

Touch Panel Display VT5 Series
Touch Panel Display VT3 Series
Software HMI Soft-VT
Data Storage Terminal DT Series

PLC Connection Manual

- How to Connect the VT5 Series/VT3 Series/Soft-VT/
DT Series with PLCs Made by Other Manufacturers

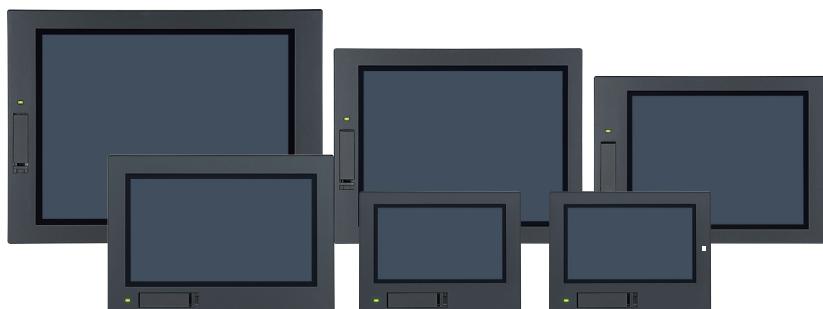
VT5-X15/X12/X10/W10/W07/W07M

VT3-X15(D)/S12(D)/S10/V10(D)/V8/V7/V6H(G)/Q5H(G)/
Q5T(W)/Q5S(W)/Q5M(W)/Q5T(W)A/Q5M(W)A/W4T(A)/
W4M(A)/W4G(A)/V7R

Soft-VT

DT-500/80/80A

DT-100/100A



Preface

This manual describes how to connect the "Touch Panel Display VT5 Series", "Touch Panel Display VT3 Series", "Software HMI Soft-VT" and "Data Storage Terminal DT Series" with PLCs from other manufacturers, and how to install and set up the hardware.

When using the VT5 Series/VT3 Series/Soft-VT

To make full use of the "Touch Panel Display VT5 Series", "Touch Panel Display VT3 Series", "Software HMI Soft-VT" and "VT STUDIO", be sure to carefully read this manual before use. Take care to store this manual in a convenient location so that it is readily accessible for reference whenever needed.

Name	Description
VT5 Series Reference Manual *	This manual describes how to operate and set up "VT STUDIO" for use with the "Touch Panel Display VT5 Series".
VT3 Series Reference Manual *	This manual describes how to operate and set up "VT STUDIO" for use with the "Touch Panel Display VT3 Series".
VT5 Series Hardware Manual *	This manual describes how to install and set up hardware for use with the "Touch Panel Display VT5 Series".
VT3 Series Hardware Manual *	This manual describes how to install and set up the Touch Panel Display VT3 Series.
VT5 Series/VT3 Series/Soft-VT/ DT Series PLC Connection Manual *	This manual. This manual describes how to set up and connect PLCs from other manufacturers with the "Touch Panel Display VT5 Series/VT3 Series," "Software HMI Soft-VT" and "Data Storage Terminal DT Series."
Soft-VT User's Manual	The user's manual describes how to operate and set up the "Software HMI Soft-VT" software before operation.
VT Transfer Tool User's Manual *	This manual describes how to install, operate and set up VT Transfer Tool.

* All the above manuals are available in the "VT STUDIO" DVD.

When using the DT Series

To make full use of the "DT Series Data Storage Terminal" and "DT STUDIO/DT BUILDER," be sure to read this Manual carefully before use and keep it in a safe place for later reference.

Name	Description
Setup Software for DT Series DT STUDIO/DT BUILDER Installation Manual *	This manual describes how to install DT STUDIO/DT BUILDER.
DT Series Guidebook	This manual describes the features, functions, and use examples of the DT series.
DT-500/80/80A Hardware Manual	This manual describes the specifications, setups, and functions of DT-500/80/80A.
DT STUDIO User's Manual Settings/WEB Part	This manual describes how to use DT STUDIO and access storage data with a WEB browser.
DT STUDIO User's manual Excel Part	This manual describes the settings, use of Excel files, and viewing method of the DT STUDIO Excel layout setting tool.
DT STUDIO User's manual VISUAL BUILDER Part	This manual describes the basic operations for creating VISUAL BUILDER screens.
DT-100/100A User's Manual Basics - Installation/Import	This manual describes the functions, briefs, and installation of DT-100/100A and the basic DT BUILDER settings which are used to collect information for DT-100/100A. Be sure to read this manual first.
DT-100/100A User's Manual Details Part	This manual describes the functionality details of DT-100/100A, DT BUILDER's menus, misc. and detailed settings.
VT5 Series/VT3 Series/Soft-VT/ DT Series PLC Connection Manual	This manual. This manual describes how to set up and connect PLCs from other manufacturers with the "Touch Panel Display VT5 Series/VT3 Series," "Software HMI Soft-VT" and "Data Storage Terminal DT Series."

* All the above manuals are available in the "DT STUDIO" CD-ROM.

■ Symbols

The following symbols are used to understand important matters at one view. Be sure to read below.

 DANGER	It indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	It indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 NOTICE	It indicates a situation which, if not avoided, could result in product damage as well as property damage.

-  **Important** It indicates cautions and limitations that must be followed during operation.
-  **Point** It indicates additional information on proper operation.
-  It indicates tips for better understanding or useful information.
-  Indicates a reference item or page to be referred to in this manual and a separate manual.

■ Request

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 - UNLHA32.DLL are public domain software made by Micco.

Safety Precautions

■ General Precautions

- At startup and during operation, be sure to monitor the functions and performance of the VT3 series.
- We recommend that you take substantial safety measures to avoid any damage in the event that a problem occurs.
- Do not modify the VT3 series or use it in any way other than described in the specifications. The functions and performance of products used or modified in this way cannot be assured.
- When the VT3 series is used in combination with other instruments, functions and performance may be degraded, depending on operating conditions and the surrounding environment.
- The rapid variation of temperature is not allowed in all equipments including external devices. Doing so might cause condensation which may cause the instrument or device to malfunction.
- Please keep the cable away from high-voltage lines or electricity transmission lines as practically as possible. Noise from power lines and high-voltage lines may cause the VT3 to malfunction.

 WARNING	<p>Do not use the touch panel (touch switches), cross-key pads or push-button switches on the switch unit to make switches that may affect human life or lead to product damage. Also, design a system that is adaptable to touch panel (touch switches), cross-key pad or push-button switches on the switch unit malfunction.</p>
 NOTICE	<ul style="list-style-type: none">• Do not touch the touch panel or touch switches with a sharp-pointed object such as a pen or screwdriver. Doing so might scratch the touch panel or touch switches or cause them to malfunction.• Do not subject the touch panel (touch switches), cross-key pad or push-button switches on the switch unit to shock or impact, or touch them with more than necessary force.• Doing so might damage them.• Do not clean it with diluents and organic solvents. Doing so might damage the display. When wiping the display, use a soft cloth moistened with watered down neutral detergent.• Do not copy copyrighted fonts and image data onto this unit for use as this infringes on the copyright.

■ About CE Marking and UL Approval

For details on precautions for CE marking, and for UL Approval, refer to the "VT5 Series Hardware Manual" and "VT3 Series Hardware Manual".

How This Manual Is Organized

Chapter 1	CONNECTING TO THE KV & KZ SERIES	This chapter describes how to connect to the KV or KZ series.
Chapter 2	CONNECTING TO MITSUBISHI ELECTRIC CORPORATION PLCs	This chapter describes how to connect to a PLC made by MITSUBISHI ELECTRIC CORPORATION.
Chapter 3	CONNECTING TO OMRON CORPORATION PLCs	This chapter describes how to connect to a PLC made by OMRON Corporation.
Chapter 4	CONNECTING TO SHARP CORPORATION PLCs	This chapter describes how to connect to a PLC made by SHARP CORPORATION.
Chapter 5	CONNECTING TO FUJI ELECTRIC CO., LTD. PLCs	This chapter describes how to connect to a PLC made by Fuji Electric Co., Ltd.
Chapter 6	CONNECTING TO HITACHI, LTD. AND HITACHI INDUSTRIAL EQUIPMENT SYSTEMS CO., LTD. PLCs	This chapter describes how to connect to a PLC made by Hitachi, Ltd or Hitachi Industrial Equipment Systems Co., Ltd.
Chapter 7	CONNECTING TO YASKAWA ELECTRIC CORPORATION PLCs	This chapter describes how to connect to YASKAWA Electric cooperation PLCs.
Chapter 8	CONNECTING TO PANASONIC CORPORATION. PLCs	This chapter describes how to connect to a PLC made by Panasonic Corporation.
Chapter 9	CONNECTING TO JTEKT (TOYODA)	This chapter describes connection with PLCs made by JTEKT (TOYODA).
Chapter 10	CONNECTING TO YOKOGAWA ELECTRIC CORPORATION PLCs	This chapter describes how to connect to a PLC made by Yokogawa Electric Corporation.
Chapter 11	CONNECTING TO KOYO ELECTRONICS INDUSTRIES CO., LTD. PLCs	This chapter describes how to connect to a PLC made by KOYO ELECTRONICS INDUS-TRIES CO., LTD.
Chapter 12	CONNECTING TO TOSHIBA CORPORATION PLCs	This chapter describes how to connect to a PLC made by TOSHIBA CORPORATION.
Chapter 13	CONNECTING TO TOSHIBA MACHINE CO., LTD. PLCs	This chapter describes how to connect to PLCs made by Toshiba Machine Co., Ltd.
Chapter 14	CONNECTING TO FANUC LTD. MOTION CONTROLLERS	This chapter describes how to connect to a motion controller made by FANUC LTD.
Chapter 15	CONNECTING TO GE INTELLIGENT PLATFORMS (GE FANUC AUTOMATION) PLCs	This chapter describes how to connect to PLCs made by GE Intelligent Platforms(GE Fanuc Automation).
Chapter 16	CONNECTING TO ROCKWELL (ALLEN-BRADLEY) PLCs	This chapter describes how to connect to a PLC made by Rockwell (Allen-Bradley).
Chapter 17	CONNECTING TO SIEMENS PLCs	This chapter describes how to connect to a PLC made by Siemens Corporation.
Chapter 18	CONNECTION OF THERMOREGULATOR	This chapter describes connections of the thermoregulators from other companies with the VT3 series.
Chapter 19	MULTI-LINK	This chapter describes Multi-link.
Chapter 20	VT2 MULTI-LINK	This chapter describes the VT2 Multi-link and how to connect the Multi-link.
Chapter 21	MEGALINK	This chapter describes an overview of MegaLink and its connections.
Chapter 22	VT/DT THROUGH COMMUNICATION	This chapter describes setups of the communications through the PLC units from other companies + VT/DT.
Chapter 23	UNIVERSAL SERIAL/ETHERNET COMMUNICATION	This chapter describes the universal serial/Ethernet communications with the external equipment.
Chapter 24	MODBUS PROTOCOL	This chapter describes how to use the MODBUS protocol to connect external equipment.
Chapter 25	EXTERNAL EQUIPMENT CONNECTION	This chapter describes the connections with the external equipment such as conversion units and servo units.
A	APPENDIX	This chapter describes optional cables for connecting VT3/DT to PLCs.

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Procedure before Starting Communication

This section describes how to check operations in this manual before starting communication between the VT5 Series/VT3 Series/Soft-VT/DT Series and a PLC.

1 Section 1 of each chapter "Checking Operation before Connection"

- When connecting PLCs from Keyence, Mitsubishi, Omron Electronics, Panasonic Corporation and YOKOGAWA Electric, etc.

Check to use the direct link or Computer Link unit connection and select the overall system of PLC.

Example) "Checking Operation before Connection", P.1-2

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
KZ	KZ-10/16/24/40/80	PLC port direct link	Not required	KZ-10/16/24/40/80
		PLC port direct link	Not required	KZ-300/350, KZ-L2
	KZ-300/350	KZ-L2	<input type="checkbox"/> P.1-11	
		VT-L16Z	<input type="checkbox"/> P.18-11	VT-L16Z(KZ-300/350) ¹⁾
		PLC port direct link	<input type="checkbox"/> P.1-12	KZ-A500
	KZ-A500	KZ-L10	<input type="checkbox"/> P.1-12	KZ-L10
KV	KV-10/16/24/40	PLC port direct link	<input type="checkbox"/> P.18-11	VT-L16Z(KZ-A500) ¹⁾
	KV-P Series	PLC port direct link	Not required	KV-10/16/24/40
		PLC port direct link	Not required	KV-P Series
		KV-L20, KV-L20R (KV BUILDER/ KV STUDIO mode)	<input type="checkbox"/> P.1-14	
	KV-700	KV-L20 (VT Multi-link)	<input type="checkbox"/> P.18-13	KV-1000/700, KV-L20(R)
				KV-L20 ¹⁾ (VT Multi-link)

To select the PLC system, and turn to Section

2 , 4 ,

5 .

- When connecting PLCs from other PLC manufacturers

Select CPU from model list.

Check the connection method, serial I/F, etc. and select the PLC system configuration.

Example) "4-1 Checking Operation before Connection" P.1-2

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring diagram	Unit Setting	Target PLC
JW10	MMI Port	RS-422A	VT3(PORT2)/DT	Wiring diagram 6	<input type="checkbox"/> P.4-6	
	Communications port	RS-422A	VT3-V7R(CN3)	Wiring diagramR 6		
JW-21CU JW-22CU	Communications port ¹⁾	RS-232C	VT3(PORT2)/DT	Wiring diagram 1	<input type="checkbox"/> P.4-6	JW Series
	+ Link unit JW- 21CM	RS-422A (4-wire)	VT3-V7R(CN2)	Wiring diagramR 1	<input type="checkbox"/> P.4-7	
		RS-422A (2-wire)	VT3(PORT2)/DT	Wiring diagram 2		
			VT3-V7R(CN3)	Wiring diagram 3		
			VT3-V7R(CN3)	Wiring diagramR 3		

To select the specific PLC system configuration, and turn to Section

3 ,

4 ,

5 .

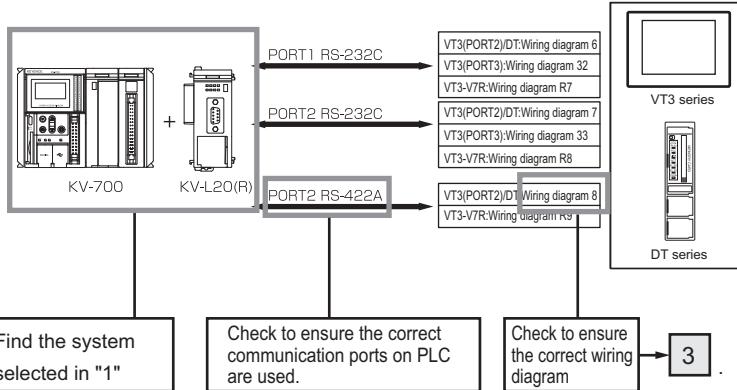
2 Section 2 of each chapter "System Configuration"

Use the system configuration diagram to make sure that the proper wiring diagram is used for connecting cables between the VT5 Series/VT3 Series/Soft-VT/DT Series and the PLC.

Please ensure the correct wiring diagram number is used.

Example) "1-2 System Configuration" P1-4

■ KV-700+KV-L20(R) (KV BUILDER/KV STUDIO mode)



3 Section 3 of each chapter "Wiring Diagrams"

Please solder the cable to the connector as indicated by the wiring diagram.

Be sure to use a multimeter to test the connections. After making a continuity test, connect the VT5/VT3/DT to the PLC.

Example) "1-3 The Wiring Diagrams" P1-15

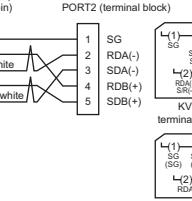
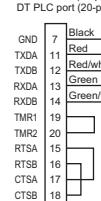
Find the wiring diagram number determined in "2"

■ Wiring Diagram 8

(RS-422A:OP-24028)

VT3 PORT2 (20-pin)

KV-L20R PORT2 (terminal block)



KV-L20R
terminal block No.

KV-L20
terminal block No.

4 Section 4 of each chapter "Unit Setup"

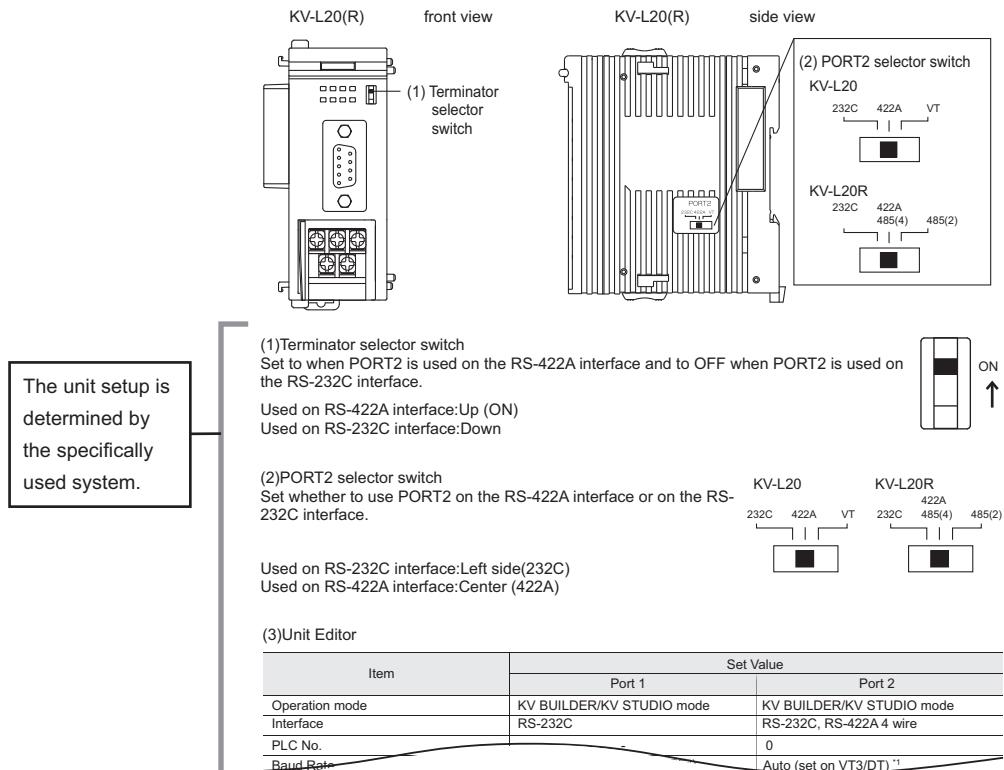
Set up the unit on the PLC side. After this, please restart the PLC if necessary.

Here, the default communication settings of the VT5/VT3 and DT should be used.

For other setups, please refer to the specific PLC manuals.

Example) "1-4 The Unit Setup" P1-26

■ KV-L20 (KV BUILDER/KV STUDIO mode)

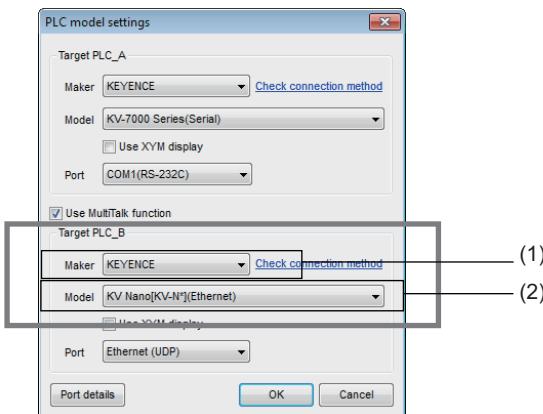


5 Set up with the VT STUDIO/DT BUILDER/DT STUDIO

■ When using the VT5/VT3/Soft-VT

1 Set up the target PLC with VT STUDIO.

From the menu, select "Resources (R)" → "Set up VT/PLC models (P)".



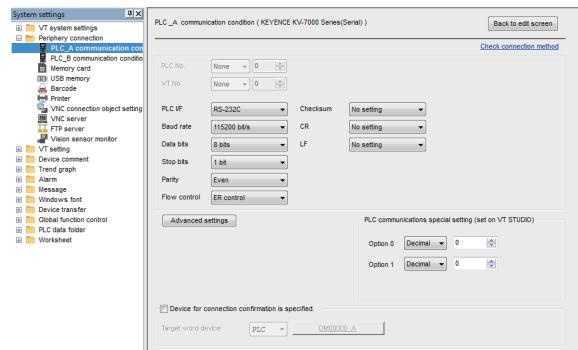
- (1) Select your desired PLC manufacturer.
(2) For the specific PLC series, please select the target PLC from the quick reference list in the Section 1 of each chapter.

- 📘 "12-3 Setup of the PLC Models", VT3 Series Reference Manual
📘 "12-3 Setup of the PLC Models", VT5 Series Reference Manual

(3) Display the PLC connection manual to be selected.

2 Change the PLC communication conditions with the VT STUDIO based on the use requirements. The same should also be made on the unit side.

From the menu, select "Resources (R)" → "VT Host System Setup (S)" → "PLC Communication Conditions (C)".

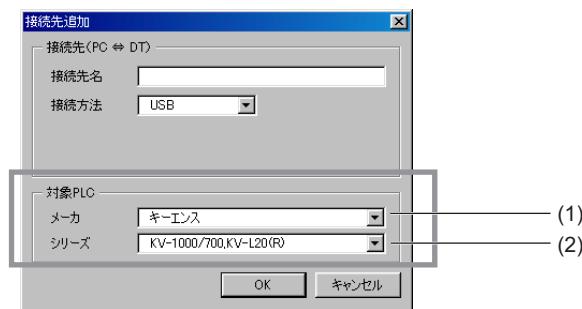


- 📘 "12-4 Setup of VT Host System", VT3 Series Reference Manual
📘 "12-5 Connecting Peripheral Devices", VT5 Series Reference Manual

■ When the DT-100/100A is used

1 Set up the target PLC with the DT BUILDER.

From the menu, select the "DT BUILDER(K)" → "Connected Targets/System Setup (S)", then click "Add" or "Change".



(1) Select your desired PLC manufacturer.

(2) For the specific PLC series, please select the target PLC from the quick reference list in the Section 1 of each chapter.

"2-8 Connected Targets/System Setup (S)", DT-100/100A User's Manual - Details Part

2 Change the PLC communication conditions with the DT BUILDER based on the use requirements. The same should also be made on the unit side.

From the menu, select the "DT BUILDER(K)" → "Connected Targets/System Setup (S)", then click "System Setup".

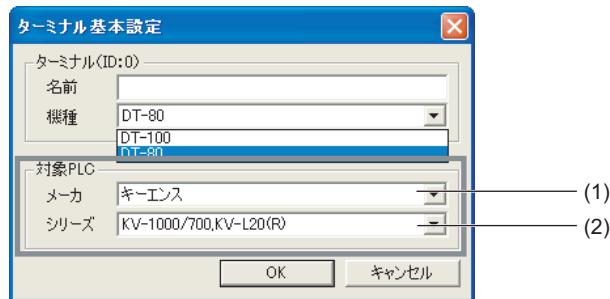


"3-2 VT3 Series System Setup", DT-100/100A User's Manual - Details Part

■ When DT-500/80/80A/100/100A is used

1 Set up the target PLC with the DT STUDIO.

From the System tab, click the List of Connected Targets. Then select the connected target ID, and click the "Basic Setup" button.



(1) Select your desired PLC manufacturer.

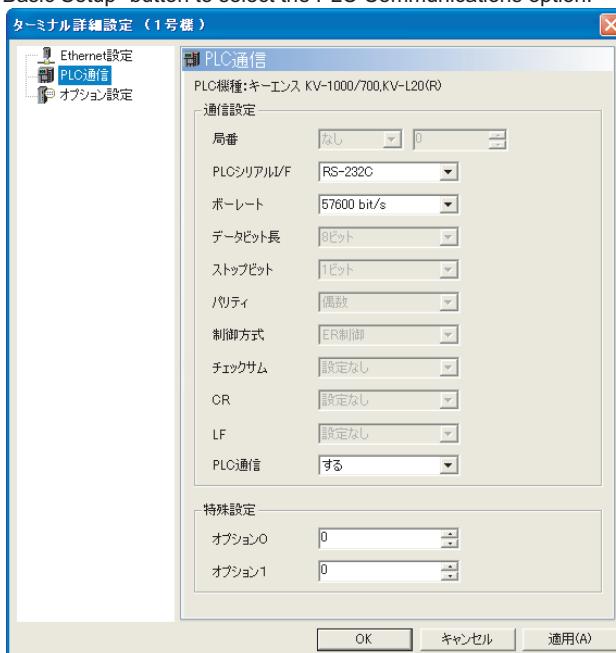
(2) For the specific PLC series, please select the target PLC from the quick reference list in the Section 1 of each chapter.

[Reference] When DT-100 is used as the terminator of DT-500, both DT STUDIO and DT BUILDER should be set up.

Please refer to "6-1 Used as the Terminator of DT-500", DT-100/100A User's Manual - Details Part

2 Change the PLC communication conditions with the DT STUDIO based on the use requirements. The same should also be made on the unit side.

From the System tab, click the List of Connected Targets. Then select the connected target, and click the "Basic Setup" button to select the PLC Communications option.



"4-1 List of Connected Targets - The Detailed Settings for the Terminator", DT STUDIO User's Manual - Setups/WEB Part

MEMO

CONNECTING TO THE KV & KZ SERIES

This chapter describes how to connect to the KV or KZ series.

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1-1

Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/Soft-VT/DT and PLC via serial interface or Ethernet.

For the connection of other interfaces (Multi-Link or VT2 Multi-Link), see each chapter.

"Chapter 19 MULTI-LINK"

"Chapter 20 VT2 MULTI-LINK"

(1) Make sure that the VT5, VT3, Soft-VT and DT can be connected to the PLC, link unit or Ethernet unit.

(2) Check whether or not CPU, link unit or Ethernet settings are required.

(3) Confirm the name of the model to set as the target PLC.

Please ensure to check the above 3 points before connecting to PLC.

"Procedure before Starting Communication", page 18

Serial connections

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
KV	KV-7500 ⁶	KV-XL402 KV-XL202 KV-L21V KV-L20V	P.1-29	KV-7000 Series (Serial) ^{*5*7} KV-7000 Series (Serial) <XYM> ^{*3*5*7}
		KV-LM21V KV-LM20V	P.1-30	KV-7000 Series (KV-LM2*V) ^{*1*5*7} KV-7000 Series (KV-LM2*V) <XYM> ^{*3*4*5*7}
	KV-7300 ⁶	Built-in serial port direct link	P.1-27	KV-7000 Series (Serial) ^{*5*7} KV-7000 Series (Serial) <XYM> ^{*3*5*7}
		KV-XL402 KV-XL202 KV-L21V KV-L20V	P.1-29	
		KV-LM21V KV-LM20V	P.1-30	
	KV-5500/5000	KV-L21V KV-L20V	P.1-29	KV-5500/5000/3000/L2*V ^{2*7} KV-5500/5000/3000/ L2*V<XYM> ^{*2*3*7}
		KV-LM21V KV-LM20V	P.1-30	KV-5500/5000/3000 (KV-LM2*V) ^{*1*4*7} KV-5500/5000/3000 (KV-LM2*V)<XYM> ^{*1*3*4*7}
	KV-3000	PLC port direct link	Not required	KV-5500/5000/3000/L2*V ^{2*7}
		KV-L21V KV-L20V	P.1-29	KV-5500/5000/3000/ L2*V<XYM> ^{*2*3*7}
		KV-LM21V KV-LM20V	P.1-30	KV-5500/5000/3000 (KV-LM2*V) ^{*1*4*7} KV-5500/5000/3000 (KV-LM2*V)<XYM> ^{*1*3*4*7}
	KV-1000	PLC port direct link	Not required	KV-1000/700, KV-L20*/L21V ^{*7} KV-1000, KV-L20*/ L21V<XYM> ^{*2*3*7}
		KV-L21V KV-L20V KV-L20R	P.1-29	
		KV-LM21V KV-LM20V	P.1-30	
	KV-700	PLC port direct link	Not required	KV-1000/700, KV-L20*/L21V ^{*7}
		KV-L21V KV-L20V KV-L20R KV-L20	P.1-29	
		KV-LM21V KV-LM20V KV-LM20	P.1-30	
		KV-L20 (VT Multi-link)	P.19-13	
		Built-in serial port direct link	P.1-31	
	KV Nano Series (KV-N14/24/40/60)	KV-N10L	P.1-31	KV Nano Series[KV-N*] ^{*7} KV Nano Series[KV-N*]<XYM> ^{*3*7}
		KV-N11L	P.1-32	
		Built-in serial port direct link	P.1-31	
	KV Nano Series (KV-NC32)	KV-NC10L	P.1-33	KV Nano Series[KV-N*] ^{*7} KV Nano Series[KV-N*]<XYM> ^{*3*7}
		KV-NC20L	P.1-34	
	KV-10/16/24/40	PLC port direct link	Not required	KV-10/16/24/40, KV-P16 ^{*4*7}
	KV-P Series	PLC port direct link	Not required	

1-1 Checking Operation before Connection

Series Name	CPU	Connection Methods	Unit Setting	Target PLC		
KZ	KZ-300/350	PLC port direct link	Not required	KZ-300/350, KZ-L2 ^{*4~7}		
		KZ-L2	P.1-35			
		VT-L16Z	P.19-11	KZ-300/50(VT-L16Z) ^{*1~4~7}		
	KZ-10/16/24/40/80	PLC port direct link	Not required	KZ-10/16/24/40/80 ^{*4~7}		
		KZ-A500	PLC port direct link	KZ-A500 ^{*4~7}		
			KZ-L10	P.1-36		
			VT-L16Z	P.19-11		
^{*1} Not supported by DT-80/80A and DT-100.						
^{*2} Not supported by DT-80 and DT-100.						
^{*3} Support the XYM display mode of KV STUDIO ladder support software.						
^{*4} Not supported by the VT5 Series.						
^{*5} Not supported by the DT Series.						
^{*6} A bus connection unit is required when using a KV-5000/3000 Series expansion unit to connect to the VT5/VT3 Series.						
^{*7} Not supported by Soft-VT.						

Ethernet connections

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
KV	KV-7500 ^{*3}	Internal Ethernet port direct link	P.1-45	KV-7000 Series (Ethernet) KV-7000 Series (Ethernet) <XYM> ^{*2}
		KV-LE21V	P.1-48	
		KV-LE20V	P.1-48	
		KV-EP21V	P.1-48	
		KV-XLE02	P.1-48	
	KV-7300 ^{*3}	KV-LE21V	P.1-48	KV-5500/5000/3000 (EtherNet) KV-5500/5000/3000 (EtherNet) <XYM> ^{*2}
		KV-LE20V	P.1-48	
		KV-EP21V	P.1-48	
	KV-5500/5000	Internal Ethernet port direct link	P.1-47	KV-5500/5000/3000 (EtherNet) KV-5500/5000/3000 (EtherNet) <XYM> ^{*2}
		KV-LE20V	P.1-48	
		KV-LE21V	P.1-48	
	KV-3000	KV-EP21V	P.1-48	KV-1000/700 (EtherNet) KV-1000 (EtherNet) <XYM> ^{*2}
		KV-LE20V	P.1-49	
	KV-1000/700	KV-LE21V	P.1-49	KV Nano Series [KV-N*] (EtherNet), KV Nano Series [KV-N*] (EtherNet) <XYM> ^{*2}
		KV-EP21V	P.1-49	
	KV Nano Series (KV-N24/40/60) ^{*1}	KV-NC1EP	P.1-50	KV Nano Series [KV-N*] (EtherNet), KV Nano Series [KV-N*] (EtherNet) <XYM> ^{*2}
	KV Nano Series (KV-NC32)		P.1-50	

*1 A KV-N1 connection conversion unit is required when using KV-NC1EP to connect to the VT5/VT3 Series.

*2 Support the XYM display mode of KV STUDIO ladder support software.

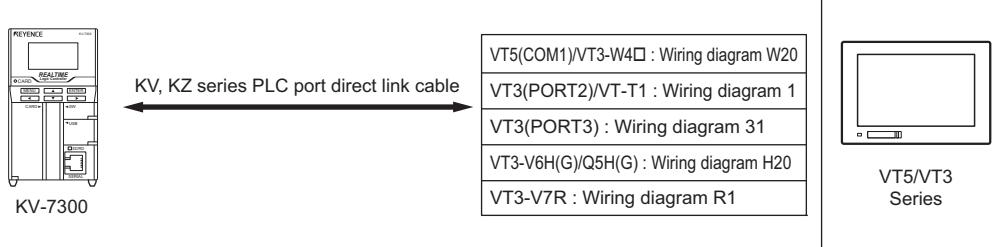
*3 A bus connection unit is required when using a KV-5000/3000 Series expansion unit to connect to the VT5/VT3 Series.

1-2 System Configuration

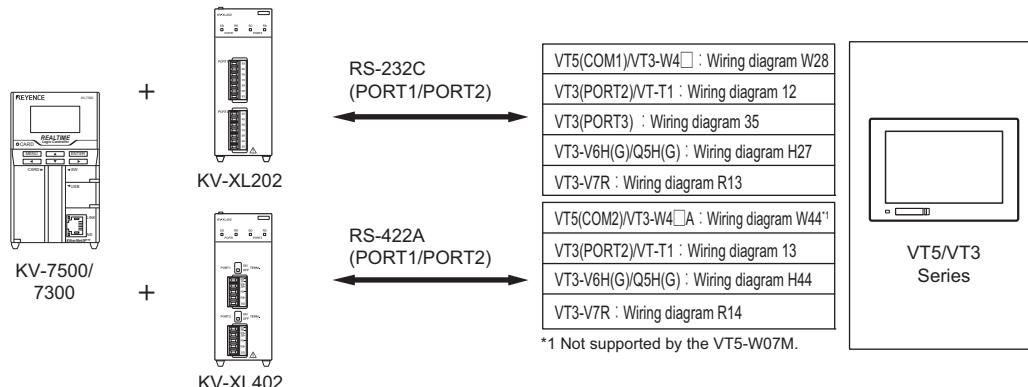
This section describes the system configuration of the VT5 Series/VT3 Series/DT Series and the KV and KZ Series.

System configuration for serial connections

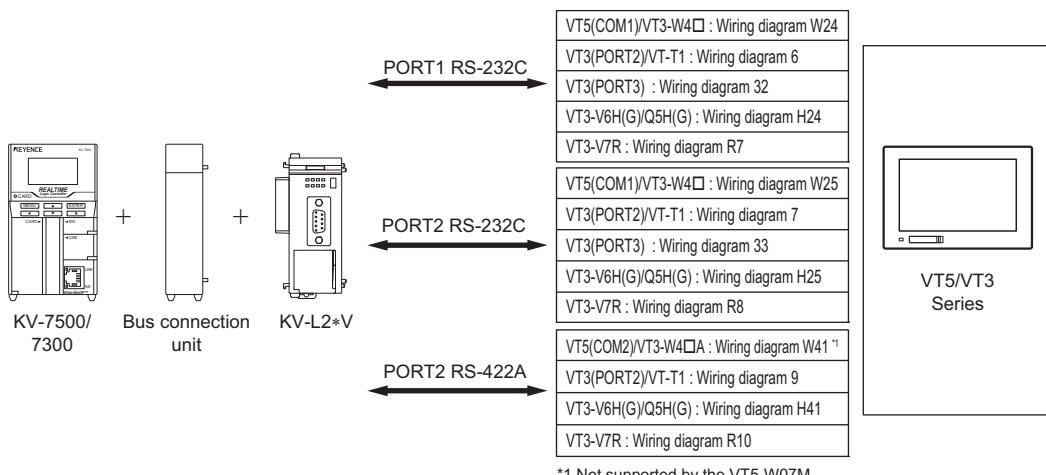
■ KV-7300 Series (built-in serial port direct link)



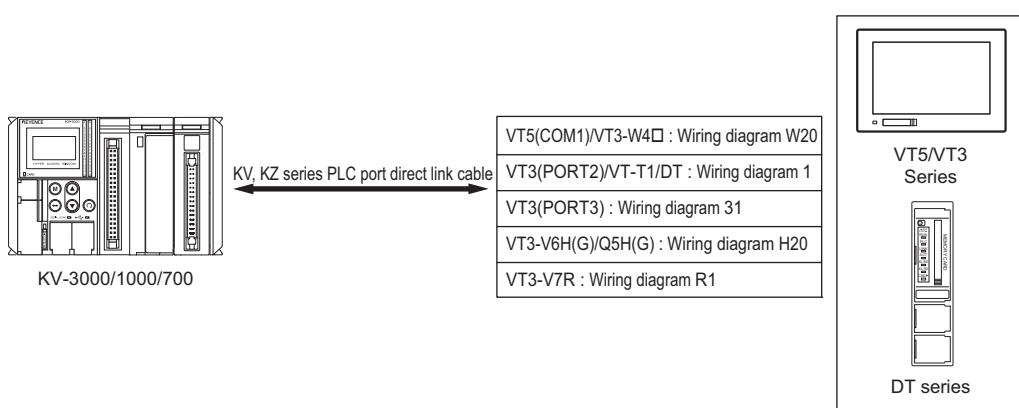
■ KV-7500/7300+KV-XL202/XL402



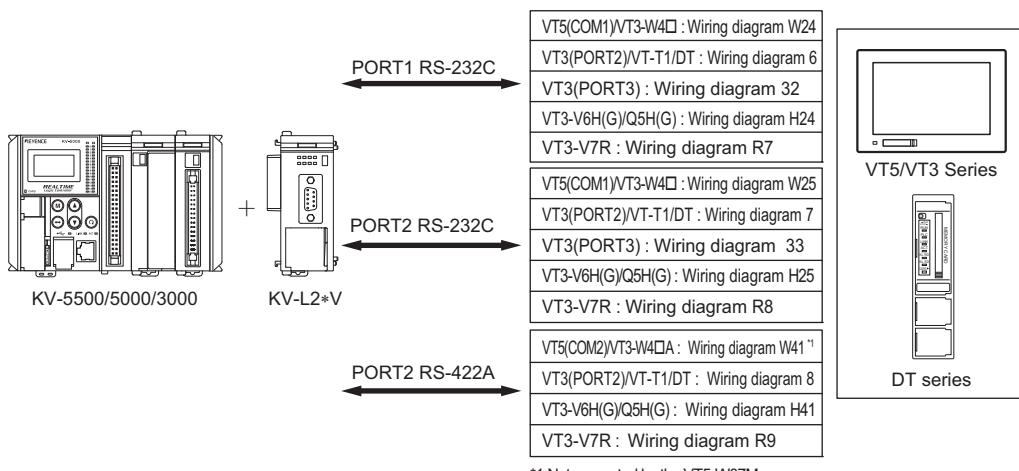
■ KV-7500/7300+KV-L2*V (KV STUDIO mode)



■ KV-3000/1000/700 (PLC port direct link)

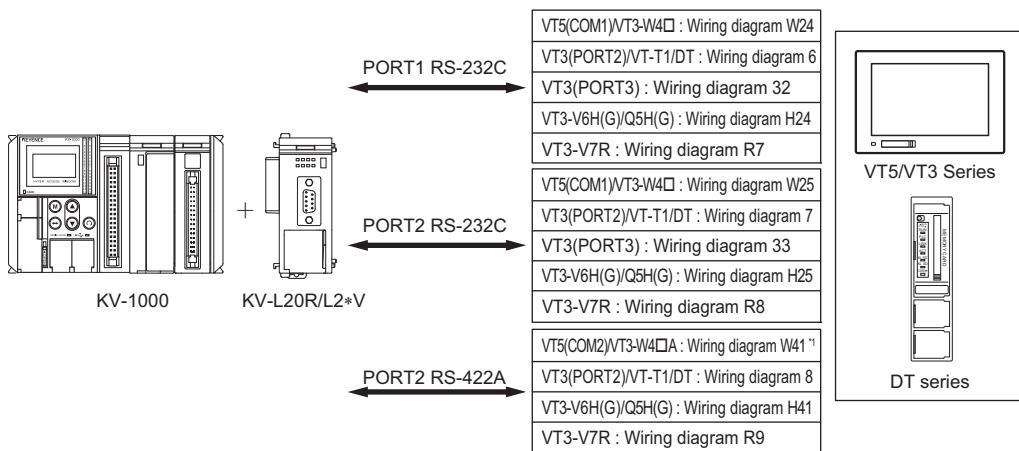


■ KV-5500/5000/3000+KV-L2*V(KV BUILDER/KV STUDIO mode)



*1 Not supported by the VT5-W07M.

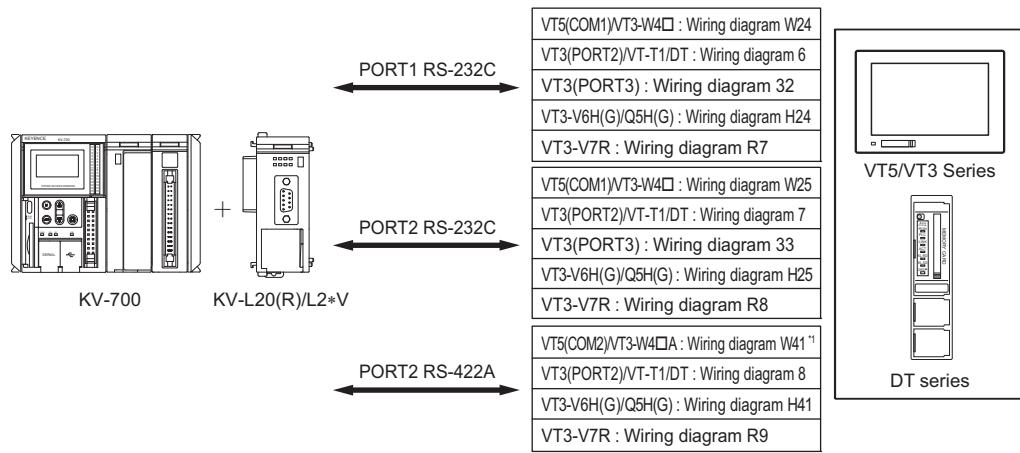
■ KV-1000+KV-L20R/KV-L2*V (KV BUILDER/KV STUDIO mode)



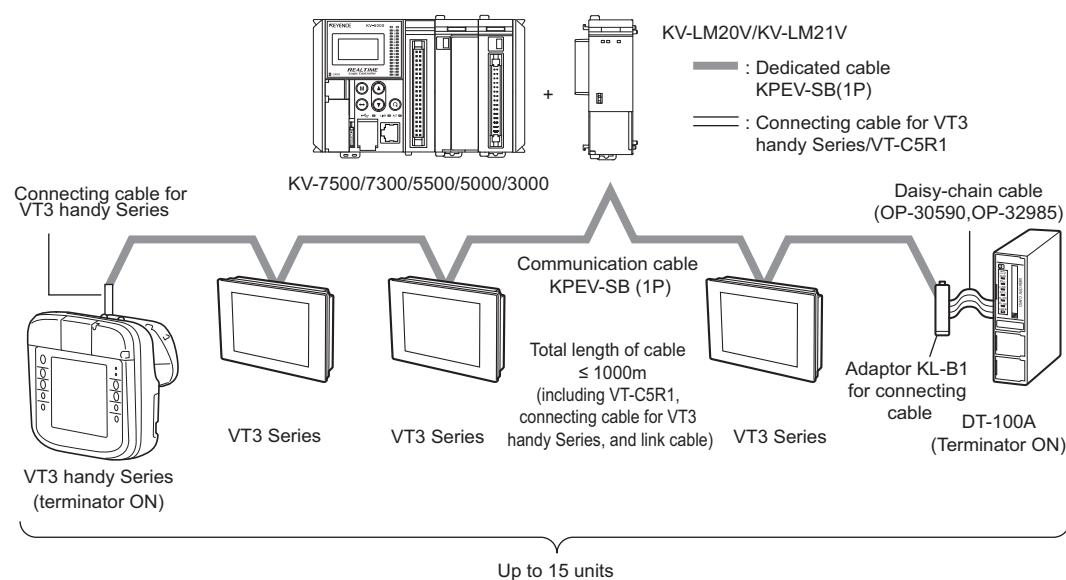
*1 Not supported by the VT5-W07M.

1-2 System Configuration

■ KV-700+KV-L20/L2*V (KV BUILDER mode)



■ KV-7500/7300/5500/5000/3000+KV-LM20V/KV-LM21V



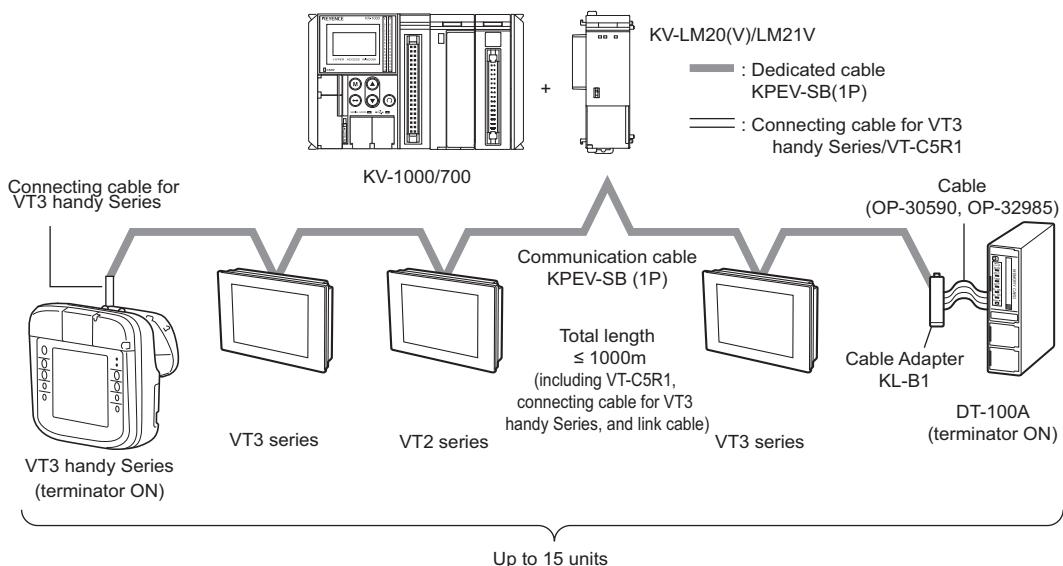
Point

- For KV-7500/7300, a bus connection unit is required when using a KV-5000/3000 series expansion unit to connect to the VT5/VT3 Series.
- The VT5 Series is not supported.
- Not supported by VT2 series and VT1 series (including the VT-7SR).
- Not supported by DT-80/80A and DT-100.
- Cannot connect to VT3-W4T/W4M/W4G (RS-232C).
- Max. speed of communication is 115200bit/s when connecting VT3-W4TA/W4MA/W4GA (RS-422A/485). Be sure that the communication speed of other connecting devices complies with VT3-W4TA/W4MA/W4GA.
- For one MegaLink, only one DT-100A can be connected.
- DT-100A, when used as the terminator of DT-500, can also use the MegaLink connection.
- VT3 handy Series and VT3-V7R can only be connected to both ends of the wiring.
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.

Reference

For setting and connection, see "Chapter 21 MEGALINK".

■ KV-1000/700+KV-LM20(V)/LM21V



Point

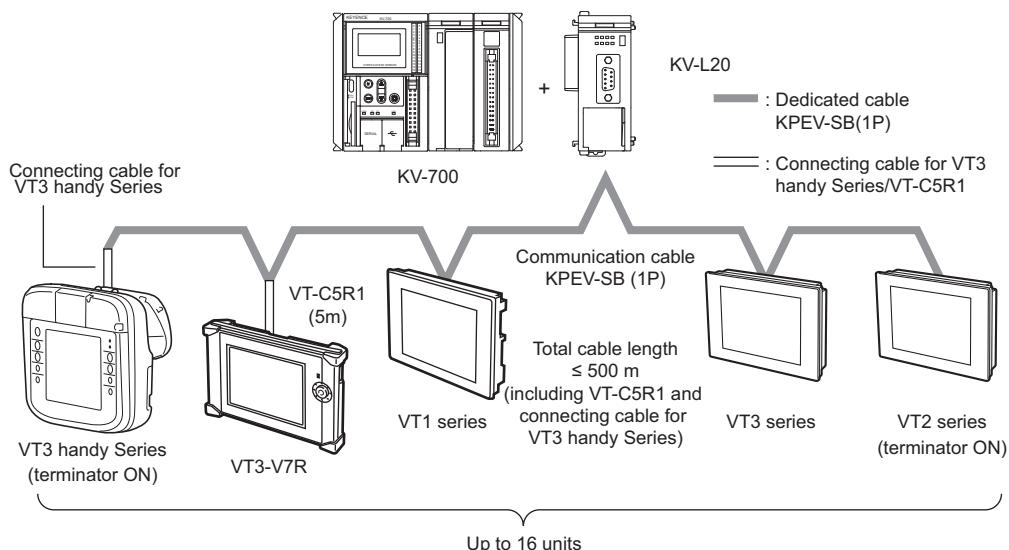
- The VT5 Series is not supported.
- The VT1 Series (including VT-7SR) is not supported.
- DT-80/80A and DT-100 are not supported.
- VT3-W4T/W4M/W4G (RS-232C type) cannot be connected.
- The maximum connection speed is 115,200 bit/s when the VT3-W4TA/W4MA/W4GA (RS-422/485 type) is connected. Align the communication speed of other connected devices with the VT3-W4TA/W4MA/W4GA.
- The VT3 handy Series/V7R can only be connected on both ends of the wiring.
- When VT-T1 is used to connect the VT3 handy Series, do not remove or connect VT-T1 and OP-87194/87195/87196 when the power is on.
- Only one DT-100A unit can be connected to one Megalink connection.
- When DT-100A is used as the terminator of DT-500, it can use the Megalink connection.



For setting and connection, see "Chapter 21 MEGALINK".

1-2 System Configuration

■ KV-700+KV-L20 (VT multi-link mode)



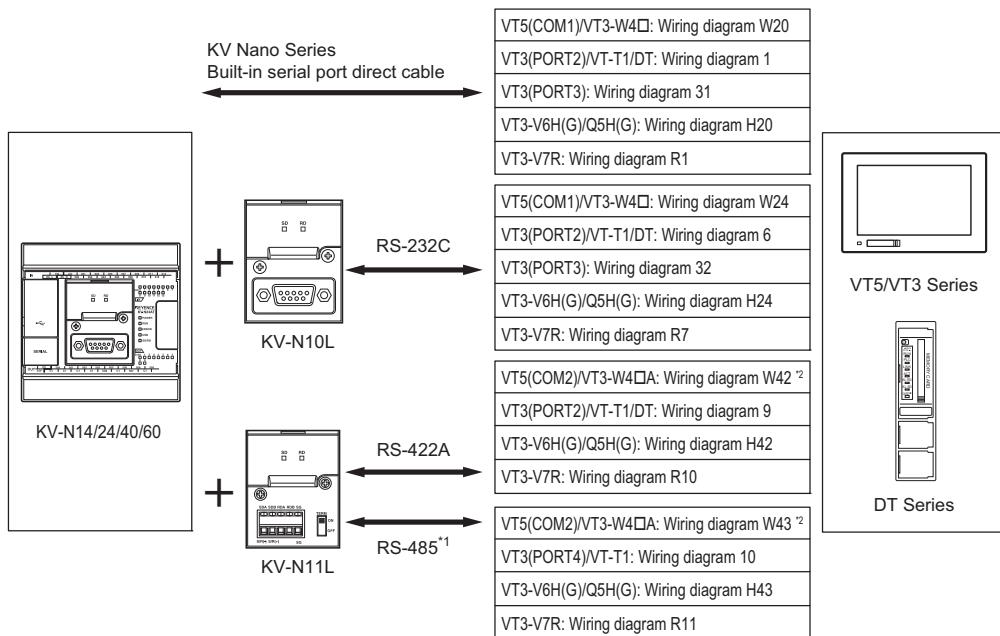
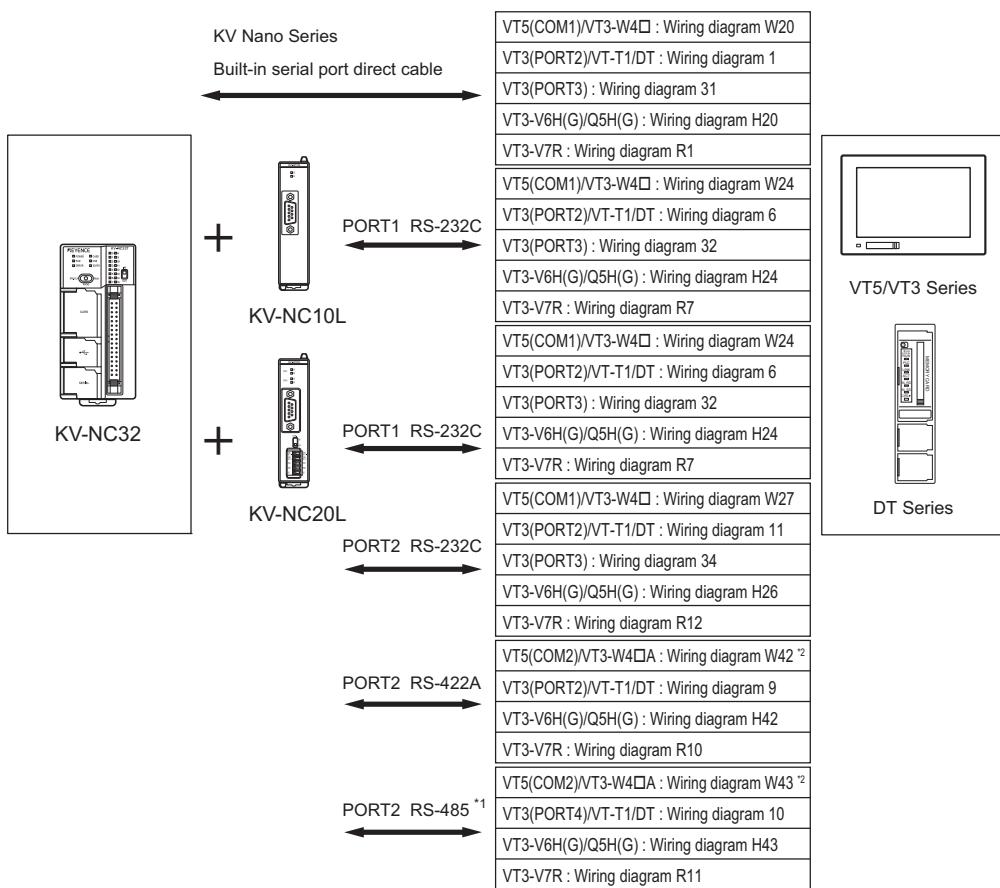
Point

- The VT5 Series is not supported.
- VT3-W4T/W4M/W4G (RS-232C type) are not supported.
- Not supported by DT series.
- Not supported by KV-L20R/KV-L20V/KV-L21V.
- VT3 handy Series can only be connected to both ends of the wiring.
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.



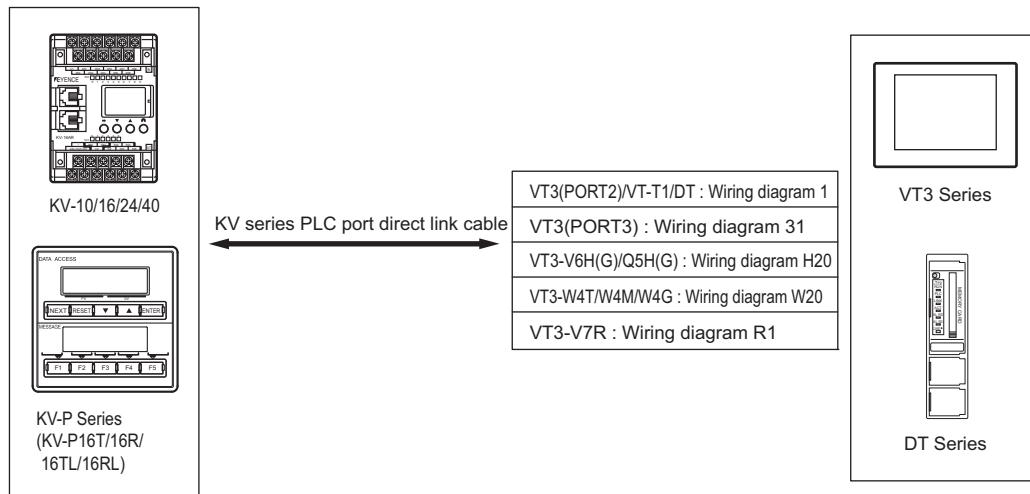
For settings and connections, see "Chapter 19 MULTI-LINK"

■ KV Nano Series

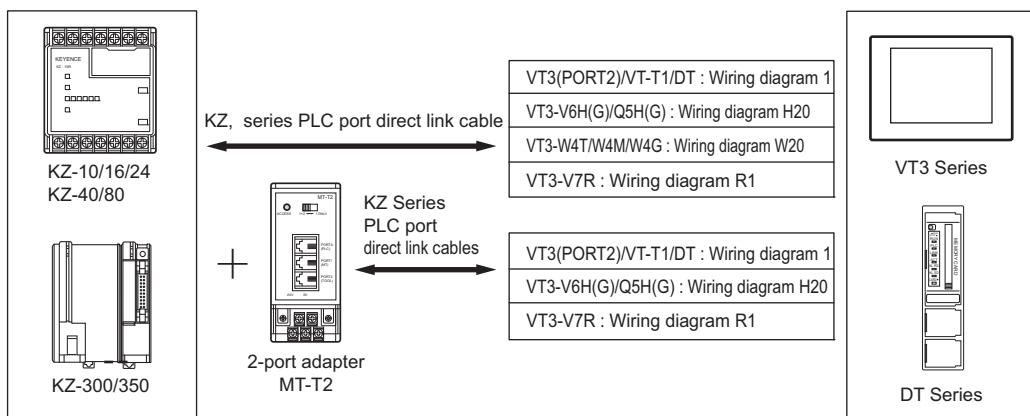
^{*1} Not supported by DT Series.^{*2} Not supported by the VT5-W07M.^{*1} Not supported by DT Series.^{*2} Not supported by the VT5-W07M.

1-2 System Configuration

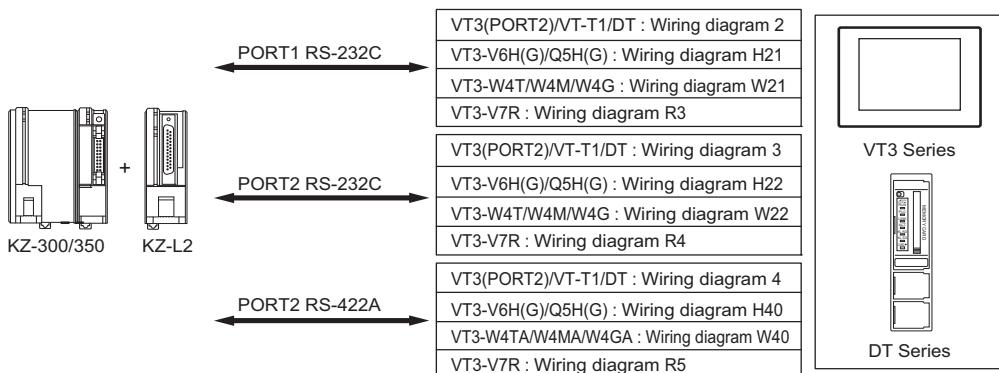
■ KV-10/16/24/40 and KV-P series (PLC port direct link)



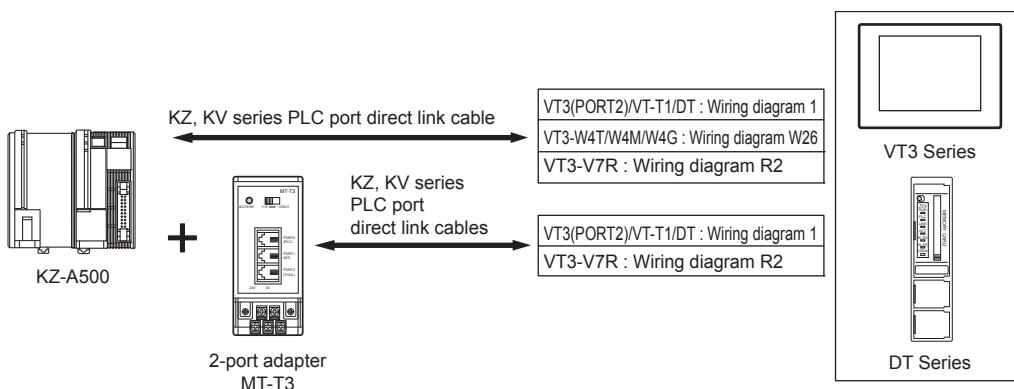
■ KZ series (PLC port direct link)



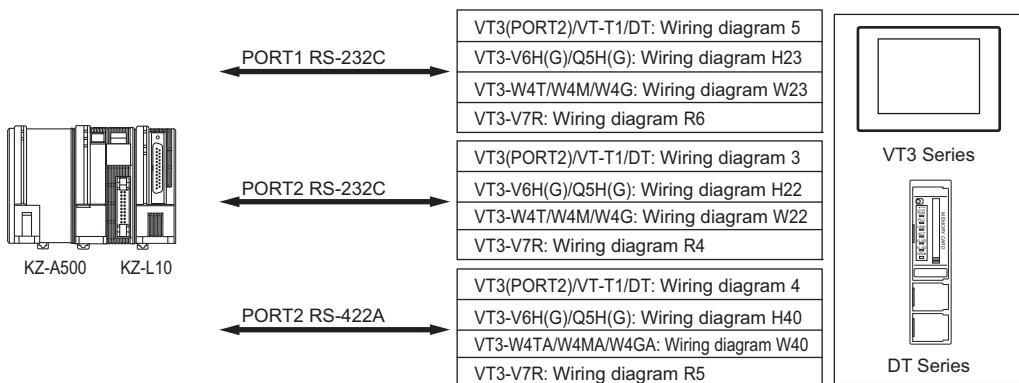
■ KZ-300/350+KZ-L2



■ KZ-A500 (PLC port direct link)

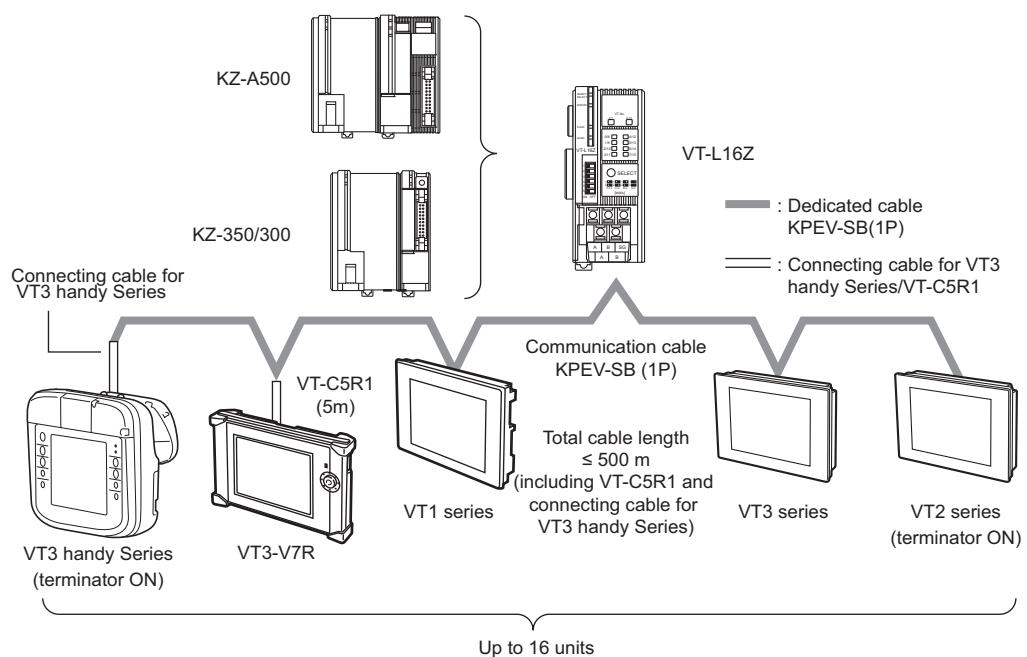


■ KZ-A500+KZ-L10



1-2 System Configuration

■ VT-L16Z (Multi-link Unit)



Point

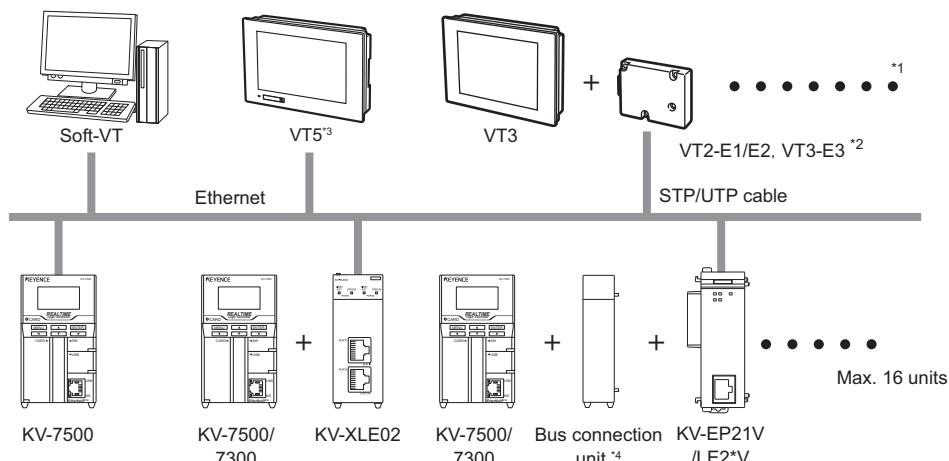
- The VT5 Series is not supported.
- VT3-W4T/W4M/W4G (RS-232C type) are not supported.
- Not supported by the DT Series.
- VT3 handy Series can only be connected to both ends of the wiring.
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.



For details on settings and connections, see "Chapter 19 MULTI-LINK"

System configuration for Ethernet connections

■ KV-7500/7300 (Ethernet)



*1 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

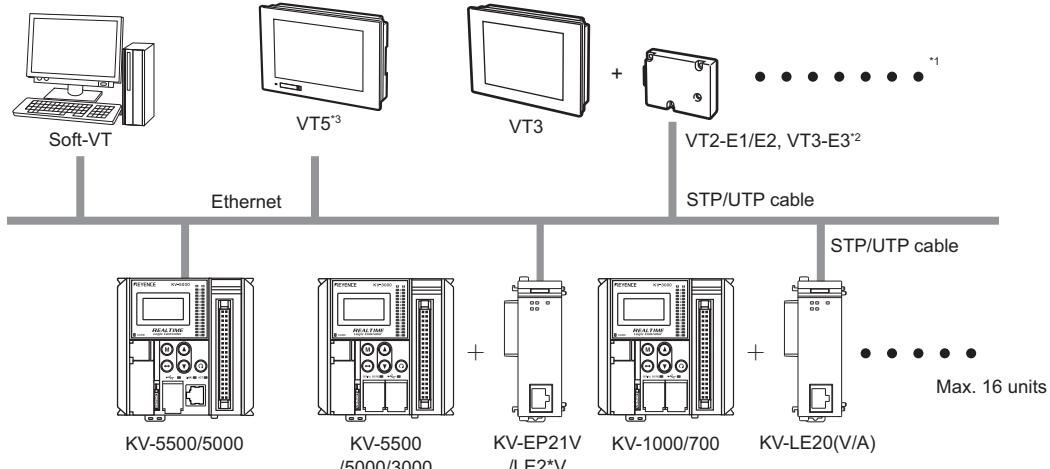
*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

*4 A bus connection unit is required when using a KV-5000/3000 Series expansion unit to connect to the VT5/VT3 Series and Soft-VT.

- Point When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

■ KV-5500/5000/3000/1000/700 (Ethernet)



*1 The KV-1000/700 cannot be connected to multiple VT5/VT3 Series.

Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

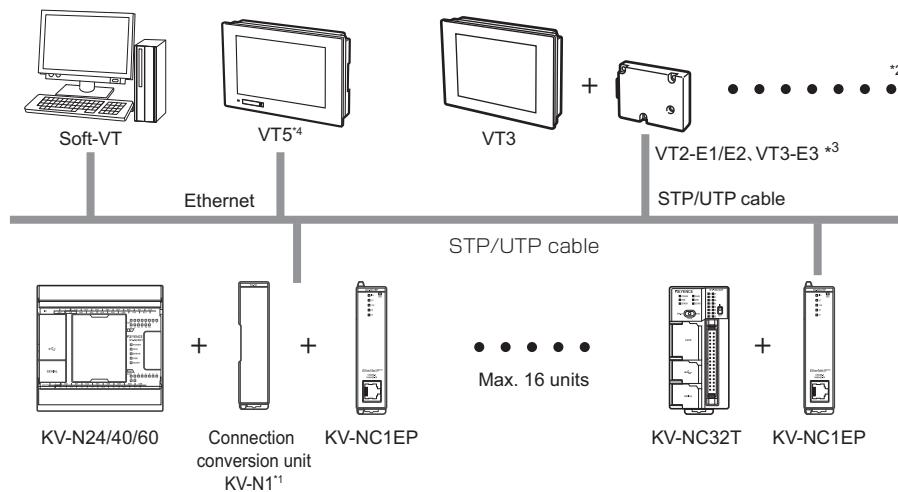
*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

- Point
 - KV-LE20 that can be connected to VT3 via Ethernet connection are marked with the letter "A" preceding the lot No..
 - When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

1-2 System Configuration

■ KV Nano Series (Ethernet)



*1 The KV-N1 connection conversion unit is required when using a KV-N24/40/60 and KV-NC1EP to connect the VT5/VT3 Series and Soft-VT.

*2 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

*3 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*4 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

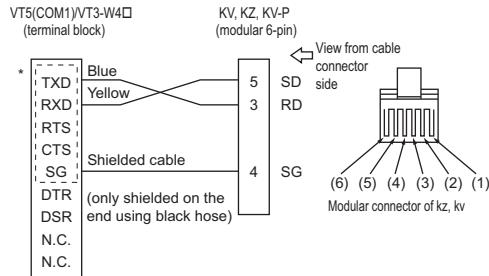
1-3 Wiring Diagrams for Connections

This section describes wiring of connector cables.

Wiring diagrams for serial connections

■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

● Wiring diagram W20 (PLC port direct link OP-86917: 5m, OP-86916: 1m)

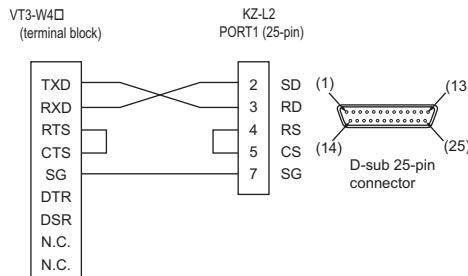


* [] indicates a terminal diagram for the VT5 Series.

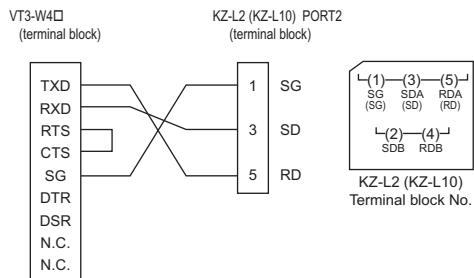
NOTICE

The shielded cable must be connected to SG when disconnecting the cables. Shielded cables must be insulated with heat shrinkable hose in order to avoid contacting with other cables or terminals.

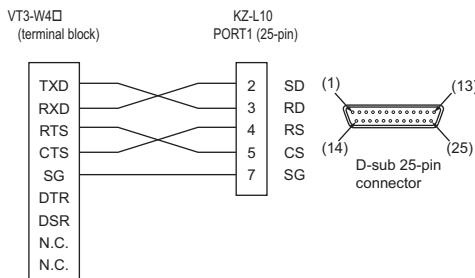
● Wiring diagram W21 (RS-232C)



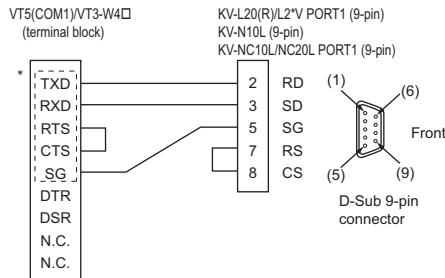
● Wiring diagram W22 (RS-232C)



● Wiring diagram W23 (RS-232C)

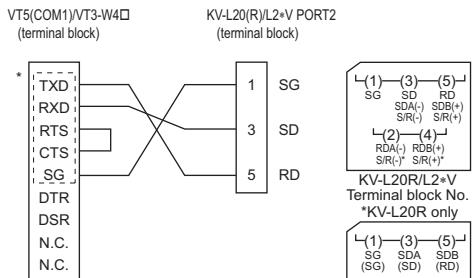


● Wiring diagram W24 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

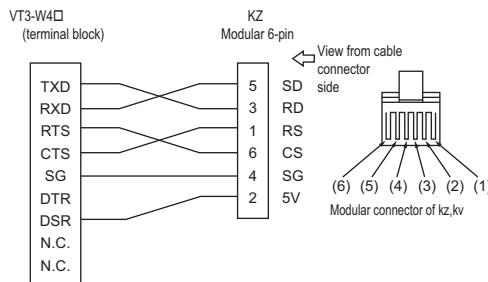
● Wiring diagram W25 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

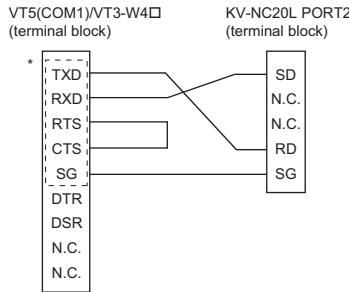
1-3 Wiring Diagrams for Connections

● Wiring diagram W26 (PLC port direct link)



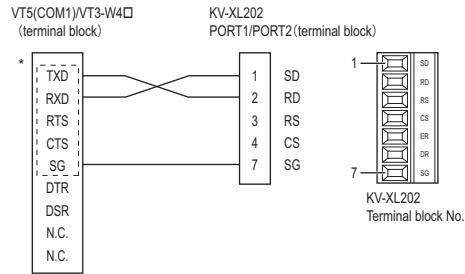
KZ internal circuit will be damaged if the wiring is wrong. This is must be noted when wiring the cable.

● Wiring diagram W27 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

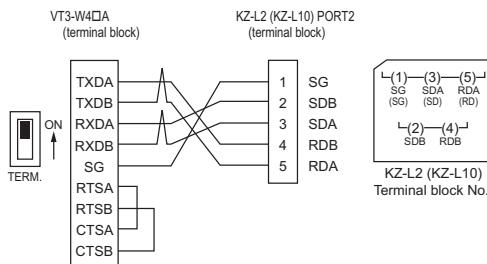
● Wiring diagram W28 (RS-232C)



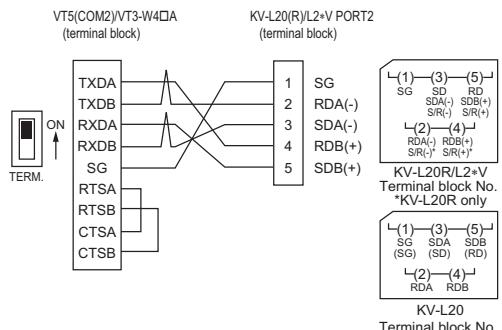
* [] indicates a terminal diagram for the VT5 Series.

■ Connection to VT5 Series (COM2) and VT3-W4□ (RS-422A)

● Wiring diagram W40 (RS-422A)

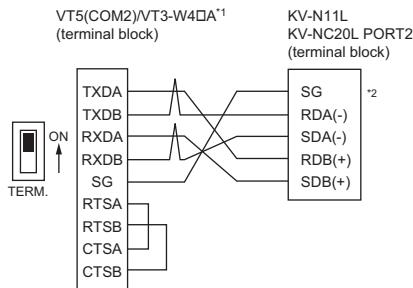


● Wiring diagram W41 (RS-422A)

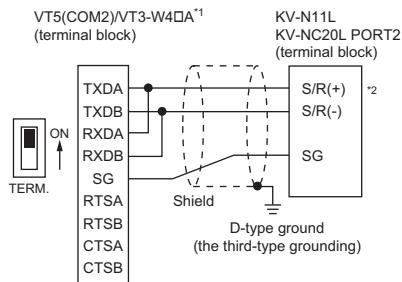


1-3 Wiring Diagrams for Connections

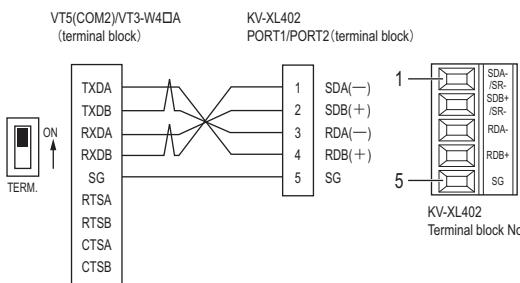
● Wiring diagram W42 (RS-422A)



● Wiring diagram W43 (RS-485: 2-wire)



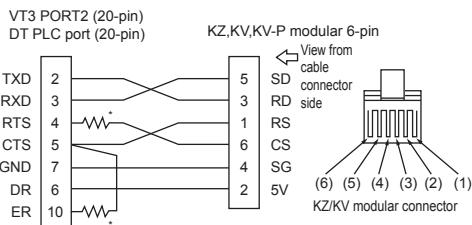
● Wiring diagram W44 (RS-422A)



■ Connection to VT3 series (PORT2)/DT series

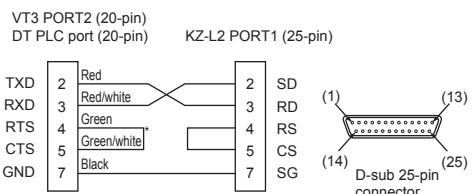
● Wiring Diagram 1

(PLC Port Direct Link OP-26484: 5m,
OP-35403: 1m)



● Wiring Diagram 2

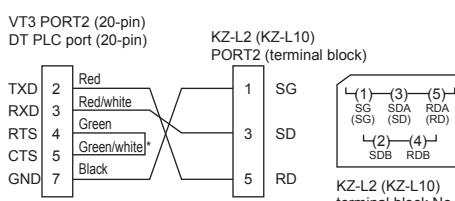
(RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 3

(RS-232C: OP-24027)

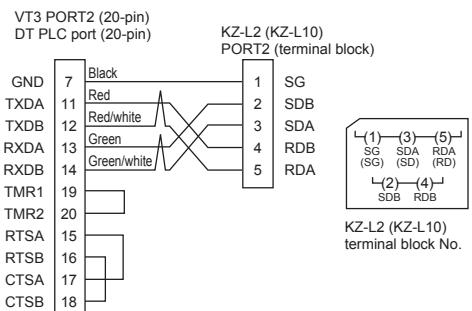


* Not wired for loopback test inside the connector.

Solder the signal lead.

● Wiring Diagram 4

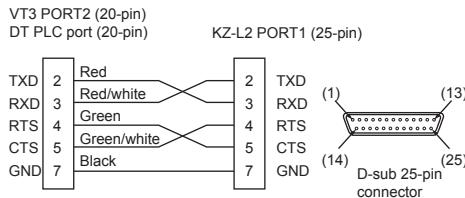
(RS-422A: OP-24028)



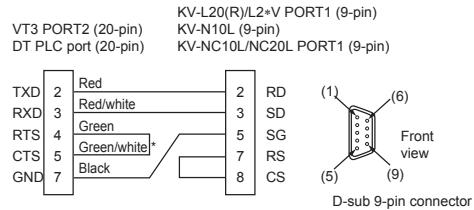
KZ-L2 (KZ-L10)
terminal block No.

1-3 Wiring Diagrams for Connections

● Wiring Diagram 5 (RS-232C: OP-24027)



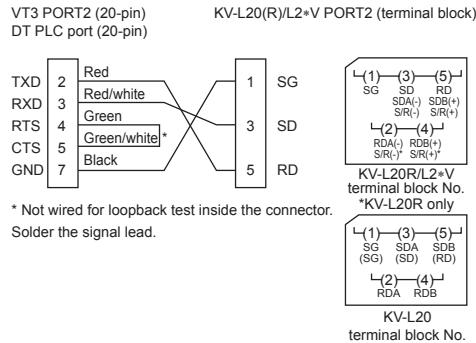
● Wiring Diagram 6 (RS-232C: OP-24027)



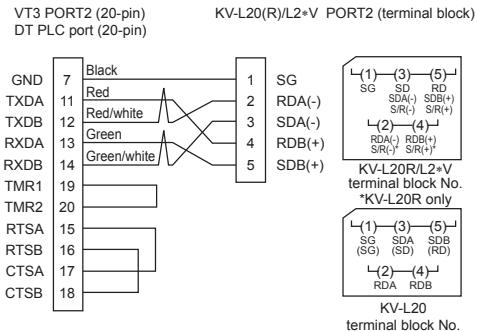
* Not wired for loopback test inside the connector. Solder the signal lead.

For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

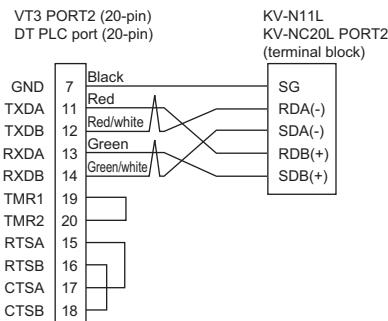
● Wiring Diagram 7 (RS-232C: OP-24027)



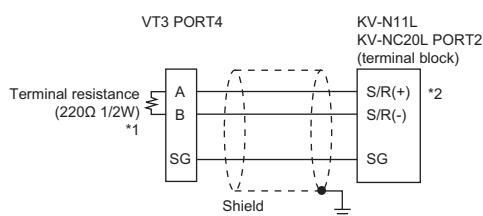
● Wiring Diagram 8 (RS-422A: OP-24028)



● Wiring Diagram 9 (RS-422A: OP-24028)



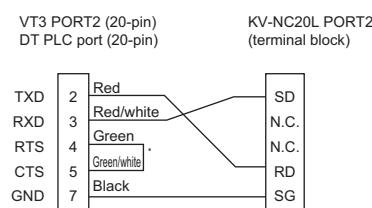
● Wiring Diagram 10 (RS-485)



*1 Attach terminal resistance (220Ω 1/2W) between AB for PORT4.

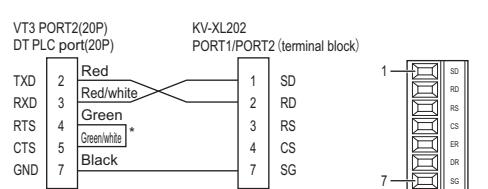
*2 Turn on the terminal resistance switch.

● Wiring Diagram 11 (RS-232C: OP-24027)



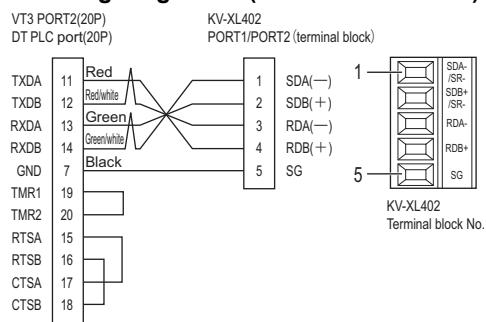
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 12 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

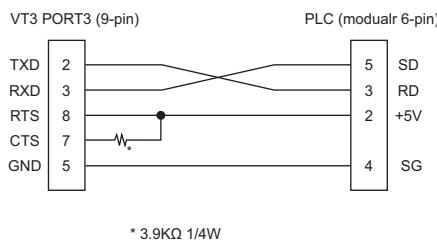
● Wiring Diagram 13(RS-422A-OP-24028)



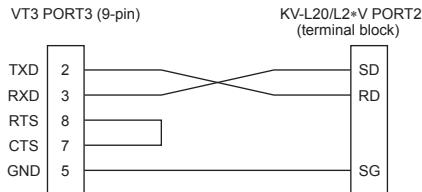
■ Connection to VT3 series (PORT3)

● Wiring Diagram 31

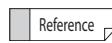
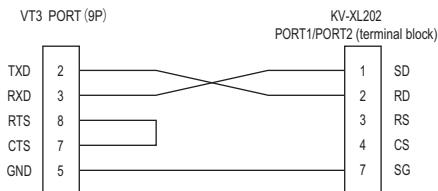
(PLC Port Direct Link OP-26486+
OP-24045: 1m, OP-24025: 5m)



● Wiring Diagram 33 (RS-232C)

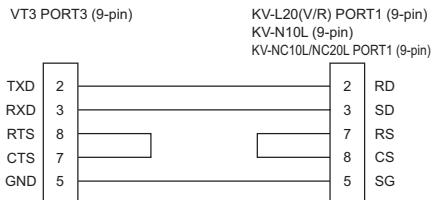


● Wiring Diagram 35(RS-232C)

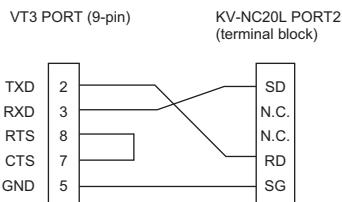


For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● Wiring Diagram 32 (RS-232C)



● Wiring Diagram 34 (RS-232C)



1-3 Wiring Diagrams for Connections

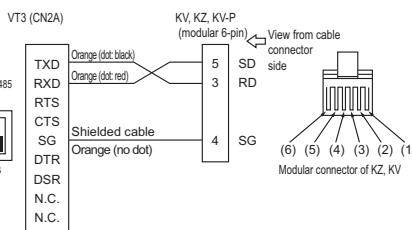
■ Connection with VT3 Handy Series



FG2 must be grounded.

● Wiring diagram H20 (PLC port direct link)

OP-87180: 1m, OP-87181: 5m



● Wiring diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m

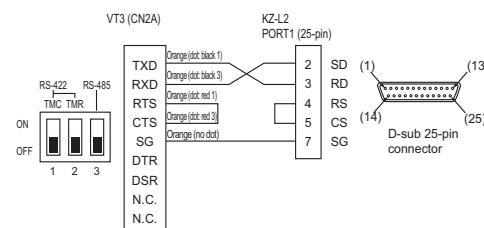
● Wiring diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



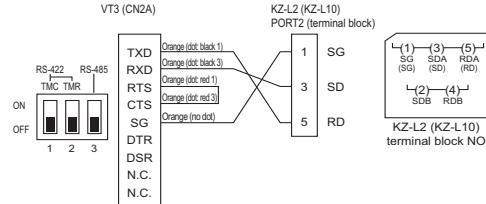
● Wiring diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



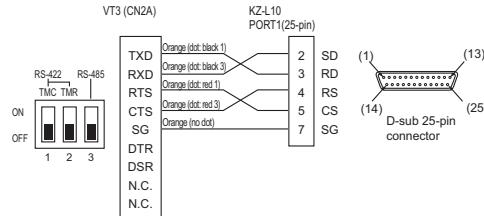
● Wiring diagram H23 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



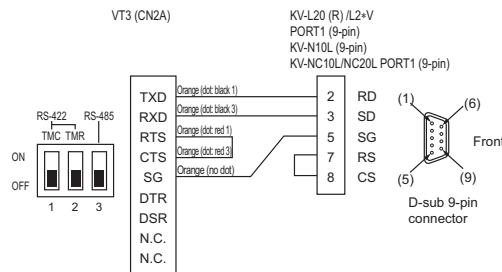
● Wiring diagram H24 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



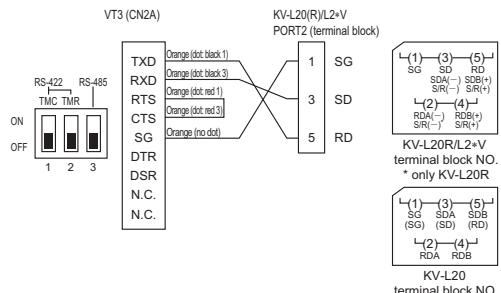
● Wiring diagram H25 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



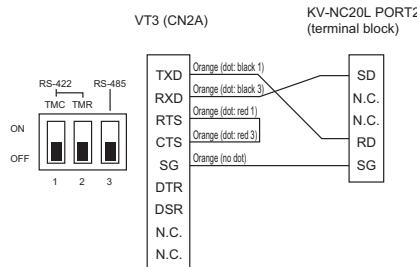
● Wiring diagram H26 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



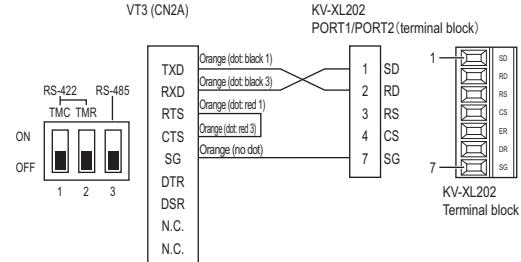
● Wiring diagram H27 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



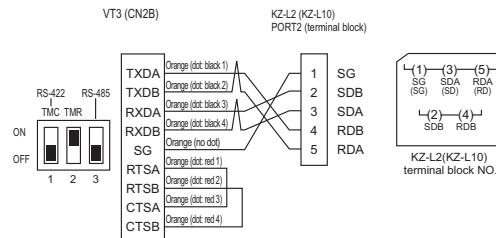
● Wiring diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



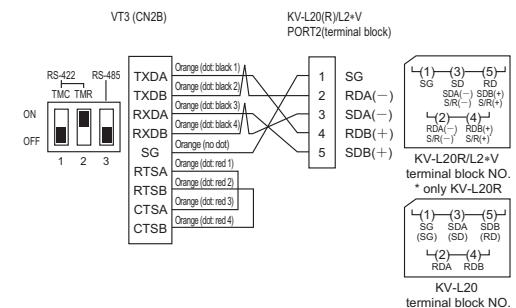
● Wiring diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



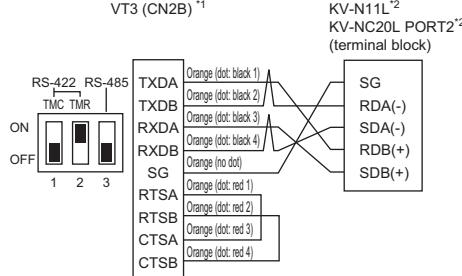
● Wiring diagram H42 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

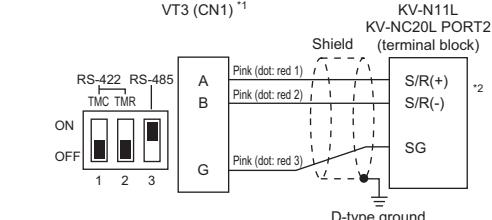
OP-87193: 10m



*1 Turn on the terminator.

*2 Turn on the terminal resistance switch.

● Wiring diagram H43 (RS-485: 2-wire)



*1 Turn on the terminator.

*2 Turn on the terminal resistance switch.

1-3 Wiring Diagrams for Connections

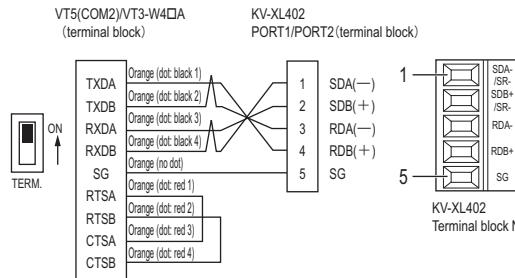
● Wiring diagram (H44-RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



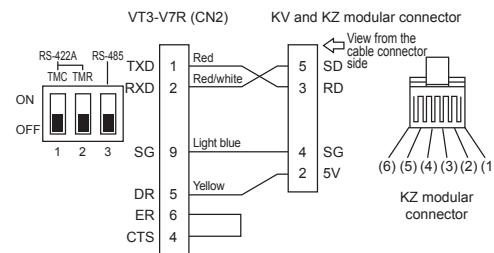
■ Connection to VT3-V7R



Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read "Connection Precautions", page A-13

● Wiring Diagram R1

(PLC port direct link: VT-C5K1)

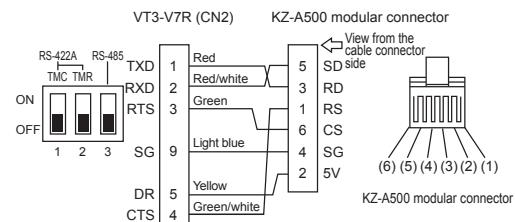


NOTICE

An error may occur when using the PLC Port Direct Link cable (VT-C5K1) of the KV and KZ series to connect with KZ-A500.

● Wiring Diagram R2

(PLC port direct link: VT-C5K2)

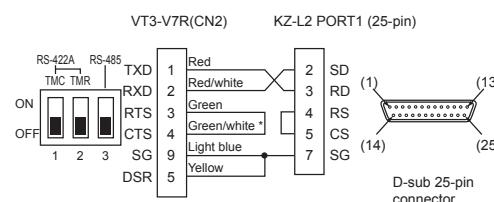


NOTICE

The KV and KZ series may be damaged when using the PLC Port Direct Link cable (VT-C5K2) of KZ-A500 to connect them.

● Wiring Diagram R3

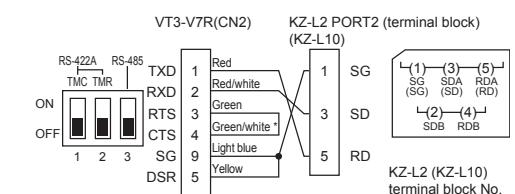
(RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R4

(RS-232C: VT-C5R1)



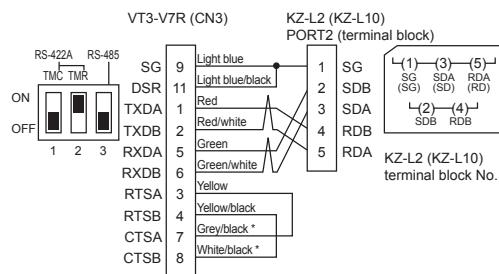
* Not wired for loopback test inside the connector.
Solder the signal lead.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

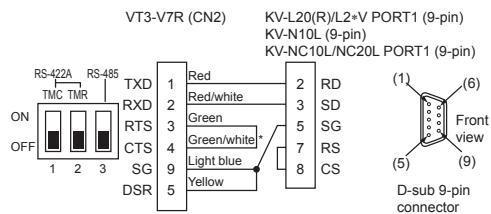
1-3 Wiring Diagrams for Connections

● Wiring Diagram R5 (RS-422A: VT-C5R2/C15R2)



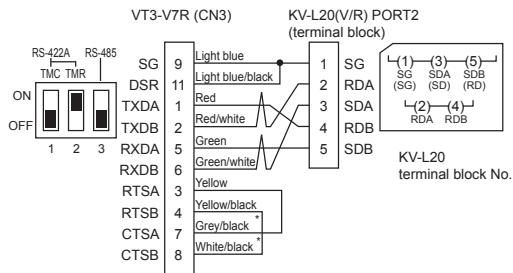
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R7 (RS-232C: VT-C5R1)



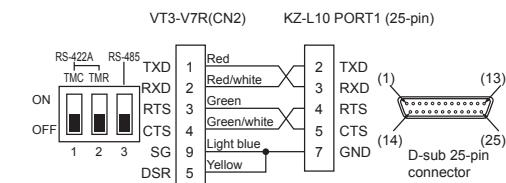
* Not wired for loopback test inside the connector. Solder the signal lead.

● Wiring Diagram R9 (RS-422A: VT-C5R2/C15R2)

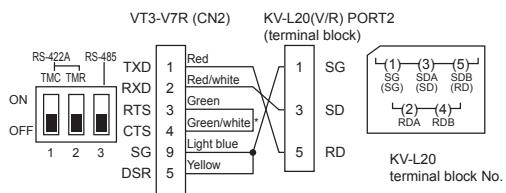


* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R6 (RS-232C: VT-C5R1)

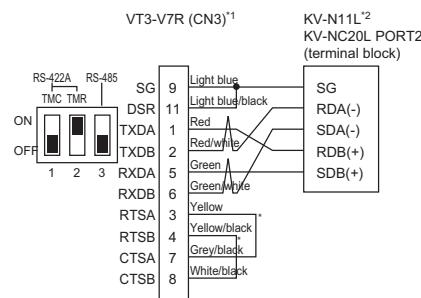


● Wiring Diagram R8 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R10 (RS-422A: VT-C5R2/C15R2)



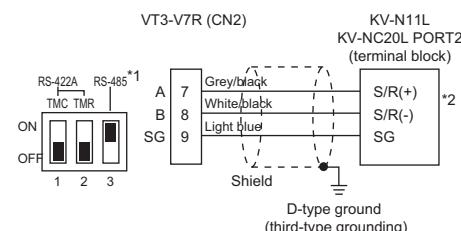
* Not wired for loopback test inside the connector.
Solder the signal lead.

*1 Turn on the terminator.

*2 Turn on the terminal resistance switch.

1-3 Wiring Diagrams for Connections

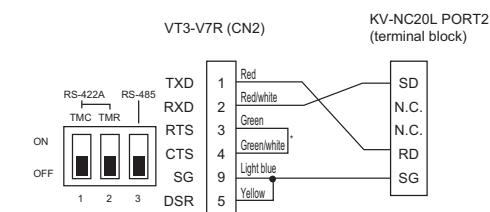
● Wiring Diagram R11 (RS-485: 2-wire)



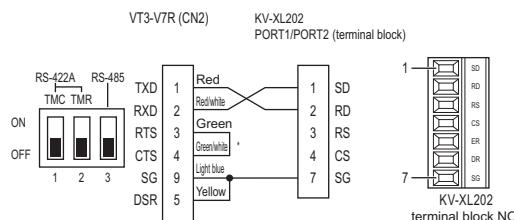
*1 Turn on the terminator switch.

*2 Turn on the terminal resistance switch.

● Wiring Diagram R12 (RS-232C: VT-C5R1)

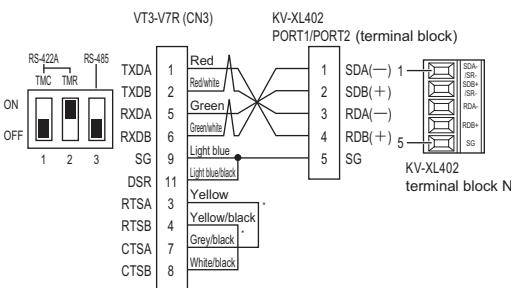


● Wiring Diagram R13 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R14 (RS-422A: VT-C5R2/C15R2)

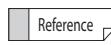


* Not wired for loopback test inside the connector.
Solder the signal lead.



Please use the following recommended cables for the connection. Using cables other than the recommended ones may lead to a shorter cable run distance.

Item	Description
Type of Cable	Shielded cable
Logarithmic	3P
Resistance (20°C)	Below 52.0Ω/km
Insulating resistance	10.000MΩ/km
Withstand voltage	DC500V 1minute
Electrostatic Capacity (1kHz)	Below 135nF/km
Characteristics Impedance (100kHz)	43Ω

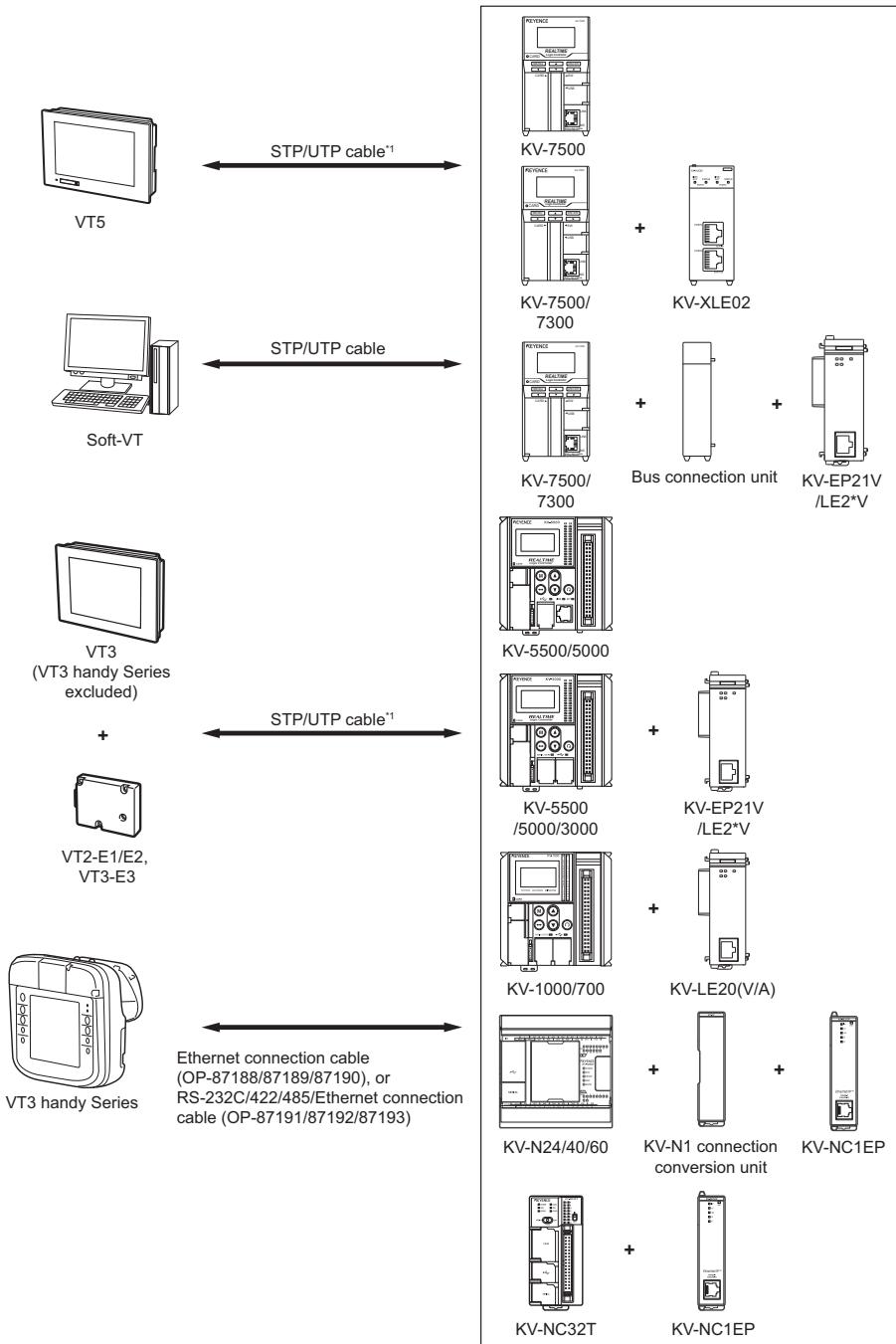


For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

■ Direct connection (1:1)

Use STP/UTP cable for connection.



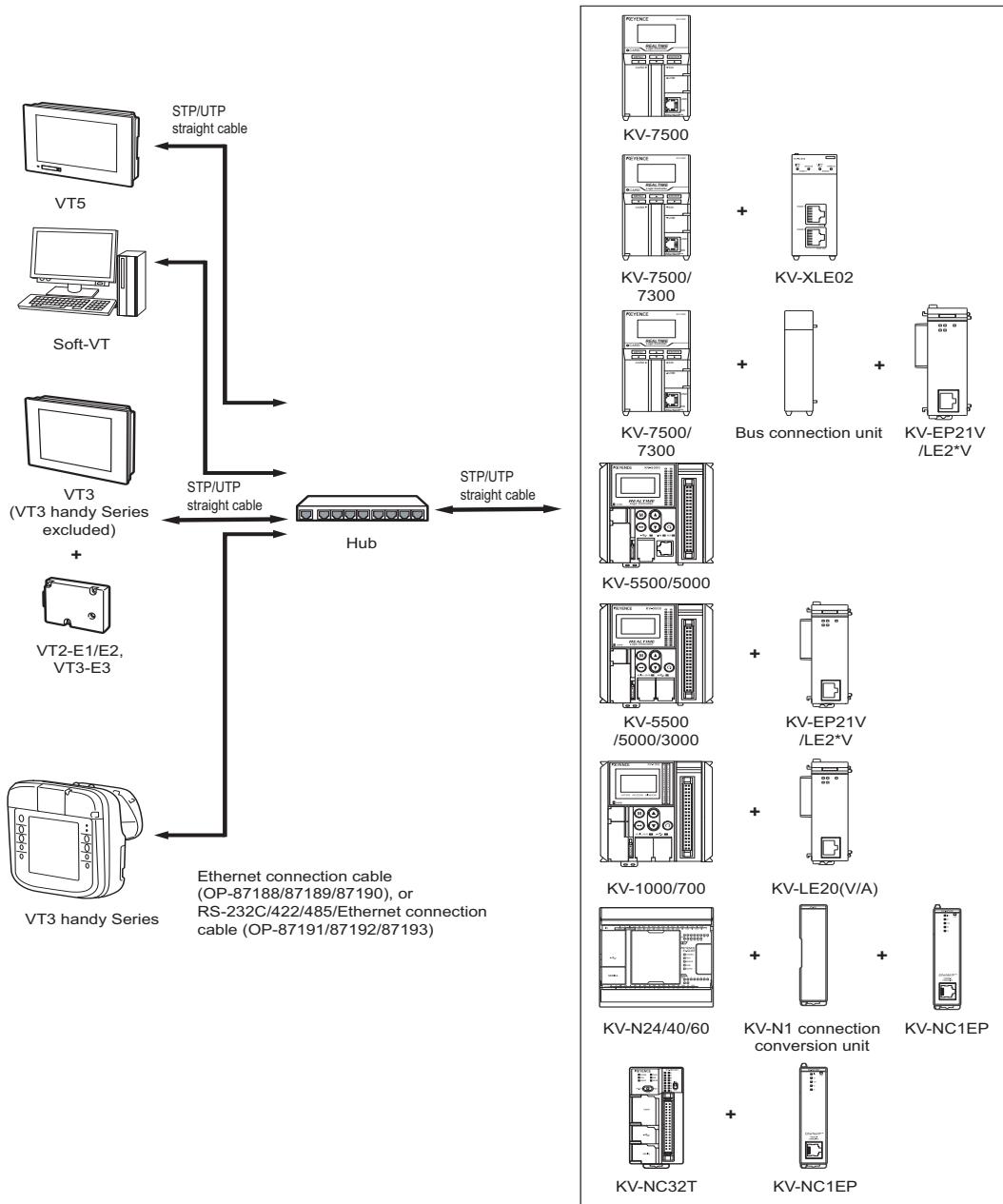
*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable.

[View Details](#) | [Edit](#) | [Delete](#)

■ Connection using a hub (multiple connections)



Connection of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series, Soft-VT to a hub

- Use the STP/UTP straight cable.
 - Please connect to where other than cascade port of hub.

Connecting KV-7500/5500/5000 Ethernet port to the hub on KV-XLE02/EP21V/LE21V/LE20(V/A)

- Use the STP/UTP straight cable.
 - Please connect to where other than cascade port of hub.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
 - When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable.

The following describes the settings of the Link Unit matched to the default communications conditions.

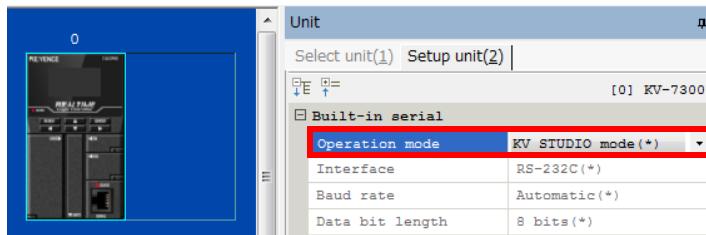
Method for making serial connections

■ KV-3000/1000/700 (PLC port direct link), KV-10/16/24/40, KV-P Series

Setting is not required.

■ KV-7300 (built-in serial port direct link)

Use the Unit Editor in the ladder software (KV STUDIO) to set up the KV-7300 (built in serial port direct link).

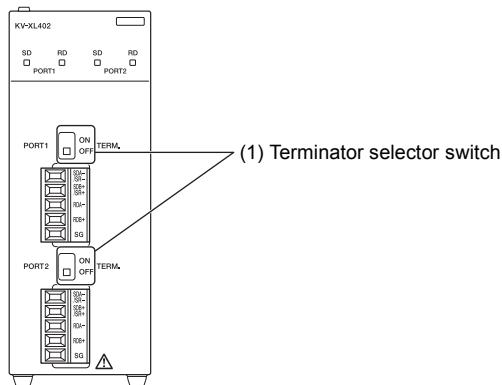


Start up the Unit Editor and select the base unit to set up.

Set the operating mode of the internal serial port to "KV STUDIO mode (*).

■ KV-XL402 setting

KV-XL402



Communication is possible with both Port 1 and Port 2.

(1) Terminator selector switch

Turn on the terminator selection switch of the port to be used.

1-4 Unit Settings

(2) Unit Editor

Set the operation mode of the port to be used to "KV STUDIO mode".

Item	Set Value
	Port 1/Port 2
Operation mode	KV STUDIO mode
Interface	RS-422A/485 (4-wire)
Baud Rate	Auto (set on VT5/VT3/DT side) ^{**1}
Data bit	8 bits
Start bit	1 bits
Stop bit	1 bits
Parity	Even
CheckSum	None
RS/CS flow control	Disable

* 1 Set baud rate with the PLC communication condition in VT system setting of VT STUDIO.

- VT 5 Series Reference Manual" 12 - 5 Peripheral Device Connection "
- VT3 Series Reference Manual" 12-4 VT main unit system setting "

■ KV-XL202 setting

The KV-XL202 communication settings are configured with the KV STUDIO ladder software Unit Editor.

Set the operation mode of the port to be used to "KV STUDIO mode".

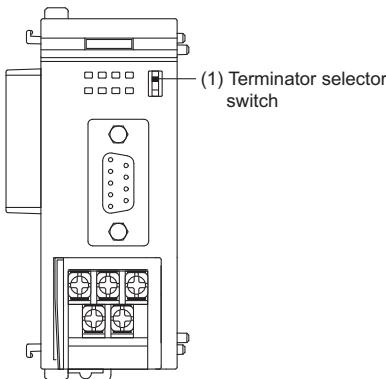
Item	Set Value
	Port 1/Port 2
Operation mode	KV STUDIO mode
Interface	RS-232C
Baud Rate	Auto (set on VT5/VT3/DT side) ^{**1}
Data bit	8 bits
Start bit	1 bits
Stop bit	1 bits
Parity	Even
CheckSum	None
RS/CS flow control	Disable

* 1 Set baud rate with the PLC communication condition in VT system setting of VT STUDIO.

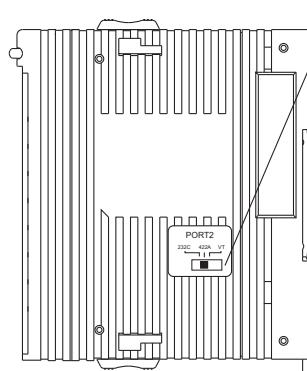
- VT 5 Series Reference Manual" 12 - 5 Peripheral Device Connection "
- VT3 Series Reference Manual" 12-4 VT main unit system setting "

■ KV-L20(R)/L2*V (KV BUILDER/KV STUDIO mode)

KV-L20(R)/L2*V front view



KV-L20(R)/L2*V side view



(2) PORT2 selector switch

KV-L20

232C 422A VT

KV-L20R

232C 422A 485(4) 485(2)

*Not exist for KV-L2*V

(1) Terminator selector switch

Set to ON when PORT2 is used on the RS-422A interface and to OFF when PORT2 is used on the RS-232C interface.

Used on RS-422A interface: Up (ON)

Used on RS-232C interface: Down



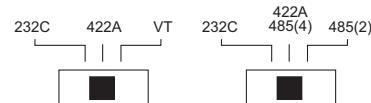
(2) PORT2 selector switch (KV-L20(R) only)

Set whether to use PORT2 on the RS-422A interface or on the RS-232C interface.

Used on RS-232C interface: Left side (232C)

Used on RS-422A interface: Center (422A)

KV-L20



KV-L20R



(3) Unit Editor

Set the operation mode to "KV BUILDER/KVSTUDIO mode".

Item	Set Value	
	Port 1	Port 2
Operation mode	KV BUILDER/KV STUDIO mode	KV BUILDER/KV STUDIO mode
Interface	RS-232C	RS-232C, RS-422A, 4-wire
PLC No.	-	0
Baud Rate	Auto (set on VT5/VT3/DT side) ^{**1}	Auto (set on VT5/VT3/DT side) ^{**1}
Data bit	8 bits	8 bits
Start bit	1 bit	1 bit
Stop bit	1 bit	1 bit
Parity	Even	Even
CheckSum	None	None
RS/CS flow control	Disable	-

*1 Set the Baud rate for the VT5/VT3 in the PLC communications conditions in the VT system parameters in VT STUDIO.

□ "12-5 Connecting Peripheral Devices", VT5 Series Reference Manual

□ "12-4 Setup of VT Main Unit System in the VT3 Series Reference Manual"

In the case of the DT, set the baud rate in the PLC communicationsconditions in the system parameters on DT BUILDER.

□ DT-100/100A User's Manual - Advanced Operation "3-2 System Parameters"

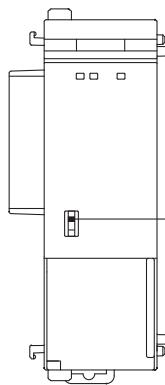


"PORT2 Selector Switch" and "Unit Editor" should be set separately when connecting KV-L20(R) via PORT2. The PLC will malfunction if both settings do not match.

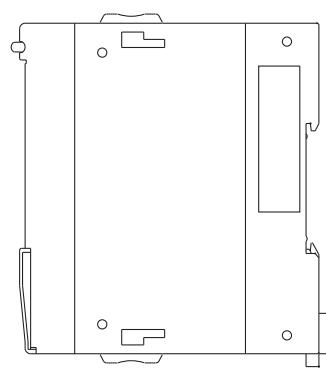
1-4 Unit Settings

■ KV-LM20(V)/LM21V

KV-LM20(V)/LM21V front view

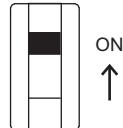


KV-LM20(V)/LM21V side view



(1) Terminator selector switch

When KV-LM20(V)/LM21V is at the MegaLink side, be sure to set to ON. Otherwise, set to OFF.

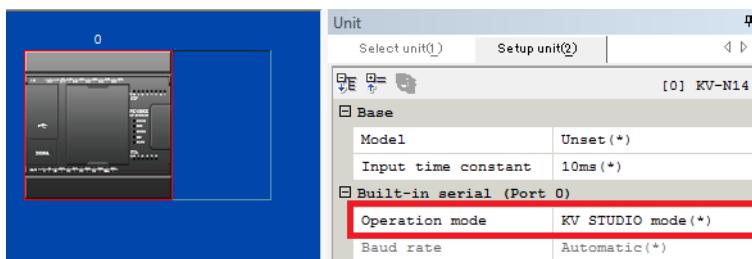


(2) Unit Editor

Item	Set Value	Default
Operation mode	MegaLink	MegaLink
Baud Rate	19200, 115200, 0.5M, 1.0M, 2.0Mbit/s	2.0Mbit/s
Retry Times	0 to 99	3

■ KV Nano Series (Built-in serial port direct connection)

The KV Nano Series (PLC port direct link) settings are configured with the KV STUDIO ladder software Unit Editor.

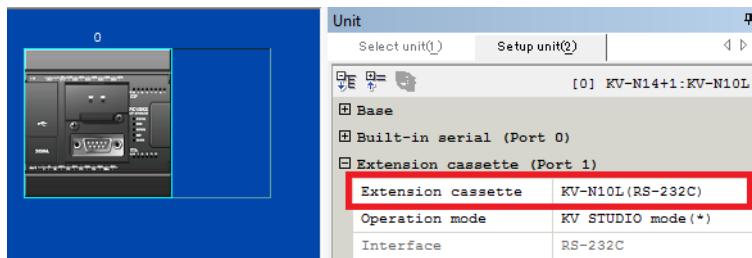


Start the Unit Editor and select the base unit to configure its settings.

Set the built-in serial port (Port0) operation mode to "KV STUDIO mode(*)".

■ KV-N10L

The KV-N10L communication settings are configured with the KV STUDIO ladder software Unit Editor.



Start the Unit Editor and select the base unit and you will be able to configure the extension cassette settings.

Port1 can be used with the KV-N14/N24. Port1 and Port2 can be used with the KV-N40/N60.

The initial value for the extension cassette is "None".

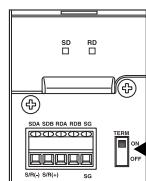
Configure the settings by referring to the table below.

Item	Communications settings	
	Setting Range	Default
Additional cassette	KV-N10L(RS-232C)	None
Operation mode	KV STUDIO mode	KV STUDIO mode
Interface	RS-232C	RS-232C
Baud Rate	Auto	Auto
Data bit	8 bits	8 bits
Start bit	1 bit	1 bit
Stop bit	1 bit	1 bit
Parity	Even	Even
RS/CS flow control	Disable	Disable

* When the extension cassette is set to "None" in Unit Editor, communication is performed with the initial settings.

1-4 Unit Settings

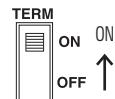
■ KV-N11L



(1) Terminator selector switch

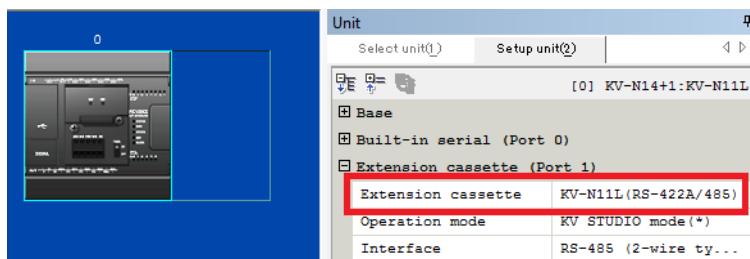
(1) Terminator selector switch

When connecting KV-N11L to VT5/VT3 using RS-485 (2-wire), set the terminator switch to On.



(2) Unit editor

The KV-N11L communication settings are configured with the KV STUDIO ladder software Unit Editor.



Start the Unit Editor and select the base unit and you will be able to configure the extension cassette settings. Port1 can be used with the KV-N14/24. Port1 and Port2 can be used with the KV-N40/N60.

The initial value for the extension cassette is "None".

Configure the settings by referring to the table below.

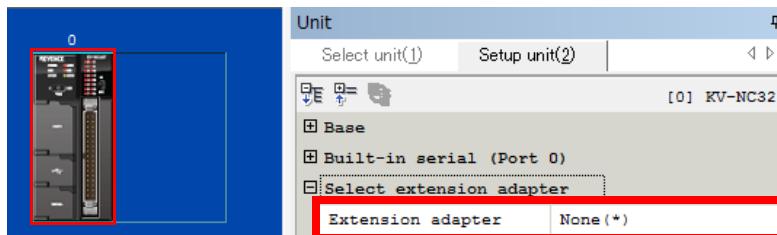
Item	Communications settings	
	Setting Range	Default
Additional cassette ¹	KV-N11L (RS-422A/485)	None
Operation mode	KV STUDIO mode	KV STUDIO mode
Interface	RS-485(2-wire) RS-422A/485(4-wire) ²	RS-485(2-wire)
Baud Rate	Auto	Auto
Data bit	8 bits	8 bits
Start bit	1 bit	1 bit
Stop bit	1 bit	1 bit
Parity	Even	Even
RS/CS flow control	Disable	Disable
KV mode station number	0	0

*1 When the extension cassette is set to "None" in Unit Editor, communication is performed with the initial settings.

*2 The DT Series can only use RS-422A/485 (4-wire).

■ KV-NC10L

The KV-NC10L communication settings are configured with the ladder software KV STUDIO Unit Editor.



Start the Unit Editor and select the base unit to configure the extension adapter settings.

Use only PORT1 (RS-232C) for KV-NC10L.

The initial value for the extension adapter is "None".

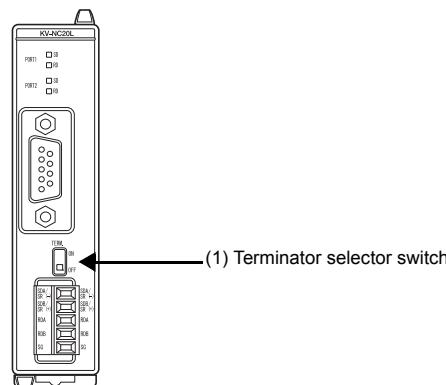
Configure the settings by referring to the table below.

Item	Communications settings	
	Setting Range	Default
Extension adapter	KV-NC10L (RS-232C)	None
Operation mode	KV STUDIO mode	KV STUDIO mode
Interface	RS-232C	RS-232C
Baud Rate	Auto	Auto
Data bit	8 bits	8 bits
Start bit	1 bit	1 bit
Stop bit	1 bit	1 bit
Parity	Even	Even
RS/CS flow control	Disable	Disable

* When the extension adapter is set to "None" in Unit Editor, communication is performed with the initial settings.

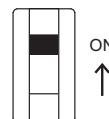
1-4 Unit Settings

■ KV-NC20L



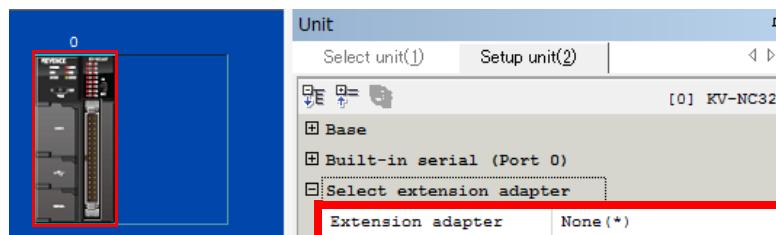
(1) Terminator selector switch

When the KV-NC20L PORT2 and the VT3 are connected by RS-485 (2-wire), set the terminator switch to ON.



(2) Unit editor

The KV-NC20L communication settings are configured with the KV STUDIO Unit Editor.



Start the Unit Editor and select the base unit to configure the extension adapter settings. Port1 (RS-232C) and Port2 (RS-232C/RS-422A/485) can be used with the KV-NC20L. The initial value for the extension adapter is "None".

Configure the settings by referring to the table below.

Item	Communications settings		
	Setting Range		Default
Extension adapter ^{*1}	KV-NC20L (RS-232C + RS-232C/422A/485)		None
PORT	Extension adapter (Port1)	Extension adapter (Port2)	-
Operation mode	KV STUDIO mode	KV STUDIO mode	KV STUDIO mode
Interface	RS-232C	RS-232C RS-485 (2-wire) ^{*2} RS-422A/485 (4-wire)	Port1: RS-232C Port2: RS-485 (2-wire) ^{*2}
Baud Rate	Auto		Auto
Data bit	8 bits		8 bits
Start bit	1 bit		1 bit
Stop bit	1 bit		1 bit
Parity	Even		Even
RS/CS flow control	Disable	-	Disable
KV mode station number	-	0	0

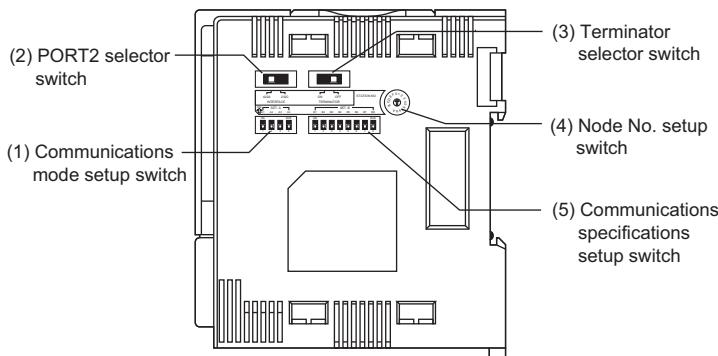
*1 When the extension adapter is set to "None" in Unit Editor, communication is performed with the initial settings.

*2 The DT Series cannot be connected with RS-485 (2-wire).

■ KZ-10/16/24/40/80, KZ-300/350 (PLC port direct link)

Setting is not required.

■ KZ-L2



(1) Communications mode setup switch

Set the port to be used to the KZ mode.

Set all switches to OFF.

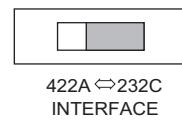


(2) PORT2 selector switch

Set whether to use PORT2 on the RS-422A interface or on the RS-232C interface.

Used on RS-422A interface: Left side (422A)

Used on RS-232C interface: Right side (232C)

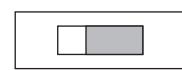


(3) Terminator selector switch

Set to ON when PORT2 is used on the RS-422A interface and to OFF when PORT2 is used on the RS-232C interface.

Used on RS-422A interface: Left side (ON)

Used on RS-232C interface: Right side (OFF)



(4) Node No. setup switch

Set to "0".



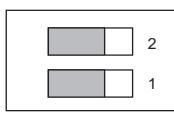
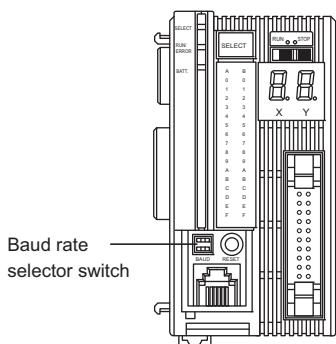
Node No. setup switch (STATION No.)

(5) Communications specifications setup switch

Always set switch B8 to OFF.

■ KZ-A500 (PLC port direct link)

Setting the baud rate selector switch

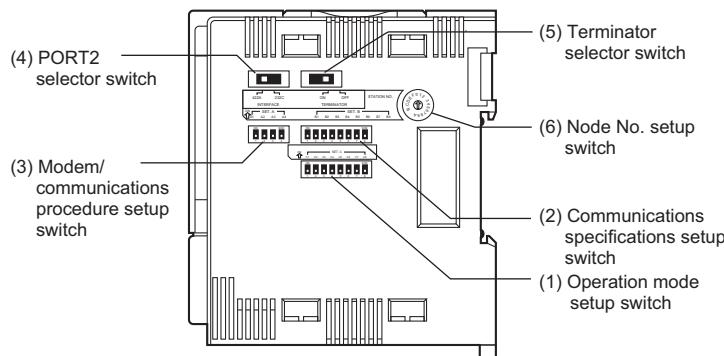


ON ⇔ OFF

Switch No.		Baud Rate
1	2	
OFF	OFF	9600 bit/s
ON	OFF	4800 bit/s
OFF	ON	19200 bit/s
ON	ON	38400 bit/s

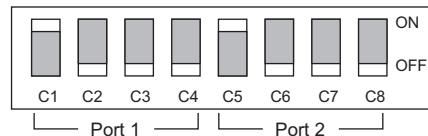
1-4 Unit Settings

■ KZ-L10



(1) Operation mode setup switch

Set the operation mode of the port to be used to Protocol Mode 1.



(2) Communications specifications setup switch

Set the communications specifications of the port to be used.

Switch No.	Setting Item	Set Value
B1		OFF
B2	Baud Rate	38400 bit/s
B3		ON
B4	Bit length	7 bits
B5		ON
B6	Parity check	Even
B7		ON
B8	Stop bit	1 bit
		OFF
		OFF at all times



(3) Modem/communications procedure setup switch

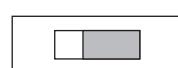
Set as follows:

Switch No.	Setting Item	Set Value
A1	Communications settings	Normal communications
A2		OFF
A3	Device data rewriting in Run mode	Enabled
A4	CheckSum	ON
		ON



(4) PORT2 selector switch

Set whether to use PORT2 on the RS-422A interface or on the RS-232C interface.

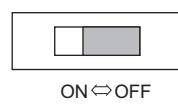


Used on RS-422A interface: Left side (422A)
Used on RS-232C interface: Right side (232C)

422A ⇔ 232C
INTERFACE

(5) Terminator selector switch

Set to ON when PORT2 is used on the RS-422A interface and to OFF when PORT2 is used on the RS-232C interface.



Used on RS-422A interface: Left side (ON)
Used on RS-232C interface: Right side (OFF)

ON ⇔ OFF
TERMINATOR

(6) Node No. setup switch

Set to "0".

The following table shows setting ranges for each communications condition and their defaults.



STATION
No.

Communication Condition Setting Ranges and Defaults During Serial Communication

● KV-7000 Series (serial), KV-7000 Series (serial) <XYM>

Item	Setting Range	Default
Station No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire ^{*1}	RS-232C
Communication speed	9600, 19200, 38400, 57600, 115200 bit/s	115200 bit/s
Data Bits	8 bits	8 bits
Stop bits	1 bit	1bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 RS-422A 4-wire type can be selected when using KV-L2*V PORT 2 or KV-XL402.

● KV-7000 Series (KV-LM2*V), KV-7000 Series (KV-LM2*V) <XYM>

Item	Setting Range	Default
Station No.	None	None
VT No.	1 to 15	1
PLC serial I/F	RS-485	RS-485
Communication speed	19200, 115200, 0.5M, 1.0M, 2.0Mbit/s ^{*1}	2.0M bit/s
Data Bits	8 bits	8 bits
Stop bits	1 bit	1bit
Parity	Odd	Odd
Flow Control	Flow control is not performed.	Flow control is not performed.
CR	-	-
LF	-	-
CheckSum	-	-

*1 All connecting devices in a MegaLink connection must be set to the same value.

● KV-5500/5000/3000/L2*V, KV-5500/5000/3000/L2*V <XYM>

Item	Setting Range	Default
Station No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire ^{*1}	RS-232C
Baud Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	115200 bit/s
Data Bits	8 bits	8 bits
Stop bits	1 bit	1bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 RS-422A 4-wire can be selected when the PORT2 on KV-L2*V is used on the RS-422A interface.

1-4 Unit Settings

- KV-1000/700, KV-KV-L20*/L21V, KV-1000, KV-KV-L20*/L21V <XYM>

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC I/F	RS-232C, RS-422A 4-wire ^{*1}	RS-232C
Baud Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s ^{*2}	57600 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

1 RS-422A 4-wire can be selected when the PORT2 on KV-L20/L21V is used on the RS-422 A interface.

2 115200 bit/s can be selected when a CPU direct link to a KV-1000 or a KV-L20/L21V is in use. It cannot be selected when a CPU direct link to a KV-700 is in use.

- KV-5500/5000/3000(KV-LM2*V),
KV-5500/5000/3000(KV-LM2*V) <XYM>,
KV-1000/700(KV-LM20*/21V), KV-1000(KV-LM20*/21V) <XYM>

Item	Setting Range	Default
PLC No.	None	None
VT No.	1 to 15	1
PLCSeries I/F	RS-485	RS-485
Baud Rate	19200, 115200, 0.5M, 1.0M, 2.0M bit/s [*]	2.0Mbit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	Not perform flow control	Not perform flow control
CR	-	-
LF	-	-
CheckSum	-	-

* All the connected equipment via MegaLink should be set to the same value.

- KV Nano Series [KV-N*], KV Nano Series [KV-N*]<XYM>

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire, RS-485 ^{*1}	RS-232C
Baud Rate	9600, 19200, 38400, 57600, 115200bit/s	115200bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 RS-485 cannot be selected on the DT Series.

● KV-10/16/24/40, KV-P16

Item	Setting Range	Default
PLC No.	None	None
VT No.	None	None
PLC I/F	RS-232C	RS-232C
Baud Rate	9600, 19200, 38400, 57600 bit/s	57600 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● KZ-300/350, KZ-L2, KZ-10/16/24/40/80

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC I/F	RS-232C, RS-422A 4 wire ^{**1}	RS-232C
Baud Rate	9600, 19200, 38400 bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 RS-422A 4 wire can be selected when PORT2 on the KZ-L2 is used on the RS-422A interface.

● KZ-A500

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC I/F	RS-232C	RS-232C
Baud Rate	4800, 9600, 19200, 38400 bit/s	9600 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● KZ-L10

Item	Setting Range	Default
PLC No.	ON (0 to 9)	ON (0)
VT No.	-	-
PLC I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400 bit/s	38400 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

1-4 Unit Settings

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port No. of the connected units should be determined in advance. The following table shows the setting items corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



Point Make sure that the "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in VT STUDIO. ^①	P.1-41
	Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.	-
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ^②	P.1-42
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Use the "Unit Editor" in KV Studio to do this.	P.1-45

*1 Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

*2 You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.1-43
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT individual settings" in "PLC Communication Conditions" in VT STUDIO. ^①	P.1-44
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use the "Unit Editor" in KV Studio to do this.	P.1-45

*1 You can also use "PLC Communication Conditions" in VT3 system mode to confirm and change settings.

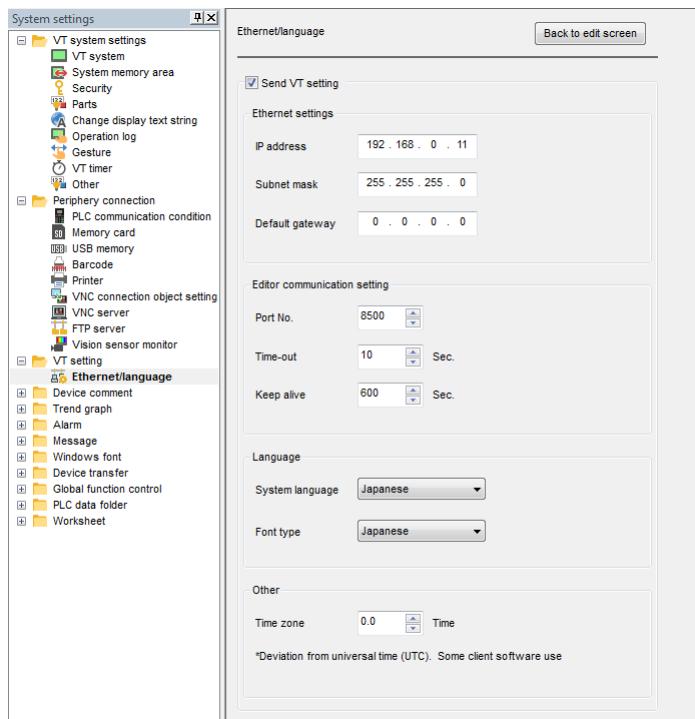
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting(J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item	Description						
Send VT setting	When checked, the VT settings are sent to the VT5.						
Ethernet settings	<table border="1"> <tr> <td>IP Address</td><td>Set the IP address to be assigned to the VT5.</td></tr> <tr> <td>Subnet mask</td><td>Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.</td></tr> <tr> <td>Default gateway</td><td>Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.</td></tr> </table>	IP Address	Set the IP address to be assigned to the VT5.	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
IP Address	Set the IP address to be assigned to the VT5.						
Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.						
Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.						
Editor communication settings	<table border="1"> <tr> <td>Port number</td><td>If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.</td></tr> <tr> <td>Keep Alive</td><td>Set as necessary.</td></tr> <tr> <td>Timeout</td><td>Set as necessary.</td></tr> </table>	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.	Keep Alive	Set as necessary.	Timeout	Set as necessary.
Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.						
Keep Alive	Set as necessary.						
Timeout	Set as necessary.						



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.



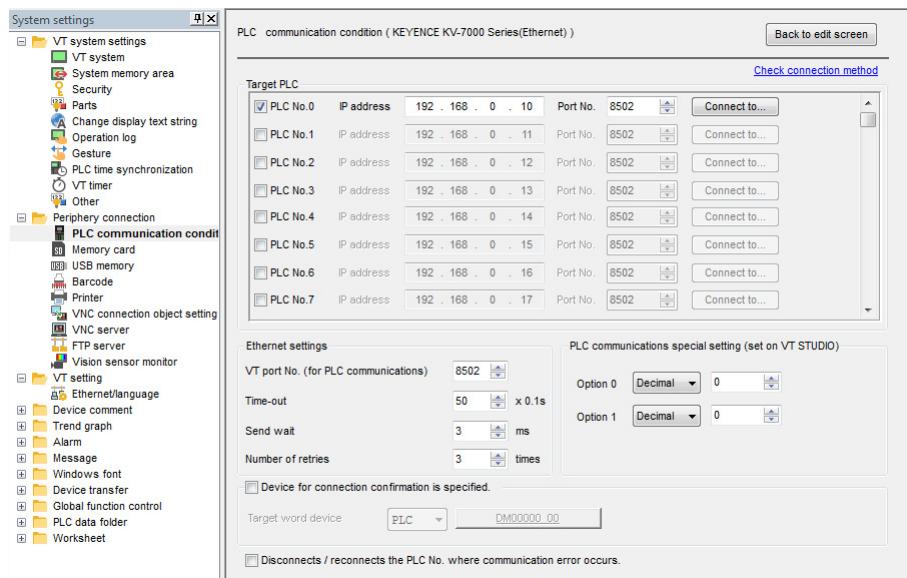
In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen. In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

1-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023. Also, take care not to use a port number already used by another device.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 System mode to set an IP address to be assigned to the VT3 or make other settings.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup (1/3)				OK	Cancel	Next page
Baud rate	100/10 Mbps Auto					
IP Address	192	168	1	10		
Subnet Mask	255	255	255	0		
Default Gateway	0	0	0	0		
MAC address	**.**.**.*.**.**					
				OK	Cancel	Next page
				OK	Cancel	Next page
				OK	Cancel	Next page
				OK	Cancel	Next page

Item	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable. Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	This is the ID No. unique to VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup¹	Selects "Enable" only when using a router.

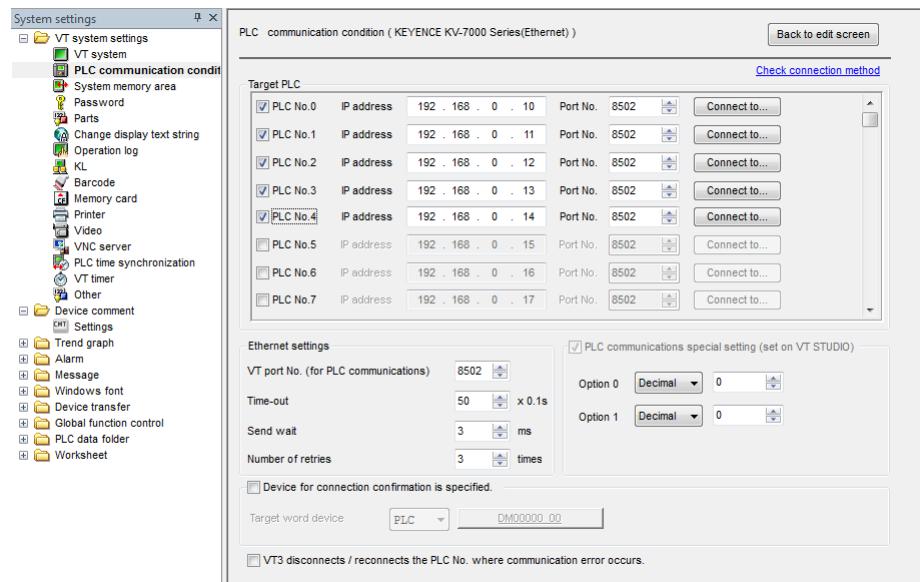
*1 "Chapter 8 ETHERNET", VT3 Series Hardware Manual

1-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connection", VT3 Series Reference Manual



Item		Description
Target PLC	PLC No.	Selects the PLC No. (0 to 15) to be used.
	IP address ¹	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port No. ²	Sets the port No. (1024 to 65535) of the connection destination PLC (marked PLC No.).
	Connect to	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet Settings	VT port No. (for PLC communications)	Sets the port No. (for PLC communications) (1024 to 65535) of the VT3.
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ³	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
VT3 disconnects / reconnects the PLC No. where communication error occurs ⁴		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP addresses to each device within the same LAN.

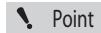
IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. Also, take care not to use another port No. that is already in use.

*3 Select "PLC Devices"

"6-7 Set up the Devices", VT3 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



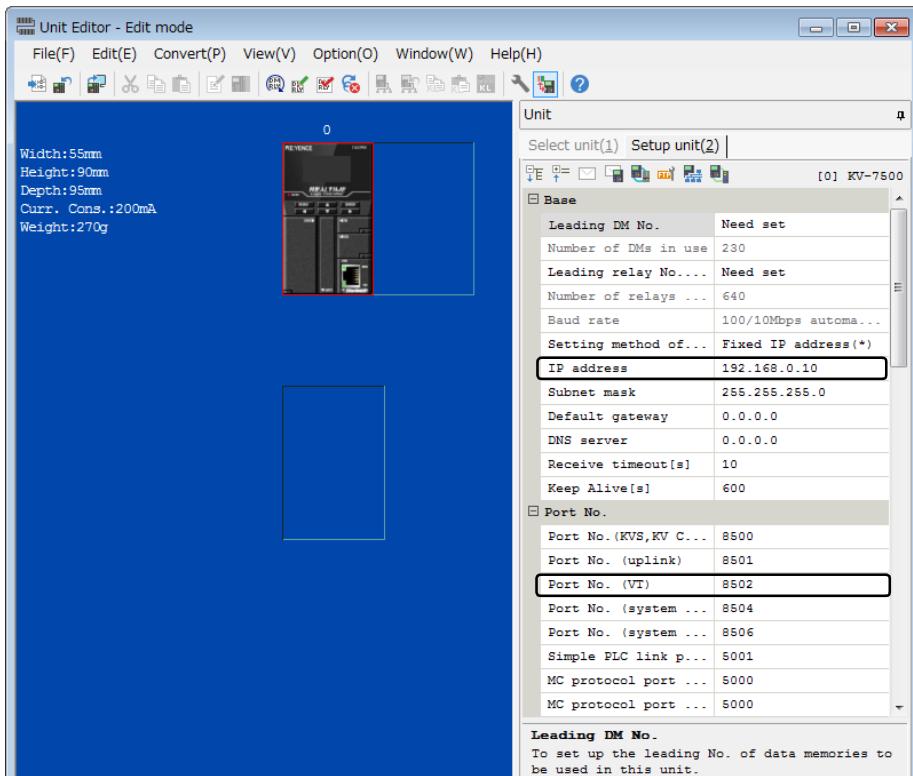
You can use VT3 system mode to check and change PLC setting conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Condition", VT3 Series Hardware Manual

■ KV-7500 internal Ethernet port setting

Use the KV STUDIO Unit Editor to set up.



Item	Description
IP Address ¹	Set the IP address to be assigned to the connected PLC.
Port number (VT) ²	Use the PLC communication condition setting to set the port number to be assigned to the target PLC.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

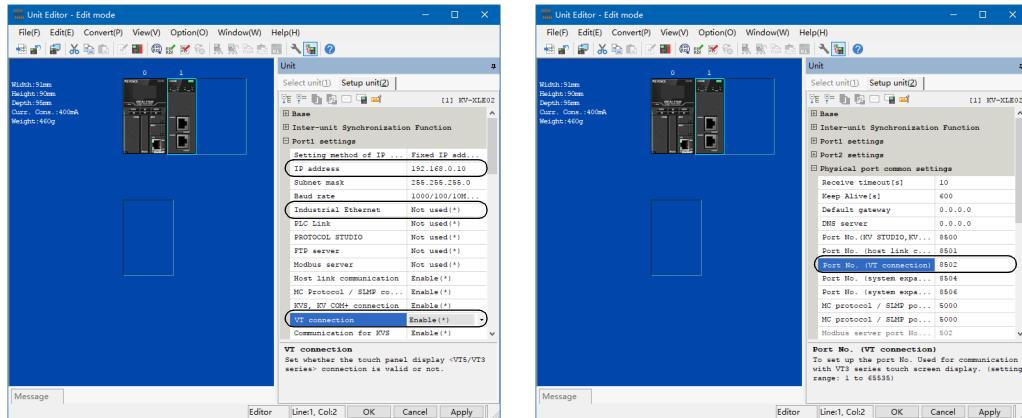
*2 Do not change the port number to a number between 0 to 1023. Also, take care not to use a port number already used by another device.

1-4 Unit Settings

■ KV-XLE02 setting

This is set up via the Unit Editor in KV STUDIO.

Communication is possible with both port 1 and port 2. Here, we will describe for port 1 as an example.



Item	Description
Industrial Ethernet	Select items that can use general Ethernet (TCP / IP) such as "Not use (*)" and "EtherNet / IP (Scanner)". * If you select a function that can not be mixed with general Ethernet, such as "EtherCAT (slave)", you can not connect with VT.
IP address*	Set the IP address to be assigned to KV-XLE02.
VT connection	Set up whether to enable VT connection on the current Ethernet port. * Normally, it is unnecessary to change from the default setting "Valid". Set this to disable the VT connection port No. of the Ethernet port not used for VT connection.
Port No. (VT)	Set up the port No. ² set for the target PLC with the PLC communication condition setting.

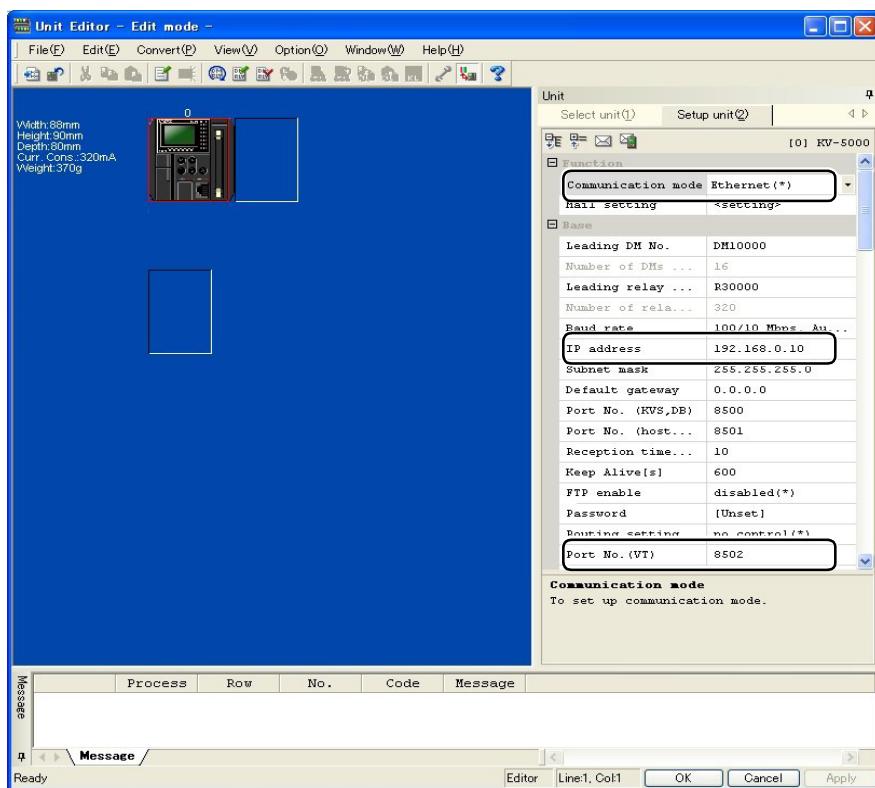
*1 Be careful that the IP address does not overlap with other devices within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 When changing the port No., do not use 0 to 1023. Also, be careful not to duplicate the number if there is another port number you are using.

■ KV-5500/5000 Ethernet port setting

This is set up via the Unit Editor in KV STUDIO.



Item	Description
Communication Mode	Select "Ethernet (*).(Only KV-5000)
IP Address¹	Set the IP address to be assigned to the connection destination PLC.
Port No. (VT)²	Use the PLC communication condition setting to set the port number to be assigned to the target PLC.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

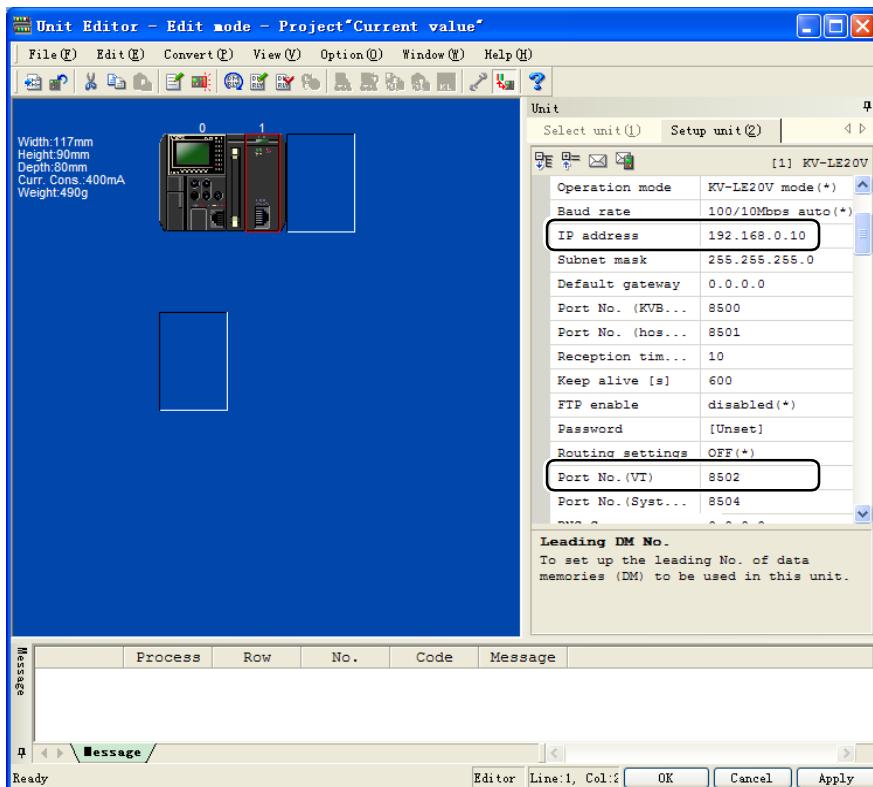
IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range of 0 to 255).

*2 When changing the port No., do not use the number of 0 to 1023 as the new port No. Also, do not use another port No. that is already in use.

1-4 Unit Settings

■ KV-EP21V/LE21V/LE20V Settings

This is set up via the Unit Editor in KV STUDIO.



Item	Description
IP Address¹	Set the IP address to be assigned to the connection destination PLC.
Port No. (VT)²	Use the PLC communication condition setting to set the port number to be assigned to the target PLC.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range of 0 to 255).

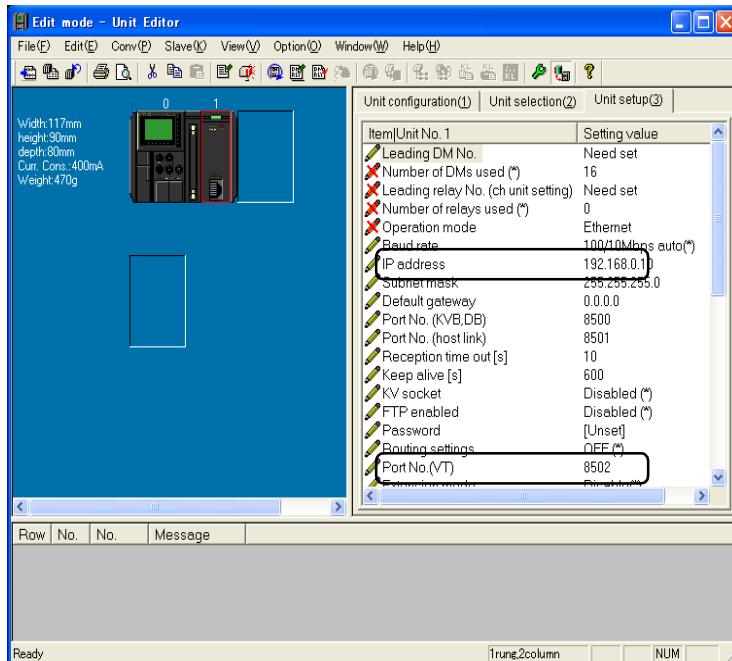
*2 When changing the port No., do not use numbers of 0 to 1023 as the new port No. Also, do not use another port No. that is already in use.

■ KV-LE20(V/A) settings

Set up with Unit Editor in KV BUILDER or KV STUDIO.



Use KV BUILDER Ver.3.52 or higher.



Item	Description
IP address ¹	Sets the IP address to be assigned to the connection destination PLC.
Port No. (VT) ²	Use the PLC communication condition setting to set the port number to be assigned to the target PLC.

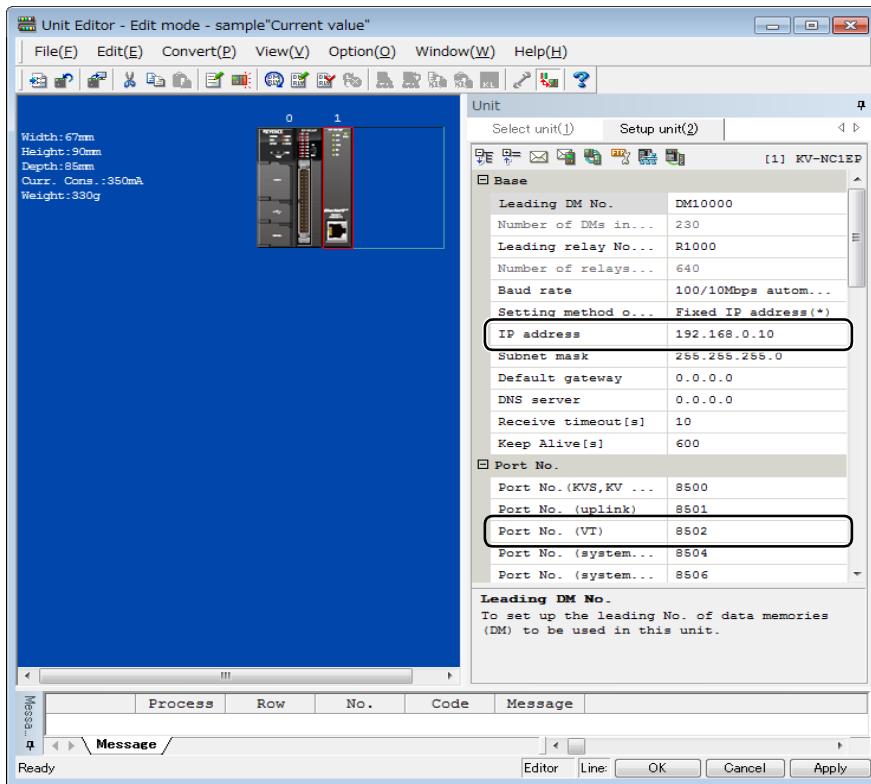
*1 Be sure to set only unique IP addresses to each device within the same LAN.
IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. In addition, the port numbers should be unique when other ports need to be used.

1-4 Unit Settings

■ KV-NC1EP setting

This is set up via the Unit Editor in KV STUDIO.



Item	Description
IP Address ¹	Set the IP address to be assigned to the connection destination PLC.
Port No. (VT) ²	Use the PLC communication condition setting to set the port number assigned to the target PLC.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range of 0 to 255).

*2 When changing the port No., do not use the number of 0 to 1023 as the new port No. Also, do not use another port No. that is already in use.

1-5 Available Devices

This section describes available devices.

- KV-7000 Series (serial), KV-7000 Series (serial) <XYM>
- KV-7000 Series (KV-LM2*V), KV-7000 Series (KV-LM2*V) <XYM>
- KV-7000 Series (Ethernet), KV-7000 Series (Ethernet) <XYM>

Device	KV-7000 Series	KV-7000 Series <XYM>
Bit device	Relay	R00000 to R199915 ¹¹
	Input relay ¹	- X0000 to X1999F ¹¹
	Output relay ¹	- Y0000 to Y1999F ¹¹
	Internal auxiliary relay	MR000000 to MR399915 M00000 to M63999
	Latch relay	LR00000 to LR99915 L00000 to L15999
	Control relay	CR0000 to CR7915
	Timer (contact)	T0000 to T3999
	Counter (contact)	C0000 to C3999
	Data memory ²	DM0000000 to DM6553415 D0000000 to D6553415
	Extended data memory ²	EM0000000 to EM6553415 E0000000 to E6553415
	File register ²	FM0000000 to FM3276715 F0000000 to F3276715
	Link relay	B0000 to B7FFF
	Work relay	VB0000 to VBF9FF
	File register (CONT mode) ²	ZF00000000 to ZF52428715
	Link register ¹	W00000 to W7FFFF
	Control memory ²	CM000000 to CM599915
	Temporary data memory ²	TM00000 to TM51115
	Work memory ²	VM0000000 to VM6399915
Word device	Relay ³	R00000 to R199900
	Input relay ⁴	- X0000 to X19990 ¹¹
	Output relay ⁴	- Y0000 to Y19990 ¹¹
	Internal auxiliary relay	MR00000 to MR399900 ³ M00000 to M63984 ⁵
	Latch relay ⁵	LR00000 to LR99900 L00000 to L15984
	Control relay ³	CR0000 to CR7900
	Trimmer ⁶	TRM0 to TRM7
	Timer (set value)	TS0000 to TS3999
	Timer (current value)	TC0000 to TC3999
	Counter (set value)	CS0000 to CS3999
	Counter (current value)	CC0000 to CC3999
	Data memory	DM00000 to DM65534 D00000 to D65534
	Extended data memory	EM00000 to EM65534 E00000 to E65534
	File register	FM00000 to FM32767 F00000 to F32767
	Control memory	CM00000 to CM5999
	Temporary data memory	TM000 to TM511
	The index register ⁷	Z1 to Z12
	Link relay ⁴	B0000 to B7FF0
	Work relay ⁴	VB0000 to VBF9F0
	File register (CONT mode)	ZF000000 to ZF524287
	Link register	W0000 to W7FFF
	Work memory	VM00000 to VM63999
	Expansion unit buffer memory ⁸	UG0000000 to UG4859999
	Expansion unit buffer memory (bank support) ⁹	ZG000000000 to ZG483159999

*1 Low-order 1 digit becomes "0 to F".

*2 Low-order 2 digits become "00 to 15".

*3 Low-order 2 digits become "00".

*4 Low-order 1 digit becomes "0".

*5 Only numbers divisible by 16 can be set.

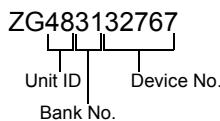
*6 Only reading is possible.

*7 For CPU function version 2.2 or earlier, the relay range is R00000 to R99915, the input relay range is X0000 to X999F, and the output relay range is Y0000 to Y999F.

*8 The high-order 2 digits are the unit ID and the low-order 5 digits are the device number.

1-5 Available Devices

- *9 The high-order 2 digits are the unit ID, the medium-order 2 digits are the bank number and the low-order 5 digits are the device number.
- *10 The device number is set as described below.



- *11 For CPU function version 2.2 or earlier, the relay range is R00000 to R99915, the input relay (bit device) range is X0000 to X999F, the output relay (bit device) range is Y0000 to Y999F, the input relay (word device) range is X0000 to X9990, and the output relay range (word device) is Y0000 Y9990.

■ KV-5500/5000/3000/L2*V, KV-5500/5000/3000/L2*V <XYM>

KV-5500/5000/3000 (KV-LM2*V), KV-5500/5000/3000 (KV-LM2*V) <XYM>

KV-5500/5000/3000 (Ethernet), KV-5500/5000/3000 (Ethernet) <XYM>

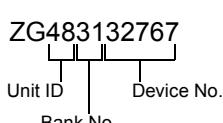
Device		KV-5500/5000/3000	KV-5500/5000/3000 <XYM>
Bit device	Relay	R00000 to R99915	R00000 to R99915
	Input relay ^{*1}	-	X0000 to X999F
	Output relay ^{*1}	-	Y0000 to Y999F
	Internal auxiliary relay	MR00000 to MR99915	M00000 to M15999
	Latch relay	LR00000 to LR99915	L00000 to L15999
	Control relay	CR0000 to CR3915	CR0000 to CR3915
	Timer (contact)	T0000 to T3999	T0000 to T3999
	Counter (contact)	C0000 to C3999	C0000 to C3999
	CTC (contact) ^{*2}	CTC0 to CTC3	CTC0 to CTC3
	Data memory ^{*3}	DM0000000 to DM6553415	D0000000 to D6553415
	Extended data memory ^{*3}	EM0000000 to EM6553415	E0000000 to E6553415
	File register ^{*3}	FM0000000 to FM3276715	F0000000 to F3276715
	Link relay	B0000 to B3FFF	B0000 to B3FFF
	Work relay	VB0000 to VB3FFF	VB0000 to VB3FFF
	File register (CONT mode) ^{*3}	ZF0000000 to ZF13107115	ZF0000000 to ZF13107115
	Link register ^{*1}	W00000 to W3FFFF	W00000 to W3FFFF
	Work memory ^{*3}	VM0000000 to VM5999915	VM0000000 to VM5999915

1-5 Available Devices

Device	KV-5500/5000/3000	KV-5500/5000/3000 <XYM>
Word device	Relay ^{*4}	R00000 to R99900
	Input relay ^{*5}	-
	Output relay ^{*5}	-
	Internal auxiliary relay	MR00000 to MR99900 ^{*4}
	Latch relay	LR00000 to LR99900 ^{*4}
	Control relay ^{*4}	CR0000 to CR3900
	Trimmer ^{*7}	TRM0 to TRM7
	Timer (set value)	TS0000 to TS3999
	Timer (current value)	TC0000 to TC3999
	Counter (set value)	CS0000 to CS3999
	Counter (current value)	CC0000 to CC3999
	High-speed counter (current value)	CTH0 to CTH1
	CTC (set value)	CTC0 to CTC3
	Data memory	DM00000 to DM65534
	Extended data memory	EM00000 to EM65534
	File register	FM00000 to FM32767
	Control memory	CM0000 to CM5999
	Temporary data memory	TM000 to TM511
	Index register ^{*8}	Z1 to Z12
Link relay ^{*5}	B0000 to B3FF0	B0000 to B3FF0
	Work relay ^{*5}	VB0000 to VB3FF0
	File register (CONT mode)	ZF000000 to ZF131071
	Link register	W0000 to W3FFF
	Work memory	VM00000 to VM59999
Expansion unit buffer memory ^{*9}	G0000000 to G4832767	G0000000 to G4832767
	Expansion unit buffer memory (bank support) ^{*10}	ZG0000000000 to ZG483132767

^{*1} Low-order 1 digit becomes "0 to F".^{*2} The high-speed counter comparator of a bit device is read only.^{*3} Low-order 2 digits become "00 to 15".^{*4} Low-order 2 digits become "00 to F".^{*5} Low-order 1-digit becomes "0".^{*6} Only numbers divisible by 16 can be set.^{*7} Only reading is possible.^{*8} The index register is a 2-word device. Since the KV-1000 Series index register is a 1-word device, a change from the KV-1000 to the KV5000/3000 model will make it an unset device.^{*9} The high-order 2 digits are the unit ID and the low-order 5 digits are the device number.^{*10} KV-5000 and KV-LE20V can be used with KEYENCE products shipped on or after September 12th 2008. When expansion unit buffer memory (bank support) is used, a port number (system extension) is used in addition to the PLC "port number (VT)".

The device number is set as described below.



1-5 Available Devices

- KV-1000/700, KV-L20*/L21V, KV-1000/700, KV-L20*/L21V <XYM>
- KV-1000/700 (KV-LM20*/21V), KV-1000 (KV-LM20*/21V) <XYM>
- KV-1000/700 (Ethernet), KV-1000 (Ethernet) <XYM>

	Device	KV-1000	KV-1000 <XYM>	KV-700
Bit device	Relay	00000 to 59915	R00000 to R59915	00000 to 59915
	Input relay ^{*1}	-	X0000 to X599F	-
	Output relay ^{*1}	-	Y0000 to Y599F	-
	Internal auxiliary relay	MR00000 to MR99915	M00000 to M15999	-
	Latch relay	LR00000 to LR99915	L00000 to L15999	-
	Control relay	CR0000 to CR3915	CR0000 to CR3915	CR0000 to CR3915
	Timer (contact)	T0000 to T3999	T0000 to T3999	T000 to T511
	Counter (contact)	C0000 to C3999	C0000 to C3999	C000 to C511
	CTC (contact) ^{*2}	CTC0 to CTC3	CTC0 to CTC3	CTC0 to CTC3
	Data memory ^{*3}	DM0000000 to DM6553415	D0000000 to D6553415	DM0000000 to DM3999915
Word device	Extended data memory ^{*3}	EM0000000 to EM6553415	E0000000 to E6553415	-
	Extended data memory ^{*3}	FM0000000 to FM3276615	F0000000 to F3276615	-
	Relay ^{*4}	00000 to 59900	R00000 to R59900	00000 to 59900
	Input relay	-	X0000 to X5990 ^{*5}	-
	Output relay	-	Y0000 to Y5990 ^{*5}	-
	Internal auxiliary relay	MR00000 to MR99900 ^{*4}	M00000 to M15984 ^{*6}	-
	Latch relay [*]	LR00000 to LR99900 ^{*4}	L00000 to L15984 ^{*6}	-
	Control relay ^{*4}	CR0000 to CR3900	CR0000 to CR3900	CR0000 to CR3900
	Trimmer ^{*7}	TRM0 to TRM7	TRM0 to TRM7	TRM0 to TRM7
	Timer (set value)	TS0000 to TS3999	TS0000 to TS3999	TS000 to TS511
	Timer (current value)	TC0000 to TC3999	TC0000 to TC3999	TC000 to TC511
	Counter (set value)	CS0000 to CS3999	CS0000 to CS3999	CS000 to CS511
	Counter (current value)	CC0000 to CC3999	CC0000 to CC3999	CC000 to CC511
	High-speed counter (current value)	CTH0 to CTH1	CTH0 to CTH1	CTH0 to CTH1
	CTC (set value)	CTC0 to CTC3	CTC0 to CTC3	CTC0 to CTC3
	Data memory	DM00000 to DM65534	D00000 to D65534	DM00000 to DM39999
	Extended data memory	EM00000 to EM65534	E00000 to E65534	-
	Extended data memory	FM00000 to FM32766	F00000 to F32766	-
	Control memory	CM00000 to CM11998	CM00000 to CM11998	CM0000 to CM3999
	Temporary data memory	TM000 to TM511	TM000 to TM511	TM000 to TM511
	Index register	Z1 to Z12	Z1 to Z12	-

^{*1} low-order 1 digit becomes "0 to F".^{*2} The high-speed counter comparator of a bit device is read only.^{*3} Low-order 2 digits become "00 to 15".^{*4} Low-order 2-digit becomes "00".^{*5} Low-order 1-digit becomes "0".^{*6} Only numbers divisible by 16 can be set.^{*7} Only reading is possible.

■ KV Nano Series [KV-N*], KV Nano Series [KV-N*] <XYM>
 KV Nano Series [KV-N*] (Ethernet), KV Nano Series [KV-N*] (Ethernet) <XYM>

	Device	KV Nano	KV Nano <XYM>
Bit device	Relay	R00000 to R59915	R00000 to R59915
	Input relay	-	X0000 to X599F
	Output relay	-	Y0000 to Y599F
	Internal auxiliary relay	MR00000 to MR59915	M0000 to M9599
	Latch relay	LR00000 to LR19915	L0000 to L3199
	Control relay	CR0000 to CR8915	CR0000 to CR8915
	Timer (contact)	T000 to T511	T000 to T511
	Counter (contact)	C000 to C255	C000 to C255
	CTC (contact) ^{*1 *6}	CTC0 to CTC7	CTC0 to CTC7
	Data memory ^{*2}	DM0000000 to DM3276715	D0000000 to D3276715
	Control memory ^{*2}	CM0000000 to CM899915	CM0000000 to CM899915
	Temporary data memory ^{*2}	TM00000 to TM51115	TM00000 to TM51115
	Link relay	B0000 to B1FFF	B0000 to B1FFF
	Work relay	VB0000 to VB1FFF	VB0000 to VB1FFF
	Link register	W00000 to W3FFFF	W00000 to W3FFFF
	Work memory ^{*2}	VM0000000 to VM999915	VM0000000 to VM999915
Word device	Relay ^{*3}	R00000 to R59900	R00000 to R59900
	Input relay	-	X0000 to X5990
	Output relay	-	Y0000 to Y5990
	Internal auxiliary relay ^{*3}	MR00000 to MR59900	M0000 to M9584
	Latch relay ^{*3}	LR00000 to LR19900	L0000 to L3184
	Control relay ^{*3}	CR0000 to CR8900	CR0000 to CR8900
	Timer (set value)	TS000 to TS511	TS000 to TS511
	Timer (current value)	TC000 to TC511	TC000 to TC511
	Counter (set value)	CS000 to CS255	CS000 to CS255
	Counter (current value)	CC000 to CC255	CC000 to CC255
	High-speed counter (current value) ^{*6}	CTH0 to CTH3	CTH0 to CTH3
	CTC (set value) ^{*6}	CTC0 to CTC7	CTC0 to CTC7
	Data memory	DM00000 to DM32767	D00000 to D32767
	Control memory	CM00000 to CM8999	CM00000 to CM8999
	Temporary data memory	TM000 to TM511	TM000 to TM511
	Index register ^{*5}	Z1 to Z12	Z1 to Z12
	Link relay	B0000 to B1FF0	B0000 to B1FF0
	Work relay	VB0000 to VB1FF0	VB0000 to VB1FF0
	Link register	W00000 to W3FFF	W00000 to W3FFF
	Work memory	VM00000 to VM9999	VM00000 to VM9999

*1 The high-speed counter comparator of a bit device is read only.

*2 Low-order 2 digits become "00 to 15".

*3 Low-order 2-digit becomes "00".

*4 Only reading is possible.

*5 The index register is a 2-word device.

*6 The KV-1000 Series index register is a 1-word device so if moved from the KV-1000 to a KV Nano Series model, it will become an unset device.

*7 Available models are restricted according to the product model. Check the specifications for the respective model.

1-5 Available Devices

■ KZ-10/16/24/40/80, KZ-300/350, KV-10/16/24/40, KV-P series

Device		Address			
		KV-10/16/24/40, KV-P	KZ-300/350	KZ-24/40/80	KZ-10/16
Bit Devices	I/O relay	00000 to 00915 07000 to 17915		00000 to 00915	
	Internal auxiliary relay	01000 to 01915, 03000 to 06915		01000 to 01915	
	Special auxiliary relay ^{*1}	02000 to 02915			
	Timer (contact)	T000 to T249		T000 to T119	T000 to T063
	Counter (contact)	C000 to C249		C000 to C119	C000 to C063
	High-speed counter comparator (contact) ^{*2}	CTC0 to CTC3			
Devices	I/O relay ^{*3}	00000 to 00900 07000 to 17900		-	
	Internal auxiliary relay ^{*3}	01000 to 01900, 03000 to 06900		-	
	Analog trimmer ^{*4}	-	AT0 to AT1		AT0
	Digital trimmer	AT0 to AT1	-		
	Timer (set)	TS000 to TS249		TS000 to TS119	TS000 to TS063
	Timer (current)	TC000 to TC249		TC000 to TC119	TC000 to TC063
	Counter (set)	CS000 to CS249		CS000 to CS119	CS000 to CS063
	Counter (current)	CC000 to CC249		CC000 to CC119	CC000 to CC063
	High-speed counter (current)	CTH0 to CTH1			
	High-speed counter comparator (Setup Value)	CTC0 to CTC3			
	Data memory	DM0000 to DM1999	DM0000 to DM9999	DM0000 to DM1999	DM0000 to DM0999
	Temporary data memory	TM00 to TM31			

^{*1} An error response is sometimes returned when the special auxiliary relay is written to.

^{*2} Only reading is possible on the high-speed counter comparator for bit devices.

^{*3} Lower two digits become "00".

^{*4} Read-only.

■ KZ-A500, KZ-L10

Device		Address	
		KZ-A500 (PLC port direct link)	KZ-L10
Bit Devices	Input relay	X000000 to X0007FF	
	Output relay	Y000000 to Y0007FF	
	Internal relay	M000000 to M008191	
	Latch relay	L000000 to L008191	
	Link relay	B000000 to B000FFF	
	Internal auxiliary relay	-	
	Special auxiliary relay	-	
	Timer (contact)	TS00000 to TS02047	
	Timer (coil)	TC00000 to TC02047	
	Counter (contact)	CS00000 to CS01023	
	Counter (coil)	CC00000 to CC01023	
	High-speed counter comparator	-	
Word Devices	Input relay ¹	X000000 to X0007F0	
	Output relay ¹	Y000000 to Y0007F0	
	Internal relay ²	M000000 to M008176	
	Latch relay ²	L000000 to L008176	
	Link relay ¹	B000000 to B000FF0	
	Data register (data memory)	D000000 to D006143	
	Link register	W000000 to W000FFF	
	File register	-	R000000 to R008191
	Internal auxiliary relay	-	
	Temporary data memory	-	
	Digital trimmer	-	
	Timer (set)	-	TX00000 to TX00255
	Timer (current)	TN00000 to TN02047	
	Counter (set)	-	CX00000 to CX00255
	Counter (current)	CN00000 to CN01023	
	High-speed counter (current)	-	
	High-speed counter comparator (set)	-	

*1 Lower one digit becomes "0".

*2 Value divisible by 16

1-6 Error Messages and Remedies

This section describes communication errors occurring in VT5/VT3 Series, Soft-VT and KV, KZ Series connections.

List of Communication Errors in Serial Connections

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Details of the communication error[**]", page 1-34.
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The following error messages may appear when a PLC is connected via the Ethernet. Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when a communications error occurs.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	<ul style="list-style-type: none"> Turn the VT3 unit OFF, mount VT2-E1/E2/VT3-E3, and then turn VT3 ON again.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[**(++)]	There was not error response** from PLC No.++.	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals.
Ethernet unit not support(++) ^{*1}	The used CPU unit and Ethernet unit do not support read/write operation of expansion unit buffer memory (support bank).	Please use the products manufactured after Sep 12, 2008.
communications error [Unit not support] ^{*1}	The read source of a defined device expansion unit buffer memory (support bank) or write destination unit does not support bank.	Please check device No. or unit configuration.

- *
 - When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 - For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

- *1 Be sure to use expansion unit buffer memory (that support banks) that have been manufactured after September 12, 2008 with the KV-5000 and KV-LE20V.

Details of the communication error[**]

This section describes the PLC communications errors that occur when a KV or KZ series PLC is connected.

■ KV-7000 Series (serial), KV-7000 Series (serial) <XYM>, KV-5500/5000/3000/L2*V, KV-5500/5000/3000/L2*V <XYM>, KV-1000/700, KV-L20*/L21V, KV-1000, KV-L20*/L21V <XYM> Connections

Error messages	Cause	Measures
PLC communications error [01]	A model other than KV-700 or KV-L20 is selected as the target PLC specified on VT STUDIO.	Please select the target PLC from KV-1000/700, KV-L20(R), KV-1000, and KV-L20R<XYM>
PLC communications error [02]	When KV-700-specific extended memory (OP-42138) is not installed, devices beyond the DM20000 is limited to the VT5/VT3/Soft-VT/DT.	Please install the KV-700-specific extended memory (OP-42138) or specify the devices between DM00000 to 19999.
PLC communications error [04]	In KV-700, the above devices cannot be used when accessing 40000 to 65534 of MR, LR, EM, FM, Z, and DM; 512 to 3999 of T/C, TS, TC, CS, and CC; and 4000 to 11998 of CM.	Cannot use the device.  page 1-38
PLC communications error [1D]	The Baud rate in the communication conditions specified for the VT5/VT3/Soft-VT/DT cannot be specified for the KV Series.	Please change the set baud rate value.
PLC communications error [31]	An attempt is being made to change the counter, timer or CTC set values on a write-protected program on the KV unit.	Remove the write-protection from the program on the KV unit before changing set values.
PLC communications error [49]	The devices (the counter, timer, CTH and CTC) specified with the VT5/VT3/Soft-VT/DT have not been defined in the KV program.	Define the devices specified with the VT5/VT3/Soft-VT/DT in the KV program.
communications error [Unit not support]	The unit that is the read source or write destination for the drawn device (expansion unit buffer memory) does not exist.	Correct the device number.
	The read source of a defined device expansion unit buffer memory (support bank) or write destination unit does not support bank.	Please check device No. or unit configuration.



For DT-100 (A)

Can be confirmed through the "Main Unit Monitor" in DT BUILDER and "Error States" in the WEB server.

For DT-500/80 (A)

Can be confirmed through the "Main Unit Monitor" in DT STUDIO and "Error States" in the WEB server.

■ KV-7000 Series (KV-LM2*V), KV-7000 Series (KV-LM2*V) <XYM>, KV-5500/5000/3000 (KV-LM2*V), KV-5500/5000/3000 (KV-LM2*V) <XYM>, KV-1000/700 (KV-LM20*/21V), KV-1000 (KV-LM20*/21V) <XYM> Connections

Description	Cause	Measures
PLC communications error [01]	Other connected VT5/VT3 is set as the master station (Station Number 0) of VT2 Multi-Link.	Correctly select the target PLC for the VT5/VT3/Soft-VT and set "Multi-Link" to "Not Used" in the System Mode Window.
PLC communications error [02]	The drawn device doesn't exist in the PLC.	Please modify the device number.
PLC communications error [1D]	An attempt is being made to change the counter, timer or CTC set values on a write-protected program on the unit.	Please disable the write protection of the PLC before changing the set value.
PLC communications error [31]	The drawn device (the counter, timer, CTH, and CTC) is not defined in the program.	Define the devices specified with the VT5/VT3/Soft-VT/DT in the KV program.
PLC communications error [49]	The unit that is the read source or write destination for the drawn device (expansion unit buffer memory) does not exist.	Correct the device number.

■ When KV Nano Series [KV-N*] or KV Nano Series [KV-N*]<XYM> is connected

Description	Cause	Measures
PLC communications error [01]	A model other than KV Nano Series is selected as the target PLC specified on VT STUDIO.	Please select the target PLC from KV Nano Series
PLC communications error [02]	A device type or device number in a range that cannot be used with the connected model is specified.	Correct the device type or device number.
PLC communications error [04]	The communication speed in the communication conditions specified for the VT5/VT3/DT cannot be specified for the KV Series.	Please change the set baud rate value.
PLC communications error [1D]	An attempt is being made to change the counter, timer or CTC set values on a write-protected program on the KV unit.	Remove the write-protection from the program on the KV unit before changing set values.
PLC communications error [31]	The devices (the counter, timer, CTH and CTC) specified with the VT5/VT3/Soft-VT/DT have not been defined in the KV program.	Define the devices specified with the VT5/VT3/Soft-VT/DT in the KV program.
PLC communications error [49]	The unit that is the read source or write destination for the drawn device (expansion unit buffer memory) does not exist.	Correct the device number.

■ When a KZ series, KV-10/16/24/40 or KV-P series is connected

Error messages	Cause	Measures
PLC communications error [02]	The VT3 and DT are run continuously without a program registered to the KZ, KV unit.	Register the program to the KZ, KV unit, and connect and run the VT3 and DT.
PLC communications error [04]	The device (relay, counter, timer, DM, CTH or CTC) specified by the VT3 and DT are not defined in the program on the KZ, KV.	Define the device specified on the VT3 and DT in the program.
PLC communications error [13]	An attempt is being made to change the counter, timer or CTC set values on a write-protected program on the KZ, KV unit.	Remove the write-protection from the program on the KZ, KV unit before changing set values.

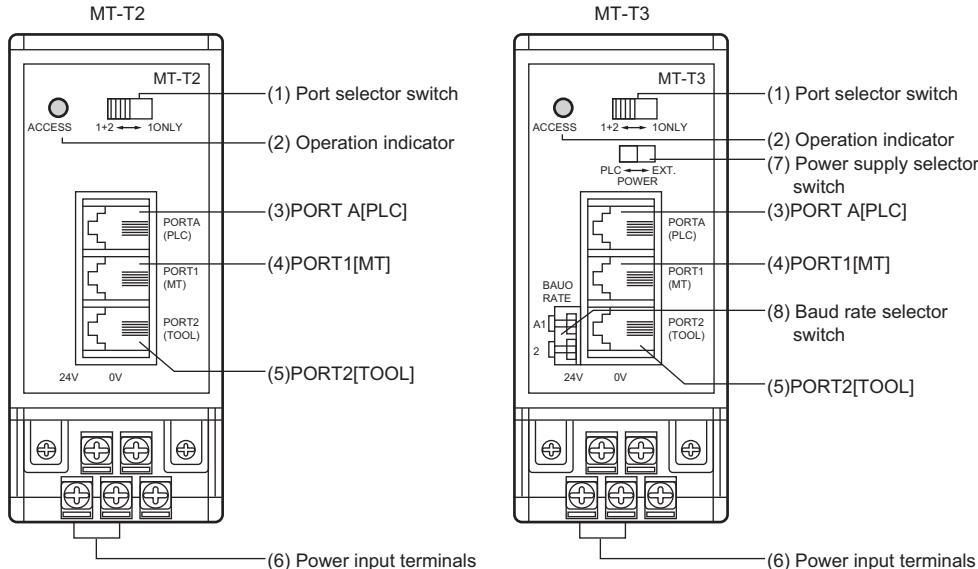
1-7 About the 2-port Adapter MT-T2/T3

The following describes the 2-port Adapter MT-T2/T3 for the KZ series.



Not supported by the VT5 Series/Soft-VT.

Names of Parts



(1) Port selector switch

When only PORT2 [MT] (connected with VT3) is used, please choose "1 ONLY"; when both PORT 1 [MT] (connected with VT3) and PORT2 [TOOL] (connected with application tool) are used, please choose "1 + 2".

(2) Operation indicator

Indicates the operation state.

Blinking (green): Blanks when communications is being performed on PORT1[MT].

Blinking (red): Blinks when communications is being performed on PORT2[TOOL].

Lit (orange): Lights when MT-T2 is not connected to the PLC. (MT-T2 only).

(3) PORTA [PLC]

Connect to PLC using the PLC connector cable provided with the VT series.

(4) PORT1 [MT]

Connected with VT3.

(5) DPORT2 [TOOL]

Can be used for connecting to the programming console or ladder software running on a personal computer using the connector cable provided with the VT2 series.

(6) Power input terminals

Supplies 24 VDC power.

(7) Power supply selector switch

Selects whether to use an external power supply or the power supplied from the PLC port.

Be sure to use an external power supply when the distance between the PLC and the MT-T3 exceeds 60 cm.

(8) Baud rate selector switch

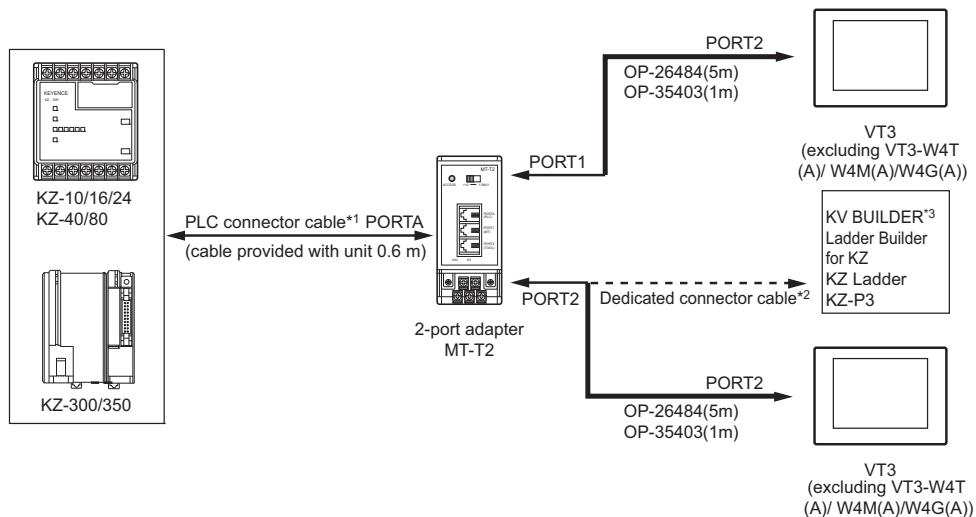
Selects the baud rate of PORTA [PLC], PORT1 [MT] and PORT2 [TOOL].

When a programming console or ladder software is not connected to PORT2, set the port selector switch to "1ONLY".

The following connection is not possible: connector cable connected to PORT1 [MT] or PORT2 [TOOL] on MT-T2/T3, and another MT-T2/T3 connected.

■ Connecting by MT-T2

MT-T2 is used to connect VT3 (excluding VT3-W4T(A)/W4M(A)/W4G(A)) or programming tools to KZ series (excluding KZ-A500).



*1 Connector cable OP-26487 can also be used. (An external power supply is needed for the MT-T2.)

*2

Connected Machine	OP
For PC98	OP-26482 or OP-26487 + OP-26485
For DOS/V machine	OP-26487 + OP-26486
For KZ-P3	OP-26487

Old type OP number	Current type OP number
OP-96368	- OP-26487
OP-96369	- OP-26485
OP-23085	- OP-26482
OP-23086	- OP-26486+OP-26487

*3 KV BUILDER is not supported by KZ-10/16/24/40/80.

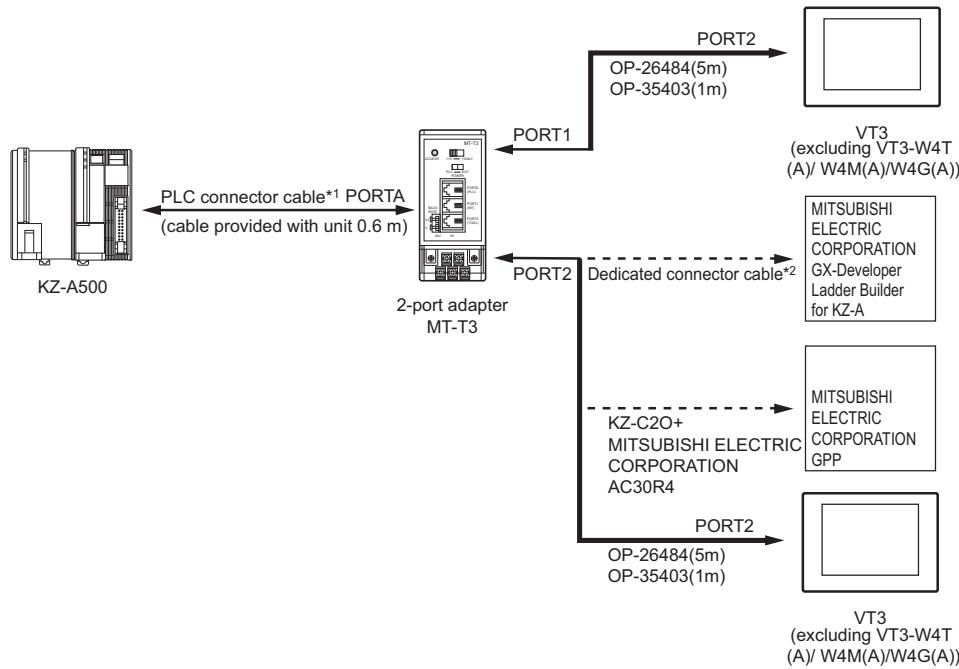
Point

- 2-port adaptor cannot be connected to VT3-W4T (A)/W4M(A)/W4G(A).
- The 2-port adapter cannot be connected to PORT3 of VT3.

1-7 About the 2-port Adapter MT-T2/T3

■ Connecting by MT-T3

MT-T3 is used to connect VT3 (excluding VT3-W4T(A)/W4M(A)/W4G(A)) or programming tools to KZ-A500.



*1 Connector cable OP-26487 can also be used. (An external power supply is needed for the MT-T3.)

*2

Connected Machine	OP	Old type OP number	Current type OP number
For PC98	OP-26482 or OP-26487 + OP-26485	OP-96368 OP-96369	- - OP-26487 OP-26485
For DOS/V machine	OP-26487 + OP-26486	OP-23085 OP-23086	- - OP-26482 OP-26486+OP-26487

Point

- The 2-port adapter cannot be connected to PORT3 of VT3.
- The 2-port adaptor cannot be connected to VT3-W4T (A)/W4M(A)/W4G(A).

How to Use

1 Connect the cable to each modular connector.

2 When using PORT2, set the PORT selector switch to "1+2". In other cases, set to "1ONLY".

Point

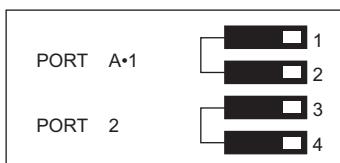
Set the baud rate at "Communication Setting" in the VT3 unit system mode. The VT3 does not operate in the following states when MT-T2 is used.

- When the time chart monitor is being used by the ladder support software
- While the program is being transferred between the KZ and ladder support software

"5-4 PLC Communication Conditions" in the VT3 Series Hardware Manual

3 Set the baud rate by the DIP switch on the top panel of the MT-T3.

The baud rates of PORTA [PLC] and PORT1 [MT] are set in common. The baudrate of PORT2 [TOOL] can be set individually.



	4800bit/s
	9600bit/s
	19200bit/s
	38400bit/s

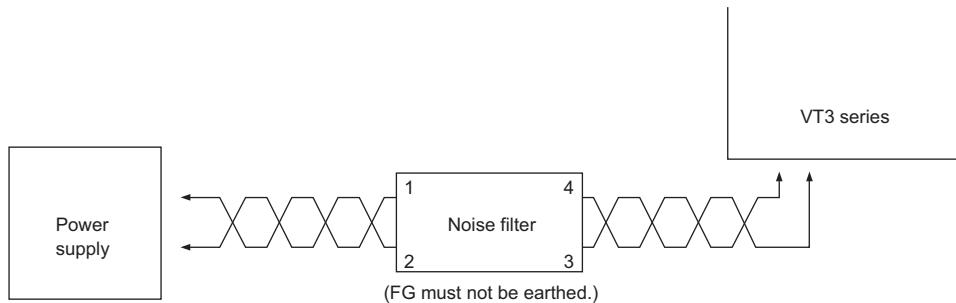
Troubleshooting

If the system does not function properly with the VT3/DT connected to the KZ series and MT-T2/T3, and power is supplied, an error message is displayed on the VT3's screen. In the case of the DT, this can be confirmed by "Unit Monitor" on DT BUILDER and "Error State" on the Web server.

For details on how to remedy error messages, refer to "Troubleshooting".

"Appendix-1 Error Troubleshooting and Removal" in the VT3 Series Hardware Manual

Providing a separate power supply or connecting a noise filter as follows will prove effective as a noise countermeasure.



Specifications

Model No.		MT-T2	MT-T3
Rating	Power voltage	24 VDC+10%-20%	24 VDC+10%-10%
	Power consumption	150 mA max.	250 mA max.
Indicator	2-color communications status LEDs (red: tool, green: MT(VT))		
Operating environment	Withstand voltage	1500 VAC for 1 min (across external terminal and case)	
	Insulating resistance	5 MΩ or more by 500 VDC megger (across power terminal and case)	
	Noise resistance	1500 Vp-p pulse width 1μ sec (by common mode noise simulator) *1	
	Vibrating resistance	10 to 55 Hz peak-to-peak, 1.5 mm, for 2 hours each in X, Y and Z directions	
	Operating atmosphere	Free from excessive dust/dirt and corrosive gases	
	Ambient operating temperature	0 to 55°C	
	Operating surrounding air humidity	35 to 85% RH (condensation not allowed)	
Applicable PLCs	KZ-10, 16, 24, 40, 80, 300, 350		KZ-A500

* The specification values vary according to the system configuration and wiring method.

*1 The power supplied from PORT2 [TOOL] on the MT-T3 is 5 V 400 mA or less.

CONNECTING TO MITSUBISHI ELECTRIC CORPORATION PLCs

This chapter describes how to connect to a PLC made by MITSUBISHI ELECTRIC CORPORATION.

2-1	Checking Operation before Connection	2-2
2-2	System Configuration.....	2-6
2-3	Wiring Diagrams for Connections	2-19
2-4	Unit Settings.....	2-34
2-5	Available Devices	2-62
2-6	Error Messages and Troubleshooting	2-73
2-7	About the 2-port Adapter MT-T1	2-75

2-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/Soft-VT/DT and PLC via serial interface or Ethernet.

For the connection of other interfaces (Multi-Link or VT2 Multi-Link), see each chapter.

- "Chapter 19 MULTI-LINK"
- "Chapter 20 VT2 MULTI-LINK"

(1) Make sure the PLC, link unit and Ethernet unit can be connected to VT5, VT3, Soft-VT and DT.

(2) Check whether or not a CPU, link unit or Ethernet settings are required.

(3) Confirm the name of the model to set as the target PLC.

Be sure to check the above 3 points before connecting to PLC.

- "Procedure before Starting Communication", page 18

Serial connections

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
	Q00UJCPU Q00UCPU Q01UCPU Q02UCPU Q03UDCPU Q04UDHCPU Q06UDHCPU Q10UDHCPU Q13UDHCPU Q26UDHCPU	PLC port direct link	Not required ^{*8}	QnU Series CPU direct link ^{*10}
MELSEC-Q	Q00JCPU Q00CPU Q01CPU Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU Q00UJCPU Q00UCPU Q01UCPU Q02UCPU Q03UDCPU Q04UDHCPU Q06UDHCPU Q10UDHCPU Q13UDHCPU Q26UDHCPU Q03UDECPU Q04UDEHCPU Q06UDEHCPU Q10UDEHCPU Q03UDVCPU Q04UDVCPU Q06UDVCPU	QJ71C24 QJ71C24-R2 QJ71CMO QJ71C24N QJ71C24N-R2 QJ71C24N-R4	□ P.2-34	Q Series (Q mode) computer link ^{*10}
	Q00CPU Q01CPU	RS-232C connector (PLC port)	□ P.2-34 Not required	Q Series (Q mode) computer link ^{*10} QUTE Series CPU direct link ^{*10}
	Q00JCPU	RS-232C connector (PLC port)	Not required	QUTE Series CPU direct link ^{*10}
	Q02CPU Q02HCPU Q06HCPU	PLC port direct link	Not required	Q Series (Q mode) CPU direct link ^{*10}
	Q02CPU-A Q02HCPU-A Q06HCPU-A	PLC port direct link	Not required	Q Series (A mode) CPU direct link ^{*9,*10}
	A1SJ71(U)C24-R2 A1SJ71(U)C24-R4 A1SJ71(U)C24-PRF	□ P.2-38	Q Series (A mode) computer link ^{*9,*10}	
MELSEC-L	L02CPU L26CPU-BT	LJ71C24 LJ71C24-R2	□ P.2-34	L Series computer link ^{*10}

2-1 Checking Operation before Connection

Series Name	CPU	Connection Methods	Unit Setting	Target PLC	
MELSEC-F	FX1,FX2,FX2C	PLC port direct link ^{*4}	Not required 	FX Series ^{*9 *10} 	
	FX0,FX0N,FX0S	PLC port direct link ^{*3}			
	FX1S	PLC port direct link ^{*3}			
		FX1N-422-BD			
	FX1NC,FX2NC	FX1N-232-BD		FX Series ^{*9 *10} FX Series computer link ^{*6 *10}	
		PLC port direct link ^{*3}	Not required	FX1N/2N Series ^{*9 *10}	
		FX0N-232ADP ^{*5}		FX1N/2N Series ^{*9 *10} FX Series computer link ^{*6 *10}	
	FX1N,FX2N	FX1N-422-BD	Not required	FX1N/2N Series ^{*9 *10}	
		FX1N-232-BD		FX1N/2N Series ^{*9 *10} FX Series computer link ^{*6 *10}	
		FX2N-232-BD			
		FX2N-422-BD			
MELSEC-F	FX3U	PLC port direct link ^{*3}	Not required	FX3 Series ^{*10}	
		FX3U-422-BD		FX3 Series ^{*10} FX Series computer link ^{*6 *10}	
		FX3U-232-BD			
		FX3U-232ADP			
	FX3UC	PLC port direct link ^{*3}	Not required	FX3 Series ^{*10}	
		FX3U-422-BD			
		FX3U-232-BD			
		FX3U-232ADP			
	FX3G	PLC port direct link ^{*3}	Not required	FX3 Series ^{*10}	
		FX3G-422-BD		FX3 Series ^{*10} FX Series (computer link) ^{*6 *10}	
		FX3G-232-BD			
		FX3G-232ADP ^{*7}			
MELSEC-AnS	FX3GC	PLC port direct link ^{*3}	Not required	FX3 Series ^{*10}	
		FX3U-232ADP		FX Series (computer link) ^{*6 *10}	
		PLC port direct link ^{*3}	Not required	FX3 Series ^{*10}	
		FX3G-422-BD			
	FX3S	FX3G-232-BD			
		FX3U-232ADP ^{*11}			
		PLC port direct link ^{*3}	Not required		
	A1S,A1SH,A1SJ, A1SJH,A2S,A2SH, A171S,A171SH	A1SJ71(U)C24-R2		A Series CPU direct link ^{*9 *10} AnN Series computer link ^{*9 *10}	
		A1SJ71(U)C24-R4			
		A1SJ71(U)C24-PRF			
		VT-L16CA(A-MODE)		VT-L16CA(A mode) ^{*1 *9 *10}	
MELSEC-A2C	A1SCPUC24-R2	PLC port direct link	Not required	A Series CPU direct link ^{*9 *10}	
		Computer Link Port		A Series computer link ^{*9 *10}	
		VT-L16CA(A-MODE)		VT-L16CA(A mode) ^{*1 *9 *10}	
		PLC port direct link	Not required	A Series CPU direct link ^{*9 *10} AnA Series computer link ^{*9 *10}	
	A2US,A2USH	A1SJ71(U)C24-R2			
		A1SJ71(U)C24-R4			
		A1SJ71(U)C24-PRF			
		VT-L16CA(A-MODE)		VT-L16CA(A mode) ^{*1 *9 *10}	
	A2CCPUC24(-PRF)	Computer Link Port		AnN Series computer link ^{*9 *10}	
MELSEC-A0J2	A0J2,A0J2H	PLC port direct link ^{*2}	Not required	A Series CPU direct link ^{*9 *10}	
		A0J2-C214-S1		AnN Series computer link ^{*9 *10}	
		VT-L16CA(A-MODE) ^{*2}		VT-L16CA(A mode) ^{*1 *9 *10}	
MELSEC-AnN	A1N,A2N,A3N	PLC port direct link	Not required	A Series CPU direct link ^{*9 *10}	
		AJ71C24		AnN Series computer link ^{*9 *10}	
		AJ71C24-S3			
		AJ71C24-S6			
		AJ71C24-S8			
MELSEC-AnA	A2A,A3A	AJ71UC24			
		VT-L16CA(A-MODE)		VT-L16CA(A mode) ^{*1 *9 *10}	
		PLC port direct link	Not required	A Series CPU direct link ^{*9 *10}	
		AJ71C24-S6		AnA Series computer link ^{*9 *10}	
		AJ71C24-S8			
		AJ71UC24			
		VT-L16CA(A-MODE)	VT-L16CA(A mode) ^{*1 *9 *10}		

2-1 Checking Operation before Connection

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
MELSEC-AnU	A2U,A3U,A4U	PLC port direct link	Not required	A Series CPU direct link * ⁹ * ¹⁰
		AJ71C24-S6 AJ71C24-S8 AJ71UC24	P.2-42 P.2-43	AnA Series computer link * ⁹ * ¹⁰
		VT-L16CA(A-MODE)	P.19-14	VT-L16CA(A mode) * ⁹ * ¹⁰
MELSEC-QnA	Q2A	PLC port direct link ³	Not required	QnA Series CPU direct link * ⁹ * ¹⁰
	Q2A,Q2A-S1,Q3A,Q4A	AJ71QC24(N) AJ71QC24(N)-R2 AJ71QC24(N)-R4	P.2-44	QnA Series computer link * ⁹ * ¹⁰
	Q2AS,Q2AS-S1, Q2ASH,Q2ASH-S1	A1SJ71QC24 A1SJ71QC24-R2	P.2-46	

*1 Not supported by the DT series.

*2 A0J2 not supported.

*3 MT-T1 cannot be used.

*4 A cable extension is required when MT-T1 is connected.

*5 The RS instruction cannot be used.

*6 The 32-bit counter (current value) cannot be written.

*7 FX3G-CNV-ADP must be used when FX3u-232ADP is used by FX3G.

*8 Please uncheck the "Use serial communication function" in GX-DEVELOPER.

*9 Not supported by the VT5 Series.

*10 Not supported by Soft-VT.

*11 In order to use FX3u-232-ADP for FX3s, FX3s-CNV-ADP is required.

Ethernet connections

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
MELSEC iQ-R	R04CPU R120CPU	Internal Ethernet port direct link	P.2-56	iQ-R Series (Ethernet)
		RJ71EN71	P.2-56	
MELSEC-Q	FX5U FX5UC	Internal Ethernet port direct link	P.2-56	iQ-F Series (Ethernet)
	Q00JCPU Q00CPU Q01CPU Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU Q00UJCPU Q00UCPU Q01UCPU Q02UCPU Q03UDCPU Q04UDHCPU Q06UDHCPU Q10UDHCPU Q13UDHCPU Q26UDHCPU	QJ71E71	P.2-57	Q Series (Ethernet) QnU Series CPU direct link (Ethernet)
MELSEC-F	Q03UDECPU Q04UDEHCPU Q06UDEHCPU Q10UDEHCPU Q03UDVCPU Q04UDVCPU Q06UDVCPU	QJ71E71-100	P.2-57	Q Series (Ethernet) QnU Series CPU direct link (Ethernet) Q Series (Ethernet) MELSECNET * ¹ * ²
	FX3U	Internal Ethernet port direct link	P.2-57	QnU Series CPU direct link (Ethernet)
	FX3UC	QJ71E71	P.2-57	Q Series (Ethernet) QnU Series CPU direct link (Ethernet)
MELSEC-L	L02CPU L26CPU-BT	Internal Ethernet port direct link	P.2-58	L Series CPU direct link (Ethernet)
MELSEC-F	FX3G	FX3U-ENET-L ³ FX3U-ENET-ADP ⁴ ⁵	P.2-58 P.2-59	FX3 Series (Ethernet)
	FX3GC	FX3U-ENET-L ³ ⁶ FX3U-ENET-ADP ⁴	P.2-58	
	FX3S	FX3U-ENET-ADP ⁷ FX3U-ENET-ADP ⁹ ¹⁰	P.2-59	

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
MELSEC-AnS	A2US A2USH	A1SJ71E71N3-T	 P.2-60	A Series (Ethernet) ^{*1*2}

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

*3 Supported by basic unit Ver. 2.21 or later.

*4 Supported by basic unit Ver. 3.10 or later.

*5 FX3U-CNV-BD, FX3U-232-BD, or FX3U-422-BD is required.

*6 FX3UC-1PS-5V or FX2NC-CNV-IF is required.

*7 Supported by basic unit Ver. 2.00 or later.

*8 FX3G-CNV-ADP is required.

*9 Supported by basic unit Ver. 1.00 or later.

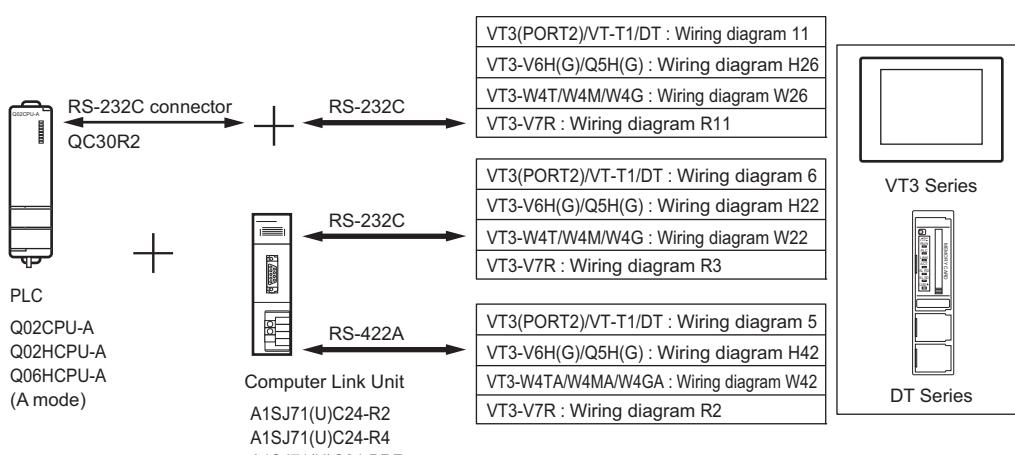
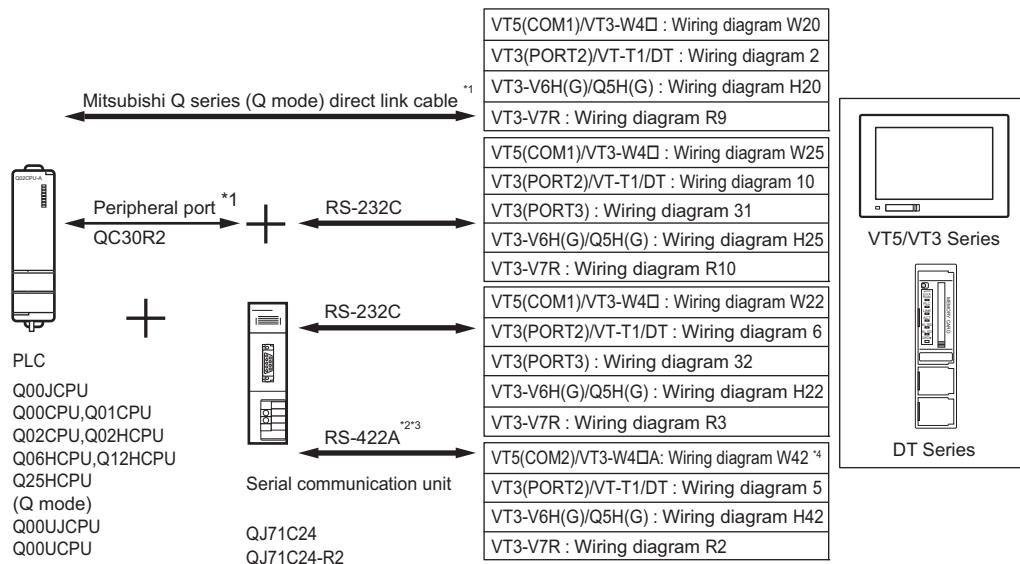
*10 FX3s-CNV-ADP is required.

2-2 System Configuration

This section describes the system configuration of the VT5 Series/VT3 Series/DT Series and a Mitsubishi Electric Corporation PLC.

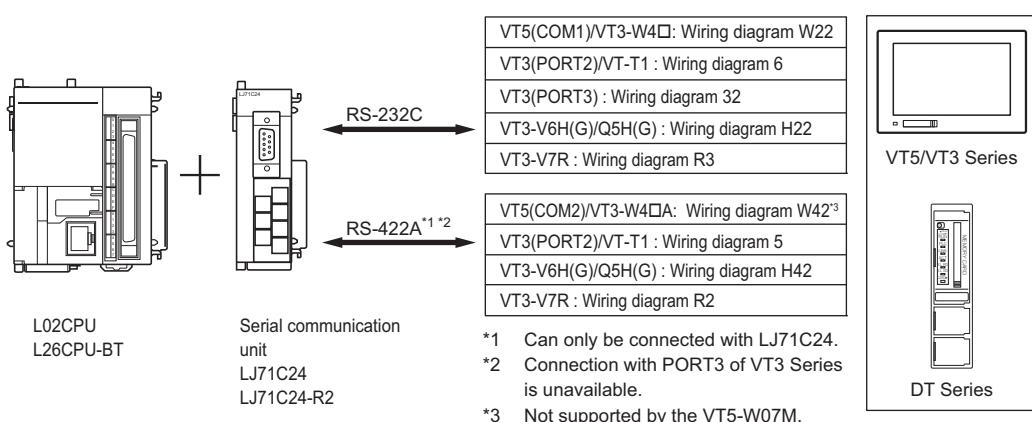
System configuration for serial connections

■ MELSEC-Q Series



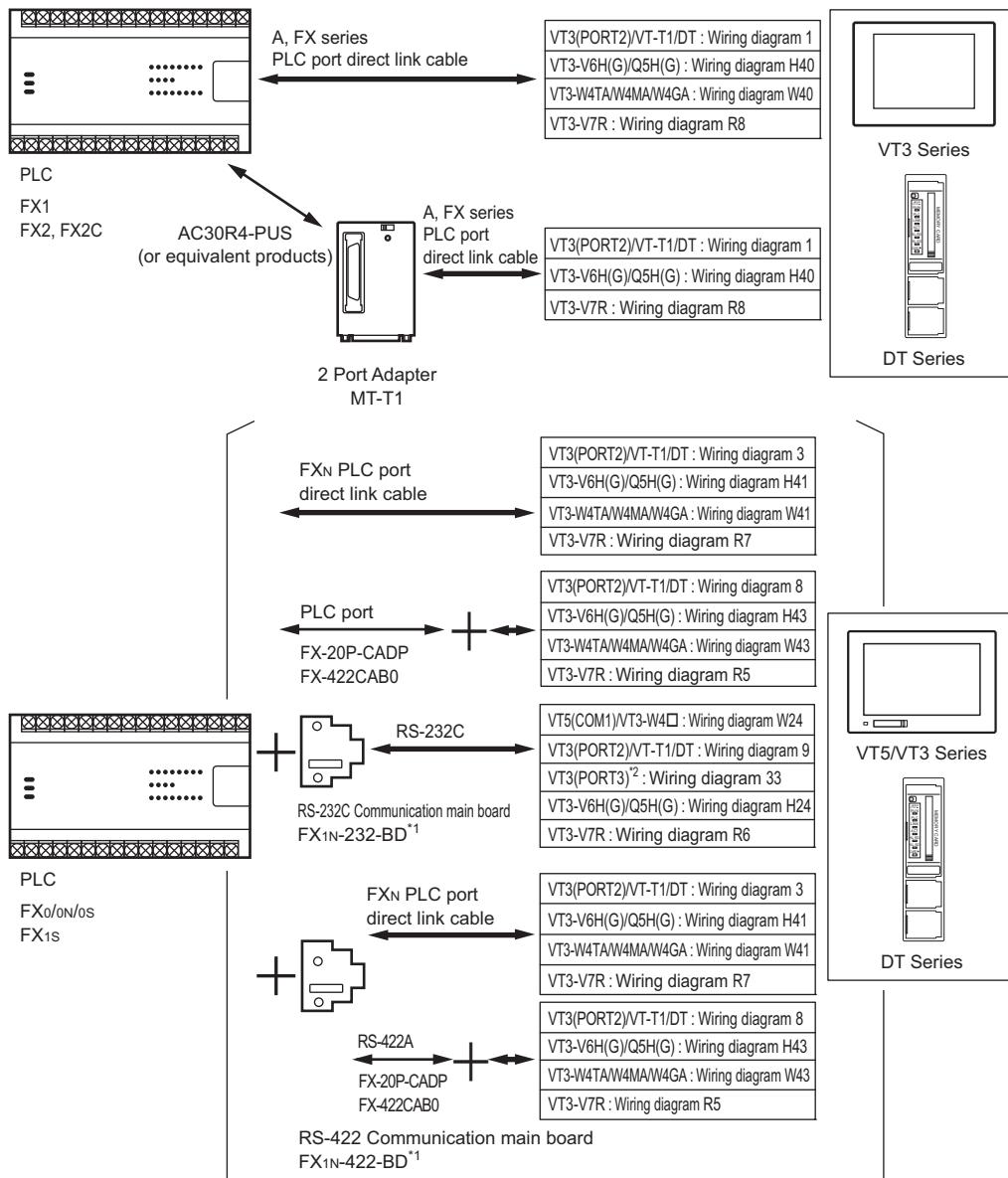
MELSEC-Q series (A mode), cannot be connected to PORT3 of VT3 series.

■ MELSEC-L Series



2-2 System Configuration

■ MELSEC-F Series



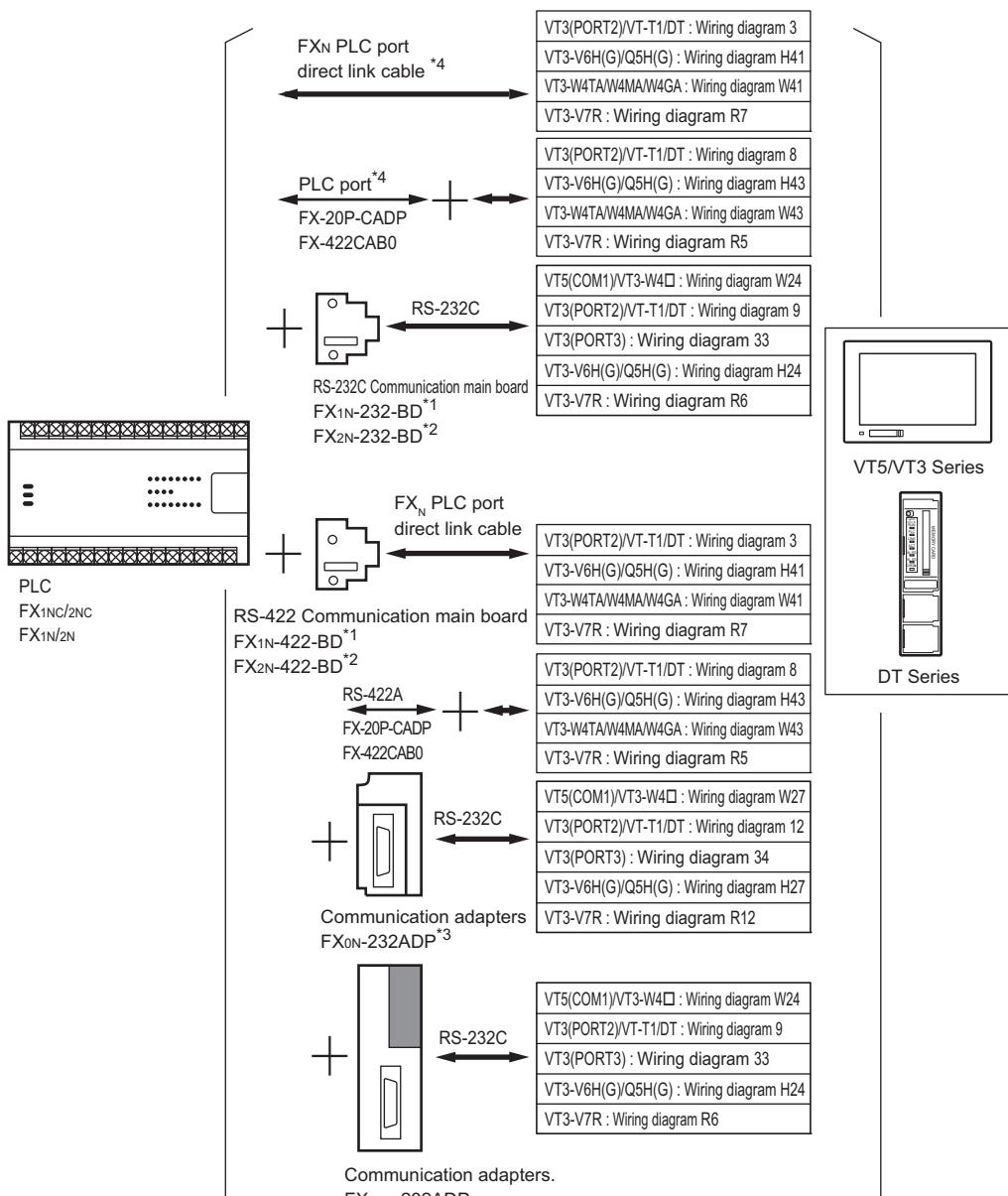
^{*1} FX_{1N}-232-BD/422-BD is only reserved for FX1S/1N.

^{*2} Can be connected only if PLC is FX1S and targeted PLC selects FX series Computer Link.

Point

FX1, FX2, FX2C, FX₀, FX_{OS} series, cannot be connected to VT3 of PORT3.

But can be connected to VT3 of PORT3 only if the FX_{1S} series use the RS-232C communication main board (FX_{1N}-232-BD).



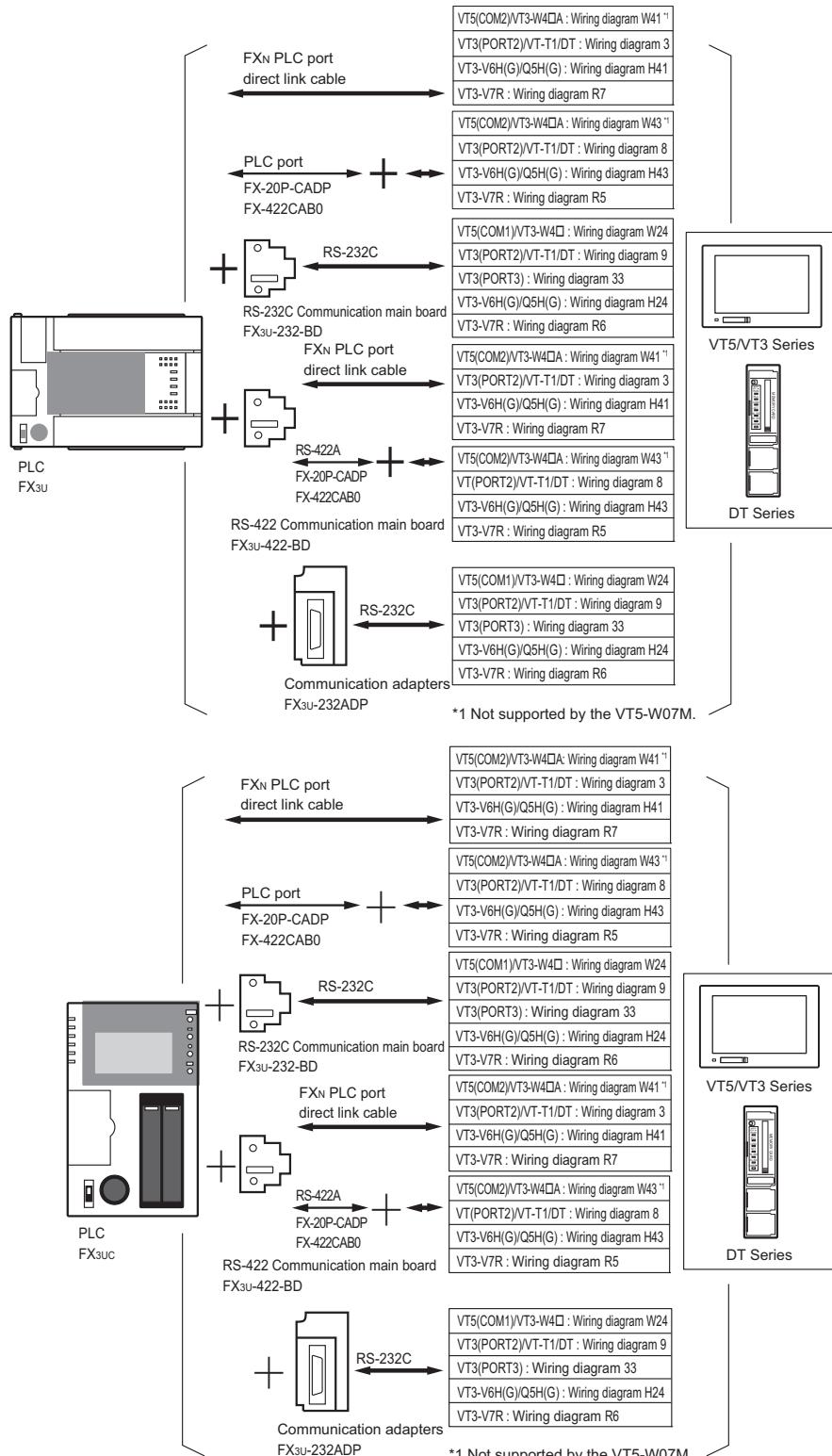
*1 FX1N-232-BD/422-BD is only reserved for FX1S/1N.

*2 FX1N-232-BD/422-BD is only reserved for FX2N.

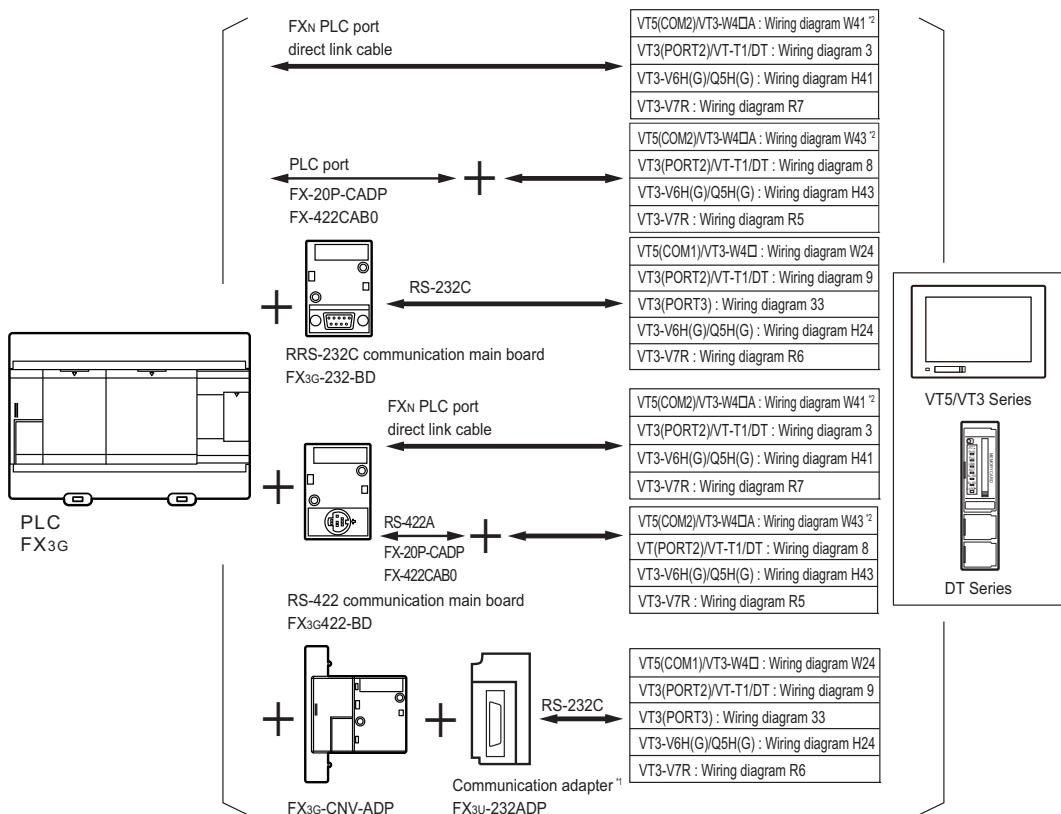
*3 Can only be connected to FX1NC/2NC.

*4 Cannot be connected to PORT3 of the VT3 Series.

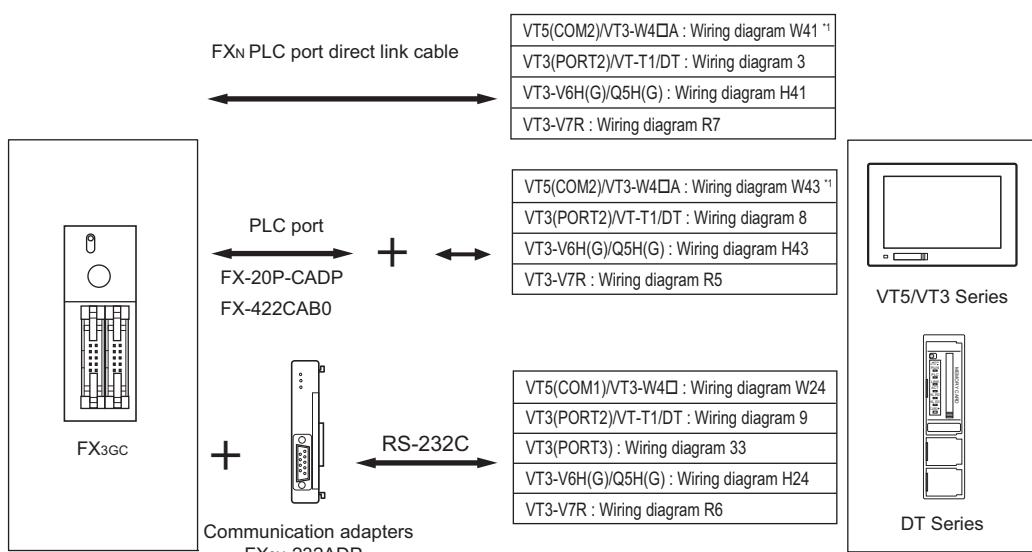
2-2 System Configuration



2-2 System Configuration

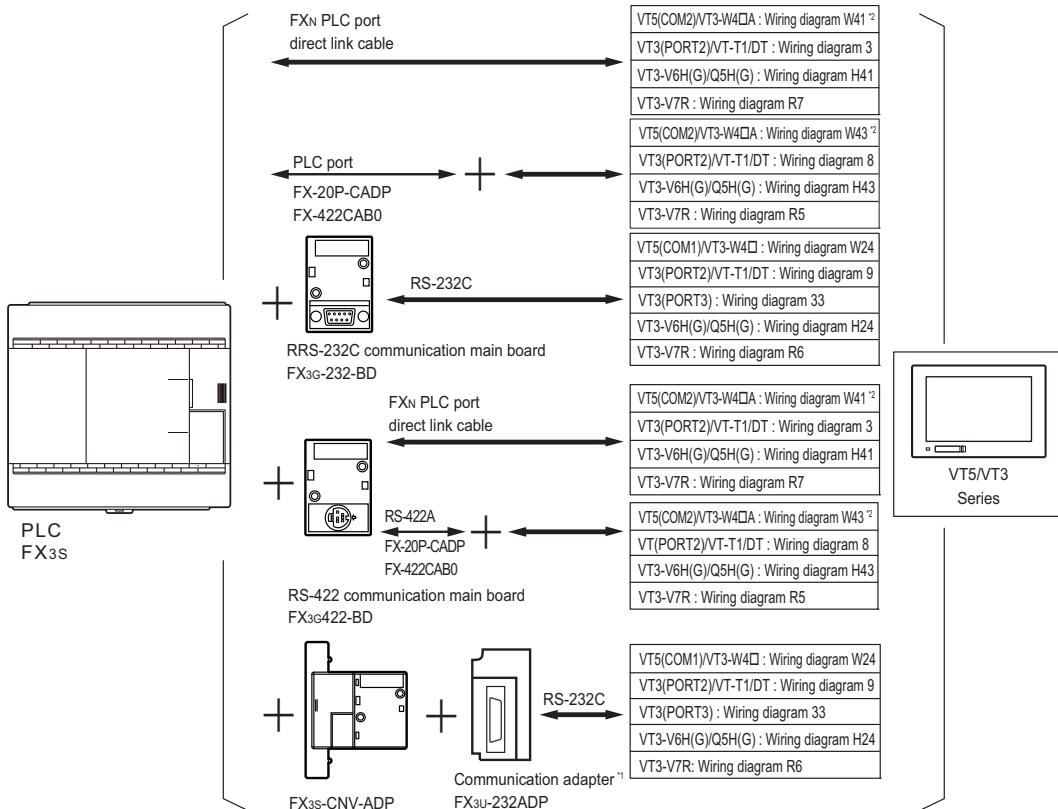


*1 FX3g-CNV-ADP must be used when FX3u-232ADP is used by FX3g.
 *2 Not supported by the VT5-W07M.



*1 Not supported by the VT5-W07M.

2-2 System Configuration



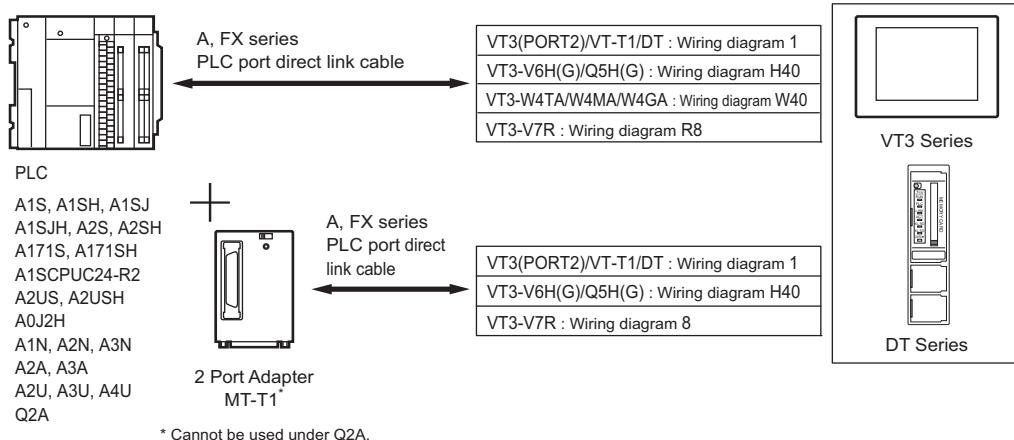
*1 FX3s-CNV-ADP must be used when FX3u-232ADP is used by FX3s.

*2 Not supported by the VT5-W07M.

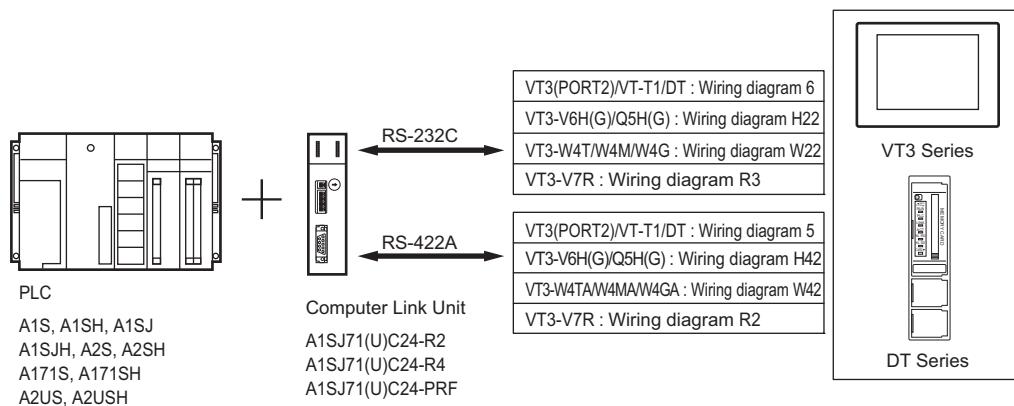


2-port adapter MT-T1 can not be used to connect to FX0, FX0N, FX0S, FX1NC, FX2NC, FX1S, FX1N, FX2N, FX3U, FX3UC, FX3G, FX3GC, and FX3s Series.

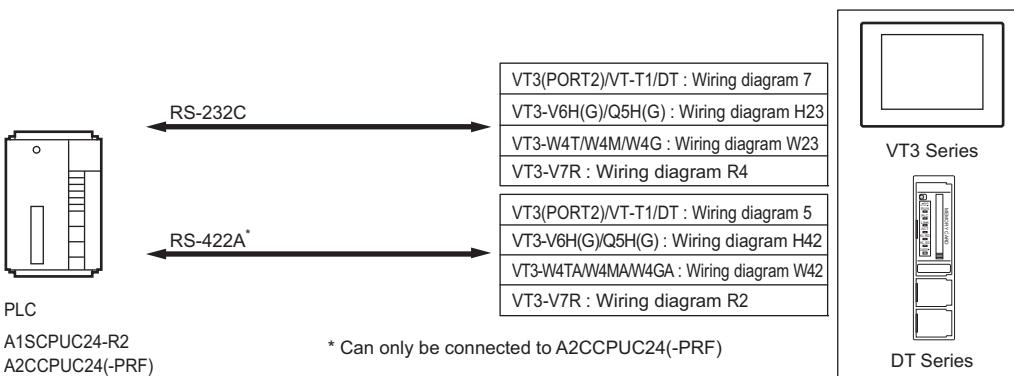
■ MELSEC-AnS, A0J2H, AnN, AnA, AnU, QnA series (PLC port direct link)



■ MELSEC-AnS Series

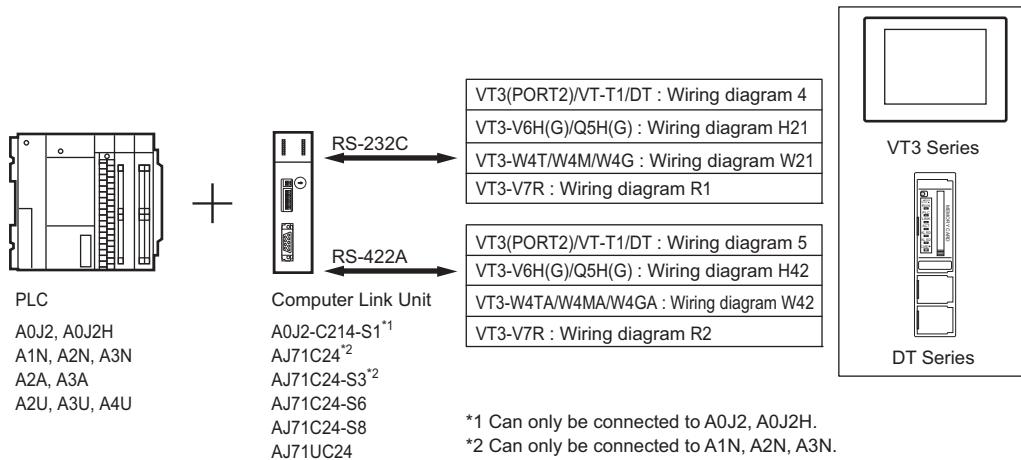


■ MELSEC-AnS, A2C Series

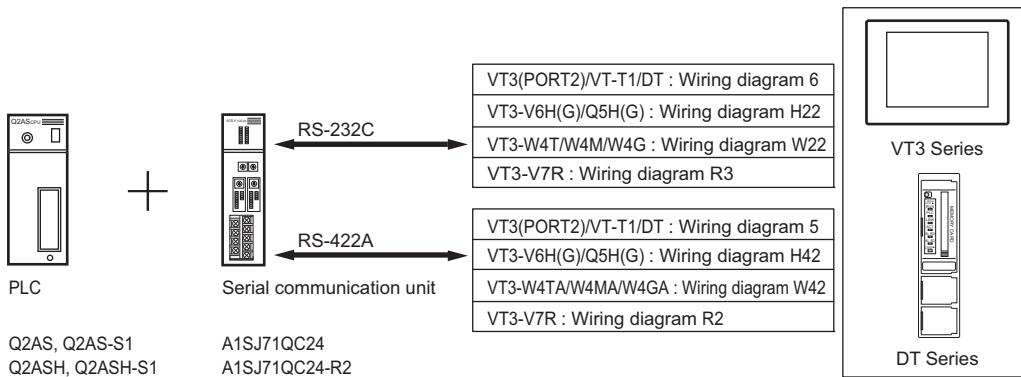
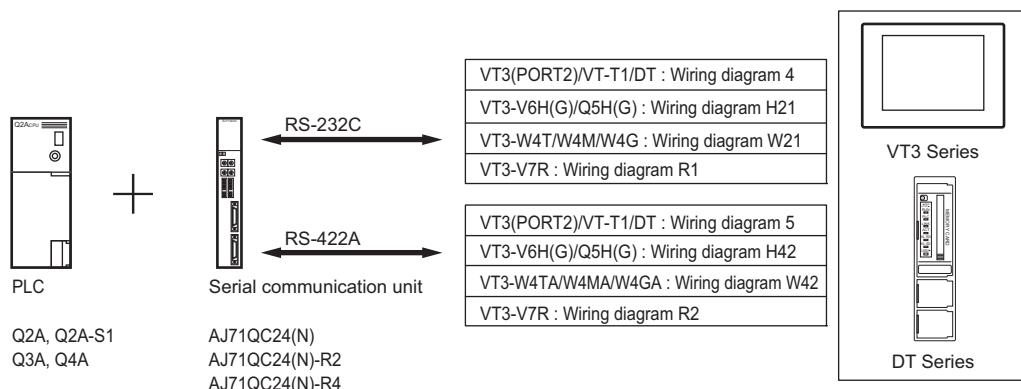


2-2 System Configuration

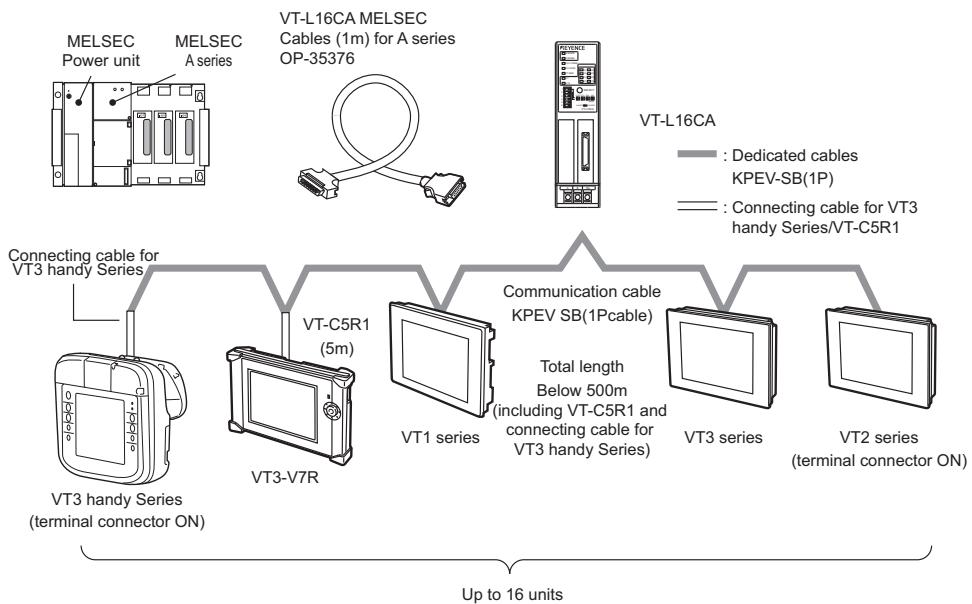
■ MELSEC-A0J2, AnN, AnA, AnU Series



■ MELSEC-QnA Series



■ VT-L16CA (Multi-link Unit)



Point

- The VT5 Series is not supported.
- VT3-W4T/W4M/W4G (RS-232C type) are not supported.
- Not supported by DT series.
- VT3 handy Series can only be connected to both ends of the wiring.
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.



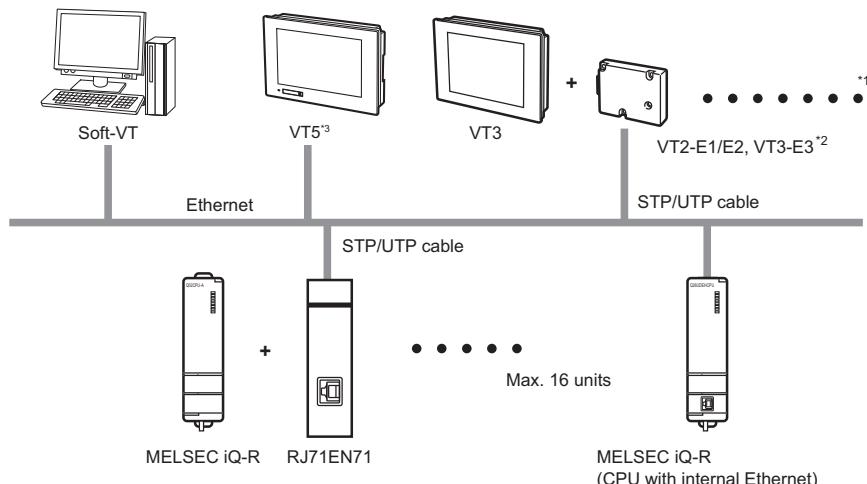
For details on settings and connections, see "Chapter 19 MULTI-LINK"

2-2 System Configuration

System configuration for Ethernet connections

■ MELSEC iQ-R Series

This section describes the system configuration of the VT5/VT3 Series, Soft-VT and the MELSEC iQ-R Series.



*1 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

*2 The VT3 handy Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

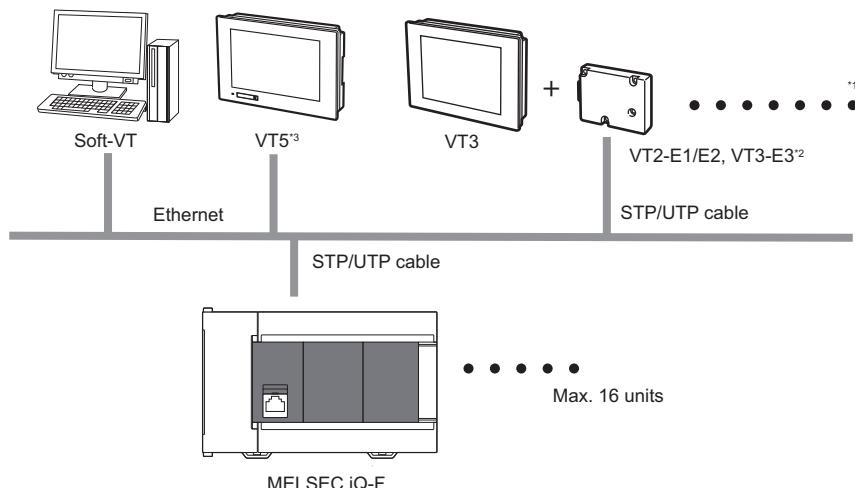
*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

■ MELSEC iQ-F Series

This section describes the system configuration of the VT5/VT3 Series, Soft-VT and the MELSEC iQ-F Series.



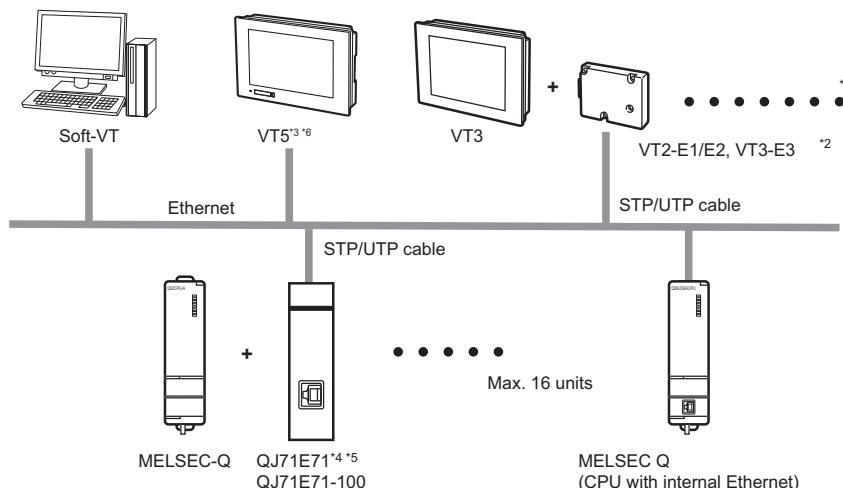
*1 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

*2 The VT3 Handy Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

■ MELSEC-Q Series

This section describes the system configuration of the VT5/VT3 Series, Soft-VT and the MELSEC-Q Series.



*1 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

*4 Use the QJ71E71-100 when multiple VT5/VT3 Series and Soft-VT units are connected.

*5 Please use QJ71E71-100 when connecting multiple VT3 series via MELSECNET.

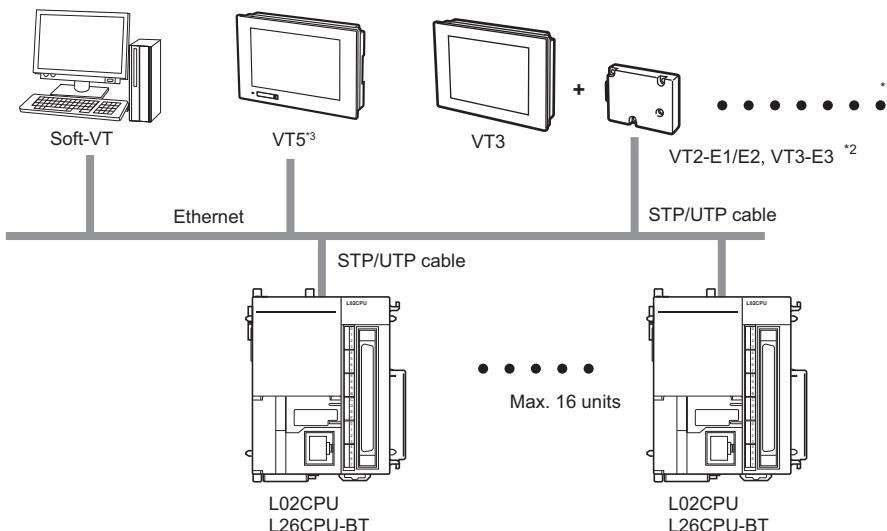
*6 The VT5 Series/Soft-VT do not support connections via the MELSECNET.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

■ MELSEC-L Series

This section describes the system configuration of the VT5/VT3 Series, Soft-VT and the MELSEC-L Series.



*1 Please note that with the increase in the number of VT5 and VT3 Series units connected, the communications load also increases.

*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

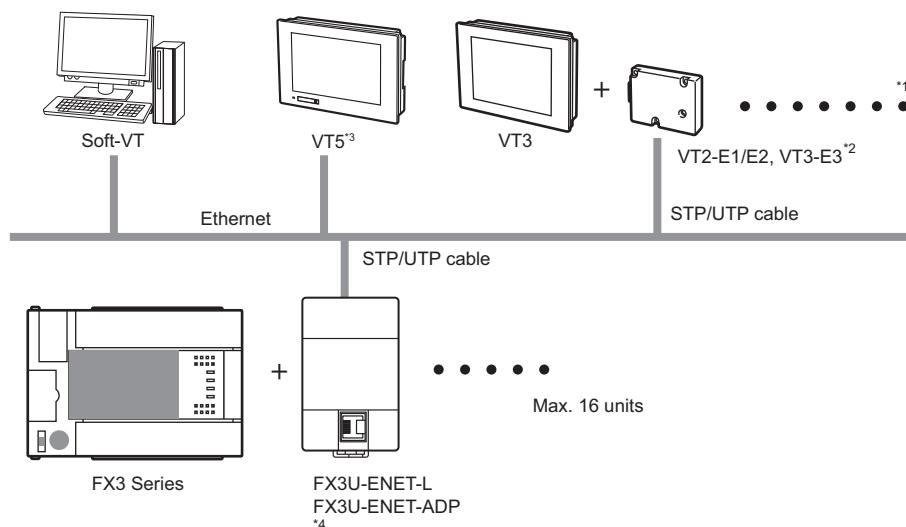


When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

2-2 System Configuration

■ MELSEC-F Series

This section describes the system configuration of VT5/VT3 series, Soft-VT and MELSEC-F series.



*1 When connecting multiple VT5 / VT3 series and Soft-VT, please note that the communication volume increases according to the number of connected units.

*2 VT2-E1 / E2 and VT3-E3 are unnecessary because the VT3 Handy Series has built-in Ethernet function.

*3 VT2-E1 / E2 and VT3-E3 are unnecessary because the VT5 series has built-in Ethernet function.

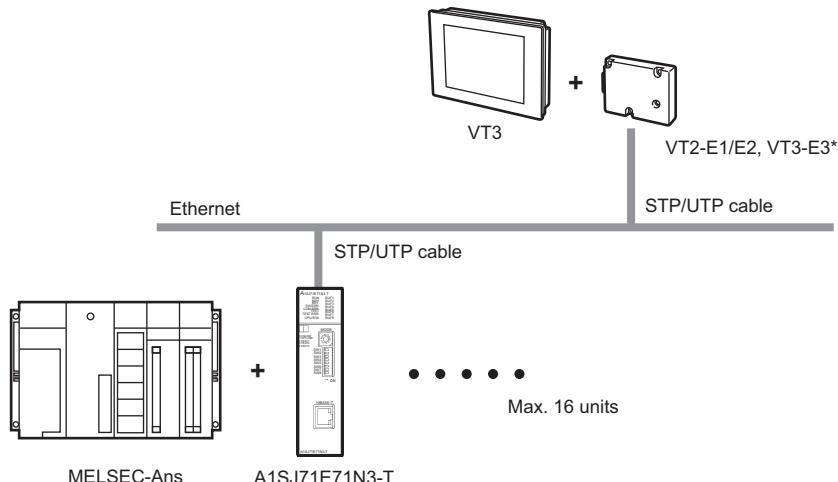
*4 Connectable units vary depending on the model. For details, refer to the manual of each PLC.



To connect VT3-E3 to VT3 series, if the end of VT3-E3 serial number is A or later, the system program of VT3 must be Ver. 4.51 or later.

■ MELSEC-AnS Series

The system configuration of VT3 and MELSEC-AnS Series is shown below.



* When connecting with several VT3 series, please note that communication quantity increases with the number of connections.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

2-3 Wiring Diagrams for Connections

This section describes wiring of connector cables.

The wiring diagrams recommended by MITSUBISHI ELECTRIC may differ from those presented in this manual.

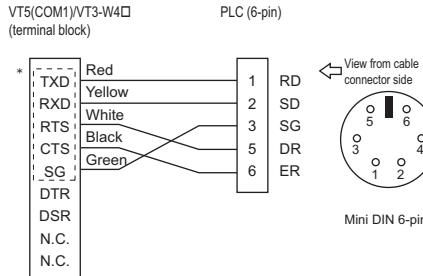
There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

Provide a ground having a terminal resistance of at least 100 Ohms for the FG terminal on the PLC body.

Wiring diagrams for serial connections

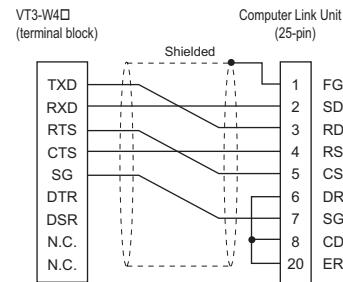
■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

- **Wiring diagram W20, Mitsubishi Q Series (Q mode) PLC port direct link cable (OP-86920:5m)**

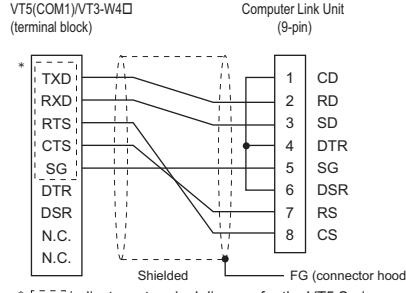


* [] indicates a terminal diagram for the VT5 Series.

- **Wiring diagram W21 (RS-232C)**



● Wiring diagram W22 (RS-232C)

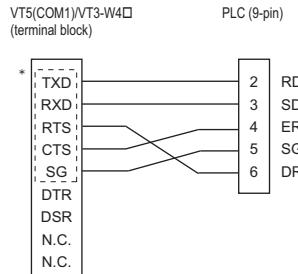


* [] indicates a terminal diagram for the VT5 Series.



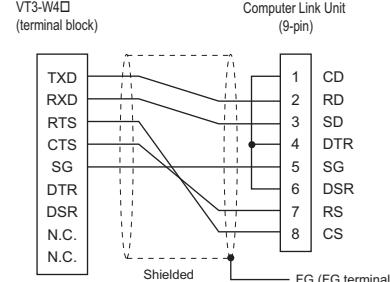
Connect FG to the connector hood side.

● Wiring diagram W24 (RS-232C)

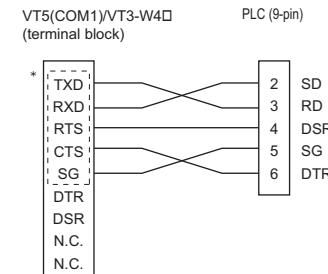


* [] indicates a terminal diagram for the VT5 Series.

- **Wiring diagram W23 (RS-232C)**



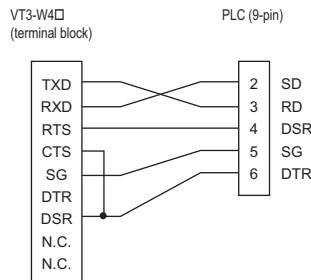
● Wiring diagram W25 (RS-232C)



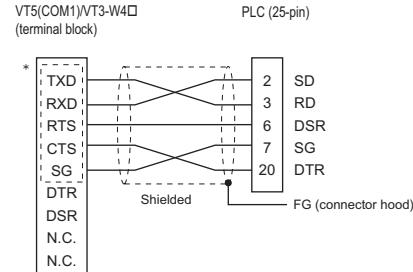
* [] indicates a terminal diagram for the VT5 Series.

2-3 Wiring Diagrams for Connections

● Wiring diagram W26 (RS-232C)



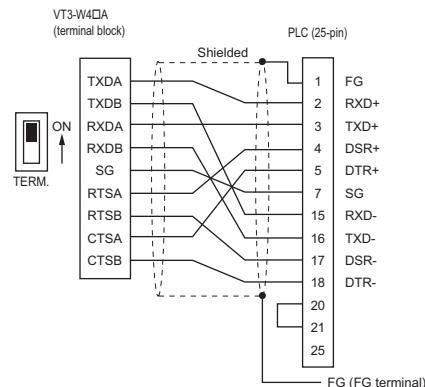
● Wiring diagram W27 (RS-232C)



* [---] indicates a terminal diagram for the VT5 Series.

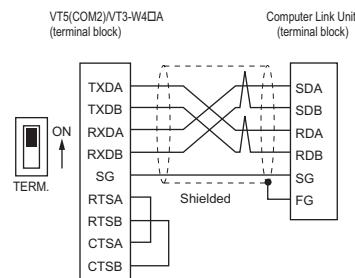
■ Connection to VT5 Series (COM2) and VT3-W4□ (RS-422A)

● Wiring diagram W40 (RS-422A)



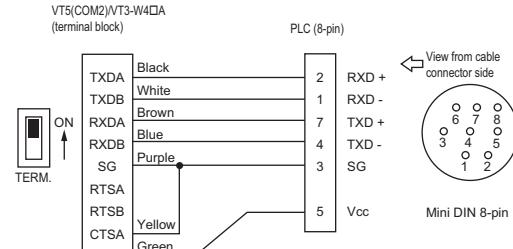
Connect FG on the PLC side to FG on the terminal block.

● Wiring diagram W42 (RS-422A)

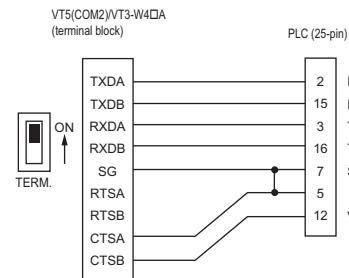


Connect termination resistor on Computer Link unit side.

● Wiring diagram W41, Mitsubishi FX_N PLC port direct link cable (OP-86919: 5m, OP-86918: 1m)



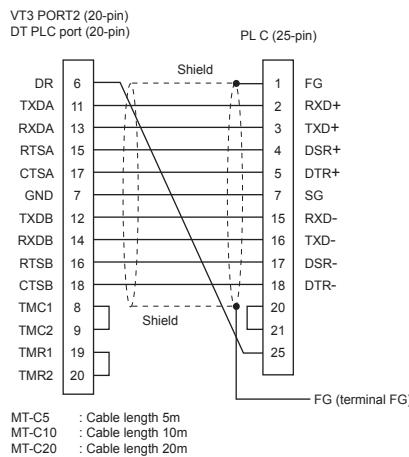
● Wiring diagram W43 (RS-422A)



- When using the FX-422CAB0, the FX side (25-pin) connector must be connected by a female connector.
- When using the FX-20P-CADP, the FX side (25-pin) connector must be connected by a male connector.

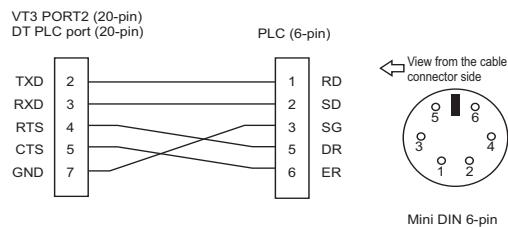
■ Connection to VT3 series (PORT2)/DT series

- **Wiring Diagram 1, Mitsubishi A, FX series, PLC port direct link cable (MT-C5/C10/C20)**

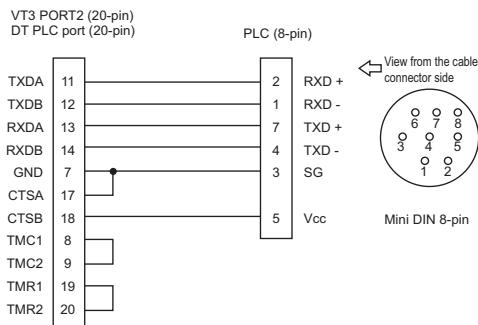


Connect FG to FG on the terminal block on the PLC side.

- **Wiring Diagram 2, Mitsubishi Q series (Q mode) PLC port direct link cable (OP-51415: 5m)**

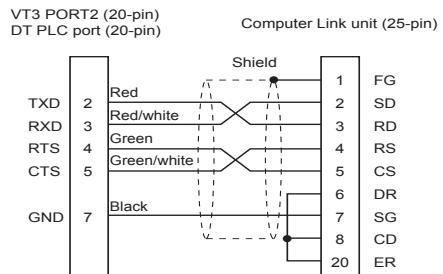


- **Wiring Diagram 3, Mitsubishi FXN PLC port direct link cable (OP-31096: 5m)**



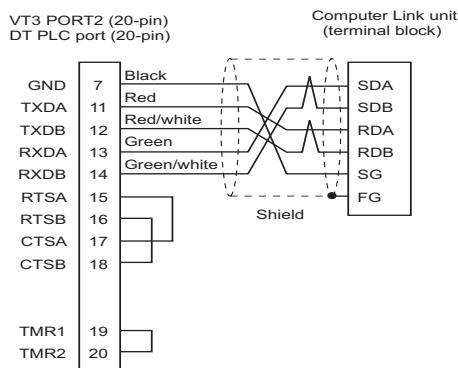
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

- **Wiring Diagram 4 (RS-232C: OP-24027)**



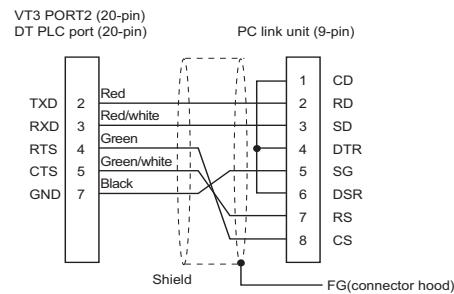
2-3 Wiring Diagrams for Connections

● Wiring Diagram 5 (RS-422A: OP-24028)



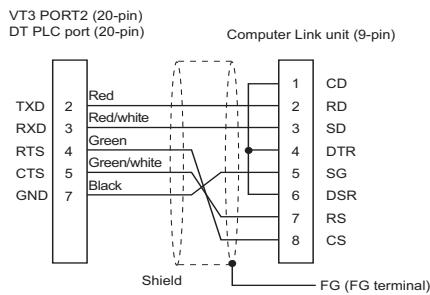
Point Connect termination resistor on Computer Link unit side.

● Wiring Diagram 6 (RS-232C: OP-24027)

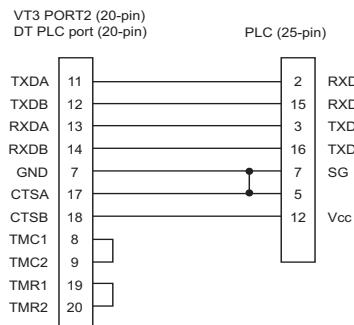


Point Connect FG to the connector hood side.

● Wiring Diagram 7 (RS-232C: OP-24027)

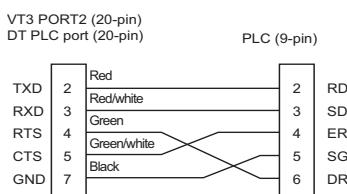


● Wiring Diagram 8 (RS-422A)

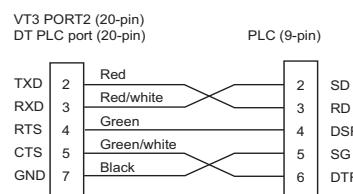


- Point
- When using the FX-422CAB0, the FX side (25-pin) connector must be connected to by a female connector.
 - When using the FX-20P-CADP, the FX side (25-pin) connector must be connected to by a male connector.

● Wiring Diagram 9 (RS-232C: OP-24027)

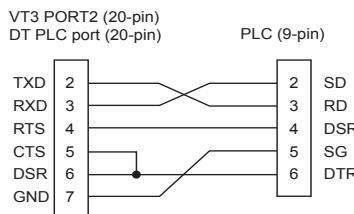


● Wiring Diagram 10 (RS-232C: OP-24027)

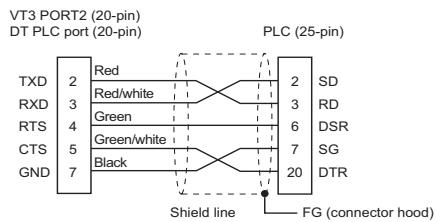


For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● **Wiring Diagram 11
(RS-232C)**



● **Wiring Diagram 12
(RS-232C: OP-24027)**



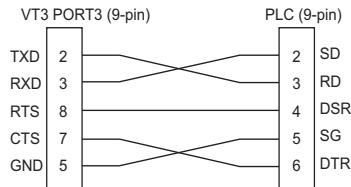
Make the cable using the serial I/F connector (20-pin) OP-26275 and a third-party cable.



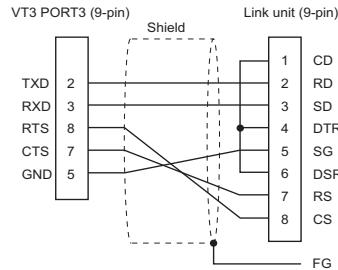
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

■ **Connection to VT3 series (PORT3)**

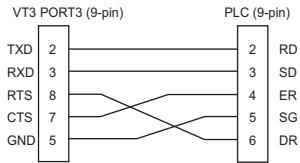
● **Wiring Diagram 31 (RS-232C)**



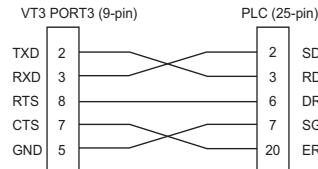
● **Wiring Diagram 32 (RS-232C)**



● **Wiring Diagram 33 (RS-232C)**



● **Wiring Diagram 34 (RS-232C)**



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

2-3 Wiring Diagrams for Connections

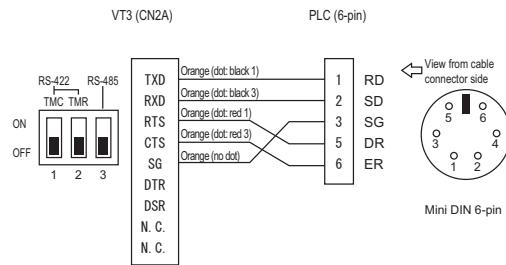
■ Connection with VT3 Handy Series



FG2 must be grounded.

● Wiring Diagram H20 MITSUBISHI Q Series (Q mode) direct link cable

OP-87182: 3m, OP-87183: 5m



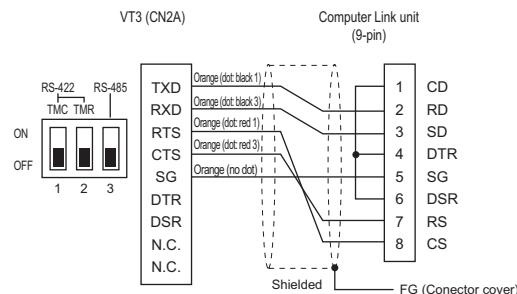
● Wiring Diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



Connect FG to the connector hood side.

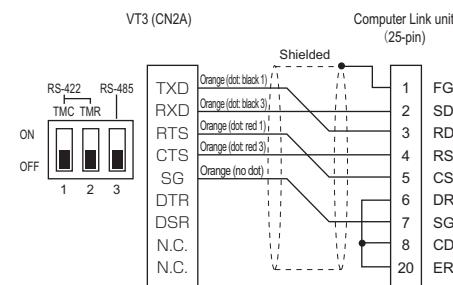
● Wiring Diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



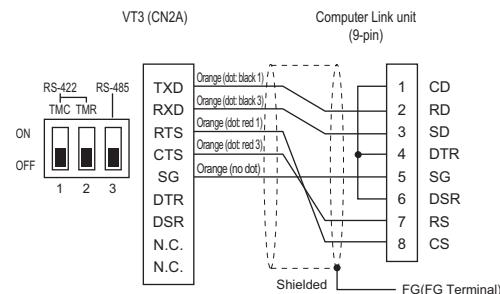
● Wiring Diagram H23 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



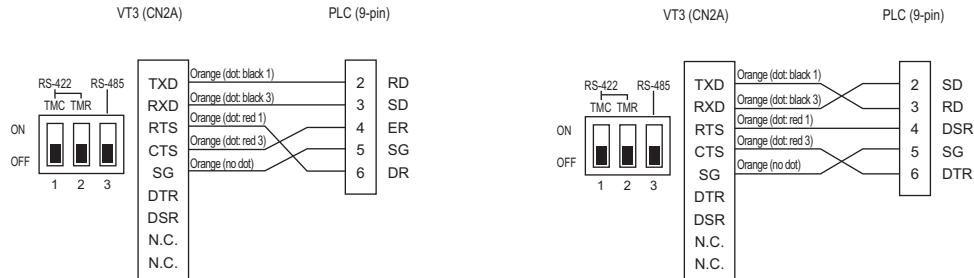
● Wiring Diagram H24 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



● Wiring Diagram H25 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m

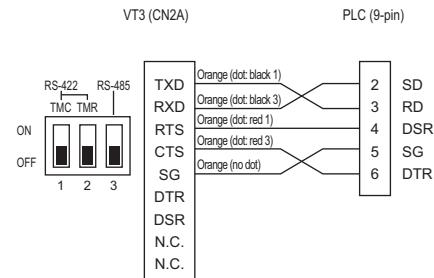
● Wiring Diagram H25 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



● Wiring Diagram H26 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m

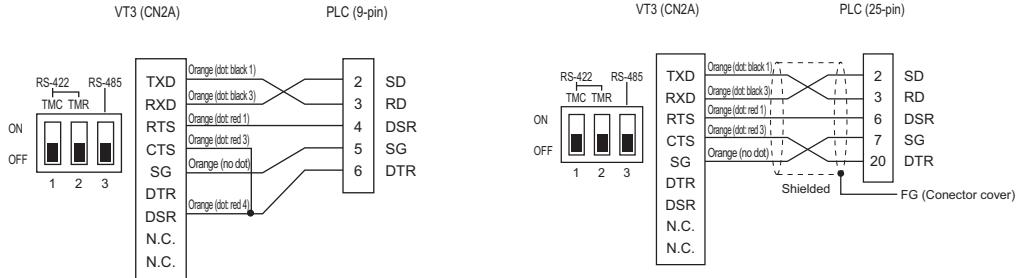
● Wiring Diagram H27 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

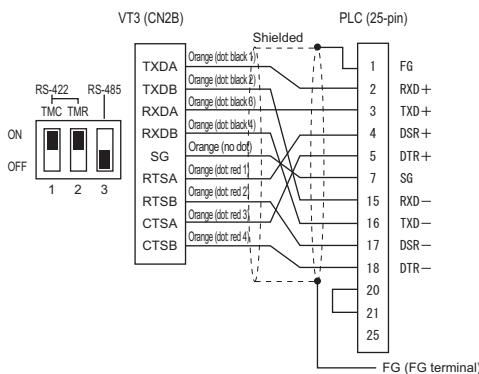
OP-87193: 10m



2-3 Wiring Diagrams for Connections

● Wiring Diagram H40 (RS-422A)

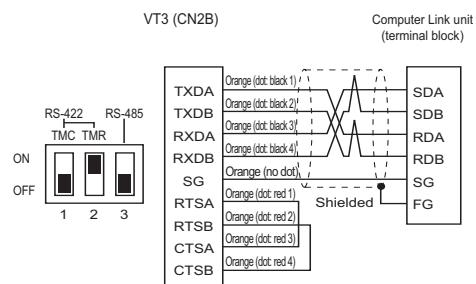
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



Connect FG on the PLC side to FG on the terminal block.

● Wiring Diagram H42 (RS-422A)

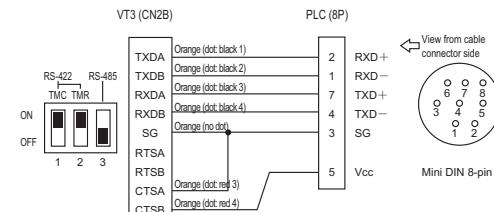
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



Connect termination resistor on Computer Link unit side.

● Wiring Diagram H41 Mitsubishi FX_N PLC port direct link cable

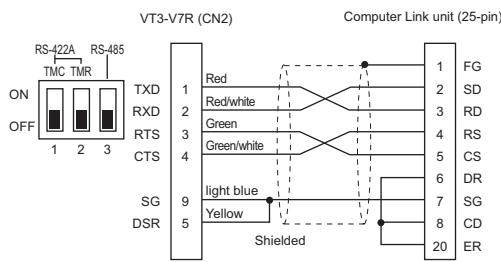
OP-87184: 5m



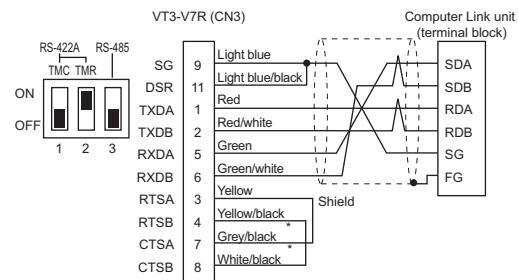
- When using the FX-422CAB0, the FX side (25-pin) connector must be connected by a female connector.
- When using the FX-20P-CADP, the FX side (25-pin) connector must be connected by a male connector.

■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-232C: VT-C5R1)



● Wiring Diagram R2 (RS-422A: VT-C5R2/C15R2)

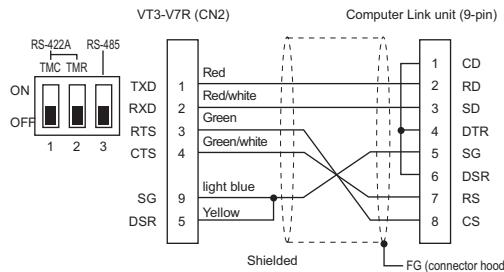


*LoopBack is not run inside the connector.
Please weld the signal line.



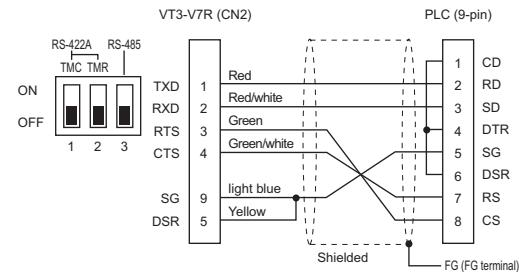
Set the terminator on the Computer Link unit to ON.

● Wiring Diagram R3 (RS-232C: VT-C5R1)

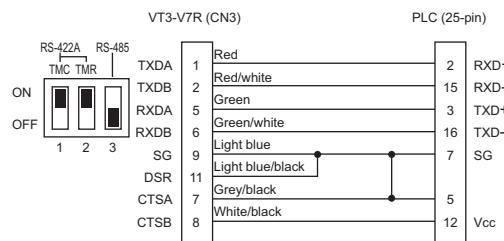


Connect FG to the connector hood side.

● Wiring Diagram R4 (RS-232C: VT-C5R1)



● Wiring Diagram R5 (RS-422A: VT-C5R2/C15R2)

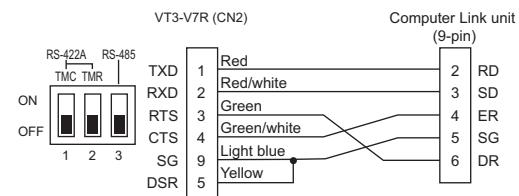


- When using FX-422CAB0, the FX side (25-pin) connector must be connected by a female connector.
- When using the FX-20P-CADP, the FX side (25-pin) connector must be connected by a male connector.



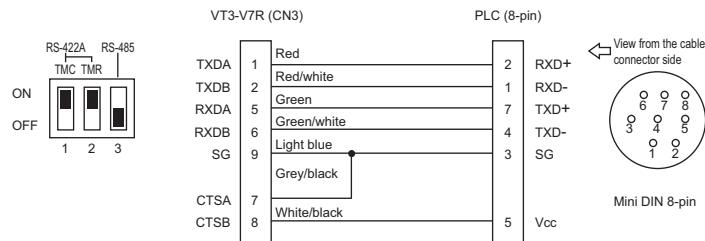
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● Wiring Diagram R6 (RS-232C: VT-C5R1)

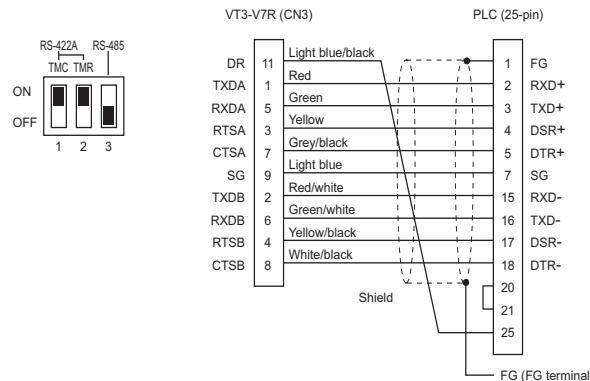


2-3 Wiring Diagrams for Connections

● Wiring Diagram R7 Mitsubishi FXN PLC port direct link cable (VT-C5F)

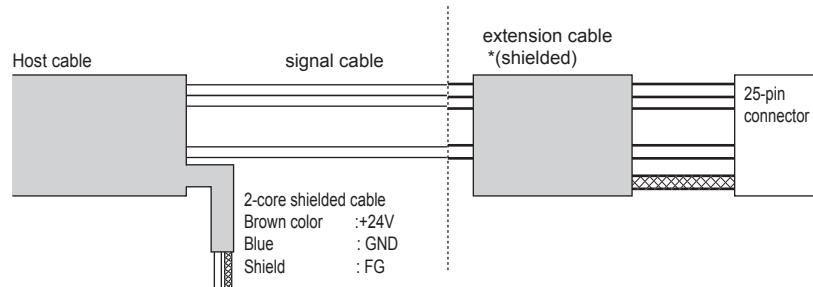


● Wiring Diagram R8 Mitsubishi A and FX PLC port direct link cable (VT-C5A)



Point

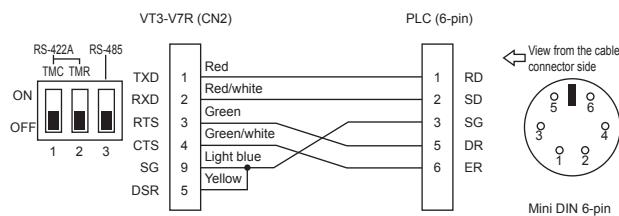
- The actual VT-C5A has no the shield shown in the wiring diagram. What is shown in the above wiring diagram is the case where VT-C5R2/C15R2 is used, which should be made by yourself. Shielding should be performed as follows.



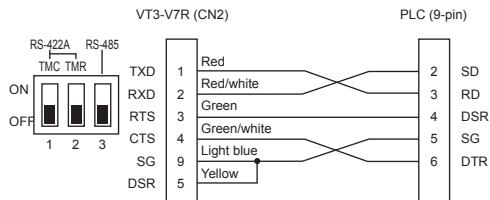
* Customers should prepare the extension cable by themselves.
What is shown in the wiring diagram (the shield in VT-C5A)
is the shield of the extension cable.

- FG is on the PLC side. Please connect it to FG of the terminal block.

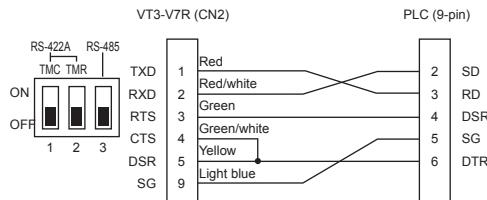
● **Wiring Diagram R9 Mitsubishi Q series (Q mode)
PLC port direct link cable (OP-75039)**



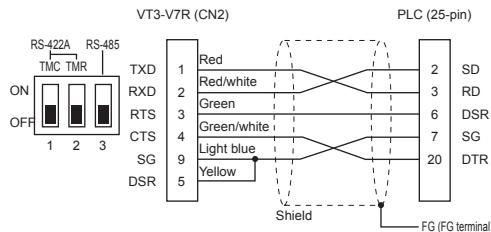
● **Wiring Diagram R10
(RS-232C: VT-C5R1)**



● **Wiring Diagram R11
(RS-232C: VT-C5R1)**



● **Wiring Diagram R12
(RS-232C: VT-C5R1)**



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the [] "Connection Precautions", page A-13.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

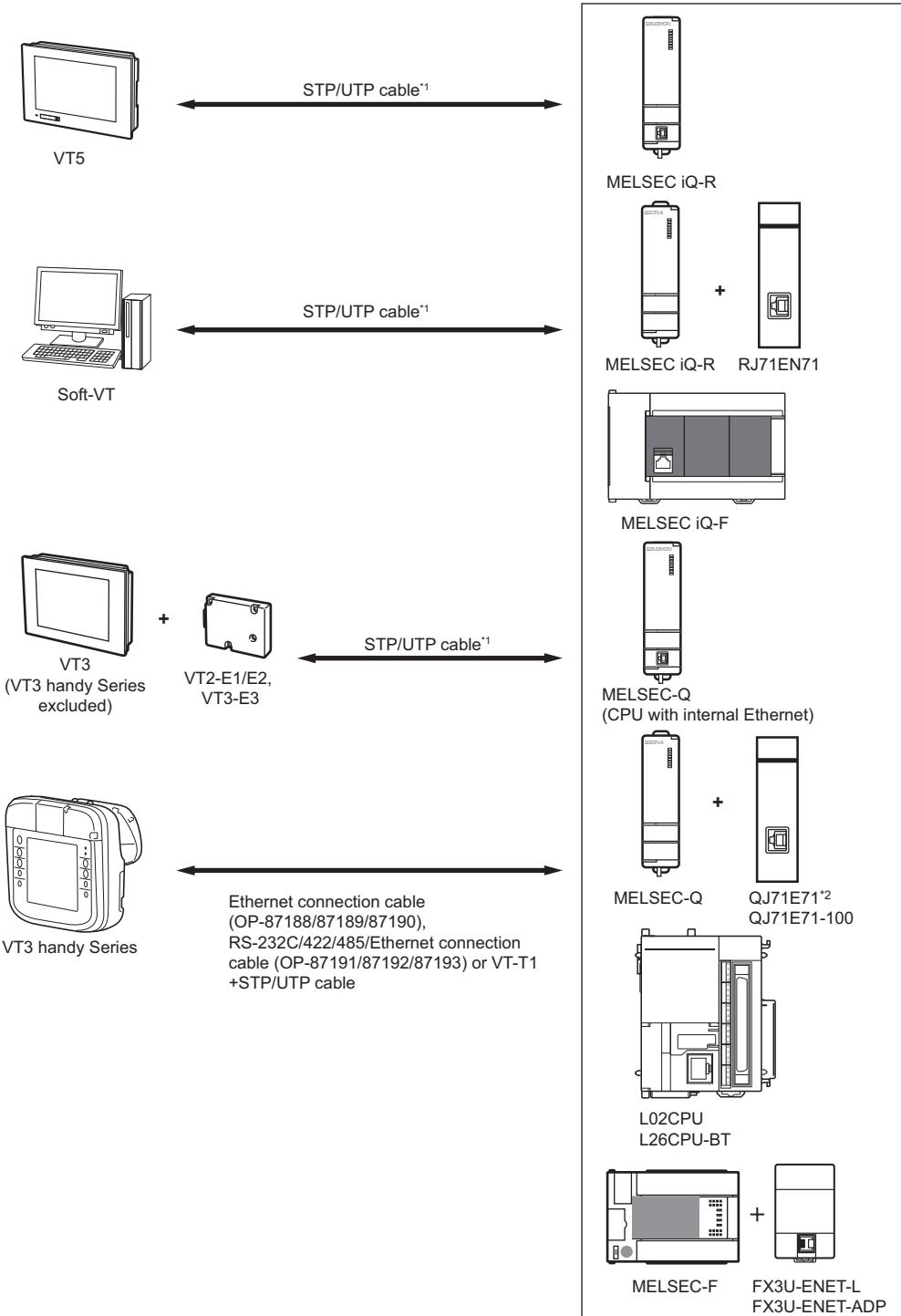
2-3 Wiring Diagrams for Connections

Ethernet Connection Methods

■ Direct connection (1:1 connection)

- MELSEC iQ-R Series, MELSEC iQ-F Series, MELSEC-Q Series and MELSEC-L Series, MELSEC-F Series

Use STP/UTP cable for connections.



2-3 Wiring Diagrams for Connections

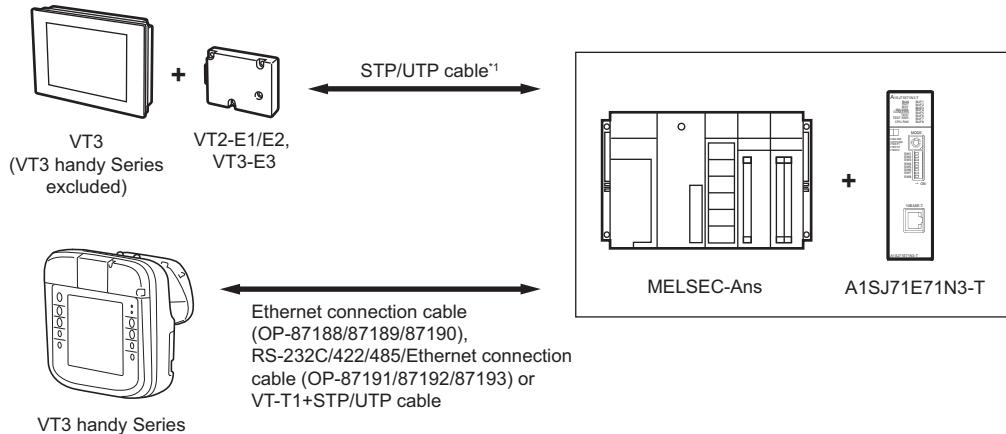
- *1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.
- *2 Use only 10BASE-T to connect the QJ71E71.

 Point

- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

● MELSEC-AnS Series

Use STP/UTP cable for connections.



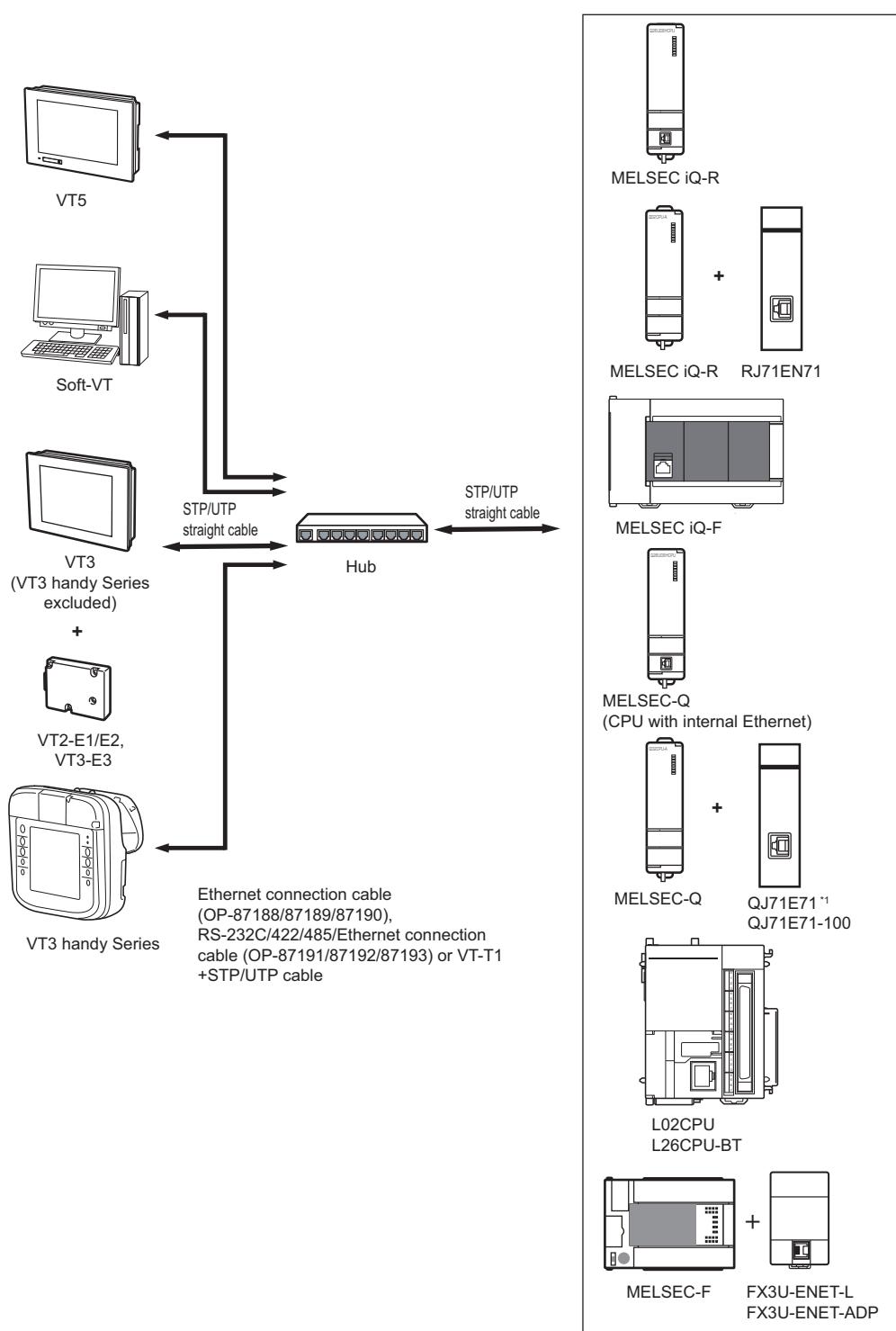
- *1 VT3-E3 whose serial number ends in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.

 Point

- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

■ Connections using a hub (multiple connections)

- MELSEC iQ-R Series, MELSEC iQ-F Series, MELSEC-Q Series and MELSEC-L Series



*1 Use only 10BASE-T to connect the QJ71E71.

Point

- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

Connection of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series, Soft-VT to a hub

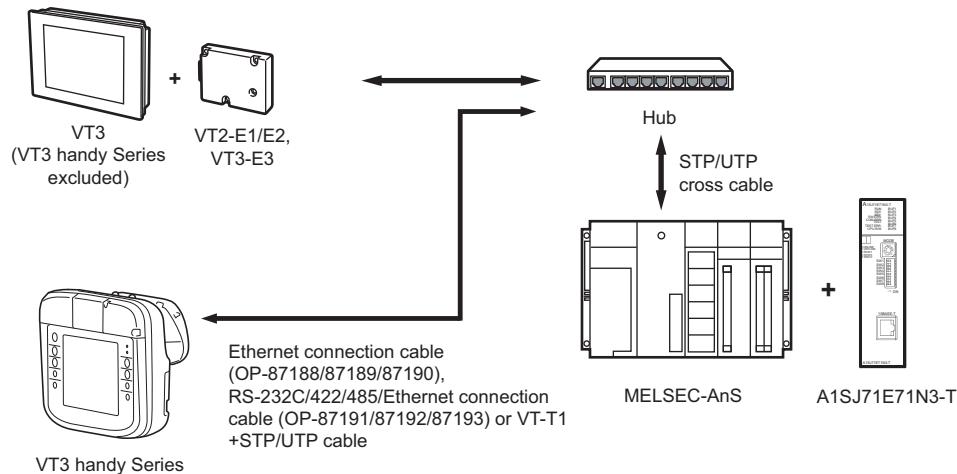
- Use the STP/UTP straight cable.
- The VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series, Soft-VT should be connected to a port other than the cascade port on the hub.

MELSEC iQ-R Series, MELSEC iQ-F Series, MELSEC-Q Series, MELSEC-L Series, MELSEC-F Series and bus connections

- Use the STP/UTP straight cable.
- Connect the PLC Ethernet port to a port other than the cascade port on the hub.

Point

- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

● MELSEC-AnS Series**Connection of VT2-E1/E2, VT3-E3, VT3 handy Series with the hub**

- Use the STP/UTP straight cable.
- VT2-E1/E2, VT3-E3, and VT3 handy Series cannot be connected with the cascade port of the hub.

Hub connection with A1SJ71E71N3-T

- Use the STP/UTP straight cable.
- Do not connect the A1SJ71E71N3-T to a cascade port on the hub.

Point

- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

2-4 Unit Settings

This section describes the default communication conditions and how to set up the units.

Method for making serial connections

■ MELSEC-QnU Series (PLC port direct link)

No need to set up Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU and Q26UDHCPU.

■ MELSEC-Q series (Q-MODE) (PLC port direct link)

Q02CPU and Q02HCPU need not be set.

■ MELSEC-Q series (A-MODE) (PLC port direct link)

Q02CPU-A, Q02HCPU-A and Q06HCPU-A need not be set.

■ Q00JCPU

There is no need to set up Q00JCPU.

■ Q00CPU, Q01CPU

● When target PLC is "QUTE Series CPU direct link"

There is no need to set up Q00CPU and Q01CPU.

● When target PLC is "Q Series (Q mode) Computer Link"

Use GX Works2 or GX Developer to set the communication conditions.

Serial communications settings

Mark the "Use serial communications functions" checkbox at "PC parameters" - "Serial Communications Settings" and set as follows:

Item	Set Value
Baud Rate	19.2 Kbps
Checksum	ON
Transmission wait time	None
RUN write setup	Yes



Change VT5/VT3/DT parity to "Odd".

■ QJ71C24(-R2), QJ71CM0, QJ71C24N(-R2/-R4), LJ71C24(-R2), settings

Use GX Works2 or GX Developer to set the communication conditions.

(1) I/O assignment settings

Set as follows at the "I/O assignment settings" in "PC parameters."

Item	Set Value
Type	Intelligent
Type name	Name of unit type to be mounted
Point	32
Leading XY	Leading I/O signal number of target unit (Hex)

(2)Setting the Intelligent Function Unit switch

Set as follows at "Switch Settings" in "PC parameters" and "I/O assignment settings."

Setup Switch	Setting Item		Set Value	
Switch 1 (ch1) or Switch 2 (ch2)	bit 0	Operation setting	Standalone	OFF
	bit 1	Data bit	8 bits	ON
	bit 2	Parity bit	ON	ON
	bit 3	Odd/even parity	Even	ON
	bit 4	Stop bit	1 bit	OFF
	bit 5	Checksum	ON	ON
	bit 6	RUN write	Enabled	ON
	bit 7	Change settings	Enabled	ON
	bit 8 to 15	Baud rate setting	19200 bit/s	07 Hex
Switch 2 (ch1) or Switch 2 (ch2)	-	Communication protocol setup	MC protocol type 5	05 Hex
Switches 5	-	Node No. setting	0	0



After setting the switches, reset the PLC or turn the power OFF and then back ON again.

■ MELSEC-F series (PLC port direct link)

No need to set up FX1, FX2, FX2C, FX0, FX0N, FX2N, AFX1S, FX1N, FX1NC, FX2NC, FX3U, FX3UC, FX3G, and FX3s.

■ FX2N-422-BD, FX1N-422-BD

No need to set up FX2N-422-BD and FX1N-422-BD.

■ FX2N-232-BD, FX1N-232-BD, FXON-232ADP, FX2NC-232ADP

- When target PLC is "FX series" or "FX₂N series"

The data register D8120 (communication mode) should be set to 0.

* Do not use GX Works2 or GX Developer to set the communication conditions.

Example of setup program

Ladder diagram



- When the target PLC is "FX Series Computer Link"

Use GX Works2 or GX Developer to set the communication conditions.

PC system settings

Mark the "Set communications conditions" checkbox at "PC parameters" - "PC System Settings (2)", and set as follows.

Item	Set Value
Protocol	Dedicated protocol communication
Data length	7 bits
Parity	Even
Stop bit	1 bit
Baud Rate	19200 bps
H/W type	RS-232C in most cases
Checksum	Yes (checking)
Transmission control program	Type 1
Node No. setting	00H
Timeout	1 (X 10ms)

2-4 Unit Settings

■ FX3U-232-BD, FX3U-232ADP, FX3G-232-BD

● When target PLC is "FX series (Computer Link)"

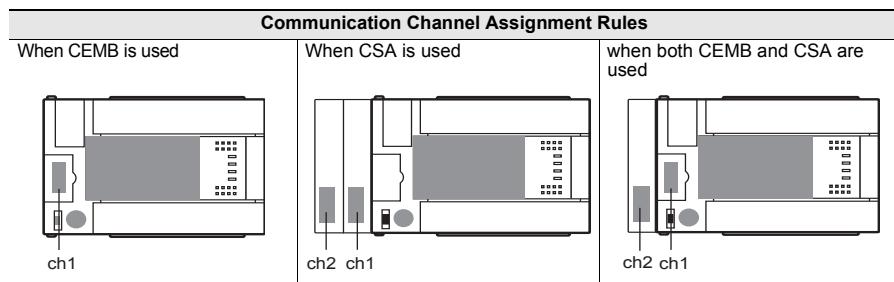
Open the GX Works2 or GX-Developer parameter setup dialog box and use the "PLC System Setup (2)" tab to set up the following parameters, and then restart the power supply.

Setting Item	Set Value
Communication protocol	Dedicated protocol communication
Data length	7 bits
Parity	Even
Stop bit	1 bit
Baud Rate	19200 bps
H/W type	RS-232C in most cases
Checksum	Yes (checking)
Transmission control program	Type 1 (no CR and LF)
Node No. setting	00H
Timeout	1 (X 10ms)



Communication Channel Assignment Rules

When the Communication Extension Main Board (CEMB) and Communication Special Adapter (CSA) are used in the FX3U basic unit, communication channels are assigned starting from the optional device that is closest to CPU.



■ FX3U-232-BD, FX3U-422-BD, FX3U-232ADP, FX3G-232-BD, FX3G-422-BD

● When target PLC is "FX3 Series"

The data register D8120 (communication mode) should be set to 0.

* Do not use GX Works2 or GX Developer to set the communication conditions.

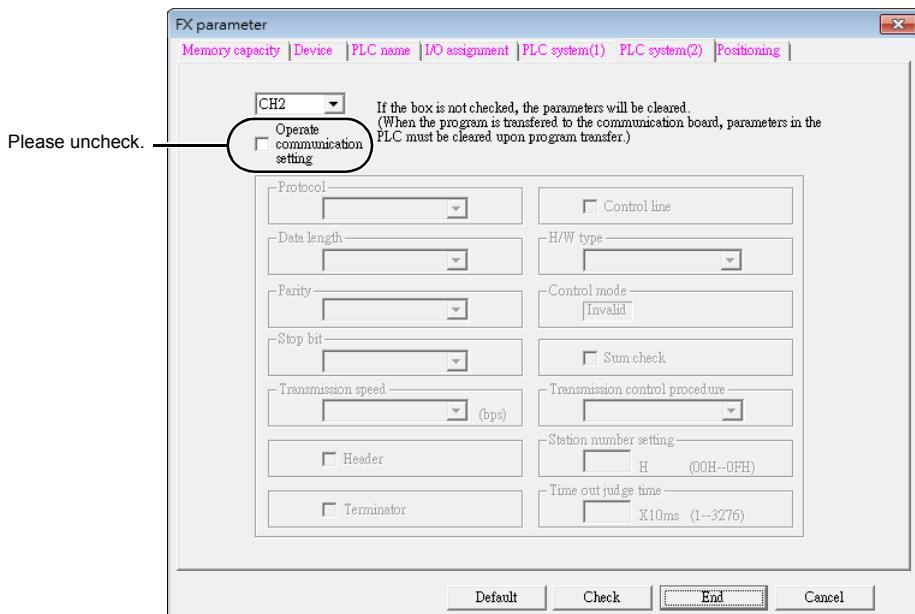
Example of setup program

Ladder diagram



● When use ch2

Make the following settings in GX Works2 or GX Developer, and then restart the power supply.



Communication Channel Assignment Rules

When the Communication Extension Main Board (CEMB) and Communication Special Adapter (CSA) are installed in the FX3uc basic unit, communication channels are assigned starting from the optional device that is closest to CPU.

Communication Channel Assignment Rules		
When CEMB is used	When CSA is used	when both CEMB and CSA are used

■ MELSEC-A Series, QnA Series (PLC port direct link)

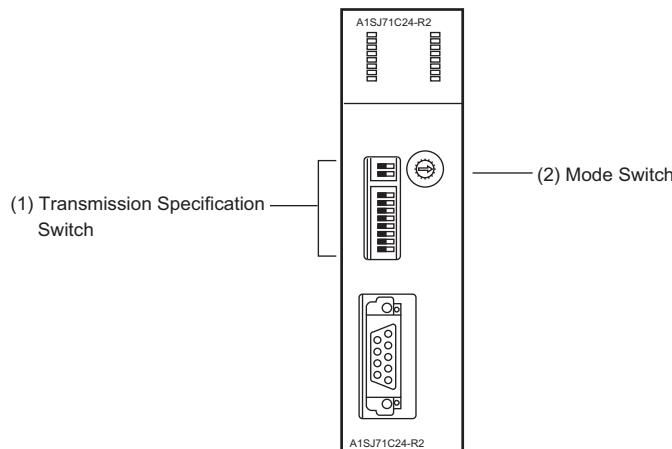
A1S, A1SH, A1SJ, A1SJH, A2S, A2SH, A171S, A171SH, A1SCPUC24-R2, A2US,A2USH, A0J2H, A1N, A2N, A3N, A2A, A3A, A2U, A3U, A4U, and Q2A need not be set.



When connections are made to the PLC port on the MELSEC-A Series, the period of the PLC program will be slightly delayed when communications between the VT3 Series/DT Series and the PLC begin.

2-4 Unit Settings

■ A1SJ71(U)C24(-R2/-PRF)

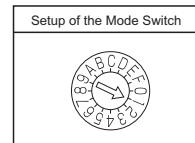


(1) Transfer specifications setup switch

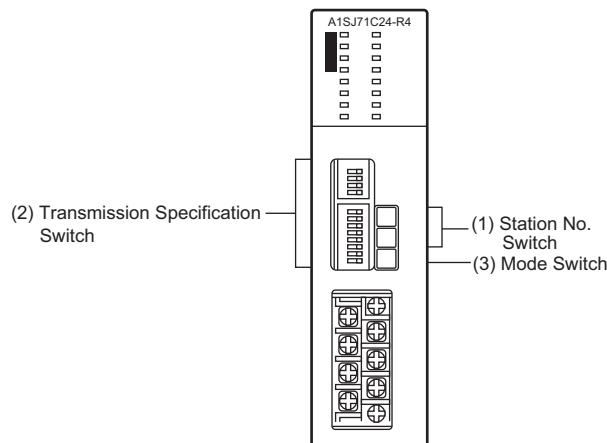
Setup Switch	Setting Item	Set Value	
SW 03 04 05 06 07 08 09 10 11 12	SW03	Not used	-
	SW04	Writing enabled/disabled in Run mode setting	ON
	SW05		OFF
	SW06	Baud rate setting	ON
	SW07		ON
	SW08	Data bit setting	OFF
	SW09	Parity bit setting	ON
	SW10	Even parity/odd parity setting	ON
	SW11	Stop bit setting	OFF
	SW12	Checksum setting	ON

(2) MODE setup switch

Set to "1".

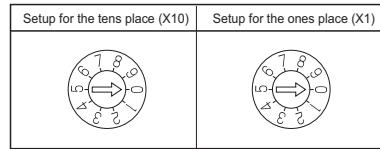


■ A1SJ71(U)C24-R4



(1)Node No. setup switch

Set the 10's position and 1's position on the node No. setup switch to "0".

**(2)Transfer specifications setup switch**

Setup Switch	Setting Item	Set Value	
	SW01	Master node/local node setting ^{*1}	-
	SW02	Computer Link/multi-drop link selection	Computer Link
	SW03	Not used	-
	SW04	Writing enabled/disabled in Run mode setting	Enable
	SW05		OFF
	SW06	Baud rate setting	19200 bit/s
	SW07		ON
	SW08	Data bit setting	7 bits
	SW09	Parity bit setting	ON
	SW10	Even parity/odd parity setting	Even
	SW11	Stop bit setting	1 bit
	SW12	Checksum setting	ON

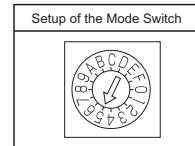
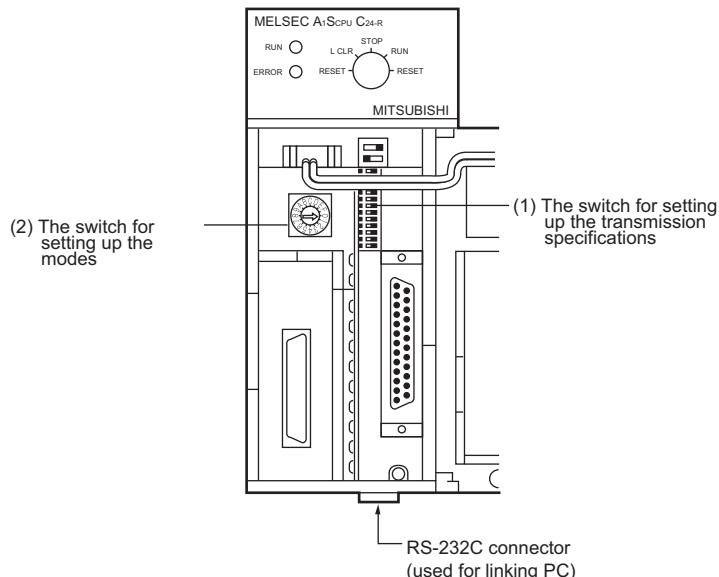
*1 Setting is ignored when used on the Computer Link.



Connect a terminator (330 Ohms 1/2 W) at both ends of the connected node. For details, refer to the **MITSUBISHI ELECTRIC General-purpose PLCAJ71(U)C24-R4 Model Computer Link/Multi-drop Link User's Manual**.

(3)Mode setup switch

Set to "5".

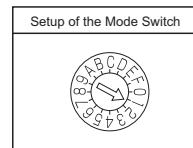
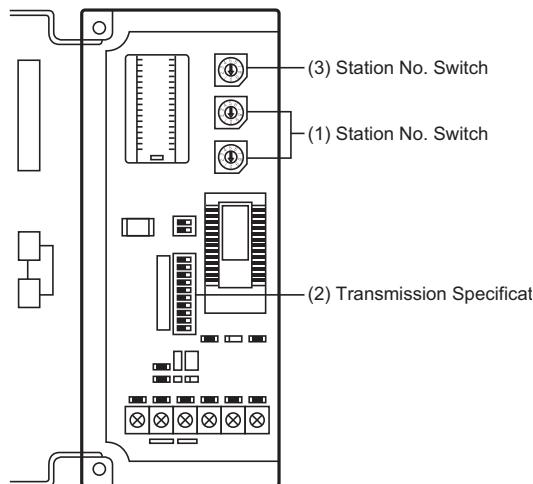
**A1SCPUC24-R2**

(1)Transfer specifications setup switch

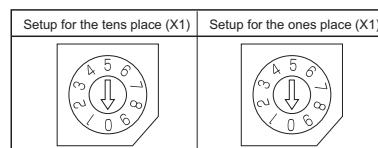
Setup Switch	Setting Item	Set Value	
1	Writing enabled/disabled in Run mode setting	Enable	ON
2			OFF
3	Baud rate setting	19200 bit/s	ON
4			ON
5	Data bit setting	7 bits	OFF
6	Parity bits setting	ON	ON
7	Even parity/odd parity setting	Even	ON
8	Stop bit setting	1 bit	OFF
9	Checksum setting	ON	ON

(2)MODE setup switch

Set to "1".

**■ A2CCPUC24(-PRF)****(1)Node No. setup switch**

Set the 10's position and 1's position on the node No. setup switch to "0".



(2) Transfer specifications setup switch

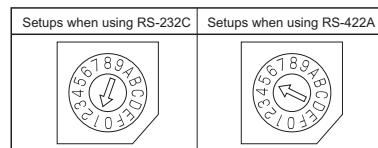
Setup Switch		Setting Item	Set Value	
ON OFF 11 12 13 14 15 16 17 18 19 20	SW11	Baud rate setting Data bit setting Parity bit setting Even parity/odd parity setting Stop bit setting Checksum setting Main channel setting Writing enabled/disabled in Run mode setting	19200 bit/s	OFF
	SW12		ON	ON
	SW13		ON	ON
	SW14		7 bits	OFF
	SW15		ON	ON
	SW16		Even	ON
	SW17		1 bit	OFF
	SW18		ON	ON
	SW19		RS-232C	OFF
	SW20		Enabled	ON



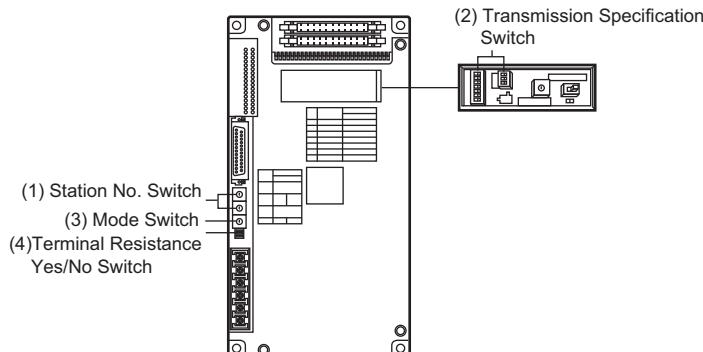
When using the RS-422A interface, connect a terminator at both ends of the connected node. For details, refer to the MITSUBISHI ELECTRIC General-purpose PLC A2CCPUC24 (-PRF) User's Manual.

(3) Mode setup switch

When performing communications on the RS-232C interface, set to "1". When performing communications on the RS-422A interface, set to "5".

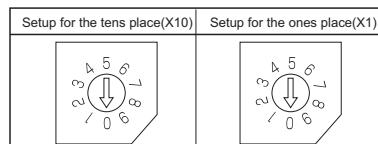


■ A0J2-C214-S1



(1) Node No. setup switch

Set the 10's position and 1's position on the node No. setup switch to "0".



(2) Transfer specifications setup switch

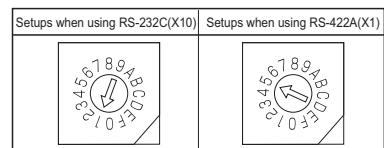
Setup Switch	Setting Item	Set Value	
 ON SW10 SW11 SW12 SW13 SW14 SW15 SW16 SW17 SW18 SW19 SW20	SW10	Computer Link/multi-drop link selection	Computer Link
	SW11	Main channel setting	RS-232C
	SW12	Writing enabled/disabled in Run mode setting	Enabled
	SW13		OFF
	SW14	Baud rate setting	19200 bit/s
	SW15		ON
	SW16	Data bit setting	7 bits
	SW17	Parity bit setting	ON
	SW18	Even parity/odd parity setting	Even
	SW19	Stop bit setting	1 bit
	SW20	Checksum setting	ON



When using the RS-422A interface, set the terminator setup switch to ON at both ends of the connected node. For details, refer to the MITSUBISHIELECTRIC General-purpose PLC A0J2-C214-S1 Model Computer Link/Multi-drop Link User's Manual.

(3) Mode setup switch

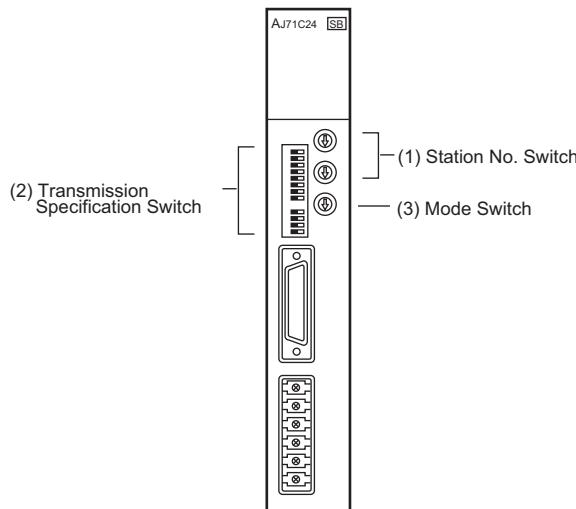
When performing communications on the RS-232C interface, set to "1".
When performing communication son the RS-422A interface, set to "5".



(4) Terminator setup switch

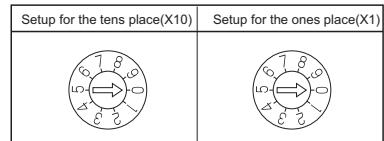
Setup Switch	Setting Item	Set Value	
ON SW21 SW22 SW23	SW21	Not used	-
	SW22	Transmitting side terminator setting	ON
	SW23	Receiving side terminator setting	ON

■ AJ71C24(-S3/-S6/-S8)



(1) Node No. setup switch

Set the 10's position and 1's position on the node No. setup switch to "0".



(2)Transfer specifications setup switch

Setup Switch	Setting Item	Set Value	
SW11 SW12 SW13 SW14 SW15 SW16 SW17 SW18	SW11 Main channel setting	RS-232C	OFF
	SW12 Data bit setting	7 bits	OFF
	SW13		OFF
	SW14 Baud rate setting	19200 bit/s	ON
	SW15		ON
	SW16 Parity bit setting	ON	ON
	SW17 Even parity/odd parity setting	Even	ON
	SW18 Stop bit setting	1 bit	OFF
	SW21 Checksum setting	ON	ON
	SW22 Writing enabled/disabled in Run mode setting	Enabled	ON
SW21 SW22 SW23 SW24	SW23 Transmitting side terminator setting	None ^{*1}	OFF
	SW24 Receiving side terminator setting	None ^{*1}	OFF

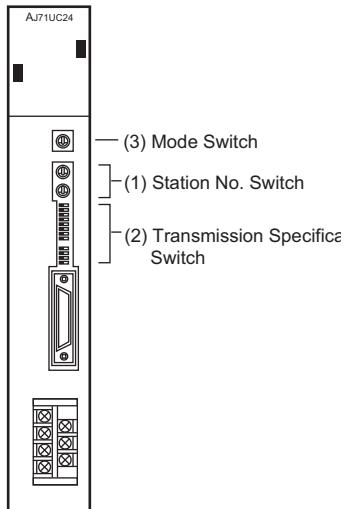
*1 When performing communications on the RS-422A interface, set the terminators at both ends of the cable to ON.

(3)Mode setup switch

When performing communications on the RS-232C interface, set to "1".

When performing communications on the RS-422A interface, set to "5".

Setups when using RS-232C	Setups when using RS-422A
	

■ AJ71UC24**(1)Node No. setup switch**

Set the 10's position and 1's position on the node No. setup switch to "0".

Setup for the tens place(X10)	Setup for the ones place(X1)
	

(2) Transfer specifications setup switch

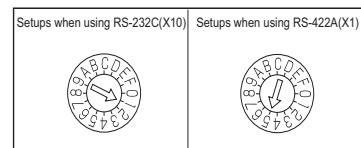
Setup Switch	Setting Item	Set Value	
	SW11	Main channel setting	RS-232C
	SW12	Data bit setting	7 bits
	SW13	Baud rate setting	OFF
	SW14		ON
	SW15		ON
	SW16	Parity bit setting	ON
	SW17	Even parity/odd parity setting	ON
	SW18	Stop bit setting	1 bit
	SW21	Checksum setting	ON
	SW22	Writing enabled/disabled in Run mode setting	Enabled
	SW23	Computer Link/multi-drop link setting	Computer Link
	SW24	Not used	-



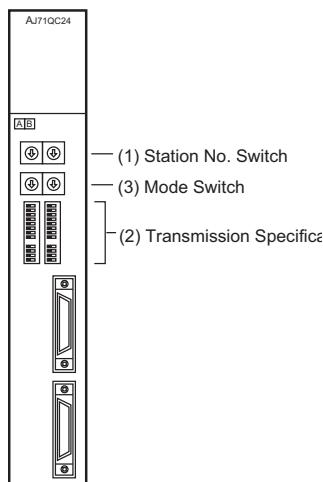
When using the RS-422A interface, connect a terminator (330 Ohms 1/2 W) at both ends of the connected node. For details, refer to the MITSUBISHIELECTRIC General-purpose PLC AJ71UC24 Model Computer Link/Multi-dropLink User's Manual.

(3) Mode setup switch

When performing communications on the RS-232C interface, set to "1".
When performing communications on the RS-422A interface, set to "5".



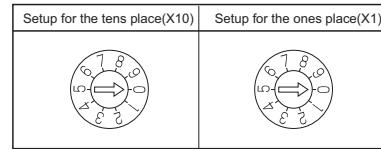
■ AJ71QC24(-R2/-R4)



2-4 Unit Settings

(1)Node No. setup switch

Set the 10's position and 1's position on the node No. setup switch to "0".



(2)Transfer specifications setup switch

Setup Switch	Setting Item	Set Value	
	SW01	Standalone operation	OFF
	SW02	8 bits	ON
	SW03	ON	ON
	SW04	Even	ON
	SW05	1 bit	OFF
	SW06	ON	ON
	SW07	Enable	ON
	SW08	Enabled	ON
	SW09		OFF
	SW10		ON
	SW11		ON
	SW12		OFF
	SW13		OFF
	SW14	All OFF	OFF
	SW15		OFF

Point

When using the RS-422A interface, connect a terminator (330 Ohms 1/2 W) at both ends of the connected node. For details, refer to the MITSUBISHIELECTRIC General-purpose PLC AJ71QC24 Model Computer Link/Multi-dropLink User's Manual.

(3)Mode setup switch

Set to "5".

Setup of the Mode Switch



Point

On the VT1 series, the mode setup switch is set to "4".

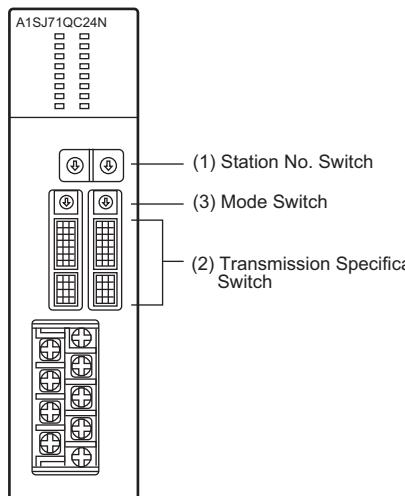
Set the VT2/VT3 Series to "5".

When VT1 series are used, bit setup can be selected from 7/8 bits.

Set the VT2/VT3 Series to "8 bits".

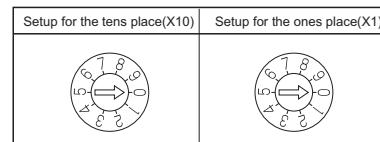
2-4 Unit Settings

■ A1SJ71QC24(-R2)



(1)Node No. setup switch

Set the 10's position and 1's position on the node No. setup switch to "0".



(2)Transfer specifications setup switch

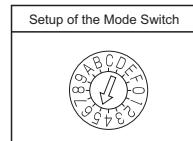
Setup Switch	Setting Item	Set Value	
SW01	Operation setting	Standalone operation	OFF
SW02	Data bit setting	8 bits	ON
SW03	Parity bit setting	ON	ON
SW04	Even parity/odd parity setting	Even	ON
SW05	Stop bit setting	1 bit	OFF
SW06	Checksum setting	ON	ON
SW07	Writing enabled/disabled in Run mode setting	Enable	ON
SW08	Changes to settings enabled/disabled setting	Enabled	ON
SW09	Baud rate setting	19200 bit/s	OFF
SW10			ON
SW11			ON
SW12			OFF



When using the RS-422A interface, connect a terminator (330 Ohms 1/2 W) at both ends of the connected node. For details, refer to the MITSUBISHIELECTRIC General-purpose PLC A1SJ71QC24 Model Computer Link/Multi-drop Link User's Manual.

(3)Mode setup switch

Set to "5".



On the VT1 series, the mode setup switch is set to "4".

Communication Condition Setting Ranges and Defaults During Serial Communication

- QnU Series CPU direct link/Q Series (Q mode) CPU direct link/
QUTE Series CPU direct link/Q Series (A mode) CPU direct link

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C	RS-232C
Baud Rate	9600, 19200, 38400, 57600, 115200 bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

- Q Series (Q-MODE) Computer Link

Item	Setting Range	Default
PLC No.	ON (0 to 1F)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

- * • Please use the RS-232C to connect to PORT3 of the VT3 series.
 • The VT5-W07M does not support RS-422A connections.

- Q Series (A-MODE) Computer Link

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● L Series Computer link

Item	Setting Range	Default
PLC No.	ON (0 to 1F)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	19200bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bit	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

* Please use the RS-232C to connect to PORT3 of the VT3 series.

● FX1N/2N Series /FX3 Series

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire ^{*1}	RS-422A 4 wire
Baud Rate	9600, 19200, 38400, 57600 ^{*2} , 115200 ^{*2}	9600 bit/s
Data bit	7 bits	7 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 • Please use the RS-232C to connect to PORT3 of the VT3 series.
• The VT5-W07M does not support RS-422A connections.

*2 57600bit/s, 115200bit/s can be used in FX3 Series only.

● FX Series

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-422A 4 wire
Baud Rate	9600 bit/s	9600 bit/s
Data bit	7 bits	7 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● FX Series Computer Link

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● A Series CPU Direct

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-422A 4 wire	RS-422A 4 wire
Baud Rate	9600 bit/s	9600 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● AnN Series Computer Link

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● AnA Series Computer Link

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● QnA Series CPU Direct

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-422A 4 wire	RS-422A 4 wire
Baud Rate	19200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● QnA Series Computer Link

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series/Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port numbers of the connected units should be determined in advance.

The following table shows the settings corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



Make sure that the "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	<p>VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in VT STUDIO. ^{*1}</p> <p>Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.</p>	P.2-52
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ^{*2}	P.2-53
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Use Mitsubishi Electric Corporation's Engineering Software: GX Works3, GX Works2 or GX Developer to set communication conditions.	P.2-56

*1 Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

*2 You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.2-54
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT system settings" in "PLC Communication Conditions" in VT STUDIO. ^{*1}	P.2-53
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use Mitsubishi Electric Corporation's Engineering Software: GX Works3, GX Works2 or GX Developer to set communication conditions.	P.2-56

*1 Use "PLC Communication Condition" in VT3 system mode to confirm and change settings.

2-4 Unit Settings

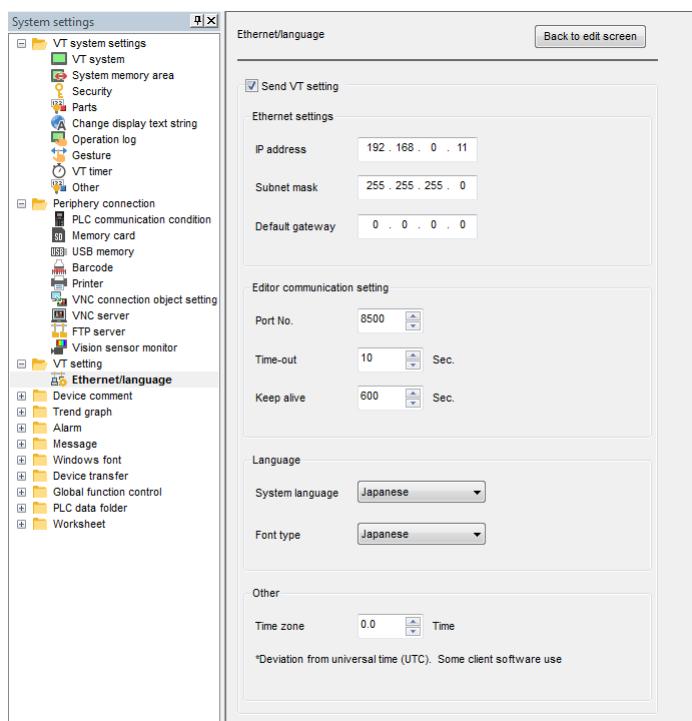
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item	Description
Send VT setting	When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address Set the IP address to be assigned to the VT5.
	Subnet mask Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive Set as necessary.
	Timeout Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.

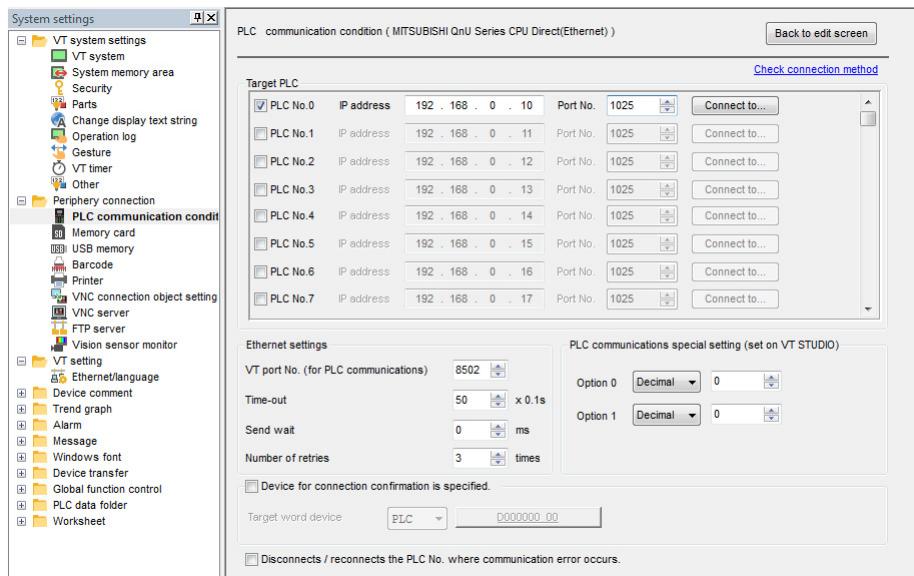


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen. In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long time out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023.

Also, take care not to use a port number already used by another device.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

2-4 Unit Settings

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 System mode to set an IP address or make other settings to be assigned to the VT3.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	0	20	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	** . ** . ** ; ** : ** ; **				
				OK	Cancel
				OK	Cancel
				OK	Cancel

Ethernet Setup (2/3)				OK	Cancel
Port No.	8500			Next page	
Time-out	10			s	
Keep alive	600			s	
				OK	Cancel
				OK	Cancel
				OK	Cancel

Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				
				OK	Cancel
				OK	Cancel
				OK	Cancel

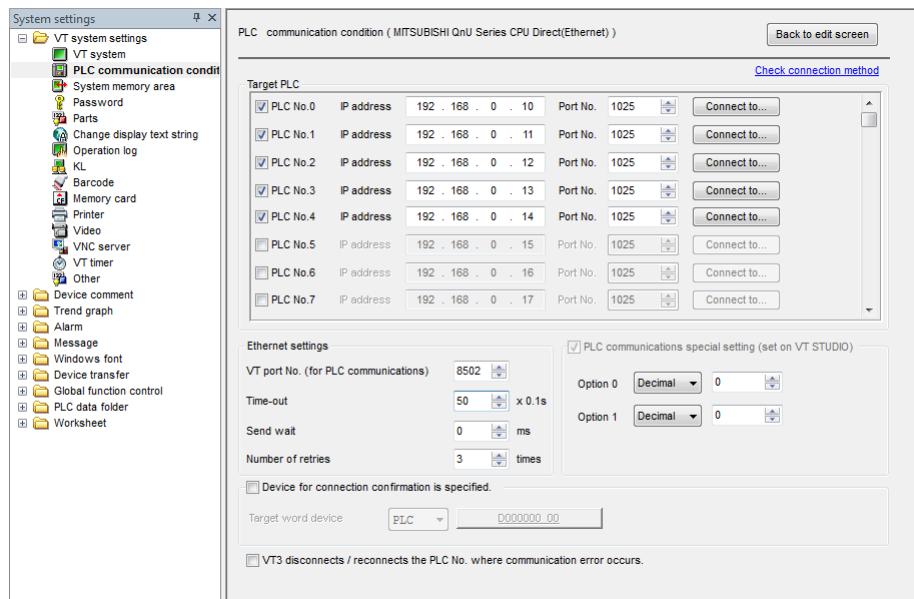
Item	Description
Baud rate	Normally, select "100/10Mbps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup¹	Selects "Enable" only when using a router.

*1 "Chapter 8 ETHERNET", VT3 Series Reference Manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (C)]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connection", VT3 Series Reference Manual



Item		Description
Target PLC	PLC No.	Selects the PLC No. (0 to 15) to be used.
	IP address ¹	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port No. ²	Sets the port No. (1024 to 65535) of the connection destination PLC (marked PLC No.).
	Connect to...	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet settings	VT port No. (for PLC communications)	Sets the port No. (for PLC communications) (1024 to 65535) of the VT3.
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Number of retries	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Device for connection confirmation is specified	Target word device ³	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
VT3 disconnects / reconnects the PLC No. where communication error occurs ⁴		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 In the same LAN, the IP address should be unique.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. Also, take care not to use another port No. that is already in use.

*3 Select "PLC Devices"

"6-7 Set up the Devices", VT3 Series Reference Manual

*4 This can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC setting conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Condition", VT3 Series Hardware Manual

2-4 Unit Settings

■ Settings for MELSEC iQ-R Series, MELSEC iQ-F Series and CPU with internal Ethernet board

- 1 Use GX Works3 to set the communication conditions.
- 1 Open "Basic Settings"→"Auto Node Settings" in the "Unit Parameter" window.
- | Item | | Description |
|---|---------------------------------|---|
| Parameter setting methods ¹⁾ | | Select "Parameter Settings". |
| IP Address setting | IP Address ²⁾ | Set the IP address to be assigned to the PLC. |
| | Subnet mask | Set the PLC subnet mask. |
| | Default gateway | Set the default IP address of the PLC router. |
| Writing enabled/disabled setting in Run mode setting ¹⁾ | | Select "Enable all (SLMP)". |
| Communication data code | | Select "Binary". |
| Open method setting ¹⁾ | | Select "Do not open in program". |
- *1 Setting not available when the MELSEC iQ-F Series is selected.
 *2 Be sure to set unique IP addresses for each device in the same LAN.
- 2 Open "Basic Settings"→"Setting Other Party Connection Environment"→"Detailed Settings" in the "Unit Parameter" window.
- 3 Add "SLMP Connecting Device" in the unit list to the Ethernet configuration and make the following settings.
- | Item | | Description |
|---------------------------------|--------------------|------------------------|
| Protocol | | Select "UDP Settings". |
| Sequencer | Port number | Set PLC port number. |
| Keep Alive ¹⁾ | | Set as necessary. |
- *1 Setting not available when the MELSEC iQ-F Series is selected.
-  Point After completing the settings, turn on the CPU unit.
-
- **RJ71EN71 settings**
- 1 Use GX Works3 to set the communication conditions.
- 1 Open "Basic Settings"→"Auto Node Settings" in the "Unit Parameter" window.
- | Item | | Description |
|---|---------------------------------|---|
| Parameter setting methods | | Select "Parameter Settings". |
| IP Address setting | IP Address ¹⁾ | Set the IP address to be assigned to the PLC. |
| | Subnet mask | Set the PLC subnet mask. |
| | Default gateway | Set the default IP address of the PLC router. |
| Network No./station number communication | | Select "Disable". |
| Writing enabled/disabled setting in Run mode setting | | Select "Enable all (SLMP)". |
| Communication data code | | Select "Binary". |
| Open method setting | | Select "Do not open in program". |
- *1 Be sure to set unique IP addresses for each device in the same LAN.
- 2 Open "Basic Settings"→"Setting Other Party Connection Environment"→"Detailed Settings" in the "Unit Parameter" window.
- 3 Add "SLMP Connecting Device" in the unit list to the Ethernet configuration and make the following settings.
- | Item | | Description |
|-------------------|--------------------|----------------------|
| Protocol | | Select "UDP". |
| Sequencer | Port number | Set PLC port number. |
| Keep Alive | | Set as necessary. |
-  Point After completing the settings, turn on the CPU unit.

■ Setting of QnU Ethernet built-in CPU unit

Use GX Works2 or GX Developer to set the communication conditions.

In "Parameter"→"PC Parameter"→"Internal Ethernet Port Settings", make the following settings.

Item		Description
IP address setting	IP address ^{**1}	Set up the IP address to be assigned to PLC.
	Subnet mask pattern	Set up the subnet mask of PLC.
	Default router IP address	Set up the IP address of default router of PLC.
Communications data code setting		Select "binary code communication".
Enable writing in RUN mode (FTP and MC protocol)		Select "Enable".
Disable direct link with MELSOFT		Set as necessary.
Response to Ethernet internal CPU search in network disabled		Set as necessary.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

Press the "Open setting" button to execute "Built-in Ethernet port open setting".

Item		Description
Protocol		Select "UDP".
Open mode		Select "MC protocol".
Self-station port No. ^{**1}		Set up the port No.

- *1 • Only 1 VT5/VT3/Soft-VT unit can be connected to one port N0.. Otherwise, communication cannot be performed correctly.
 • Select "Decimal" for "Port number input format" and set the port number in a range from 1024 to 4999 or from 5010 to 65534.

After setting, restart the power of CPU unit.

■ QJ71E71(-100) settings

Use GX Works2 or GX Developer to set the communication conditions.

 The setting items and setting method of the QJ71E71-100 are the same as those of the QJ71E71.

In "Parameters"→"Network Parameters", make the following settings.

(1) "MELSECNET/Ethernet"

Item		Description
Network type		Select "Ethernet".
Leading I/O No.		Set as necessary.
Network No.		Set as necessary.
Group No.		Set as necessary.
PLC No. mode		Set as necessary.
Mode		Select "online".

(2) "Ethernet operation settings"

Item		Description
Communications data code settings		Select "binary code communications".
Initial timing setting		Select "Always wait for OPEN".
IP address setting ^{**1}		Set the IP address to be assigned to the PLC.
Send frame setting		Select "Ethernet (V2.0)".
Enable writing in the RUN mode		Select "Enable".

*1 Be sure to set only unique IP address to each equipment within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range of 0 to 255).

■ Setting of MELSEC-L CPU unit

Use GX Works2 or GX Developer to set the communication conditions.

In "Parameters"→"PC Parameters"→"Internal Ethernet Port Settings", make the following settings.

Item		Description
IP address setting	IP address ^{*1}	Set up the IP address to be assigned to PLC.
	Subnet mask pattern	Set up the subnet mask of PLC.
	Default router IP address	Set up the IP address of default router of PLC.
Communications data code setting		Select "binary code communication".
Enable writing in RUN mode (FTP and MC protocol)		Select "Enable".
Disable direct link with MELSOFT		Set as necessary.
Response to Ethernet internal CPU search in network disabled		Set as necessary.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

Press the "Open setting" button to execute "Built-in Ethernet port open setting".

Item	Description
Protocol	Select "UDP".
Open mode	Select "MC protocol".
Self-station port No. ^{*1}	Set up the port No. (0401H to 1387H, 1392H to FFFEH, expressed in HEX) of PLC.

- *1 • Only 1 VT5/VT3 unit can be connected to one port No.. Connecting two or more VT5/VT3 units to one port number will prevent normal communications.
 • Select "Decimal" for "Port number input format" and set the port number in a range from 1024 to 4999 or from 5010 to 65534.

After setting, restart the power of CPU unit.

■ FX3U-ENET-L setting

The communication condition is to set with the FX3U-ENET-L setting tool.

Set up "Ethernet unit setting" as follows.

(1) Ethernet unit setting

Set up the target unit number.

(2) Operation setting

Item	Setting
Communication data code setting	Binary code communication
Initial timing setting	Always wait for OPEN (Communication possible during STOP)
IP address setting	Any
Transmission frame setting	Ethernet(V2.0)
TCP existence confirmation setting	Any

(3) OPEN setting

Item	Setting
Protocol	UDP
Open style	MC protocol
Existence confirmation	Any
Local station port No. (decimal)	Any
Communication destination IP address	Any
Communication destination port No. (decimal)	Any

* 1 and 2 are for non-procedure communication only, please set to 3 and 4.

■ FX3U-ENET-ADP setting

The communication condition is to set with the GS Works2 setting tool.
Set up with "FX Parameter Setting" as follows.

(1) Ethernet port setting

Item	Setting
CH to be used	CH1 or CH2
IP address setting	Any
Communications data code setting	Binary code communication
Disable direct link with MELSOFT	Unchecked
Response to CPU search in network disabled	Unchecked

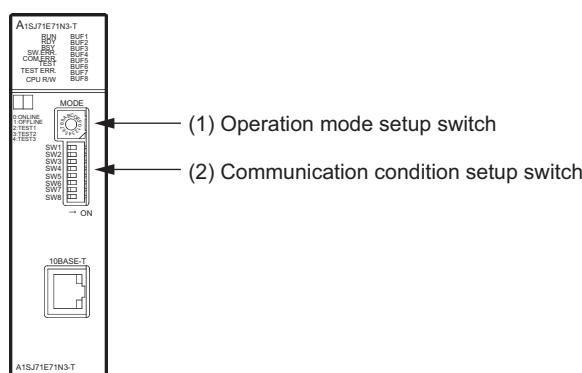
(2) OPEN setting

Item	Setting
Protocol	UDP
Open style	MC protocol
Local station port No.	Any
Communication destination IP address	Any
Communication destination port No.	Any

2-4 Unit Settings

■ A1SJ71E71N3-T setting

To set up the Ethernet unit of Mitsubishi AnS Series.
Please set switches according to the following diagram.



(1) Operation mode setup switch

Operation mode setup Switch	Setting No.	Setting	Set value
	0	Online	0*
	1	Online	
	2	Self-diagnosis test	
	3	RAM test	
	4	ROM test	
	5 to F	Disabled	

* Be sure to set to 0.

(2) Communication condition setup switch

Communication condition setup switch	Setting No.	Setting	Set (recommended) value	
	SW1	Line handling in case a TCP timeout error occurs	Communication lines closed	OFF
	SW2	Data code setting	Binary code	OFF ^{*1}
	SW3 to SW6	Disabled (fixed as OFF)	-	OFF ^{*1}
	SW7	CPU communication timing setting	Write enabled	ON ^{*2}
	SW8	Initial timing setting	-	Any setting

*1 Be sure to set to OFF.

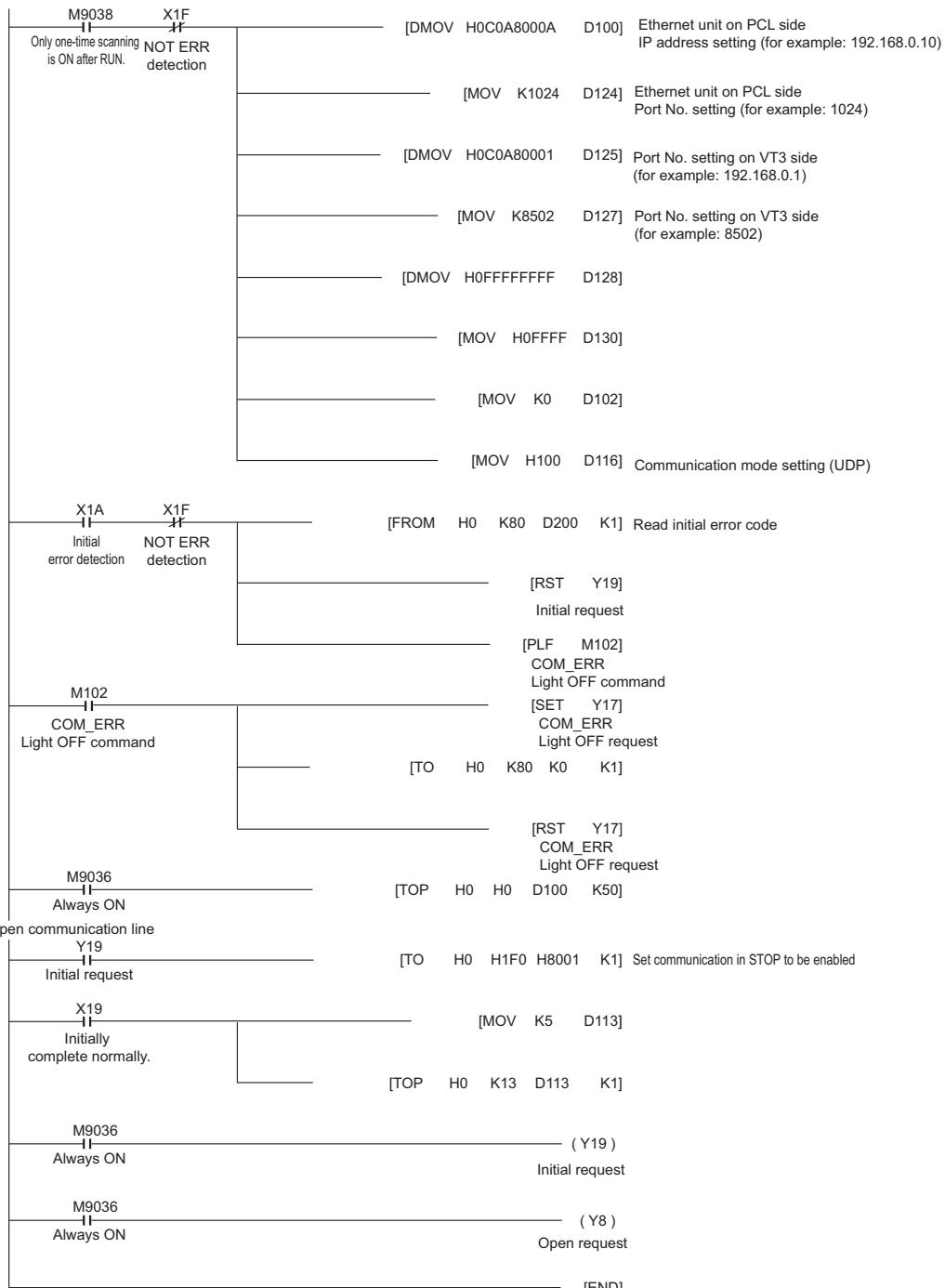
*2 Be sure to set to ON when writing in RUN mode.

● Communication setting

It is necessary to create ladder program with ladder software “GX Developer” from MITUSBISSI Electric for Ethernet connection of A1SJ71N3T and VT3. For more information, see the MELSEC-A Series Ethernet Interface User's Manual (Detail Description).

Reference Ladder Program Example

* Initial use



2-5 Available Devices

Devices Available for Serial Communications

● MELSEC-Q Series/QUTE Series/QnU/L Series

Device	Address	
	MELSEC Q series Q mode QUTE Series QnU Series L Series	MELSEC Q Series A-MODE
Bit Devices	Input relay	X000000 to X001FFF
	Output relay	Y000000 to Y001FFF
	Internal relay	M000000 to M061439
	Latch relay	L000000 to L032767
	Link relay	B000000 to B00EFFF
	Timer (contact)	TS000000 to TS032767
	Timer (coil)	TC000000 to TC032767
	Counter (contact)	CS000000 to CS032767
	Timer (coil)	CC000000 to CC032767
	Total timer (contact)	SS000000 to SS032767
	Total timer (coil)	SC000000 to SC032767
	Annunciator	F000000 to F032767
	Edge relay	V000000 to V032767
	Step relay	S000000 to S008191
Word Devices	Special relay for link	SB000000 to SB007FFF
	Special relay	SM000000 to SM002047
	Input relay ^{1,2}	X000000 to X001FF0
	Output relay ^{1,2}	Y000000 to Y001FF0
	Internal relay ¹	M000000 to M061424
	Latch relay ¹	L000000 to L032752
	Link relay ^{1,2}	B000000 to B00EFF0
	Timer (set)	-
	Timer (current)	TN000000 to TN032767
	Counter (set)	-
	Counter (current)	CN000000 to CN032767
	Total timer (current)	SN000000 to SN032767
	Annunciator ¹	F000000 to F032752
	Edge relay ¹	V000000 to V032752
Word Devices	Step relay ¹	S000000 to S008176
	Special relay for link ²	SB000000 to SB007FF0
	Special relay ¹	SM000000 to SM002032
	Data register	D000000 to D065535
	Link register	W000000 to W00FFFF
	Special register for link	SW000000 to SW007FFF
	Special register	SD000000 to SD002047
	File register	-
	File register (bank)	R000000 to R032767
	File register (sequential)³	ZR0000000 to ZR4849663
Extended file register ⁴	-	nR000000 to nR488191
	Index register	Z00 to Z15

*1 Set a value divisible by 16.

*2 Always specify the lower bit as "0".

*3 For MELSEC L Series, the range is ZR0000000 to ZR0393215.

*4 Set the higher two bits within the range of "0 to 48" and the lower four bits within "0 to 8191".



Available devices are restricted according to the product model. Check the manual for the respective models.

● FX1, FX2, FX2C, FX0, FX0N, FX2N, FX1NC, FX2NC

Device		Address	
		FX1, FX2, FX2C FX0, FX0N	FX2N, FX1NC, FX2NC
Bit Devices	Input relay ^{*1}	X000 to X177	X000 to X267
	Output relay ^{*1}	Y000 to Y177	Y000 to Y267
	Internal relay	M0000 to M1203	M0000 to M3071
	State	S000 to S999	S000 to S999
	Timer (contact)	TS000 to TS255	TS000 to TS255
Word Devices	Counter (contact)	CS000 to CS255	CS000 to CS255
	Input relay ^{*1*2}	X000 to X160	X000 to X260
	Output relay ^{*1*2}	Y000 to Y160	Y000 to Y260
	Internal relay ^{*3}	M0000 to M1008	M0000 to M3056
	State ^{*3}	S000 to S976	S000 to S976
	Timer (current)	TN000 to TN255	TN000 to TN255
	Counter (current)	CN000 to CN255	CN000 to CN255
	32-bit counter (current) ^{*4}	CLN200 to CLN255	CLN200 to CLN255
Data register		D000 to D999	D0000 to D7999

*1 Value divisible by 8.

*2 The upper two digits are divided by 2, and the lower digit becomes "0".

*3 Value divisible by 16.

*4 Writing is not possible when the target PLC is set to "FX series Computer Link".



Available devices are restricted according to the product model. Check the manual for the respective model.

● FX1S, FX1N

Device		Address	
		FX1S	FX1N
Bit Devices	Input relay ^{*1}	X000 to X017	X000 to X177
	Output relay ^{*1}	Y000 to Y015	Y000 to Y177
	Internal relay	M0000 to M0511	M0000 to M1535
	State	S000 to S127	S000 to S999
	Timer (contact)	TTS000 to TS063	TS000 to TS255
	Counter (contact)	CS000 to CS031	CS000 to CS234
Word Devices	Input relay ^{*1*2}	X000	X000 to X160
	Output relay ^{*1*2}	Y000	Y000 to Y160
	Internal relay ^{*3}	M0000 to M0496	M0000 to M1520
	State ^{*3}	S000 to S112	S000 to S976
	Timer (current)	TN000 to TN063	TN000 to TN255
	Counter (current)	CN000 to CN031	CN000 to CN199
	32-bit counter (current) ^{*4}	CLN235 to CLN255	CLN200 to CLN255
	Data register	D000 to D255	D0000 to D7999

*1 Value divisible by 8.

*2 The upper two digits are divided by 2, and the lower digit becomes "0".

*3 Value divisible by 16.

*4 Writing is not possible when the target PLC is set to "FX series Computer Link".



Available devices are restricted according to the product model. Check the manual for the respective model.

● FX_{3U}, FX_{3UC}, FX_{3G}, FX_{3GC}, FX_{3S}

Device		Address		
		FX _{3U} , FX _{3UC}	FX _{3G} , FX _{3GC}	FX _{3S}
Bit Device	Input relay ^{*1}	X000 to X377	X000 to X177	X000 to X017
	Output relay ^{*1}	Y000 to Y377	Y000 to Y177	Y000 to Y015
	Internal auxiliary relay	M0000 to M8511 ^{*4}	M0000 to M17679 M8000 to M8511 ^{*4}	M0000 to M1535 M8000 to M8511 ^{*4}
	State	S000 to S4095	S0000 to S4095	S0000 to S0255
	Timer (contact)	TS000 to TS511	TS000 to TS319	TS000 to TS137
	Counter (contact)	CS000 to CS255	CS000 to CS255	CS000 to CS255
Word Device	Input relay ^{*12}	X000 to X360	X000 to X160	X000
	Output relay ^{*12}	Y000 to Y360	Y000 to Y160	Y000
	Internal relay ^{*3}	M0000 to M8496	M0000 to M17664 M8000 to M8496 ^{*4}	M0000 to M1520 M8000 to M8496 ^{*4}
	State ^{*3}	S000 to S4080	S0000 to S4080	S0000 to S0240
	Timer (current)	TN000 to TN511	TN000 to TN319	TN000 to TN137
	Counter (current)	CN000 to CN255	CN000 to CN199	CN000 to CN031 CN200 to CN255
	32-bit counter (current)	CLN200 to CLN255 ^{*6}	CLN200 to CLN255 ^{*6}	CLN200 to CLN255
	Data register	D0000 to D8511 ^{*5}	D0000 to D7999 D8000 to D8511 ^{*5}	D0000 to D2999 D8000 to D8511 ^{*5}
	Expansion register	R00000 to R32767	R00000 to R23999	-

*1 Octal value only.

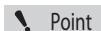
*2 The upper 2 digits are divisible by 2, and the lowest 1 digit is the value "0".

*3 It is a value divisible by 16.

*4 M8000 to M8511 are special internal relays (write-protected devices).

*5 D8000 to D8511 are special data registers (write-protected devices).

*6 Writing is impossible if the destination PLC is set to "FX series (computer link)".



Because there are restrictions on usable devices depending on the product type, please check the manuals of each model.

● MELSEC-AnS, A2C, A0J2, AnN, AnA, AnU Series

Device		Address		
		AnS,A0J2H,AnN,AnA,AnU (CPU direct link cable)	AnS, A2C, AOJ2, AnN (Computer Link)	AnA, AnU (Computer Link)
Bit Devices	Input relay	X000000 to X001FFF	X0000 to X07FF	X000000 to X001FFF
	Output relay	Y000000 to Y001FFF	Y0000 to Y07FF	Y000000 to Y001FFF
	Internal relay	M000000 to M008191	M0000 to M2047	M000000 to M008191
	Latch relay	L000000 to L008191	L0000 to L2047	L000000 to L008191
	Link relay	B000000 to B001FFF	B0000 to B03FF	B000000 to B001FFF
	Timer (contact)	TS00000 to TS02047	TS000 to TS255	TS00000 to TS02047
	Timer (coil)	TC00000 to TC02047	TC000 to TC255	TC00000 to TC02047
	Counter (contact)	CS00000 to CS01023	CS000 to CS255	CS00000 to CS01023
Word Devices	Timer (coil)	CC00000 to CC01023	CC000 to CC255	CC00000 to CC01023
	Input relay ¹	X000000 to X001FF0	X0000 to X07F0	X000000 to X001FF0
	Output relay ¹	Y000000 to Y001FF0	Y0000 to Y07F0	Y000000 to Y001FF0
	Internal relay ²	M000000 to M008176	M0000 to M2032	M000000 to M008176
	Latch relay ²	L000000 to L008176	L0000 to L2032	L000000 to L008176
	Link relay ¹	B000000 to B001FF0	B0000 to B03F0	B000000 to B001FF0
	Timer (set)	-	TX000 to TX255	TX00000 to TX0255
	Timer (current)	TN00000 to TN02047	TN000 to TN255	TN00000 to TN02047
	Counter (set)	-	CX000 to CX255	CX00000 to CX0255
	Counter (current)	CN00000 to CN01023	CN000 to CN255	CN00000 to CN01023
	Data register	D000000 to D008191	D0000 to D1023	D000000 to D008191
	Link register	W000000 to W001FFF	W0000 to W03FF	W000000 to W001FFF
	File register	-	R0000 to R8191	R000000 to R008191
	Extended file register ³	-	nR000000 to nR488191	nR000000 to nR488191

*1 Always specify the lower digit as "0".

*2 Value divisible by 16.

*3 Set the upper two digits between the range "0 to 48" and the lower four digits between "0 to 8191".



Available devices are restricted according to the product model. Check the manual for the respective model.

2-5 Available Devices

● MELSEC-QnA Series

Device	Address	
	Q2A (PLC port direct link cable)	QnA (Computer Link)
Bit Devices	Input relay	X000000 to X001FFF
	Output relay	Y000000 to Y001FFF
	Internal relay	M000000 to M032767
	Latch relay	L000000 to L032767
	Link relay	B000000 to B007FFF
	Timer (contact)	TS000000 to TS023551
	Timer (coil)	TC000000 to TC023551
	Counter (contact)	CS000000 to CS023551
	Timer (coil)	CC000000 to CC023551
	Total timer (contact)	SS000000 to SS023551
	Total timer (coil)	SC000000 to SC023551
	Announcer	F000000 to F032767
	Edge relay	V000000 to V032767
	Step relay	S000000 to S032767
Word Devices	Special relay for link	SB000000 to SB0007FF
	Special relay	SM000000 to SM002047
	Input relay ^{*1²}	X000000 to X001FF0
	Output relay ^{*1²}	Y000000 to Y001FF0
	Internal relay ^{*1}	M000000 to M032752
	Latch relay ^{*1}	L000000 to L032752
	Link relay ^{*1²}	B000000 to B007FF0
	Timer (current)	TN000000 to TN023551
	Counter (current)	CN000000 to CN023551
	Total timer (current)	SN000000 to SN023551
	Announcer ^{*1}	F000000 to F032752
	Edge relay ^{*1}	V000000 to V032752
	Step relay ^{*1}	S000000 to S032752
	Special relay for link ^{*1}	SB000000 to SB0007F0
	Special relay ^{*1}	SM000000 to SM002032
	Data register	D000000 to D026495
	Link register	W000000 to W00677F
	Special register for link	SW000000 to SW0007FF
	Special register	SD000000 to SD002047
	File register	R000000 to R032767
	File register	ZR000000 to ZR032767

^{*1} Value divisible by 16.^{*2} Always specify the lower digit as "0".

Available devices are restricted according to the product model. Check the manual for the respective model.

Devices Available for Ethernet Communications

■ MELSEC iQ-R Series (Ethernet)

Device	Address
	MELSEC-iQ-R Series (Ethernet)
Input relay	X000000 to X001FFF
Output relay	Y000000 to Y001FFF
Internal relay	M000000 to M061439
Latch relay	L000000 to L032767
Link relay	B000000 to B00EFFF
Timer (contact)	TS000000 to TS032767
Timer (coil)	TC000000 to TC032767
Long timer (contact)	LTS0000000 to LTS1480831
Long timer (coil)	LTC0000000 to LTC1480831
Counter (contact)	CS000000 to CS032767
Counter (coil)	CC000000 to CC032767
Bit device	LC0000000 to LCS2787391
Long counter (contact)	LCC0000000 to LCC2787391
Integration timer (contact)	SS000000 to SS032767
Integration timer (coil)	SC000000 to SC032767
Long integration timer (contact)	LSS0000000 to LSS1480831
Long integration timer (coil)	LSC0000000 to LSC1480831
Announcer	F000000 to F032767
Edge relay	V000000 to V032767
Special relay for link	SB000000 to SB007FFF
Special relay	SM000000 to SM002047
Word device	X000000 to X001FF0
Input relay ^{*1 *2}	Y000000 to Y001FF0
Output relay ^{*1 *2}	M000000 to M061424
Internal relay ^{*1}	L000000 to L032752
Latch relay ^{*1}	B000000 to B00EFF0
Link relay ^{*1 *2}	TN000000 to TN032767
Timer (current value)	LTN0000000 to LTN1480831
Long timer (current value)	CN000000 to CN032767
Counter (current value)	LCN0000000 to LCN2787391
Long counter (current value)	SN000000 to SN032767
Integration timer (current value)	LSN0000000 to LSN1480831
Long integration timer (current value)	F000000 to F032752
Announcer ^{*1}	V000000 to V032752
Edge relay ^{*1}	SB000000 to SB007FF0
Special relay for link ^{*2}	SM000000 to SM002032
Special relay ^{*1}	D000000 to D065535
Data register	W000000 to W00FFFF
Link register	SW000000 to SW007FFF
Special register for link	SD000000 to SD002047
Special register	R000000 to R032767
File register (block switching mode)	(Hexadecimal) ZR000000 to ZR49FFFF (Decimal) ZRD0000000 to ZRD04849663
File register (CONT mode)	Z00 to Z19
Index register	LZ00 to LZ11
Long index register	

*1 Set a value divisible by 16.

*2 Be sure to set the low-order 1 digit to "0".



Available models are restricted according to the product model. Check the manual for the respective model numbers.

2-5 Available Devices

■ MELSEC iQ-F Series (Ethernet)

Device	Address
	MELSEC iQ-F Series (Ethernet)
Input relay ^{*1}	X0000 to X1777
Output relay ^{*1}	X0000 to X1777
Internal relay	M00000 to M32767
Latch relay	L00000 to L32767
Annunciator	F00000 to F32767
Link relay	B0000 to B7FFF
Timer (contact)	TS0000 to TS1023
Timer (coil)	TC0000 to TC1023
Counter (contact)	CS0000 to CS1023
Counter (coil)	CC0000 to CC1023
Long counter (contact)	LCS0000 to LCS1023
Long counter (coil)	LCC0000 to LCC1023
Integration timer (contact)	SS0000 to SS1023
Integration timer (coil)	SC0000 to SC1023
Special relay	SM0000 to SM9999
Special relay for link	SB0000 to SB7FFF
Word Device	Input relay ^{*1*2}
	X0000 to X1760
	Output relay ^{*1*2}
	Y0000 to Y1760
	Internal relay ^{*4}
	M00000 to M32752
	Latch relay ^{*4}
	L00000 to L32752
	Annunciator ^{*4}
	F00000 to F32752
	Link relay ^{*3}
	B0000 to B7FF0
	Timer (current value)
	TN0000 to TN1023
	Counter (current value)
	CN0000 to CN1023
	Long counter (current value)
	LCN1023 to LCN1023
	Integration timer (current value)
	SN0000 to SN1023
	Special relay ^{*4}
	SM0000 to SM9984
	Special relay for link ^{*3}
	SB0000 to SB7FF0
	Data register
	D0000 to D7999
	Special register
	SD00000 to SD11999
	Link register
	W0000 to W7FFF
	Special relay for link
	SW0000 to SW7FFF
	File register
	R00000 to R32767
	Index register
	Z00 to Z23
	Long index register
	LZ00 to LZ11

*1 Set a value divisible by 8.

*2 If the high-order 2 digits are divisible by 2, the low-order 1 digit is "0".

*3 The low-order 1 digit becomes "0".

*4 Only numbers divisible by 16



Available models are restricted according to the product model. Check the manual for the respective model number.

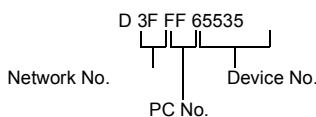
■ MELSEC-Q Series (Ethernet)

Device	Address	
	MELSEC Q Series (EtherNet)	MELSEC Q Series (EtherNet) MELSECNET*3
Bit Devices	Input relay	X000000 to X001FFF
	Output relay	Y000000 to Y001FFF
	Internal relay	M000000 to M061439
	Latch relay	L000000 to L032767
	Link relay	B000000 to B00EFFF
	Timer (contact)	TS000000 to TS032767
	Timer (coil)	TC000000 to TC032767
	Counter (contact)	CS000000 to CS032767
	Counter (coil)	CC000000 to CC032767
	Total timer (contact)	SS000000 to SS032767
	Total timer (coil)	SC000000 to SC032767
	Annunciator	F000000 to F032767
	Edge relay	V000000 to V032767
	Step relay	S000000 to S008191 ⁴
Word Devices	Special relay for link	SB000000 to SB007FFF
	Special relay	SM000000 to SM002047
	Input relay ^{1~2}	X000000 to X001FF0
	Output relay ^{1~2}	Y000000 to Y001FF0
	Internal relay ¹	M000000 to M061424
	Latch relay ¹	L000000 to L032752
	Link relay ^{1~2}	B000000 to B00EFF0
	Timer (current)	TN000000 to TN032767
	Counter (current)	CN000000 to CN032767
	Total timer (current)	SN000000 to SN032767
	Annunciator ¹	F000000 to F032752
	Edge relay ¹	V000000 to V032752
	Step relay ¹	S000000 to S008176
	Special relay for link ²	SB000000 to SB007FFF
	Special relay ¹	SM000000 to SM002032
	Data register	D000000 to D065535
	Link register	W000000 to W00FFFF
	Special register for link	SW000000 to SW007FFF
	Special register	SD000000 to SD002047
	File register (bank)	R000000 to R032767
	File register (sequential)	(HEX)ZR000000 to ZR49FFFF (DEC)ZRD00000000 to ZR4849663
	Index register	Z00 to Z19

*1 Set a value divisible by 16.

*2 Always specify the lower digit as "0".

*3 The device No. is set as follows.



However, when the QJ71E71 (-100) connected with VT5/VT3 is specified, set up as follows:

Network No. : 00H

PC No. : FFH

*4 When an QJ71E71 (-100) is installed in and connected to the Q03UDVCPUs, Q04UDVCPUs and Q06UDVCPUs, a communication error (4032) will occur if an attempt is made to write to the bit device step relay.

To write to a bit device step relay, set "PLC communication Special Settings Option 0" in "PLC Communication Conditions" in VT STUDIO to "1".



Available models are restricted according to the product model. Check the manual for the respective model numbers.

■ MELSEC-L Series (Ethernet)

Device	Address
	MELSEC L series
Bit Devices	Input relay
	Output relay
	Internal relay
	Latch relay
	Link relay
	Timer (contact)
	Timer (coil)
	Counter (contact)
	Timer (coil)
	Total timer (contact)
	Total timer (coil)
	Annunciator
	Edge relay
	Step relay
	Special relay for link
	Special relay
Word Devices	Input relay ^{*1²}
	Output relay ^{*1²}
	Internal relay ^{*1}
	Latch relay ^{*1}
	Link relay ^{*1²}
	Timer (current)
	Counter (current)
	Total timer (current)
	Annunciator ^{*1}
	Edge relay ^{*1}
	Step relay ^{*1}
	Special relay for link ^{*2}
	Special relay ^{*1}
	Data register
	Link register
	Special register for link
	Special register
	File register (bank)
	File register (sequential)
	Index register

*1 Set a value divisible by 16.

*2 Always specify the lower digit as "0".



Available devices are restricted according to the product model. Check the manual for the respective model.

■ FX3 Series (Ethernet)

Device		Address		
		FX3u, FX3uc	FX3G, FX3GC	FX3s
Bit Devices	Input relay ¹	X000 to X377	X000 to X177	X000 to X017
	Output relay ¹	Y000 to Y377	Y000 to Y177	Y000 to Y015
	Internal relay	M0000 to M8511 ⁴	M0000 to M7679 M8000 to M8511 ⁴	M0000 to M1535 M8000 to M8511 ⁴
	State	S000 to S4095	S0000 to S4095	S0000 to S0255
	Timer (contact)	TS000 to TS511	TS000 to TS319	TS000 to TS137
	Counter (contact)	CS000 to CS255	CS000 to CS255	CS000 to CS255
Word Devices	Input relay ^{1,2}	X000 to X360	X000 to X160	X000 to X160
	Output relay ^{1,2}	Y000 to Y360	Y000 to Y160	Y000 to Y160
	Internal relay ³	M0000 to M8496	M0000 to M7664 M8000 to M8496 ⁴	M0000 to M1520 M8000 to M8496 ⁴
	State ³	S000 to S4080	S0000 to S4080	S0000 to S4080
	Timer (current)	TN000 to TN511	TN000 to TN319	TN000 to TN319
	Counter (current)	CN000 to CN255	CN000 to CN199	CN000 to CN199
	32-bit counter (current) ⁴	CLN200 to CLN255	CLN200 to CLN255	CLN200 to CLN255
	Data register	D0000 to D8511 ⁵	D0000 to D7999 D8000 to D8511 ⁵	D0000 to D2999 D8000 to D8511 ⁵
	Extended register	R00000 to R32767	R00000 to R23999	R00000 to R23999

*1 Octal value only.

*2 The upper 2 digits are divisible by 2, and the lowest 1 digit is the value "0".

*3 It is a value divisible by 16.

*4 M8000 to M8511 are special internal relays (write-protected devices).

*5 D8000 to D8511 are special data registers (write-protected devices).



Because there are restrictions on usable devices depending on the product type, please check the manuals of each model.

■ MELSEC-AnS Series (Ethernet)

	Device	Address
Bit Device	Input relay	X000 to X7FF
	Output relay ^{*3}	Y000 to Y7FF
	Internal relay	M0000 to M8191
	Special relay	M9000 to M9255
	Latch relay	L0000 to L8191
	Link relay	B000 to BFFF
	Timer (contact)	TS0000 to TS2047
	Timer (coil)	TC0000 to TC2047
	Counter (contact)	CS0000 to CS1023
	Timer (coil)	CC0000 to CC1023
	Annunciator	F0000 to F2047
	Input relay ^{*1*2}	X000 to X7F0
Word Device	Output relay ^{*1*2}	Y000 to Y7F0
	Internal relay ^{*1}	M0000 to M8176
	Special relay ^{*1}	M9000 to M9240
	Latch relay ^{*1}	L0000 to L8176
	Link relay ^{*1*2}	B000 to BFFF
	Timer (current)	TN0000 to TN2047
	Counter (current)	CN0000 to CN1023
	Annunciator ^{*1}	F0000 to F2032
	Data register	D0000 to D6143
	Link register	W000 to WFFF
	Special register	D9000 to D9255
	File register	R0000 to R8191
	Expanded file register	nR000000 to nR488191

*1 Set a value divisible by 16.

*2 Be sure to set the lower bit as "0".

*3 Do not execute special bit operations such as assignment of sending request signal.

Otherwise, communications cannot be performed.



Available devices are restricted according to the product model. Check the manual for the respective model.

2-6 Error Messages and Troubleshooting

This section describes communication errors occurring in VT5/VT3 Series/Soft-VT and Mitsubishi Electric Corporation PLC connections.

List of Communication Errors in Serial Connections

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
Parity Error	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

* • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.

• For details on error messages other than communication errors, refer to the following manuals.

"Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual

"Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The following error messages are displayed when communicating with the PLC units over Ethernet. Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when a communications error occurs.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2 is not connected.	<ul style="list-style-type: none"> Turn the VT3 unit OFF, mount VT2-E1/E2, VT3-E3 and then turn VT3 ON again.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED of the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[**(++)]	There was not error response** from PLC No.++.	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

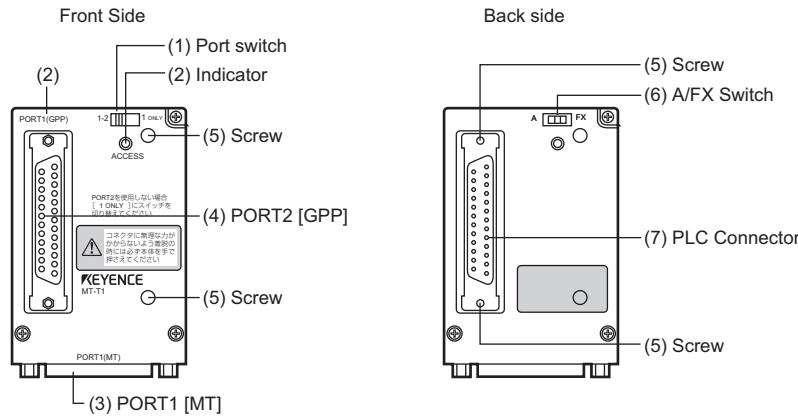
2-7 About the 2-port Adapter MT-T1

The following describes the 2-port Adapter MT-T1 for the MELSEC-A/FX Series.



Not supported by the VT5 Series/Soft-VT.

Names of Parts



(1) Port selector switch

When only PORT2 [MT] (connected with VT3) is used, please choose "1 ONLY"; when both PORT 1 [MT] (connected with VT3) and PORT2 [GPP] (connected with application tool) are used, please choose "1 + 2".

(2) Operation Indicator

Indicates the operation state.

Blinking (green): Blanks when communications is being performed on PORT1[MT].

Blinking (red): Blanks when communications is being performed on PORT2[GPP].

(3) PORT1 [MT]

For connecting the VT3 using the PLC port direct link cable for the MELSEC-A/FX Series.

(4) PORT2 [GPP]

For connecting the programming console or ladder software running on a personalcomputer using the connector cable.

(5) Mounting Screw

Used when fixing the MT-T1 to MELSEC-A Series CPU units or when fixing the connector cable to the MT-T1.

(6) A/FX series selector switch

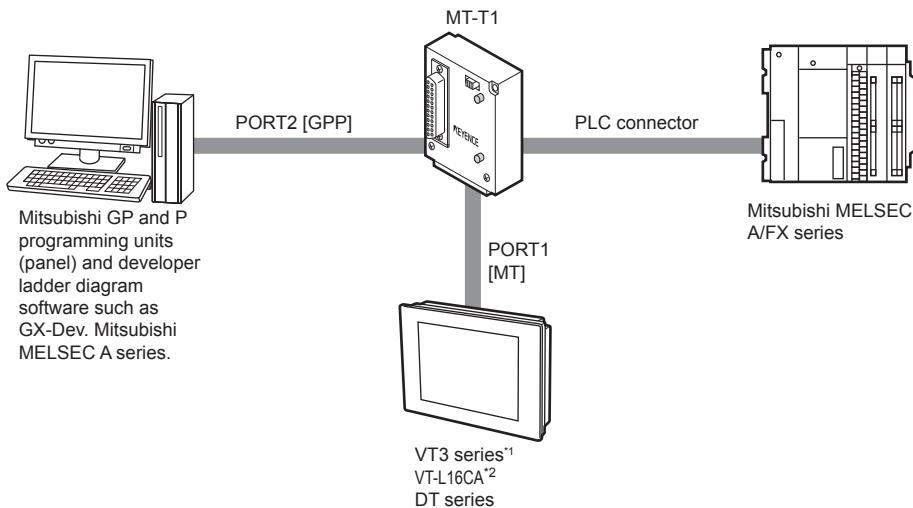
Select "A" when connecting to the MELSEC-A Series and to "FX" when connecting to the MELSEC-F Series.

(7) PLC connector

For connecting to the PLC port (RS-422A connector) on the PLC.

Connection Methods

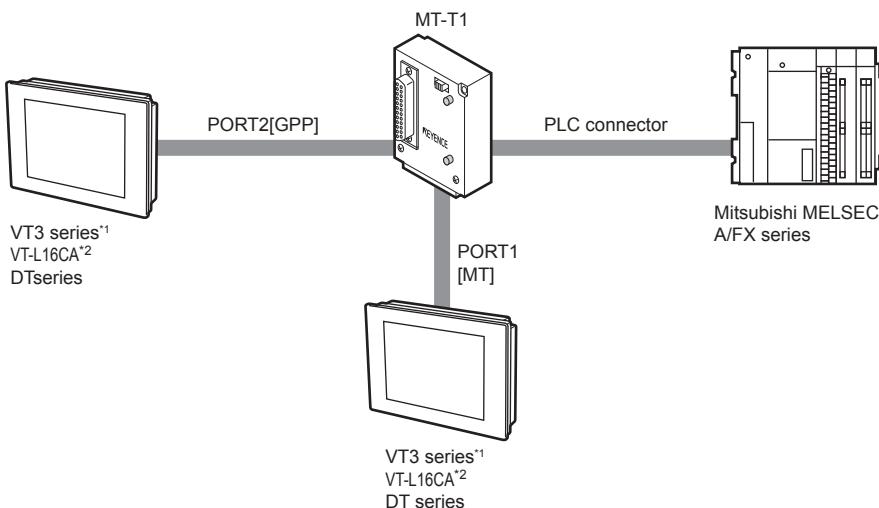
■ Connected with VT3 (GPP)



*1 Cannot be connected to VT3-W4T (A)/W4M(A)/W4G(A).

*2 VT-L16CA only supports our MT-T1 models made after April 7, 1999. The serial number of adapters supported by the VT-L16CA are either prefixed with A or appended with G.

■ Connect VT3 in the form 2CH.



*1 Cannot be connected to VT3-W4T (A)/W4M(A)/W4G(A).

*2 VT-L16CA only supports our MT-T1 models made after April 7, 1999. The serial number of adapters supported by the VT-L16CA are either prefixed with A or appended with G.

NOTICE

A communication error sometimes occurs in the ladder software when the MT-T1 is used to write in the program RUN mode (when automatic transfer is performed during conversion) or the ladder monitor is executed while the MITSUBISHI ELECTRIC ladder software is being used.

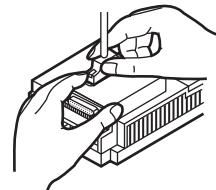
Method of Use

Set the port selector switch to "1ONLY" when a GPP or programming unit (panel) is not connected to PORT2. Connection of the connector cable to PORT1 [MT] or PORT2 [GPP] on the MT-T1 for connection of another MT-T1 is not possible.

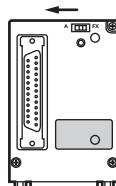
■ When using the MELSEC-A Series



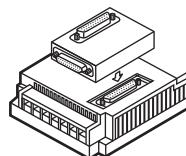
When connecting or disconnecting connectors, be sure to hold down the MT-T1 with your hand. Otherwise, the connector section on the PLC may be damaged.



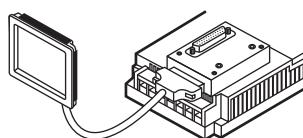
- 1 Set the A/FX Series selector switch on the rear side of the MT-T1 to "A".



- 2 Remove the cover for the PLC port (RS-422A connector) on the PLC body.
- 3 Mount the MT-T1, and tighten the mounting screws.



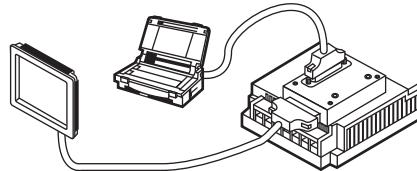
- 4 Connect the serial interface (PORT2) on the VT3/DT for connecting to the PLC to PORT1 [MT] on the MT-T1. For the cable, please prepare additional Mitsubishi A and FX series PLC port direct link cables (MT-C5/C10/C20)



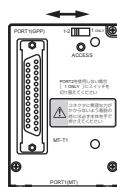
2-7 About the 2-port Adapter MT-T1

- 5** Connect a PLC peripheral device such as a GPP, programming unit (panel), or ladder software to PORT2 [GPP] on the MT-T1 using a connector cable.

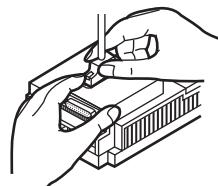
Prepare a separate connector cable for the PLC peripheral device. For details, refer to the manual for the respective device.



- 6** When using a PLC peripheral device, set the port selector switch to "1+2". When not used, please set to "1 ONLY".

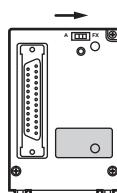


- 7** When removing the connector, hold down the MT-T1 with your hand.



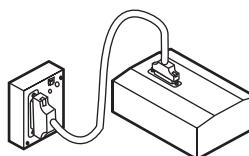
■ When using the MELSEC-F Series

- 1** Set the A/FX Series selector switch on the rear side of the MT-T1 to "FX".



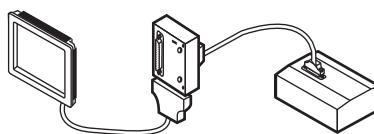
- 2** Connect the MT-T1 PLC connector to the PLC port (RS-422A connector) on the PLC body using the PLC connector cable.

Prepare a separate MITSUBISHI ELECTRIC AC30R4-PUS cable or equivalent product as the connector cable.



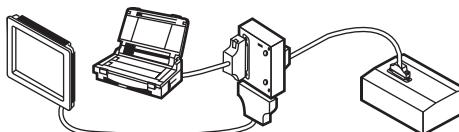
3 Connect the serial interface (PORT2) on the VT3/DT for connecting to the PLC to PORT1 [MT] on the MT-T1.

For the cable, please prepare additional Mitsubishi A and FX series PLC port direct link cables (MT-C5/C10/C20)

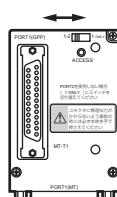


4 Connect a PLC peripheral device such as a GPP, programming unit (panel), or ladder software to PORT2 [GPP] on the MT-T1 using a connector cable.

Prepare a separate connector cable for the PLC peripheral device. For details, refer to the manual for the respective device.



5 When using a PLC peripheral device, set the port selector switch to "1+2". When not used, please set to "1 ONLY".



Specifications

Model No.		MT-T1
Rating	Power voltage	5 VDC (supplied from PLC)
	Power consumption	340 mA max. (supplied from PLC)
Indicator		2-color communications status LEDs (red: GPP, green: MT(VT))
Operating Environment	Operating atmosphere	Free from excessive dust/dirt and corrosive gases
	Ambient operating temperature	0 to 55°C
	Operating surrounding air humidity	35 to 85%RH (condensation not allowed)
	Vibrating resistance	10 to 55 Hz peak-to-peak, 1.5mm, for 2 hours each in X, Y and Z directions
Applicable PLCs		Mitsubishi MELSEC-A series: (AnN ,A0J2H,AnS(H),AnA,AnU, and A2US(H)) MELSEC-F series: (FX1, FX2, and FX2C) (selectable by switch)
Weight		Approx. 95g

MEMO

CONNECTING TO OMRON CORPORATION PLCs

This chapter describes how to connect to a PLC made by OMRON Corporation.

3-1	Checking Operation before Connection	3-2
3-2	System Configuration.....	3-6
3-3	Wiring Diagrams for Connections	3-24
3-4	Unit Settings.....	3-38
3-5	Available Devices	3-69
3-6	Error Messages and Troubleshooting	3-73

3-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/Soft-VT/DT and PLC via serial interface or Ethernet.

For connection of other interfaces (Multi-Link or VT2 Multi-Link), see each chapter.

- "Chapter 19 MULTI-LINK"
- "Chapter 20 VT2 MULTI-LINK"

(1) Make sure the PLC, link unit and Ethernet unit can be connected to the VT5/VT3/Soft-VT and DT.

(2) Check whether or not CPU, link unit and Ethernet settings are required.

(3) Confirm the name of the model to set as the target PLC.

Be sure to check the above 3 points before connecting to PLC.

- "Procedure before Starting Communication", page 18

Serial connections

■ Host Link

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
SYSMAC CJ2	CJ2H-CPU64(-EIP) CJ2H-CPU65(-EIP) CJ2H-CPU66(-EIP) CJ2H-CPU67(-EIP)	RS-232C port CJ1W-SCU21(-V1) CJ1W-SCU31-V1 CJ1W-SCU41(-V1)	□ P.3-40 □ P.3-41	
	CJ2M-CPU11 CJ2M-CPU12 CJ2M-CPU13 CJ2M-CPU14 CJ2M-CPU15	RS-232C port CJ1W-SCU21(-V1) CJ1W-SCU31-V1 CJ1W-SCU41(-V1)	□ P.3-40 □ P.3-41	
	CJ2M-CPU31 CJ2M-CPU32 CJ2M-CPU33 CJ2M-CPU34 CJ2M-CPU35	CP1W-CIF01 CP1W-CIF11 CJ1W-SCU21(-V1) CJ1W-SCU31-V1 CJ1W-SCU41(-V1)	□ P.3-40 □ P.3-41	
	CJ1M-CPU11/12/13 CJ1M-CPU21/22/23 CJ1G-CPU44/45 CJ1G-CPU42H/43H CJ1G-CPU44H/45H CJ1H-CPU65H/66H CJ1H-CPU65H-R CJ1M-CPU13-ETN CJ1M-CPU12-ETN CJ1M-CPU11-ETN	Peripheral port RS-232C port CPM2C-CIF01 CPM2C-CIF11 CJ1W-SCU21(-V1) CJ1W-SCU31-V1 CJ1W-SCU41(-V1)	□ P.3-40 □ P.3-41	SYSMAC CJ/CS1 Series (Host Link) ⁷
	CS1G-CPU42(H)/43(H) CS1G-CPU44(H)/45(H) CS1H-CPU63(H)/64(H) CS1H-CPU65(H)/66(H) CS1H-CPU67(H)	Peripheral port RS-232C port CPM1-CIF01 CPM1-CIF11 CS1W-SCB21(-V1) CS1W-SCB41(-V1) CS1W-SCU21(-V1) CS1W-SCU31-V1	□ P.3-42 □ P.3-43	
	CP1H-X CP1H-XA CP1H-Y CP1L-L	CP1W-CIF01 CP1W-CIF11 CJ1W-SCU21(-V1) ⁴ CJ1W-SCU31-V1 ⁴ CJ1W-SCU41(-V1) ⁴	□ P.3-44 □ P.3-43	
	CP1E-N	RS-232C port	□ P.3-44	

3-1 Checking Operation before Connection

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
SYSMAC SRM1	SRM1-C01 ¹ SRM1-C02	RS-232C port	P.3-44	
		CPM1-CIF01		
SYSMAC CPM1 SYSMAC CPM1A	CPM1 CPM1A	CPM1-CIF01	P.3-44	
SYSMAC CPM2A	CPM2A-20CD□-□ CPM2A-30CD□-□ CPM2A-40CD□-□ CPM2A-60CD□-□	Peripheral port	P.3-45	
		RS-232C port		
		CPM1-CIF01		
		CPM1-CIF11		
SYSMAC CPM2C	CPM2C-10□-□ CPM2C-20□-□	Peripheral port	P.3-45	
		RS-232C port		
		CPM1-CIF01		
		CPM1-CIF11		
SYSMAC CQM1H	CQM1H-CPU11 ^{1,2} CQM1H-CPU21 ² CQM1H-CPU51/61	Peripheral port	P.3-46	
		RS-232C port		
		CPM1-CIF01		
		CPM1-CIF11		
SYSMAC CQM1	CQM1-CPU11 ¹ CQM1-CPU21 CQM1-CPU41/42 CQM1-CPU43/44	Peripheral port	P.3-47	
		RS-232C port		
		RS-232C port		
		Communications board		
SYSMAC α	C200HE-CPU11 ^{1,3} C200HE-CPU32 ¹ C200HE-CPU42	RS-232C port	P.3-48	SYSMAC C Series (Host Link) ^{6,7}
		Communications board	P.3-48	
		C200H-LK201(-V1)	P.3-49	
	C200HG-CPU33 ¹ C200HG-CPU43 C200HG-CPU53 ¹ C200HG-CPU63	C200H-LK202(-V1)	P.3-50	
		RS-232C port	P.3-48	
		Communications board	P.3-48	
	C200HX-CPU34 ¹ C200HX-CPU44 C200HX-CPU54 ¹ C200HX-CPU64	C200H-LK201(-V1)	P.3-49	
		C200H-LK202(-V1)	P.3-49	
		RS-232C port	P.3-48	
	C200HX-CPU65-Z C200HX-CPU85-Z	Communications board	P.3-48	
		C200H-LK201(-V1)	P.3-49	
		C200H-LK202(-V1)	P.3-50	
SYSMAC C	C20H, C28H, C40H	RS-232C port	P.3-50	
	C120, C120F	C120-LK201-V1	P.3-51	
	C200H	C120-LK202-V1	P.3-52	
		C200H-LK201(-V1)	P.3-49	
	C200HS-CPU01 ¹ C200HS-CPU03 ¹ C200HS-CPU21/23 C200HS-CPU31/33	C200H-LK202(-V1)	P.3-50	
		RS-232C port	P.3-48	
SYSMAC C	C500, C500F C1000H C1000HF ⁵ C2000, C2000H	C200H-LK201(-V1)	P.3-49	
		C200H-LK202(-V1)	P.3-50	
		C120-LK201-V1	P.3-51	
		C120-LK202-V1	P.3-52	
SYSMAC CV	CV500, CV1000 CV2000-V□	C500-LK201-V1	P.3-53	SYSMAC CV Series (Host Link) ^{6,7}
		C500-LK203	P.3-54	
		RS-232C/422A port	P.3-55	
	CV500-LK201	RS-232C/422A port	P.3-55	
		CV500-LK201	P.3-55	

Communications Board for OMRON SYSMAC α series

C200HW-COM02/COM03/COM04/COM05/COM06

- *1 The CPU is not provided with an RS-232C port.
- *2 CQM1H-SCB41 cannot be used.
- *3 The communications board cannot be mounted.
- *4 The CJ unit adapter (CP1W-EXT01) must be used when the VT5/VT3/DT are connected to the CJ1W-SCU21(-V1), CJ1W-SCU31-V1 and CJ1W-SCU41(-V1).
- *5 Only C500-LK203 can be used.
- *6 Not supported by the VT5 Series.
- *7 Not supported by Soft-VT.

■ NT Link (1:1 mode)

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
SYSMAC SRM1	SRM1-C02-V1	RS-232C port	P.3-57	
SYSMAC CPM1	CPM1	CPM1-CIF01	P.3-57	
SYSMAC CPM1A	CPM1A			
SYSMAC CPM2A	CPM2A-30CD□-□ CPM2A-40CD□-□ CPM2A-60CD□-□	RS-232C port	P.3-57	
SYSMAC CPM2C	CPM2C-10□-□ CPM2C-20□-□	Communications port	P.3-57	
SYSMAC CQM1	CQM1-CPU41/42-V1 CQM1-CPU43/44-V1	RS-232C port	P.3-58	
SYSMAC CQM1H	CQM1H-CPU21 ¹ CQM1H-CPU51/61	RS-232C port CQM1H-SCB41 ²	P.3-58	
SYSMAC C	C200HS-CPU21/23 C200HS-CPU31/33	RS-232C port	P.3-59	
SYSMAC α	C200HE-CPU32 ³ C200HE-CPU42	RS-232C port	P.3-59	
		Communications board	P.3-59	
		VT-L16CA (C-MODE)	P.19-16	VT-L16CA (C-MODE) ⁵⁻⁶⁻⁷
	C200HG-CPU33 ³ C200HG-CPU43 C200HG-CPU53 ³ C200HG-CPU63	RS-232C port	P.3-59	SYSMAC C Series (NT Link) ⁶⁻⁷
		Communications board	P.3-59	
		VT-L16CA (C-MODE)	P.19-16	VT-L16CA (C-MODE) ⁵⁻⁶⁻⁷
	C200HX-CPU34 ³ C200HX-CPU44 C200HX-CPU54 ³ C200HX-CPU64 C200HX-CPU65-Z C200HX-CPU85-Z	RS-232C port	P.3-59	SYSMAC C Series (NT Link) ⁶⁻⁷
		Communications board	P.3-59	
		VT-L16CA (C-MODE)	P.19-16	VT-L16CA (C-MODE) ⁵⁻⁶⁻⁷

Communications Board for OMRON SYSMAC α series

C200HW-COM02/COM04/COM05
C200HW-COM06⁴

*1 CQM1H-SCB41 cannot be used.

*2 The RS-422A/485 port (PORT2) cannot be used. Connect to the RS-232C port (PORT1).

*3 The CPU is not provided with an RS-232C port. Connect to the communications board.

When the VT-L16CA is used, connect to the communications board.

*4 The RS-422A/485 port (PORTA) cannot be used. Connect to the RS-232C port (PORTB).

*5 This is not supported on the DT series.

*6 Not supported by the VT5 Series.

*7 Not supported by Soft-VT.

Ethernet connections

■ SYSMAC CJ/CS1/CP1 Series

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
SYSMAC CJ2	CJ2H-CPU64(-EIP) CJ2H-CPU65(-EIP) CJ2H-CPU66(-EIP) CJ2H-CPU67(-EIP) CJ2M-CPU31 CJ2M-CPU32 CJ2M-CPU33 CJ2M-CPU34 CJ2M-CPU35	Internal Ethernet port direct link		SYSMAC CJ/CS1 Series (Ethernet)
	CJ1W-ETN11 CJ1W-ETN21			
	CJ2M-CPU11 CJ2M-CPU12 CJ2M-CPU13 CJ2M-CPU14 CJ2M-CPU15	CJ1W-ETN11 CJ1W-ETN21		
	CJ1M-CPU13-ETN CJ1M-CPU12-ETN CJ1M-CPU11-ETN	Internal Ethernet port direct link		
		CJ1W-ETN11 CJ1W-ETN21		
	CJ1M-CPU11/12/13 CJ1M-CPU21/22/23 CJ1G-CPU44/45 CJ1G-CPU42H/43H CJ1G-CPU44H/45H CJ1H-CPU65H/66H CJ1H-CPU65H-R	CJ1W-ETN11 CJ1W-ETN21		
SYSMAC CP1	CP1H-X CP1H-XA CP1H-Y	CJ1W-ETN11 CJ1W-ETN21		
	CP1H-X CP1H-XA CP1H-Y CP1L	CP1W-CIF41		
SYSMAC CS1	CS1G-CPU42(H)/43(H) CS1G-CPU44(H)/45(H) CS1H-CPU63(H)/64(H) CS1H-CPU65(H)/66(H) CS1H-CPU67(H)	CS1W-ETN11 CS1W-ETN21		

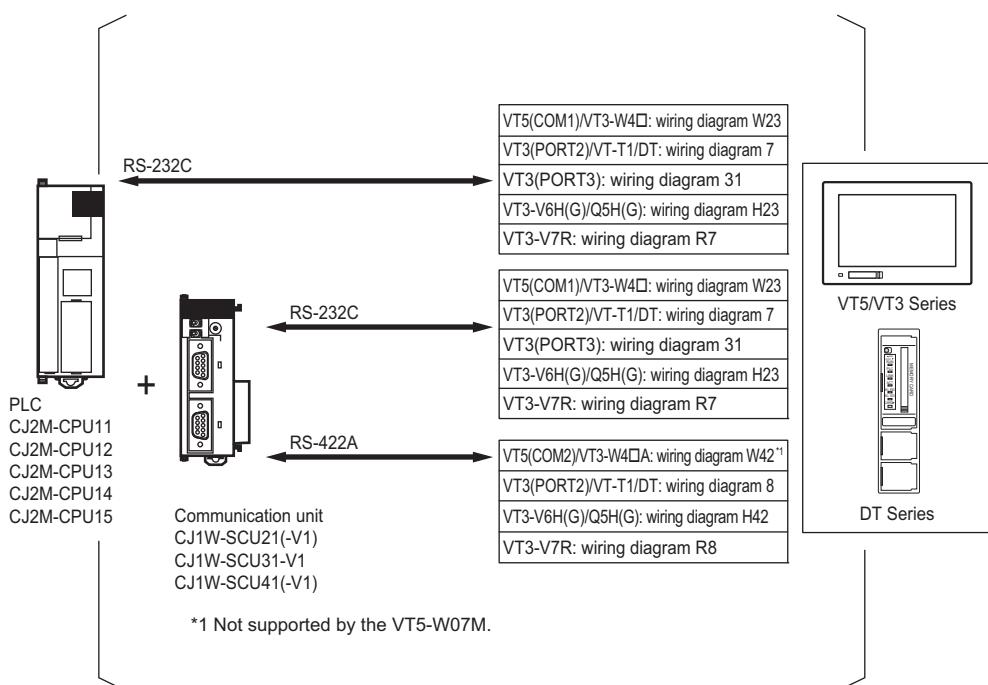
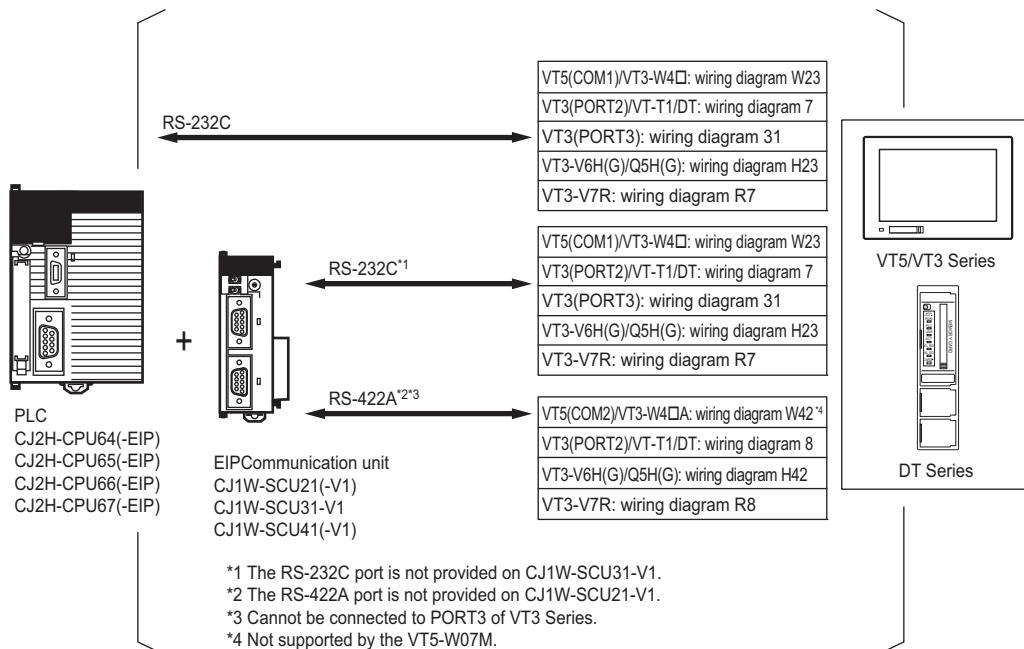
P.3-67

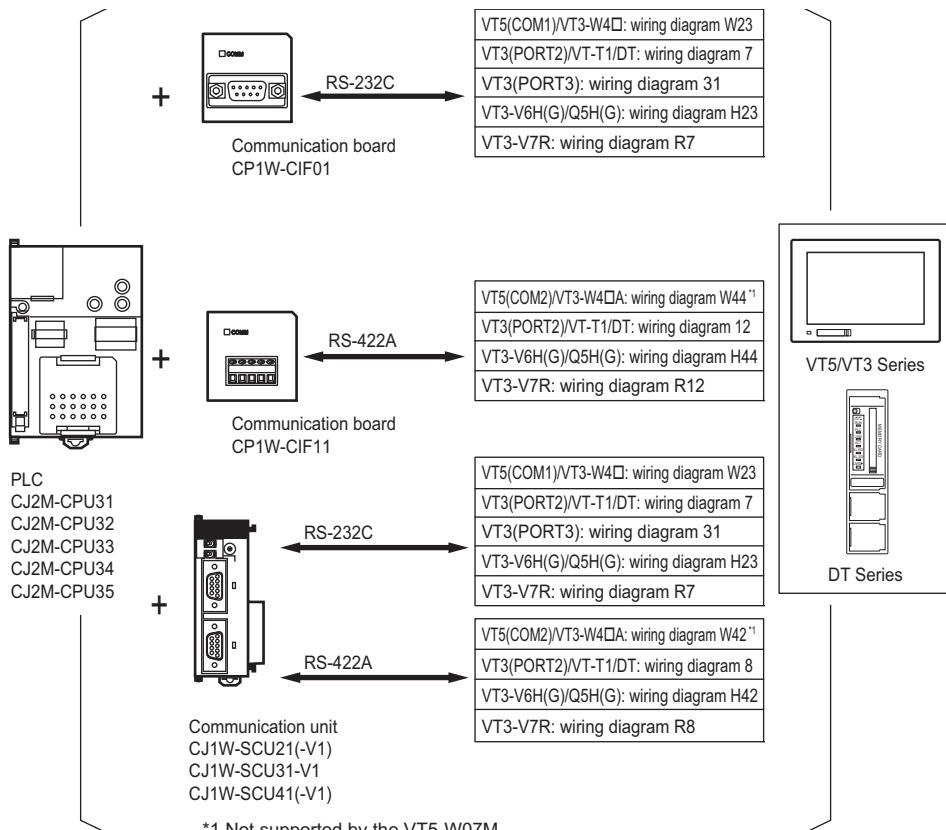
This section describes the system configuration of the VT5 Series/VT3 Series, DT Series and an Omron Corporation PLC.

System configuration for serial connections

3 Host Link

■ SYSMAC CJ2 Series

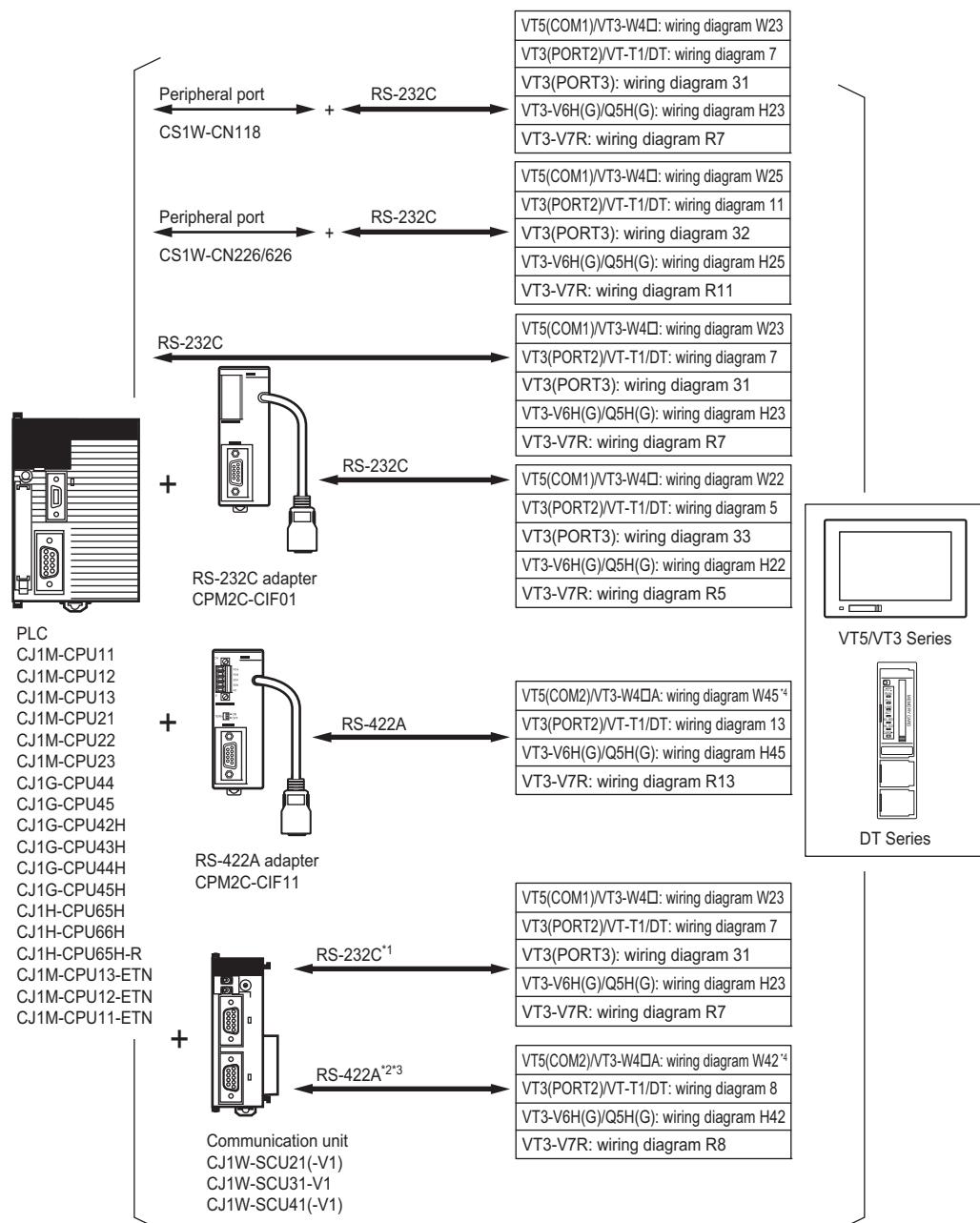




*1 Not supported by the VT5-W07M.

3-2 System Configuration

■ SYSMAC CJ1 Series



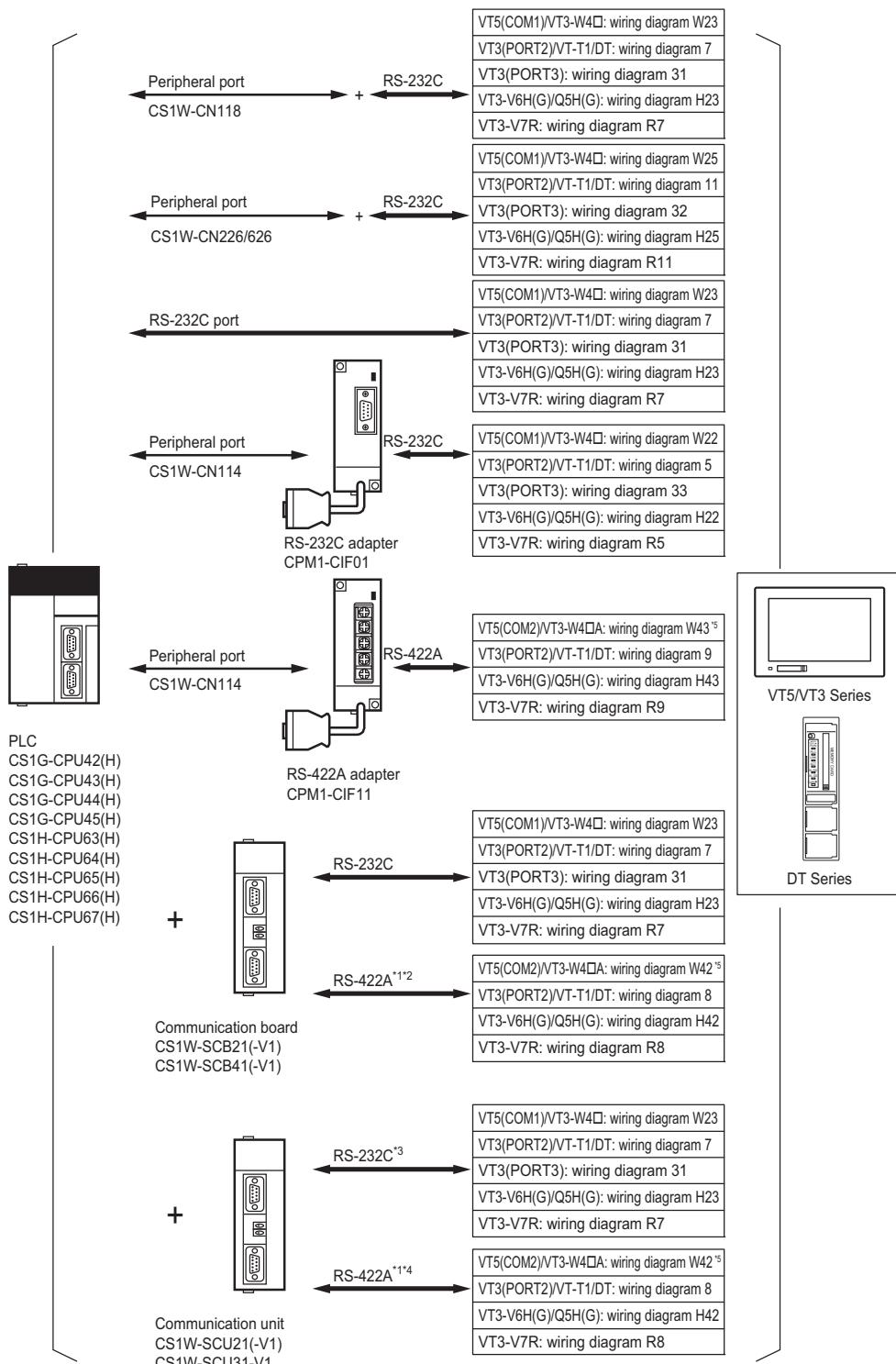
*1 The RS-232C port is not provided on CJ1W-SCU31-V1.

*2 The RS-422A port is not provided on CJ1W-SCU21-V1.

*3 Cannot be connected to PORT3 of VT3 Series.

*4 Not supported by the VT5-W07M.

■ SYSMAC CS1 Series



*1 Cannot be connected to PORT3 of VT3 Series.

*2 The RS-422A port is not provided on CS1W-SCB21 (-V1).

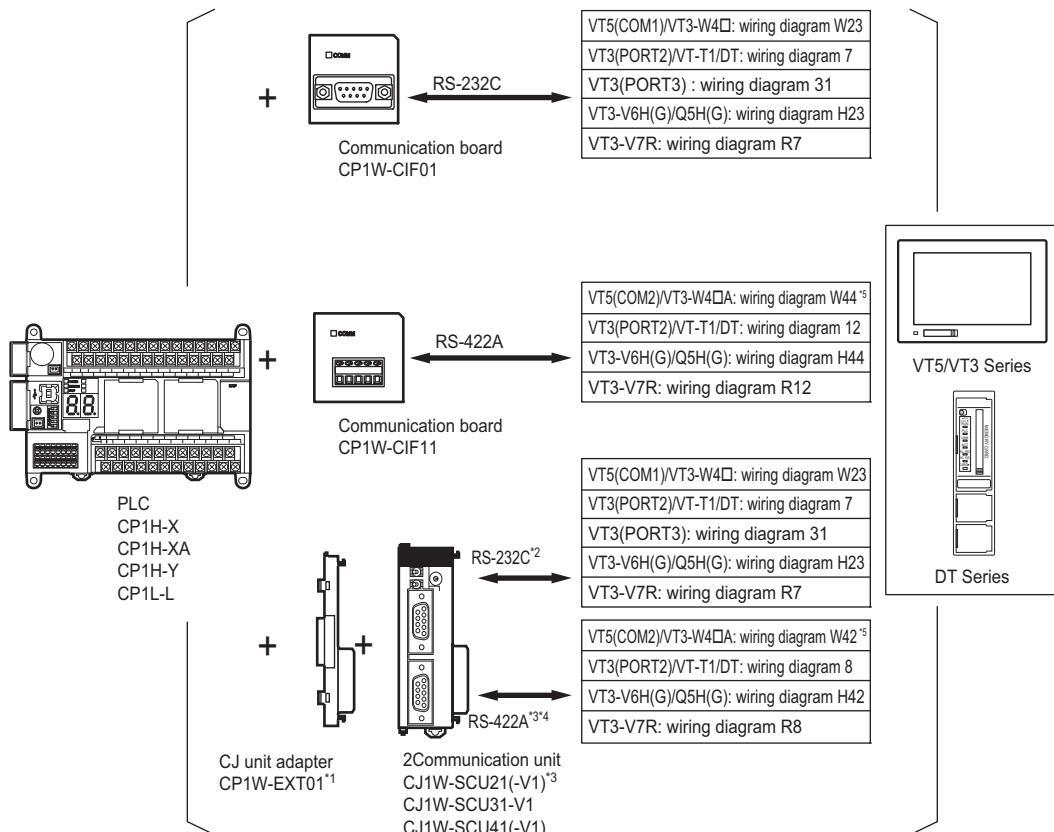
*3 The RS-232C port is not provided on CS1W-SCU31-V1.

*4 The RS-422A port is not provided on CS1W-SCU21 (-V1).

*5 Not supported by the VT5-W07M.

3-2 System Configuration

■ SYSMAC CP1H/CP1L Series



*1 CJ unit adaptor (CP1W-EXT01) must be used when VT3/DT is connected with CJ1W-SCU21 or CJ1W-SCU41.

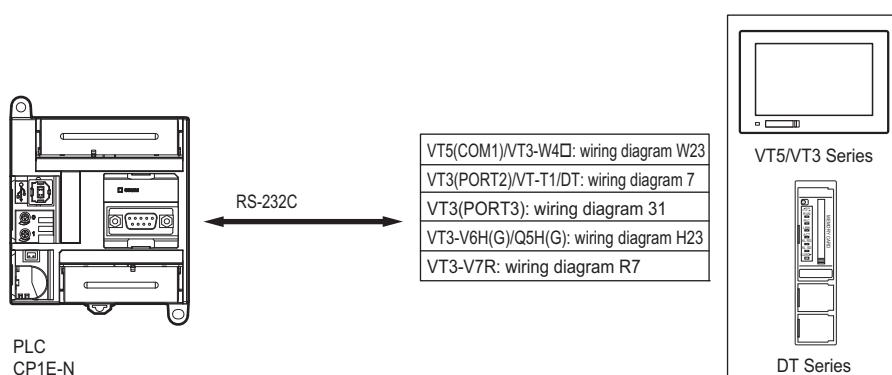
*2 The RS-232C port is not provided on CJ1W-SCU31-V1.

*3 Cannot be connected to PORT3 of VT3 Series.

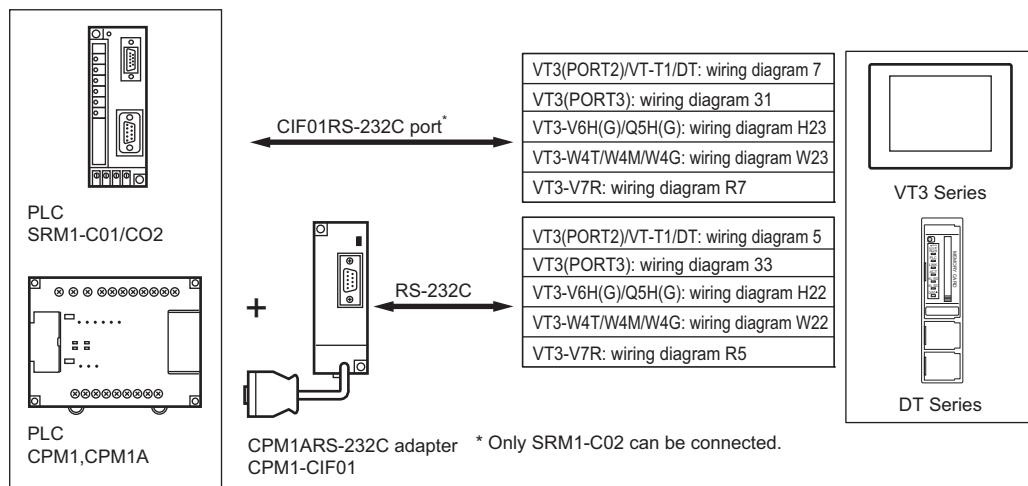
*4 The RS-422A port is not provided on CJ1W-SCU21(-V1).

*5 Not supported by the VT5-W07M.

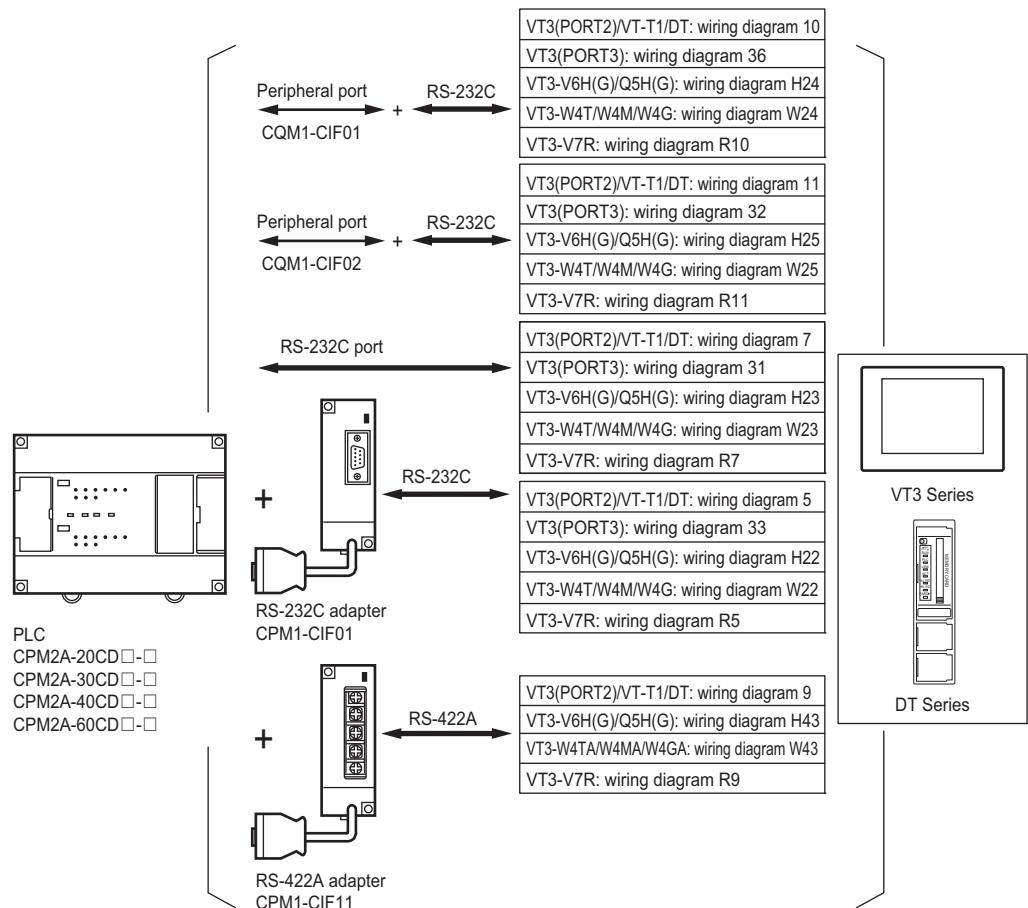
■ SYSMAC CP1E Series



■ SYSMAC SRM1, CPM1, CPM1A Series

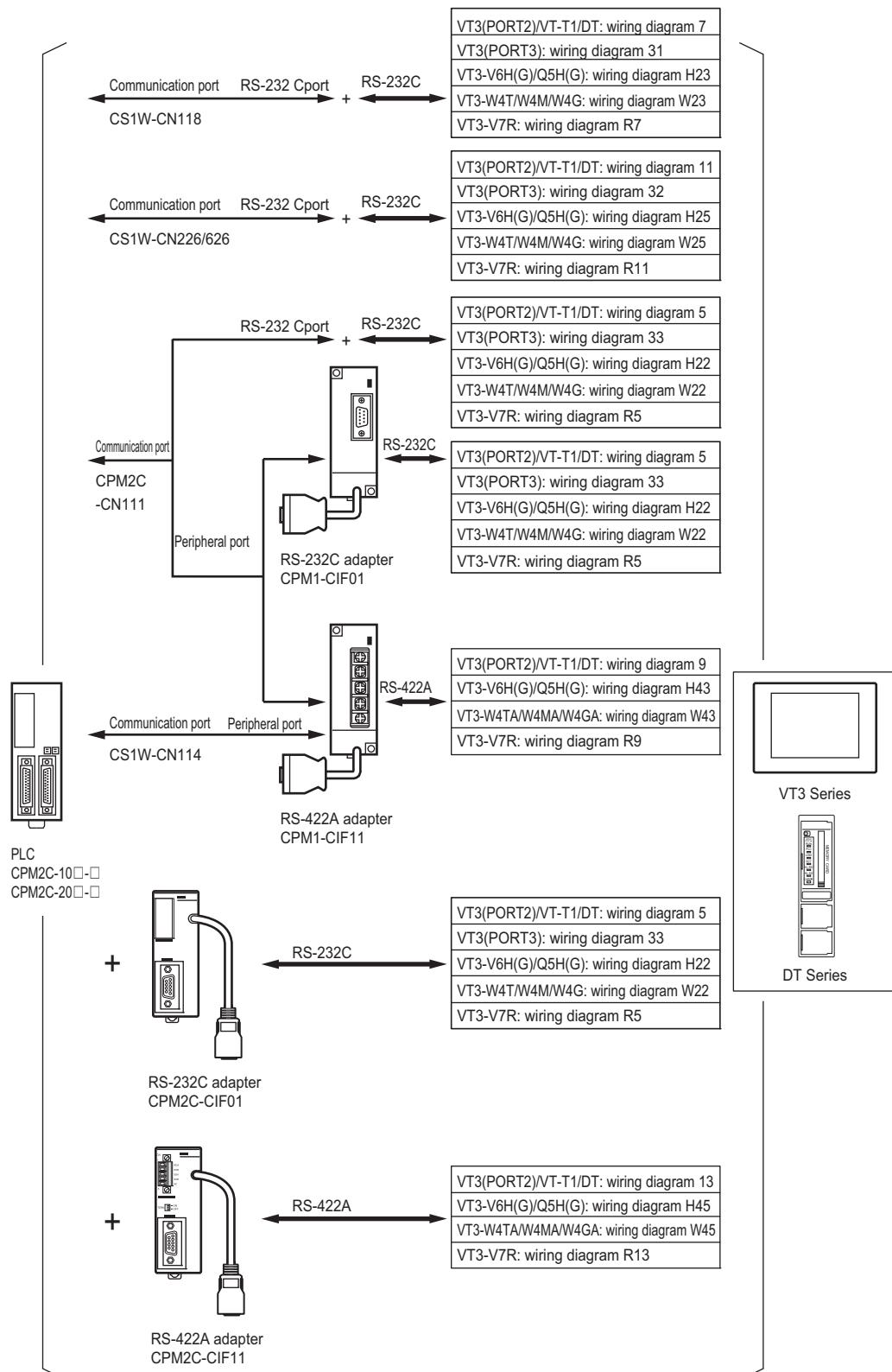


■ SYSMAC CPM2A Series

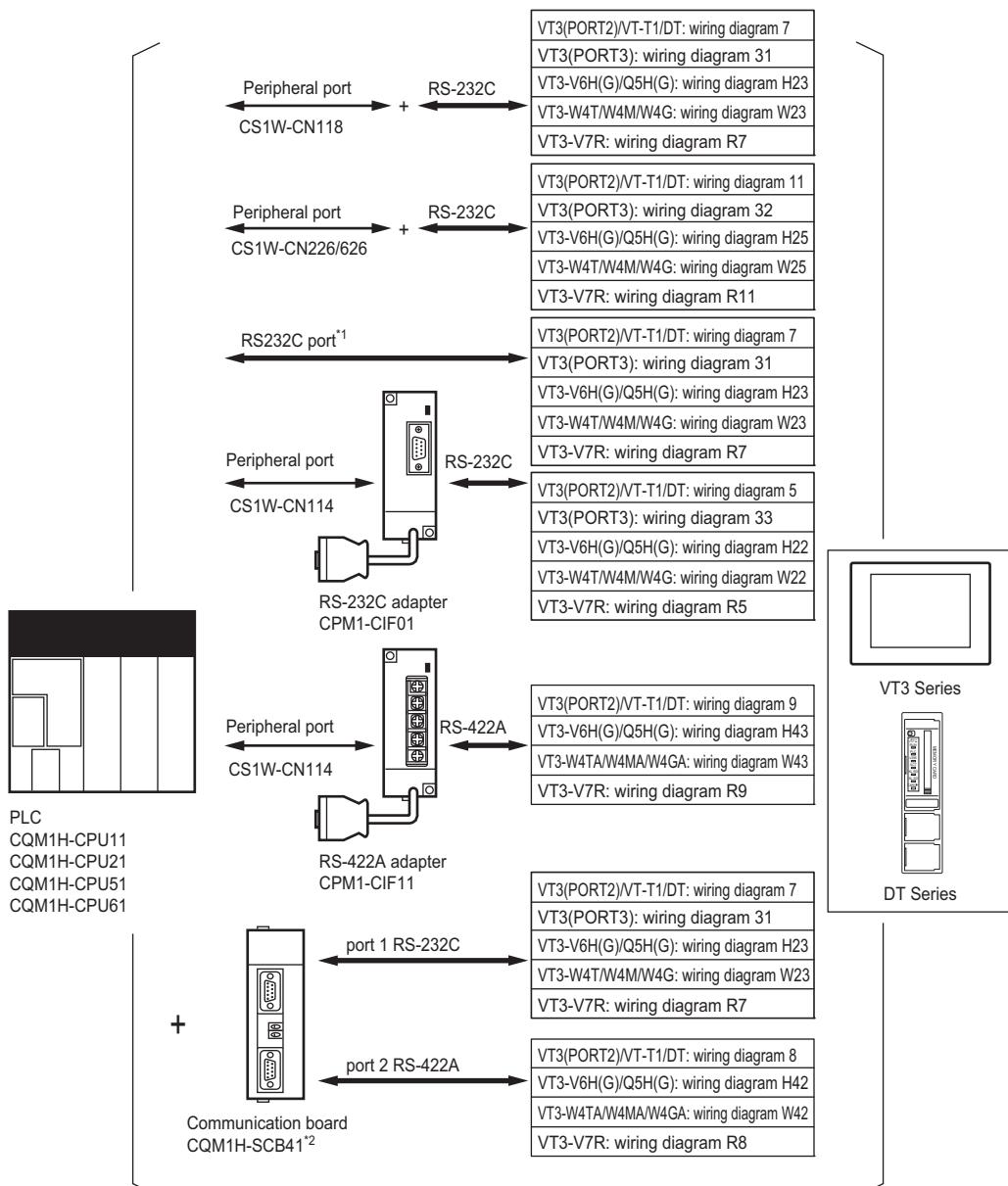


3-2 System Configuration

■ SYSMAC CPM2C Series



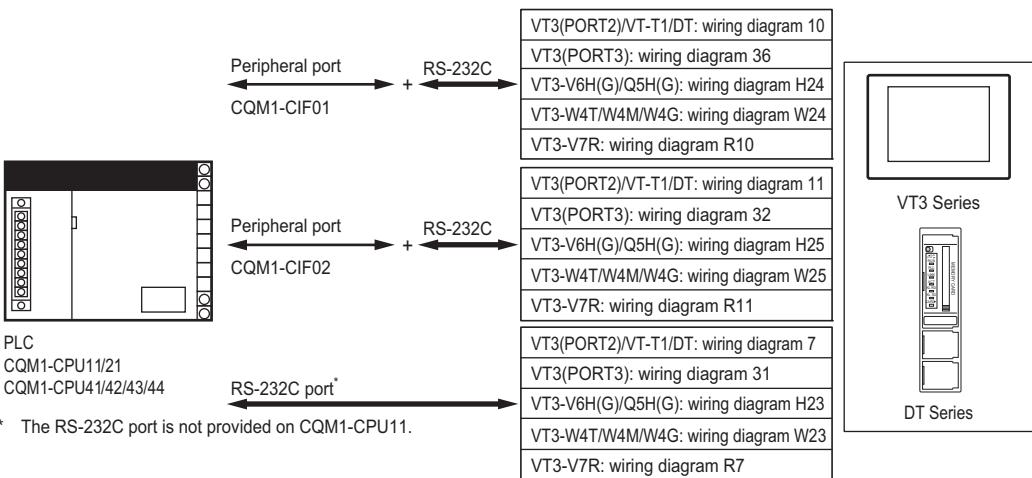
■ SYSMAC CQM1H Series



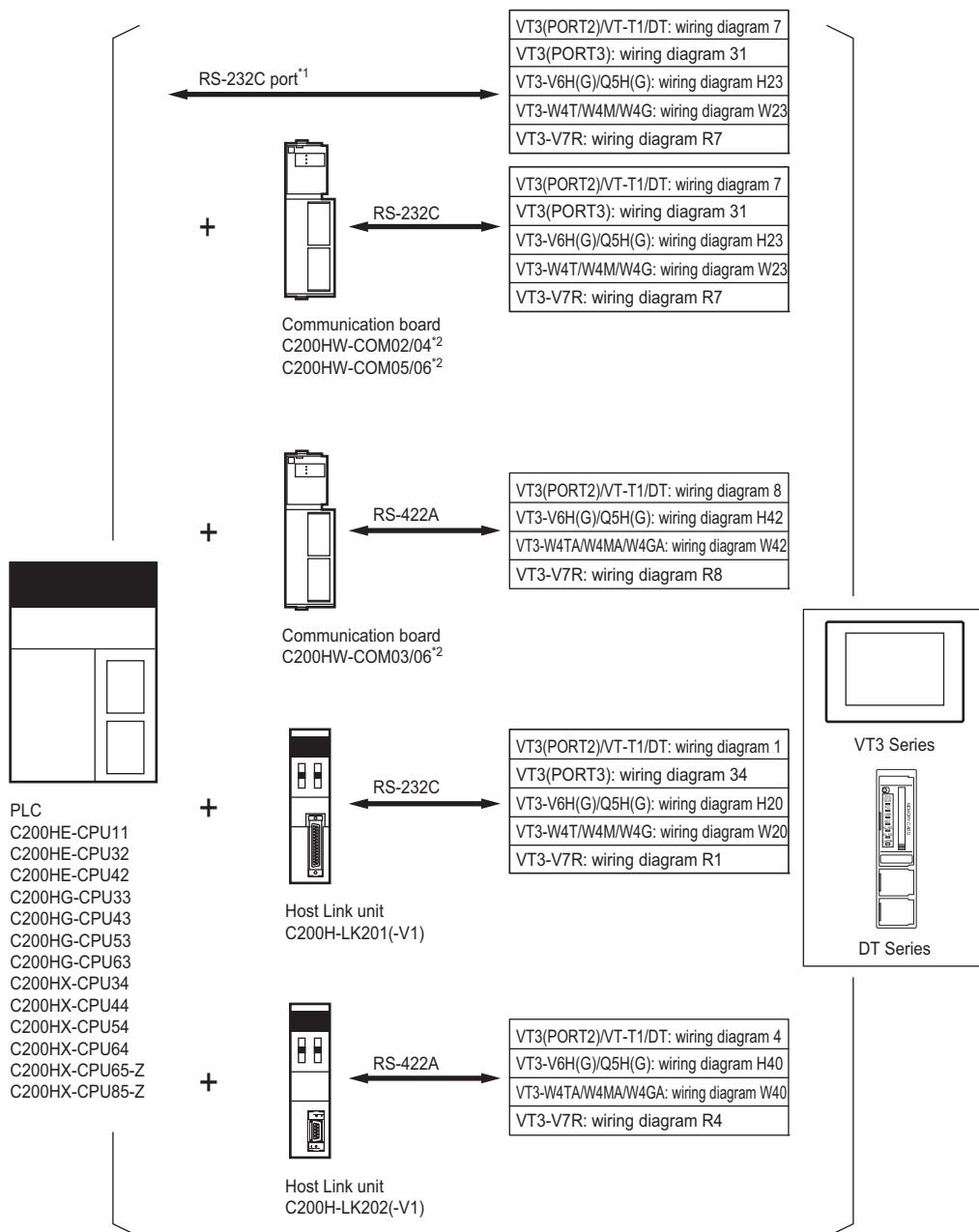
*1 The RS-232C port is not provided on CQM1H-CPU11.

*2 Cannot be connected to CQM1H-CPU11/21.

■ SYSMAC CQM1 Series



SYSMAC α Series

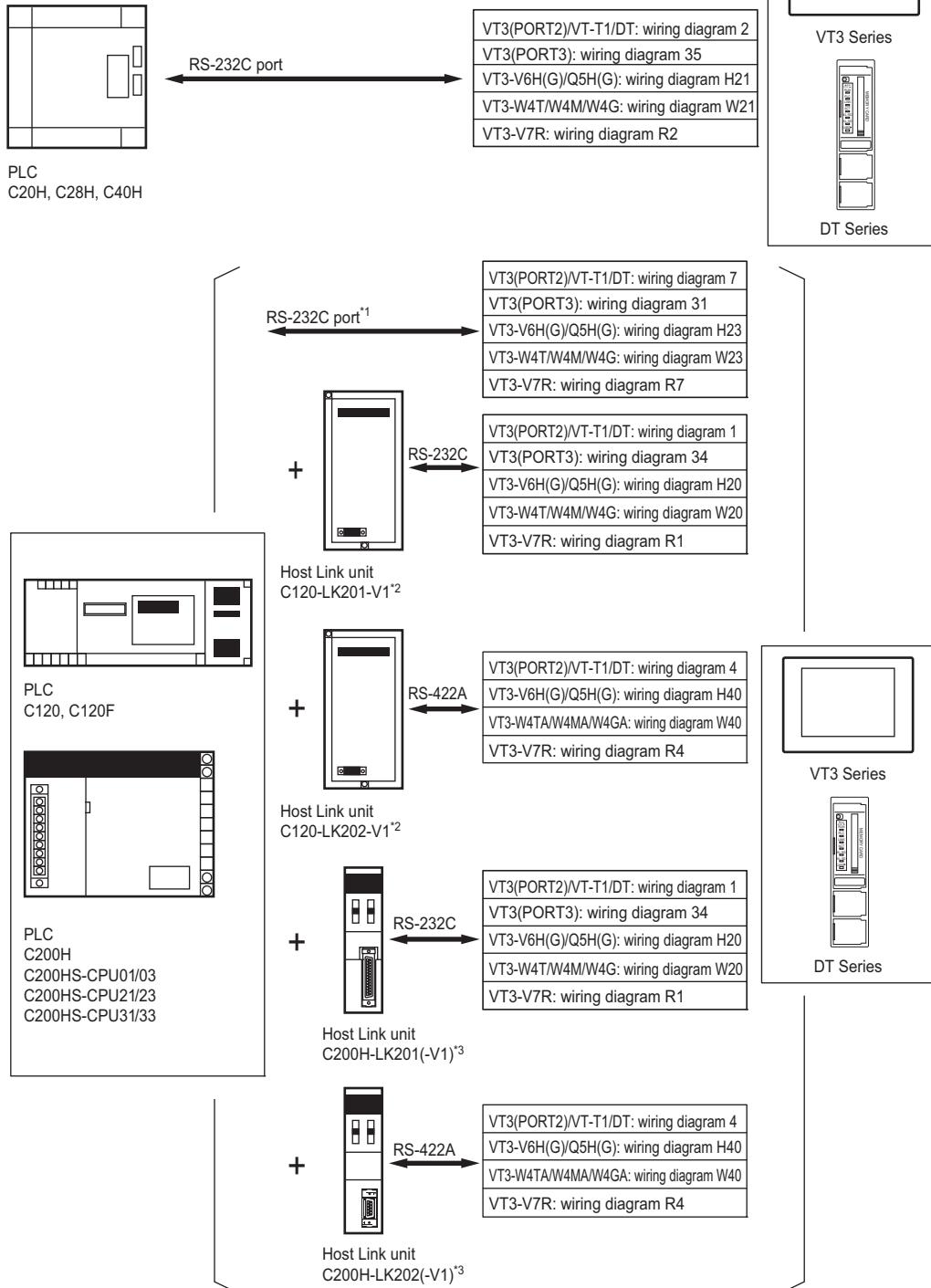


*1 The RS-232C port is not provided on C200HE-CPU11/32, C200HG-CPU33/53, and C200HX-CPU34/54.

*2 Cannot be connected to C200HE-CPU11.

3-2 System Configuration

■ SYSMAC C Series

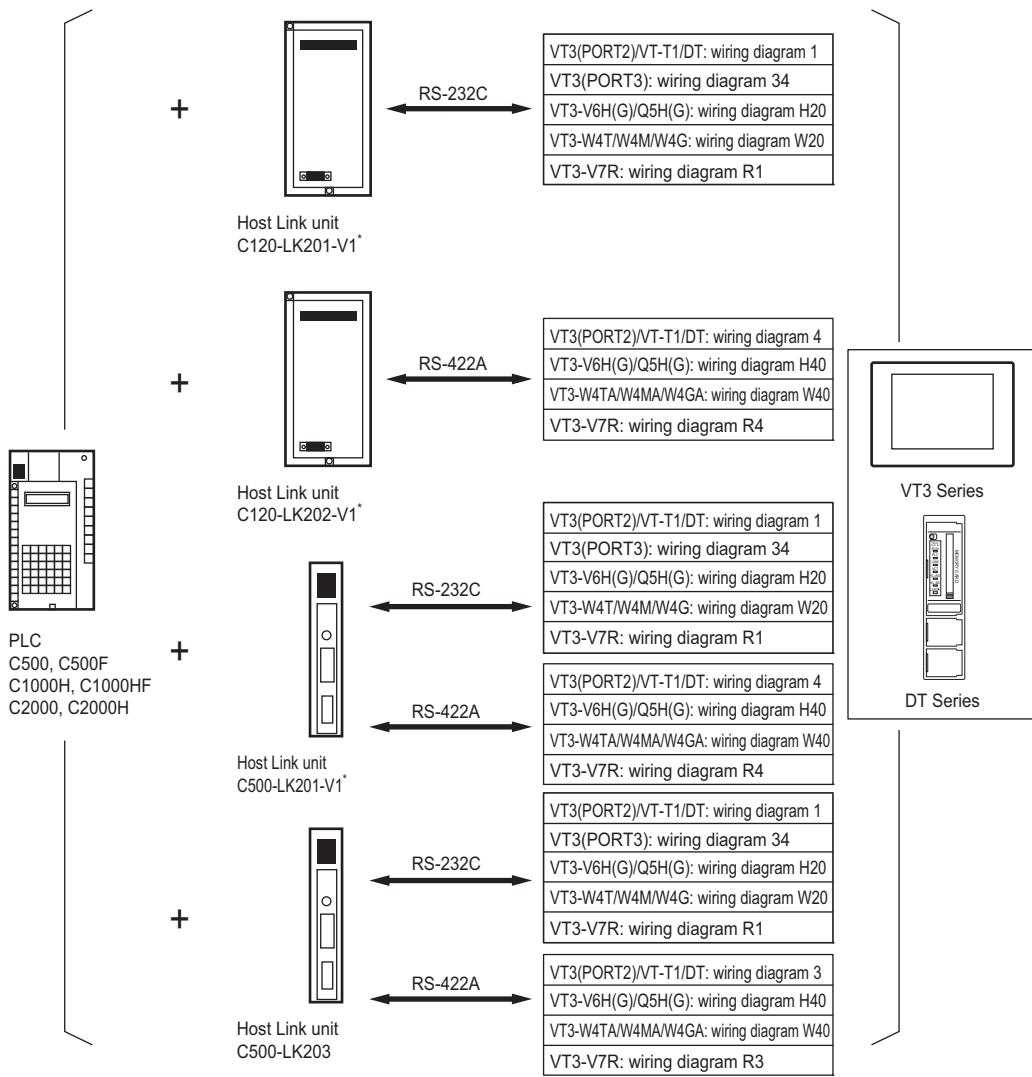


*1 Only C200HS-CPU21/23/31/33 can be connected.

*2 Cannot be connected to C200HS.

*3 Cannot be connected to C120 and C120F.

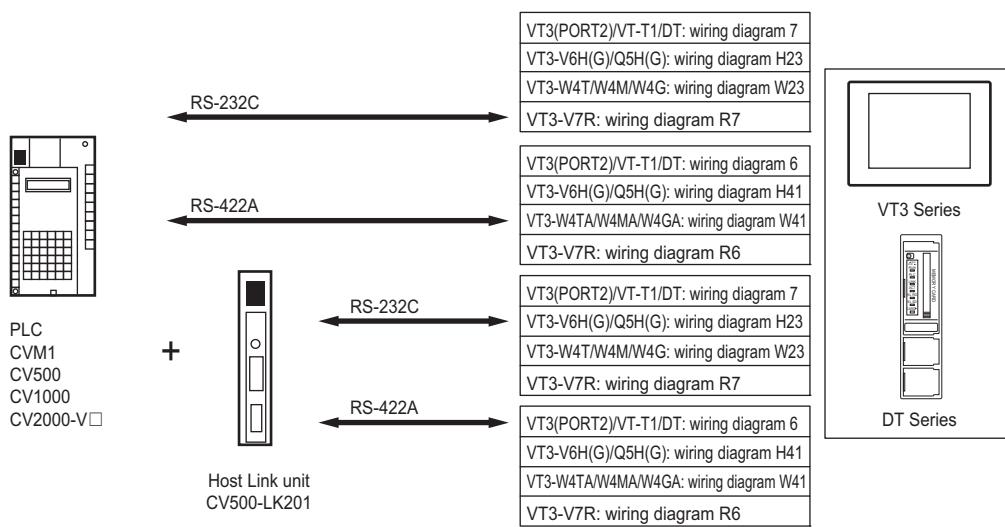
■ SYSMAC C Series



* Cannot be connected to C1000HF.

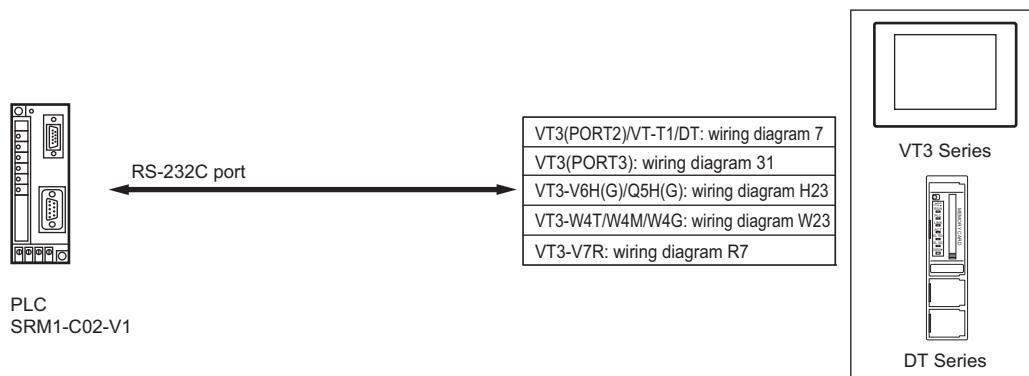
3-2 System Configuration

■ SYSMAC CV Series

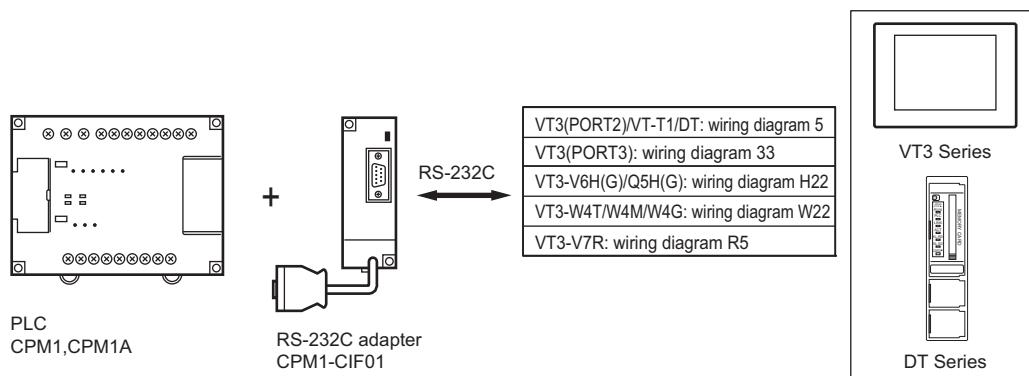


NT Link (1:1 mode)

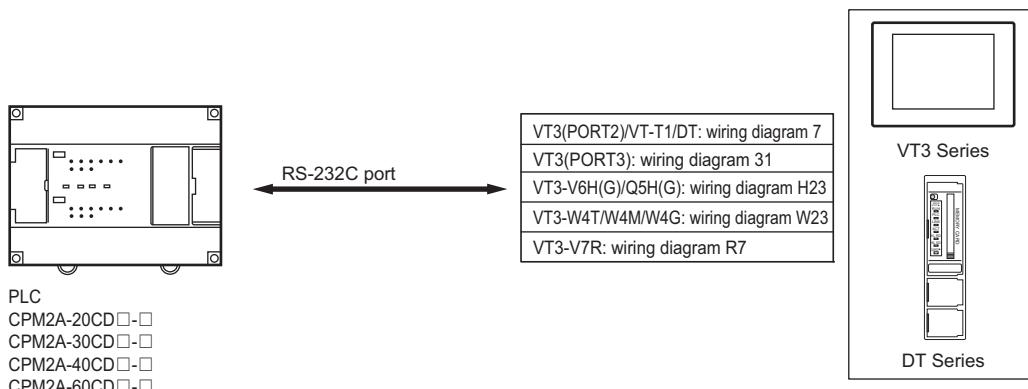
■ SYSMAC SRM1 Series



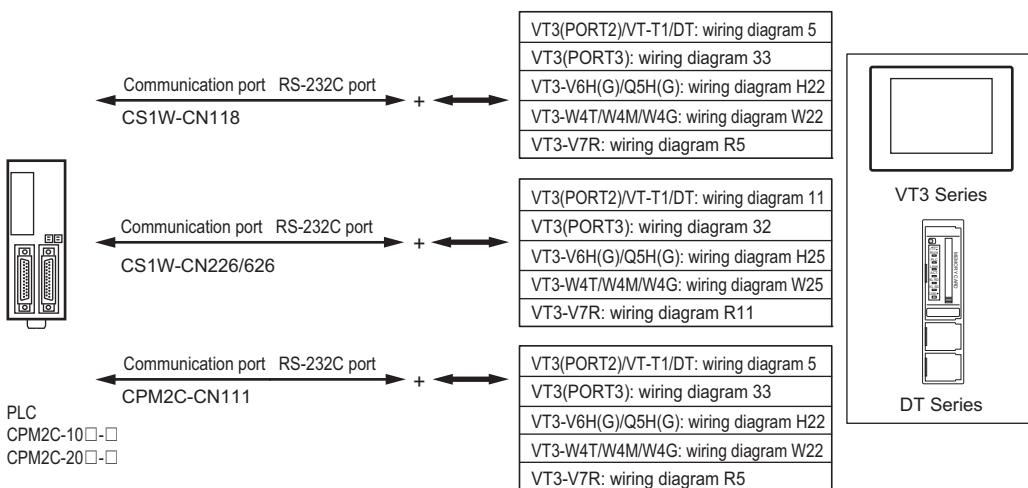
■ SYSMAC CPM1, CPM1A Series



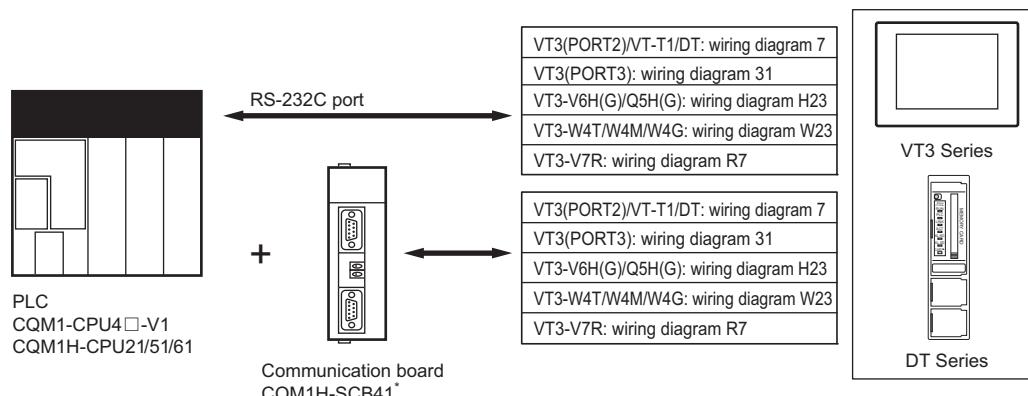
■ SYSMAC CPM2A Series



■ SYSMAC CPM2C Series



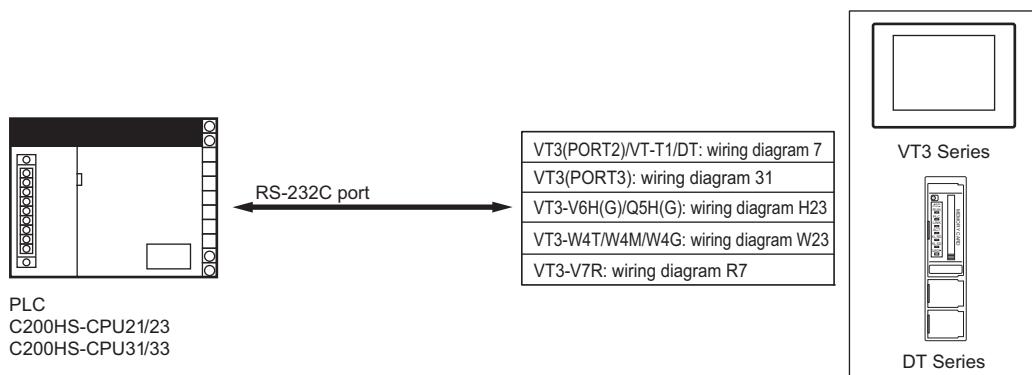
■ SYSMAC CQM1, CQM1H Series



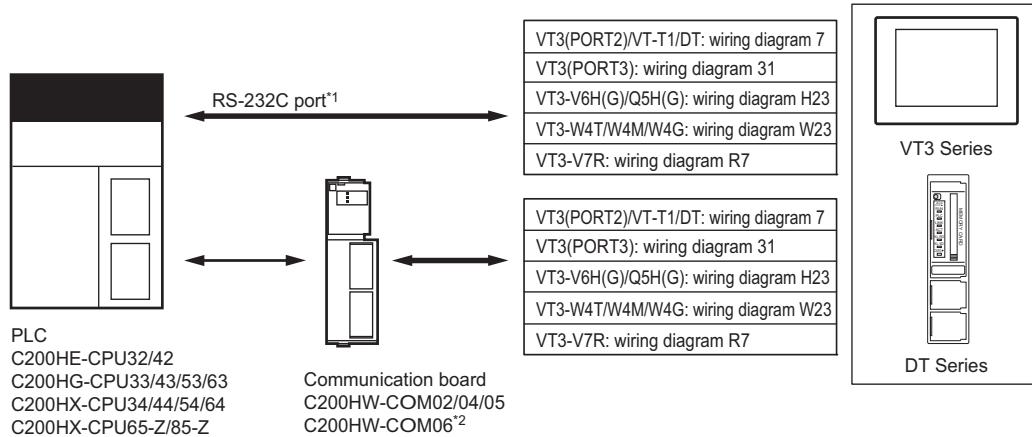
* Only CQM1H-CPU51/61 can be connected.
The RS-422A/485 port (port 2) on CQM1H-SCB41 cannot be used.
Can be connected to RS-232C port (port 1).

3-2 System Configuration

■ SYSMAC C Series



■ SYSMAC α Series

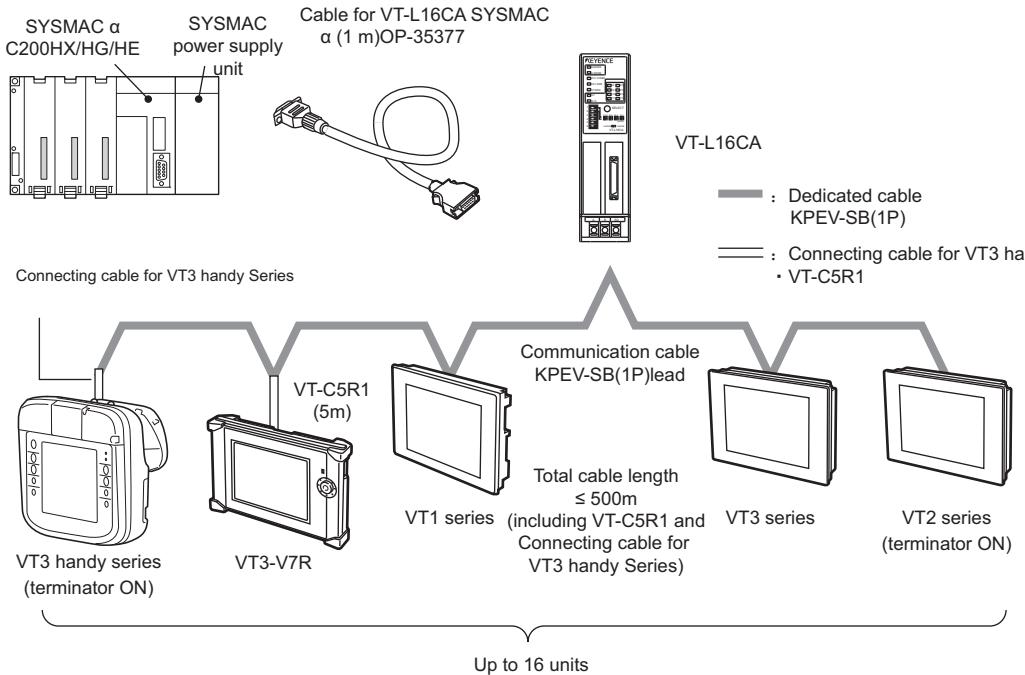


*1 The RS-232C port is not provided on C200HE-CPU32, C200HG-CPU33/53, and C200HX-CPU34/54.

*2 The RS-422A/485 port (port A) on C200HW-COM06 cannot be used.

Connect to the RS-232C port (port B).

■ VT-L16CA (Multi-link Unit)



- Point**
- VT3-W4T/W4M/W4G (RS-232C type) are not supported.
 - Not supported by DT series.
 - VT3 Handy Series can only be connected to both ends of the wiring.
 - For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.
 - Not supported by the VT5 Series.

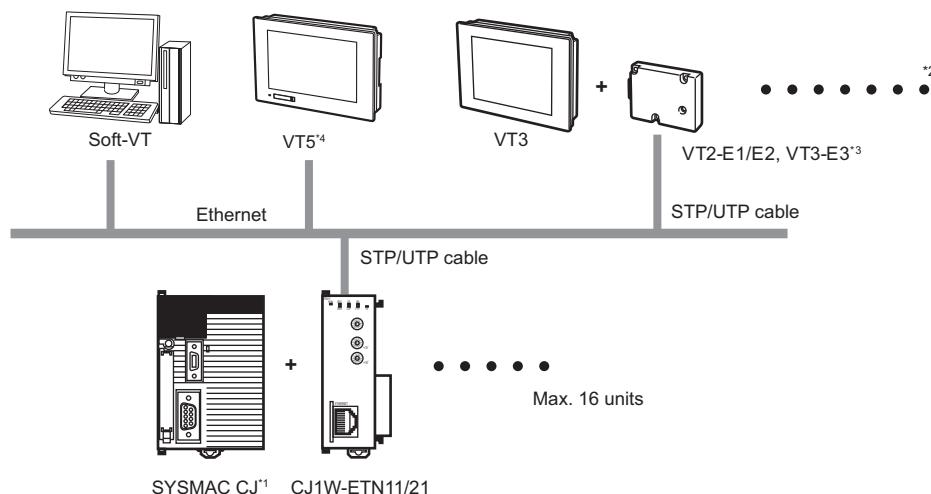
Reference

For details on settings and connections, see "Chapter 19 MULTI-LINK"

System configuration for Ethernet connections

This section describes the system configuration of the VT5/VT3 Series, Soft-VT and the SYSMAC CJ/CS1/CP1H Series.

■ SYSMAC CJ Series



*1 CJ2H-CPU64/65/66/67-(EIP), CJ2M-CPU31/32/33/34/35 and CJ1M-CPU11/12/13-ETN can be connected directly to CPU.

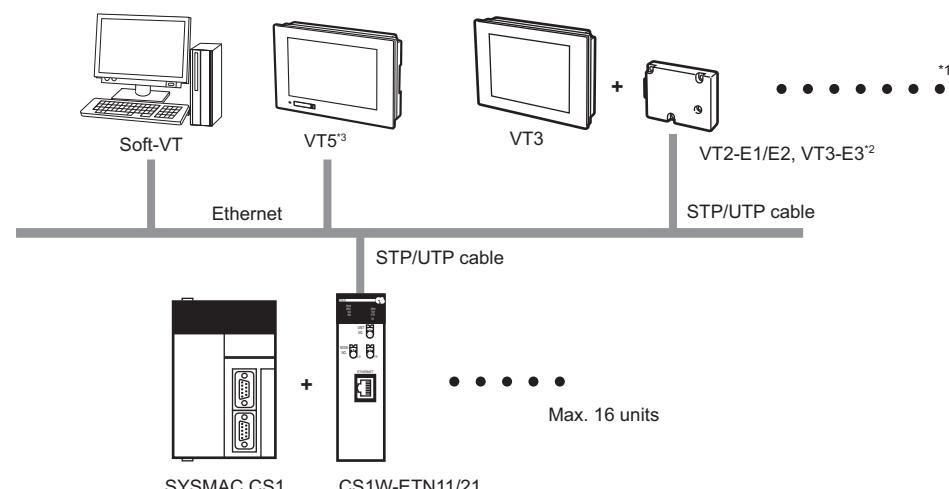
*2 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

*3 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*4 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

- Point** When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

■ SYSMAC CS1 Series



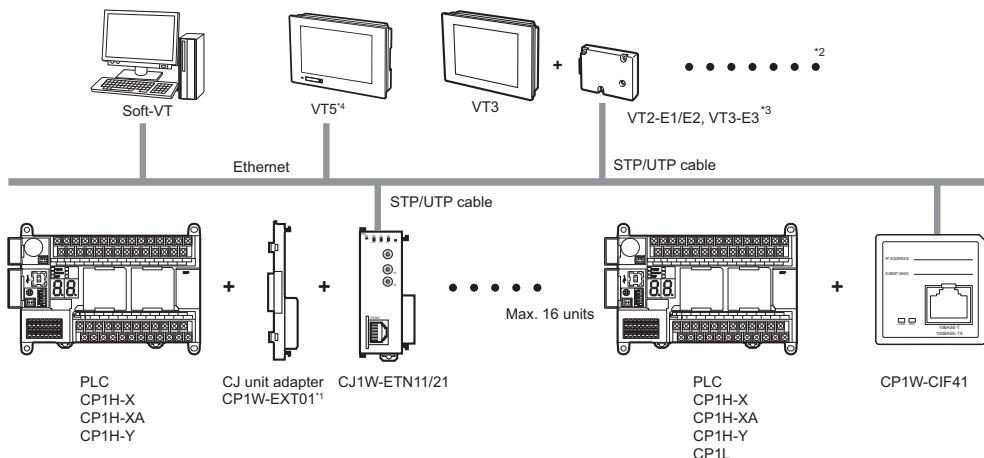
*1 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.

*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

- Point** When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

■ SYSMAC CP1 Series



- *1 When CJ1W-ETN11/21 is connected with VT3, be sure to use the CJ unit adapter (CJ1W-EXT01).
- *2 Please note that with the increase in the number of VT5/VT3 Series and Soft-VT units connected, the communications load also increases.
- *3 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.
- *4 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

3-3 Wiring Diagrams for Connections

This section describes cable connections.

The wiring diagrams recommended by Omron Corporation may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

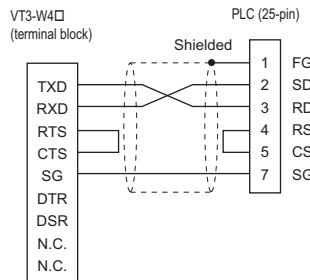
Wiring diagrams for serial connections

3

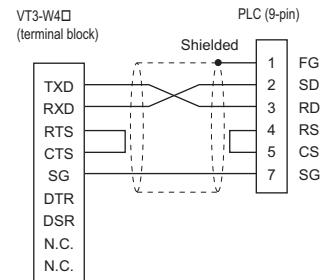
CONNECTING TO OMRON CORPORATION PLCs

■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

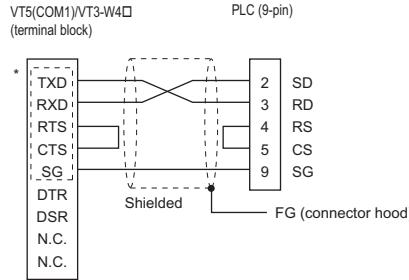
● Wiring diagram W20 (RS-232C)



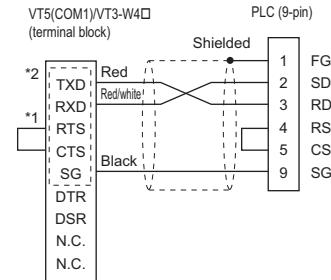
● Wiring diagram W21 (RS-232C)



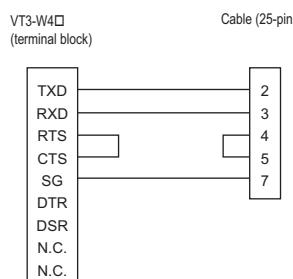
● Wiring diagram W22 (RS-232C)



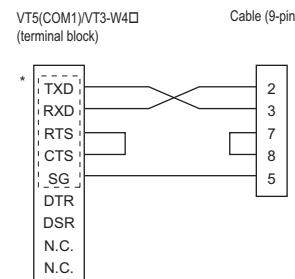
● Wiring diagram W23 (OP-86922: 5m)



● Wiring diagram W24 (RS-232C)



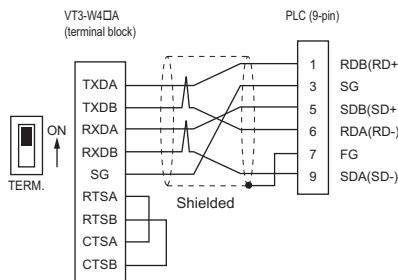
● Wiring diagram W25 (RS-232C)



* This is a terminal diagram for the VT5 Series.

■ Connection to the VT5 Series (COM2) and VT3-W4□A (RS-422A)

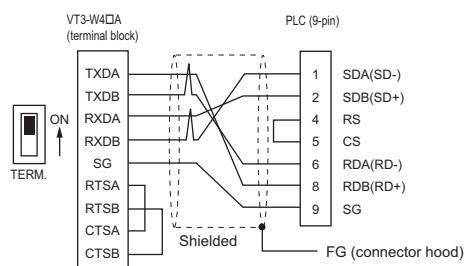
● Wiring diagram W40 (RS-422A)



Point

- Set the termination resistor on the PLC side "ON".
- The naming of the A and B poles is reversed on the VT3 unit and the PLC.
- Do not mistake during connection.

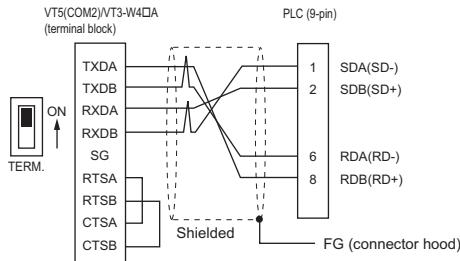
● Wiring diagram W41 (RS-422A)



Point

- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422 interface, reverse the name of the A and B poles on the VT3 unit and the PLC.
- Do not mistake during connection.

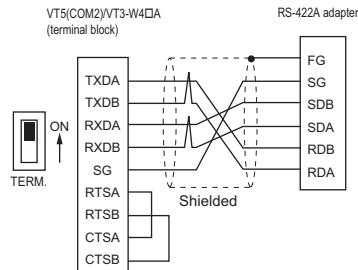
● Wiring diagram W42 (RS-422A)



Point

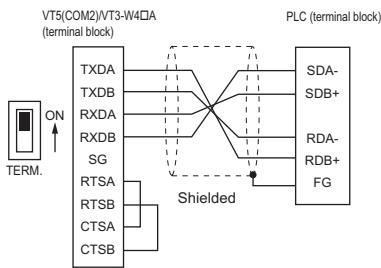
- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422 interface, reverse the name of the A and B poles on the VT3 unit and the PLC.
- Do not mistake during connection.

● Wiring diagram W43 (RS-422A)



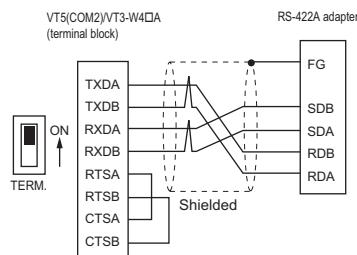
3-3 Wiring Diagrams for Connections

● Wiring diagram W44 (RS-422A)



Point
Set the termination resistor switch on the PLC to ON.
Reverse the name of the A and B poles on the VT3 unit and the PLC.
Do not mistake during connection.

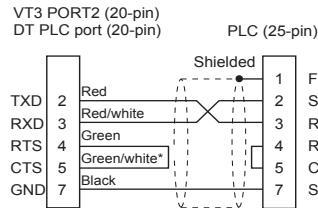
● Wiring diagram W45 (RS-422A)



■ Connecting the VT3/DT Series

● Wiring Diagram 1

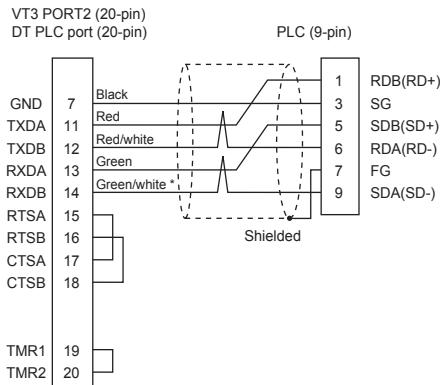
(RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 3

(RS-422A: OP-24028)



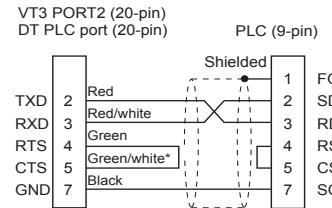
Point
Set the terminator switch on the PLC to ON.
The naming of the A and B poles is reversed on the VT3 unit and the PLC.
Do not mistake during connection.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● Wiring Diagram 2

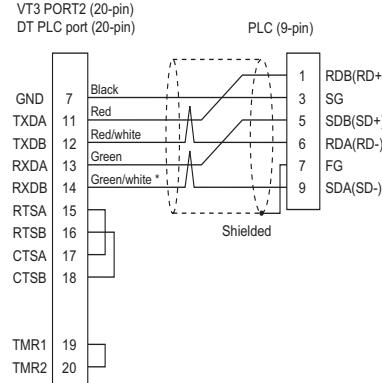
(RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

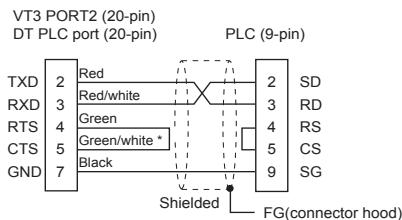
● Wiring Diagram 4

(RS-422A: OP-24028)

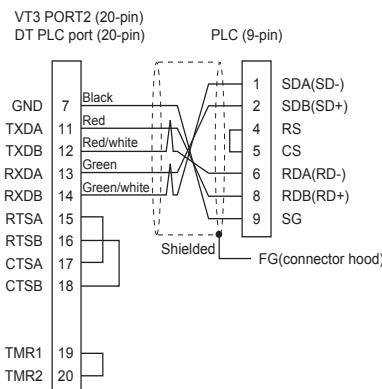


3-3 Wiring Diagrams for Connections

● Wiring Diagram 5 (RS-232C: OP-24027)



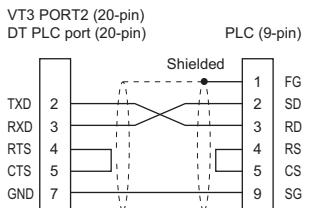
● Wiring Diagram 6 (RS-422A: OP-24028)



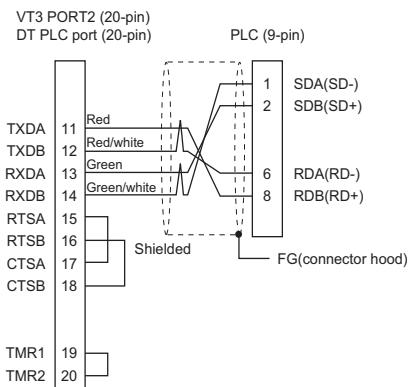
Point

- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422A interface, reverse the name of the A and B poles on the VT3 unit and the PLC. Do not mistake during connection.

● Wiring Diagram 7 (OP-86921: 5m)



● Wiring Diagram 8 (RS-422A: OP-24028)



Point

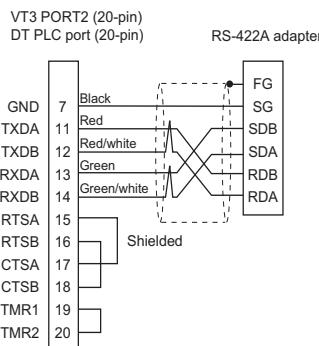
- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422A interface, reverse the name of the A and B poles on the VT3 unit and the PLC. Do not mistake during connection.



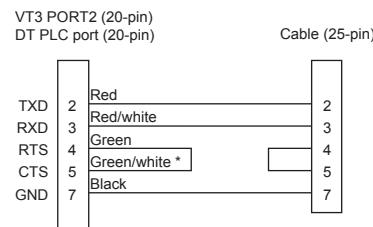
For the pin assignment number of the connectors on the VT3 series/DT series, see the Appendix at the end of this manual.

3-3 Wiring Diagrams for Connections

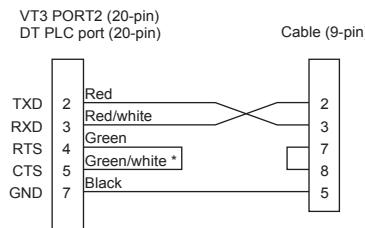
● Wiring Diagram 9 (RS-422A: OP-24028)



● Wiring Diagram 10 (RS-232C: OP-24027)

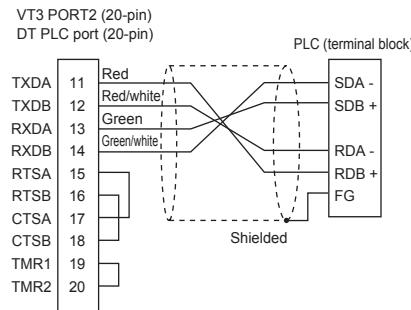


● Wiring Diagram 11 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 12 (RS-422A: OP-24028)

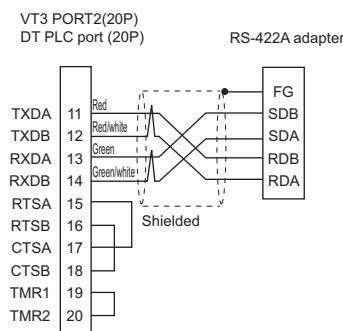


Point
Set the termination resistor on the PLC side "ON".

The naming of the A and B poles is reversed on the VT3 unit and the PLC.

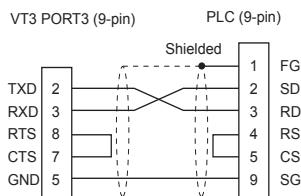
Do not mistake during connection.

● Wiring Diagram 13 (RS-422A: OP-24028)

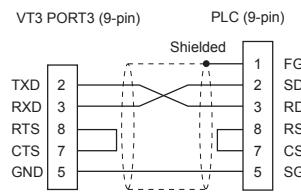


■ Connection to VT3 series (PORT3)

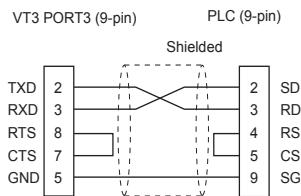
● Wiring Diagram 31 (RS-232C)



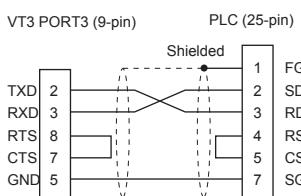
● Wiring Diagram 32 (RS-232C)



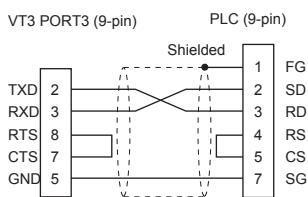
● Wiring Diagram 33 (RS-232C)



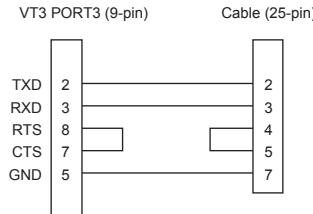
● Wiring Diagram 34 (RS-232C)



● Wiring Diagram 35 (RS-232C)



● Wiring Diagram 36 (RS-232C)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

3-3 Wiring Diagrams for Connections

■ Connection with VT3 Handy Series



FG2 must be grounded.

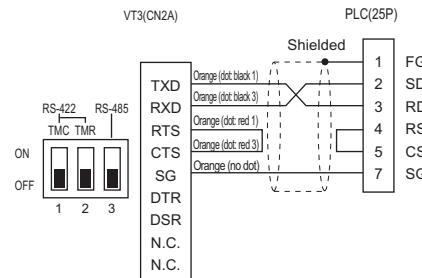
● Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



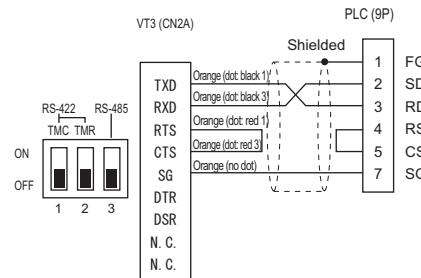
● Wiring Diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



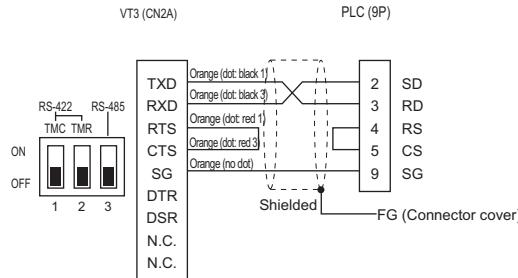
● Wiring Diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



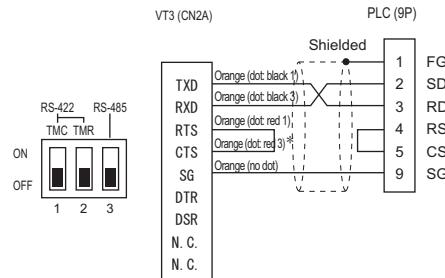
● Wiring Diagram H23 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



* Not wired for loopback test inside the connector.
Solder the signal lead.

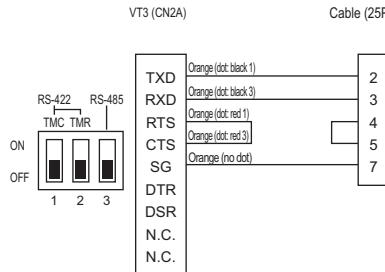
● Wiring Diagram H24 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



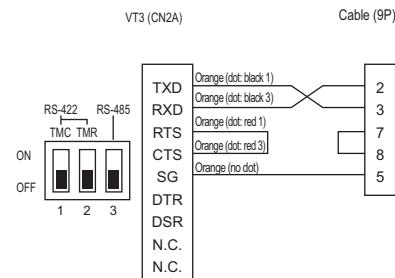
● Wiring Diagram H25 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



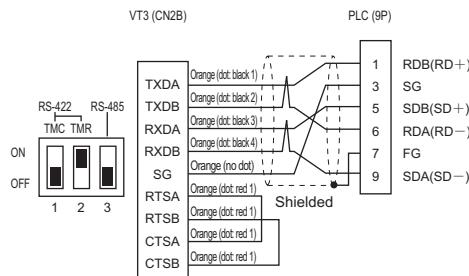
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



Point

- Set the termination resistor on the PLC side "ON".
- The naming of the A and B poles is reversed on the VT3 unit and the PLC.

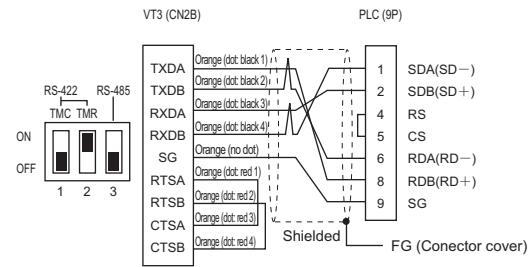
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



Point

- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422 interface, reverse the name of the A and B poles on the VT3 unit and the PLC.

3-3 Wiring Diagrams for Connections

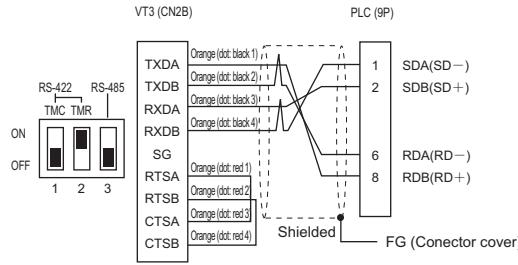
● Wiring Diagram H42 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422 interface, reverse the name of the A and B poles on the VT3 unit and the PLC.

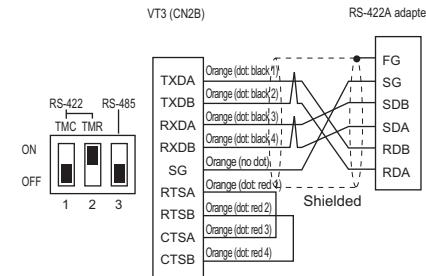
● Wiring Diagram H43 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



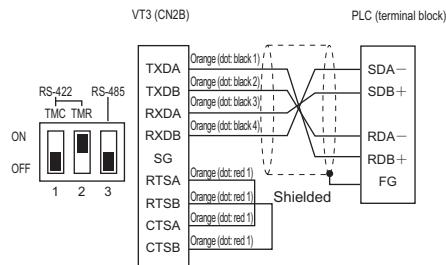
● Wiring Diagram H44 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



- Set the termination resistor on the PLC side "ON".
- The naming of the A and B poles is reversed on the VT3 unit and the PLC.

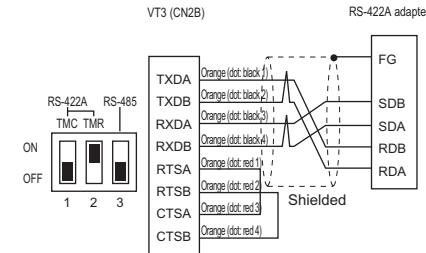
● Wiring Diagram H45 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

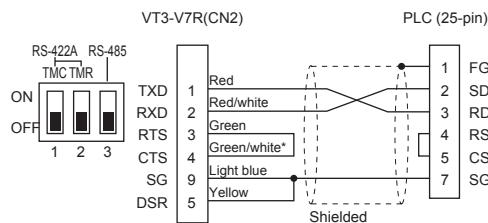
OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



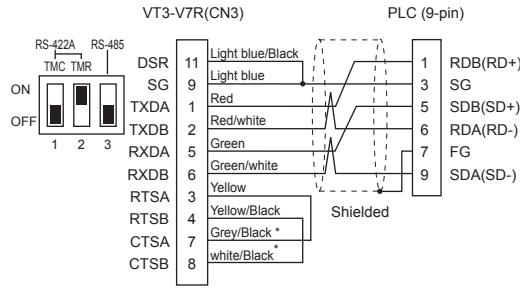
■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

Point

- Set the terminator switch on the PLC to ON.
- Reverse the name of the A and B poles on the VT3 unit and the PLC.
- Do not mistake during connection.

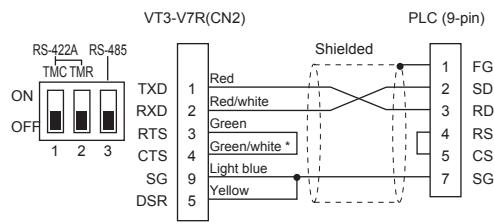
Point

Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13



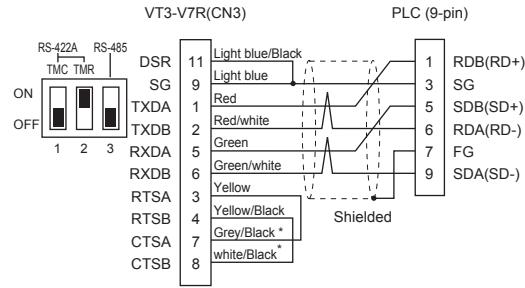
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● Wiring Diagram R2 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

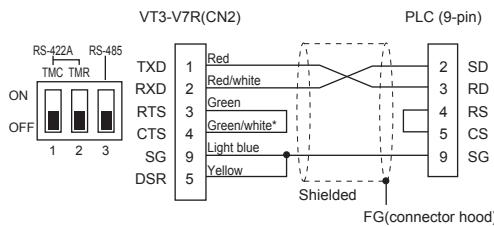
● Wiring Diagram R4 (RS-422A: VT-C5R2/C15R2)



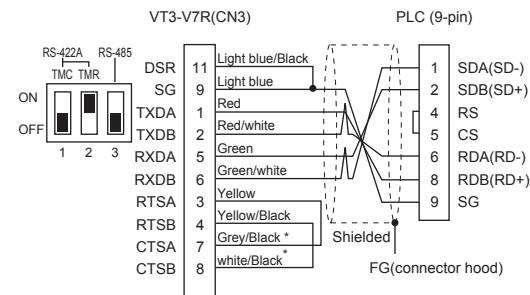
* Not wired for loopback test inside the connector.
Solder the signal lead.

3-3 Wiring Diagrams for Connections

● Wiring Diagram R5 (RS-232C: VT-C5R1)



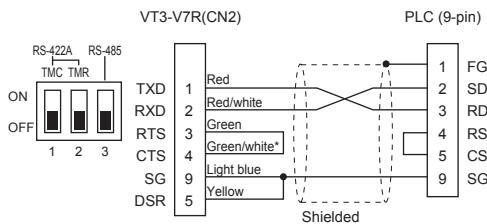
● Wiring Diagram R6 (RS-422A: VT-C5R2/C15R2)



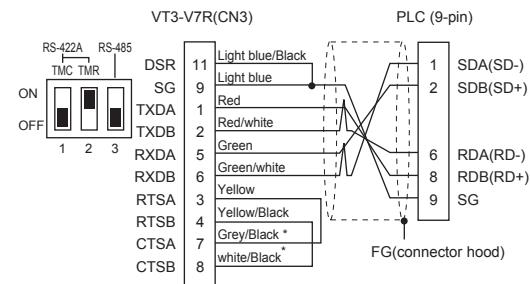
Point

- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422A interface, reverse the name of the A and B poles on the VT3 unit and the PLC. Do not mistake during connection.

● Wiring Diagram R7 (RS-232C: VT-C5R1)



● Wiring Diagram R8 (RS-422A: VT-C5R2/C15R2)



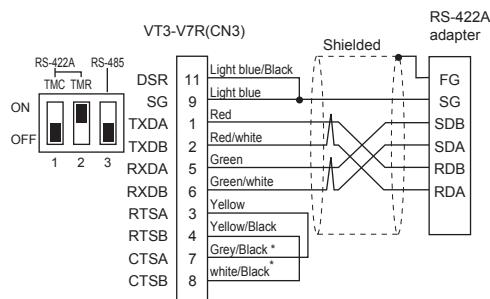
Point

- For RS-422A interface, set the termination resistor switch on the PLC to ON.
- For RS-422A interface, reverse the name of the A and B poles on the VT3 unit and the PLC. Do not mistake during connection.



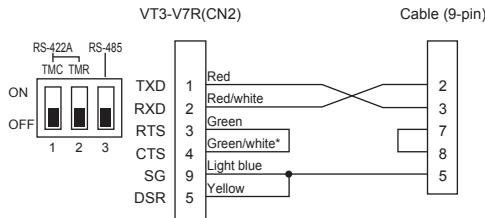
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● **Wiring Diagram R9**
(RS-422A: VT-C5R2/C15R2)



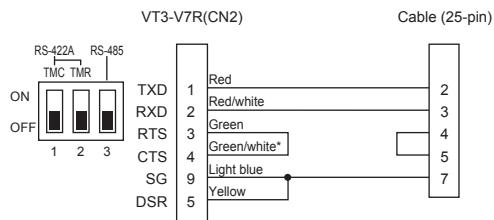
* Not wired for loopback test inside the connector.
Solder the signal lead.

● **Wiring Diagram R11**
(RS-232C: VT-C5R1)



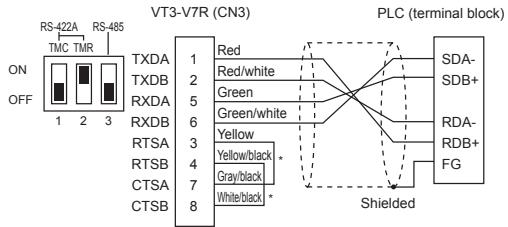
* Not wired for loopback test inside the connector.
Solder the signal lead.

● **Wiring Diagram R10**
(RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● **Wiring Diagram R12**
(VT-C5R2/VT-C15R2)

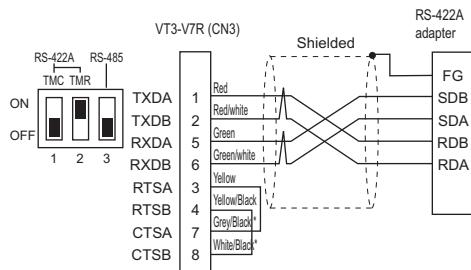


* Not wired for loopback test inside the connector.
Solder the signal lead.



Set the termination resistor switch on the PLC to ON.
Reverse the name of the A and B poles on the VT3 unit and the PLC.
Do not mistake during connection.

● **Wiring Diagram R13**
(VT-C5R2/C15R2)



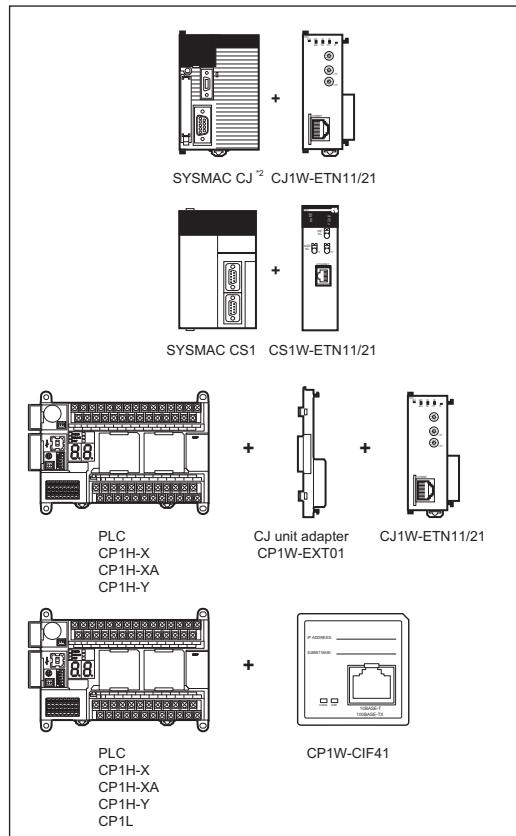
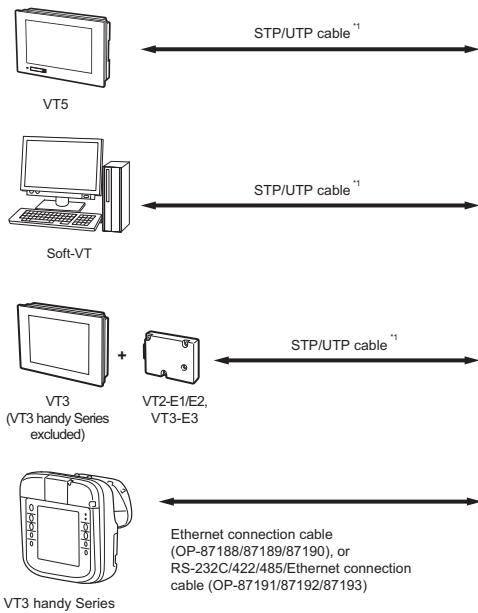
* Not wired for loopback test inside the connector.
Solder the signal lead.

3-3 Wiring Diagrams for Connections

Ethernet Connection Methods

■ Direct connection (1:1)

Use the STP/UTP cable for connection.



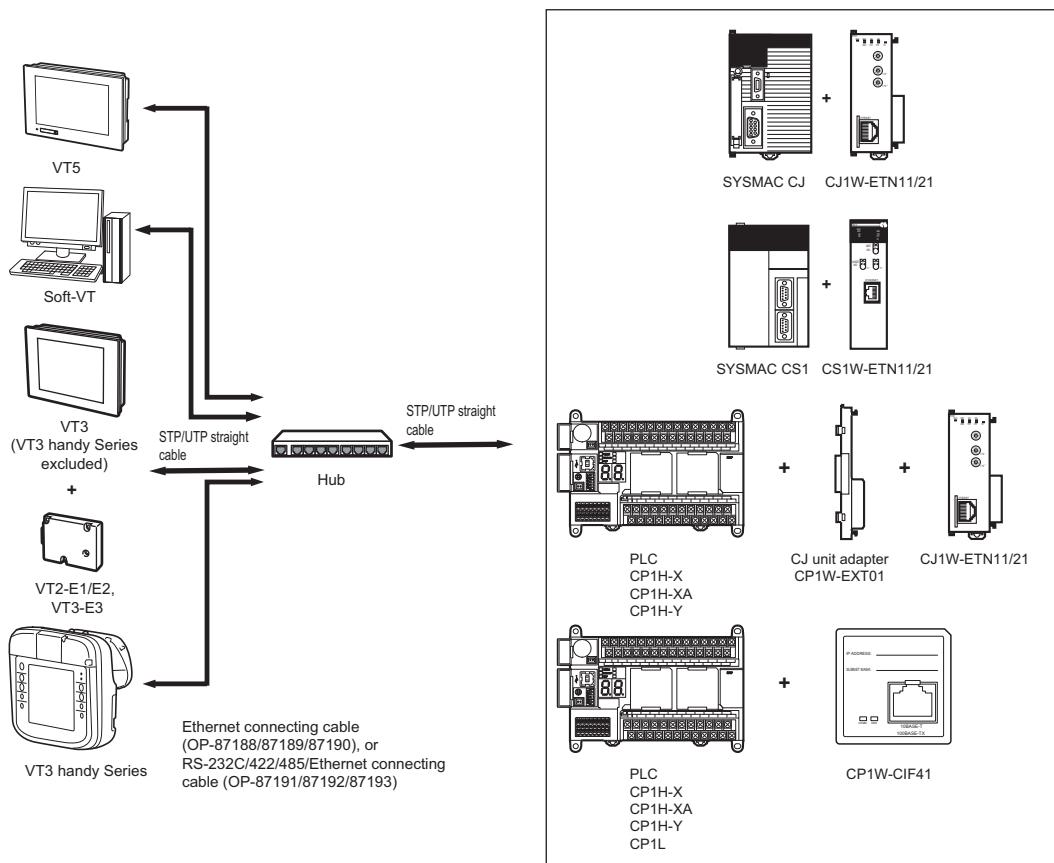
*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function.
To connect any other device directly to a PLC, use an STP/UTP cross cable.

*2 CJ2H-CPU64/65/66/67-EIP, CJ2MCPU31/32/33/34/35 may be connected directly with CPU.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable

■ When connecting by using hub(multiple connections)



* CJ2H-CPU64/65/66/67-EIP, CJ2M-CPU31/32/33/34/35 may be connected directly with CPU.

Connection of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and Soft-VT to a hub

- Use the STP/UTP straight cable.
- The VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and Soft-VT should be connected to a port other than the cascade port on a hub.

Hub connection with CJ1W-ETN11/21 or CS1W-ETN11/21

- Use the STP/UTP straight cable.
- Do not connect the CJ1W-ETN11/21 or CS1W-ETN11/21 to a cascade port on the hub.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable

The following describes the settings of the Link Unit matched to the default communications conditions.

Operation mode

The CPU on the VT5/VT3/Soft-VT/DT automatically switches to monitor mode to perform communications so there is no need to set up the CPU operation mode.



- If communications with the CPU start in a mode other than run mode before switching to run mode, the VT5/VT3 may display the "PLC communication error (01)".**
- Also, on the DT, status LED PLC may light (red), and "PLC communications error (01)" maybe displayed at the "Unit Monitor" on DT BUILDER.**
- However, the VT5/VT3/Soft-VT/DT will after a set interval automatically return to the monitor mode and resume communications. This will not adversely affect communications.**

PLC System Settings and I/O Table Window

Set the conditions for communications with the VT3 in the PLC system settings in CX-Programmer or on the I/O Table window.

When changing the PC system settings, change the PLC system settings after reading the PLC system settings on the CPU. After changing these settings, transfer them to the CPU again.

For details, refer to the manual for the respective CPU or CX-Programmer.

[Example] Synchronize settings to match the VT5/VT3/Soft-VT and DT default settings

"Communication Condition Setting Ranges and Defaults During Serial Communication", page 3-60

● When connecting a CS1 series communications board

- (1) Click the connection destination INNER board on the I/O Table window with the right mouse button, and select "Edit advanced unit settings".
- (2) Select the connection destination port in the display parameters group.
- (3) Select "Any setting" under arbitrary setting.
- (4) Serial communication mode: host link, Data length: 7 bits, Stop bit: 2 bits, Parity: Even, Baud rate: 38400 bps, Host link number: Set to VT5/VT3 station number.

● When connecting a CS1/CJ1 series communications board

- (1) Click the connection destination INNER board on the I/O Table window with the right mouse button, and select "Edit advanced unit settings".
- (2) Select the connection destination port in the display parameters group.
- (3) Select "Any setting" under arbitrary setting.
- (4) Serial communication mode: host link, Data length: 7 bits, Stop bit: 2 bits, Parity: Even, Baud rate: 38400 bps, Host link number: Set to VT5/VT3 station number.

● When connecting a SYSMAC α series host link

- (1) Open the tab for the connection destination port in the PLC System Settings.
- (2) Mark the user settings checkbox.
- (3) Communication speed: 19200 bps, Parameters: 1,7,2,E, Mode: Host link number: Set to VT5/VT3 station number.

● When setting a SYSMAC α series NT link

- (1) Open the tab for the connection destination port in the PLC System Settings.
- (2) Mark the user settings checkbox.
- (3) Baud rate: 19200, parameters: 1,8,1,O, mode: NT link (1:1).

Reference

When changing settings with the programming console without configuring the CX-Programmer PLC System Settings and without configuring settings on the I/O Table window, directly change the system setting area in the following table on the programming console.

The system setting area cannot be communicated with properly unless the area is written to in the ladder program. Be sure to write to the area on the programming console.

When configuring settings with CX-Programmer, the data memory below need not be modified.

CJ, CS1 series

Peripheral port	RS-232C Port	Communications board	Communications unit	Bit	Setting Item	DM Value
144 Channel	160 Channel	Port 1 DM32000 Port 2 DM32010	Port 1m Port 2 m+10	00 to 01	Parity 00: Even	8000
				2	Stop bit 0 : 2 bits	
				3	Data length 0 : 7 bits	
				8 to 11	Serial communications mode 00: Host Link	
				15	Arbitrary setting 1 : Any setting	
145 Channel	161 Channel	Port 1 DM32001 Port 2 DM32011	Port 1 m+1 Port 2 m+11	00 to 07	Port baud rate 08: 38400 bit/s	0008

m=D30000+100 x Unit No.

Host Link**SRM1, CPM1, CPM1A, CPM2A, CPM2C, CQM1, CQM1H, C200HS, α series**

Peripheral port	RS-232C Port	Communications board	Bit	Setting Item	DM Value
DM6650	DM6645	Port A DM6555 Port B DM6550	00 to 03	Setting the communications conditions 1 : According to setting of DM6646, DM6651, DM6556, or DM6551	0001
			12 to 15	Mode setting 0 : Host Link	
DM6651	DM6646	Port A DM6556 Port B DM6551	00 to 07	Baud rate setting (bit/s) 04: 19200	0304
			08 to 15	Frame format setting 03: Data bit 7 bits, stop bit 2 bits, parity even	
DM6652	DM6647	Port A DM6557 Port B DM6552	00 to 15	Sets the send delay time (Unit: 10ms)	0000
DM6653	DM6648	Port A DM6558 Port B DM6553	00 to 07	Unit No. setting	0000

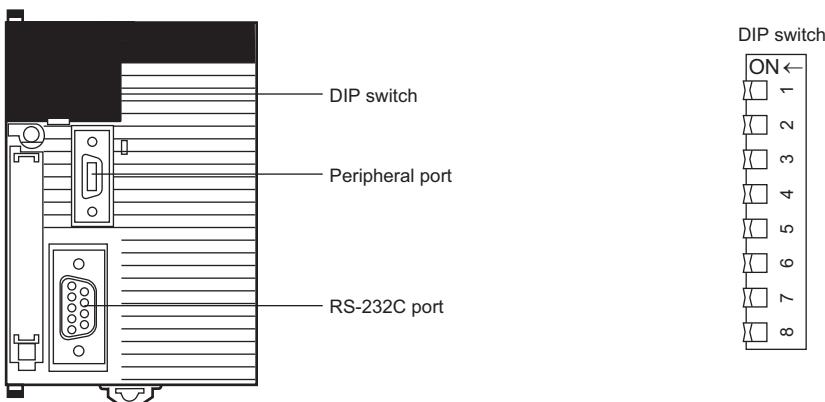
NT link**SRM1, CPM2A, CPM2C, CQM1, CQM1H, C200HS, α series**

RS-232C Port Connection	Communications Board Connection	Bit	Setting Item	Set Value (hex)
DM6645	Port A DM6555 Port B DM6550	12 to 15	Mode setting 0 : NT link	4000

Method for making serial connections

Host Link

■ SYSMAC CJ series (host link)



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	38400
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

● RS-232C port connection

(1) Select "PLC System Settings" → "Host Link Port" and use the table above to make settings.

(2) Set DIP switch No. 5 on the front panel to "OFF".

● Peripheral port connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set DIP switch No. 4 on the front panel to "ON".

● Peripheral port + CPM2C-CIF01 (RS-232C adapter unit) connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set DIP switch No. 4 on the front panel to "ON".

● Peripheral port + CPM2C-CIF11 (RS-422 adapter unit) connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set DIP switch No. 4 on the front panel to "ON".

● Serial option port CP1W-CIF01 connection

Select "PLC System Settings" → "Serial Port" and use the table above as reference to make settings.

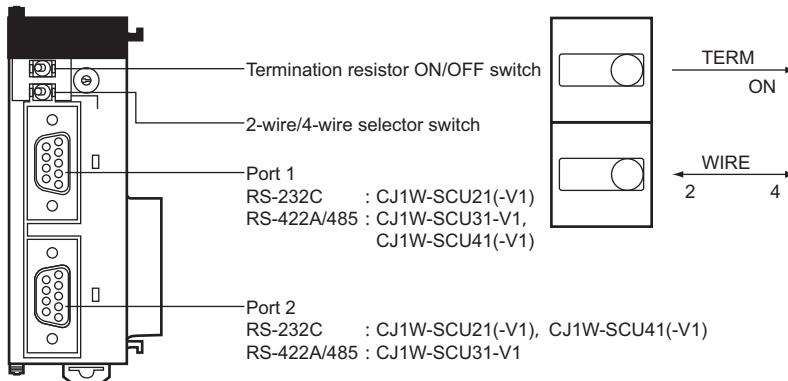
● Serial option port CP1W-CIF11 connection

(1) Select "PLC System Settings" → "Serial Port" and use the table above as reference to make settings.

(2) Set the DIP switches for operation settings on the CP1W-CIF11 rear panel as described below.

Setting Switch	Setting Item		Set value	
	Pin No. 1	Termination resistor enable/disable selection	With terminator	ON
	Pin No. 2	2-wire/4-wire selection	4-wire	OFF
	Pin No. 3	2-wire/4-wire selection	4-wire	OFF
	Pin No. 4	Free	-	OFF
	Pin No. 5	RS control based on RD enable/disable selection	None	OFF
	Pin No. 6	RS control based on SD enable/disable selection	None	OFF

■ CJ1W-SCU□□(-V1) (Host link)



Use the PLC System settings in CX-Programmer to set communication conditions.

● Communication settings

(1) Open "I/O Table Unit Settings" in CX-Programmer and register "Serial Communication Unit".

The unit number you enter to register a unit should match the unit number setting switch on the front of the CJ1W-SCU□□(-V1).

(2) Open "Edit Advanced Unit Settings" on the unit you want to register using the table below as reference.

Item name	Set value
Displayed parameter group	"Port 1: Host Link Settings" or "Port 2: Host Link Settings"
Any setting	Any setting
Serial Communication mode	Host Link
Data length	7 bits
Stop bit	2 bits
Parity	Even
Baud rate	38400 bps
Transmission delay time	Default value (0 ms)
Transmission delay any time	0
CTS control	None
1:N/1:1 protocol	1:N protocol
Frame format	Default value (A mode)
Host Link number	0

● Setting the Unit Number Setting Switch

Set the Unit Number Setting switch (rotary switch) on the front panel of the CJ1W-SCU□□(-V1).

3-4 Unit Settings

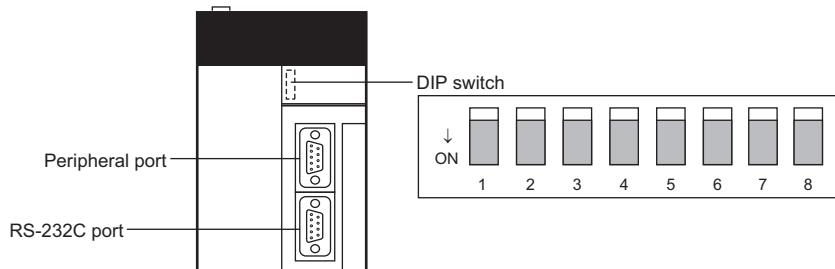
● Switch settings in an RS-422A 4-wire connection

When an RS-422A/485 port is used, set the TERM switch to "ON" and the WIRE switch to "4 (4-wire)".
The CJ1W-SCU31-V1 port 2 setting switch is at the bottom.

 Point

- Set the rotary switch so that it matches the unit number in the I/O table assigned by CX-Programmer.
- Make sure that the unit number is unique and not the same as some other CPU Advanced Unit.

■ SYSMAC CS1 Series (host link)



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	38400
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

● RS-232C port connection

(1) Select "PLC System Settings" → "Host Link Port" and use the table above to make settings.

(2) Set the DIP switch No. 5 on the PLC to "OFF".

● Peripheral port connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set the DIP switch No. 4 on the PLC to "ON".

● Peripheral port + CPM1-CIF01 (RS-232C adapter unit) connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set the DIP switch No. 4 on the PLC to "ON".

(3) Set the mode switch on the CPM1-CIF01 to "HOST".

● Peripheral port + CPM1-CIF11 (RS-422 adapter unit) connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set the DIP switch No. 4 on the PLC to "ON".

(3) Set the terminal resistance switch on the CPM1-CIF11 to "ON".



Use the program console instead of CX-Programmer to make settings.

 "PLC System Settings and I/O Table Window", page 3-38

■ CS1W-SCB□□(-V1), CS1W-SCU□□(-V1)



Use the PLC System settings in CX-Programmer to set communication conditions.

● Communication settings

- (1) Open "I/O Table Unit Settings" in CX-Programmer and register the unit.
Register a "serial communication board" on an "inner board" for CS1W-SCB□□(-V1).
Register the "serial communication unit" of a "rack" for CS1W-SCU□□(-V1).
The unit number you enter to register a serial communication unit should match the unit number setting switch on the front of the CS1W-SCU□□(-V1).
- (2) Open "Edit Advanced Unit Settings" on the unit you want to register using the table below as reference.

Item name	Set value
Displayed parameter group	"Port 1: Host Link Settings" or "Port 2: Host Link Settings"
Any setting	Any setting
Serial Communication mode	Host Link
Data length	7 bits
Stop bit	2 bits
Parity	Even
Baud rate	38400 bps
Transmission delay time	Default value (0 ms)
Transmission delay any time	0
CTS control	None
1:N/1:1 protocol	1:N protocol
Frame format	Default value (A mode)
Host Link number	0

- * To use port 1, set the display parameters group to "Port 1: Host Link setting".
To use port 2, set the display parameters group to "Port 2: Host Link setting".

● Setting the Unit Number Setting Switch (CS1W-SCU□□(-V1 only))

Set the Unit Number Setting switch (rotary switch) on the front panel of the CS1W-SCU□□(-V1).

● Switch settings in an RS-422A 4-wire connection

When an RS-422A/485 port is used, set the TERM switch to "ON" and the WIRE switch to "4 (4-wire)".



- Set the rotary switch so that it matches the unit number in the I/O table assigned by CX-Programmer.
- Make sure that the unit number is unique and not the same as some other CPU Advanced Unit.

■ SYSMAC CP1H/CP1L/CP1E Series (Host Link)

Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	38400
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

- Internal RS-232C port (CP1E only) connection

Select "PLC System Settings"→"Internal RS-232C Port" and use the table above as reference to make settings.

- Serial option port CP1W-CIF01 connection

Select "PLC System Settings"→"Serial Port 1" or "Serial Port 2" and use the table above as reference to make settings.

- Serial option port CP1W-CIF11 connection

(1) Select "PLC System Settings"→"Serial Port 1" or "Serial Port 2" and use the table above as reference to make settings.

(2) Set the DIP switches for operation settings on the CP1W-CIF11 rear panel as described below.

Setting Switch	Setting Item	Set value	
	Pin No. 1	Termination resistor enable/disable selection	With terminator ON
	Pin No. 2	2-wire/4-wire selection	4-wire OFF
	Pin No. 3	2-wire/4-wire selection	4-wire OFF
	Pin No. 4	Free	- OFF
	Pin No. 5	RS control based on RD enable/disable selection	None OFF
	Pin No. 6	RS control based on SD enable/disable selection	None OFF

■ SYSMAC SRM1, CPM1, CPM1A series (host link)

Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

- RS-232C port connection

Select "PLC System Settings"→"Host Link Port" and use the table above to make settings.

- Peripheral port connection

Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.

- Peripheral port + CPM1-CIF01 (RS-232C adapter unit) connection

(1) Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.

(2) Set the mode switch on the CPM1-CIF01 to "HOST".

- Peripheral port + CPM1-CIF11 (RS-422 adapter unit) connection

(1) Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.

(2) Set the terminal resistance switch on the CPM1-CIF11 to "ON".



Use the program console instead of CX-Programmer to make settings.

□ "PLC System Settings and I/O Table Window", page 3-38

■ SYSMAC CPM2A and CPM2C Series (Host Link)

Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

● RS-232C port connection

- (1) Select "PLC System Settings" → "Host Link Port" and use the table above to make settings.
- (2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.
Set the Communication port function setup switch SW1 on the PLC to "OFF" for the CPM2C.

● Peripheral port connection

- (1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.
- (2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.
Set the Communication port function setup switch SW2 on the PLC to "ON" for the CPM2C.

● Peripheral port + CPM1-CIF01 (RS-232C adapter unit) connection

- (1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.
- (2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.
Set the Communication port function setup switch SW2 on the PLC to "ON" for the CPM2C.
- (3) Set the mode switch on the CPM1-CIF01 to "HOST".

● Peripheral port + CPM1-CIF11 (RS-422 adapter unit) connection

- (1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.
- (2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.
Set the Communication port function setup switch SW2 on the PLC to "ON" for the CPM2C.
- (3) Set the terminal resistance switch on the CPM1-CIF11 to "ON".

● Peripheral port + CPM2C-CIF01 (RS-232C adapter unit) connection

- (1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.
- (2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.
Set the Communication port function setup switch SW2 on the PLC to "ON" for the CPM2C.

● Peripheral port + CPM2C-CIF11 (RS-232C adapter unit) connection

- (1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.
- (2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.
Set the Communication port function setup switch SW2 on the PLC to "ON" for the CPM2C.
- (3) Set SW1 (terminal resistance switch) on the CPM2C-CIF11 to "ON".
- (4) Set SW2-3 on the CPM2C-CIF11 to "ON (RS-422A 4-wire)".

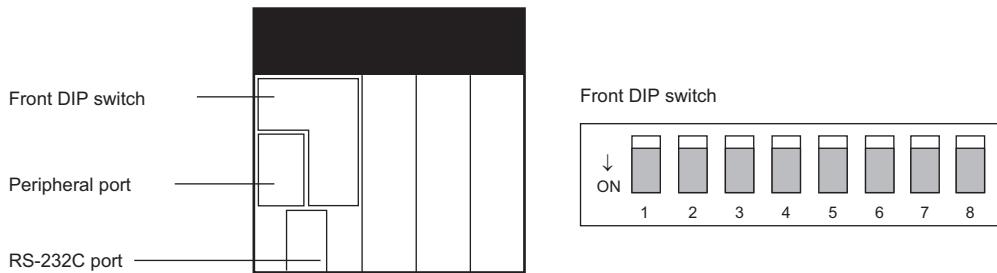


Use the program console instead of CX-Programmer to make settings.

□ "PLC System Settings and I/O Table Window", page 3-38

3-4 Unit Settings

■ SYSMAC CQM1H Series (host link)



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

● RS-232C port connection

(1) Select "PLC System Settings" → "Host Link Port" and use the table above to make settings.

(2) Set DIP switch No. 5 on the front panel to "OFF".

● Peripheral port connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set DIP switches No. 5 and No. 7 on the front panel to "OFF" and "ON", respectively.

● Peripheral port + CPM1-CIF01 (RS-232C adapter unit) connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set DIP switches No. 5 and No. 7 on the front panel to "OFF" and "ON", respectively.

(3) Set the mode switch on the CPM1-CIF01 to "HOST".

● Peripheral port + CPM1-CIF11 (RS-422 adapter unit) connection

(1) Select "PLC System Settings" → "Peripheral Port" and use the table above as reference to make settings.

(2) Set DIP switches No. 5 and No. 7 on the front panel to "OFF" and "ON", respectively.

(3) Set the terminal resistance switch on the CPM1-CIF11 to "ON".

● Communication board CQM1H-SCB41 connection

(1) Select "PLC System Settings" → "Communication board port A" or "Communication board port B" and use the table above as reference to make settings.

(2) To use port 2, set the WIRE switch on the CQM1H-SCB41 to "4" and the TERM switch to "ON".



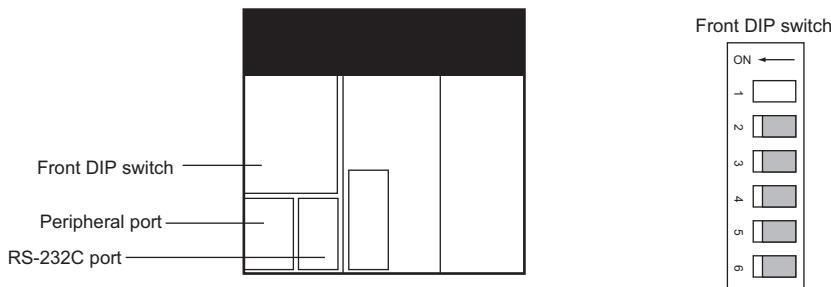
Use the program console instead of CX-Programmer to make settings.

↳ "PLC System Settings and I/O Table Window", page 3-38

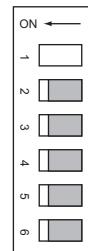


When connecting PLC to the peripheral port, return DIP switch No. 7 on the front panel to "OFF".

■ SYSMAC CQM1 Series (host link)



Front DIP switch



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

● RS-232C port connection

(1) Select "PLC System Settings"→"Host Link Port" and use the table above to make settings.

(2) Set DIP switch No. 5 on the front panel to "OFF".

● Peripheral port connection

(1) Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.

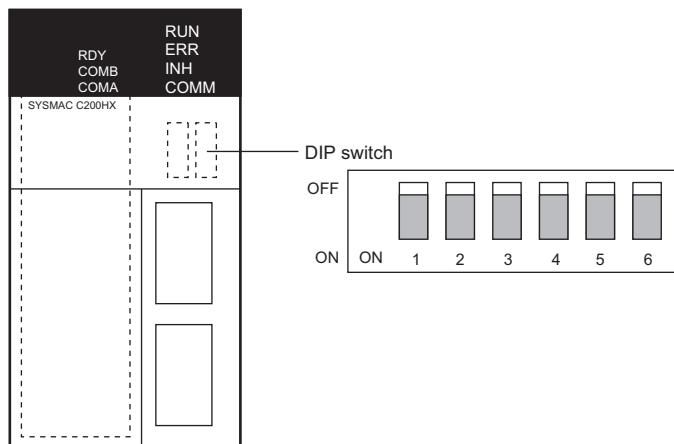
(2) Set DIP switch No. 5 on the front panel to "OFF".



Use the program console instead of CX-Programmer to make settings.

▷ "PLC System Settings and I/O Table Window", page 3-38

■ C200HS, SYSMAC α series (host link)



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	7,2,E
Mode	Host Link
Unit No.	0
Delay	0

● RS-232C port connection

- (1) Select "PLC System Settings" → "Host Link Port" and use the table above to make settings.
- (2) Set DIP switch No. 5 on the front panel to "OFF".

● Communication board C200HW-COM02/03/04/05/06 connection

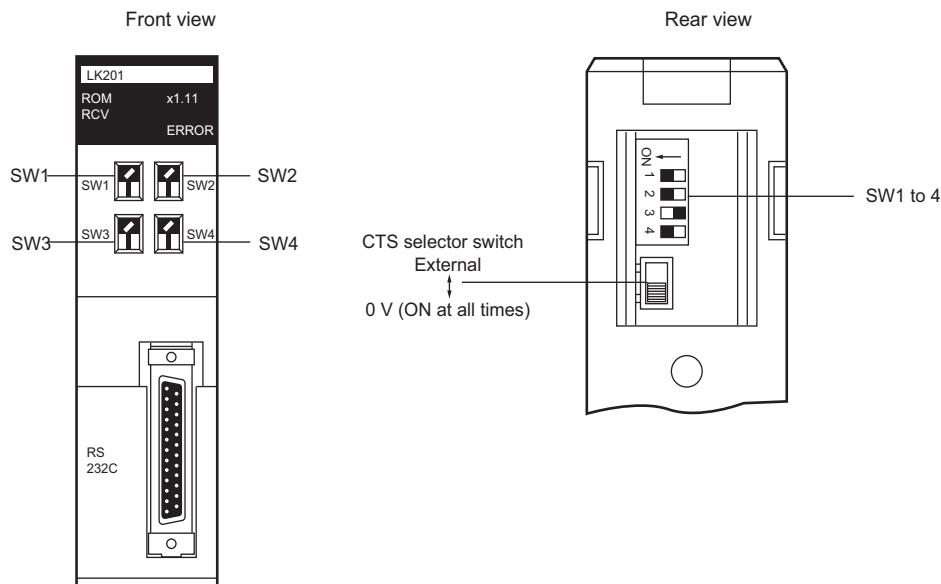
- (1) Select "PLC System Settings" → "Communication board port A" or "Communication board port B" and use the table above as reference to make settings.
- (2) When using the C200HW-COM03/COM06 RS-422A port (port A), set the DIP switch SW1 to "4(4-wire)" and SW2 to "ON".



Use the program console instead of CX-Programmer to make settings.

□ "PLC System Settings and I/O Table Window", page 3-38

■ C200H-LK201-V1 (host link)



● Front Side Switches (SW1 to SW4)

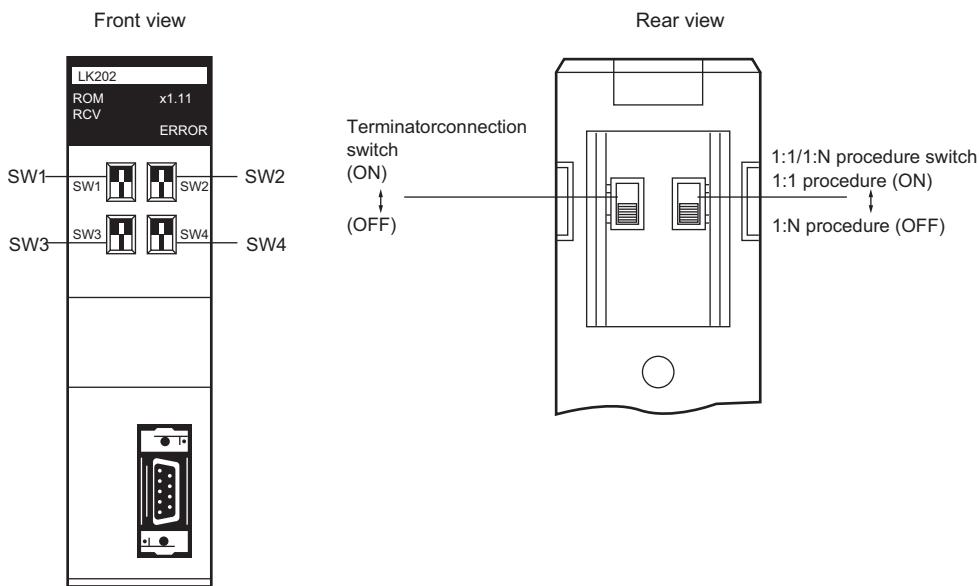
Setup Switch	Setting Item	Set Value	
SW1	Unit No. upper digit	Unit No. 0	0
SW2	Unit No. lower digit		0
SW3	Baud rate	19200 bit/s	6
SW4	Command level Parity Transmission code	Levels 1, 2 and 3 are enabled Even ASCII7 bits 2 Stop bit	2

● Rear Side Switches (SW1 to SW4)

Set the CTS selector switch to 0 V (always ON).

SW No.	Set Value	
1	Not used	OFF
2	Not used	OFF
3	1:N procedure	ON
4	No 5 V supply	OFF

■ C200H-LK202-V1 (host link)



● Front side switches (SW1 to SW4)

Setup Switch	Setting Item	Set Value	
SW1	Unit No. upper digit	Unit No. 0	0
SW2			0
SW3	Baud Rate	19200 bit/s	6
SW4	Command level Parity Transmission code	Levels 1, 2 and 3 are enabled Even ASCII7 bits 2 Stop bit	2

● Rear side switches

Set the 1:1/1:N procedure switch to 1:N (OFF).

Set the terminator connection switch to ON only for the connected nodes at both ends of the communications path.

■ SYSMAC C20H, C28H, C40H (Host link)

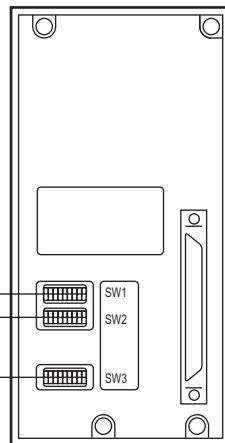
● Setting the system setting area/registration area

System Setting Area	Registration Area	Setting Item	Set Value		Value of DM
DM0920	DM1920	RS-232C interface Upper bit: Mode used	Host Link	00	0000
		Lower bit: Communications conditions	Standard setting	00	
DM0921 ¹	DM1921 ¹	Upper bit: Frame format	7 Data bit 2 Stop bit Even	00	0005
		Lower bit: Baud rate	9600 bit/s	05	
DM0922	DM1922	Upper bit: Transmission delay	0 ms	00	0000
		Lower bit: RS/CS control	Control OFF	00	
DM0923	DM1923	Upper bit: Unit No. (BCD)	Unit No.0	00	0000
		Lower bit: Not used		00	

*1 Set DM0921 according to the above table when the lower bit of DM0920 is set to "01" (individual setting). DM0921 need not be set when the lower bit of DM0920 is set to "00" (standard setting).

■ C120-LK201-V1 (host link)

Rear view

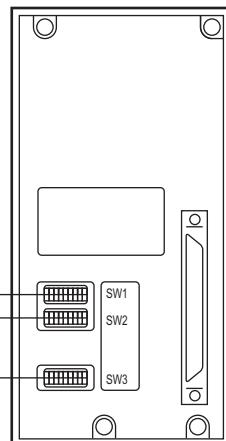


● Rear side switches (SW1 to SW3)

Switch Name	Setting Item		Set Value
SW1	1	16	OFF
	2	8	OFF
	3	4 Unit No. Unit No.0 to Unit No.31	Unit No.0
	4	2	OFF
	5	1	OFF
	6	Not used	-
	7	Not used	OFF
	8	Run/stop setting	Set according to situation
SW2	1	Baud rate 300 to 19200 bit/s	OFF
	2		OFF
	3		ON
	4		OFF
	5	Not used	OFF
	6	1:1/1:N procedure	1:N procedure
	7	Level setting	ON
	8		ON
SW3	1	CTS switching (0V / external)	ON
	2	OFF	
	3	ON	
	4	Synchronization selector switch (internal/external)	Internal synchronization
	5	ON	
	6	OFF	
	7	Not used	OFF
	8	Not used	OFF

■ C120-LK202-V1 (host link)

Rear view



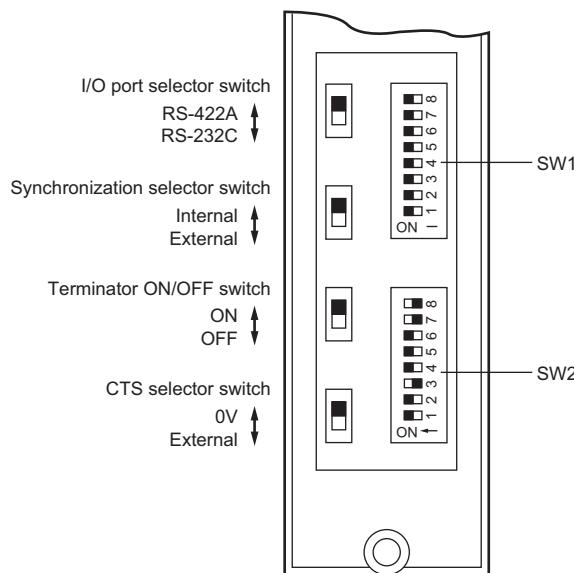
● Rear side switches (SW1 to SW3)

Switch Name	Setting Item		Set Value	
SW1	1	16	Unit No.0	OFF
	2	8		OFF
	3	4		OFF
	4	2		OFF
	5	1		OFF
	6	Not used		OFF
	7	Not used		OFF
	8	Run/stop setting		-
SW2	1	Baud rate 300 to 19200 bit/s	19200 bit/s	OFF
	2			OFF
	3			ON
	4			OFF
	5	Not used		OFF
	6	1:1/N procedure		OFF
	7	Level setting	Levels 1, 2 and 3 enabled	ON
	8			ON
SW3	1	Terminator input	"Yes"	"No"
	2		ON	ON
	3		OFF	OFF
	4		ON	OFF
	5		OFF	OFF
	6		ON	OFF
	7		OFF	OFF
	8		OFF	OFF

Point

- Set to ON only for the nodes at both ends of the communications path.
- Set to OFF for nodes in between. Normal transfer is not possible when ON is set for nodes in between.

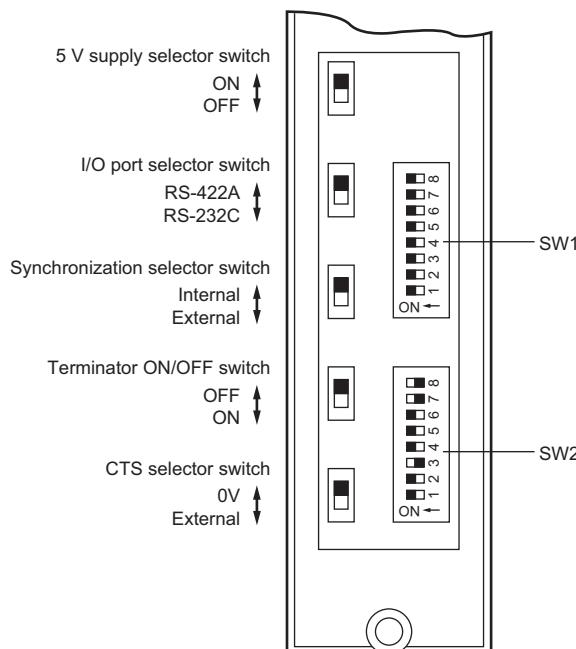
■ C500-LK201-V1 (host link)



Switch Name	Setting Item	Set Value
I/O port selector switch	RS-232C/RS-422A	RS-232C
Synchronization selector switch	Internal/external	Internal
Terminator ON/OFF switch ^{*1}	No/Yes	No
CTS selector switch	0V/ external	0V
SW1	1 16	OFF
	2 8	OFF
	3 4 Unit No. Unit No.0 to Unit No.31	Unit No.0
	4 2	OFF
	5 1	OFF
	6 Not used	-
	7 Not used	OFF
	8 Run/stop setting	Set according to situation
SW2	1	OFF
	2 Baud rate 300 to 19200 bit/s	19200 bit/s
	3	ON
	4	OFF
	5 Not used	-
	6 1:1/1:N procedure	1:N procedure
	7 Level setting	Levels 1, 2 and 3 enabled
	8	ON

*1 Set the terminator ON/OFF switch to ON only for the nodes at both ends of the communications path when communications is performed using the RS-422A interface.

■ C500-LK203 (host link)



Switch Name	Setting Item	Set Value
5 V supply selector switch	ON/OFF	OFF
I/O port selector switch	RS-232C/RS-422A	RS-232C
Synchronization selector switch	Internal/external	Internal
Terminator ON/OFF switch ¹	No/Yes	No
CTS selector switch	0V/ external	0V
SW1	1 16	OFF
	2 8	OFF
	3 4 Unit No. Unit No.0 to Unit No.31	Unit No.0
	4 2	OFF
	5 1	OFF
	6 Parity: Even	-
	7 Transmission code	ASCII7 bits, 2 Stop bit
	8 Monitor/normal mode	Set according to situation
SW2	1	OFF
	2 Baud rate 300 to 19200 bit/s	19200 bit/s
	3	ON
	4	OFF
	5 Line setting	Set according to situation
	6 1:1:1:N procedure	1:N procedure
	7 Level setting	Levels 1, 2 and 3 enabled
	8	ON

*1 Set the terminator ON/OFF switch to ON only for the nodes at both ends of the communications path when communications is performed using the RS-422A interface.

■ CV500, CV1000, CVM1 (host link)

● Setting the CPU Unit

Switch Name	Setting Item	Set Value	
Host link RS-422A/232C selector switch	RS-232C/RS-422A selection	RS-232C	Upper setting
DIP switch	SW6	Terminator setting	*1
	SW4	Setting the communications conditions	Communications by PC system setting values OFF

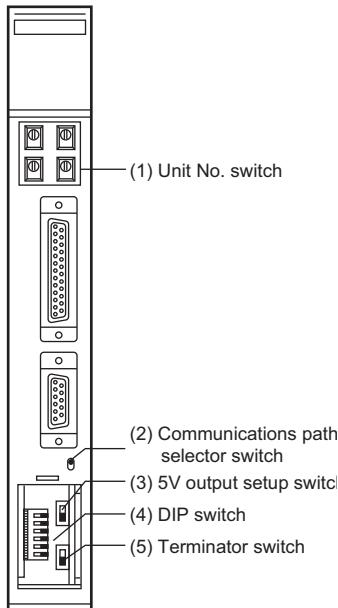
*1 When performing communications on the RS-422A interface, set the nodes at both ends of the cable to ON. Set to OFF for nodes in between. Normal transfer is not possible when ON is set for nodes in between.

● System setting

Set the PC system settings on-line using FIT or another peripheral tool.

Item	Setting Item	Set Value
Baud rate	Sets baud rate. 1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Stop bit	Sets the number of Stop bit. 1 bit/2 bits	1 bit
Parity	Specifies the bit for the parity check. None/Odd/Even	Even
Data length	Sets the length of the data to be sent. ASCII7ÉrÉbÉg/JIS8ÉrÉbÉg	7 bits
Unit No.	Sets the unit No. of the PLC. 00 to 31	Unit No. 00

■ CV500-LK201 (host Link)



3-4 Unit Settings

(1) Unit No. switch

Setup Switch	Setting Item	Set Value	
SW3	Unit No. upper digit	Unit No. 00	0
SW4	Unit No. lower digit		0

(2) Communications path selector switch

Upper setting	Sets the communications method on communications port 2 to RS-232C.
Lower setting	Sets the communications method on communications port 2 to RS-422A.

(3) 5 V output setup switch

Lower setting	5 V power supply to communications port 1 is cut.
---------------	---

(4) DIP switch

Setup Switch	Setting Item	Set Value
SW1	Communications conditions	Communications by value of PC Bus Unit System settings.
SW2	CTS switching	Sets the CTS signal of communications port 1 ON at all times.
SW3	CTS switching	Sets the CTS signal of communications port 2 ON at all times.
SW4	Not used	OFF at all times
SW5	Loopback communications test	Regular operation
SW6	Specification of test report	Executes the loopback test at port 1.

(5) Terminator switch

When performing communications on the RS-422A interface, set the terminator switch on the nodes at both ends of the communication path to ON (up position). Set the terminator switch on the nodes in between to OFF (down position). If the terminator switch on nodes in between is set to ON, data transfer cannot be performed normally.

(6) Setting the CPU Bus Unit system

Set the system settings for the Host Link Unit at "CPU Bus Unit System Setup" in the OMRON CV Support Software.

Item	Setting Item	Set Value
Baud rate	Sets the baud rate. 1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Stop bit	Sets the number of Stop bit. 1 bit/2 bits	1 bit
Parity	Specifies the bit for the parity check. None/Odd/Even	Even
Data length	Sets the length of the data to be sent. ASCII7 bits/JIS8 bits	7 bits
Xon/Xoff control	Set to perform Xon/Xoff Control or not. Yes/No	OFF
Communications method	Selects the communications method. (Full duplex/Halfduplex)	Full-duplex
Data resend	Sets whether or not to resend data from the beginning when communications is interrupted. (Resend OFF/Resend ON)	Resend OFF
Transmission stop code (X off)	Sets the X off code.	13 (Hex)
Transmission stop cancel code(Xon)	Sets the X on code.	11 (Hex)
Transmission delay	Sets the time up till when the data is sent after the RS signal turns ON.	0 ms

NT Link (1:1 mode)

■ SRM1-C02, SYSMAC SRM1, CPM1, CPM1A Series (NT Link)

Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	8,1,0
Mode	NT link

● RS-232C port connection

Select "PLC System Settings"→"Host Link Port" and use the table above to make settings.

● Peripheral port + CPM1-CIF01 (RS-232C adapter unit) connection

(1) Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.

(2) Set the mode switch on the CPM1-CIF01 to "NT".



Use the program console instead of CX-Programmer to make settings.

"PLC System Settings and I/O Table Window", page 3-38

■ SYSMAC CPM2A and CPM2C Series (NT Link)

Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	8,1,0
Mode	NT link

● RS-232C port connection

(1) Select "PLC System Settings"→"Host Link Port" and use the table above to make settings.

(2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.

Set the Communication port function setup switch SW1 on the PLC to "OFF" for the CPM2C.

● Peripheral port connection

(1) Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.

(2) Set the Communication conditions setup switch on the PLC to "OFF" for the CPM2A.

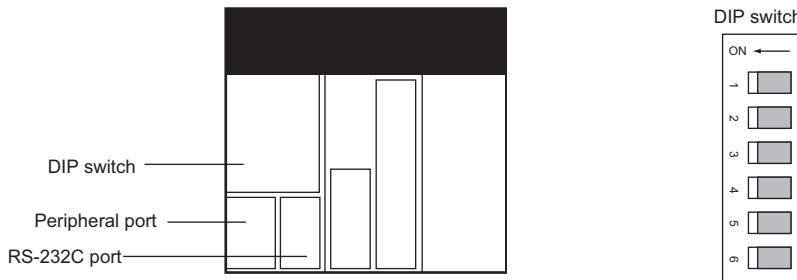
Set the Communication port function setup switch SW2 on the PLC to "ON" for the CPM2C.



Use the program console instead of CX-Programmer to make settings.

"PLC System Settings and I/O Table Window", page 3-38

■ SYSMAC CQM1, CQM1H Series (NT Link)



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	8,1,0
Mode	NT link

● RS-232C port connection

- (1) Select "PLC System Settings"→"Host Link Port" and use the table above to make settings.
- (2) Set DIP switch No. 5 on the front panel to "OFF".

● Peripheral port connection

- (1) Select "PLC System Settings"→"Peripheral Port" and use the table above as reference to make settings.
- (2) Set DIP switch No. 5 on the front panel to "OFF".

● Communication board CQM1H-SCB41 (CQM1H only) connection

- (1) Select "PLC System Settings"→"Communication board port A" or "Communication board port B" and use the table above as reference to make settings.
- (2) To use port 2, set the WIRE switch on the CPM1-CIF11 to "4" and the TERM switch to "ON".

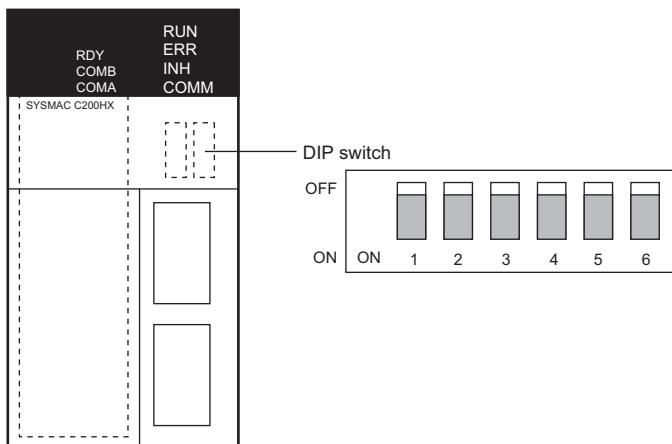


**The RS-422A/485 port (port 2) on CQM1H-SCB41 cannot be used.
Use PORT1 (RS-232C).**



Use the program console instead of CX-Programmer to make settings.
"PLC System Settings and I/O Table Window", page 3-38

■ C200HS, SYSMAC α Series (NT Link)



Use the PLC System settings in CX-Programmer to set communication conditions.

Setting items	Set value
Communication settings	User settings
Communication speed	19200
Parameter	8,1,0
Mode	NT link

● RS-232C port connection

(1) Select "PLC System Settings"→"Host Link Port" and use the table above to make settings.

(2) Set DIP switch No. 5 on the front panel to "OFF".

● Communication board C200HW-COM02/03/04/05/06 (SYSMAC α Series only) connection

(1) Select "PLC System Settings"→"Communication board port A" or "Communication board port B" and use the table above as reference to make settings.

(2) When using the C200HW-COM03/COM06 RS-422A port (port A), set the DIP switch SW1 to "4(4-wire)" and SW2 to "ON."



PORT2 (RS-422A/485) on C200HW-COM06 cannot be used.

Use PORT1 (RS-232C).



Use the program console instead of CX-Programmer to make settings.

"PLC System Settings and I/O Table Window", page 3-38

Communication Condition Setting Ranges and Defaults During Serial Communication

● SYSMAC-CS1/CJ Series

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serie I/F ¹	RS-232C, RS-422A 4 wire ²	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	38400 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	2 bits
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set RS-232C/RS-422A matched to the interface on the PLC.

*2 • Please use the RS-232C to connect to PORT3 of the VT3 series.
• The VT5-W07M does not support RS-422A connections.

● SYSMAC CP1H/CP1L/CP1E Series

Item	Setting range	Default
Station No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serial I/F ¹	RS-232C, RS-422A, 4-wire ²	RS-232C
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	38400bit/s
Data bits	7bits, 8bits	7 bits
Stop bits	1bit, 2bits	2 bits
Parity	None, odd, even	Even
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set RS-232C/RS-422A matched to the interface on the PLC.

*2 • Use the RS-232C to connect to PORT3 of the VT3 Series.
• The VT5-W07M does not support RS-422A connections.

● SYSMAC-C Series

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serie I/F ¹	RS-232C, RS-422A 4 wire	RS-232C
Baud rate ²	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	2 bits
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set RS-232C/RS-422A matched to the interface on the PLC.

*2 Set to 9600 bit/s when connecting to C20H, C28H and C40H.

● SYSMAC-CV Series

Item	Setting Range	Default
PLC No.	ON (0 to 31)	ON (0)
VT No.	-	-
PLC serie I/F ^{*1}	RS-232C, RS-422A 4 wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set RS-232C/RS-422A matched to the interface on the PLC.

● NT link

Item	Setting range	Default
Setting	None	None
VT No.	-	-
PLC serial I/F	RS-232C	RS-232C
Baud rate	19200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

3-4 Unit Settings

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port No. of the connected units should be determined in advance. The following table shows the setting items corresponding to the connection type. Check these settings items with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> IP address assigned to VT5/VT3/Soft-VT (PC) IP Address to assign to PLC Port No. to be used for communication
Direct connection	<ul style="list-style-type: none"> IP address assigned to VT5/VT3/Soft-VT (PC) IP Address to assign to PLC Port No. to be used for communication Subnet Mask Default Gateway



- Make sure that "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".
- Use the same port number for communications with the VT5/VT3/Soft-VT and PLC.

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in "Ethernet/Language" in VT STUDIO. ¹	P.3-63
	Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.	-
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ²	P.3-64
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Set the communication conditions on the Omron Corporation PLC.	P.3-67

¹ Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

² You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.3-65
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.3-66
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use an Omron Corporation PLC to set the communication conditions.	P.3-67

¹ Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

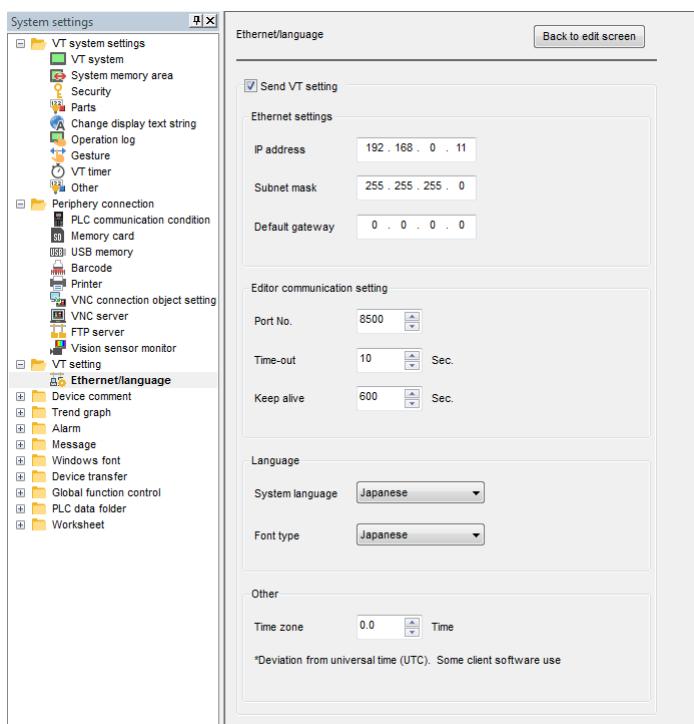
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.



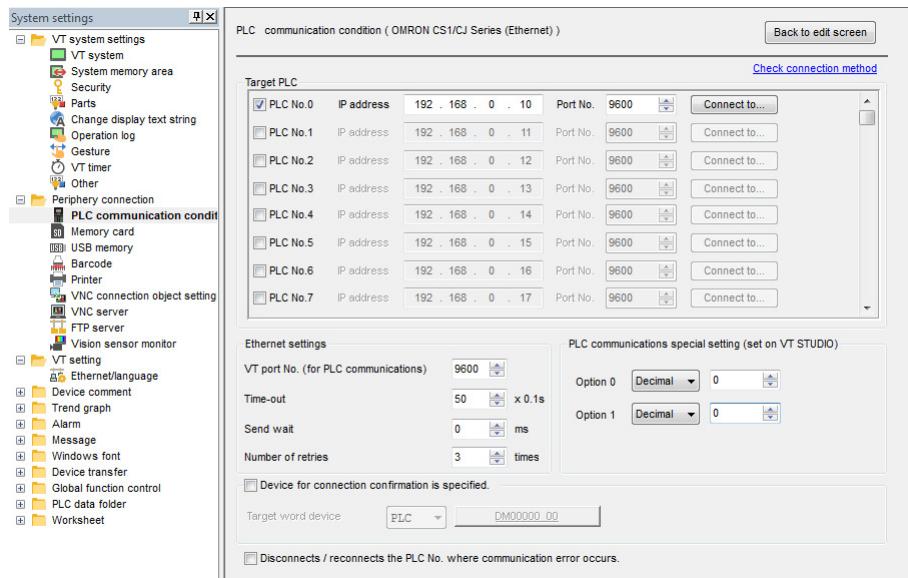
In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

3-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



	Item	Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (9600).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)	Option 0	This is displayed when the "PLC communications special settings" (set in VT STUDIO) checkbox is selected. Set at NODE No. on VT5/Soft-VT. Normally, set this setting to "1".
	Option 1	Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.
IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023.
Also, take care not to use a port number already used by another device.

*3 Select "PLC device".
 "6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	**.**.**.**.**.**				
				OK	Cancel
				Next page	
Ethernet Setup (2/3)				OK	Cancel
Port No.	8500			Next page	
Time-out	10 s				
Keep alive	600 s				
				OK	Cancel
				Next page	
Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				
				OK	Cancel
				Next page	

Item	Description
Baud rate	Normally, select "100/10 Mbps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup¹	Selects "Enable" only when using a router.

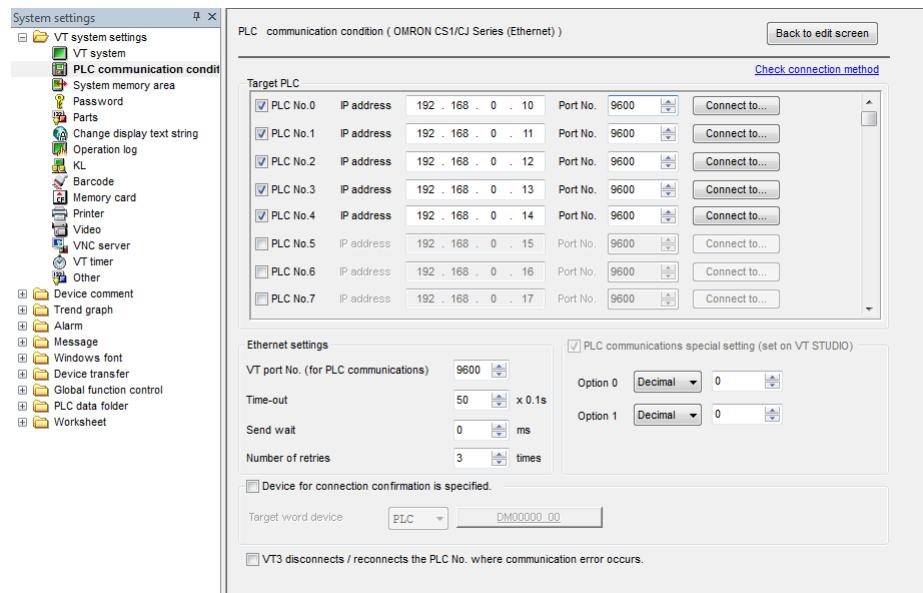
*1 "Chapter 8 ETHERNET", VT3 Series Reference Manual

3-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connection", VT3 Series Reference Manual



Item		Description
Target PLC	PLC No.	Selects the PLC No. (0 to 15) to be used.
	IP address ¹	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port No. ²	Sets the port No. (1024 to 65535) of the connection destination PLC (marked PLC No.).
	Connect to...	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet Settings	VT port No. (for PLC communications)	Sets the port No. (for PLC communications) (1024 to 65535) of the VT3.
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communication Special Setup VT Using VTSTUDIO for the setup	Option 0	This is displayed when the "Communications special settings (set on VT STUDIO)" checkbox is marked. Set at NODE No. on VT3. Normally, use this setting set to "1".
	Option 1	Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ³	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
Disconnects / reconnects the PLC No. where communication error occurs ⁴		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range of 0 to 255)

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. Also, do not use another port No. that is already in use.

*3 Select "PLC Devices".

"6-7 Set up the Devices", VT3 Series Reference Manual

*4 This can be set up when a PLC model that supports 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC setting conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Setup", VT3 Series Hardware Manual

■ Set up CJ2H-CPU6□-EIP, CJ2M-CPU3□, CJ1W-ETN11/21 and CS1W-ETN11/21

The settings of CJ2H-CPU6□-EIP, CJ2M-CPU3□, CJ1W-ETN11/21 and CS1W-ETN11/21 can be set up with CX-Programmer.

Point

- Items not found in the table below are not required in connecting the VT5/VT3/Soft-VT to the Ethernet. Set as necessary.
- The IP address of CS1W-ETN11 is set up with the IP address setup SWs on CS1W-ETN11.
- Make sure that the CJ2H-CPU6□-EIP, CJ2M-CPU3□, CJ1W-ETN11/21, CS1W-ETN11/21 NODE No. (use the NODE No. setting switch on the unit to set) is not identical to the VT5/VT3/Soft-VT NODE No. (use Special Settings Option 0 to set).

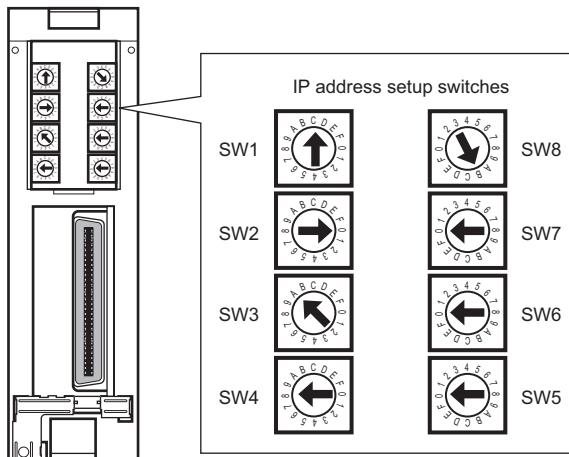
Item	Description
IP Address	Set the IP address to be assigned to the PLC.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections. Set the same "subnet mask" value as the VT5/VT3/Soft-VT.
FINS UDP port	Select "User defined" and set the port No. to be used for communication. Please set up the same number as the PLC port number•VT3 port number.
IP address table ^{*1}	Set the IP address and node address (=NODE No.) to be assigned to the VT5/VT3/Soft-VT. Normally, set the node address to "1".
IP router table	Set this only when using a router. Sets the IP address of the router to the router address. Set the IP address to be assigned to the VT5/VT3/Soft-VT.

*1 Be sure to set only unique IP addresses to each device within the same LAN.
IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

● About the IP address of the CS1W-ETN11

Set the IP address of CS1W-ETN11 on the IP address setup switch on the rear of the CS1W-ETN11 unit.

Rear view



4 groups of hexadecimal numbers that are separated with "." are used for the setup of the IP address.

[Example] To set the IP address of the CS1W-ETN11 to "192.168.0.11"

192=the setting for C0H, 168=the setting for A8H, 0=the setting for 00H, 11=the setting for 0BH

SW1: C

SW3: A

SW5: 0

SW7: 0

SW2: 0

SW4: 8

SW6: 0

SW8: B

■ CP1W-CIF41 settings

Set up the Ethernet option board CP1W-CIF41 from the Web browser.

For more information on how to set up, please refer to each device's data sheet.

Items not found in the table below are not required in connecting the VT5/VT3/Soft-VT to the Ethernet.
Set as necessary.

● IP address and protocol

	Item	Description
Setting format	IP Address ^{*1}	Set the IP address to be assigned to the PLC.
	Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections. Set the same "subnet mask" value as the VT5/VT3/Soft-VT.
	FINS node address	Set the Ethernet option board FINS node address. Set a unique node address that is not the same as the VT5/VT3/Soft-VT node address.
	FINS UDP port	Select "User defined" and set the port No. to be used for communication. Target PLC port number set the same port number as for the VT5/VT3/Soft-VT.
	Change IP address	Request an IP address from the FINS node address, and select the address change method. When using the IP address table method or a combination method, carry out IP address table settings.
	Peer IP address dynamic change	Select FINS UDP peer IP address dynamic change.
	Broadcast	Set the FINS UDP broadcast IP address selection method. Normally, the default is used.

*1 Be sure to set only unique IP addresses to each device within the same LAN.

● IP address/router table

	Item	Description
IP address table	FINS node address	Set the node address to be assigned to the VT5/VT3/Soft-VT. Make each node address unique.
	IP address	Set the IP address to be assigned to the VT5/VT3/Soft-VT.
IP router table	IP network address	Set this only when using a router. Set the IP address to be assigned to the VT5/VT3/Soft-VT.
	Router IP address	Set this only when using a router. Set the router IP address.

3-5 Available Devices

Devices Available for Serial Communications

● SYSMAC CJ, CS1 Series

Device	Address		
	SYSMAC CJ2	SYSMAC CJ1	SYSMAC CS1
Bit Device	I/O relay and internal auxiliary relay	000000 to 614315	
	Internal auxiliary relay	WR00000 to WR51115	
	SYSBUS remote I/O relay	300000 to 304915	
	Data link relay	100000 to 119915	
	Hold relay	HR00000 to HR51115	
	Special auxiliary relay ^{*1}	AR00000 to AR95915	
	CPU advanced function unit relay	150000 to 189915	
	Task mark (bit) ^{*3}	TK00 to TK31	
	Timer (contact)	TIM0 to TIM4095 ^{*2}	TIM0 to TIM2047
	Counter (contact)	CNT0 to CNT4095 ^{*2}	CNT0 to CNT2047
Word Device	I/O relay and internal auxiliary relay	0000 to 6143CH	
	Internal auxiliary relay	WR000 to WR511CH	
	SYSBUS remote I/O relay	3000 to 3049CH	
	Data link relay	1000 to 1199CH	
	Hold relay	HR000 to HR511CH	
	Special auxiliary relay	AR000 to AR447CH (Read only/write unavailable)	
		AR448 to AR959CH (can be read/written)	
	CPU advanced function unit relay	1500 to 1899CH	
	Data memory	DM00000 to DM32767	
	Extended data memory (current bank)	EM00000 to EM32767	
	Extended data memory (bank 0 to C) ^{*4}	EMn000000 to EMnC32767	
	Extended data memory (bank 0 to 18) ^{*5}	EMn0000000 to EMn1832767	—
	Index register	IR00 to IR15	
	Data register	DR00 to DR15	
	Task mark (status)	TK00 to TK31	
	Timer (current value)	TIM0 to TIM4095	TIM0 to TIM2047
	counter(current value)	CNT0 to CNT4095	CNT0 to CNT2047

*1 Cannot to be used at DT-100(A)/80(A).

*2 The addresses 2048 to 4095 of timer (contact) and counter (contact) cannot be written.

*3 Special device for reading. Communication error occurs when writing.

*4 1 higher bit represents memory bank No., and 5 lower bits represent device No..

*5 2 higher bits represent memory bank No., and 5 lower bits represent device No..



Available devices are restricted according to the product model. Check the manual for the respective model.

● SYSMAC CP1H / CP1L / CP1E Series

Device	Address	
	CP1H / CP1L	CP1E
Bit Device	I/O relay and internal auxiliary relay	000000 to 614315
	Internal auxiliary relay	WR000000 to WR51115
	SYSBUS remote I/O relay	300000 to 304915
	Data link relay	100000 to 119915
	Hold relay	HR000000 to HR51115
	Special auxiliary relay ¹	AR000000 to AR95915
	CPU advanced function unit relay	150000 to 189915
	Task mark (bit)	TK00 to TK31
	Timer (contact)	TIM0000 to TIM4095 ²
	Counter (contact)	CNT0000 to CNT4095 ²
Word Device	I/O relay and internal auxiliary relay	0000 to 6143CH
	Internal auxiliary relay	WR000 to WR511CH
	SYSBUS remote I/O relay	3000 to 3049CH
	Data link relay	1000 to 1199CH
	Hold relay	HR000 to HR511CH
	Special auxiliary relay	AR000 to AR447CH (Read only/writing is not possible) AR448 to AR959CH (can be read/written)
	CPU advanced function unit relay	1500 to 1899CH
	Data memory	DM00000 to DM32767
	Index register	IR00 to IR15
	Data register	DR00 to DR15

*1 Cannot to be use at DT-100(A)/80(A).

*2 The addresses 2048 to 4095 of timer (contact) and counter (contact) cannot be written.



Available devices are restricted according to the product model. Check the manual for the respective model.

● SYSMAC CQM1, CQM1H, α CV Series

Device		Address	
		SYSMAC α SYSMAC CQM1 SYSMAC CQM1H	SYSMAC CV
Bit Devices	I/O relay and internal auxiliary relay	00000 to 51115	000000 to 019915
	Internal auxiliary relay	-	190000 to 229915
	SYSMAC BUS/2 Remote I/O relay	-	020000 to 099915
	SYSBUS Remote I/O relay	-	230000 to 255515
	Data link relay	LR00000 to LR6315	100000 to 119915
	Hold relay	HR00000 to HR9915	120000 to 149915
	CPU Bus Unit area	-	150000 to 189915
	Timer (contact) ¹⁾	TIM000 to TIM511	TIM0000 to TIM1023
	Counter (contact) ¹⁾	CNT000 to CNT511	CNT0000 to CNT1023
	I/O relay and internal auxiliary relay	000 to 511CH	0000 to 0199CH
Word Devices	Internal auxiliary relay	-	1900 to 2299CH
	SYSMAC BUS/2 Remote I/O relay	-	0200 to 0999CH
	SYSBUS Remote I/O relay	-	2300 to 2555CH
	Data link relay	-	1000 to 1199CH
	Hold relay	-	1200 to 1499CH
	CPU Bus Unit area	-	1500 to 1899CH
	Data memory ²⁾	DM0000 to DM9999	DM0000 to DM9999
	Timer (current)	TIM000 to TIM511	TIM0000 to TIM1023
	Counter (current)	CNT000 to CNT511	CNT0000 to CNT1023

*1 These cannot be used when the NT Link (1:1) is used.

*2 Addresses become DM0000 to DM6655 when the NT Link (1:1) is used.



Available devices are restricted according to the product model. Check the manual for the respective model.

● SYSMAC CPM2A, CPM2C Series

Device		Address	
		SYSMAC CPM2A	SYSMAC CPM2C
Bit Devices	Input relay	00000 to 00915	
	Output relay	01000 to 01915	
	Internal auxiliary relay	02000 to 04915, 20000 to 22715	
	Special auxiliary relay	22800 to 25515	
	Hold relay	HR0000 to 1915	
	Link relay	LR0000 to 1515	
	Timer/counter	TIM CNT000 to 255 (not usable on NT Link)	
Word Devices	Input relay	000 to 009 CH	
	Output relay	010 to 019 CH	
	Internal auxiliary relay	020 to 049 CH, 200 to 227 CH	
	Special auxiliary relay	228 to 255CH	
	Hold relay	HR00 to 19CH	-
	Link relay	LR00 to 15CH	-
	Data memory	DM0000 to DM1999	DM0000 to DM2047
Timer/counter (current)		TIM I CNT000 to 255	



Available devices are restricted according to the product model. Check the manual for the respective model.

3-5 Available Devices

Devices Available for Ethernet Communications

■ SYSMAC CJ/CS1/CP1 Series

Device	Address				
	SYSMAC CJ	SYSMAC CS1	SYSMAC CP1H SYSMAC CP1L		
Bit Device	I/O relay and internal auxiliary relay	000000 to 614315			
	Internal auxiliary relay	WR00000 to WR51115			
	Remote I/O relay SYSBUS	300000 to 304915			
	Data link relay	100000 to 119915			
	Hold relay	HR00000 to HR51115			
	Special auxiliary relay	AR00000 to AR95915			
	CPU advanced function unit relay	150000 to 189915			
	Task mark (bit)	TK00 to TK31			
	Timer (contact)	TIM0 to TIM4095 ^{*1}	TIM0 to TIM2047	TIM0000 to TIM4095 ^{*1}	
	Counter (contact)	CNT0 to CNT4095 ^{*1}	CNT0 to CNT2047	CNT0000 to CNT4095 ^{*1}	
Word Device	I/O relay and internal auxiliary relay	0000 to 6143CH			
	Internal auxiliary relay	WR000 to WR511CH			
	Remote I/O relay SYSBUS	3000 to 3049CH			
	Data link relay	1000 to 1199CH			
	Hold relay	HR000 to HR511CH			
	Special auxiliary relay	AR000 to AR447CH (can be read/can not be written) AR448 to AR959CH (can be read/written)			
	CPU advanced function unit relay	1500 to 1899CH			
	Data memory	DM00000 to DM32767			
	Extended data memory (current bank) ^{*2}	EM00000 to EM32767		-	
	Extended data memory (bank 0 to C) ^{*2*3}	EMn000000 to EMnC 32767		-	
	Extended data memory (bank 0 to 18) ^{*2*4}	EMn0000000 to EMn1832767 ^{*5}	-		
	Index register	IR00 to IR15			
	Data register	DR00 to DR15			
	Task mark (status)	TK00 to TK31			
	Timer (current)	TIM0 to TIM4095	TIM0 to TIM2047	TIM0000 to TIM4095	
	Counter (current)	CNT0 to CNT4095	CNT0 to CNT2047	CNT0000 to CNT4095	

*1 The addresses 2048 to 4095 of timer (contact) and counter (contact) cannot be written.

*2 Cannot be used in CP1H series.

*3 The higher 1 bit denotes Bank No., the lower 5 bits denote device No.

*4 The higher 2 bits denotes Bank No., the lower 5 bits denote device No.

*5 Only the CJ2 series can be used.



Available devices are restricted according to the product model. Check the manual for the respective model.

3-6 Error Messages and Troubleshooting

This section describes communication errors occurring in VT5/VT3 Series/Soft-VT and Omron Corporation PLC connections.

List of Communication Errors in Serial Connections

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The following error messages are displayed when communicating with the PLC units over Ethernet.

Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when a communications error occurs.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	<ul style="list-style-type: none"> Turn the VT3 unit OFF, mount VT2-E1/E2/VT3-E3, and then turn VT3 ON again.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED of the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[**(++)]	There was not error response ** from PLC No.++.	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

CONNECTING TO SHARP CORPORATION PLCS

This chapter describes how to connect to a PLC made by Sharp Corporation.

4-1	Checking Operation before Connection	4-2
4-2	System Configuration.....	4-5
4-3	Wiring Diagrams for Connections	4-6
4-4	Unit Settings.....	4-15
4-5	Available Devices.....	4-25
4-6	Error Messages and Troubleshooting	4-27

4-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3 Series, Soft-VT, DT and PLC via serial interface or Ethernet.

For connection of other interfaces (Multi-Link or VT2 Multi-Link), see each chapter.

□ "Chapter 19 MULTI-LINK"

□ "Chapter 20 VT2 MULTI-LINK"

(1) Make sure the PLC, link unit and Ethernet unit can be connected to the VT5/VT3 Series, Soft-VT and DT.

(2) Check whether or not a CPU, link unit or Ethernet settings are required.

(3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

□ "Procedure before Starting Communication", page 18

Serial connections

■ Connection of New Satellite JW300 Series

CPU	Connection methods	Serial I/F	Connected machine	Wiring diagram	Unit setting	Target PLC
JW-311CU JW-312CU JW-321CU JW-322CU JW-331CU JW-332CU JW-341CU JW-342CU JW-352CU JW-362CU	COMM1 port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 8	□ P.4-15	JW300 Series ³
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H22		
			VT5(COM1)/VT3-W4□	Wiring diagram W22		
			VT3-V7R(CN2)	Wiring diagram R8		
	COMM2 port ¹	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 5		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H42		
			VT5(COM2) ⁴ /VT3-W4□A	Wiring diagram W42		
			VT3-V7R(CN2)	Wiring diagram R5		
	+ Link unit JW-21CM ²	RS-422A (2-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ⁴ /VT3-W4□A	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R2		
		RS-422A (4-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	□ P.4-16	
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ⁴ /VT3-W4□A	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R3		

*1 There is no COMM2 port in JW-311CU and JW-312CU Series.

*2 Be sure to use an option unit with marke supported by JW300 Series.

*3 Not supported by the VT5 Series.

*4 VT5-W07M is not supported.

4-1 Checking Operation before Connection

■ Connection of New Satellite JW Series

CPU	Connection method	Serial I/F	Connected machine	Wiring diagram	Unit setting	Target PLC
JW-50CU/ 50CUH ^{*1} JW-70CU/ 70CUH JW-100CU/ 100CUH ^{*2}	Communication port	RS-232C ^{*1}	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.4-15	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT5(COM1)/VT3-W4□	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
		RS-422A ^{*2}	VT3(PORT2)/VT-T1/DT	Wiring diagram 7		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H44		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W44		
	+ Link unit JW-10CM	RS-422A (4-wire)	VT3-V7R(CN3)	Wiring diagram R7		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W40		
		RS-422A (2-wire)	VT3-V7R(CN3)	Wiring diagram R2		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W41		
JW-31CUH ^{*3} JW-32CUH/ 33CUH	COMM2 port ^{*3}	RS-232C	VT3-V7R(CN3)	Wiring diagram R3	P.4-15	JW Series ^{*6}
			VT3(PORT2)/VT-T1/DT	Wiring diagram 4		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21		
			VT5(COM1)/VT3-W4□	Wiring diagram W21		
	+ Link unit JW-21CM	RS-422A (4-wire)	VT3-V7R(CN2)	Wiring diagram R4		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 5		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H42		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W42		
		RS-422A (2-wire)	VT3-V7R(CN3)	Wiring diagram R5		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W40		
JW-21CU ^{*4} JW-22CU	Communication port ^{*4}	RS-232C	VT3-V7R(CN3)	Wiring diagram R2	P.4-15	JW Series ^{*6}
			VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W41		
	+ Link unit JW-21CM	RS-422A (4-wire)	VT3-V7R(CN3)	Wiring diagram R3	P.4-16	JW Series ^{*6}
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W40		
		RS-422A (2-wire)	VT3-V7R(CN3)	Wiring diagram R2		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W41		
JW10	MMI port	RS-422A	VT3-V7R(CN3)	Wiring diagram R3	P.4-15	JW Series ^{*6}
			VT3(PORT2)/VT-T1/DT	Wiring diagram 6		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H43		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W43		
	Communication port	RS-422A	VT3-V7R(CN3)	Wiring diagram R6		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ^{*5} /VT3-W4□A	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R3		

^{*1} Cannot be connected to JW-50CU/50CUH.^{*2} Cannot be connected to JW-50CU/50CUH and JW-100CU/100CUH.^{*3} The COMM1/COMM2 port is not provided on JW-31CUH.^{*4} The communication port is not provided on JW-21CU.^{*5} VT5 - W07M is not supported.^{*6} Not supported by Soft-VT.

Ethernet connections

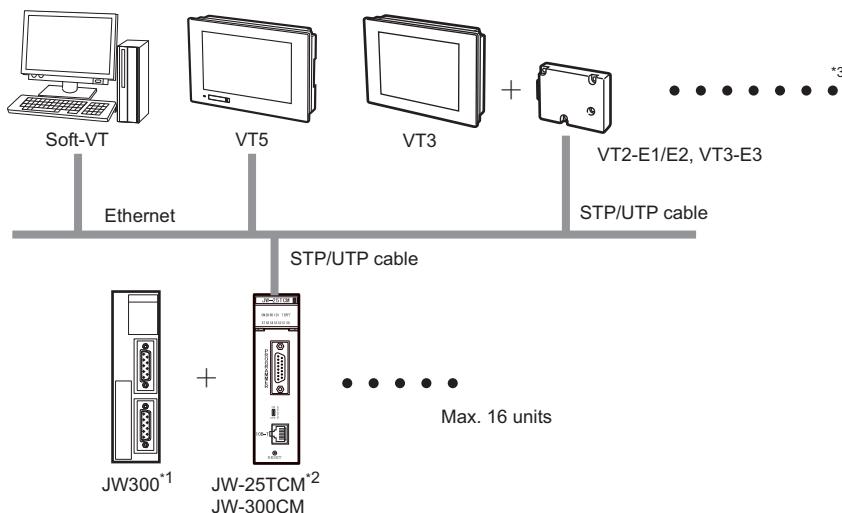
Series Name	PLC	Connection Methods	Unit Setting	Target PLC
JW300 Series	JW-311CU JW-312CU JW-321CU JW-322CU JW-331CU JW-332CU JW-341CU JW-342CU JW-352CU JW-362CU	JW-25TCM JW-300CM	P.4-24	JW300 Series (Ethernet)

4-2 System Configuration

System configuration for Ethernet connections

System configuration of VT5/VT3 Series, Soft-VT and JW300 series is described below.

■ JW300 Series



*1 Connectable models include JW-311CU, JW-312CU, JW-331CU, JW-331CU, JW-341CU, JW-342CU, JW-352CU, JW-362CU

*2 Please use the optional unit with the sign to support JW300 series.

*3 Please pay attention, for connection of multiple VT5/VT3 Series, soft-VT, communication capacity increases correspondingly with the increase of number of connected units.

*4 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

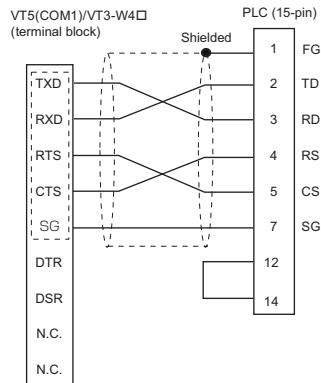
This section describes wiring of connector cables.

The wiring diagrams recommended by SHARP may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

Wiring diagrams for serial connections

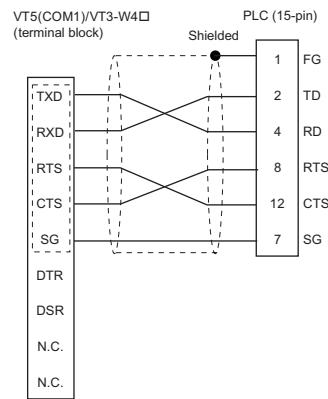
■ Connection to VT5 Series (COM1), VT3-W4□ (RS-232C)

● Wiring Diagram W20 (RS-232C)



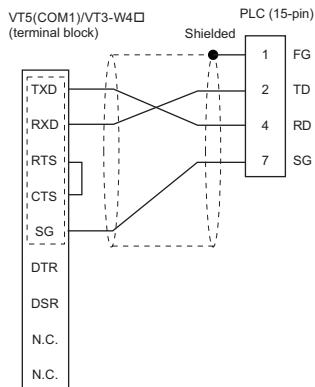
* indicates a terminal diagram for the VT5 Series.

● Wiring Diagram W21(RS-232C)



* indicates a terminal diagram for the VT5 Series.

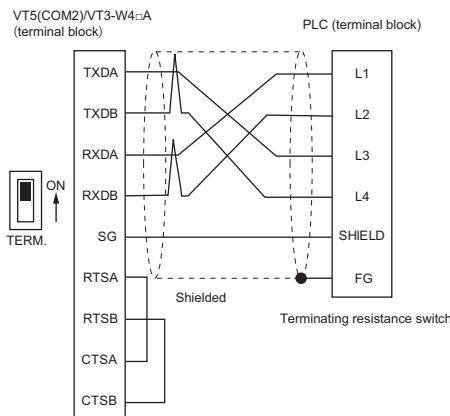
● Wiring Diagram W22 (RS-232C)



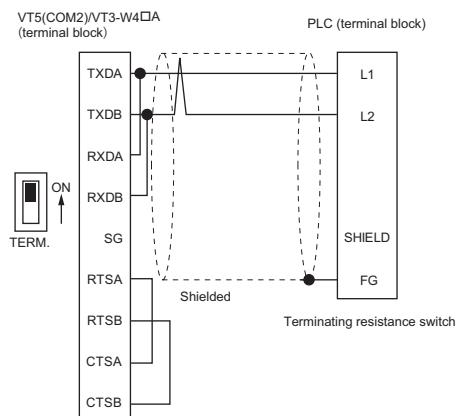
* indicates a terminal diagram for the VT5 Series.

■ Connection with VT5 series (COM2), VT3-W4□A (RS-422A)

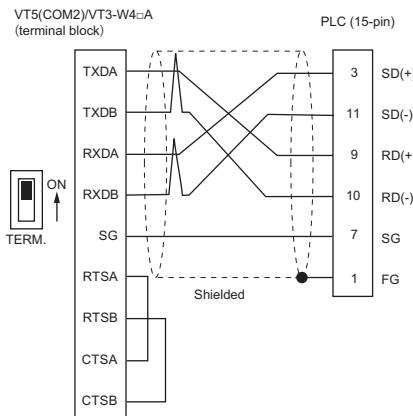
● Wiring Diagram W40 (RS-422A)



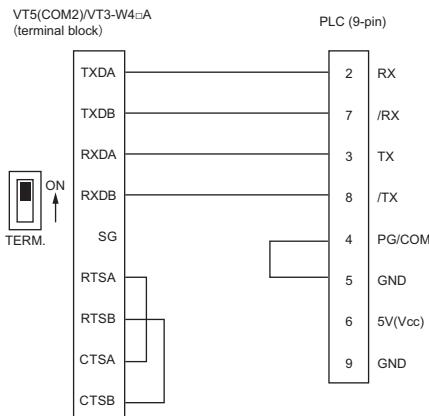
● Wiring Diagram W41 (RS-422A)



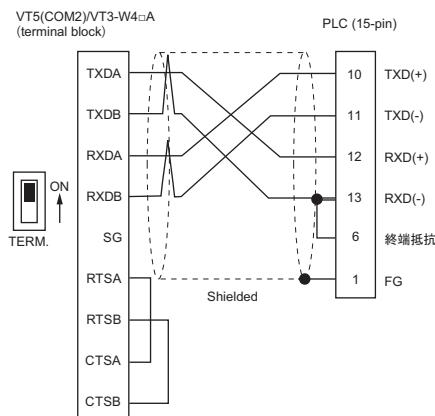
● Wiring Diagram W42 (RS-422A)



● Wiring Diagram W43 (RS-422A)



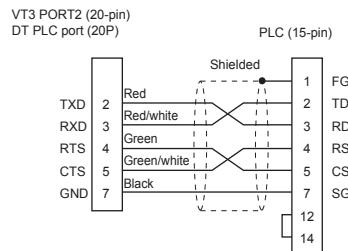
● Wiring Diagram W44 (RS-422A)



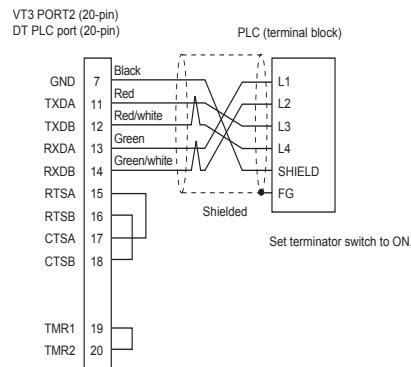
4-3 Wiring Diagrams for Connections

■ Connection to VT3 series/DT series

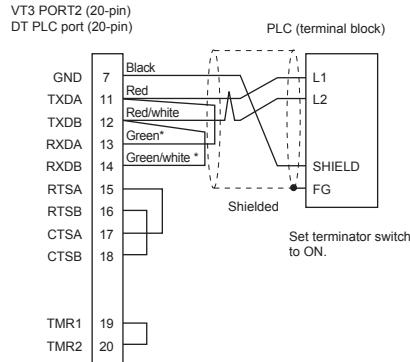
- **Wiring Diagram 1
(RS-232C: OP-24027)**



- **Wiring Diagram 2
(RS-422A 4-wire: OP-24028)**

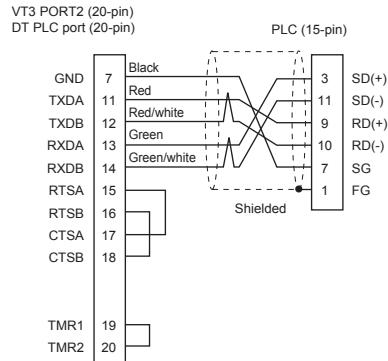


- **Wiring Diagram 3
(RS-422A 2-wire: OP-24028)**

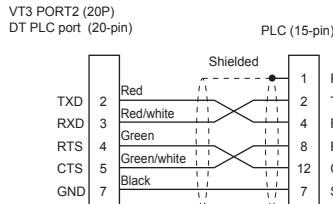


* Not wired for loopback test inside the connector.
Solder the signal lead.

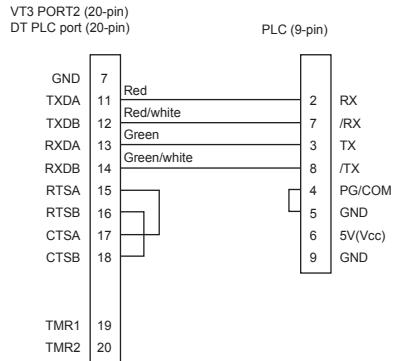
- **Wiring Diagram 5
(RS-422A: OP-24028)**



- **Wiring Diagram 4
(RS-232C: OP-24027)**

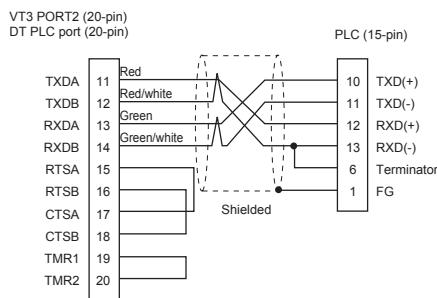


- **Wiring Diagram 6
(RS-422A: OP-24028)**

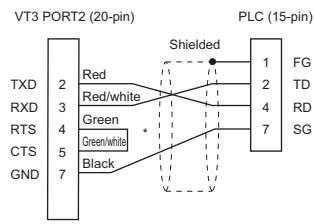


For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● **Wiring Diagram 7**
(RS-422A: OP-24028)



● **Wiring Diagram 8**
(RS-232C: OP-24027)



■ **Connection with VT3 Handy Series**

Point FG2 must be grounded.

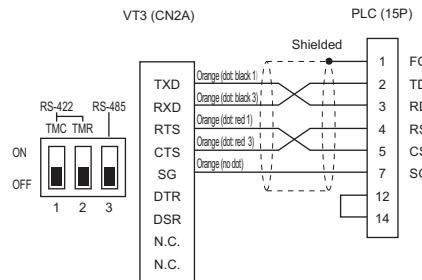
● **Wiring Diagram H20 (RS-232C)**

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



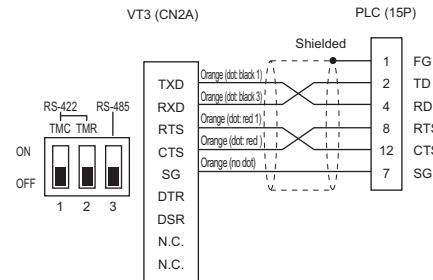
● **Wiring Diagram H21 (RS-232C)**

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



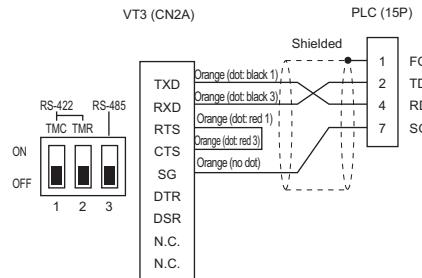
● **Wiring Diagram H22 (RS-232C)**

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

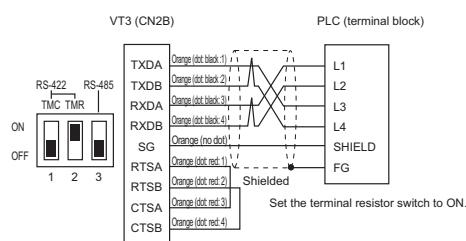
OP-87193: 10m



4-3 Wiring Diagrams for Connections

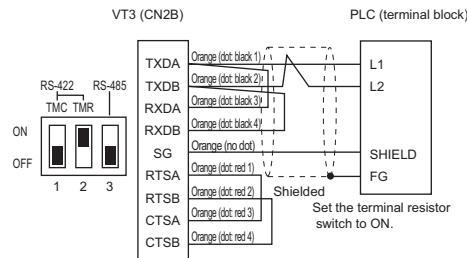
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



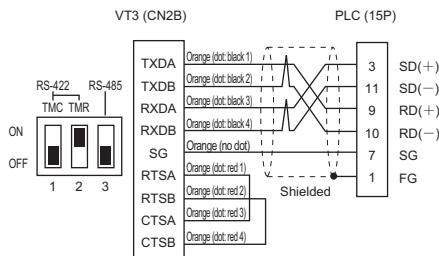
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



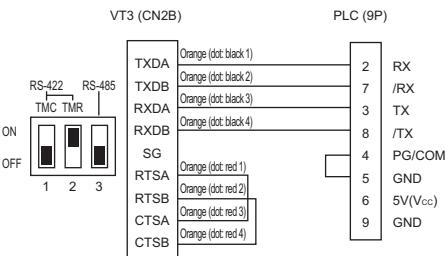
● Wiring Diagram H42 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



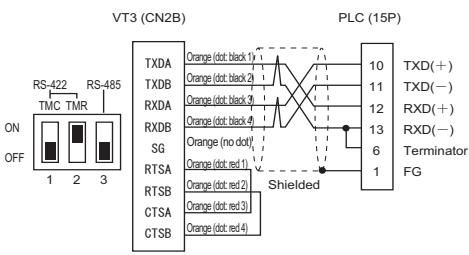
● Wiring Diagram H43 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



● Wiring Diagram H44 (RS-422A)

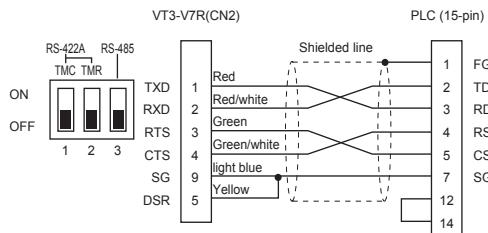
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



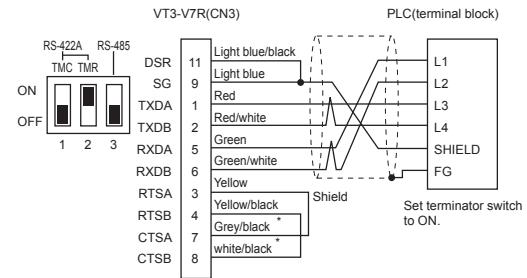
4-3 Wiring Diagrams for Connections

■ Connection to VT3-V7R

- **Wiring Diagram R1**
(RS-232C: CPU Link Port: VT-C5R1)

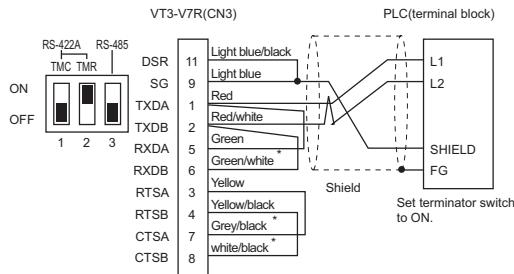


- **Wiring Diagram R2**
(RS-422A 4-wire: VT-C5R2/C15R2)



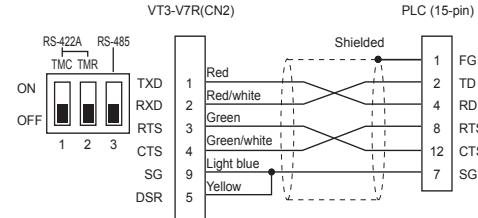
* Not wired for loopback test inside the connector.
Solder the signal lead.

- **Wiring Diagram R3**
(RS-422A 2-wire: VT-C5R2/C15R2)



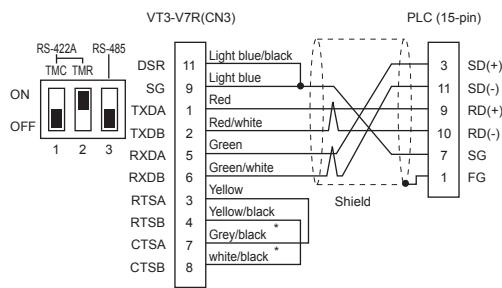
* Not wired for loopback test inside the connector.
Solder the signal lead.

- **Wiring Diagram R4**
(RS-232C: VT-C5R1)



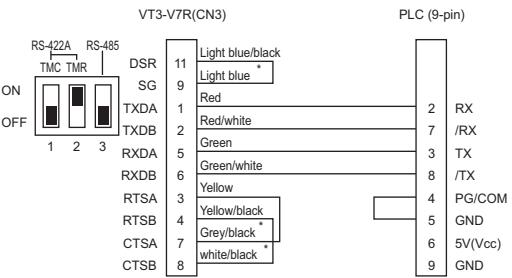
4-3 Wiring Diagrams for Connections

● Wiring Diagram R5 (RS-422A: VT-C5R2/C15R2)



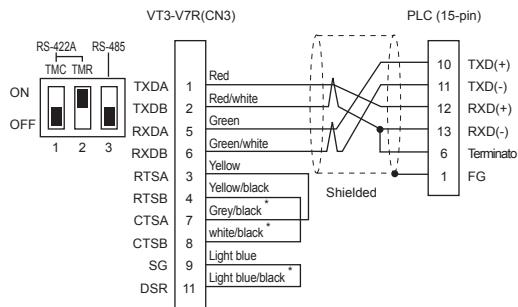
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R6 (RS-422A: VT-C5R2/C15R2)



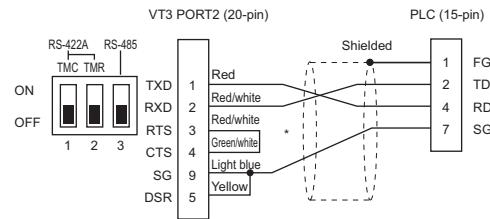
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R7 (RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R8 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.



**Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039),
please ensure to read the "Connection Precautions", page A-13**



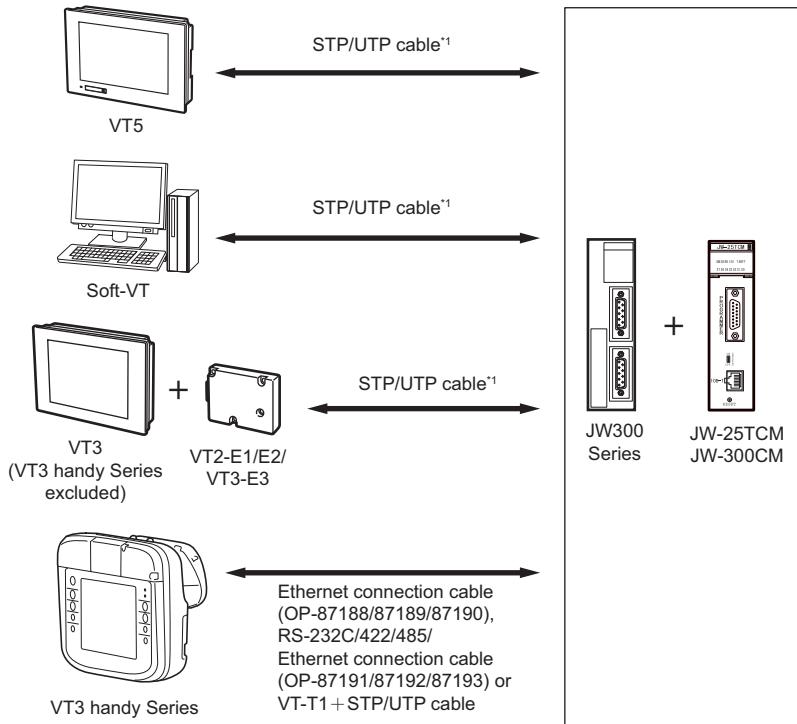
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

Cables used in different connection modes are introduced below.

■ Direct connection (1:1 Connection)

STP/UTP cable is used for connection.

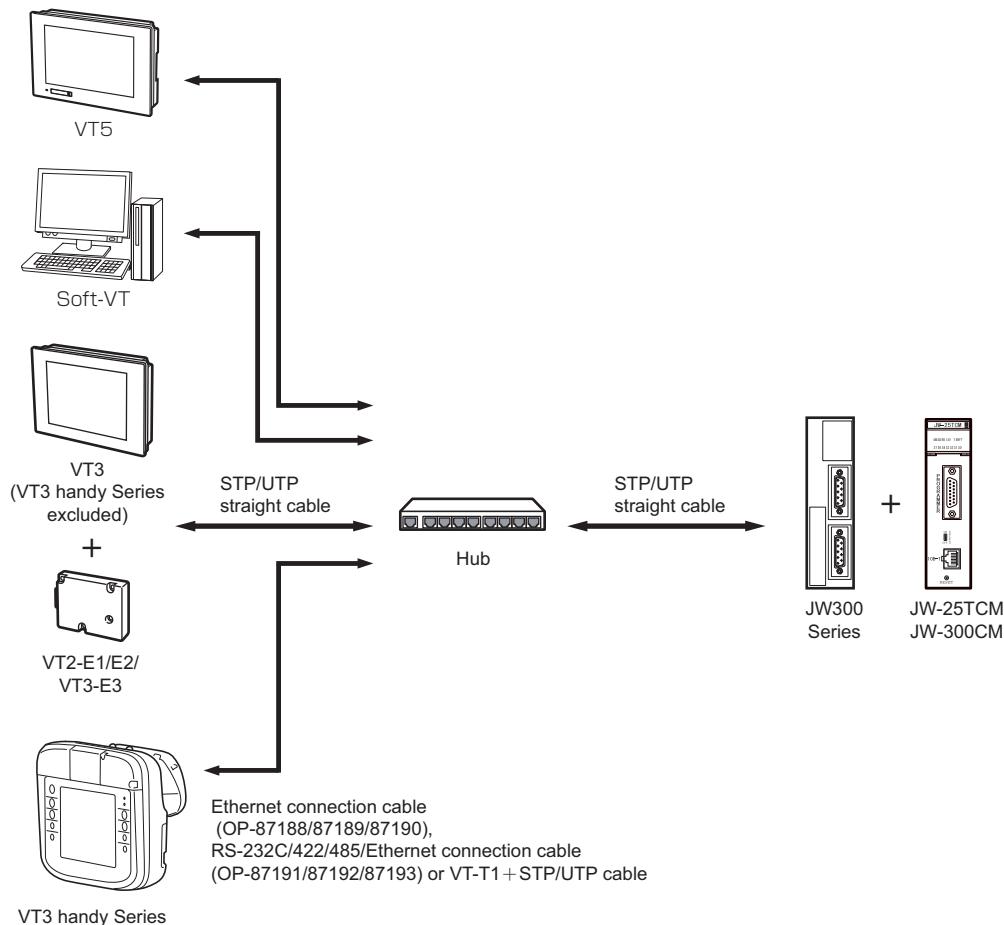


^{*1} MDI/MDI-X auto switch function is supported by VT5 series and VT3-E3 whose serial number ends with "A". To connect any other device directly to a PLC, use an STP/UTP cross cable.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

■ When hub is used for connection (complex connection)



VT3 handy Series

Hub connection with VT2-E1/E2, VT3-E3 or VT3 handy Series

- Use the STP/UTP straight cable.
- Do not connect the VT2-E1/E2, VT3-E3 or VT3 handy Series to a cascade port on the hub.

Hub connection with JW-25TCM

- Use the STP/UTP straight cable.
- Do not connect the JW-25TCM to a cascade port on the hub.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

This section describes setting of units matched to the default communications parameters.

Method for making serial connections

JW300 Series

Set the system memory.

When entering parameters in the ladder software, set while switching the display format from binary/octal/Hex.

JW300		bit	Setting item	Set value (hex)
COMM1 port	COMM2 port			
#234	#236	D0 to D2	Baud rate (bit/s) 001 : 19200 bit/s	31
		D3 to D4	Parity 10: even	
		D5	Stop bits 1 : 2 bits	
		D6 to D7	Data length 0 : 7 bits	
#235	#237	D0 to D7	Self node No. (octal)	01

JW-22CU, JW-70CU/JW-70CUH, JW-100CU/100CUH

Set the system memory.

When entering parameters in the ladder software, set while switching the display format from binary/octal/Hex.

Communications port		Bit	Setting Item	Set Value (hex)
#236	#237	D0 to D2	Baud rate (bit/s) 000 : 9600 bit/s	30
		D3 to D4	Parity 10 : Even	
		D5	Stop bit 1 : 2 bits	
#237		D0 to D7	Self node No. (octal)	01



Change the VT3/DT baud rate to 9600 bit/s.

JW10 series, JW-32CUH/33CUH

Set the system memory.

When entering parameters in the ladder software, set while switching the display format from binary/octal/Hex.

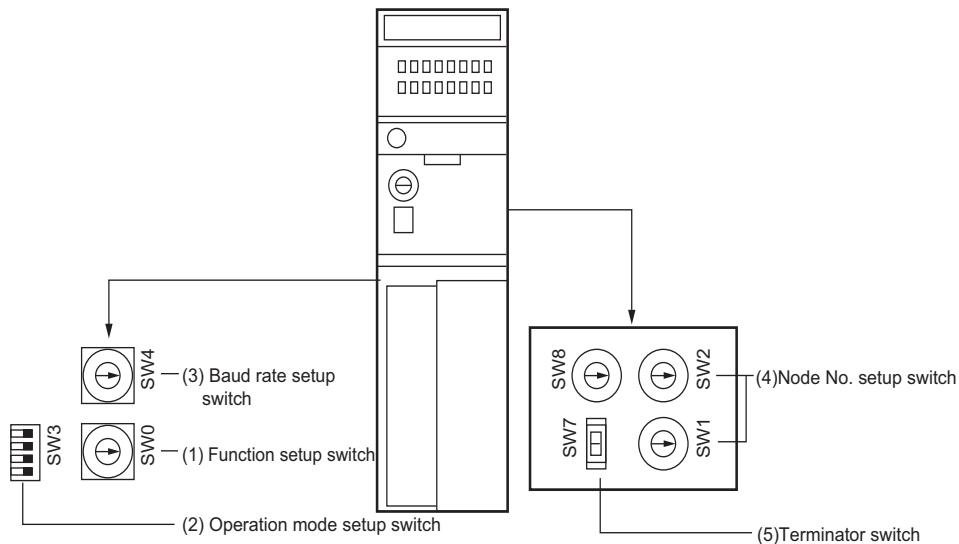
JW10		JW30		Bit	Setting Item	Set Value (hex)
MMI port	Communications port	COMM1 port	COMM2 port			
-	#234	-	-	D0 to D7	Communications mode (Hex) 00 : PC link	00
#226	#236	#234	#236	D0 to D2	Baud rate (bit/s) 000 : 19200 bit/s	30
				D3 to D4	Parity 10 : Even	
				D5	Stop bit 1 : 2 bits	
				D7 ¹	Data length 0 : 7 bits	
#227 ²	#237	#235	#237	D0 to D7	Self node No. (octal)	01

*1 Only JW10 can be set. Fixed to 7 bits on JW30.

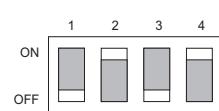
*2 As the MMI port on JW10 is a 1:1 connection, only "001" is valid as the self node No.

4-4 Unit Settings

■ JW-21CM



Setup Switch	Set Value	
SW3-1	Not used	OFF
SW3-2	4-wire	ON*
SW3-3	Not used	OFF
SW3-4	Even	ON



SW2 Setting	SW1 Setting
0	1

(4) Node No. setup switch

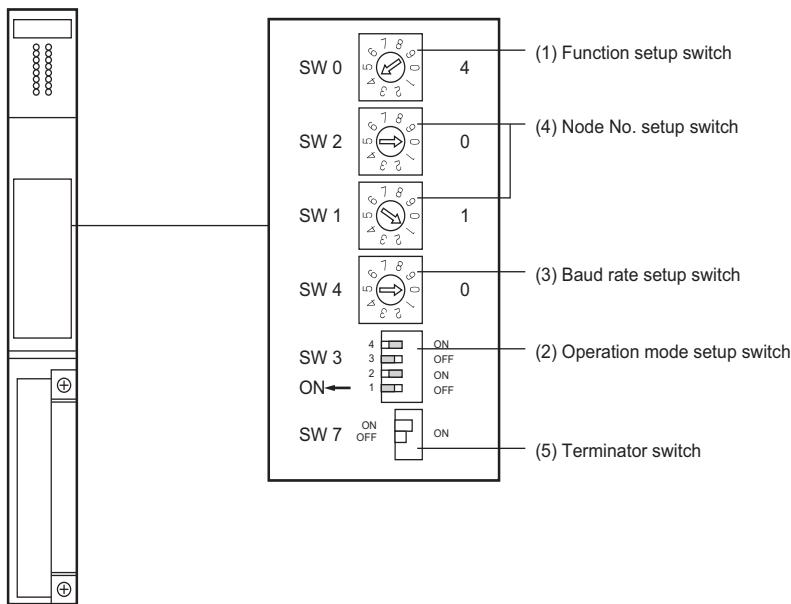
Set the baud rate to 19200 bit/s "0".

(5) Terminator switch

When the Link Unit is a node at either end of the communications path, set to ON. When the Link Unit is a node in between, set to OFF.

Set Value	Description
ON	Terminator inserted
OFF	Terminator not inserted

JW-10CM



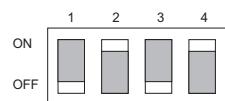
(1) Function setup switch

Set the CCU link mode to "4".



(2) Operation mode setup switch

Set the communication system and parity.



* Set to OFF in case of 2-wire.

(3) Baud rate setup switch

Set the baud rate to 19200 bit/s "0".

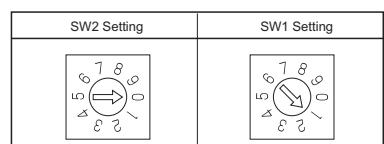


(4) Node No. setup switch

Set the upper digit (10's digit) by SW2 and the lower digit (1's digit) by SW1.

Specify the node No. within the range 01 to 08 in octal.

Set SW2 to "0" and SW1 to "1".



(5) Terminator switch

When the Link Unit is a node at either end of the communications path, set to ON. When the Link Unit is a node in between, set to OFF.

Set Value	Description
ON	Terminator inserted
OFF	Terminator not inserted

Communication Condition Setting Ranges and Defaults During Serial Communication

● JW300 series / JW series

Item	Setting Range	Default
PLC No.	ON (1 to 77: octal)	ON (1)
VT No.	-	-
PLC serie I/F ¹	RS-232C, RS-422A 4-wire, RS-422A 2-wire	RS-232C
Baud Rate	9600, 19200, 38400, 57600, 115200 bit/s	19200bit/s ²
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	2 bits
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set RS-232C /RS-422A matched to the interface on the PLC.

*2 When using the communications port of the JW-22CU, JW-70CU/70CUH or JW100CU/100CUH, change the baud rate to 9600 bit/s.

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series/Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port numbers of the connected units should be determined in advance.

The following table shows the settings corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



Make sure that the "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in VT STUDIO. ^{*1}	P.4-20
	Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.	-
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ^{*2}	P.4-21
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Use the ladder design support software (JW300SP) made by Sharp to set communication conditions.	P.4-24

*1 Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

*2 You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.4-22
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT system settings" in "PLC Communication Conditions" in VT STUDIO. ^{*1}	P.4-21
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use the ladder design support software (JW300SP) made by Sharp to set communication conditions.	P.4-24

*1 Use "PLC Communication Condition" in VT3 system mode to confirm and change settings.

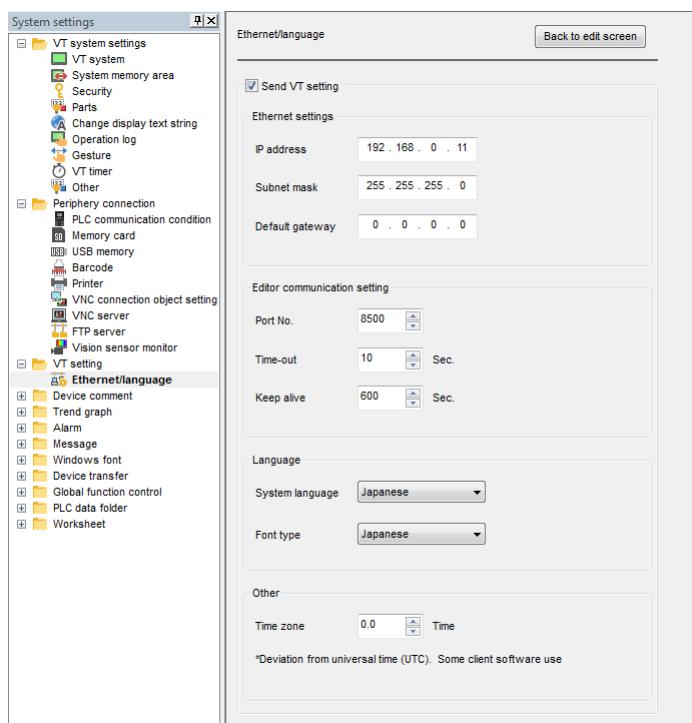
4-4 Unit Settings

■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.
 "12-6 VT setting", VT5 Series Reference Manual



Item	Description
Send VT setting	When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address Set the IP address to be assigned to the VT5.
	Subnet mask Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive Set as necessary.
	Timeout Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series. The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.

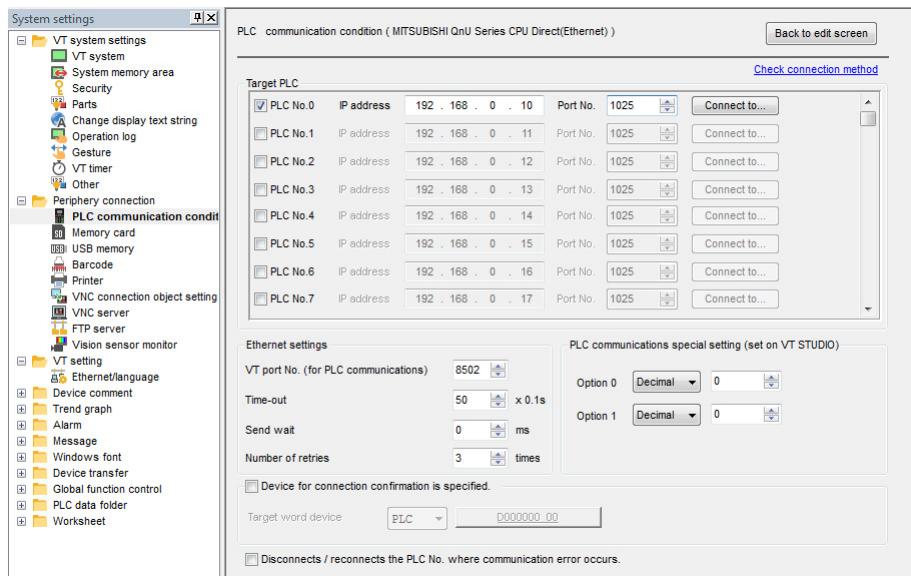


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen. In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long time out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023.

Also, take care not to use a port number already used by another device.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

4-4 Unit Settings

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set up "Option Setup" in the System mode on the VT3 unit.

VT3 Series Reference Manual "Chapter 5 SYSTEMMODE"

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	**.**.**.*.**.**				
				OK	Cancel
				Next page	

Ethernet Setup (2/3)				OK	Cancel
Port No.	8500				
Time-out	10 s				
Keep alive	600 s				
				OK	Cancel
				Next page	

Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				

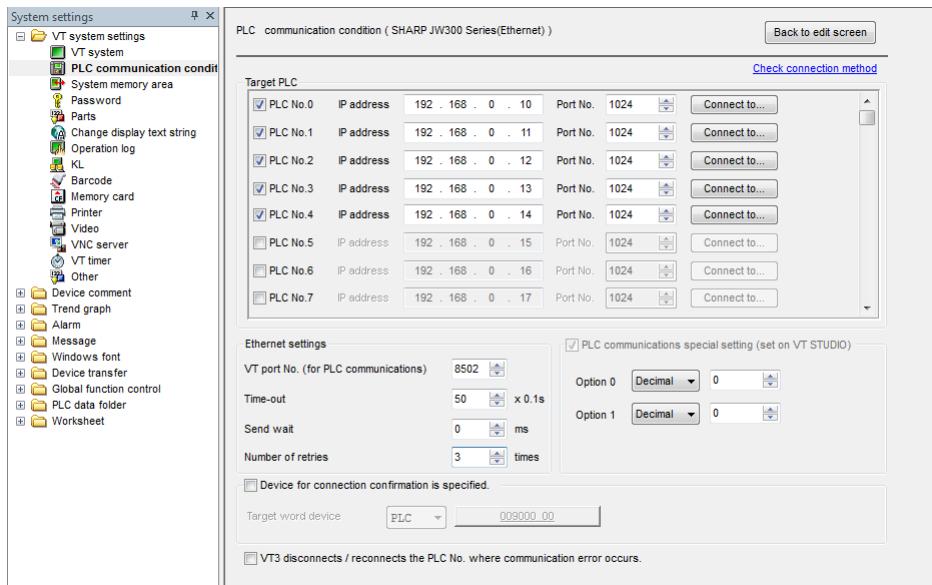
Items	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable. Select "10Mbps" only when communication is unstable.
IP address	Set the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting for direct connection. Set up a pre-confirmed subnet mask for other connections.
Default Gateway	Use the default setting for direct connection. Set up a pre-confirmed default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port No.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup*	Select "Enable" only when using a router.

*1 VT3 Series Hardware Manual "Chapter 8 ETHERNET"

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT3 System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

VT3 Series Reference Manual "Chapter 17 Ethernet"



Item		Description
Target PLC	Station No.	Selects the PLC No. (0 to 15) to be used.
	IP address ¹	Set up the IP address assigned to the PLC (marked PLC No.)
	Port No. ²	Set up the port No. of the PLC (marked PLC No.) (1024 to 65535)
	List of connection destinations	Select the connection destination from the connection destination list file, or add connection destinations.
Ethernet Setting	VT port No. (for PLC communication)	Set up the port No. of VT3 (for PLC communication) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communication special settings (via VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ³	Set up the device which is used to check the connection when no communication is performed in a specific period. Normally, this is not required.
VT3 disconnects / reconnects the PLC No. where communication error occurs ⁴		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

The IP address is represented as XXX.XXX.XXX.XXX (XXX is 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. Also, do not use another port No. that is already in use.

*3 "PLC device" can be selected.

VT3 Series Reference Manual "6-7 Device Setting"

*4 This can be set up when a PLC model that supports 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those in VT STUDIO.

"5-4 PLC Communication Conditions", VT3 Series Hardware Manual

■ Setting of V Series JW-25TCM/JW-300CM

To connect JW-25TCM/JW-300CM and VT5/VT3/Soft-VT, ladder diagram design support software (JW300SP) provided by Sharp (Company) is used for setup.

Please set up according to the following diagram.
For more information, please see User's Manuals.

Classification	Set item	PLC setting
IP address setting	IP address	Setup IP address of PLC
	Subnet mask	Setup subnet mask
Connection setting	Opening mode	UDP
	Local port No.	Setup port No. of PLC

4-5 Available Devices

■ JW300 Series

For details of devices, refer to the manual for the respective device.

Device		Address ^{*4}
Bit Device	Relay	000000 to 015777
	Relay	20000 to 075777
	Relay	100000 to 543777
	Timer (contact)	T0000 to T1777
	Timer (contact)	T02000 to T17777
	Counter (contact)	C0000 to C1777
	Counter (contact)	C02000 to C17777
Word Device	Register ^{*1}	009000 to 099776
	Register ^{*1}	109000 to 199776
	Register ^{*1}	209000 to 299776
	Register ^{*1}	309000 to 389776
	Register ^{*1}	E0000 to E7776
	Register	Z000 to Z377
	Relay ^{*1}	A00000 to A01576
	Relay ^{*1}	A02000 to A07576
	Relay ^{*1}	A10000 to A54376
	File register (word specific) ^{*12}	F00000000 to F37777776
	Timer/Counter (current value)	T00000 to T01777
	Timer/Counter (current value)	T02000 to T17777
	Timer/Counter ^{*1}	B(b)00000 to B(b)03776
	Timer/Counter ^{*1}	B(b)04000 to B(b)37776
	File register (swap) ^{*3}	F1000000 to F1177776
	File register	F1-00000000 to F1-07777776
	File register	F1-10000000 to F1-17777776
	File register	F1-20000000 to F1-27777776
	File register	F1-30000000 to F1-37777776

*1 Specify even addresses so as to handle byte addresses by word.

The fifteenth bit of timer/counter (B (b)) shows the status of timer/counter.

*2 It is a file register special for word devices. Cannot to be specified as bit devices.

*3 The file register of JW Series is changed file register (swap) when the PLC model is changed from JW Series to JW300 Series.

*4 Specify all device No. in octal.



Available devices are restricted according to the product model. Check the manual for the respective model.

4-5 Available Devices

■ JW Series

For details of devices, refer to the manual for the respective device.

Device		Address
Bit Devices	Relay	00000 to 15777 20000 to 75777
	Timer (contact)	T0000 to T1777
	Counter (contact)	C0000 to C1777
Word Device	Relay ^{*1}	A0000 to A1576 A2000 to A7576
	Timer/counter (current)	T0000 to T1777 B(b)0000 to B(b)3776 ^{*1}
	Register ^{*1}	09000 to 09776 19000 to 19776 29000 to 29776 39000 to 39776 49000 to 49776 59000 to 59776 69000 to 69776 79000 to 79776 89000 to 89776 99000 to 99776 E0000 to E7776
	File register ^{*1}	1000000 to 7177776 10000000 to 1F177776 20000000 to 2C177776

*1 Specify even-numbered addresses as byte addresses handled in word units.



- Specify all device Nos. in octal.
- Available devices are restricted according to the product model. Check the manual for the respective model.

4-6 Error Messages and Troubleshooting

The communication errors that occur when VT5/VT3/Soft-VT series is connected to a PLC made by Sharp Corporation are described.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

List of Communication Errors in Ethernet Connections

The following table shows the error messages displayed in Ethernet connection with PLC.

Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when communication errors occur.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Please check to ensure the network is OK. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	<ul style="list-style-type: none"> Turn off the power of VT3 and then turn VT3 ON after VT2-E1/E2 or VT3-E3 is connected.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	Linking errors of Ethernet unit.	<ul style="list-style-type: none"> Please check to ensure the cable is connected correctly. Please check to ensure the LINK LED of VT2-E1/E2, VT3-E3 ,VT3 handy Series and PLC lights up.
PLC ERROR [PLC ERROR**(++)]	There was not error response** (HEX) from PLC No.++.	For details on response **, refer to the manuals for the respective PLC and the Ethernet Unit.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

CONNECTING TO FUJI ELECTRIC CO., LTD. PLCs

This chapter describes how to connect to a PLC made by Fuji Electric Co., Ltd.

5-1	Checking Operation before Connection	5-2
5-2	System Configuration.....	5-5
5-3	Wiring Diagrams for Connections	5-6
5-4	Unit Settings.....	5-12
5-5	Available Devices.....	5-27
5-6	Precautions for Communication	5-30
5-7	Error Messages and Troubleshooting	5-31

5-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/DT and PLC via serial interface or Ethernet.

For connection of other interfaces (Multi-Link or VT2 Multi-Link), see each chapter.

- (1) Make sure that the PLC, link unit and Ethernet unit can be connected to the VT5, VT3 and DT.
- (2) Check whether or not a CPU, link unit or Ethernet settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

Serial connections

5

CONNECTING TO FUJI ELECTRIC CO., LTD. PLCs

■ Connect with MICREX-SX Series

CPU	Connection Methods	Serial I/F	Connected machine	Wiring diagram	Unit Setting	Target PLC
NP1PH-08 NP1PH-16 NP1PS-32 NP1PS-32R NP1PS-74 NP1PS-74R NP1PS-117 NP1PS-117R NP1PS-245R	LOADER port +NP4H-CB ¹ +NW0H-CNV ²	RS-232C	VT5(COM1)/VT3-W4□	Wiring diagram W22	 P.5-12	MICREX-SX Series ⁴
			VT3(PORT2)/VT-T1/DT	Wiring diagram 4		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H22		
			VT3-V7R(CN2)	Wiring diagram R4		
	NP1L-RS1	RS-232C	VT5(COM1)/VT3-W4□	Wiring diagram W23		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 5		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H23		
			VT3-V7R(CN2)	Wiring diagram R5		
		RS-422A (4-wire)	VT5(COM2) ³ /VT3-W4□A	Wiring diagram W41		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 6		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT3-V7R(CN3)	Wiring diagram R6		

*1 Dedicated cable (NP4H-CB2) for LOADER port connection made by Fuji Electric Corporation

*2 Dedicated cable converter (NW0H-CNV) for LOADER port made by Fuji Electric Corporation

*3 Not supported by the VT5-W07M.

*4 Not supported by Soft-VT.

5-1 Checking Operation before Connection

■ Connection with FLEX-PC

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC	
NJ-E4 ^{*1} NJ-A8 ^{*1} NJ-B16	RS-232C Interface ^{*2}	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	□ P.5-12	FLEX-PC Series ^{*4 *5}	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21			
			VT3-W4T/W4M/W4G	Wiring diagram W21			
			VT3-V7R(CN2)	Wiring diagram R3			
	NJ-RS2	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.5-13		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			
	NJ-RS4	RS-485	VT3(PORT2)/VT-T1/DT	Wiring diagram 2	□ P.5-14		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40			
			VT3-V7R(CN3)	Wiring diagram R2			
NS-A32 ^{*1} NS-A64 ^{*1} NS-B32/B64	RS-232C Interface ^{*3}	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	□ P.5-12		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21			
			VT3-W4T/W4M/W4G	Wiring diagram W21			
			VT3-V7R(CN2)	Wiring diagram R3			
	NS-RS1	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.5-15	FLEX-PC Series ^{*4 *5}	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			
	RS-485	RS-485	VT3(PORT2)/VT-T1/DT	Wiring diagram 2			
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40			
			VT3-V7R(CN3)	Wiring diagram R2			

*1 Without RS-232C.

*2 Only NJ-B16 can be connected.

*3 Only NS-B32/B64 can be connected.

*4 Not supported by the VT5 Series.

*5 Not supported by Soft-VT.

■ Connection with MICREX-F

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC	
F55	NV1L-RS2	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.5-16	MICREX-F Series ^{*1 *2}	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			
F70, F70S	NC1L-RS2	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.5-16		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			
F80H, F81 F120, F120S, F120H F140S F150S F250, F251	NC1L-RS4	RS-485	VT3(PORT2)/VT-T1/DT	Wiring diagram 2	□ P.5-16		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40			
			VT3-V7R(CN3)	Wiring diagram R2			
FFU120B	FFU120B	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.5-16		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2	□ P.5-16		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40			
			VT3-V7R(CN3)	Wiring diagram R2			

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

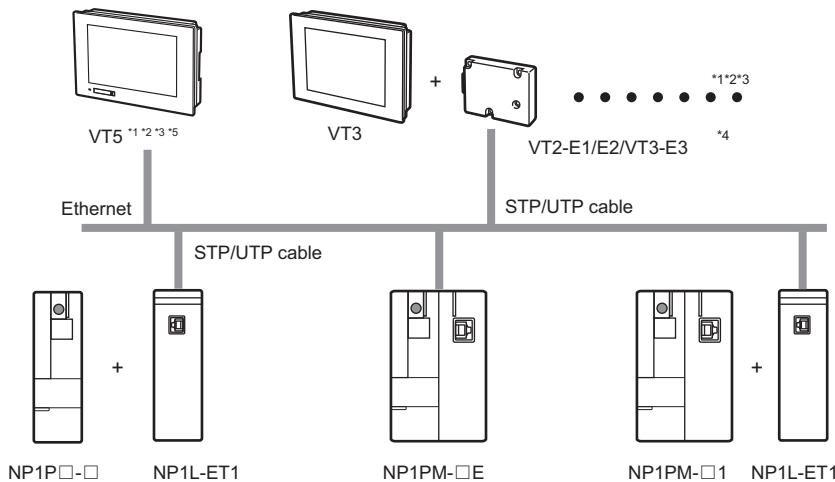
Ethernet connections

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
SPH200	NP1PH-08 NP1PH-16	NP1L-ET1		
SPH2000	NP1PM-48R	NP1L-ET1	□ P.5-26	MICREX-SX (Ethernet TCP) ¹
	NP1PM-48E NP1PM-256E	CPU Internal Ethernet port NP1L-ET1		
	NP1PS-32 NP1PS-32R NP1PS-74 NP1PS-74R NP1PS-117 NP1PS-117R NP1PS-245R	NP1L-ET1		

5-2 System Configuration

System configuration for Ethernet connections

System configuration of VT5/VT3 series and MICREX-SX series is described below.



*1 Use NP1PM-□E Ethernet or NP1P(M)□-□+ NP1L-ET1 ports for connections of multiple VT5/VT3 Series.

*2 Please note that with the increase in the number of VT5 and VT3 Series units connected, the communications load also increases.

*3 Only one PLC can be connected to each VT5/VT3. It cannot be connected to multiple PLCs through a 1:N connection.

*4 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*5 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

5-3 Wiring Diagrams for Connections

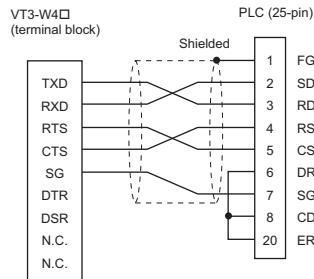
This section describes wiring of connector cables.

The wiring diagrams recommended by Fuji Electric may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

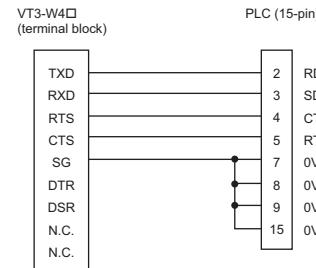
Wiring diagrams for serial connections

■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

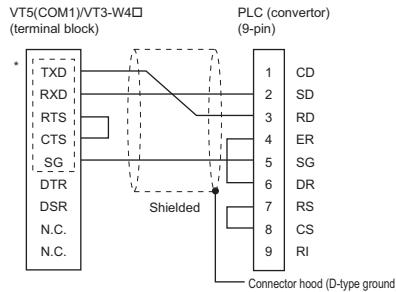
● Wiring diagram W20 (RS-232C)



● Wiring diagram W21 (RS-232C)

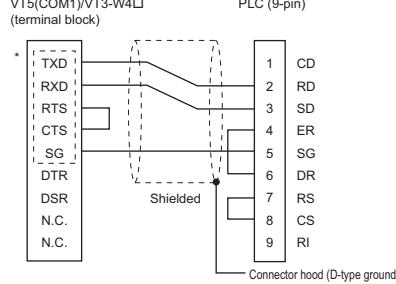


● Wiring diagram W22 (RS-232C)



* [] This is a terminal diagram for the VT5.

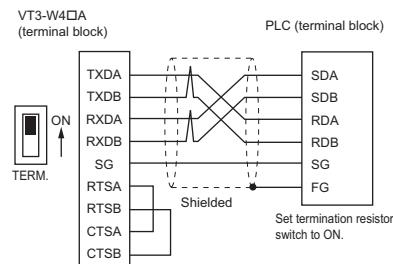
● Wiring diagram W23 (RS-232C)



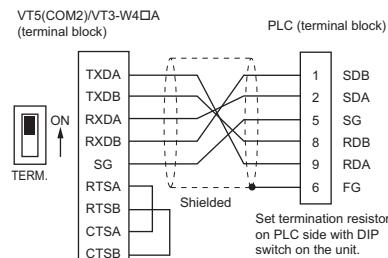
* [] This is a terminal diagram for the VT5.

■ Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A)

● Wiring diagram W40 (RS-485)



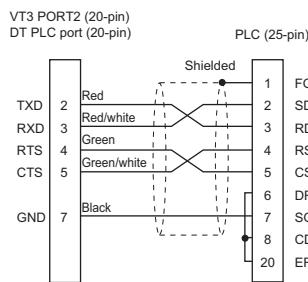
● Wiring diagram W41 (RS-422A)



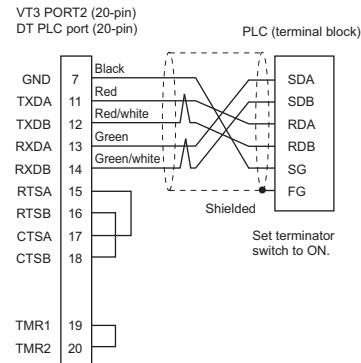
5-3 Wiring Diagrams for Connections

■ Connection to VT3 series/DT series

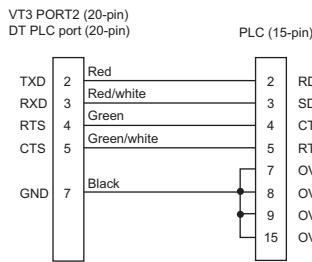
● Wiring Diagram 1 (RS-232C: OP-24027)



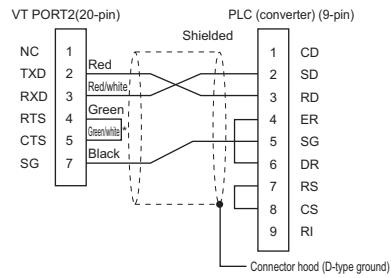
● Wiring Diagram 2 (RS-485: OP-24028)



● Wiring Diagram 3 (RS-232C CPU port: OP-24027)



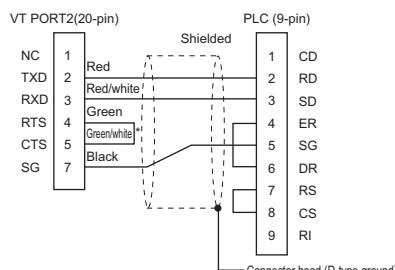
● Wiring Diagram 4 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.

Solder the signal lead.

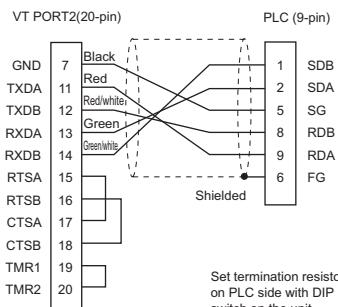
● Wiring Diagram 5 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.

Solder the signal lead.

● Wiring Diagram 6 (RS-422A 4-wire: OP-24028)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

5-3 Wiring Diagrams for Connections

■ Connection with VT3 Handy Series



FG2 must be grounded.

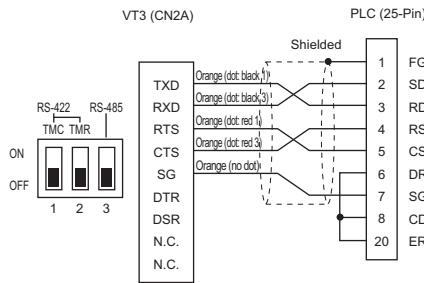
● Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



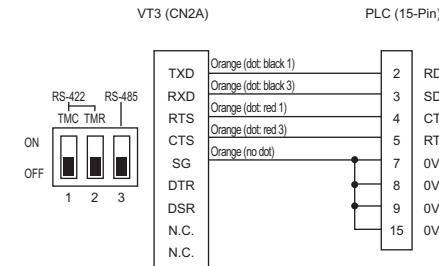
● Wiring Diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



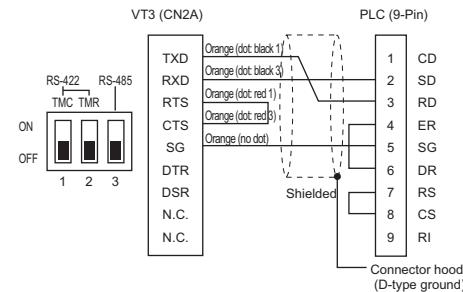
● Wiring Diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



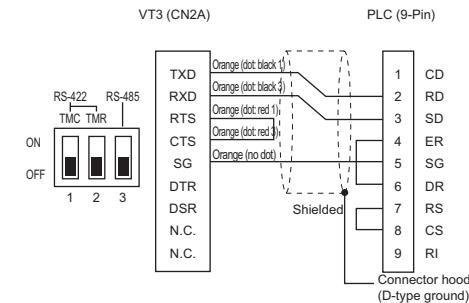
● Wiring Diagram H23 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



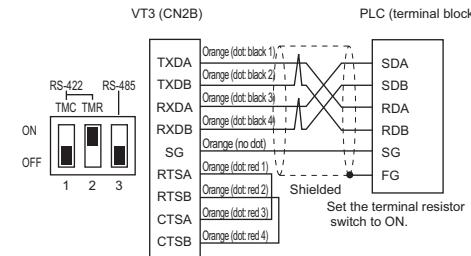
● Wiring Diagram H40 (RS-485)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



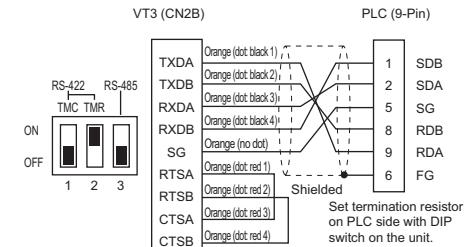
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

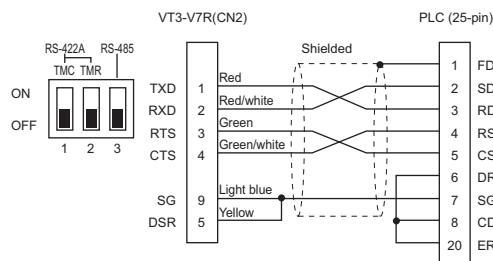
OP-87193: 10m



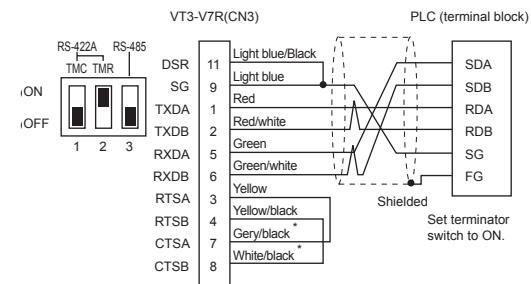
5-3 Wiring Diagrams for Connections

■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-232C: VT-C5R1)

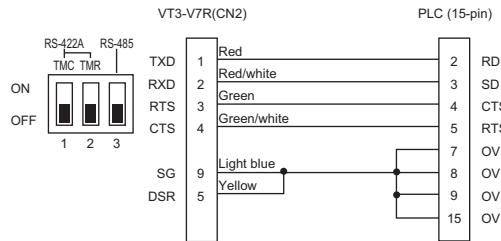


● Wiring Diagram R2 (RS-485: VT-C5R2/C15R2)

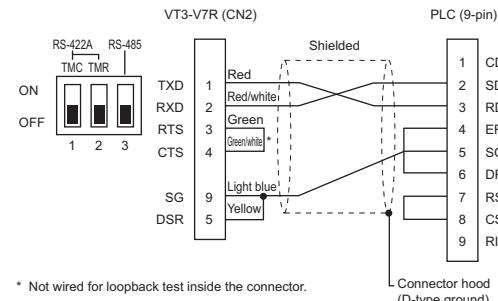


* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-232C CPU Link Port: VT-C5R1)

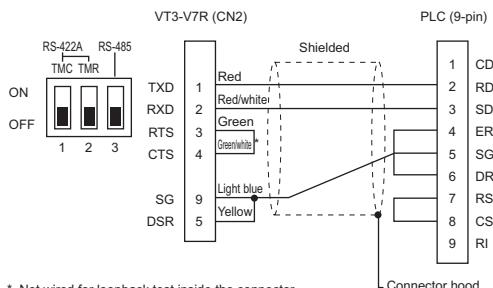


● Wiring Diagram R4 (RS-232C: VT-CR51)



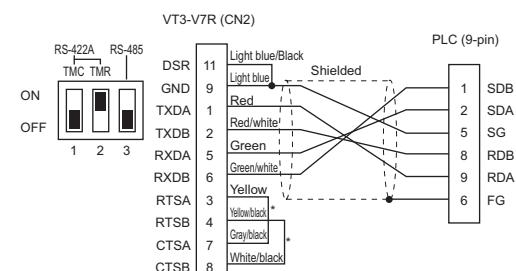
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R5 (RS-232C: VT-CR51)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R6 (RS-422A 4-wire: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting with the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

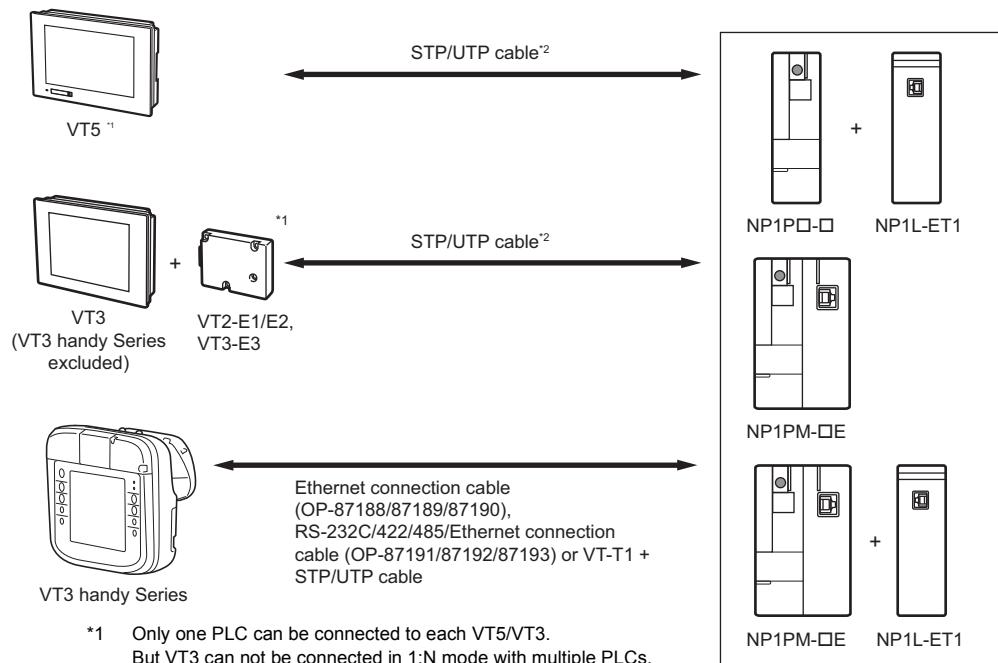
5-3 Wiring Diagrams for Connections

Ethernet Connection Methods

Cables used in different connection modes are described below.

■ Direct connection (1:1 connection)

Connection is made using a STP/UTP cable.

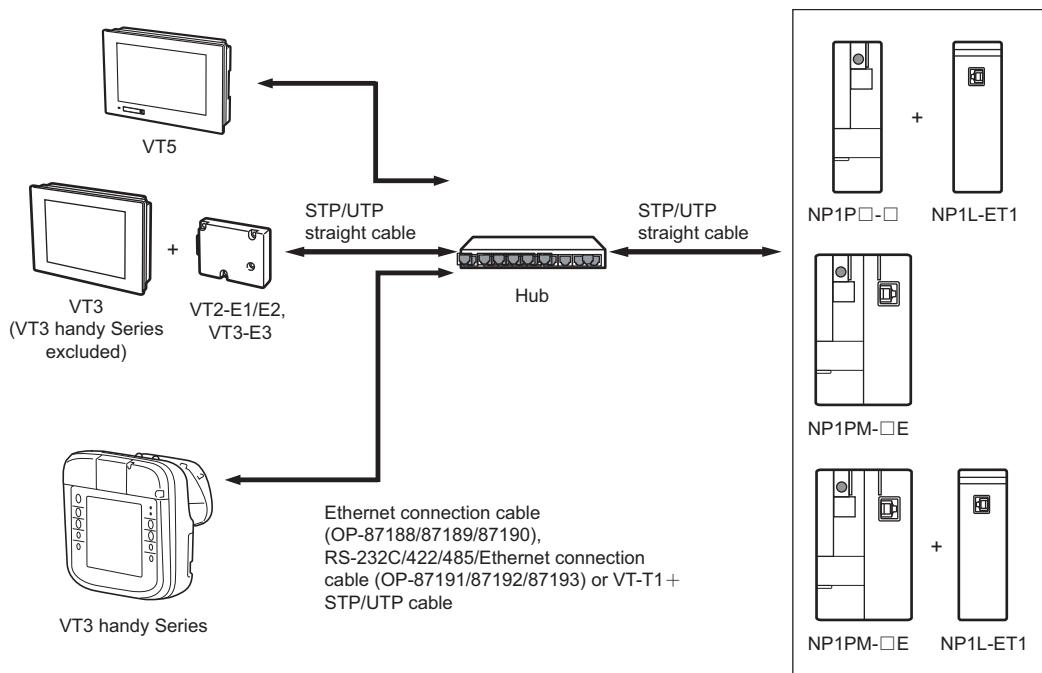


- *1 Only one PLC can be connected to each VT5/VT3.
But VT3 can not be connected in 1:N mode with multiple PLCs.
- *2 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.

Point

- When creating a 10BASE-T Ethernet, please use STP/UTP cables above CAT 3.
- When creating a 100BASE-TX Ethernet, please use STP/UTP cables above CAT 5.

■ Connections using a hub (multiple connections)



Multiple connections

- Only one PLC can be connected to each VT5/VT3. It cannot be connected to multiple PLCs through a 1:N connection.
- Multiple VT5/VT3 units can be connected to one PLC through an N:1 connection. Up to 8 VT3 units can be connected to one Ethernet unit/Ethernet built-in CPU unit. The message "PLC transmission interlocking in progress" may be displayed when multiple VT5/VT3 units in an N:1 connection is started simultaneously. Communications will start after a short delay.

Connection of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series to a hub

- Please use a STP/UTP direct connection cable.
- The VT5, VT2-E1/E2, VT3-E3 and VT3 handy Series should be connected to a port other than the cascade port on the hub.

Connection of MICREX-SX series to a hub

- Please use a STP/UTP direct connection cable.
- Do not connect the MICREX-SX series to the cascade port of a hub.

Point

- When creating a 10BASE-T Ethernet, please use STP/UTP cables above CAT 3.
- When creating a 100BASE-TX Ethernet, please use STP/UTP cables above CAT 5.

This section describes the default communication conditions and how to set up the units.

Method for making serial connections

■ MICREX-SX Series (LOADER port) Setting

Setting of NP1PH-08, NP1PH-16, NP1PS-32, NP1PS-32R, NP1PS-74, NP1PS-74R, NP1PS-117, NP1PS-117R , NP1PS-245 isn't required.

■ NP1L-RS1 Setting

The operation mode of communication module port (RS232C or RS485) for connection must be set to LOADER. The operation mode can be set with mode setting switch of communication module.

Setting examples

When using RS-232C port : "1" or "3"
When using RS-485 port : "2" or "3"



For mode setting switch, see User's Manual of SX Series made by Fuji Electric Corporation.



Be sure to power PLC ON again after setting.

■ NJ-B16, NS-B32/B64 (RS-232C interface)

Set the parameters.

Set at "Initial Setting" → "Parameter Setting" → "Define Processor Operation" → "RS-232C Settings" in the loader software.



Set the data bit length of the VT5/VT3/DT to 8 bits.

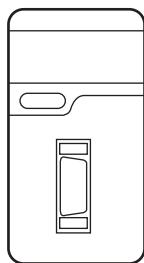


When setting parameters on the Handy Loader, enter the setting values to the following address:

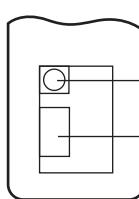
Address	Bit	Setting Item	SetValue(hex)
50H	D0 to D2	Baud rate (bit/s) 111: 19200bit/s	0077
	D3	Stop bit 0:1 bit	
	D4	Character length (Data bit) 1: 8 bits	
	D5 to D6	Parity 11: Even	

■ NJ-RS2

Front view



Rear view



(1) MODE switch

(2) Character configuration switches

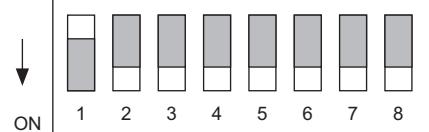
(1) MODE switch

Set to "1".

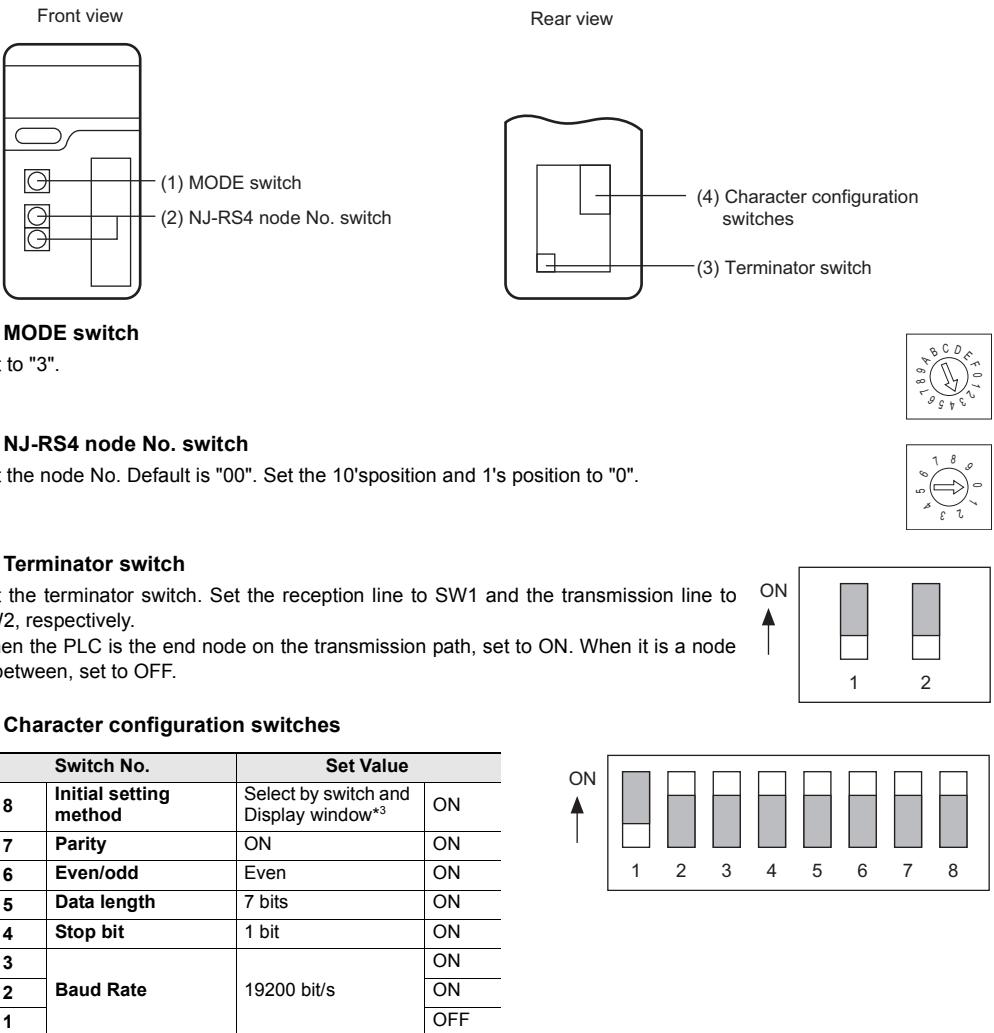


(2) Character configuration switches

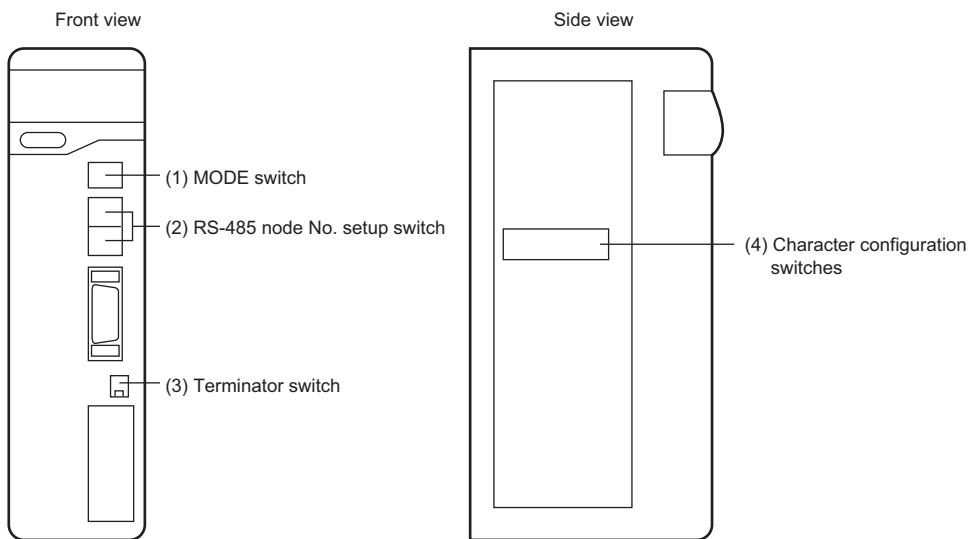
Switch No.		Set Value	
8	Initial setting method	Select by switch and Display window ^{*3}	ON
7	Parity	ON	ON
6	Even/odd	Even	ON
5	Data length	7 bits	ON
4	Stop bit	1 bit	ON
3	Baud Rate	19200 bit/s	ON
2			ON
1			OFF



■ NJ-RS4



■ NS-RS1



(1) MODE switch

Set whether to use RS-232C or RS-485.

When performing communications on the RS-232C interface, set to "1".

When performing communications on the RS-485 interface, set to "3".



(2) RS-485 node No. setup switch

Set the node No. when communications is performed on the RS-485 interface. Default is "00". Set the 10's position and 1's position to "0".

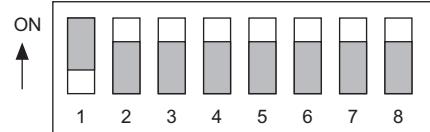


(3) Terminator switch

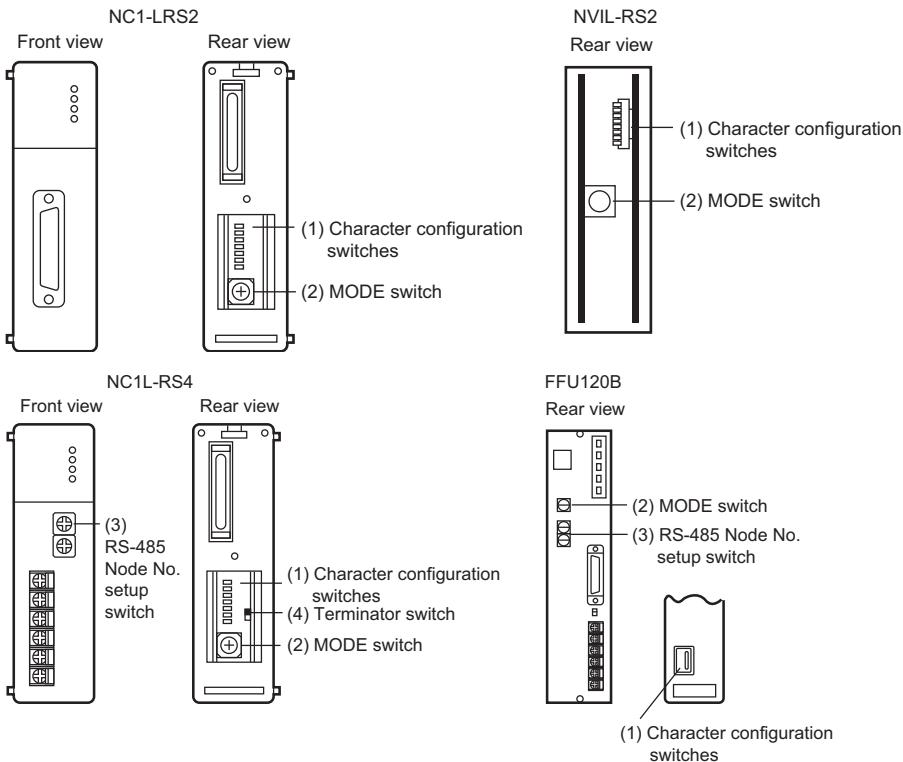
Set this switch when communications is performed on the RS-485 interface. When the PLC is the end node on the transmission path, set to ON. When it is a node in between, set to OFF.

(4) Character configuration switches

Switch No.		Set Value	
8	Initial setting method	Select by switch and Display window*3	ON
7	Parity	ON	ON
6	Even/odd	Even	ON
5	Data length	7 bits	ON
4	Stop bit	1 bit	ON
3	Baud Rate	ON	ON
2		ON	OFF
1		OFF	



■ NV1L-RS2, NC1L-RS2/RS4, FFU120B



● Operation mode

(1) Character configuration switches

Set switch 8 to OFF.

(2) MODE switch

Set whether to use RS-232C or RS-485.

When performing communications on the RS-232C interface, set to "1".

When performing communications on the RS-232C interface, set to "3".

* Can be set only on NC1L-RS4 and FFU120B.



(3) RS-485 Node No. setup switch

Set the node No. when communications is performed on the RS-485 interface. Default is "00". Set the 10's position and 1's position to "0".



X 10

X 1

(4) Terminator switch

Set this switch when communications is performed on the RS-485 interface. When the PLC is the end node on the transmission path, set to ON. When it is a node in between, set to OFF.

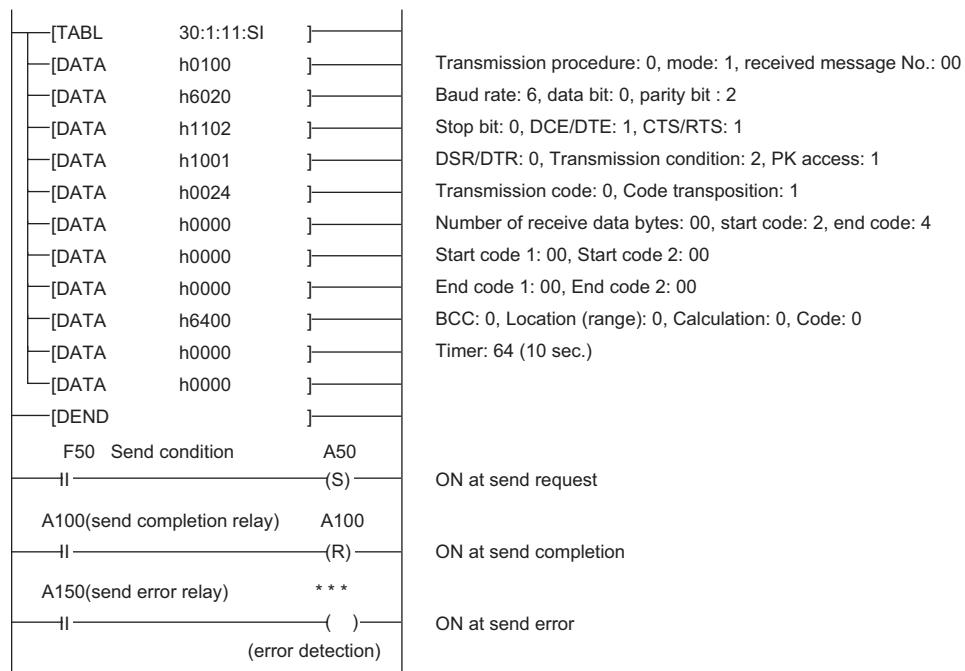
● Initial file

Set the transmission specifications of the link unit in the ladder program.

Setting each item

Item	Description		Item	Description	
Transmission procedure	Non-procedural	0	Transmission code	JIS	0
Mode	Setting	1	Code transposition	Yes	1
Received message No.	00	00	Number of receive data bytes	00	00
Baud Rate	19200 bit/s	6	Start code	:	2
Data bit	7 bits	0	End code	CR\LF	4
Parity bit	Even	2	Start code 1, 2	0000	0000
Stop bit	1 bit	0	End code 1, 2	0000	0000
DCE/DTE	DTE	1	BCC	No	0
CTS/RTS	Always ON	1	Location (range)	TEXT	0
DSR/DTR	Always ON	0	Calculation	Addition	0
Send condition	No	2	Code	Transmission code	0
PK access	Enabled	1	Timer	64 (10 sec.)	64

Example of a setting reference program

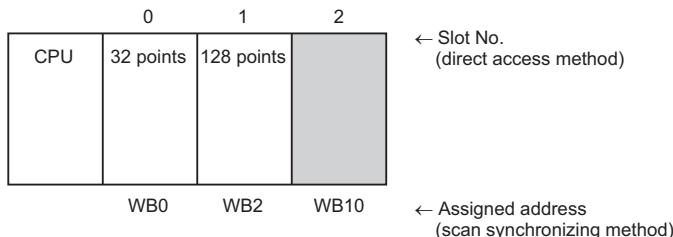


Be sure to turn the power OFF then back ON again after registering the initial file and message module.

● Registering the message module

Register the communications settings for the CPU and the link unit on the message module.
Set at "Register message module" in PC Programmer.

System configuration example



Item	Setting Range	
Data Module	Data file No.	
Application	Initial	
Link	Scan synchronizing system:	0
	Direct access system: W24	7
Capsule No.	Scan synchronizing system: Assigned address	Example: 10
	Direct access system: Slot No.	Example: 2
ETC	OFF	
Channel	OFF	

Reference setting example (scan synchronized system)

No.	Use of Data	Module	Link	Capsule No.	ETC	Channel
00	030	1	0	010	000	0
01	000	0	0	000	000	0
02	000	0	0	000	000	0
:	:	:	:	:	:	:

Reference setting example (direct access system)

No.	Use of Data	Module	Link	Capsule No.	ETC	Channel
00	030	1	7	002	000	0
01	000	0	0	000	000	0
02	000	0	0	000	000	0
:	:	:	:	:	:	:



Be sure to turn the power OFF then back ON again after registering the initial file and message module.

Communication Condition Setting Ranges and Defaults During Serial Communication

● MICREX-SX Series

Item	Setting range	Default
Station No.	-	-
VT No.	-	-
PLC serial I/F	RS-232C, RS422A, 4-wire ¹⁾	RS-232C
Baud Rate	38400bit/s	38400bit/s
Data bits	8 bits	8 bits
Stop bits	1 bit	2 bits
Parity	Even	Even
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 The VT5-W07M does not support RS-422A connections.

● FLEX-PC Series

Item	Setting Range	Default
PLC No.	OFF, ON (0 to 99)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-



With an RS-485 connection, set the PLC serial interface to "RS-422A 4-wire".

● MICREX-F Series

Item	Setting range	Default
PLC No.	ON (0 to 99)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-



With an RS-485 connection, set the PLC serial interface to "RS-422A 4-wire".

5-4 Unit Settings

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series to a PLC via Ethernet.

■ Check before setting up

When connecting to Ethernet, the IP address of the equipment to be connected and the port No. used for communication etc should be determined in advance.

The setting items in different connection modes are shown as follows. Please confirm the settings with your network administrator.

Connection mode	Setting item
Direct connection	<ul style="list-style-type: none"> IP address to be assigned to VT5/VT3 IP address assigned to PLC Port No. used for communication
Other connection	<ul style="list-style-type: none"> IP address to be assigned to VT5/VT3 IP address assigned to PLC Port No. used for communication Subnet mask Default gateway



- Make sure that "IP address to be assigned to VT5/VT3" differs from "the IP address to be assigned to the PLC".
- For the port No. used for communication, please use the value obtained from the "Standard No. of self port" set in the PLC plus 251.

■ Required Settings for Ethernet connections

The following settings must be made when connecting the VT5/VT3 Series to a PLC via Ethernet.

● VT5 Series

Required settings	Description	
VT5 Ethernet settings	Set the IP address and port number to be assigned to the VT5. Select "System settings"→"VT setting" in "Ethernet/language" in VT STUDIO. ¹	P.5-21
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"Periphery connection" in "PLC communication conditions" in VT STUDIO. ²	P.5-22
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5 Series. Use SX-Programmer Expert (D300Win), a programming support tool from Fuji Electric Co., Ltd. to set communication conditions.	P.5-26

*1 Select "VT Machine Setup"→"Ethernet settings" in VT5 system mode to confirm and change settings.

*2 Use "PLC Comm. Setup" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.5-24
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.5-25
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use SX-Programmer Expert (D300Win), a programming support tool from Fuji Electric Co., Ltd. to set communication conditions.	P.5-26

*1 Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

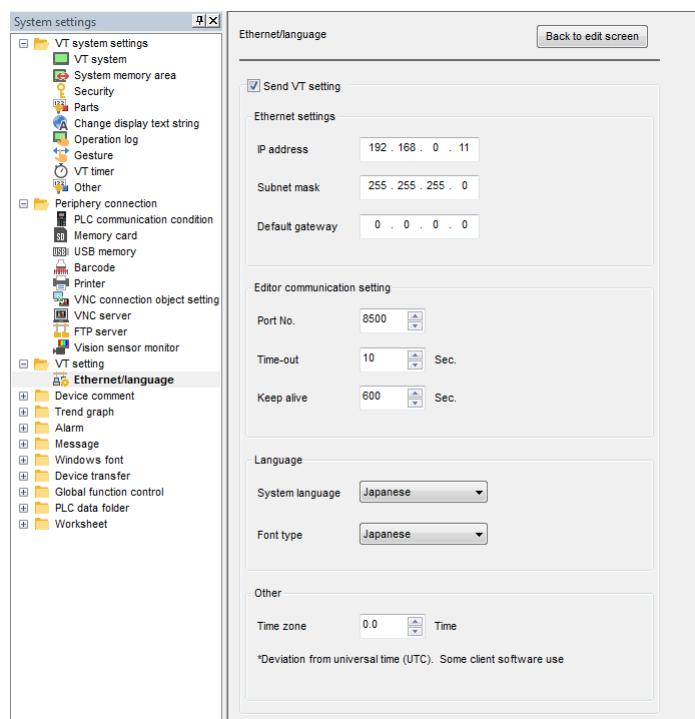
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item	Description
Send VT setting	When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address Set the IP address to be assigned to the VT5.
	Subnet mask Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive Set as necessary.
	Timeout Set as necessary.



You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.

The setting items are the same as those in VT STUDIO.

"5-3 VT Machine Setup", VT5 Series Hardware Manual



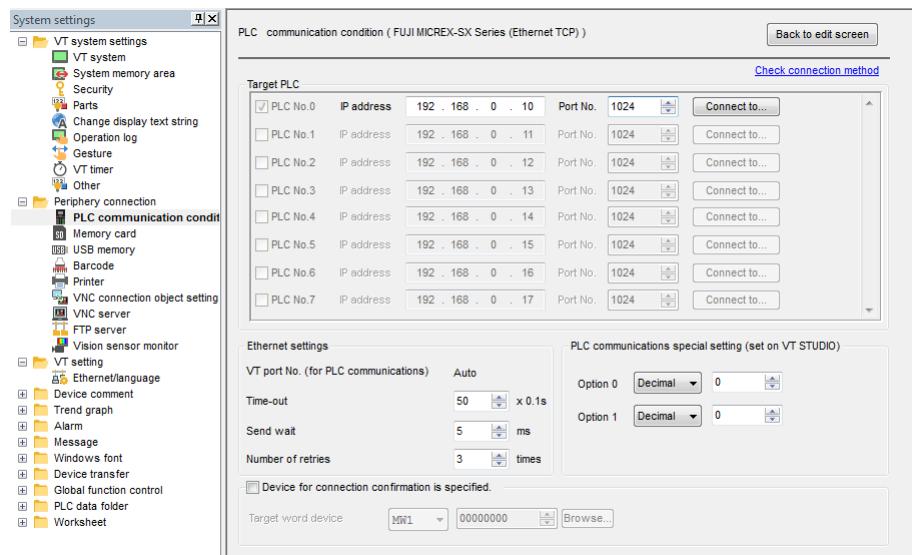
In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

5-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



	Item	Description
Target PLC	Station No.	Only station number 0 can be used.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC.
	Port number ^{*2}	Add the value of "Standard No. of self port" set in the PLC plus 251. ^{*2}
	List of connected targets	Only station number 0 can be used.
Ethernet settings	VT port numbers (for PLC communications)	VT port numbers (for PLC communications) need not be set. Port numbers are automatically assigned to the VT5.
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)	Option 0	To shut down PLC communications, set the max. response wait time. Normally, set this setting to "0".
	Option 1	Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Use SX-Programmer Expert (D300Win) to set "Standard No. of self port".

Example: When "Standard No. of self port" is set to 773, set a port number of 1024 for the target PLC.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

PLC communications special settings

- When the VT5 shuts down communications with the PLC, the VT5 sends the PLC a shutdown request and waits for a response from the PLC.
- You can use "Option 0" in the PLC communication special settings to change the max. response wait time that will be used.
- Set the low-order bytes in option 0 as shown below.

Option 0	Max. response wait time	Details
0	30 sec (normal)	Use this setting for normal use. ^{*1}
1 to 60	Option 0 value (sec)	Set the low-order 1 byte in option 0 as shown below. The upper limit of the max. response wait time is 60 seconds.

*1 If the wait time is reduced, it may not be possible to communicate with the PLC if network conditions are poor.



You can use VT5 system mode to check and change PLC Communication Condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set up "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Hardware manual

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	** . ** . ** , ** . ** . **				
				OK	Cancel
				Next page	

Ethernet Setup (2/3)				OK	Cancel
Port No.	8500			Next page	
Time-out	10 s				
Keep alive	600 s				
				OK	Cancel
				Next page	

Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				
				OK	Cancel
				Next page	

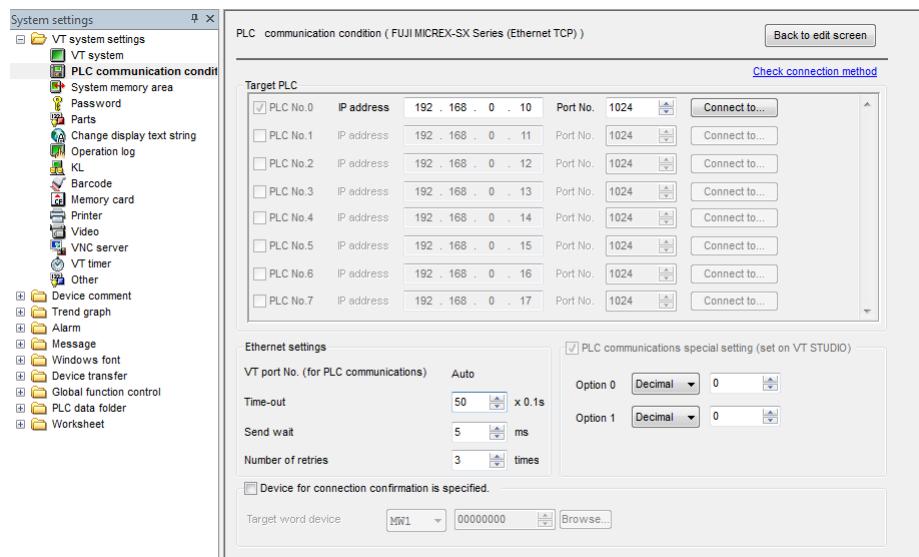
Item	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup ¹	Selects "Enable" only when using a router.

*1 "Chapter 8 ETHERNET", VT3 Series Hardware manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT3 Series Reference Manual



	Item	Description
Target PLC	PLC No.	Only station No. 0 can be used.
	IP address ¹	To set up the IP address assigned to the connection target PLC.
	Port No.	Please set to the value obtained from the "Standard No. of self port" in the PLC setting plus 251. ²
	Connect to	Only station No. 0 can be used.
Ethernet Settings	VT port No. (for PLC communications)	It is not necessary to set up a VT port No. (for PLC communication). A port No. will be assigned by VT3 automatically.
	Timeout	Unnecessary to set up normally. Please increase the time if the network communication traffic load is large.
	Send Wait	Unnecessary to set up normally. Please increase the time if the network communication traffic load is large.
	Retry	Unnecessary to set up normally. Please increase the number of retrials if it is used in a noisy environment.
PLC communications special settings (set on VT STUDIO)	Option 0	To set up the max. response wait time when communication with PLC is disconnected. Normally "0" is used.
	Option 1	Unnecessary to set up normally.
Specify a device to troubleshoot Ethernet connections	Target word device ³	To set up the device used for connection check when no communication occurs within a period of time. Unnecessary to set up normally.

*1 In the same LAN, an IP address cannot be the same as the one of another equipment.

An IP address should be in the format of XXX.XXX.XXX.XXX (XXX is 0-255).

*2 Please use SX-Programmer Expert(D300win) to set up the "Standard No. of self port" of the PLC.

Example: when the "Standard No. of self port" is 773, the port No. of the target PLC should be set to 1024.

*3 "PLC device" can be selected.

VT3 Series Reference Manual, "6-7 Device Settings"

Special settings of PLC communication

- When communication between VT3 and PLC is disconnected, the VT3 will send a disconnect request to PLC first, then wait a response from the PLC.
By setting up "Option 0" in the "Special settings of PLC communication", it is possible to change the max. response wait time in this case.
- Please set up the low bytes of "Option 0" according to following requirements.

Option 0	Max. response wait time	Description
0	30 s (normal)	Needs to be set up normally.* ¹
1to60	Value of option 0 (s)	Please set low 1 byte of option 0 to the desired time to be set. The upper limit of the max. response wait time is 60 s.

*1 When the wait time is shorter and the network communication environment is bad, it may be impossible to communicate with the PLC.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those in VT STUDIO.

"5-4 PLC Communication Conditions", VT3 Series Hardware Manual

■ MICREX-SX Series Setting

You can use SX-Programmer Expert (D300Win) to set up the MICREX-SX series.

Please set up the following items through NP1L-ET1 or the CPU attributes of the built-in Ethernet under "System Definition" in the "Project Tools" window to be edited.

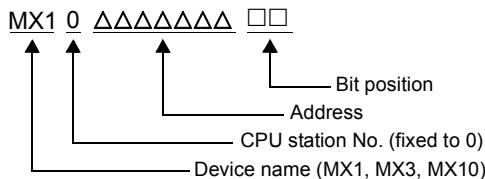
Item	Description
IP address	To set up the IP address assigned to PLC.
Subnet mask	To input the subnet mask of a self-station IP address.
Default gateway	To input the IP address of a gateway when communicating with another connected network
IP address	To input the IP address of a gateway when communicating with another connected network through the gateway (router).
Standard No. of self port	Set the value of "Standard No. of self port" +251 as a port number for the target PLC in the VT5/VT3.

5-5 Available Devices

● MICREX-SX Series

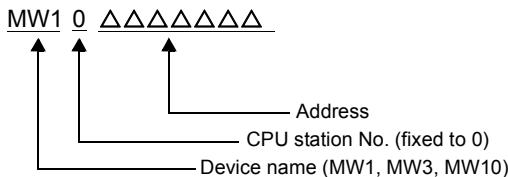
	Device	Address
Bit Device	Standard memory (MX1) ¹	MX10000000000 to MX10170393515
	Retain memory (MX3) ¹	MX3000000000 to MX3026214315
	System memory (MX10) ¹	MX10000000 to MW100102315
	Input memory (IX) ³	IX00100000 to IX23851115
	Output memory (QX) ³	QX00100000 to QX23851115
Word Device	Standard memory (MW1) ²	MW10000000 to MW101703935
	Retain memory (MW3) ²	MW30000000 to MW30262143
	System memory (MW10) ²	MW1000000 to MW1001023
	Input memory (IW) ⁴	IW001000 to IW238511
	Output memory (QW) ⁴	QW001000 to QW238511

*1 Setting method for devices of standard memory (MX1), retain memory (MX3) and system memory (MX10)
Set up according to "device name + CPU station No. (fixed to 0) + address + bit position".



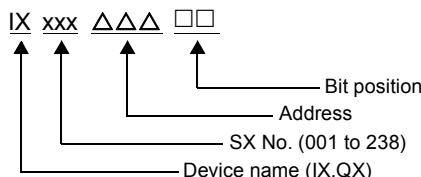
Setting example) The device at tenth bit of address 100000 of retain memory (MX3) with CPU station No. 0 can be set to "MX3010000010".

*2 Setting method for devices of standard memory (MW1), retain memory (MW3) and system memory (MW10)
Set up according to "device name + CPU station No. (fixed to 0) + address".



Setting example) The device of address 100000 of retain memory (MX3) with CPU station No. 0 can be set to "MW30100000".

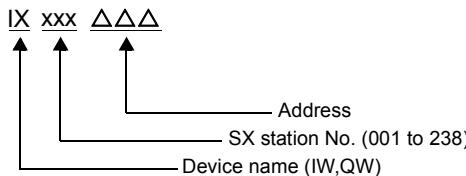
*3 Setting method for devices of input memory (IX) and output memory (QX)
Set up according to "device name + SX station No. + address + bit position".



Setting example) The device at 5th bit of address 1 of input memory (IX) in with SX station No.2 can be set to "IX00200105".

5-5 Available Devices

- *4 Setting method for devices of input memory (IW) and output memory (QW)
Set up according to "device name + SX station No. + address".



Setting example) The device of address 1 of input memory (IW) with SX station No.2 can be set to "IW002001".

5



The designation of devices differs from that of the PLC manual.

For example) The device at 10th bit of address 100000 of retain memory (MX3) with in CPU station No.0 is designated as "% MX3.100000.10" (CPU station No.0 omitted).



- Available devices are restricted according to the product model. Check the manual for the respective model.
- "variable specifying" cannot be performed to devices.
- When the remote I/O main module is used in I/O expansion mode, the input/output memory of the remote I/O cannot be read/written. When it is used in normal mode/expansion mode, it can be read/written.
- When I/O expansion has been made or a remote I/O address has been specified, the VT will display "Device specifying error", and an error will occur.

● FLEX-PC Series

	Device	Address
Bit Devices	Input relay	X0000 to X07FF
	Output relay	Y0000 to Y07FF
	Internal relay	M0000 to M03FF
	Extended internal relay	M0400 to M1FFF
	Latch relay	L0000 to L03FF
	Extended latch relay	L0400 to L1FFF
	Timer (contact)	T0000 to T03FF
	Counter (contact)	C0000 to C01FF
Word Devices	Input relay	X0000 to X007F
	Output relay	Y0000 to Y007F
	Internal relay	M0000 to M003F
	Extended internal relay	M0040 to M01FF
	Latch relay	L0000 to L003F
	Extended latch relay	L0040 to L01FF
	Data register	D0000 to D2FFF
	Link register	W0000 to W3FFF
	File register	R0000 to R7FFF
	Timer (current)	T0000 to T03FF
	Counter (current)	C0000 to C01FF
	Timer (set) ¹	TS000 to TS3FF
	Counter (set) ¹	CS000 to CS1FF

*1 Writing is possible only in the terminal mode. The only switch function that can be set in the Editor software is data setting.



Available devices are restricted according to the product model. Check the manual for the respective model.

● MICREX-F Series

	Device	Address
Bit Devices	I/O relay ¹	B0000 to B399F
	Auxiliary relay	M0000 to M511F
	Keep relay	K0000 to K063F
	Differential relay	D0000 to D063F
	Link relay	L0000 to L511F
	Timer 0.01 sec. (contact)	T0000 to T0511
	Timer 0.1 sec. (contact)	T0512 to T0999
	Counter (contact)	C0000 to C0255
Word Devices	I/O relay ¹	WB0000 to WB0511
	Auxiliary relay	WM0000 to WM0511
	Keep relay	WK0000 to WK0063
	Differential relay	WD0000 to WD063
	Link relay	WL000 to WL511
	Timer 0.01 sec. (current)	TR0000 to TR0511
	Timer 0.01 sec. (set)	TS0000 to TS0511
	Timer 0.1 sec. (current) ^{2,3}	W9.000 to W9.511
	Counter (current)	CR0000 to CR0511
	Counter (set)	CS0000 to CS0511
	Data memory	BD0000 to BD4095
	Direct I/O ²	W24.0000 to W24.0159
	File memory ^{2,4}	W30.0000 to W30.4094
		W31.0000 to W31.4094
		W32.0000 to W32.4094
		W33.0000 to W33.4094
		W34.0000 to W34.4094
	File memory (32-bit processing)	W30.0000 to W30.4094
		W31.0000 to W31.4094
		W32.0000 to W32.4094
		W33.0000 to W33.4094
		W34.0000 to W34.4094

*1 The MSB of word devices corresponds to bit 0 of bit devices.

*2 The decimal point is not displayed.

*3 W9.488 to W9.511 can be used only as data memory.

*4 Set the data format to SI=0 (Hex 1 word) on the PLC.

Point

- Available devices are restricted according to the product model. Check the manual for the respective model.
- Expression of minus BCD values is not supported.

5-6 Precautions for Communication

■ Precautions for MICREDX-SX Series communication

If the message "Transmission interlocking in progress" is displayed on the VT5/VT3 Series and does not clear within 5 seconds, check whether the SX Series is in a transmission interlock with some device other than the VT5/VT3 Series.

■ Operation when error device specified in MICREX-SX Series.

● When the device of specified SX station No. out of occupied range

When a device out of the occupied range of the unit is set, a "Device out of range" error will occur in VT5/VT3.

For example) When the unit of SX station No.2 is 32-input unit (2 words occupied)
"Device out of range" error occurs when the 3rd word or above is set.

● When error occurs in device names of input/output memory

When a device name different from the actually used unit is set, operation is performed according to the type of actually used device.

For example) When an SX station No. 2 unit is an input unit (64 points) and QW002002 (output memory) is set, VT5/VT3 parts will operate according to IW002002 (input memory) settings.

5-7 Error Messages and Troubleshooting

This section describes communication errors occurring in VT5/VT3 Series and Fuji Electric Co., Ltd. PLC connections.

List of Communication Errors in Serial Connections

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

When Ethernet connection to a PLC is made, the error messages are as follows.

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs.

Message displayed	Cause	Solution
Time Out Error(++)	A timeout error occurs on the PLC with station No. ++.	<ul style="list-style-type: none"> Please check the network. Perform communication setting once again.
No Ethernet unit	Ethernet unit VT2-E1/E2 or VT3-E3 is not connected.	<ul style="list-style-type: none"> Please turn off the power of the VT3 unit, install VT2-E1/E2 and VT3-E3, and turn on the power of the VT3 unit again.
Protocol stack error	Protocol stack is being started.	Please wait.
Link error	Link error of the Ethernet unit.	<ul style="list-style-type: none"> Please check if the connection cable is connected correctly. Make sure that LINK LED of the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[**(++)]	A error response ** is sent out from the PLC with station No. ++.	For contents of the response **, please refer to manuals of PLCs of respective companies and manuals of Ethernet units.
PLC Transmission Interlocked	Communication with PLC is locked due to another equipment.	Please wait, until locking is released.
Device Error	The specified devices are incorrect.	<ul style="list-style-type: none"> Please check type/range/unit configuration of the devices. I/O expansion function is not supported.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

CONNECTING TO HITACHI, LTD. AND HITACHI INDUSTRIAL EQUIPMENT SYSTEMS CO., LTD. PLCS

This chapter describes how to connect to a PLC made by Hitachi, Ltd or Hitachi Industrial Equipment Systems Co., Ltd.

6-1	Checking Operation before Connection	6-2
6-2	System Configuration.....	6-5
6-3	Wiring Diagrams for Connections	6-6
6-4	Unit Settings.....	6-15
6-5	Available Devices.....	6-28
6-6	Error Messages and Troubleshooting	6-33

6-1 Checking Operation before Connection

This section describes how to check the items required for connecting the PLC to the VT5/VT3/Soft-VT/DT.

- (1) Make sure that the VT5/VT3/Soft-VT/DT can be connected to the PLC or link unit.
- (2) Check whether or not CPU or link unit settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

Serial connections

6

■ Connection of HIDIC-S10 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
S10V	up link connector	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 9	 P.6-15	HIDIC-S10 α Series ^{*1}
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H43		
			VT5(COM2) ^{*2} /VT3-W4□A	Wiring diagram W43		
			VT3-V7R(CN3)	Wiring diagram R9		
S10mini	LQE060	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 5	 P.6-15	HIDIC-S10 α Series ^{*1}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H22		
			VT5(COM1)/VT3-W4□	Wiring diagram W22		
			VT3-V7R(CN2)	Wiring diagram R5		
4 α ,4 α F,4 α H	LWE805	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.6-15	HIDIC-S10 α Series ^{*1}
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ^{*2} /VT3-W4□A	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		
2 α ,2 α E,2 α H, 2 α Hf	Host computer Interface	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.6-15	HIDIC-S10 α Series ^{*1}
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ^{*2} /VT3-W4□A	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		

*1 Not supported by Soft-VT.

*2 VT5-W07M is not supported.

6-1 Checking Operation before Connection

■ Connection of EHV/HIDIC-H Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Object PLC
EHV-CPU128, EHV-CPU64, EHV-CPU32, EHV-CPU16	Serial link port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 7	□ P.6-16	EHV Series ⁷
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H24		
			VT5(COM1)/VT3-W4□	Wiring diagram W24		
			VT3-V7R(CN2)	Wiring diagram R7		
		RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 8		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H42		
			VT5(COM2) ⁸ /VT3-W4□A	Wiring diagram W42		
			VT3-V7R(CN3)	Wiring diagram R8		
	Serial link port +EH-RS05 ¹	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 6	□ P.6-16	EHV Series ⁷ / HIDIC-H Series ^{6,7}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H23		
			VT5(COM1)/VT3-W4□	Wiring diagram W23		
			VT3-V7R(CN2)	Wiring diagram R6		
EH-150	Port 1 +EH-RS05 ¹	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 6	□ P.6-16	EHV Series ⁷ / HIDIC-H Series ^{6,7}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H23		
			VT5(COM1)/VT3-W4□	Wiring diagram W23		
			VT3-V7R(CN2)	Wiring diagram R6		
H-200 ² H-250 ² H-252 ² H-252C ² H-300, H-302 H-700, H-702 H-1002 H-2000, H-2002 H-4010	Peripheral port ⁵ 4800 bit/s, 38400 bit/s ³	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 2	□ P.6-17	HIDIC-H Series ^{6,7}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R2		
	Peripheral port ⁵ 19200 bit/s	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	□ P.6-19	HIDIC-H Series ^{6,7}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21		
			VT3-W4T/W4M/W4G	Wiring diagram W21		
			VT3-V7R(CN2)	Wiring diagram R3		
	COMM-H ⁴ COMM-2H ⁴	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	□ P.6-19	HIDIC-H Series ^{6,7}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21		
			VT3-W4T/W4M/W4G	Wiring diagram W21		
			VT3-V7R(CN2)	Wiring diagram R3		
	RS-422A	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 4	□ P.6-19	HIDIC-H Series ^{6,7}
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R4		

¹ EH-RS05 is a kind of cable made by Hitachi Industrial Equipment Systems Co., Ltd.² COMM-H and COMM-2H cannot be used.³ 38400 bit/s can be set only on H-4010.⁴ Cannot be used on H-200/250/252/252C. H-4010 can be used only on COMM-2H.⁵ Universal port is unavailable.⁶ Not supported by the VT5 Series.⁷ Not supported by Soft-VT.⁸ VT5-W07M is not supported.

Remote COM port function is not supported by EHV Series.

Ethernet connections

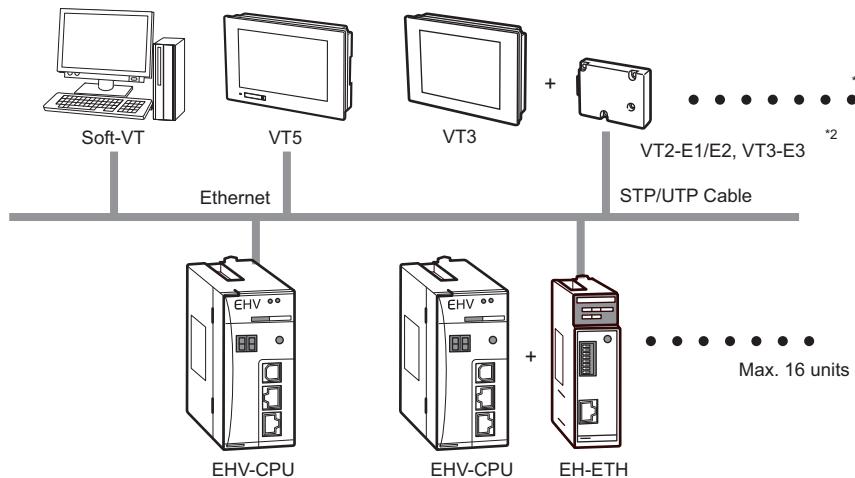
■ Connection of EHV Series

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
EHV Series	EHV-CPU128 EHV-CPU64 EHV-CPU32 EHV-CPU16	Internal Ethernet port direct link	P.6-26	EHV Series (Ethernet UDP)
	EH-ETH			

6-2 System Configuration

System configuration for Ethernet connections

System configuration of VT5/VT3 Series, Soft-VT and EHV series is described below.



*1 Please note that when connecting multiple VT5/VT3 Series, Soft-VT units, communication volume will become larger due to influence of number of connected units.

Up to 4 VT series units can be connected to one PLC.

*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

6-3 Wiring Diagrams for Connections

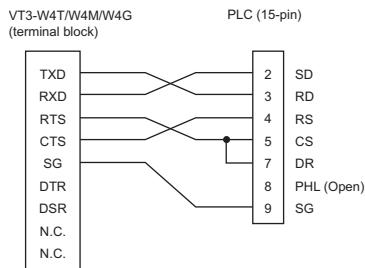
This section describes wiring of connector cables.

The Wiring diagrams recommended by Hitachi or Hitachi Industrial Equipment Systems may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the Wiring diagrams in this manual.

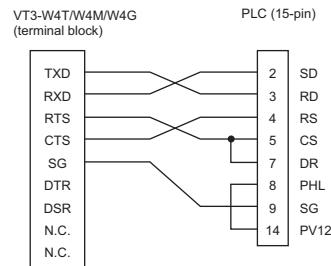
Wiring diagrams for serial connections

■ Connection to VT5 series (COM1), VT3-W4□ (RS-232C)

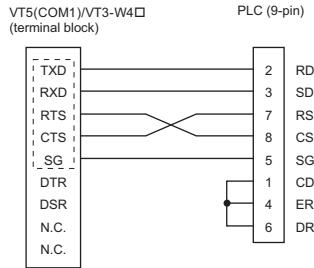
● Wiring Diagram W20 (RS-232C)



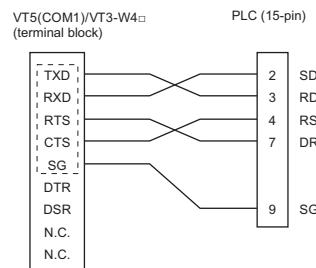
● Wiring Diagram W21 (RS-232C)



● Wiring Diagram W22 (RS-232C)



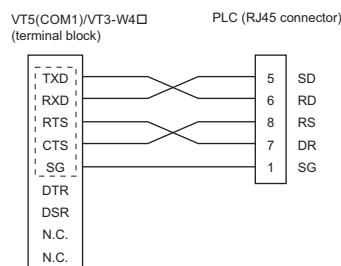
● Wiring Diagram W23 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

* [] indicates a terminal diagram for the VT5 Series.

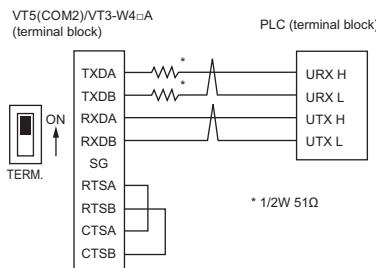
● Wiring Diagram W24 (RS-232C)



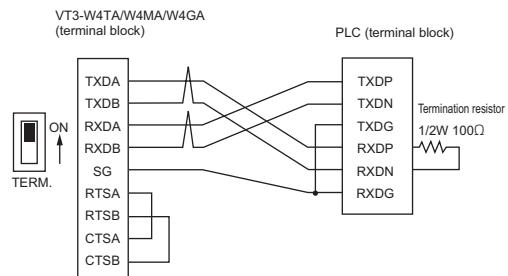
* [] indicates a terminal diagram for the VT5 Series.

■ Connection to VT5 series (COM2), VT3-W4□A (RS-422A)

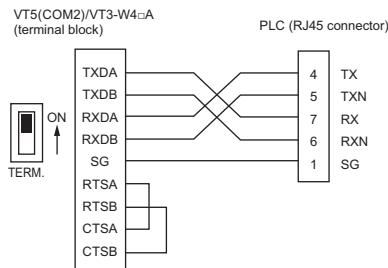
● Wiring Diagram W40 (RS-422A)



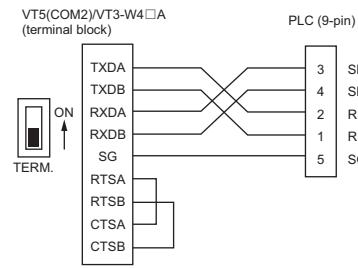
● Wiring Diagram W41 (RS-422A)



● Wiring Diagram W42 (RS-422A)



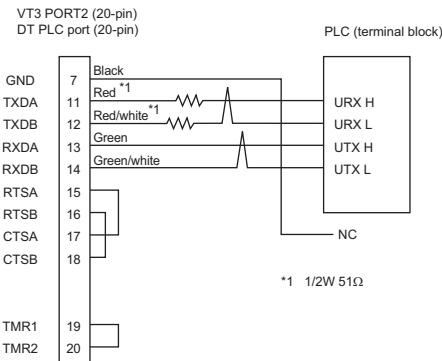
● Wiring Diagram W43 (RS-422A)



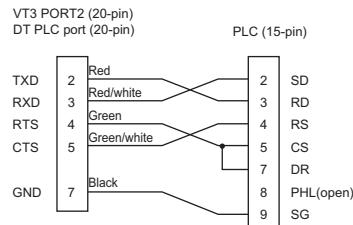
6-3 Wiring Diagrams for Connections

■ Connection to VT3 series/DT series

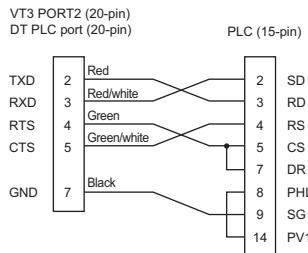
● Wiring Diagram 1 (RS-422A: OP-24028)



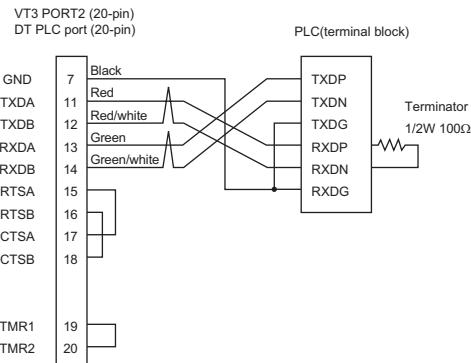
● Wiring Diagram 2 (RS-232C: OP-24027)



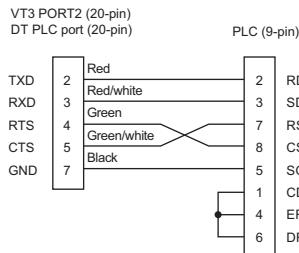
● Wiring Diagram 3 (RS-232C: OP-24027)



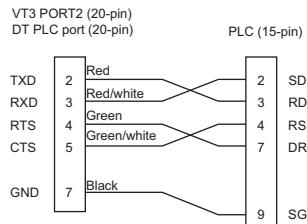
● Wiring Diagram 4 (RS-422A: OP-24028)



● Wiring Diagram 5 (RS-232C: OP-24027)



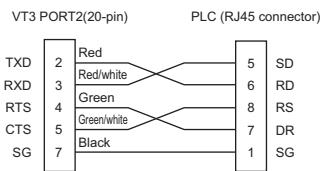
● Wiring Diagram 6 (RS-232C: OP-24027)



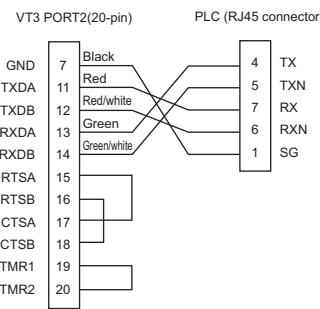
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

6-3 Wiring Diagrams for Connections

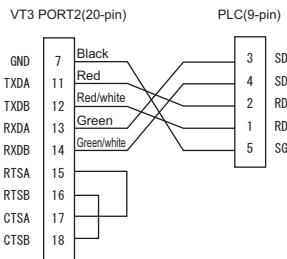
● Wiring Diagram 7 (RS-232C: OP-24027)



● Wiring Diagram 8 (RS-422A, 4-wire: OP-24028)



● Wiring Diagram 9 (RS-422A: OP-24028)



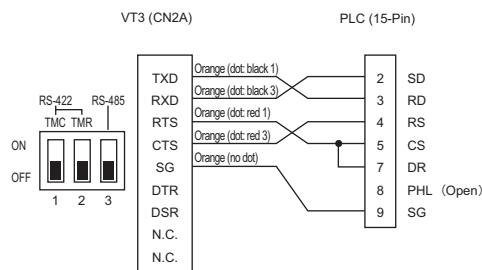
■ Connection with VT3 Handy Series



FG2 must be grounded.

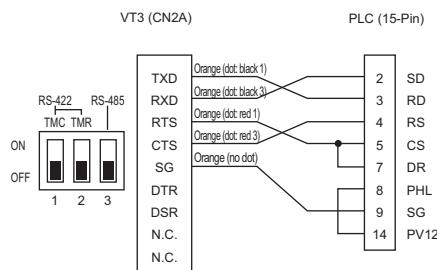
● Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



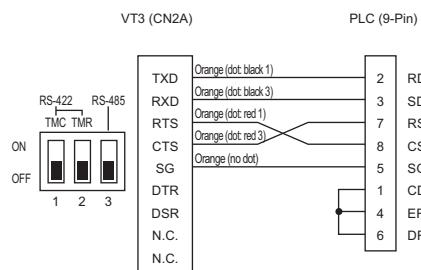
● Wiring Diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



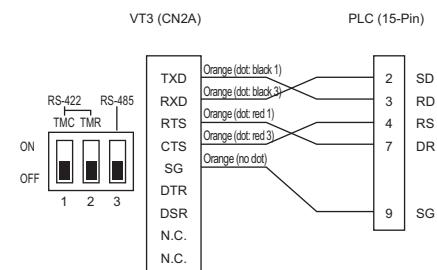
● Wiring Diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



● Wiring Diagram H23 (RS-232C)

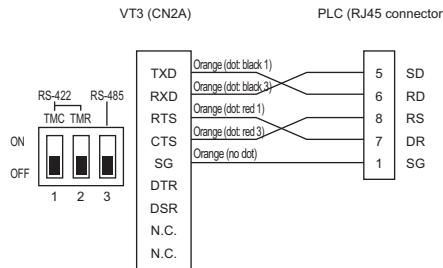
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



6-3 Wiring Diagrams for Connections

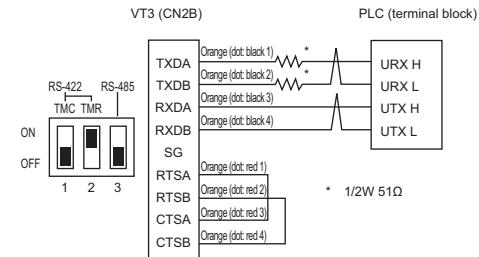
● Wiring Diagram H24 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



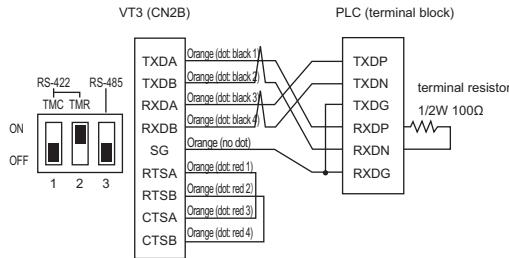
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



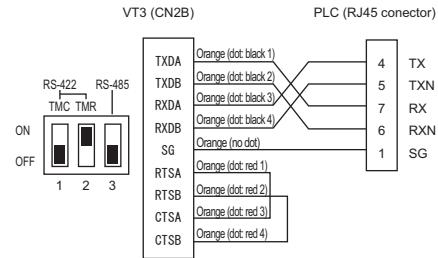
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



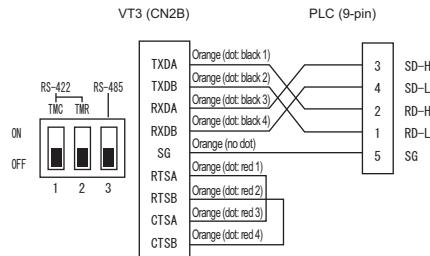
● Wiring Diagram H42 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



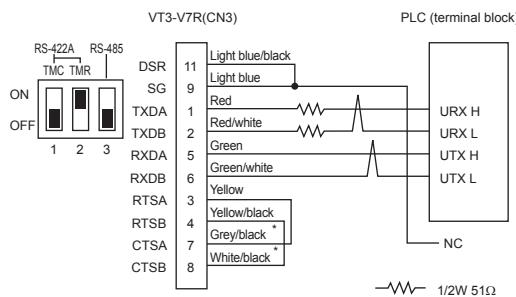
● Wiring Diagram H43 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m

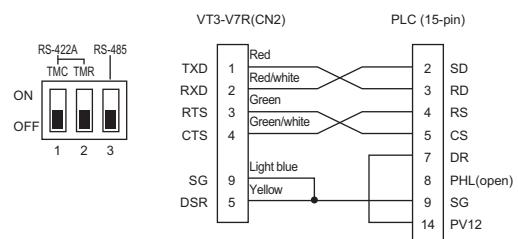


■ Connection to VT3-V7R

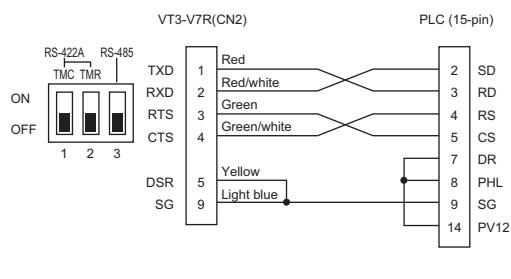
● Wiring Diagram R1 (RS-422A: VT-C5R2/C15R2)



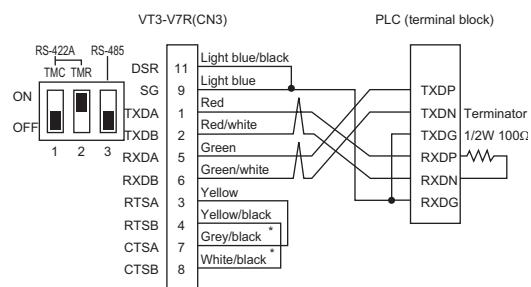
● Wiring Diagram R2 (RS-232C: VT-C5R1)



● Wiring Diagram R3 (RS-232C: VT-C5R1)

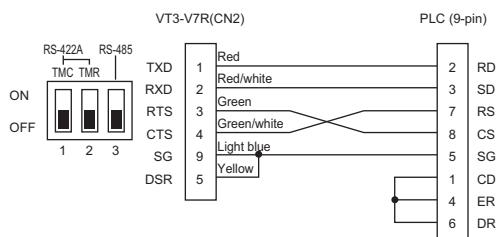


● Wiring Diagram R4 (RS-422A: VT-C5R2/C15R2)

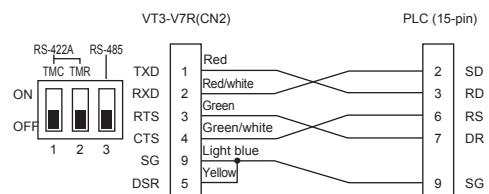


For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

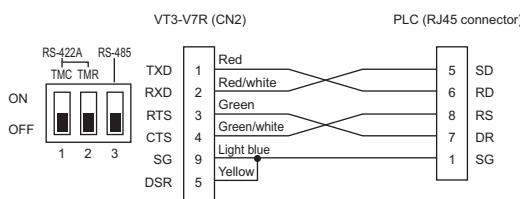
● Wiring Diagram R5 (RS-232C: VT-C5R1)



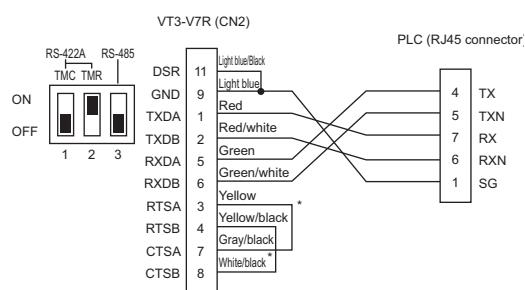
● Wiring Diagram R6 (RS-232C: VT-C5R1)



● **Wiring Diagram R7**
(RS-232C: VT-C5R1)

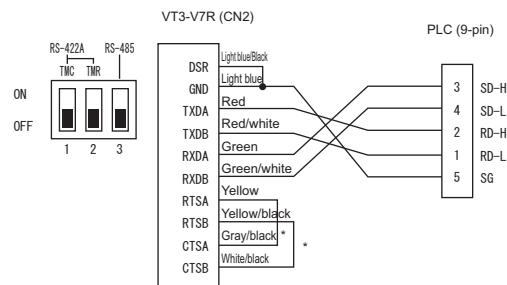


● **Wiring Diagram R8**
(RS-422A, 4-wire: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● **Wiring Diagram R9**
(RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.



**Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039),
please ensure to read the "Connection Precautions", page A-13**



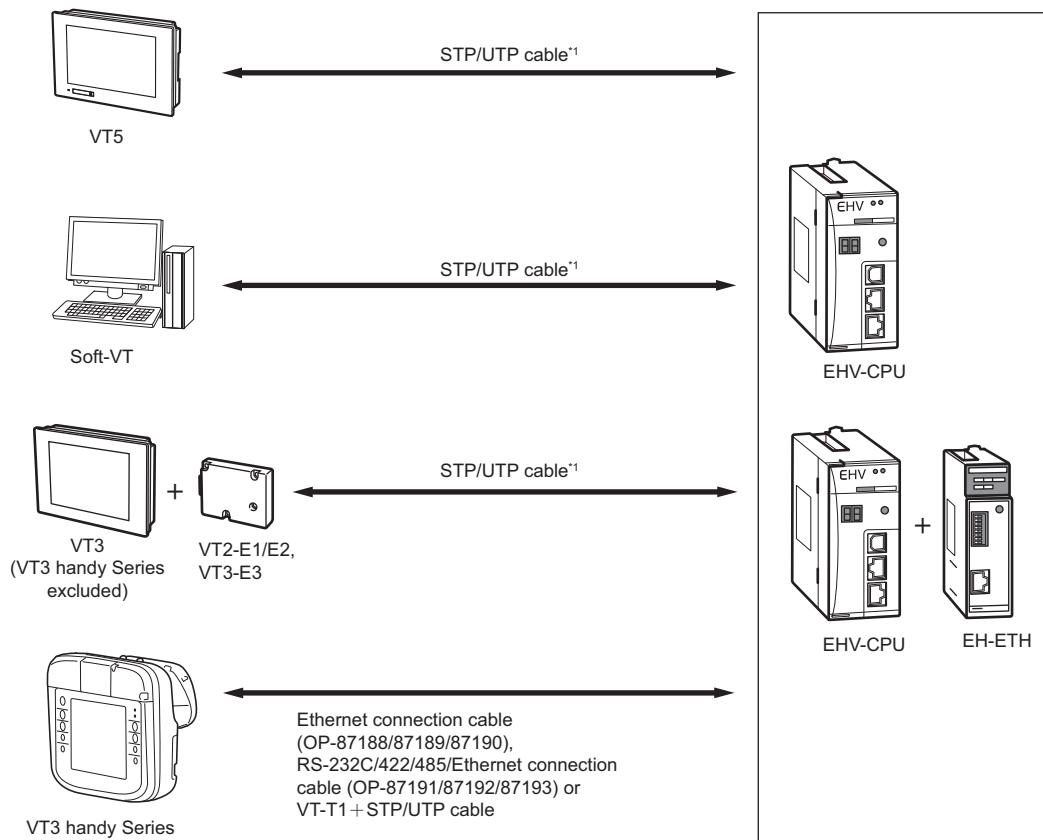
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

Cables used in different connection modes are described below.

■ Direct connection (1:1 connection)

Connection is made using a STP/UTP cable.

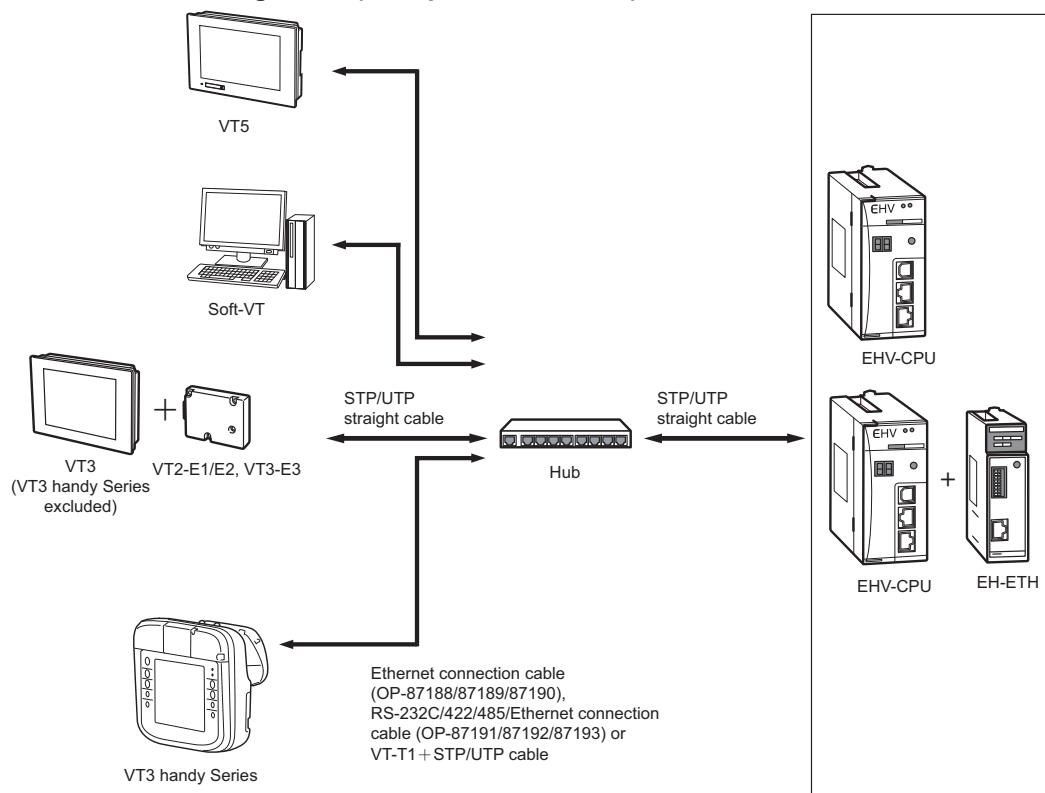


*1 A VT3-E3 whose serial number ends in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.



- When creating a 10BASE-T Ethernet, please use STP/UTP cables above CAT 3.
- When creating a 100BASE-TX Ethernet, please use STP/UTP cables above CAT 5.

■ Connection using a hub (multiple connections)



Connection of Hub with VT2-E1/E2, VT3-E3 or VT3 handy Series

- Use the STP/UTP straight cable.
- Do not connect the VT2-E1/E2, VT3-E3 or VT3 handy Series to the cascade port on the hub.

Connection of EHV-CPU or EH-ETH to a hub

- Please use a STP/UTP direct connection cable.
- Do not connect the EHV-CPU or EH-ETH to the cascade port of a hub.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

6-4 Unit Settings

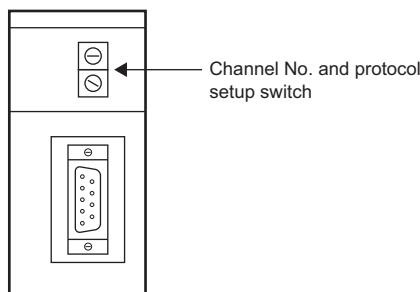
The following describes the settings of the Link Unit matched to the default communications conditions.

Method for making serial connections

■ S10V (UP Link Connector)

Setting is not required.

■ LQE060



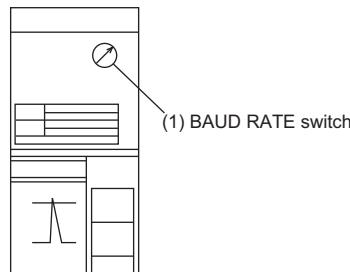
Setting the channel No. and protocol setup switch

Set the channel No. and protocol setup switch to the H-7338 protocol.

* Set CN1 and CN2 to have unique channel Nos.

Set Value	Communications method
8	H-7338 protocol, channel No. #0
9	H-7338 protocol, channel No. #1

■ LWE805



BAUD RATE switch

Set the BAUD RATE switch matched to the baud rate within the range 3 to 7.

The H-7338 terminal is selected by setting the switch to "7".

Set Value	Baud Rate
3	1200
4	2400
5	4800
6	9600
7	19200

■ 2α, 2αE, 2αH, 2αHf (host computer interface)

Setting is not required.

■ EHV Series

Communication condition can be set up with programming software "Control Editor" for EHV CPU made by Hitachi Industrial Equipment Systems Co.,Ltd.

Communication setting when RS-232C used

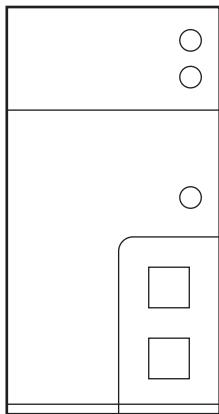
Setting item	Set value
Serial communication setting	Dedicated
Type of port	RS-232C
Baud rate	According to the setting of VT3
Communication steps	Step 2 (1:1)

Communications setting when RS-422A used

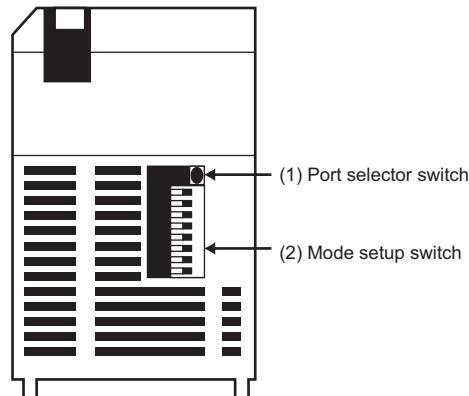
Setting item	Set value
Serial communication setting	Dedicated
Type of port	RS-422/485
Baud rate	According to the setting of VT3
Communication steps	Step 2 (1:1)
Internal termination resistor enabled	Check checkbox

■ EH-150 (serial port)

Front view



Bottom view



(1) Port selector switch

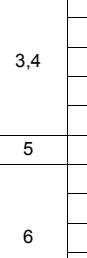
Switches the operating state of the serial port.

ON



OFF

(2) MODE setup switch

Setup Switch No.	Setting Item	Set Value	
	1 Remote operation	Set this matched to the operating conditions.	
	2 PORT1 operation	OFF	
	PORT1 baud rate	3	4
	4800 bit/s	ON	ON
	9600 bit/s	OFF	ON
	19200 bit/s	ON	OFF
	38400 bit/s	OFF	OFF
	5 PORT1 operation	ON	
	6 PORT2 baud rate	6	Port selector switch
	4800 bit/s	OFF	OFF
	9600 bit/s	ON	OFF
	19200 bit/s	OFF	ON
	38400 bit/s	ON	ON
7	Operation mode	OFF	
8			

(3) Communication steps

Communication steps can be set up with "LADDER EDITOR for Windows" ladder software made by Hitachi Industrial Equipment Systems Co.,Ltd.

Communication steps vary depending on the target PLC.

I/O No.	Set value	Communication steps	Target PLC
WRF037	H8000	Transfer control Steps 1	HIDIC-H Series
	HC000	Transfer control Steps 2'	EHV Series

* Transfer control steps 2 can not be used by port 2.



Set the VT5/VT3/DT station No. to "none".

■ HIDIC-H Series (Peripheral port)

● H-200/250/252/252C (Peripheral port)

Set the PLC's baud rate by the DIP switch on the CPU module.

H-200

No.	Function	2400 bit/s	4800 bit/s	9600 bit/s	Impossible
1	Baud Rate	ON	ON	OFF	OFF
2		ON	OFF	ON	OFF
3	Not used			Always OFF	



Change the VT3/DT baud rate to 9600 bit/s.

H-250

No.	Function	2400 bit/s	4800 bit/s	9600 bit/s	19200 bit/s
1	Baud Rate	ON	ON	OFF	OFF
2		ON	OFF	ON	OFF
3	I/O processing method			Refresh mode: ON, Direct mode: OFF	
4	Remote setting			In Remote mode: ON, During regular operation: OFF	

● H-300/302/700/702/1002/2000/2002 (Peripheral port)

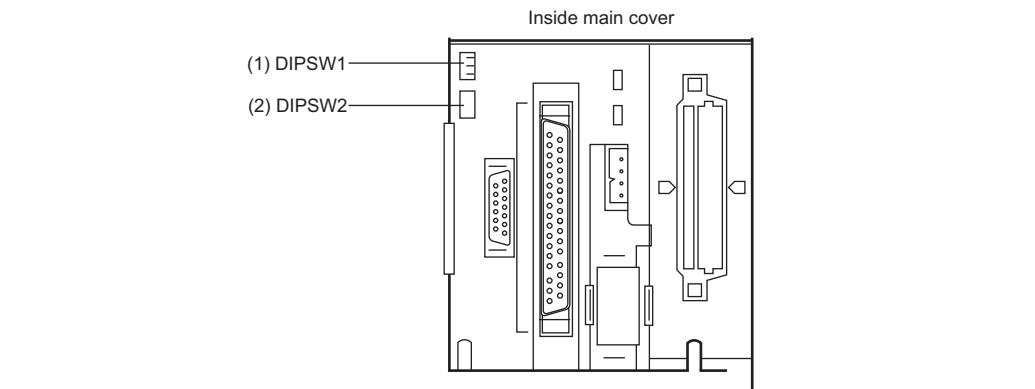
Change the PLC's baud rate by the connector wiring.

 "Wiring Diagram 2 (RS-232C: OP-24027)", "Wiring Diagram 3 (RS-232C: OP-24027)", page 6-8



Point Set the VT3/DT node No. to "none".

● H-4010 (Peripheral port)



(1)Setting DIPSW1

Setup Switch No.	Setting Item	Set Value	
	1 Programming/RUN execution memory	Set this matched to the operating conditions	
	2		
	3 Peripheral port 1 for setting baud rate	4800bit/s, 19200bit/s ¹	OFF
		38400 bit/s	ON
	4 Peripheral port 2 for setting baud rate	4800bit/s, 19200bit/s	OFF
		38400 bit/s	ON
5	RUN/ERR contact	Set this matched to the operating conditions	
6	I/O mode		

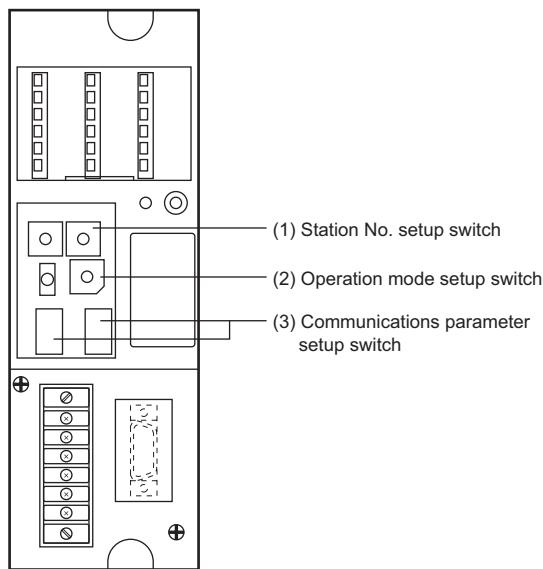
*1 Change the PLC's baud rate by the connector wiring.

 "Wiring diagram 2, "Wiring diagram 3, page 6-8

(2)Setting DIPSW2

Setup Switch No.	Setting Item	Set Value	
	1 Peripheral port 1	Exclusive port 1	OFF
	2 Peripheral port 2	Exclusive port 2	OFF
	3 Program upload	Set this matched to the operating conditions.	
	4 Program download		
	5 Loopback check	Regular operation	OFF
	6 Not used	-	OFF

■ COMM-H/2H



(1) Station No. setup switch

Set the station No. 10's digit and 1's digit both to "0".

10's Setting	1's Setting

(2) Operation mode setup switch

When communications is performed on the RS-232C interface, set to "0". When communications is performed on the RS-422A interface, set to "2".

Setting when RS-232C is Used	Setting when RS-422A is Used

(3) Communications parameter setup switch

Set the communications parameters.

Setup Switch No.	Setting Item	Set Value	
 ON ↔ OFF	1 Bit length	7 bits	OFF
	2		OFF
	3 Baud rate	19200 bit/s	ON
	4		ON
	5 Parity ON/OFF	ON	ON
	6 Odd/even parity	Even	ON
	7 Stop bit length	1 bit	OFF
	8 Checksum ON/OFF	ON	ON

Communication Condition Setting Ranges and Defaults During Serial Communication

● HIDIC-S10 α Series

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-422A 4-wire
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● EHV Series

Item	Setting Range	Default
Station No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A, 4-wire	RS-232C
Baud Rate	9600, 19200, 38400, 57600	38400bps
Data bits	7 bits	7 bits
Stop bits	1 bit	1 bit
Parity	Even	Even
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● HIDIC-H Series

Item	Setting Range	Default
Station Number ^{*1}	OFF, ON (0 to 31)	ON (0)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set to OFF in the case of the CPU direct link.

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series/Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port numbers of the connected units should be determined in advance.

The following table shows the settings corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



Make sure that the "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in VT STUDIO. ¹ Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.	P.6-22
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ²	P.6-23
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Use the PLC made by HITACHI to set communication conditions.	P.6-26

*1 Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

*2 You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.6-24
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.6-25
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use the PLC made by HITACHI to set communication conditions.	P.6-26

*1 Use "PLC Communication Condition" in VT3 system mode to confirm and change settings.

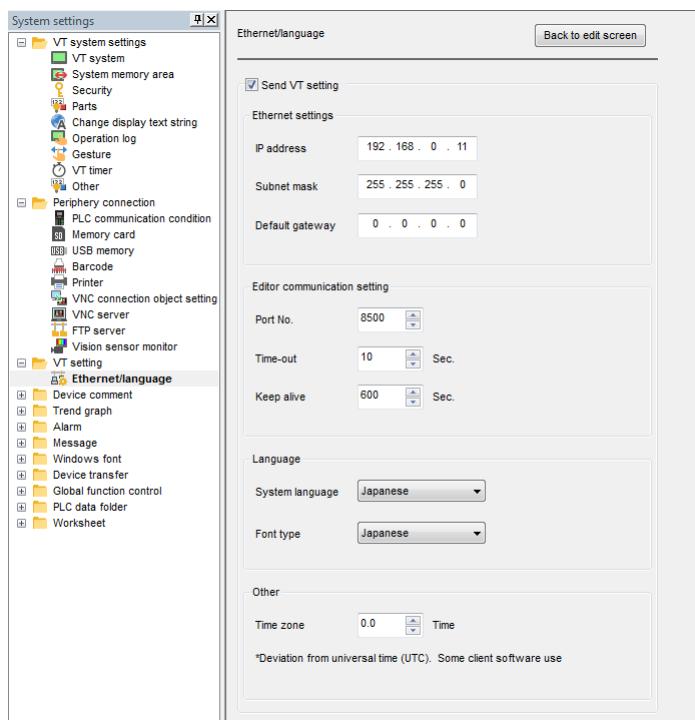
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.

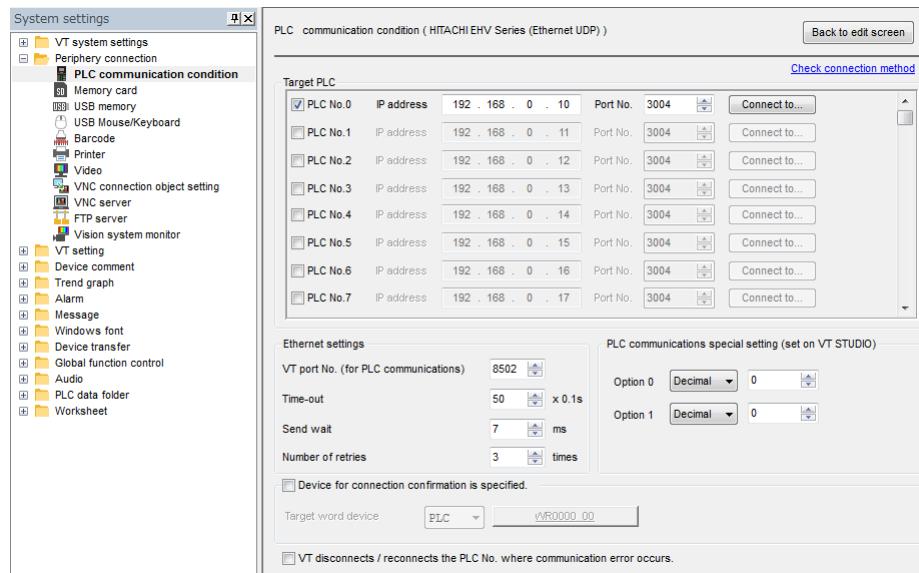


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long time out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.
IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023.
Also, take care not to use a port number already used by another device.

*3 Select "PLC device".
 "6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set up "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Hardware manual

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	**.**.**.**.**.**				
				OK	Cancel
				Next page	
Ethernet Setup (2/3)				OK	Cancel
Port No.	8500			Next page	
Time-out	10 s				
Keep alive	600 s				
				OK	Cancel
				Next page	
Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Setup	OK	Cancel
Routing setup				Next page	
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				
				OK	Cancel
				Next page	

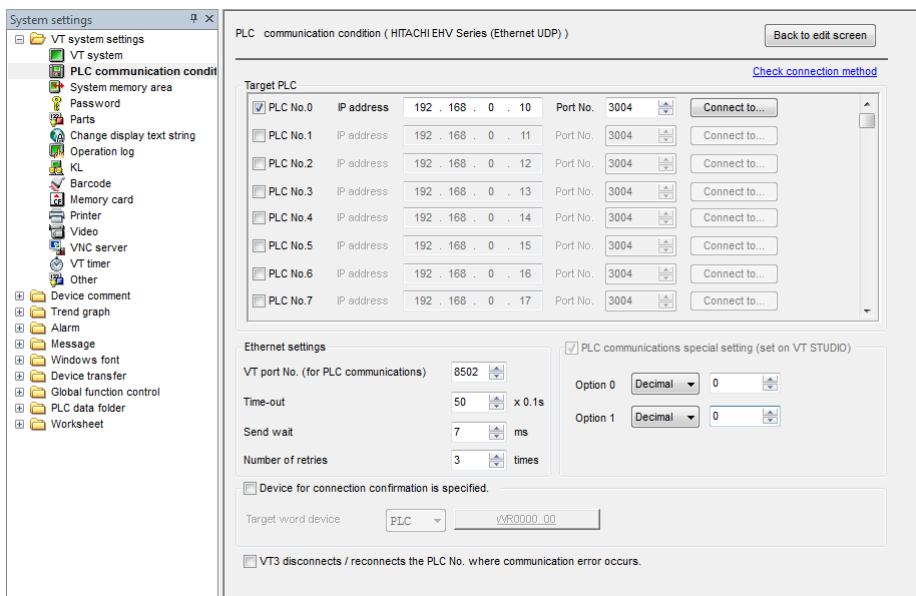
Item	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup ¹	Selects "Enable" only when using a router.

¹ "Chapter 8 ETHERNET", VT3 Series Hardware manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 ETHERNET CONNECTION", VT3 Series Hardware manual



Item		Description
Target PLC	PLC No.	To select the PLC No. (0 to 15) to be used.
	IP address ^{*1}	To set up the IP address to be assigned to the connection target PLC (checked PLC No.).
	Port No. ^{*2}	To set up the port No. (1024 to 65535) of the connection target PLC (checked PLC No.).
	List of connection targets	To select the connection target from the connection target list file, or adds connection targets.
Ethernet Settings	VT port No. (for PLC communications)	To set up the port No. (for PLC communications) (1024 to 65535) of VT3.
	Timeout	Unnecessary to set up normally. Please increase the time if the network communication traffic load is large.
	Send Wait	Unnecessary to set up normally. Please increase the time if the network communication traffic load is large.
	Retry	Unnecessary to set up normally. Please increase the number of retrials if it is used in a noisy environment.
PLC communications special settings (set on VT STUDIO)		Unnecessary to set up normally.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	To set up the device used for connection check when no communication occurs within a period of time.Unnecessary to set up normally.
VT3 disconnects / reconnects the PLC No. where communication error occurs ^{*4}		To cut off the communication with the PLC No. in communication error in case of checked.And, by regularly monitoring, to start communication again with the cut-off PLC No. when error is recovered.

*1 In the same LAN, an IP address cannot be the same as the one of another equipment.
An IP address should be in the format of XXX.XXX.XXX.XXX (XXX is 0-255).

*2 Do not use 0 to 1023 as the new port No. when changing the port No.. And do not to use the port No. that is already in use.

*3 "PLC device" can be selected.

VT3 Series Reference Manual, "6-7 Device Settings"

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those in VT STUDIO.

"5-4 PLC Communication Condition", VT3 Series Hardware Manual

6-4 Unit Settings

■ EH-ETH Setting

When setting up EH-ETH, you need perform I/O assignment with the Control Editor, and set up IP address and port No. with a browser.

● To set up with the Control Editor

Assign an I/O.

Item	Description
Set up a module	Select EH-ETH



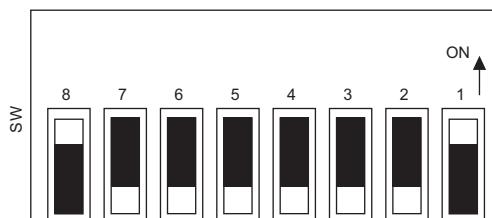
- If not in online mode, it is not possible to perform I/O assignment.
If I/O pre-assignment is not performed with the Control Editor, then it is not possible to access the Ethernet module with a browser. To set up using a browser.

DIP switch setting

You need to use the DIP switch of EH-ETH to set up the temporary address for accessing the Ethernet module using a browser.

SW3 to 8 are used to set up the lowest byte of the IP address. SW1 to SW3 Fixed refers to 192.168.0.

Example: To set 192.168.0.1 as the temporary address



Through connecting the Ethernet port of PC to the Ethernet port of EH-ETH using a LAN cable, you can input a temporary address in the address field of the browser, in order to access EH-ETH.

EH-ETH Information

Item	Description
IP address ^{*1}	To set up the IP address of PLC
Subnet mask	To set up according to VT3
Default gateway	To set up according to VT3

*1 In the same LAN, an IP address cannot be the same as the one of another equipment. An IP address should be in the format of XXX.XXX.XXX.XXX (XXX is 0-255).

Task Code Information

	Item	Setting
Task code port 1	Protocol	UDP/IP
	Port No	Please set up according to VT3 ^{*1}
Task code port 2	Protocol	UDP/IP
	Port No	Please set up according to VT3 ^{*1}
Task code port 3	Protocol	UDP/IP
	Port No	Please set up according to VT3 ^{*1}
Task code port 4	Protocol	UDP/IP
	Port No	Please set up according to VT3 ^{*1}

*1 1 port is connected to one VT3. If 1 port is connected to two or more VT3, then it can't communicate.

Reset the DIP switch

Please disconnect power of the PLC, set all the DIP switches to OFF position, and turn on power of the PLC again.

■ EHV series CPU unit setting

Control Editor can be used to set up the EHV series CPU unit.

Please set up the following items in the IP address settings.

Item	Description
IP address ^{*1}	To set up the IP address of PLC
Subnet mask	To set up according to VT
Default gateway	To set up as required

*1 In the same LAN, an IP address cannot be the same as the one of another equipment. An IP address should be in the format of XXX.XXX.XXX.XXX (XXX is 0-255).

Please set up the following items in the Ethernet communication (task code) settings.

	Setting
Port 1	Port 1 enabled
	Set up the port No. according to VT3
	Protocol UDP/IP fixed
Port 2	Port 2 enabled
	Set up the port No. according to VT3
	Protocol UDP/IP fixed
Port 3	Port 3 enabled
	Set up the port No. according to VT3
	Protocol UDP/IP fixed
Port 4	Port 4 enabled
	Set up the port No. according to VT3
	Protocol UDP/IP fixed

*1 Please connect one VT3 to one port No. If 2 or more VT3 units are connected, communication may be abnormal.



After setup, you have to turn on power of the PLC again.

6-5 Available Devices

● HIDIC-S10 α Series

	Device	Address
Bit Devices ^{*5}	Input relay	X000 to XFFF
	Output relay	Y000 to YFFF
	Internal relay	R000 to RFFF
	Global link	G000 to GFFF
	Event ^{*1}	E000 to E3FF
	Keep relay ^{*1}	K000 to KFFF
	ON delay timer (contact) ^{*1}	T000 to T1FF
	One-shot timer (contact) ^{*1}	U000 to U7FF
	Up-down counter (contact)	C000 to C0FF
	Transferring register ^{*2}	J000 to JFFF
	Receiving register ^{*2}	Q000 to QFFF
	Inner-expanding register ^{*2}	M000 to MFFF
	Inner-expanding register ^{*2}	A000 to AFFF
	System register ^{*2}	S000 to SBFF
	Workspace register ^{*2}	LB0000 to LBFFFF
	Register for ladder converter ^{*2}	LR0000 to LR0FFF
	Register for ladder converter ^{*2}	LV0000 to LV0FFF
	Input relay ^{*4}	XW000 to XWFF0
	Output relay ^{*4}	YW000 to YWFF0
	Internal relay ^{*4}	RW000 to RWFF0
	Global link ^{*4}	GW000 to GWFF0
	E-word ^{*4}	EW400 to EWFF0
	Event ^{*4}	EV000 to EV3F0
	Keep relay ^{*1,*4}	KW000 to KWFF0
	ON delay timer (contact) ^{*1,*4}	TW000 to TW1F0
	One-shot timer (contact) ^{*1,*4}	UV000 to UW0F0
	Up-down counter (contact) ^{*4}	CW000 to CW0F0
	ON delay timer (set)	TS000 to TS1FF
	ON delay timer (count)	TC000 to TC1FF
	One-shot timer (set)	US000 to US7FF
	One-shot timer (count)	UC000 to UC7FF
	Up-down counter (set)	CS000 to CS0FF
	Up-down counter (count)	CC000 to CC0FF
Word Devices	Work register	FW000 to FWBFF
	Data register ^{*6}	DW000 to DWFFF
	Extended register ^{*3}	MS0000 to MSFFFF
	Shift register ^{*2}	JV000 to JWFF0
	Receiving register ^{*2}	QW000 to QWF0
	Inner-expanding register ^{*2}	MWW000 to MWFF0
	Inner-expanding register ^{*2}	AV000 to AWFF0
	System register ^{*2}	SW000 to SWBF0
	Workspace register ^{*2}	LBW0000 to LBWFFF0
	Register for ladder converter ^{*2}	LRW0000 to LRWOFF0
	Register for ladder converter ^{*2}	LVW0000 to LVWOFF0
	Word workspace register ^{*2}	LWW0000 to LWWFFF
	Long word workspace register	LLL0000 to LLL1FFF
	Floating register	LF0000 to LF1FFF
	Word workspace register ^{*2}	LXW0000 to LXW3FFF
	Long word workspace register ^{*2}	LML0000 to LML1FFF
	Floating register	LG0000 to LG1FFF
	Memory direct ^{*7}	MD100000 to MD4FFFFE

*1 Only contacts are used.

*2 Available only for 2 α , 2 α E and 2 α H, S10mini, S10V .

*3 64 K words can be accessed from the leading address inside extended memory.

*4 Value divisible by 16.

*5 Bit 0 of the bit device corresponds to the MSB of the word device.

*6 On the 4 α , 4 α F and 4 α H, the address range becomes DW000 to DW7FF.

*7 Value divisible by 2.

Point

- Available devices are restricted according to the product model. Check the manual for the respective model.
- Memory direct is a device for writing directly to memory. Before using memory direct, make sure there will be no problems with the device if it is changed.

● EHV Series

	Device	Address
Bit Device	External input relay	X00000 to X05A95
	External output relay	Y00000 to Y05A95
	Remote input relay	X10000 to X49A95
	Remote output relay	Y10000 to Y49A95
	Extended external input relay	EX00000 to EX5A7FF
	Extended external output relay	EY00000 to EY5A7FF
	Internal output relay	R000 to R7BF
	Special internal output relay	R7C0 to RFFF
	1st CPU link	L00000 to L03FFF
	2nd CPU link	L10000 to L13FFF
	3rd CPU link	L20000 to L23FFF
	4th CPU link	L30000 to L33FFF
	5th CPU link	L40000 to L43FFF
	6th CPU link	L50000 to L53FFF
	7th CPU link	L60000 to L63FFF
	8th CPU link	L70000 to L73FFF
	Data area	M00000 to M7FFFF
	ON delay timer	TD0000 to TD2559
	OFF delay timer	TDN0000 to TDN2559
	Single-shot timer	SS0000 to SS2559
	Watchdog timer	WDT0000 to WDT2559
	Mono-stable timer	MS0000 to MS2559
	Accumulation timer	TMR0000 to TMR2559
Word Device	Up counter	CU0000 to CU2047
	Ring counter	RCU0000 to RCU2047
	UP/DOWN counter	CT0000 to CT2047
	External input relay	WX0000 to WX05A7
	External output relay	WY0000 to WY05A7
	Remote input relay	WX1000 to WX49A7
	Remote output relay	WY1000 to WY49A7
	Extended external input relay	WEX0000 to WEX5A7F
	Extended external output relay	WEY0000 to WEY5A7F
	Word internal output	WR0000 to WREFFF
	Word special internal output	WRF000 to WRFFF
	1st CPU link	WL0000 to WL03FF
	2nd CPU link	WL1000 to WL13FF
	3rd CPU link	WL2000 to WL23FF
	4th CPU link	WL3000 to WL33FF
	5th CPU link	WL4000 to WL43FF
	6th CPU link	WL5000 to WL53FF
	7th CPU link	WL6000 to WL63FF
	8th CPU link	WL7000 to WL73FF
	Data area	WM0000 to WM7FFF
	Timer/counter (procedure value)	TC0000 to TC2559
	Network I/O area	WN00000 to WN1FFFF



- When CPU data Link is used, the devices of PLC that are not connected with VT3/DT cannot be used.
- Available devices are restricted according to the product model. Check the manual for the respective model.

● HIDIC-H Series

	Device	Address
Bit Devices	External input relay	X00000 to X05A95
	External output relay	Y00000 to Y05A95
	Remote input relay	X10000 to X49995
	Remote output relay	Y10000 to Y49995
	Internal output relay	R000 to R7BF
	Primary CPU link	L00000 to L03FFF
	Secondary CPU link	L10000 to L13FFF
	Data area	M0000 to M3FFF
	ON delay timer	TD000 to TD1023
	One-shot timer	SS000 to SS1023
	Watchdog timer	WDT000 to WDT1023
	Mono-stable timer	MS000 to MS1023
	Accumulation timer	TMR000 to TMR1023
	Up counter	CU000 to CU2047
	Ring counter	RCU000 to RCU2047
	Up-down counter	CT000 to CT2047
Word Devices	External input relay	WX0000 to WX05A7
	External output relay	WY0000 to WY05A7
	Remote input relay	WX1000 to WX4997
	Remote output relay	WY1000 to WY4997
	Word internal output	WR0000 to WRC3FF
	Primary CPU link	WL0000 to WL03FF
	Secondary CPU link	WL1000 to WL13FFF
	Data area	WM000 to WM3FF
	Timer/counter (procedure value)	TC000 to TC2047
	Network I/O area	WN0000 to WN7FFF

Point

- When CPU Data Link is used, the PLC devices that are not connected with VT3/DT cannot be used.
- Available devices are restricted according to the product model. Check the manual for the respective model.

■ Changing the Leading Address of Hitachi S10 α Series Extended Memory Area(MS)

The following describes how to change the leading address of extended register (MS) on the Hitachi S10 α Series.

● When using the VT3

- 1** Set the unit to the System mode.
 VT 3 Series Reference Manual "Chapter 5 SYSTEMMODE"
- 2** Touch **Communication Setup** in the System Mode screen.
- 3** Touch **Next page** in the Communication Setup (1/2).
- 4** Touch the "Special Setup"  in the Serial Communications Setting 2/2 screen.
- 5** Touch **[DEC]** in the Serial Communications Setting screen to change to **[HEX]**.
- 6** Touch the data value display area () at each of "Option 0" and "Option 1", and set the Hex value using the numeric keypad. (Apply) by **[ENT]**.
 Set a value (0 to 3E0000 Hex) obtained by subtracting 100000 (Hex) from the leading address to be accessed as the Hex value. Enter the upper two digits (0 to 3E Hex) at "Option 0" and the lower four digits (0 to FFFF Hex) at "Option 1".

For example To set the leading address to "180000 (Hex)"
 Set "8" (Hex) to "Option 0" and "0000 (Hex)" to "Option 1".

For example To set the leading address to "32F000 (Hex)"
 Set "22" (Hex) to "Option 0" and "F000 (Hex)" to "Option 1".
- 7** The leading address is written to the VT3 when **[OK]** on the Serial Communications Setting (option) screen is touched.
- 8** Exit the System mode, and move to the Run mode.

6-5 Available Devices

● When using the DT

Change the setting on DT BUILDER.

1 Display PLC Communication Setup window.

For DT STUDIO

Select "List of Connected Targets". After selecting a connected target, click the "Setup Details" button. Then select "PLC Communication" option from the "Terminator Setup Details" dialog box.

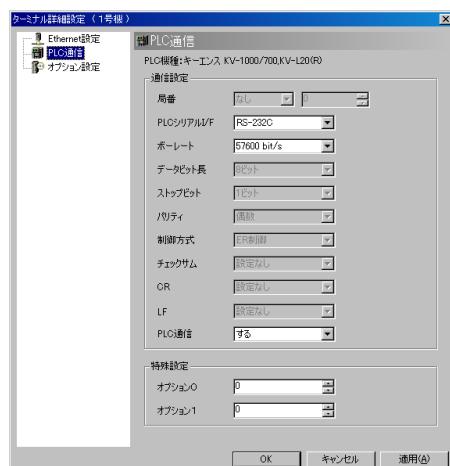
For DT BUILDER

Select [DT BUILDER(K)] [Connection destination/system parameters(S)] from menu in that order, and click the "System parameters" button.

2 Set Hex numerical values to "Option 0" and "Option 1" in the special settings.

Set a value (0 to 3E0000 Hex) obtained by subtracting 100000 (Hex) from the leading address to be accessed as the Hex value. Enter the upper two digits (0 to 3E Hex) at "Option 0" and the lower four digits (0 to FFFF Hex) at "Option 1".

For DT STUDIO



For DT BUILDER



Example 1 To set the leading address to "180000 (Hex)"

Set "8" (Hex) to "Option 0" and "0000 (Hex)" to "Option 1".

Example 2 To set the leading address to "32F000 (Hex)"

Set "22" (Hex) to "Option 0" and "F000 (Hex)" to "Option 1".

3 Click the "OK" button.

6-6 Error Messages and Troubleshooting

The communication errors that occur when VT5/VT3/Soft-VT is connected to a PLC made by HITACHI Corporation and Hitachi Industrial Equipment Systems Co.,Ltd. are described.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

List of Communication Errors in Ethernet Connections

When Ethernet connection to a PLC is made, the error messages are as follows.

When an error occurs, an error message will be displayed in the bottom left part of the VT5/VT3/Soft-VT unit screen.

Message displayed	Cause	Solution
Time Out Error(++)	A timeout error occurs on the PLC with station No. ++.	<ul style="list-style-type: none"> Please check the network. Perform communication setting once again.
No Ethernet unit	Ethernet unit VT2-E1/E2 or VT3-E3 is not connected.	<ul style="list-style-type: none"> Please turn off the power of the VT3 unit, install VT2-E1/E2 and VT3-E3, and turn on the power of the VT3 unit again.
Protocol stack error	Protocol stack is being started.	Please wait.
Link error	Link error of the Ethernet unit.	<ul style="list-style-type: none"> Please check if the connection cable is connected correctly. Please check if the LINK LEDs of VT2-E1/E2, VT3-E3, VT3 handy Series and the target PLC light up.
PLCError[**(++)]	A error response ** is sent out from the PLC with station No. ++.	For contents of the response **, please refer to manuals of PLCs of respective companies and manuals of Ethernet units.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

7

CONNECTING TO YASKAWA ELECTRIC CORPORATION PLCS

This chapter describes how to connect a PLC made by YASKAWA Electric corporation.

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7-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/Soft-VT/DT and PLC via serial interface or Ethernet.

- (1) Make sure the PLC, link unit and Ethernet unit can be connected to VT5/VT3/Soft-VT/DT.
- (2) Check whether or not a CPU, link unit or Ethernet settings are required.
- (3) Confirm the target PLC.

"Procedure before Starting Communication", page 18

Serial connections

■ Connection with MP Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
MP2200, MP2300	217IF-01	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 6	P.7-18	MP series ^{*3} MP/CP series ^{*3*4}
			VT3(PORT3)	Wiring diagram 31		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H24		
			VT5(COM1)/VT3-W4□	Wiring diagram W24		
			VT3-V7R(CN2)	Wiring diagram R6		
	218IF-01	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 9		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H42		
			VT5(COM2) ^{*2} /VT3-W4□A	Wiring diagram W42		
			VT3-V7R(CN3)	Wiring diagrams R9		
	MEMOBUS port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 6	P.7-16	MP series ^{*3} MP/CP series ^{*3*4}
			VT3(PORT3)	Wiring diagram 31		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H24		
			VT5(COM1)/VT3-W4□	Wiring diagram W24		
			VT3-V7R(CN2)	Wiring diagram R6		
MP920, MP930	217IF ^{*1}	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 10		
			VT3(PORT3)	Wiring diagram 32		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H26		
			VT5(COM1)/VT3-W4□	Wiring diagram W26		
			VT3-V7R(CN2)	Wiring diagram R10		
	217IF ^{*1}	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 7		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ^{*2} /VT3-W4□A	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R7		

^{*1} Cannot be connected to the MP930.

^{*2} VT5-W07M is not supported.

^{*3} Not supported by Soft-VT.

^{*4} VT5 series is not supported by CP series.

■ Connection with CP Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
CP316, CP317	217IF	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 8	P.7-16	MP/CP Series ^{*1}
			VT3(PORT3)	Wiring diagram 33		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H25		
			VT3-W4T/W4M/W4G	Wiring diagram W25		
			VT3-V7R(CN2)	Wiring diagram R8		
		RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 7		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT3-W4T/W4M/W4GA	Wiring diagram W41		
	217IF		VT3-V7R(CN3)	Wiring diagram R7		

^{*1} Not supported by Soft-VT.

7-1 Checking Operation before Connection

■ Connection with MEMOCON-SC Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
U84, U84J	JAMSC-C8110	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.7-21	MEMOCON-SC Series ^{1,2}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagrams R1		
U84S	JAMSC-C8610	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
GL40S	Port 1, JAMSC-IF61, JAMSC- IF41A	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.7-20	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
GL60S, GL60H, GL70H	JAMSC-IF60, JAMSC- IF61	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.7-21	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
GL120, GL130	MEMOBUS port JAMSC-120MON26100, JAMSC-120NOM27100	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.7-20	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
MICRO	COMM port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 4	P.7-21	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H23		
			VT3-W4T/W4M/W4G	Wiring diagram W23		
			VT3-V7R(CN2)	Wiring diagram R4		
PROGIC-8	COMM port	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 5	P.7-21	
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R5		
MICRO	COMM port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	P.7-22	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H22		
			VT3-W4T/W4M/W4G	Wiring diagram W22		
			VT3-V7R(CN2)	Wiring diagram R3		
PROGIC-8	COMM port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 2	P.7-23	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21		
			VT3-W4T/W4M/W4G	Wiring diagram W21		
			VT3-V7R(CN2)	Wiring diagram R2		

¹*1 Not supported by the VT5 Series.²*2 Not supported by Soft-VT.

Ethernet connections

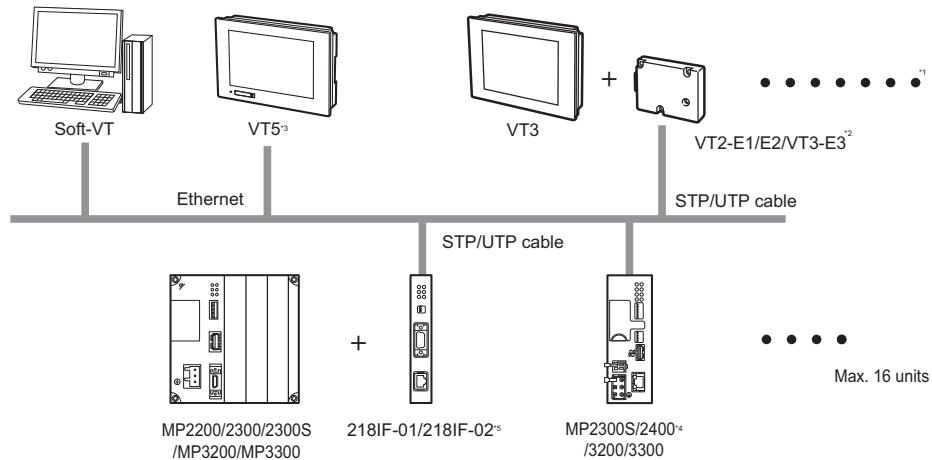
■ MP Series Connections

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
MP Series	MP2200 MP2300	218IF-01	P.7-31	MP Series (Ethernet)
	MP2310 MP2300S	Internal Ethernet port direct link 218IF-01	P.7-30 P.7-31	
	MP2400	Internal Ethernet port direct link	P.7-30	
	MP3200 MP3300	Internal Ethernet port direct link 218IF-01/218IF-02	P.7-30	
*1 In the case of MP series (Ethernet), the device range is restricted.				MP series (Ethernet) ¹ MP3000 series (Ethernet)

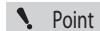
7-2 System Configuration

System configuration for Ethernet connections

This section describes the system configuration of the VT5/VT3 Series and the MP Series.



- *1 Please note that with the increase in the number of VT5 and VT3 Series units connected, the communications load also increases.
- *2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.
- *3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.
- *4 Automatic reception is available only when one VT5/VT3 Series is connected to one MP2300S/2400/3200/3300. Create a ladder program that uses the MSG-RCV function to connect multiple VT5 and VT3 Series units.
 - "Setting when function Auto-receive used", page7-30
 - "Settings when MSG-RCV/MSG-RCVE function is used", page7-31
- *5 218IF-02 can be used if the PLC is MP3200/MP3300.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

7-3 Wiring Diagrams for Connections

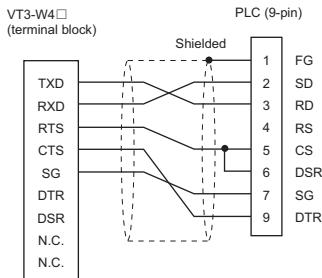
Wiring diagrams for serial connections

This section describes wiring of connector cables.

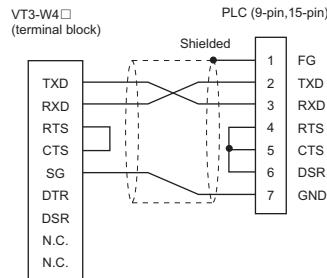
The Wiring Diagrams recommended by YASKAWA ELECTRIC CORPORATION may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the Wiring diagrams in this manual.

■ Connection to T5 Series (COM1), VT3-W4□ (RS-232C)

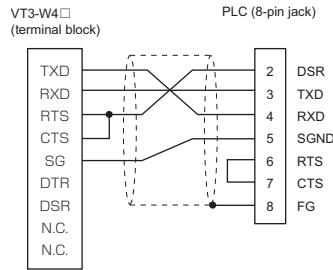
● Wiring diagram W20 (RS-232C)



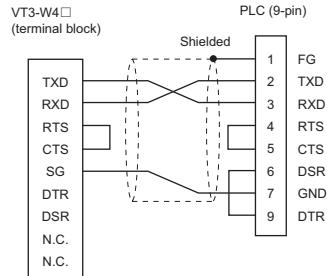
● Wiring diagram W21 (RS-232C)



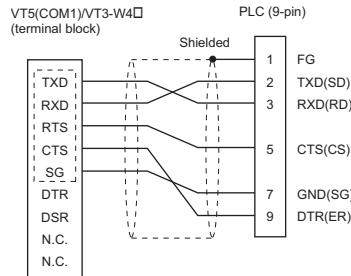
● Wiring diagram W22 (RS-232C)



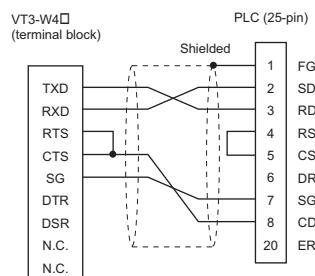
● Wiring diagram W23 (RS-232C)



● Wiring diagram W24 (RS-232C)



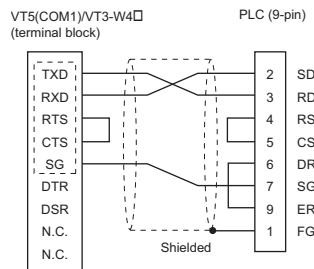
● Wiring diagram W25 (RS-232C)



* ----- indicates a terminal diagram for the VT5 Series.

7-3 Wiring Diagrams for Connections

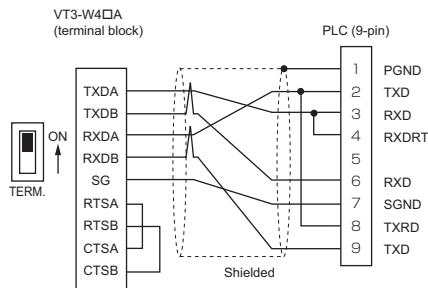
● Wiring diagram W26 (RS-232C)



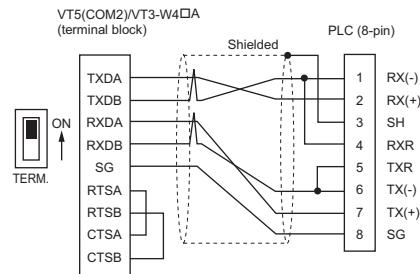
* indicates a terminal diagram for the VT5 Series.

■ Connection to VT5 Series(COM2), VT3-W4□ (RS-422A)

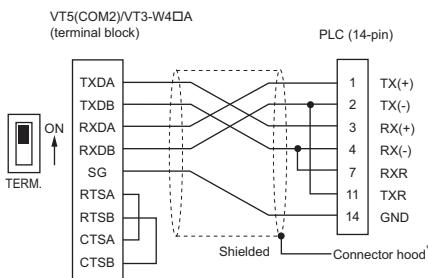
● Wiring diagram W40 (RS-422A)



● Wiring diagram W41 (RS-422A)



● Wiring diagram W42 (RS-422A)

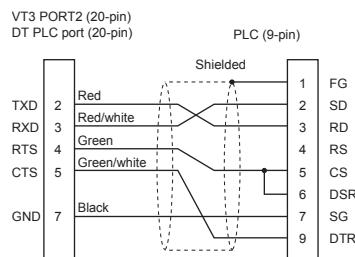


* Use D-type (the third-type) grounding for the connector hood.

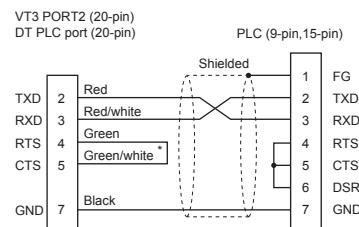
7-3 Wiring Diagrams for Connections

■ Connection to VT3 series/DT series

● Wiring Diagram 1 (RS-232C: OP-24027)

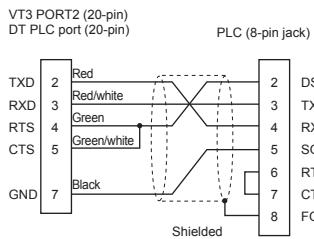


● Wiring Diagram 2 (RS-232C: OP-24027)

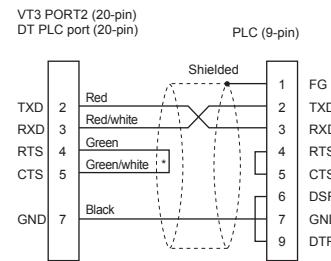


* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 3 (RS-232C: OP-24027)

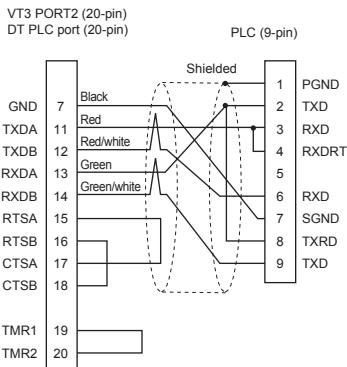


● Wiring Diagram 4 (RS-232C: OP-24027)

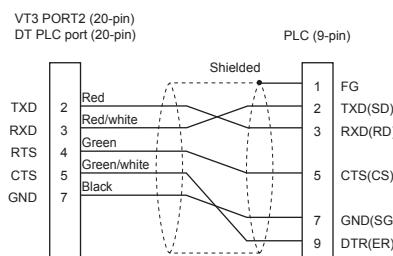


* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 5 (RS-422A 4-wire: OP-24028)

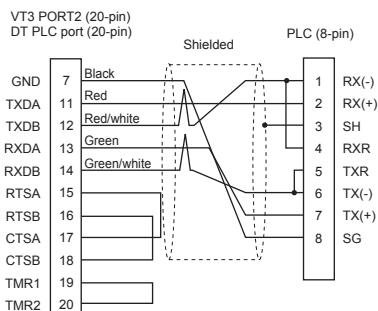


● Wiring Diagram 6 (RS-232C: OP-24027)

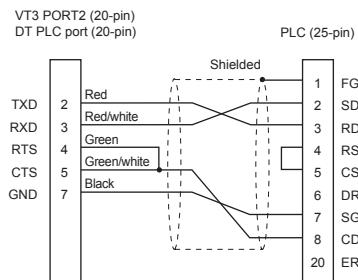


For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

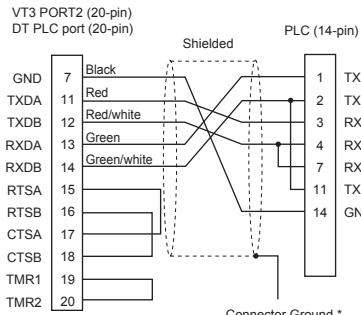
● **Wiring Diagram 7**
(RS-422A: OP-24028)



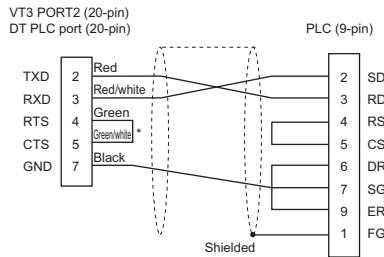
● **Wiring Diagram 8**
(RS-232C: OP-24027)



● **Wiring Diagram 9**
(RS-422A: OP-24028)



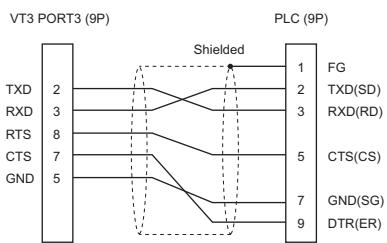
● **Wiring Diagram 10**
(RS-232C: OP-24027)



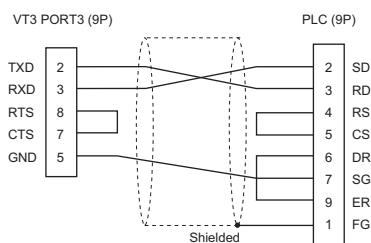
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

■ Connection to VT3 series (PORT3)

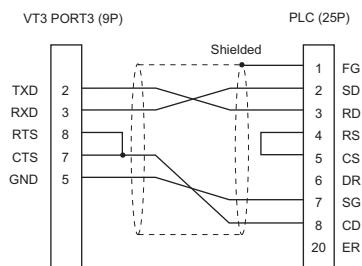
● Wiring Diagram 31 (RS-232C)



● Wiring Diagram 32 (RS-232C)

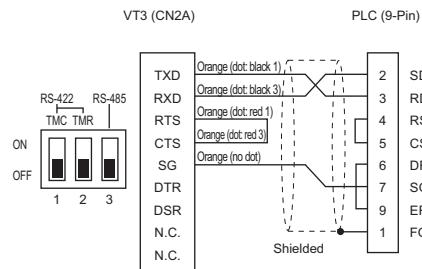


● Wiring Diagram 33 (RS-232C)



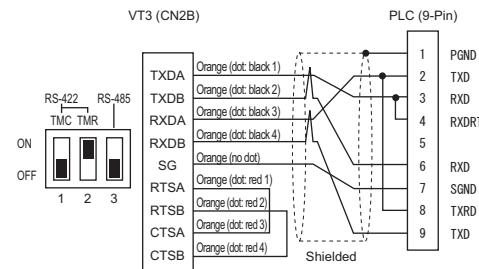
● Wiring Diagram H26 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



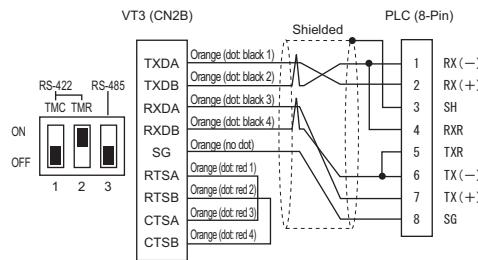
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



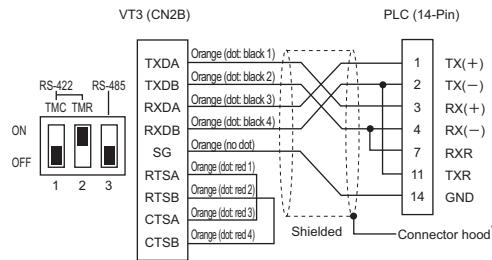
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



● Wiring Diagram H42 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m

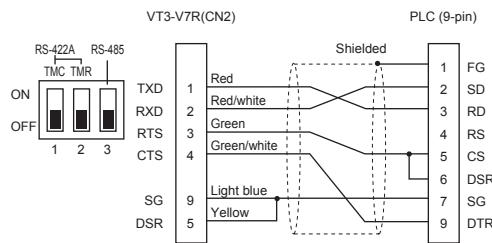


* Use D-type (the third-type) grounding for the connector hood.

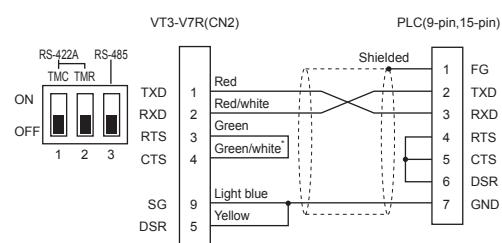
7-3 Wiring Diagrams for Connections

■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-232C: VT-C5R1)

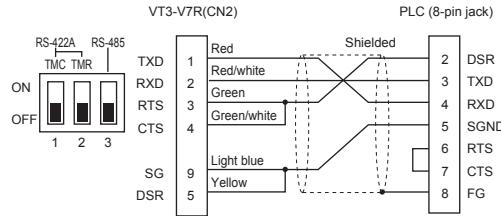


● Wiring Diagram R2 (RS-232C: VT-C5R1)

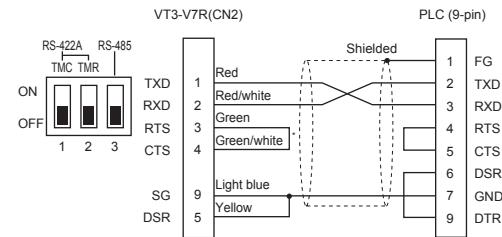


* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-232C: VT-C5R1)

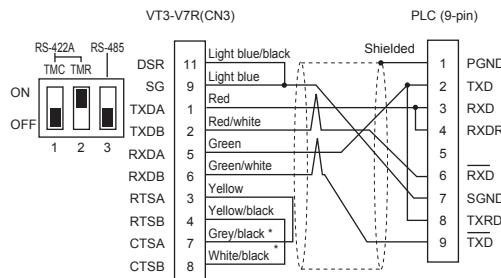


● Wiring Diagram R4 (RS-232C: VT-C5R1)



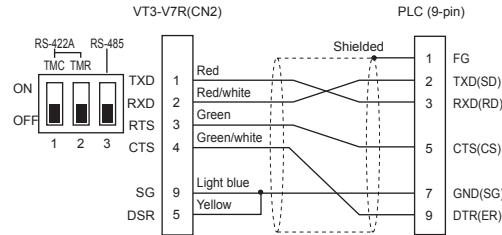
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R5 (RS-422A 4-wire: VT-C5R2/C15R2)



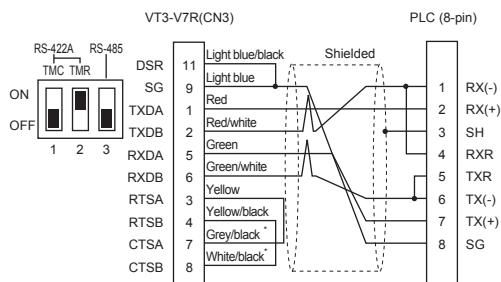
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R6 (RS-232C: VT-C5R1)



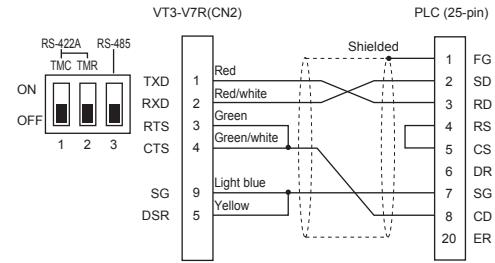
7-3 Wiring Diagrams for Connections

● Wiring Diagram R7 (RS-422A: VT-C5R2/C15R2)



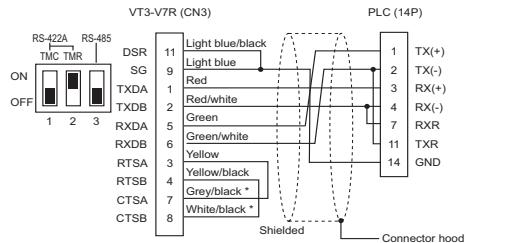
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R8 (RS-232C: VT-C5R1)



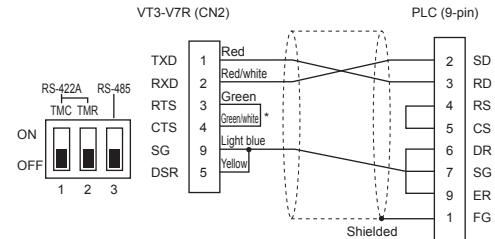
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R9 (RS-422A: VT-C5R2/C15R2)



* No loopback is used in the connector.
The signal line must be soldered.

● Wiring Diagram R10 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

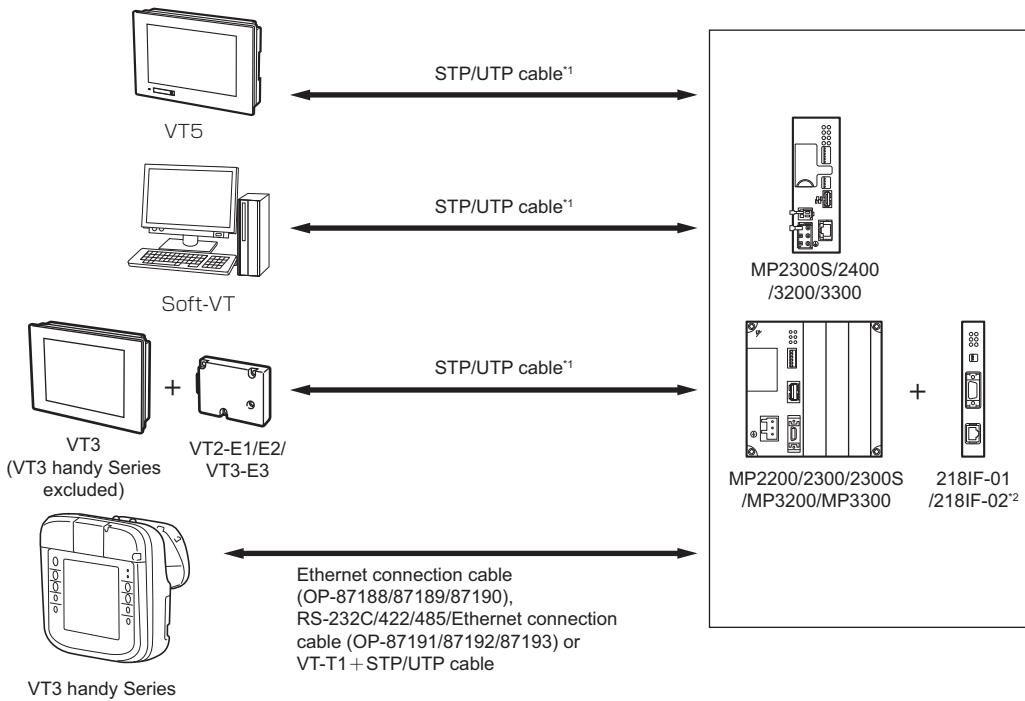
7-3 Wiring Diagrams for Connections

Ethernet Connection Methods

The following describes the cables used for the Ethernet connection for each of the connection types.

■ Direct connection (1:1)

Use the STP/UTP cable for the connection.



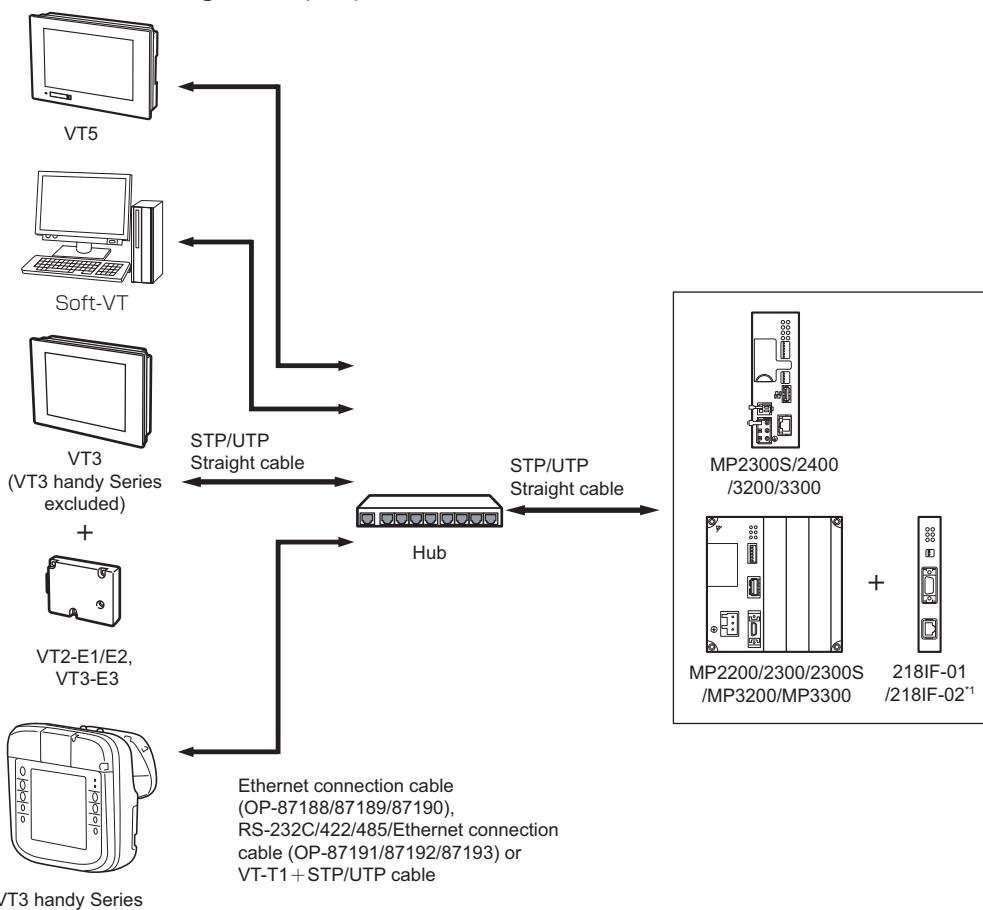
*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function.
To connect any other device directly to a PLC, use an STP/UTP cross cable.

*2 218IF-02 can be used if the PLC is MP3200/MP3300.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable.

■ Connection using a hub (1:N)



Connection of the VT5 Series, VT2-E1/E2, VT3-E3 and VT3 handy Series to a hub

- Use the STP/UTP straight cable.
- The VT5 Series, VT2-E1/E2, VT3-E3 and VT3 handy Series should be connected to a port other than the cascade port on a hub.

The connection between MP Series and hub

- Use the STP/UTP straight cable.
- Do not connect the MP Series to a cascade port on the hub.

*1 218IF-02 can be used if the PLC is MP3200/MP3300.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable.

The following describes the settings of the Link Unit matched to the default communications conditions.

Method for making serial connections

■ MP920, MP930, 217IF

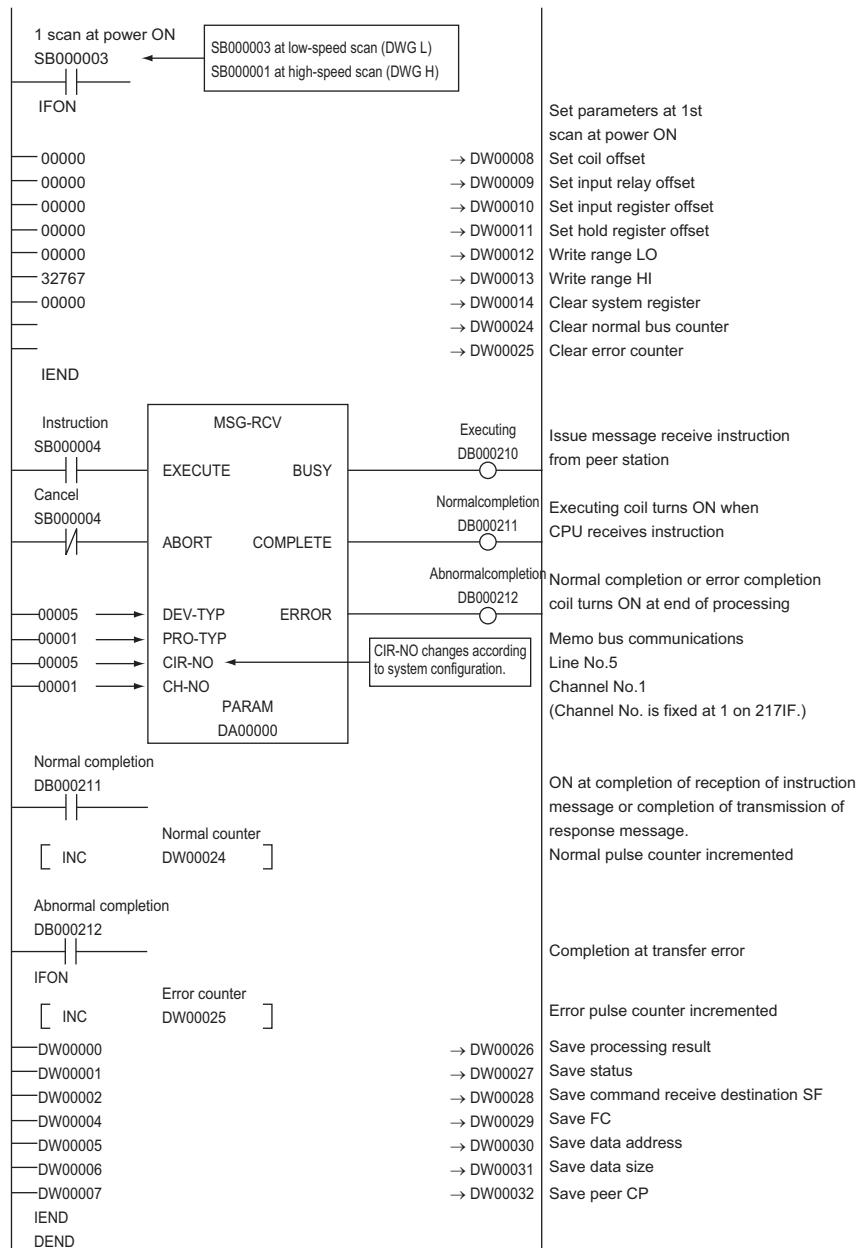
● Setting the transmission protocol

Set the transmission protocol in the module configuration of YASKAWA ELECTRIC Engineering workstation.

Item	Setting Item	Settings
Transmission protocol	Sets the type of transmission protocol.	MEMOBUS
Master/slave	Sets master or slave.	Slave
Device address	Set the node No.	01
Serial I/F	Sets the serial interface. RS-232C, RS-485	Set to match the operating conditions. Set to RS-485 when connecting via the RS-422A interface.
Transmission mode	Sets the transmission mode.	RTU
Data length	Sets the number of Data bit.	8 bits
Parity bit	Sets the parity.	Even
Stop bit	Sets the stop bit.	1 stop
Baud Rate	Sets the baud rate.	19.2K
Transmission delay	Sets the send delay time.	Not specified
Auto-receive	Sets auto-receive to "Not specified".	Not specified

● Setting the transmission format

Define the transmission format of the port by the MSG-RCV function in the ladder program.



Item	Setting Item	Settings	
DEV-TYP	Transmission device type	8	CPU MEMOBUS port
		5	217IF
PRO-TYP	Transmission protocol	1	MEMOBUS
CIR-NO	Line No.	-	Please set line numbers based on the port numbers of MEMOBUS or unit composition.
CH-NO	Transfer buffer channel No.	1	
PARAM	Leading address of set data	-	Sets the leading address of the set data, etc.

■ 217IF-01, 218IF-01

● Protocol Setup for 217IF-01 and 218IF-01

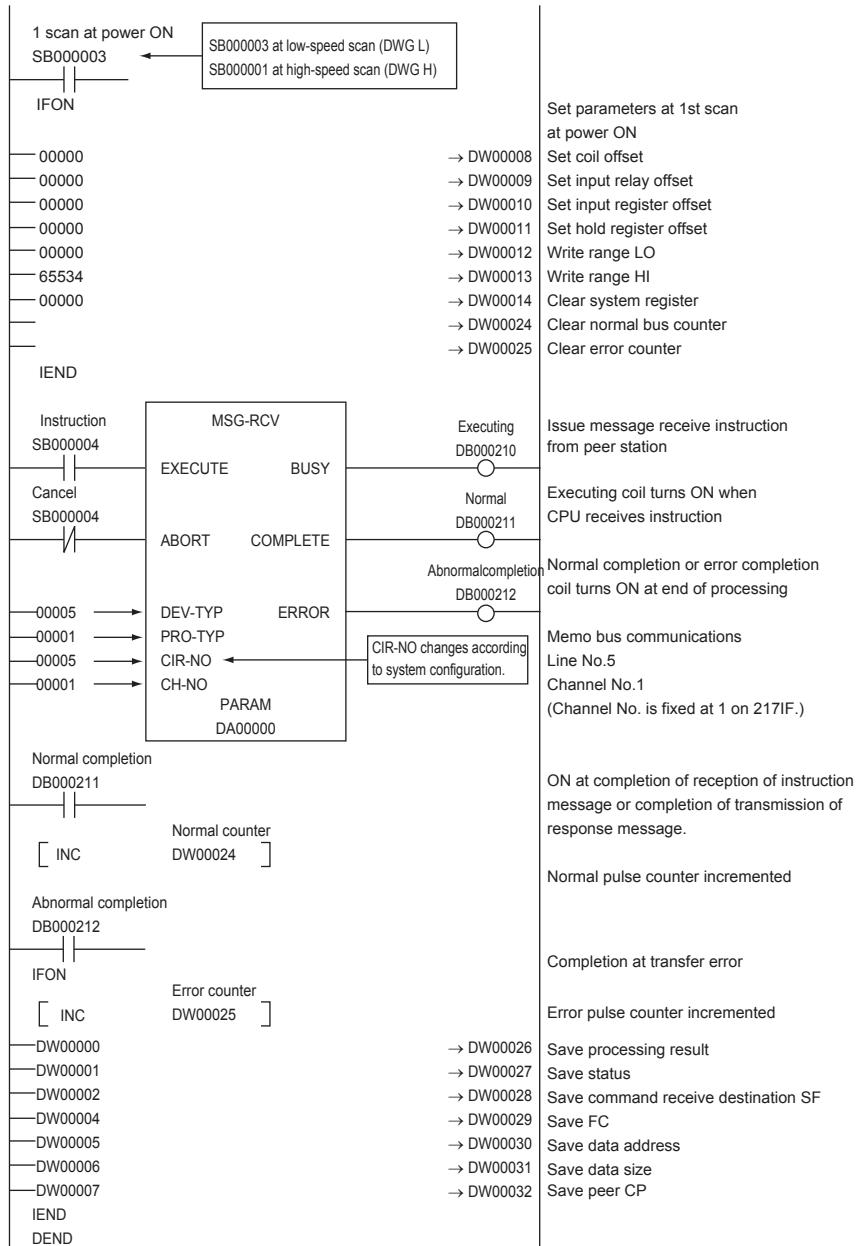
Set the transmission protocol in the module configuration of YASKAWA ELECTRIC Engineering workstation.

Item	Setting Item	Settings
Transmission protocol	Sets the type of transmission protocol.	MEMOBUS
Master/slave	Sets master or slave.	Slave
Device address	Set the node No.	01
Serial I/F	Sets the serial interface. RS-232, RS-485*	Set to match the operating conditions. Set to RS-485 when connecting via the RS-422A interface.
Transmission mode	Sets the transmission mode.	RTU
Data length	Sets the number of Data bit.	8 bits
Parity bit	Sets the parity.	Even
Stop bit	Sets the stop bit.	1 stop
Baud Rate	Sets the baud rate.	19.2K
Transmission delay	Sets the send delay time.	Not specified
Auto-receive	Sets auto-receive to "Not specified".	Not specified

* RS-485 cannot be selected for 218IF-01.

● Setting the transmission format

Define the transmission format of the port by the MSG-RCV function in the ladder program.



Item	Setting Item	Settings	
DEV-TYP	Transmission device type	5	217IF
PRO-TYP	Transmission protocol	1	MEMOBUS
CIR-NO	Line No.	-	Please set line numbers based on the Module Setup Details in the module structure. The defaulted value is 217IF-01 1: RS-232C 2: RS-485(RS-422A) 218IF-01 1: RS-232C
CH-NO	Transfer buffer channel No.	1	
PARAM	Leading address of set data	-	Sets the leading address of the set data, etc.

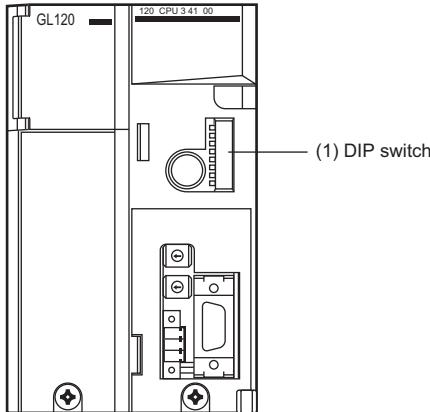
■ GL40S

Changes to PLC communications protocol settings (on VT3 and DT)

Item	Default	Value after Change
Baud Rate	19200 bit/s	9600 bit/s

Set to defaults when settings are other than above.

■ GL120, GL130



(1) DIP switch

- | | |
|--------------------|--|
| DIP switch 1 | : OFF (sets parameters to any values) |
| Other DIP switches | : These switches are not related to connection with the VT3/DT series. Set this matched to the operating conditions. |

● Setting the transmission parameters

Use the programming panel to set the transmission parameters.

Connect the programming panel to the PLC, and set as follows according to the port setup menu using the configuration setup function.

Item	Description
Address	1
Baud Rate	19200 bit/s
Parity check	ON
Parity type	Even
Stop bit length	1 bit
Data bit	8 bits
Port delay timer	0 ms

■ JAMSC-C8110/C8610/IF41A/IF60/IF61

Set the port parameters using "Register access panel" or "Program development support system".

● Register access panel

Set registers by entering a 6-digit specific number.

6 X O O O Y



Port No.

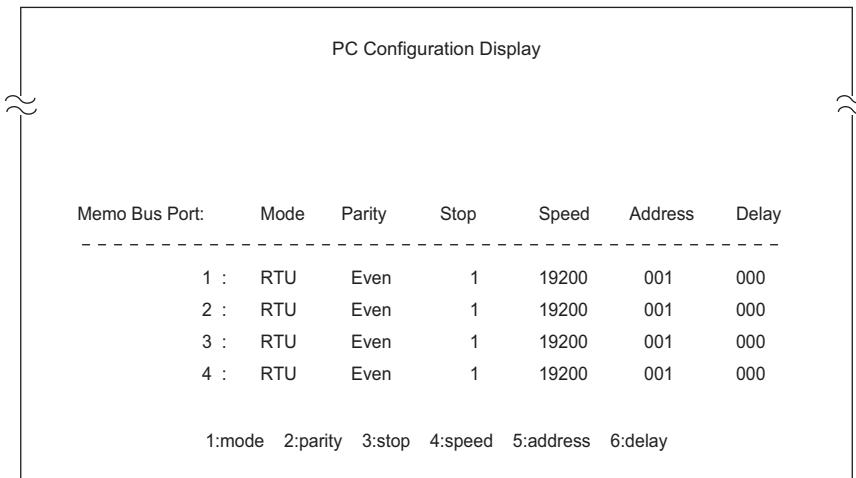
Value of X	Port no.
X=1	Port 1
X=2	Port 2
X=3	Port 3
X=4	Port 4

Parameter

Value of Y	Setting Item	Set Value
Y=1	Device address	1
Y=2	Baud Rate	19200 bit/s
Y=3	Parity ON/OFF	PARITY ON
Y=4	Parity	Even
Y=5	Stop bit	1 bit
Y=6	Communications mode	RTU
Y=7	Port delay timer set value	0 ms

● Program development support system

Set by "Processor type/configuration" at "6: Processor configuration" in the on-line edit menu. Set the port to be used as follows:



■ JAMSC-120NOM26100/27100

● DIP switch

Switch No.	Settings	
1	OFF	User set value
2	OFF	User set value
3	OFF	MEMOBUS mode
4	OFF	MEMOBUS mode
5	ON	Slave port
6	ON	Slave port
7	ON/OFF	Match to module configuration.
8	OFF	Regular operation mode

Set other DIP switches to match the operating conditions.

● Program development support system

Set by "Processor type/configuration" at "6: Processor configuration" in the on-line edit menu. Set the port to be used as follows:

PC Configuration Display						
Memo Bus Port:	Mode	Parity	Stop	Speed	Address	Delay
1 :	RTU	Even	1	19200	001	000
2 :	RTU	Even	1	19200	001	000
3 :	RTU	Even	1	19200	001	000
4 :	RTU	Even	1	19200	001	000
1 : mode		2 : parity	3 : stop	4 : speed	5 : address	6 : delay

■ MICRO

When using the COMM1 port of the MICRO, the communications parameters on the VT3/DT unit must be changed by the PLC communications protocol settings as the transmission parameters are fixed as follows.

The following shows the changes.

COMM1 port setting value

Item	Description
Address	1
Baud Rate	9600 bit/s
Parity check	ON
Parity type	Even
Stop bit length	1 bit
Data bit	8 bits
Port delay timer	10 ms

Changes to PLC communications protocol settings (on VT3 and DT)

Item	Default	Value after Change
Baud Rate	19200 bit/s	9600 bit/s

Set to defaults when settings are other than above.

■ PROGIC-8

Use the "PROGIC-8 Programming" to set the PROGIC-8 communications conditions.

Select "Online Operation" → "Status Display" → "Communications Parameters" on the PLC programming menu, and set as follows.

(1)Port 1 settings

The communications parameters of port 1 are fixed. Changes the PLC communications protocol settings on the VT3/DT.

PORT1 communications conditions (PLC side)

Item	Description
Device address	1
Baud Rate	9600 bit/s
Parity check	Even
Communications mode	RTU
Port stop bit	1 bit
Port delay timer	0 ms

PLC communications conditions (VT3/DT sides)

Item	Default	Value after Change
Baud Rate	19200 bit/s	9600 bit/s

Set to defaults when settings are other than above.

(2)Port 2 settings

The communications conditions of port 2 can be changed. Change the communications conditions of port 2.

Port 2 communications conditions

Item	Description
Device address	1
Baud Rate	19200 bit/s
Parity check	Even
Communications mode	RTU
Port stop bit	1 bit
Port delay timer	0 ms

Communication Condition Setting Ranges and Defaults During Serial Communication

● MP/CP Series

Item	Setting Range	Default
PLC No.	ON (1 to 247)	ON (1)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● MEMOCON SC Series

Item	Setting Range	Default
PLC No.	ON (1 to 247)	ON (1)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series/Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port No. of the connected units should be determined in advance. The following table shows the setting items corresponding to the connection type. Check these settings items with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address to be assigned to VT5/VT3/Soft-VT(PC) • IP Address to assign to PLC • Port No. to be used for communication
Other connection	<ul style="list-style-type: none"> • IP address to be assigned to VT5/VT3/Soft-VT(PC) • IP Address to assign to PLC • Port No. to be used for communication • Subnet Mask • Default Gateway



Make sure that "IP address to be assigned to VT5/VT3/Soft-VT(PC)" differs from "the IP address to be assigned to the PLC".

■ Required Settings for Ethernet connections

The following settings must be made when connecting the VT5/VT3/Soft-VT Series to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet settings	VT5 Series: Set the IP address and port number to be assigned to the VT5. Select "System settings"→"VT setting" in "Ethernet/language" in VT STUDIO. ¹ Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel"→"Network and Sharing Center" in Windows to make this setting.	P.7-26
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"Periphery connection" in "PLC communication conditions" in VT STUDIO. ²	P.7-26
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5/Soft-VT Series. Use MPE720, an engineering tool from Yaskawa Electric Corporation, to set communication conditions.	P.7-30

*1 Select "VT Machine Setup"→"Ethernet settings" in VT5 system mode to confirm and change settings.

*2 Use "PLC Comm. Setup" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in the VT3 system mode.	P.7-28
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.7-28
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use MPE720, an engineering tool from Yaskawa Electric Corporation, to set communication conditions.	P.7-30

*1 Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

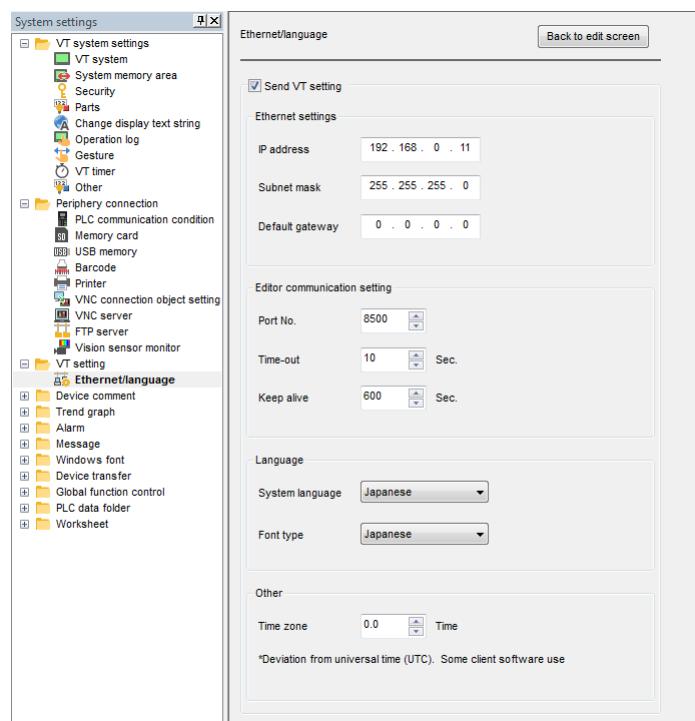
7-4 Unit Settings

■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.
📖 "12-6 VT setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
📖 "5-3 VT System Setup", VT5 Series Hardware Manual
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.

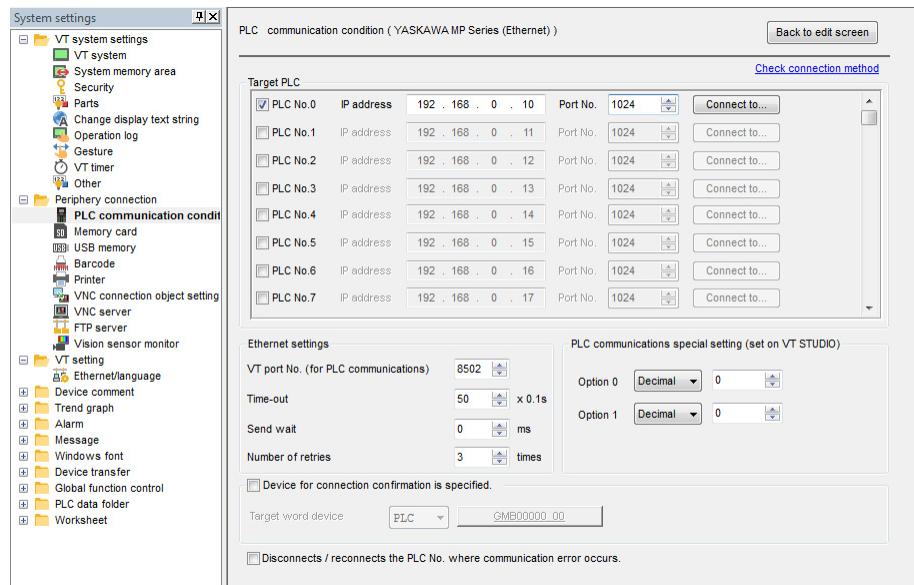


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 165535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
	PLC communications special settings (set in VT STUDIO)	Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.
IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023.
Also, take care not to use a port number already used by another device.

*3 Select "PLC device".
 "6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC Communication Condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup (1/3)		OK
		Cancel
Baud rate	100/10 Mbps Auto	Next page
IP Address	192 168 1 10	
Subnet Mask	255 255 255 0	
Default Gateway	0 0 0 0	
MAC address	**.**.**.**.**.**	
Ethernet Setup (2/3)		OK
		Cancel
Port number	8500	Next page
Time-out	10 s	
Keep Alive	600 s	
Ethernet Setup (3/3)		OK
		Cancel
FTP Setup	Enable	Password
Routing setup		
No.0 (Disabled)	Setup	
No.1 (Disabled)	Setup	
No.2 (Disabled)	Setup	
No.3 (Disabled)	Setup	

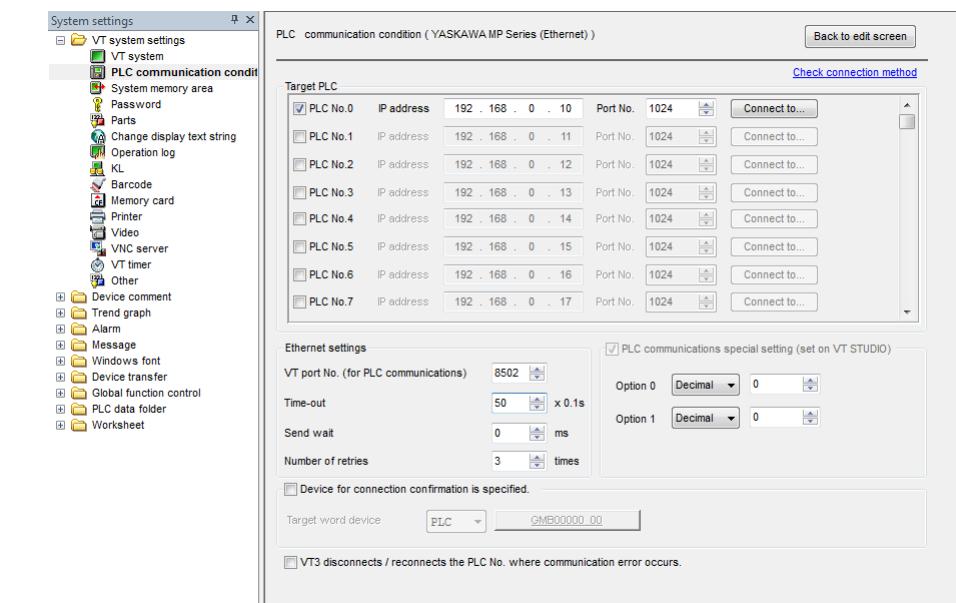
Item	Description
Baud rate	Normally, select "100/100 Mbps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Specify the IP address assigned to VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup^{*1}	Selects "Enable" only when using a router.

*1 "Chapter 8 ETHERNET", VT3 Series Reference Manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connection," VT3 Series Reference Manual



Item		Description
Target PLC	PLC No.	Selects the PLC No. (0 to 15) to be used.
	IP address ^{*1}	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port No. ^{*2}	Sets the port No. (1024 to 65535) of the connection destination PLC (marked PLC No.).
	Connect to...	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet Settings	VTis port number (for PLC communications)	Sets the port No. (for PLC communications) (1024 to 65535) of the VT3.
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
VT3 disconnects / reconnects the PLC No. where communication error occurs ^{*4}		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP address to each equipment within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. In addition, the port numbers should be unique when other ports need to be used.

*3 Select "PLC Devices".

"6-7 Set up the Devices", VT3 Series Reference Manual

*4 This can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those in VT STUDIO.

"5-4 PLC Communication Setup", VT3 Series Hardware Manual

■ Setting when function Auto-receive used

Automatic reception is available only when one VT5/VT3 Series, Soft-VT is connected to one MP2300S/MP2400/3200/3300.

Set with MPE720.

Refer to "Settings when MSG-RCV/MSG-RCVE function is used", page7-31 when connecting multiple VT5/VT3 Series, Soft-VT units to the MP2300S/MP2400/3200/3300 or connecting VT5/VT3 Series, Soft-VT units to the 218IF-01/02.

● Transmission parameters setup

Item		Description
IP Address		Set the IP address to be assigned to the PLC.
Subnet Mask		Set the local IP subnet mask.
Gateway IP address		When gateway (router) are connected with other network communication, set gateway IP address. When a gateway is not used, set 0.0.0.0 as the gateway IP address.
MEMOBUS setup	Response wait time*	Set up the response wait time when sending a command from the PLC. (setting range: 0 to 255)
	Re-send times*	Set up the re-send times of a command when PLC detects a time-out. (setting range: 0 to 255)

* Under the default setting (setting value=0), communication can happen.

● Connection parameters setup

Item		Description
Local port		Set up the PLC port Please specify a unique port and port engineering.
Counterpart IP address		The IP address of the units connected to PLC.
Counterpart node port		Set up the port number of the unit connected to PLC.
Connection type		Select the "UDP" option.
Protocol Type		Select the "Extended MEMOBUS" option.
Code		Select the "BIN" option.
Detailed settings	Auto-receive	Select enable/disable of Auto-receive function. "Enable" should be set .

■ Settings when MSG-RCV/MSG-RCVE function is used

When connecting VT5/VT3 Series/Soft-VT to 218IF-01/02, or connecting multiple VT5/VT3 Series/Soft-VT to MP2300S/MP2400/3200/3300, use MSG-RCV/MSG-RCVE function. The function to be used depends on the target PLC.

The function to be used	Target PLC
MSG-RCV function	MP Series (Ethernet)
MSG-RCVE function	MP3000 Series (Ethernet)

● Transmission parameters setup

Item		Description
Local setup	IP address	Set the IP address to be assigned to the PLC.
MEMOBUS setup	Response wait time*	Set up the response wait time when sending a command from the PLC. (setting range: 0 to 255)
	Re-send times*	Set up the re-send times of a command when PLC detects a time-out. (setting range: 0 to 255)

* Under the default setting (setting value=0), communication can happen.

● Connection parameters setup

Item		Description
Local port		Set up the PLC port Since the port number 10000 is the system port, please specify another port number.
Counterpart IP address		The IP address of the units connected to PLC.
Counterpart node port		Set up the port number of the unit connected to PLC.
Connection type		Select the "UDP" option.
Protocol Type		Select the "Extended MEMOBUS" option.
Code		Select the "BIN" option.

● CP-218 setup (local setup)

Item		Description
Subnet Mask		Set the local IP subnet mask.
Gateway IP address		When gateway (router) are connected with other network communication, set gateway IP address. When a gateway is not used, set 0.0.0.0 as the gateway IP address.
System port (diagnostic port/management port)		(diagnostic port/management port) Enter the (diagnostic port / management port number) (256 to 65535) that receives diagnostic instruments from the diagnostic terminal. The default value is 10000.

● CP-218 setup (TCP/IP setup)

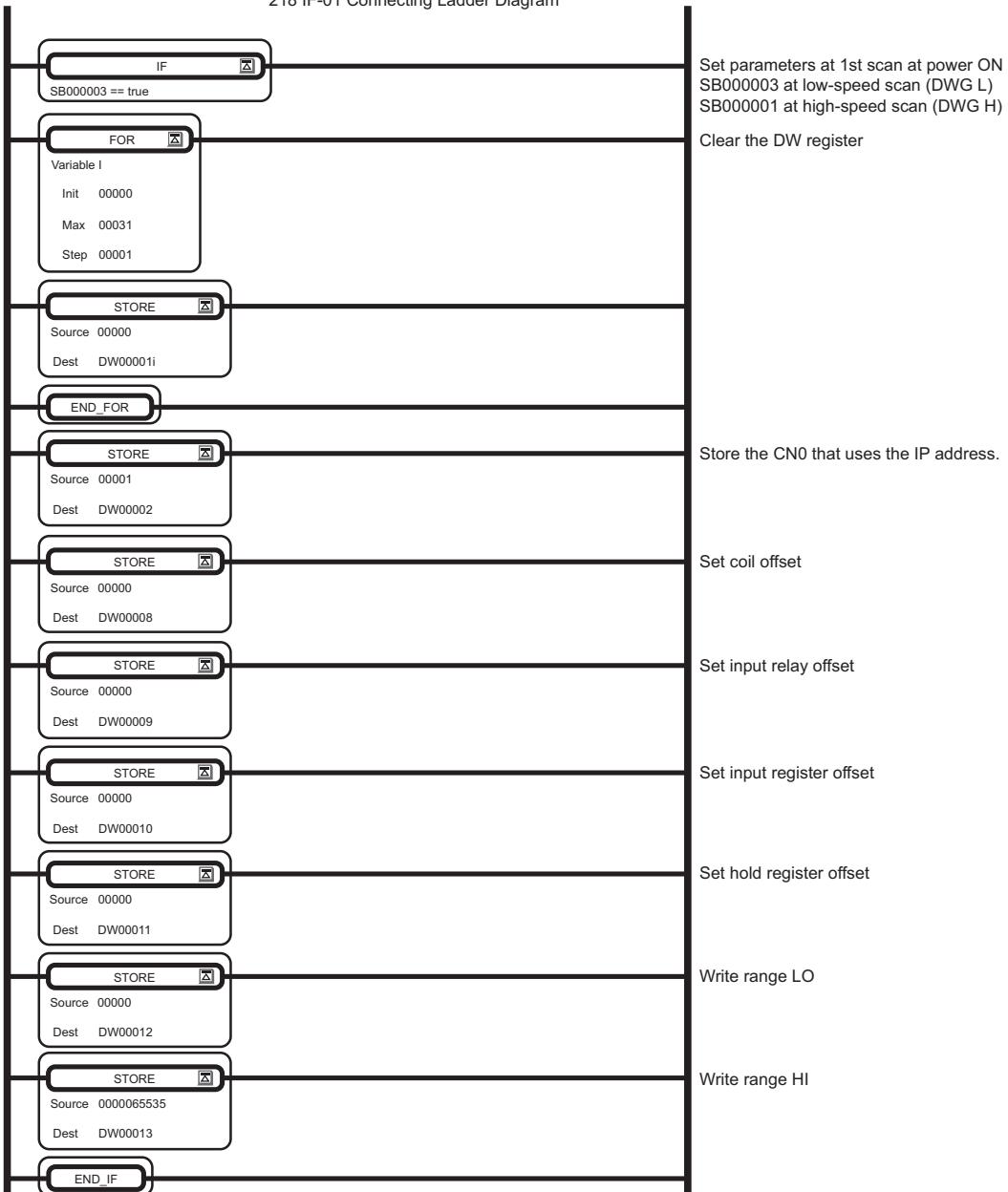
The default setting can be changed only when communication cannot happen (normally communication can happen with the default setting).

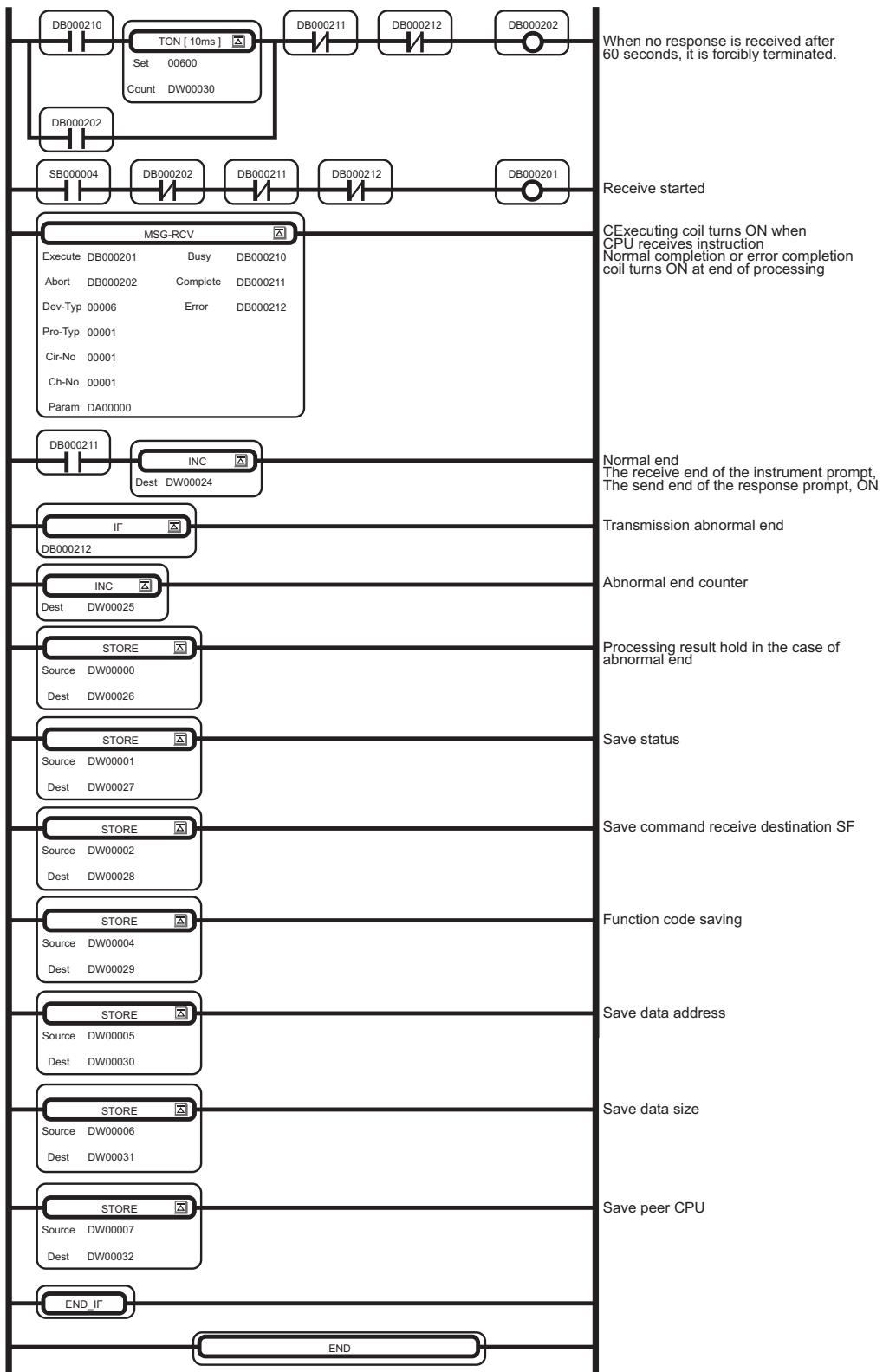
Item	Setting Range	Default Value
TCP ZEROWIND timer value	1 to 255	3s
TCP re-send timer value	50 to 32000	500ms
TCP end timer value	1 to 255	60s
IP assembly timer value	1 to 255	30s
Max packet length	64 to 1500	1500byte

● Setting the transmission format (MSG-RCV)

Define the transmission format of the port by the MSG-RCV function in the ladder program.

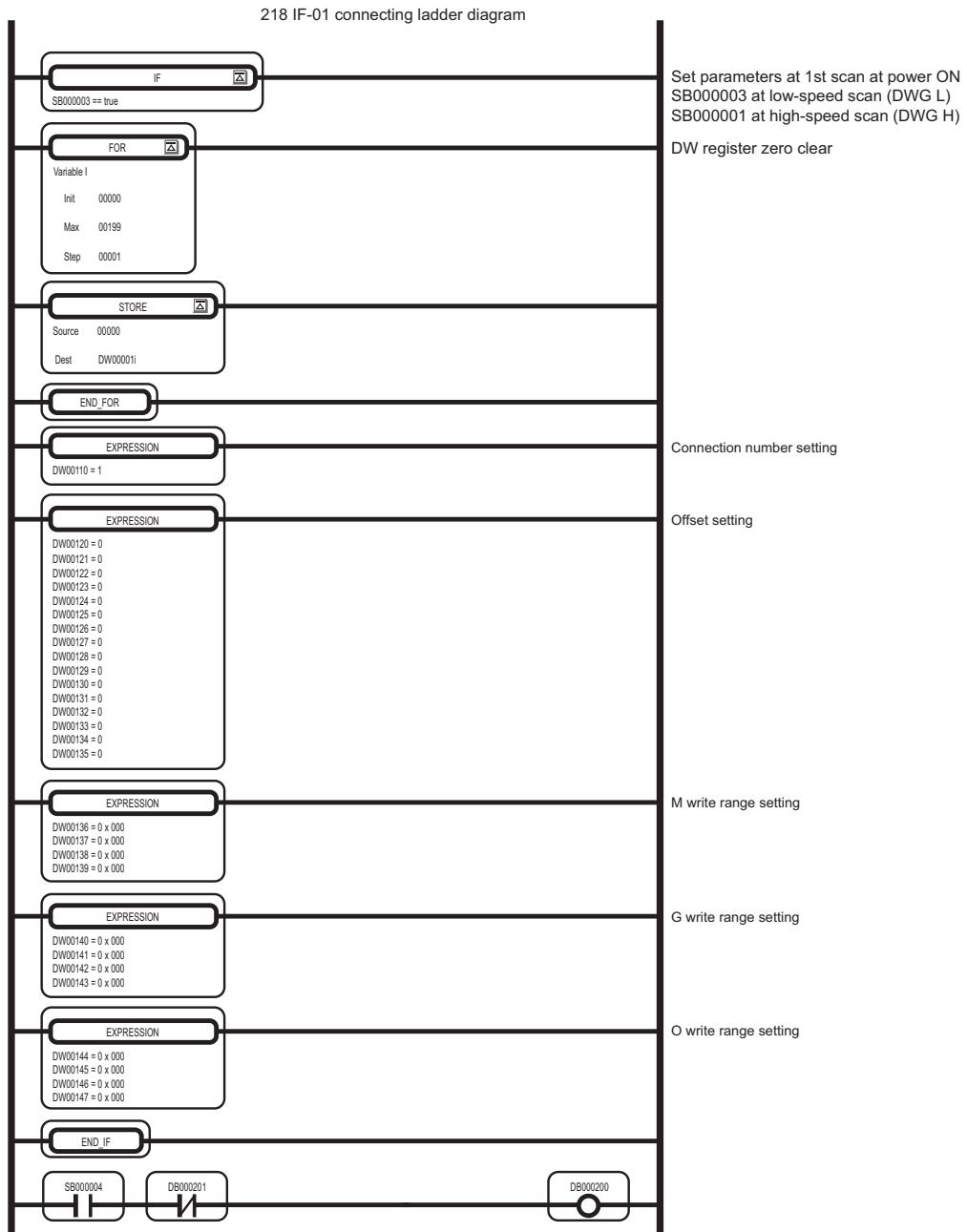
218 IF-01 Connecting Ladder Diagram

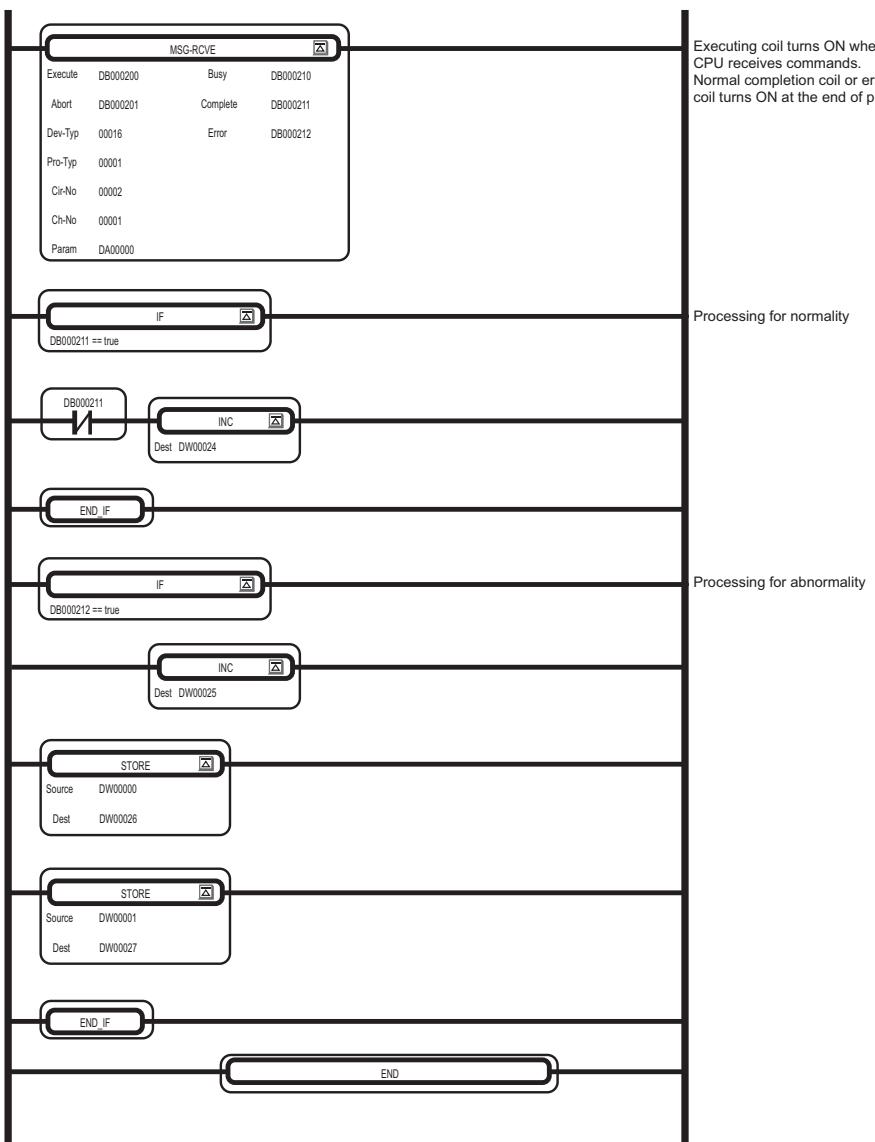




● Setting the transmission format (MSG-RCVE)

Define the transmission format of the port by the MSG-RCVE function in the ladder program..





Item	Settings	Settings	
DEV-TYP	Transmission device type	6	In case of 218IF-01
		16	In case of 218IF-02
PRO-TYP	Transmission protocol	1	MEMOBUS
CIR-NO	Line number	-	Please set the line number according to the unit configuration.
CH-NO	Transmission buffer channel number	1	
PARAM	Leading address of setting data, etc.	-	Set the leading address of setting data, etc.

7-5 Available Devices

■ MP/CP Series^{*1}

Device		Address
Bit Devices	Coil	GMB00000 to GMB4095F
	Input relay	GIB00000 to GIB0FFFF
Word Device	Coil	GMB00000 to GMB40950
	Input relay	GIB00000 to GIB0FFFF0
	Hold register	GMW0000 to GMW65534
	Input register	GIW0000 to GIW7FFF

*1 To distinguish them from internal VT5/VT3 MB devices, their product names are prefixed by the letter "G".



Available devices are restricted according to the product model. Check the manual for the respective model.

■ MP3000 series

Device		Address
Bit Devices	Coil ^{*1}	GMB00000000 to GMB1048575F
	Input relay ^{*2}	IB000000 to IB21FFFF
	Output register	OB000000 to OB21FFFF
	G register	GB00000000 to GB2097151F
	System register	SB000000 to SB65534F
Word Device	Data register ^{*1}	GMW0000000 to GMW1048575
	Input register ^{*2}	IW00000 to IW21FFF
	Output register	OW00000 to OW21FFF
	G register	GW0000000 to GW2097151
	System register	SW00000 to SW65534
	Coil ^{*1*3}	GMB0000000?GMB10485750
	Input relay ^{*2*3}	IB000000 to IB21FFFF0
	Output register ^{*3}	OB000000 to OB21FFFF0
	G register ^{*3}	GB00000000 to GB20971510
	System register ^{*3}	SB000000 to SB655340

*1 To distinguish them from internal VT5/VT3 MB/MW devices, their product names are prefixed by the letter "G".

*2 Read only is possible.

*3 Be sure set the lower 1 digit with "0".



Available devices are restricted according to the product model. Check the manual for the respective model.

● GL Series

		PLC Device		Device to be Set on VT3/DT
		GL-40S, 60S, 60H, 70H	GL-120, 130	
Device		Address		Device
Bit Devices	Coil (output/internal) ^{*1}	00001 to 08192	000001 to 009999	00001 to 09999
	Input relay ^{*1, *2}	10001 to 14096	100001 to 109999	10001 to 19999
	Link coil ^{*1}	D0001 to D1024	D10001 to D12048	D10001 to D12048
Word Device	Input register ^{*2}	-	D20001 to D22048	D20001 to D22048
	Output/hold register	30001 to 30512	300001 to 309999	30001 to 39999
	Link register	40001 to 49999	400001 to 409999	40001 to 49999
	Constants register	R0001 to R1024	R10001 to R12048	R10001 to R12048
	Extended register	-	R20001 to R22048	R20001 to R22048

*1 When specifying word devices, set using a value obtained by adding "1" to a multiple of 16 (lower two digits) such as 01, 17, 33, 49, and so forth.

*2 Read only. (cannot write)



- When word devices are handled in two words, the smaller of the device numbers is taken as the upper 16 bits and the larger of the device numbers is taken as the lower 16 bits. Note that this differs from the order of the two words handled in the ladder program.
- Available devices are restricted according to the product model. Check the manual for the respective model.

■ MICRO

Device to be Set on VT3/DT			
Device		Address	
Bit Devices	Coil (output/internal)	00001 to 01531	
	Input relay	10001 to 10511	
Word Device	Input register	30001 to 30047	
	Output/hold register	40001 to 41871	



Available devices are restricted according to the product model. Check the manual for the respective model.

■ PROGIC-8

		PLC Device		Device to be Set on VT3/DT	
Device		Address	Device	Address	
Bit Devices	Output coil	0001 to 0512	Coil (output/internal)	00001 to 00512	
	Input relay	I001 to I512	Input relay	10001 to 10512	
	Internal coil	N0001 to N1536	Coil (output/internal)	00513 to 02048	
	Link coil	D0001 to D1024	Link coil	0001 to 1024	
Word Device	Data register	W0001 to W2048	Output/hold register	40001 to 42048	
	Input register	Z001 to Z128	Input register	30001 to 30128	
	Link register	R0001 to R1024	Link register	0001 to 1024	

7-6 Error Messages and Troubleshooting

This section describes communication errors occurring in the VT5/VT3 Series, Soft-VT and Yaskawa Electric Corporation PLC connections.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

List of Communication Errors in Ethernet Connections

The following error messages are displayed when communicating with the PLC units over Ethernet.

Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when a communications error occurs.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	Please turn off the power of VT3 and install VT2-E1/E2/VT3-E3, then turn on the power of VT3 again.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[**(++)]	There was not error response ** from PLC No.++.	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

MEMO

CONNECTING TO PANASONIC CORPORATION PLCS

This chapter describes how to connect to a PLC made by Panasonic Corporation.

8-1	Checking Operation before Connection	8-2
8-2	System Configuration.....	8-3
8-3	Connection Methods and Wiring Diagrams.....	8-7
8-4	Unit Settings.....	8-15
8-5	Available Devices	8-35
8-6	Error Messages and Troubleshooting	8-37

8-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/DT and PLC via serial interface or the Ethernet.

For connection of other interfaces (multilink or VT2 multilink), see each chapter.

- "Chapter 19 MULTI-LINK"
- "Chapter 20 VT2 MULTI-LINK"

- (1) Make sure the PLC, link unit and Ethernet unit can be connected to VT5, VT3 and DT.
- (2) Check whether or not a CPU, link unit or Ethernet settings are required.
- (3) Confirm the instrument name that should be set in the PLC.

Please ensure to check the above 3 points before connecting to PLC.

- "Procedure before Starting Communication", page 18

Serial connections

Series Name	CPU	Connection Methods	Unit Setting	Target PLC	
MEWNET FP	FP0(RS-232C)	RS-232C port	P.8-15	MEWNET-FP Series ^{*1}	
	FP0R(RS-232C)		P.8-15		
	FP1-C24C/C40C FP1-C56C/C72C		P.8-15		
	FP-M-C20RC/C20TC FP-M-C32TC		P.8-15		
	FP2, FP2SH		P.8-16		
	FP3	RS-422A port	P.8-17		
		CCU-AFP3462	P.8-22		
	FP5	Tool port	P.8-17		
		CCU-AFP5462	P.8-22		
	FP10	RS-232C port	P.8-18		
		CCU-AFP5462	P.8-22		
	FP10S, FP10SH	RS-232C port	P.8-18 P.8-19		
		CCU-AFP3462	P.8-22		
	FP-C	RS-232C port	P.8-21		
		FP-C computer Communications board	P.8-22		
	FP-Σ	Tool port	P.8-23		
		AFPG801 AFPG802			
FP-X	FP-X	Tool port	P.8-23	MEWTTOCOL-7 ^{*1}	
		AFPX-COM1			
		AFPX-COM2			
		AFPX-COM3			
		AFPX-COM4			
FP7	FP7	COM0 port	P.8-25	MEWTTOCOL-7 ^{*1}	
		AFP7CCS1			
		AFP7CCS2			
		AFP7CCM1			
		AFP7CCM2			
		AFP7CCS1M1			

*1 Not supported by Soft-VT.

Ehernet connections

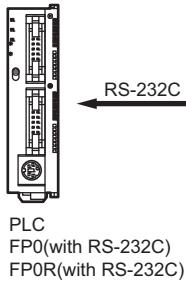
Series Name	CPU	Connection Methods	Unit Setting	Target PLC
MEWNET-FP	FP7	LAN port	P.8-28	MEWTTOCOL-7 (Ethernet UDP)
		AFP7CCET1		

8-2 System Configuration

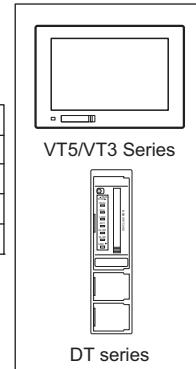
This section describes systems configured by a VT5/VT3/DT series and a PLC made by Panasonic Corporation.

System configuration for serial connections

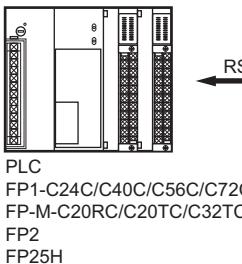
■ FP0/FP0R



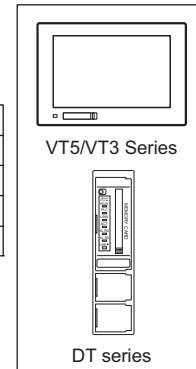
VT5(COM1)/VT3-W4□: wiring diagram W21
VT3(PORT2)/VT-T1/DT : wiring diagram 2
VT3(PORT3) : wiring diagram 32
VT3-V6H(G)/Q5H(G) : wiring diagram H21
VT3-V7R : wiring diagram R2



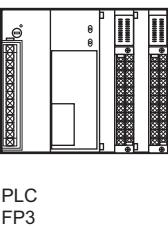
■ FP1, FP-M, FP-2



VT5(COM1)/VT3-W4□: wiring diagram W20
VT3(PORT2)/VT-T1/DT : wiring diagram 1
VT3(PORT3) : wiring diagram 31
VT3-V6H(G)/Q5H(G) : wiring diagram H20
VT3-V7R : wiring diagram R1

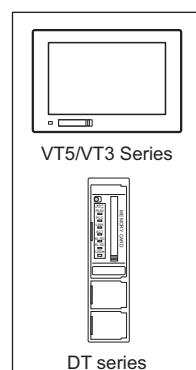


■ FP3, FP5



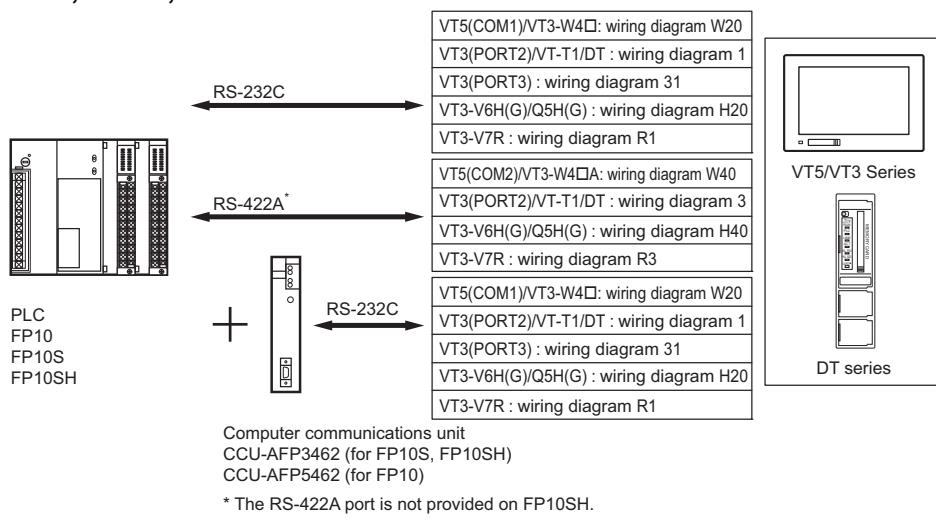
Computer communications unit
CCU-AFP3462(for FP3)
CCU-AFP5462(for FP5)

VT5(COM2)/VT3-W4□: wiring diagram W40
VT3(PORT2)/VT-T1/DT : wiring diagram 3
VT3-V6H(G)/Q5H(G) : wiring diagram H40
VT3-V7R : wiring diagram R3
VT5(COM1)/VT3-W4□: wiring diagram W20
VT3(PORT2)/VT-T1/DT : wiring diagram 1
VT3(PORT3) : wiring diagram 31
VT3-V6H(G)/Q5H(G) : wiring diagram H20
VT3-V7R : wiring diagram R1



8-2 System Configuration

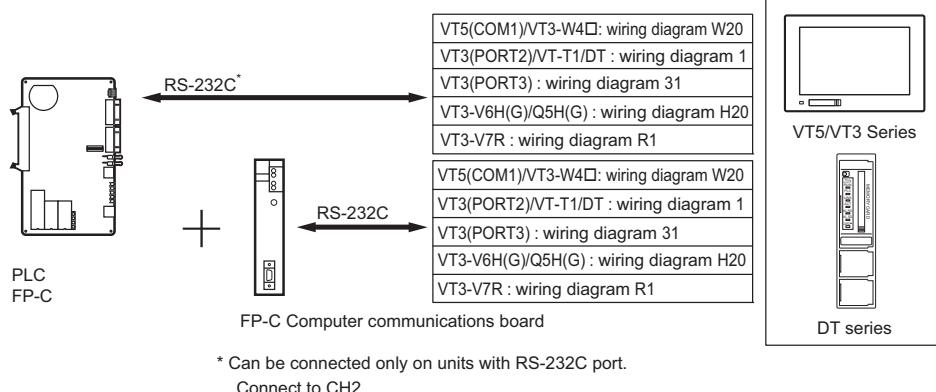
■ FP10, FP10S, FP10SH



Computer communications unit
CCU-AFP3462 (for FP10S, FP10SH)
CCU-AFP5462 (for FP10)

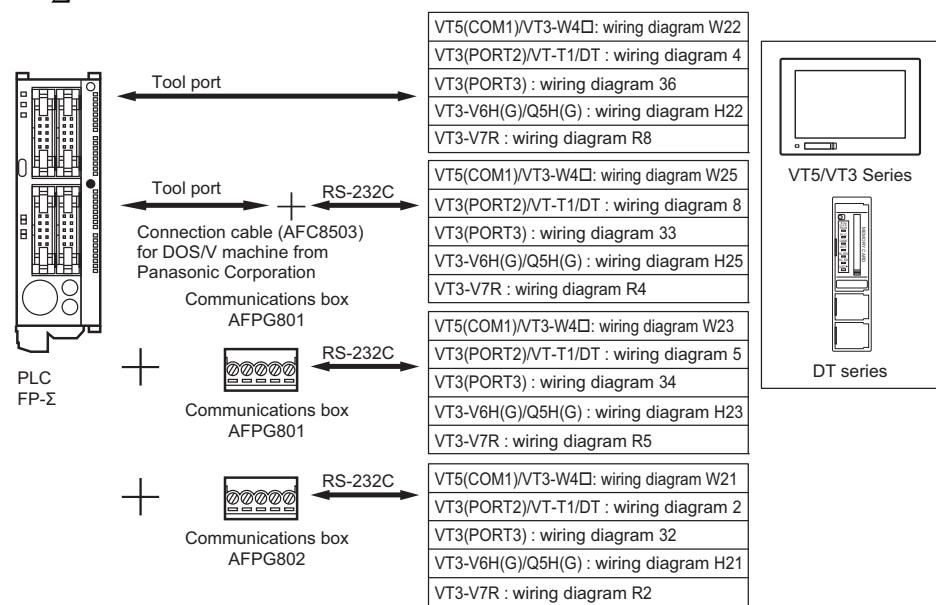
* The RS-422A port is not provided on FP10SH.

■ FP-C

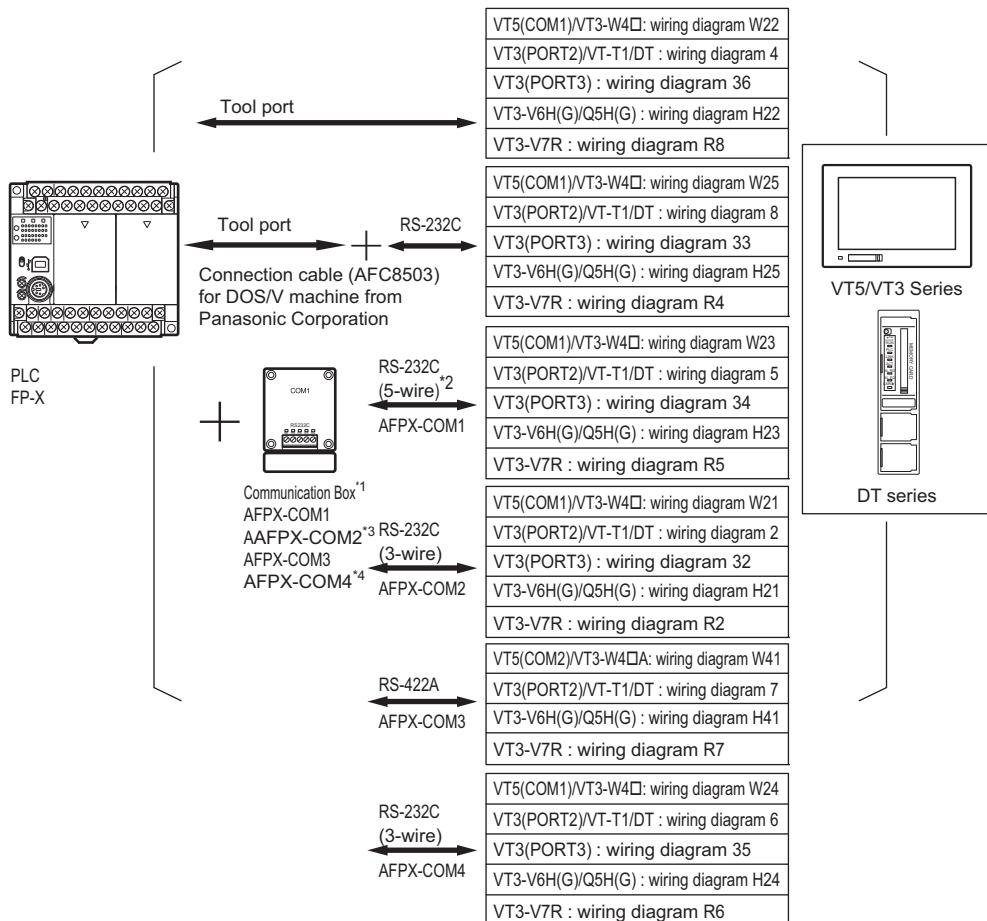


* Can be connected only on units with RS-232C port.
Connect to CH2.

■ FP-Σ

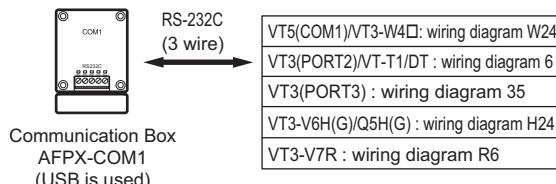


■ FP-X



*1 Communication Box can only be mounted at the "Box Mounting Position 1".

*2 When USB is used, please use the RS-232C (the 3-wire style).
The wiring diagram is shown as follows.

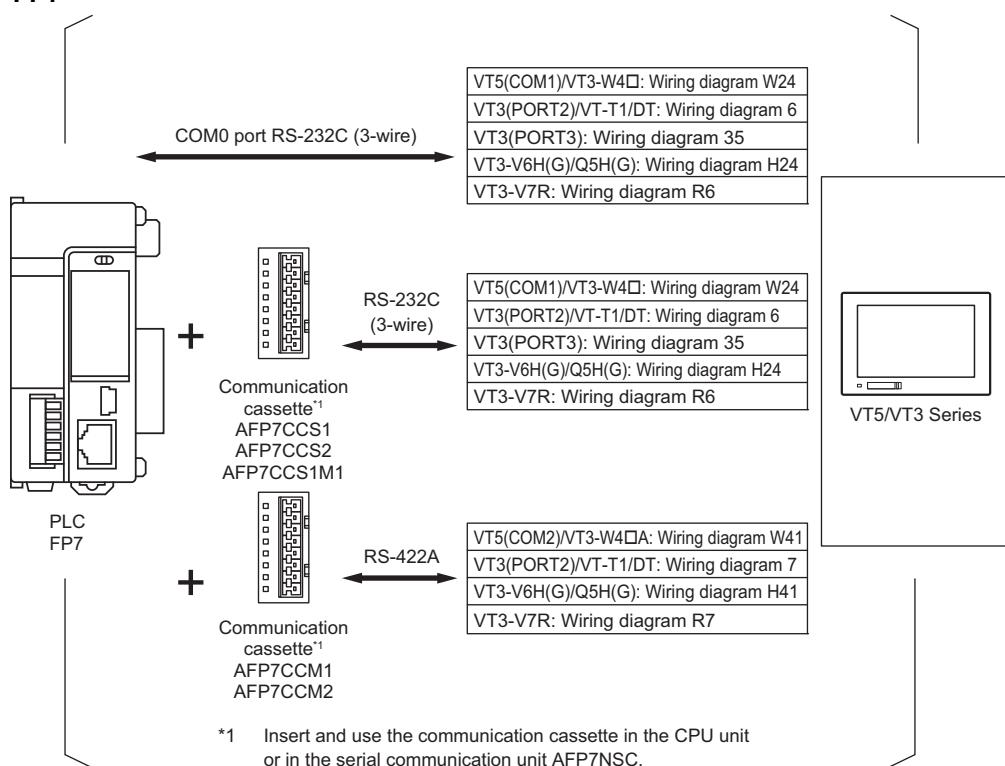


*3 When the "Internal USB" option is selected for the setup of the COM2 port, ch2 cannot be used for the communication.

*4 When the "Internal USB" option is selected for the setup of the COM2 port, AFPX-COM4 cannot be used for the communication.

8-2 System Configuration

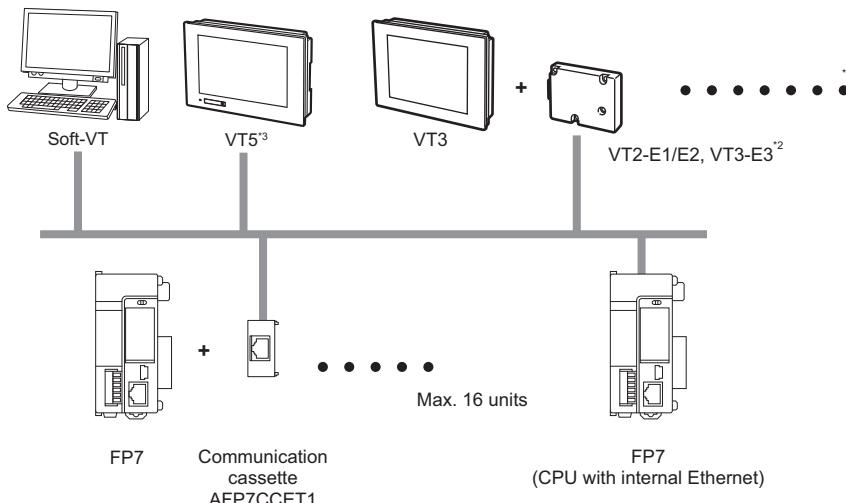
■ FP7



System configuration for Ethernet connections

■ FP7

This section describes the system configuration of VT5/VT3 Series, Soft-VT and FP7.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

8-3 Connection Methods and Wiring Diagrams

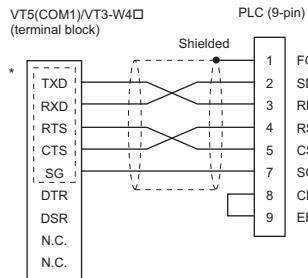
This section describes wiring of connector cables.

The wiring diagrams recommended by Panasonic Corporation may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

System configuration for serial connections

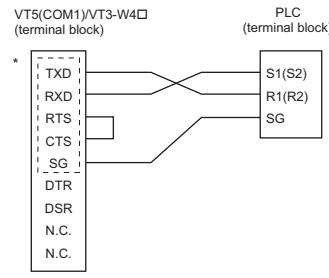
■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

● Wiring Diagram W20 (RS-232C)



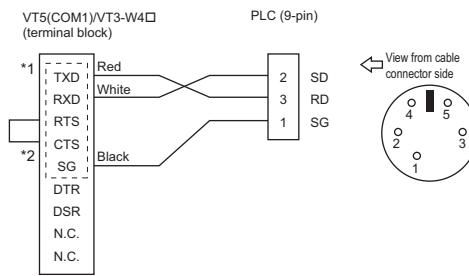
* [---] indicates a terminal diagram for the VT5 Series.

● Wiring Diagram W21 (RS-232C)



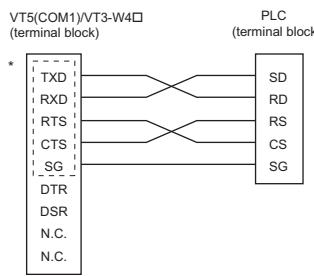
* [---] indicates a terminal diagram for the VT5 Series.

● Wiring Diagram W22 (OP-86924: 5m)



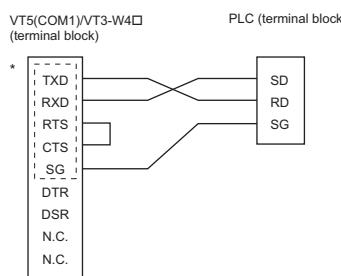
*1 [---] indicates a terminal diagram for the VT5 Series.
*2 The jumper attached with OP-86924 is used to short-circuit RTS and CTS.

● Wiring Diagram W23 (RS-232C)



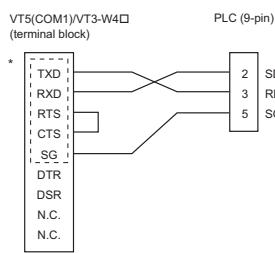
* [---] indicates a terminal diagram for the VT5 Series.

● Wiring Diagram W24 (RS-232C)



* [---] indicates a terminal diagram for the VT5 Series.

● Wiring Diagram W25 (RS-232C)

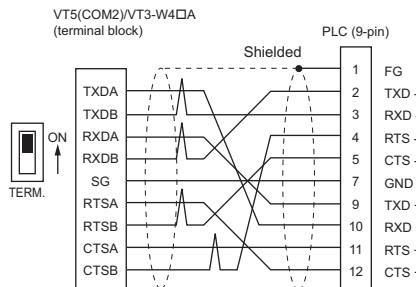


* [---] indicates a terminal diagram for the VT5 Series.

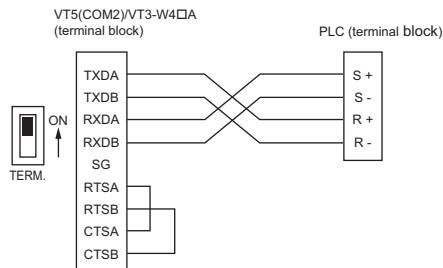
8-3 Connection Methods and Wiring Diagrams

■ Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A)

● Wiring Diagram W40 (RS-422A)

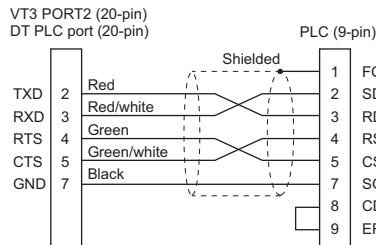


● Wiring Diagram W41 (RS-422A)

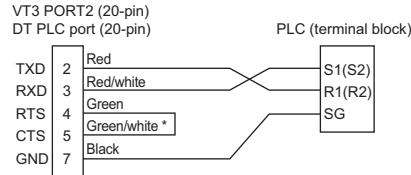


■ Connection to VT3 Series (PORT2)/DT Series

● Wiring Diagram 1 (RS-232C: OP-24027)

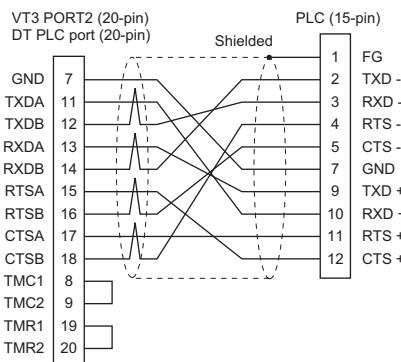


● Wiring Diagram 2 (RS-232C: OP-24027)

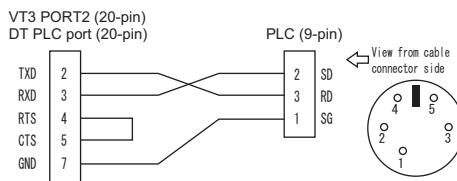


* Not wired for loopback test inside the connector.
Solder the signal lead.

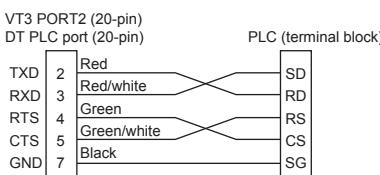
● Wiring Diagram 3 (RS-422A)



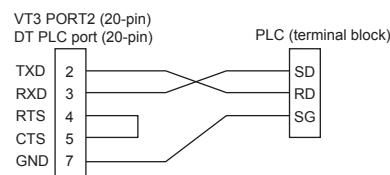
● Wiring Diagram 4 (OP-86923: 5m)



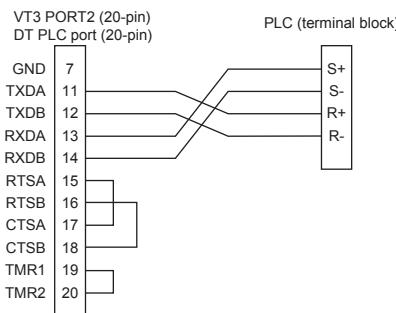
● Wiring Diagram 5 (RS-232C: OP-24027)



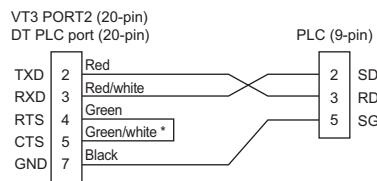
● Wiring Diagram 6 (RS-232C)



● Wiring Diagram 7 (RS-422A)



● Wiring Diagram 8 (RS-232C: OP-24027)



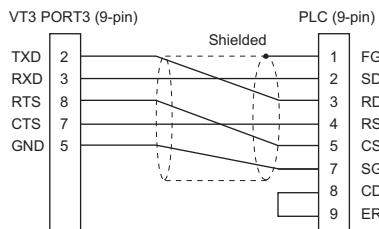
* Not wired for loopback test inside the connector.
Solder the signal lead.



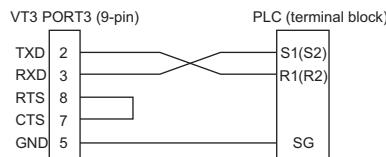
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

■ Connection to VT3 Series (PORT3)

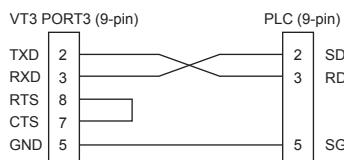
● Wiring Diagram 31 (RS-232C)



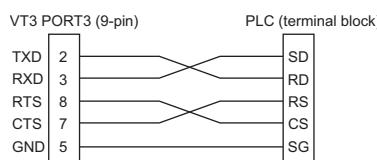
● Wiring Diagram 32 (RS-232C)



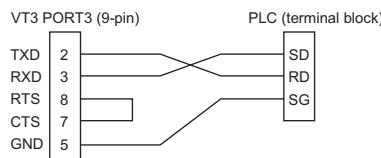
● Wiring Diagram 33 (RS-232C)



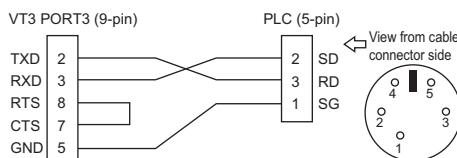
● Wiring Diagram 34 (RS-232C)



● Wiring Diagram 35 (RS-232C)



● Wiring Diagram 36 (RS-232C)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

8-3 Connection Methods and Wiring Diagrams

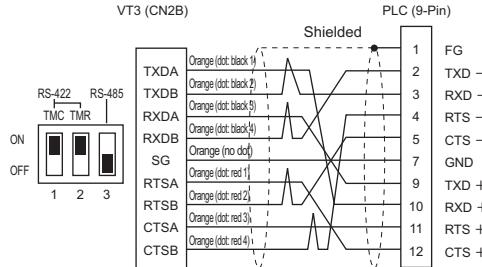
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



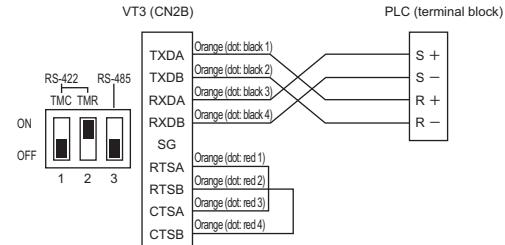
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

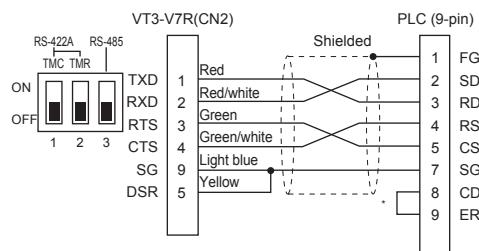
OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



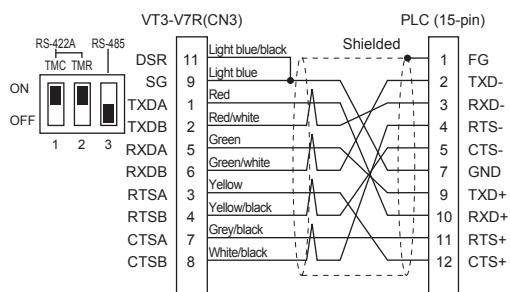
■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-232C: VT-C5R1)

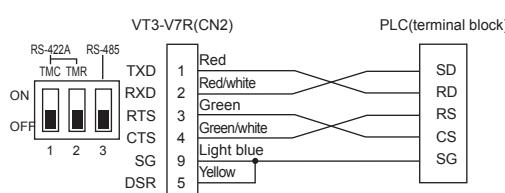


* FP-C(RS-232C serial port enclosed) required.

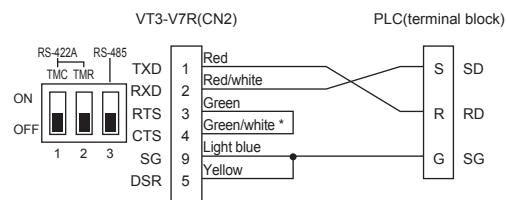
● Wiring Diagram R3 (RS-422A: VT-C5R2/C15R2)



● Wiring Diagram R5 (RS-232C: VT-C5R1)

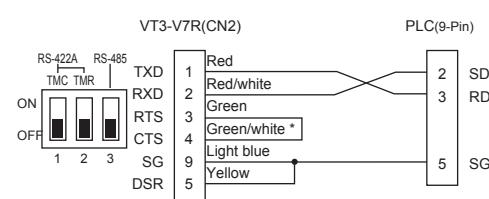


● Wiring Diagram R2 (RS-232C: VT-C5R1)



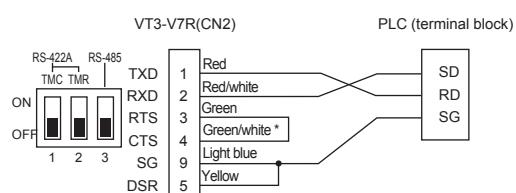
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R4 (RS-232C: VT-C5R1)



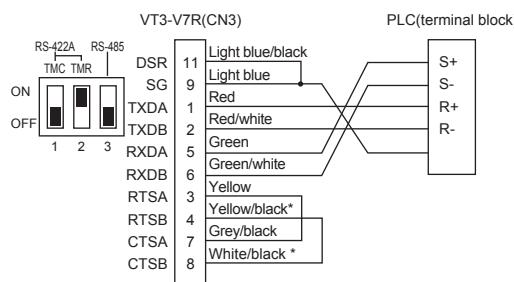
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R6 (RS-232C: VT-C5R1)



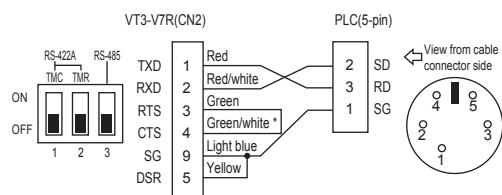
* Not wired for loopback test inside the connector.
Solder the signal lead.

● **Wiring Diagram R7**
(RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● **Wiring Diagram R8**
(RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.



**Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039),
please ensure to read the "Connection Precautions", page A-13**



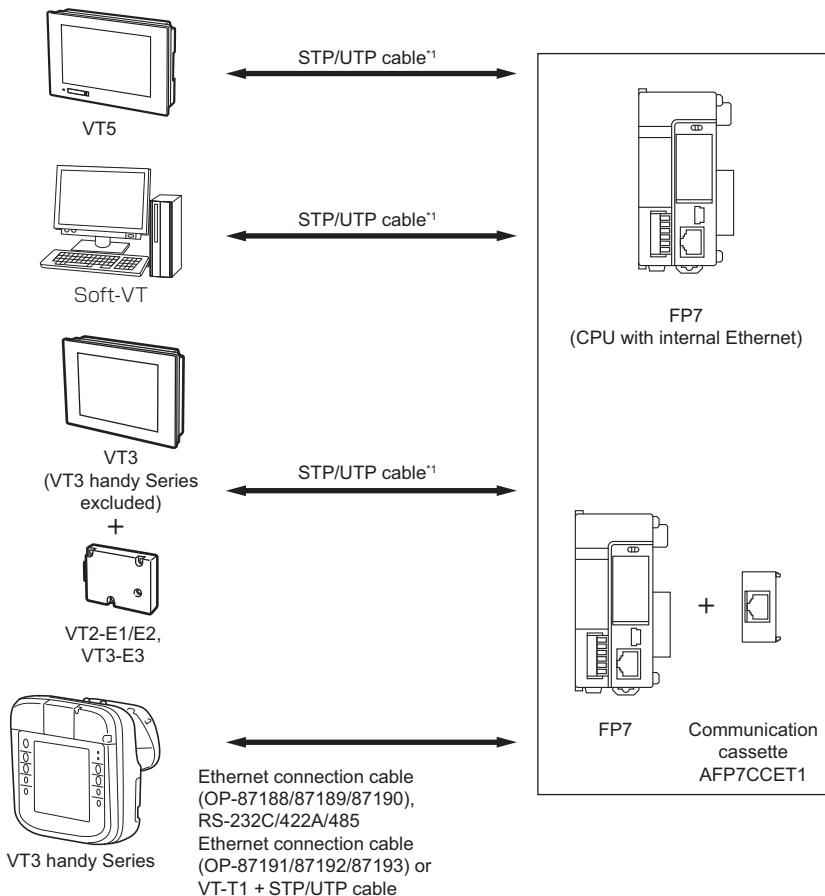
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

■ Direct connection (1:1)

● FP7

Use the STP/UTP cable for the connection.



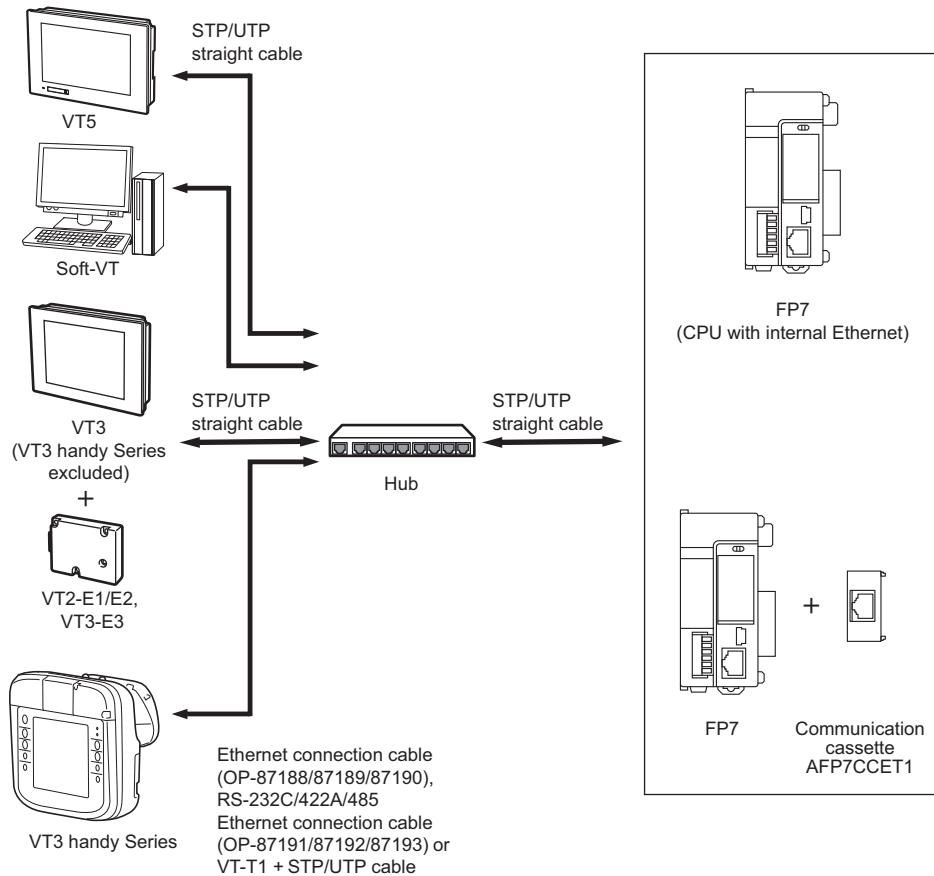
*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 STP/UTP cable.

■ Connection using a hub (multiple connections)

● FP7



Connections of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and Soft-VT with a hub

- Use the STP/UTP straight cable.
- The VT5 Series, VT2-E1/E2, VT3-E3 and VT3 handy Series should be connected to a port other than the cascade port on a hub.

Connection of Hub with the FP7

- Use the STP/UTP straight cable.
- Connect the FP7 Ethernet port to a port other than the cascade port on the hub.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 STP/UTP cable.

The following describes the settings of the Link Unit matched to the default communications conditions.

Settings for serial connection

■ FP0, FP1, FP-M

Set the communications conditions in the PLC system register setting on FPWIN GR. Communications conditions are set by values being written to system registers.

PLC system register settings (COM port settings)

No.	Designation	Settings
412	Purpose of use	CCU link
	Data length	7 bits
	Parity check	Even
	Stop bit	1 bit
	End code	CR
	Start code	STX OFF
414	Baud rate setting	19200 bit/s
415	Unit No.	1
416	Modem connection	No connection (unmark checkbox)

■ FP0R

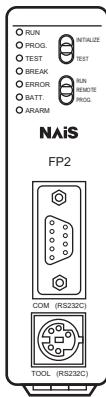
Set the communications conditions in the PLC system register setting on FPWIN GR. Communications conditions are set by values being written to system registers.

PLC system register settings (COM port settings)

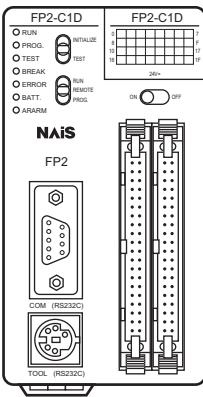
No.	Designation	Settings
410	Unit No.	1
	Communication mode	PC link
412	Modem connection	No connection (uncheck)
	Data length	7 bits
	Parity	Even
	Stop bit	1 bit
	End code	CR
	Start code	Without STX
415	Transmission rate setting	19200 bit/s

■ FP2, FP2SH

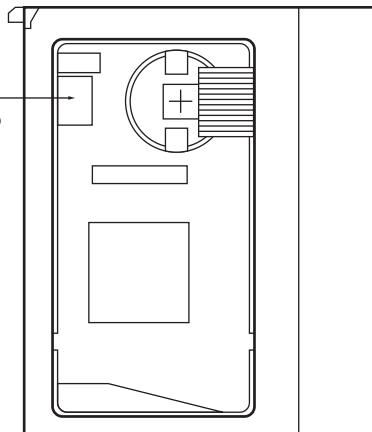
FP2-C1
front view



FP2-C1D
front view

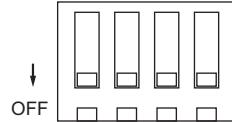


FP2-C1/C1D
side view



(1) Operation mode setup switch

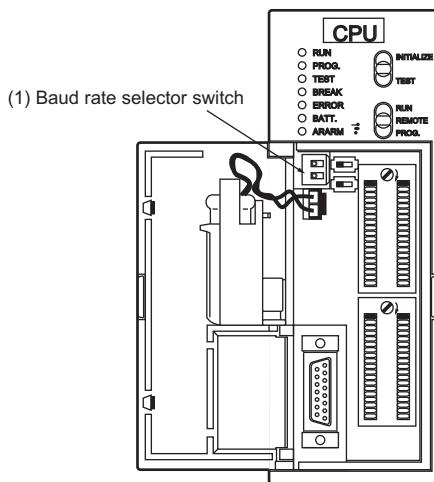
Switch No.	Set Value	
1	Tool port baud rate	19200 bit/s
2	Program memory selection	Set this matched to the operating conditions.
3	Program memory protection	
4	Empty	-



(2) System registers

For details on setting PLC system registers, see "FP0, FP1, FP-M" above.

■ FP3, FP5



(1) Baud rate selector switch

Set the switch to match the communications speed. Use the lower switch.

Switch	Set Value
ON	9600 bit/s
OFF	19200 bit/s



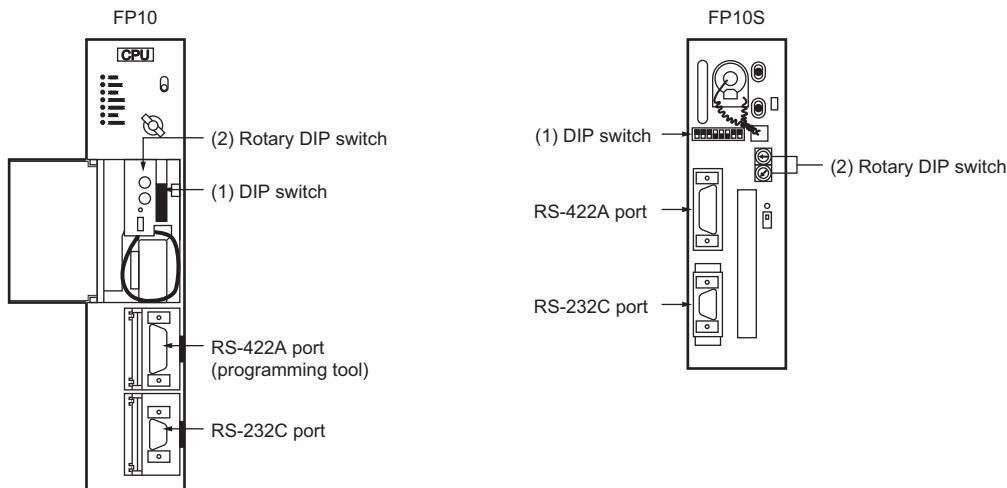
Baud rate selector switch

Setting the communications conditions

Please reset some VT3/DT communication conditions from the initial values.

Item	Set Value
PLC No.	None
PLC serial I/F	RS-422A 4-wire
Baud rate	9600, 19200 bit/s
Data bit	8 bits
Parity	Odd

■ FP10, FP10S



● RS-232C port settings

(1) DIP switch

Switch No.	Switch Name	Set Value
ON ← 1 2 3 4 5 6 7 8	1 Programming tool baud rate	Set this matched to the operating conditions.
	2 Programming memory protection	
	3 Programming memory selection	
	4 Baud Rate	19200 bit/s
	5 Bit length	7 bits
	6 Parity bit	ON
	7	Even
	8 Stop bit	1 bit

(2) Rotary DIP switch

Set to "01".

● RS-422A port settings

Please reset some VT3/DT communication conditions from the initial values.

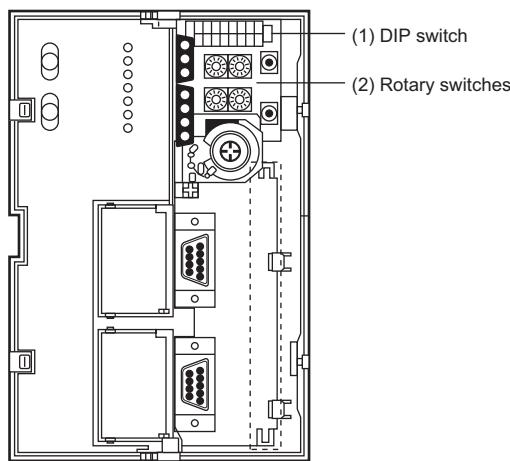
Item	Default	Value after Change
PLC No.	ON (1)	None
PLC serial I/F	RS-232C	RS-422A 4-wire
Data bit	7 bits	8 bits
Parity	Even	Odd

(1) DIP switch

Switch No.	Switch Name	Set Value
ON ← 1 2 3 4 5 6 7 8	1 Programming tool baud rate	9600 bit/s 19200 bit/s
	2 Programming memory protection	ON OFF
	3 Programming memory selection	
	4 Baud rate	
	5 Bit length	Set this matched to the operating conditions.
	6 Parity bit	
	7	
	8 Stop bit	

■ FP10SH

● Tool port



Change some of the default communications conditions as follows:

Item	Default	Value after Change
Parity	Even	Odd

(1) DIP switch

Upper side: This is the setting of the COM port. Set this matched to the operating conditions.

Lower side: Set as follows.



Switch No./Name No.		Set Value
1	Baud rate	19200 bit/s
2	Data length	7 bits
3	Modem control	Disable
4	Program memory protection	
5	Program memory selection	
6	COM port baud rate	Set this matched to the operating conditions.
7		
8		

(2) Rotary switches

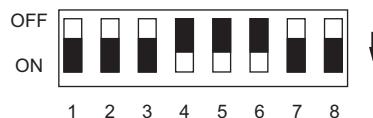
Upper side: Set the two rotary switches to "01".

Lower side: The two rotary switches are for COM port use.

● COM port

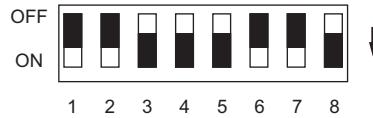
(1) DIP switch

Upper side: Set as follows.



Switch No./Name No.		Set Value	
1	Modem control	Disable	OFF
2	Start code	STX disabled	OFF
3	End code	CR code	OFF
4			ON
5	Stop bit length	1 bit	ON
6	Parity check	Even	ON
7			OFF
8	Data length	7 bits	OFF

Lower side: Set as follows.

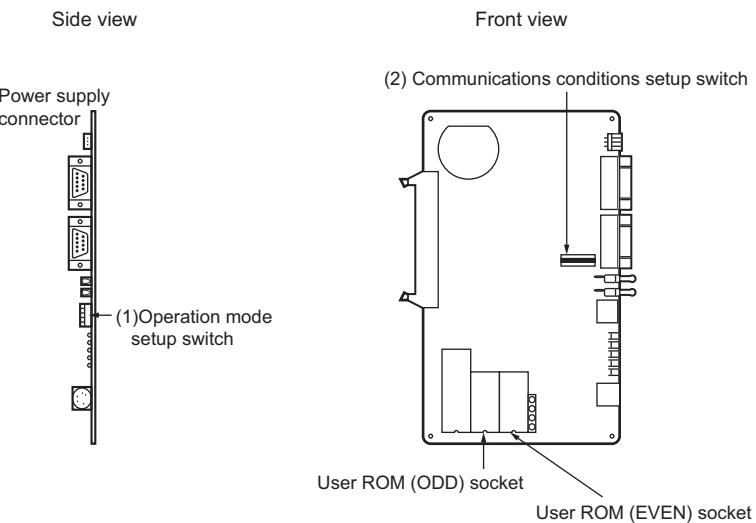


Switch No./Name No.		Set Value	
1			
2	Tool port		
3	Transmission format		
4	Program memory protection	Set this matched to the operating conditions.	
5	Program memory selection		
6			ON
7	COM port		ON
8	Baud rate	19200 bit/s	OFF

(2) Rotary switches

Upper side: The two rotary switches are exclusively for the tool port.

Lower side: Set the two rotary switches to "01".

■ FP-C**(1) Operation mode setup switch**

Switch No.	Switch Name	Set Value
ON ← 	1 Memory Protection Switch	Set this matched to the operating conditions.
2 	2 Baud rate selector switch	19200 bit/s
3 	3 Operation mode setup switch	Computer communications board
4 	4 Not used	

(2) Communications conditions setup switch

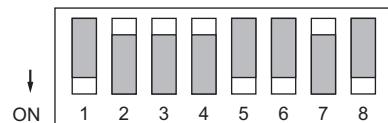
Switch No.	Switch Name	Set Value
ON → 	1	ON
2 	Modem control/baud rate	OFF
3 		OFF
4 	4 Data length	7 bits
5 	5 Parity check	ON
6 	6 Parity setting	ON
7 	7 Stop bit length	1 bit
8 	8 Control signal ^{*1}	ON

*1 SW8 must always be set to ON.

■ CCU-AFP3462, CCU-AFP5462

● DIP switch

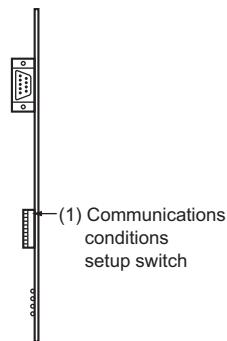
Switch No.		Set Value	
1	Baud rate (Baud Rate)	19200 bit/s	ON
2			OFF
3			OFF
4	Data length	7 bits	OFF
5	Parity check	ON	ON
6	Parity setting	Even	ON
7	Stop bit	1 bit	OFF
8	Control signal ¹	Enables CS and CD.	ON



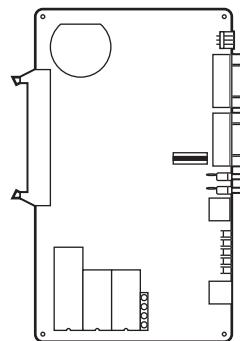
*1 Use the control signals of switch No.8 at its ON setting.

■ Computer communications board

Side view



Front view



(1) Communications conditions setup switch

Switch No.	Switch Name	Set Value
1	Modem control/baud rate	ON
2		OFF
3		OFF
4	Data length	7 bits
5	Parity check	ON
6	Parity setting	ON
7	Stop bit length	OFF
8	Control signal ¹	ON

*1 Use the control signals of switch No.8 at its ON setting.

■ FP-Σ

Set the communications conditions in the PLC system register setting on FPWINGR. Communications conditions are set by values being written to system registers.

● PLC system register settings

Tool port settings

No.	Designation	Settings
410	Unit No.	1
412	Modem connection	No connection (unmark checkbox)
413	Data length	7 bits
	Parity check	Even
	Stop bit	1 bit
415	Baud rate	19200 bit/s

COM port settings

No.		Designation	Settings
COM1	COM2		
410	411	Unit No.	1
412		Communications board	CCU link
		Modem connection	No connection (unmark checkbox)
413	414	Data length	7 bits
		Parity check	Even
		Stop bit	1 bit
415		Baud rate	19200 bit/s

■ FP-X

To set up FP-X communication, follow the steps “Options” → “PLC System Register Setup” from the FPWIN GR menu.

Communication conditions are set up based on specific values written to the system register.



After making a change to the system register, please ensure to restart the PLC power.

● Communications settings

With FP-X, the following communication items can be changed. For more information, please refer to data sheets of specific devices.

Item	Setting Range	Default
Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	9600 bit/s
Data length	7, 8 bits	8 bits
Parity	None, odd, even	Odd
Stop bit	1 bit/ 2 bits	1 bit

● PLC system register settings

Tool port settings

No.	Designation	Settings
410	Unit No.	1
412	Communication Mode	CCU link
	Modem connection	No connection (unmark checkbox)
413	Data length	7 bits
	Parity check	Even
	Stop bit	1 bit
415	Baud rate	19200 bit/s

COM1 port settings

No.	Designation	Settings
410	Unit No.	1
412	Communication Mode	CCU link
	Modem connection	No connection (unmark checkbox)
413	Data length	7 bits
	Parity check	Even
	Stop bit	1 bit
415	Baud rate	19200 bit/s

COM2 port settings

No.	Designation	Settings
411	Unit No.	1
412	Communication Mode	CCU link
	Modem connection	No connection (unmark checkbox)
	Port Selection	Communication box/onboard USB [*]
414	Data length	7 bits
	Parity check	Even
	Stop bit	1 bit
415	Baud rate	19200 bit/s

* When using USB to communicate with the ladder diagram programming software, please set to "onboard USB".

● Precautions when using the Communication box

- Please connect Communication box to "Cassette Connection Position 1". Cannot be connected to other positions.
- Connection varies depending on Communication box models when selecting "onboard USB" via COM2. Please refer to the following table.



The USB port is valid in the initial settings.

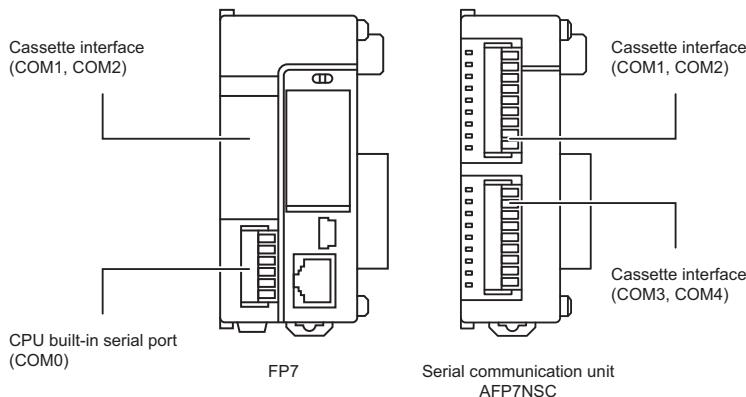
Communication box	Connection of Serial I/F	
	USB Port Not Used	USB Port Used
AFPX-COM1	RS-232C 5-wire	RS-232C 3-wire (RS and CS cannot control, Please loopback).
AFPX-COM2	RS-232C 3-wire (2 channels can be used simultaneously)	RS-232C 3 wire (only the COM1 port can be used)
AFPX-COM3 ^{*1} ^{*2}	Not limited RS-422A	
AFPX-COM4 ^{*1}	RS-232C 3-wire	Cannot use RS-232C

*1 Not support RS-485 communication.

*2 AFPX-3Cassette Switch RS-422A/RS-485. Please change the DIP switch on the back of Cassette based on the following.

Switch No.	Switch Name	Set Value	
 ON	1	RS-422A/RS-485 switching	OFF
	2		OFF
	3		OFF
	4	terminator	OFF

■ FP7



● CPU built-in serial port (COM0), cassette interface (COM1/COM2)

In the FPWIN GR menu, select [Option]→[FP7 Configuration]→[Built-in SCU setting] to make communication settings for the FP7 COM0 port (CPU built-in serial port), COM1 and COM2 port (cassette interface).

Set up COM1 and COM2 when a communication cassette will be used.

Name	Setting
Communication/function cassette ^{*1}	Install the communication cassette you are going to use.
Communication mode	MEWTTOCOL-7
PLC number	1
Communication speed	115200bps
Data length	8 bits
Parity	Odd
Stop bit	1 bit
RS/CS	Invalid
Transmission wait time	0
Head code STX	Invalid
Determine that communication has ended	CR
Time it takes to determine end of communication	0
Modem initialization	Does not initialize

*1 Set up COM1 only.

8-4 Unit Settings

● Serial communication unit AFP7NSC

In the FPWIN GR7 menu, select [Option]→[FP7 configuration]→[I/O map setting] to make communication settings for AFP7NSC.

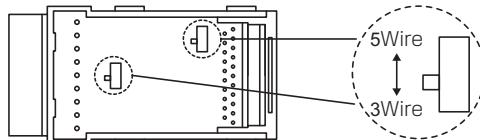
Place the AFP7NSC in the slot and make the following detailed settings.

Name	Setting
Communication cassette ¹	Install the communication cassette you are going to use.
Communication mode	MEWTOCOL-7
PLC number	1
Communication speed	115200bps
Data length	8 bits
Parity	Odd
Stop bit	1 bit
RS/CS	Invalid
Transmission wait time	0
Head code STX	Invalid
Determine that communication has ended	CR
Time it takes to determine end of communication	0
Modem initialization	Does not initialize

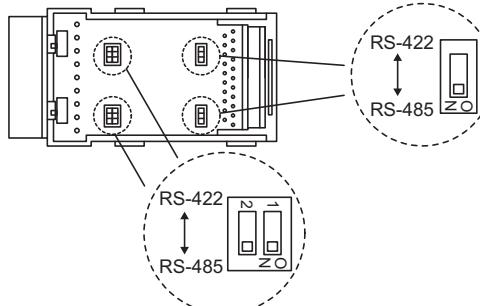
*1 Set up COM1 and COM3 only.

● Communication cassette precautions

- Insert and use the communication cassette in the CPU unit or in the serial communication unit AFP7NSC.
- Set the AFP7CCS2 cassette to RS-232C 3-wire.
Set the two switches on the rear panel of the cassette to "3-wire".



- The AFP7CCM1 and AFP7CCM2 cassette allow you to select RS-422A or RS-485.
Set the port switch on the rear panel of the cassette to "RS-422".



- CH1 (RS-485) of AFP7CCS1M1 cannot be connected. Use CH2 (RS-232C 3-wire) to make a connection.

Communication Condition Setting Ranges and Defaults During Serial Communication

● MEWNET FP Series

Item	Setting Range	Default
PLC No.	OFF, ON (1 to 63)	ON (1)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire *	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

* Please use the RS-232C to connect to PORT3 of the VT3 series.

● MEWTTOCOL-7

Item	Setting Range	Default
PLC No.	OFF, ON (1 to 63)	ON (1)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	9600, 19200, 38400, 57600, 115200bit/s	115200bit/s
Data bit	7 bits, 8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

8-4 Unit Settings

Setting for Ethernet connection

This section describes how to connect the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port No. of the connected units should be determined in advance. The following table shows the setting items corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



Make sure that "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required settings for Ethernet connections

The following settings must be made when connecting VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT5. Select "System settings"→"VT setting" in "Ethernet/language" in VT STUDIO. ¹	P.8-29
	In the case of Soft-VT: Set the IP address assigned to the PC which uses Soft-VT. Set it with "network and sharing center" in "control panel" on a Windows.	-
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"Periphery connection" in "PLC communication conditions" in VT STUDIO. ²	P.8-30
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5 Series. Use the Panasonic Corporation programming tool FPWIN GR7 to set the communication conditions.	P.8-33

¹ Select "VT Machine Setup"→"Ethernet settings" in VT5 system mode to confirm and change settings.

² Use "PLC Comm. Setup" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.8-31
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.8-32
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use the Panasonic Corporation programming tool FPWIN GR7 to set the communication conditions.	P.8-33

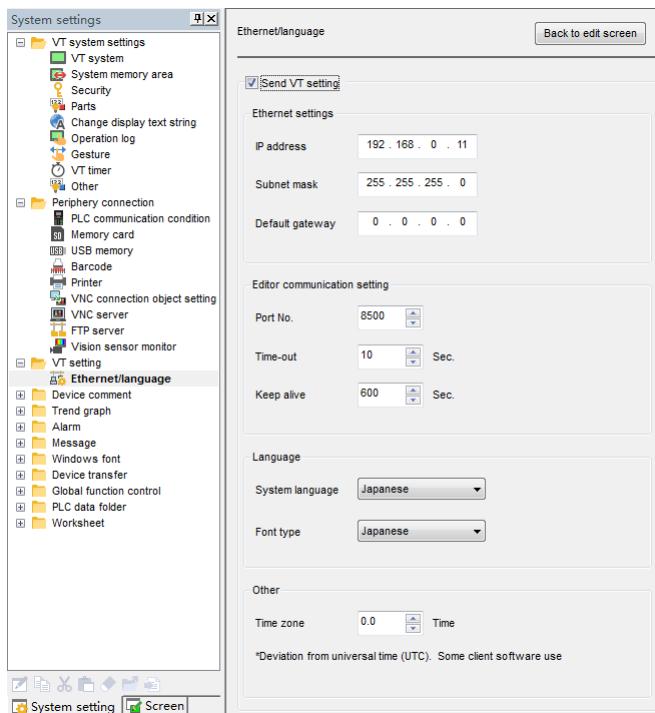
¹ Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.

Point

- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
[] "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are unnecessary because Soft-VT uses the Ethernet setting of the PC which uses Soft -VT.



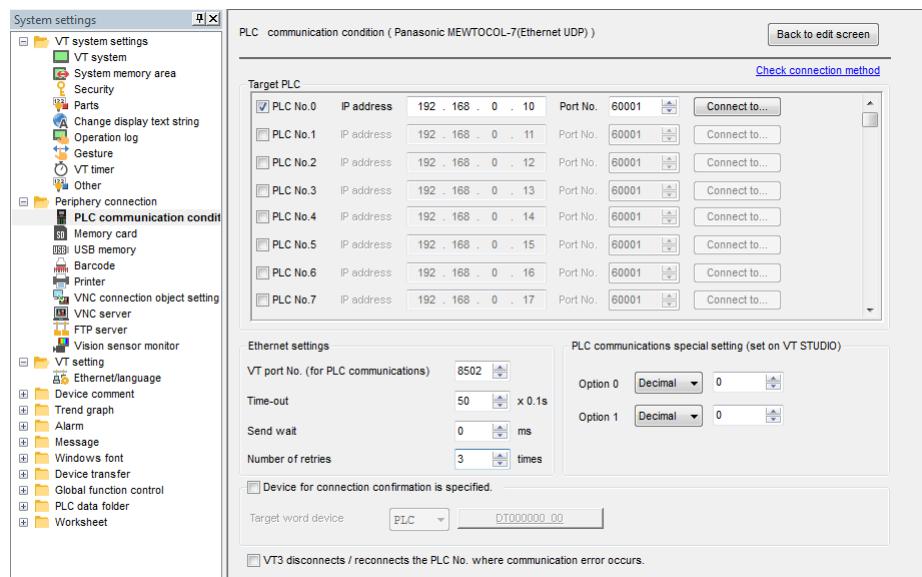
In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

8-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Shut down/reset station number causing communication error ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023. Also, take care not to use a port number already used by another device.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 System mode to set an IP address to be assigned to the VT3 or make other settings.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Hardware Manual

Ethernet Setup (1/3)				OK	Cancel	Next page
Baud rate	100/10 Mbps Auto					
IP Address	192	168	1	10		
Subnet Mask	255	255	255	0		
Default Gateway	0	0	0	0		
MAC address	**.**.**.*.**.**					
				OK	Cancel	Next page
				OK	Cancel	Next page
Ethernet Setup (3/3)				OK	Cancel	Next page
FTP Setup	Enable	Password				
Routing setup						
No.0 (Disabled)	Setup					
No.1 (Disabled)	Setup					
No.2 (Disabled)	Setup					
No.3 (Disabled)	Setup					

Item	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	This is the ID No. unique to VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup¹	Selects "Enable" only when using a router.

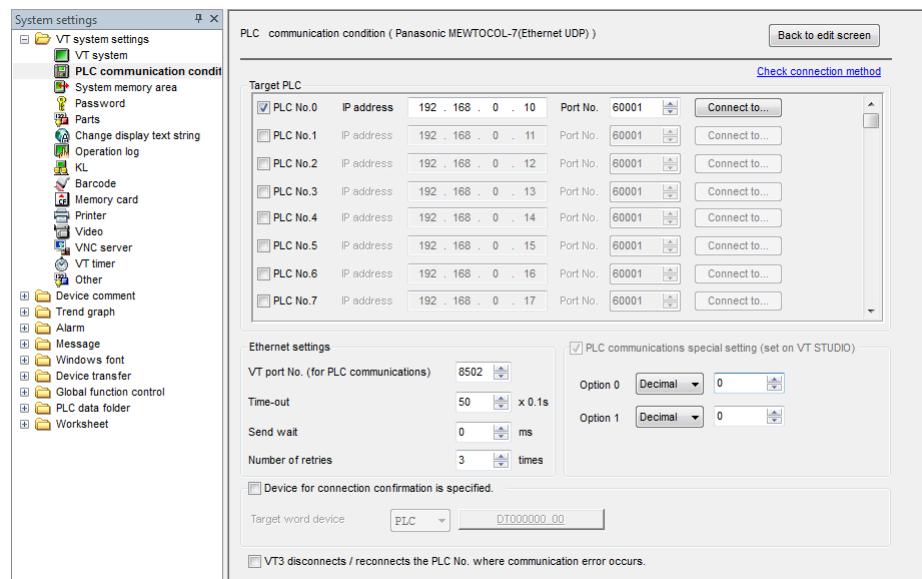
*1 "Chapter 8 ETHERNET", VT3 Series Hardware Manual

8-4 Unit Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connection", VT3 Series Reference Manual



Item		Description
Target PLC	PLC No.	Selects the PLC No. (0 to 15) to be used.
	IP address ¹	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port No. ²	Sets the port No. (1024 to 65535) of the connection destination PLC (marked PLC No.).
	Connect to	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet Settings	VT port No. (for PLC communications)	Sets the port No. (for PLC communications) (1024 to 65535) of the VT3.
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ³	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
Disconnects / reconnects the PLC No. where communication error occurs ⁴		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP addresses to each device within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. Also, take care not to use another port No. that is already in use.

*3 Select "PLC Devices"

"6-7 Set up the Devices", VT3 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC setting conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Condition", VT3 Series Hardware Manual

■ FP7 LAN Port settings

In the FPWIN GR7 menu, select [Option]→[FP7 configuration]→[Built-in ET-LAN setting] to make communication settings for the FP7 LAN port.

Item	Setting
Basic communication settings	IPv4/IPv6 settings Select [IPv4 only].
	Auto IP Address (IPv4) Set the IP address to be assigned to the PLC.
	Subnet mask (IPv4) Set the PLC subnet mask.
	Default gateway (IPv4) Set the default IP address of the PLC router.
User connection information settings	Connection settings Select "Use".
	Communication method Select "UDP/IP".
	Open method (auto/manual) Select "Auto OPEN".
	Operating mode setting Select "MEWTOCOL-7".
	Local port number Set the PLC Port Number.
	Time until unused connections are disconnected Set as necessary.
	Remote port number Need not be set when any remote office is OK. Set the VT5/VT3 port number to specify a remote office.
	Method for setting remote office Set "Use IP address to make setting (IPv4)".
	Remote IP Address Need not be set when any remote office is OK. To specify a remote party, set the IP address to be assigned to the VT5/VT3.

* Connect only one VT5/VT3/Soft-VT to one port number.
Connecting two or more VT5/VT3/Soft-VT units to one port number will prevent normal communications.



After completing the settings, turn on the CPU.

■ AFP7CCET1 Communication Cassette Settings

Make the AFP7CCET1 communication settings as follows. Use the FPWIN GR7 to make function cassette settings and use the Configurator WD to set the IP address or port number.

● FPWIN GR7 settings

In the FPWIN GR7 menu, select [Option]→[FP7 configuration]→[Built-in SCU setting] to set up.

Name	Setting
Communication/function cassette *1	AFP7CCET1
Communication mode	MEWTOCOL-COM
PLC number	1
Transmission wait time	Set the transmission wait time on the PLC.
Determine that communication has ended	CR
Time it takes to determine end of communication	0

* Items other than those above even if they are FPWIN GR7 settings are disabled.

● Configurator WD Settings

Use the Configurator WD to set the IP address and port number for the AFP7CCET1 communication cassette.

1 Unit search

When the AFP7CCET1 communication cassette and the PC have been connected to the Ethernet, start up the Configurator WD and perform a unit search.

2 IP address setting

When the system is looking for the AFP7CCET1 communication cassette , select the unit name and open [Edit]→[IP address setting] in the menu bar and make the following settings.

Item	Setting
IP Address	Set the IP address to be assigned to the PLC.
Subnet mask	Set the PLC subnet mask.
Default gateway	Set the default IP address of the PLC router.

3 Port number setting

When the system is looking for the AFP7CCET1 communication cassette, select the unit name and open [Edit]→[Communication setting] in the menu bar and make the following settings.

Item	Setting
Communication protocol selection	Select "UDP".
Select operating mode	Select "Connect server".
Communication mode	Select "MEWTOCOL".
Standby port No.	Set the PLC Port Number.

When the settings have been completed, press the "Update" button.



After completing the settings, turn on the CPU.

8-5 Available Devices

■ MEWNET FP Series

	Device	Address
Bit Devices	Input relay ^{*1}	X0000 to X511F
	Output relay	Y0000 to Y511F
	Internal relay	R0000 to R886F
	Link relay	L0000 to L639F
	Special relay ^{*1}	R9000 to R913F
	Timer (contact) ^{*1}	T0000 to T2999
	Counter (contact) ^{*1}	C0000 to C3071
Word Devices	Input relay ^{*1}	WX000 to WX511
	Output relay	WY000 to WY511
	Internal relay	WR000 to WR886
	Link relay	WL000 to WL639
	Special relay ^{*1}	WR900 to WR913
	Link register	Ld0000 to Ld8447
	Data register	DT00000 to DT32764
	Special data register	DT90000 to DT90511
	File register	FL00000 to FL32764
	Timer/counter (set) ^{*2}	SV0000 to SV3071
	Timer/counter (count) ^{*2}	EV0000 to EV3071

*1 Read-only.

*2 Specify the ranges of timers and counters in system registers on the PLC.



Available devices are restricted according to the product model. Check the manual for the respective model.

■ MEWTOCOL-7

Device	Global device	Local device ^{*2}
Bit device	Input memory	X0000 to X511F _X001000000 to _X46800511F
	Output memory	Y0000 to Y511F _Y001000000 to _Y46800511F
	Internal relay	R00000 to R2047F _R001000000 to _R46802047F
	Link relay	L00000 to L1023F _L001000000 to _L46801023F
	Timer (contact) ^{*1}	T0000 to T4095 _T001000000 to _T468004095
	Counter (contact) ^{*1}	C0000 to C1023 _C001000000 to _C468001023
	Pulse relay	P0000 to P255F _P001000000 to _P46800255F
	Error warning relay	E0000 to E4095 -
	System relay ^{*1}	SR0000 to SR223F -
Word device	Input memory	WX000 to WX511 _WX001000000 to _WX46800511
	Output memory	WY000 to WY511 _WY001000000 to _WY46800511
	Internal relay	WR0000 to WR2047 _WR001000000 to _WR468002047
	Link relay	WL0000 to WL1023 _WL001000000 to _WL468001023
	System relay ^{*1}	WS000 to WS223 -
	Link register	LD00000 to LD16383 _LD001000000 to _LD468016383
	Data register	DT000000 to DT999423 _DT001000000 to _DT468065534
	System data ^{*1}	SD000 to SD255 -
	Timer set value	TS0000 to TS4095 _TS001000000 to _TS468004095
	Timer elapsed value	TE0000 to TE4095 _TE001000000 to _TE468004095
	Counter set value	CS0000 to CS1023 _CS001000000 to _CS468001023
	Counter elapsed value	CE0000 to CE1023 _CE001000000 to _CE468001023
	Index register	I0 to IE -

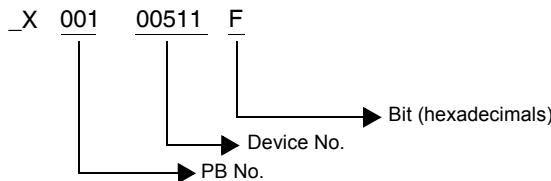
^{*1} This is a read-only device.

Write attempts will result in a communication error.

^{*2} The local device number is set as described below.

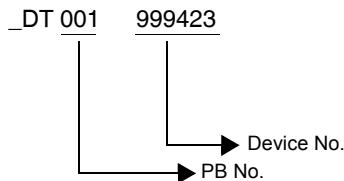
- For bit devices (excluding timer contacts and counter contacts)

The high-order 3 digits is the PB No., the middle-order 5 digits is the device No. and the low-order 1 digit is a bit.



- For word devices, timer contacts and counter contacts

The high-order 3 digits is the PB No. and the low-order 6 digits is the device No.



8-6 Error Messages and Troubleshooting

This section describes the communication errors that occur when VT5/VT3 Series or Soft-VT is connected to a PLC made by Panasonic Corporation.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3/Soft-VT main unit.

The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
Parity Error	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	The receive buffer of VT5/VT3 overrun.	Please decrease the communication speed (baud rate).
Over Run Error	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
Framing Error	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- *
 - When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 - For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The following error messages are displayed when communicating with the PLC units over Ethernet.

Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when a communications error occurs.

Display Message	Cause	Remedy
TimeOut Error (++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2, VT3-E3 is not connected.	<ul style="list-style-type: none"> Turn the VT3 unit OFF, mount VT2-E1/E2, VT3-E3, and then turn VT3 ON again.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLC Error [**(++)]	There was not error response ** from PLC No.++.	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

9

CONNECTING TO JTEKT (TOYODA) PLCS

This chapter describes how to connect a PLCs made by JTEKT (TOYODA).

9-1	Checking Operation before Connection	9-2
9-2	Connection method and connection diagram.....	9-4
9-3	Unit Settings.....	9-10
9-4	Available devices	9-22
9-5	Error Messages and Troubleshooting	9-27

9-1 Checking Operation before Connection

This section describes how to check the items required for connecting the PLC to the VT5/VT3/DT.

- (1) Make sure that the VT5/VT3/DT can be connected to the PLC or link unit.
- (2) Check whether or not CPU or link unit settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

"Procedure before Starting Communication", page 18

Serial connection

■ Connection of TOYOPUC PC10 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
PC10G	Internal link	RS-422A (4-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	P.9-10	TOYOPUC PC10 Series
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H42		
			VT3-V7R(CN3)	Wiring diagram R3		
			VT5(COM2)*1/VT3-W4□A	Wiring diagram W42		

*1 VT5-W07M is not supported

■ Connection of TOYOPUC-PC3 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
PC3J, PC3JL	Internal link	RS-422A (2-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.9-11	TOYOPUC PC3 Series
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2)*1/VT3-W4□A	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		
		RS-422A (4-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 2	P.9-11	
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2)*1/VT3-W4□A	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R2		

*1 VT5-W07M is not supported

■ Connection of TOYOPUC-PC2 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
PC2, L2	TPU-2652	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.9-12	TOYOPUC PC2 Series*1
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		
PC2J	THU-2755	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.9-12	
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		

*1 VT5 series is not supported.

■ Connection of TOYOPUC-PC1 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
PC1	TPU-2785	RS-422A (2-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.9-13	TOYOPUC PC1 Series*1
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		
F2, F2N	TPU-2628	RS-422A (2-wire)	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.9-13	
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R1		

*1 VT5 series is not supported.



- VT3-W4T/W4M/W4G (RS-232C) cannot be connected.
- Not supported by the Soft-VT.

Ethernet connection

■ Connection of TOYOPUC series

CPU	Connection Methods	Unit Setting	Target PLC
PC10G(Ver.3.00 or later)	TPU-2785	P.9-19	
PC10GE	TPU-2628	P.9-19	
	Built-in Ethernet port connection	P.9-19	
Plus CPU	Plus EX (CN1) Plus EX2 (CN1) Plus EFR (CN1) Plus EFR2 (CN1) Plus 2P-EFR (CN1/CN2)	P.9-21	TOYOPUC series (Ethernet) ¹

*1 VT3 series is not supported.

*2 Only PC 10 mode can be connected for CPU operation mode.



9-2 Connection method and connection diagram

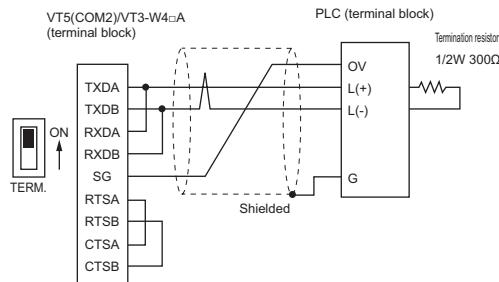
This section describes wiring of connector cables.

The Wiring diagrams recommended by JTEKT (TOYODA) may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the Wiring diagrams in this manual.

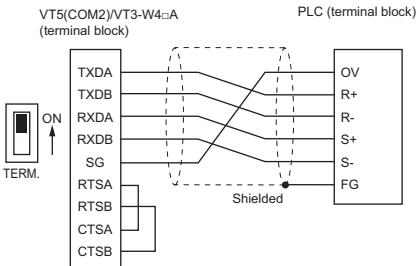
Connection diagram for serial connection

■ Connection to VT5 Series (COM2) / VT3-W4□A (RS-422A)

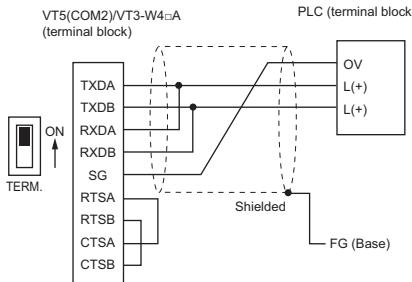
● Wiring Diagram W40 (RS-422A)



● Wiring Diagram W41 (RS-422A)

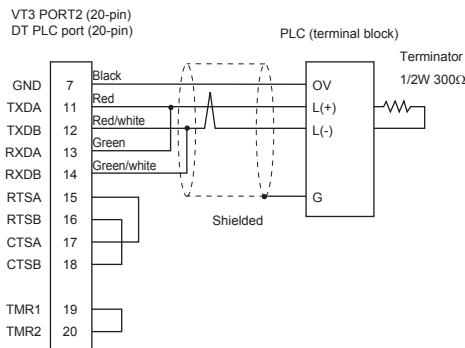


● Wiring Diagram W42(RS-422A)

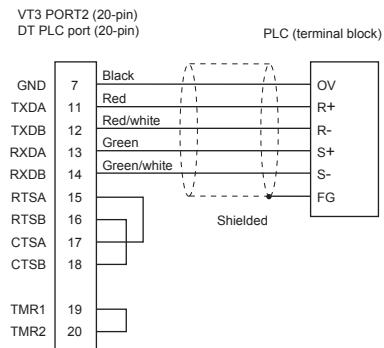


■ Connection to VT3 Series/DT Series

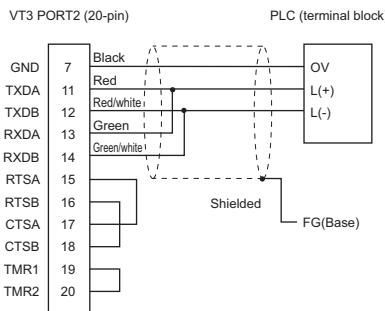
● Wiring Diagram 1 (RS-422A, 2-wire: OP-24028)



● Wiring Diagram 2 (RS-422A, 4-wire: OP-24028)



● Wiring Diagram 3 (RS-422A, 2-wire: OP-24028)



■ Connection with VT3 Handy Series



FG2 must be grounded.

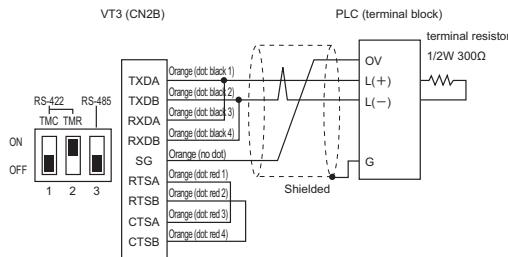
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192:5m,

OP-87193: 10m



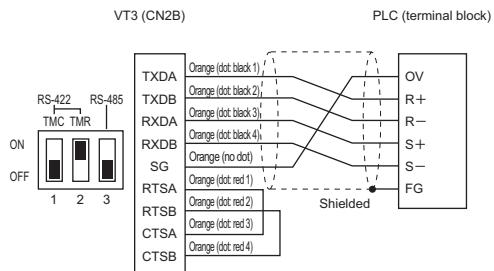
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192:5m,

OP-87193: 10m



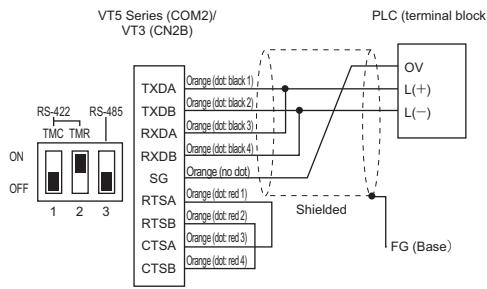
● Wiring Diagram H42 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192:5m,

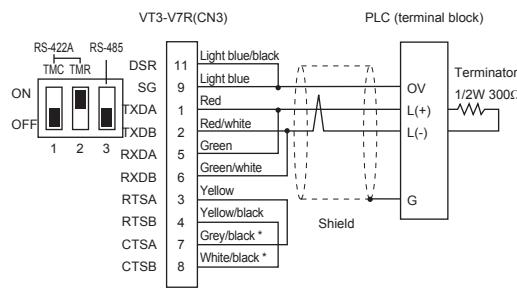
OP-87193: 10m





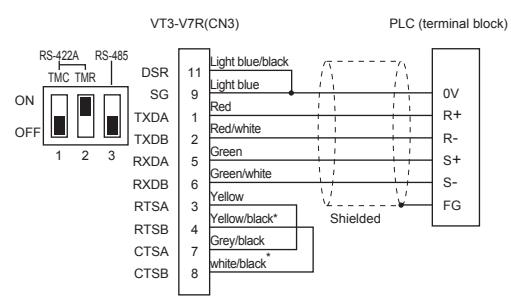
■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-422A 2-wire: VT-C5R2/C15R2)



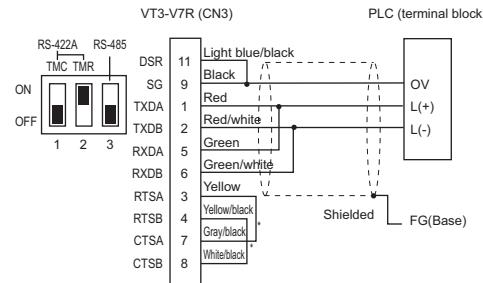
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R2 (RS-422A 4-wire: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-422A 2-wire: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), please ensure to read the "Connection Precautions", page A-13

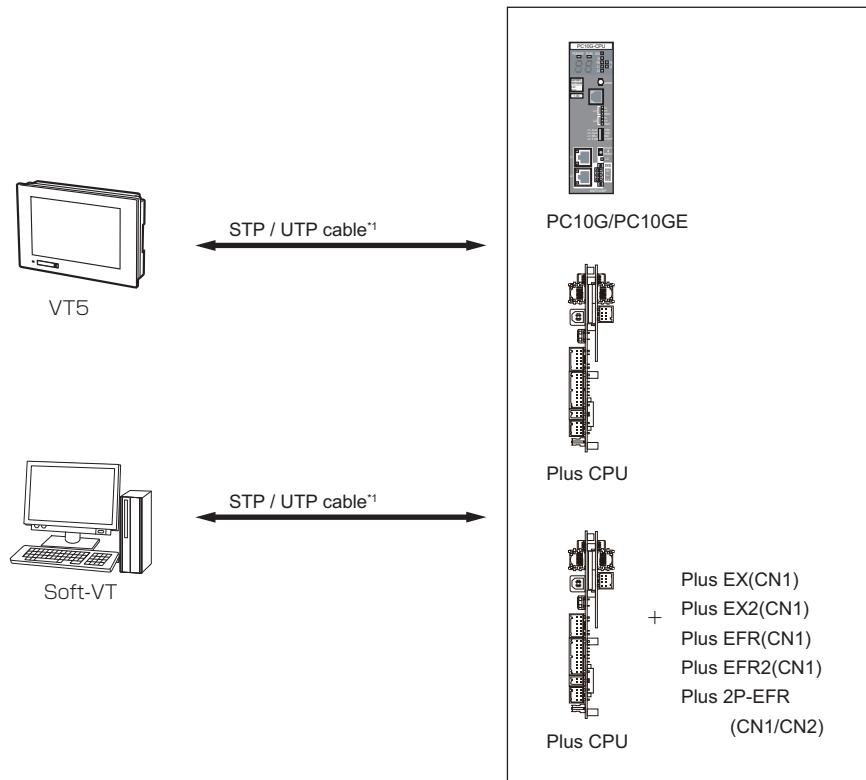


For the pin assignment number of the connectors on the VT5 Series/VT3 series/DT series, please see the Appendix at the end of this manual.

Connection method for connecting to Ethernet

■ Direct connection (1: 1 connection)

Connect by using STP / UTP cable.



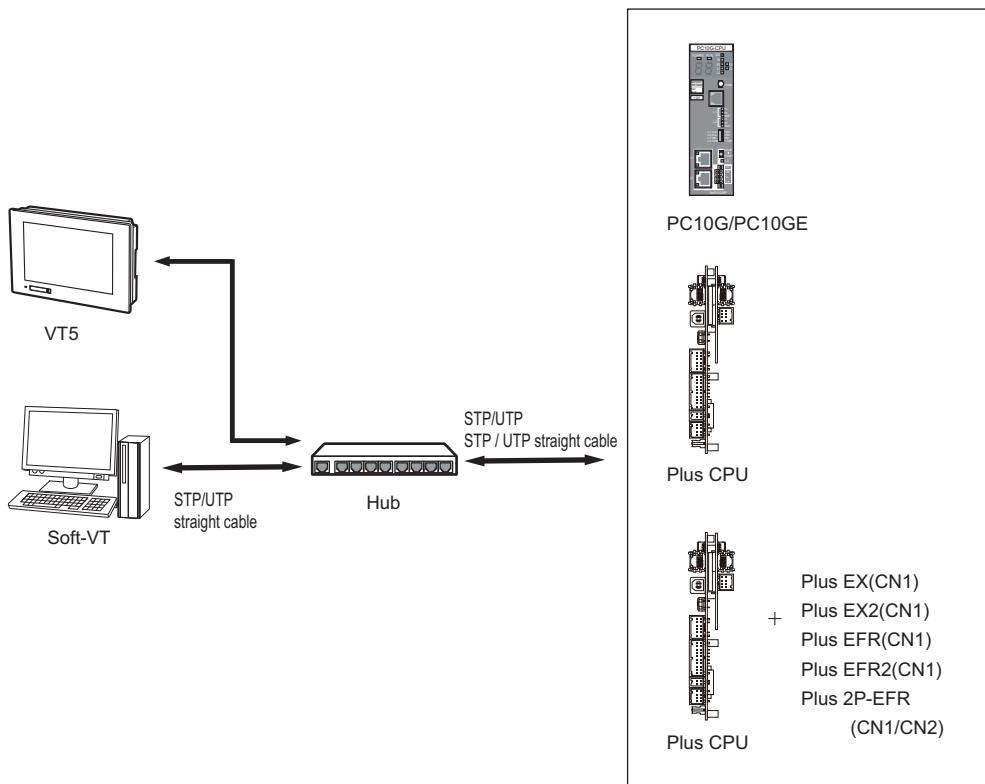
*1 The VT5 series supports MDI / MDI-X auto switching function.
To connect directly to PLC with other models, please use STP / UTP cross cable.



- When building with 10BASE - T, use STP / UTP cable category 3 or higher.
- When building with 100 BASE - TX, please use STP / UTP cable category 5.



■ When connecting using a hub (multiple connections)



Connection of VT5 Series and Soft-VT to a hub

- Use the STP/UTP straight cable.
- The VT5 Series and Soft-VT should be connected to a port other than the cascade port on a hub.

Hub connection with PC10G/PC10GE and Plus CPU

- Use the STP/UTP straight cable.
- Connect the PLC Ethernet port to a port other than the cascade port on the hub.



- When building with 10BASE - T, use STP / UTP cable category 3 or higher.
 • When building with 100 BASE - TX, please use STP / UTP cable category 5.

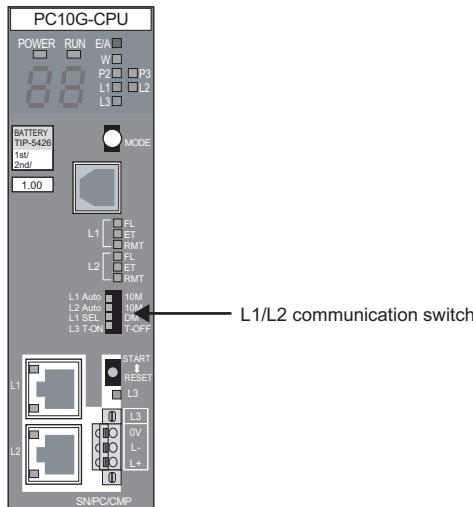
9-3 Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

Connection diagram for serial connection

■ PC10G

● Communication setting



● L1/L2 communication setting switch

Setup switch	Setting range	Set value
L1	Auto, 10M	Any setting
L2	Auto, 10M	Any setting
L1	SEL, DM	Any setting
L3	T-ON, T-OFF	T-OFF ^{*1}

*1 Be sure to set to T-OFF.

● Link parameter setting

Link parameter can be set via PCwin.

Set items according to the followig table.

(1) Link setting

Item	Setting
Rack No.	Internal
Slot No.	Standard
Remote module	PC link

(2) Detail setting

Item	Setting	Set value
Station No.	00 to 37	00
Data length	7, 8 bits	7 bits
Stop bit	1, 2 bits	2 bits
Baud rate ^{*2}	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600bit/s	19200bit/s
2-wire/4-wire ^{*3}	2-wire/4-wire	2-wire

*2 Set within the range of 9600 to 57600bit/s when commnunicating with VT3.

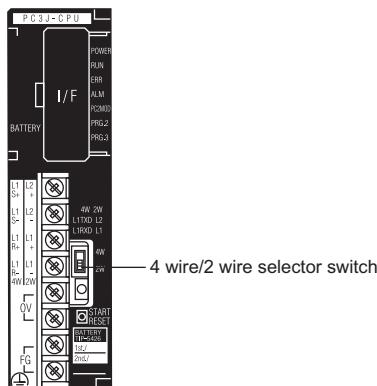
*3 Be sure to select 2-wire.



Be sure to power PLC ON again after setting.



■ PC3J, PC3JL



● Link parameter settings

Set link parameter settings at Hello Win. Set at "Parameters" - "Link Parameter Settings".

Link settings

Item	Setting Item
Rack No.	Internal
Slot No.	Standard
Remote module	CCU link

Detailed Setting

Item	Setting Item
PLC No.	00
Data length	8 bits
Stop bit length	1 bit
Baud rate	19200bit/s
2/4-wire	2-wire

● 4-wire/2-wire selector switch

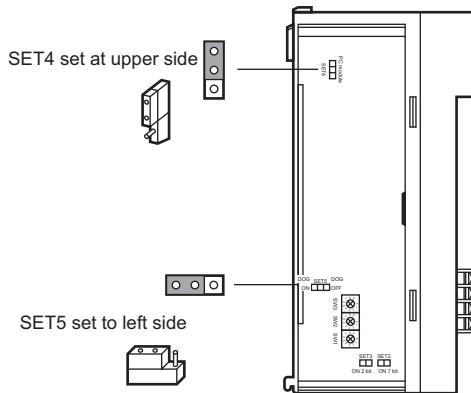
Set either of 4-wire (4W) or 2-wire (2W) according to the Wiring diagram.

To match to the VT STUDIO/DT BUILDER default, set 2-wires (2W).



After changing the setting of the selector switch, turn the PLC OFF then back ON again.

■ CCU Links for PC2/L2



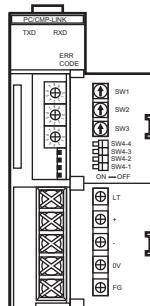
● Internal switches

Switch No.	Setting Item	Set Value	
SW1	Node No. 10 digits	0	0
SW2	Node No. 1 digits	0	0
SW3	Baud rate	19200 bit/s	1

● Short bar

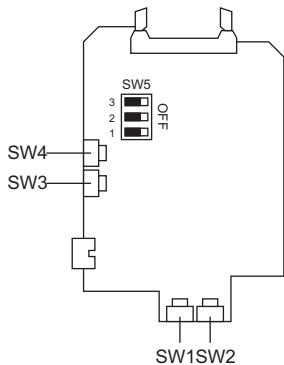
Switch No.	Setting Item	Set Value	
SET2	Data length	7 bits	Yes
SET3	Stop bit length	1 bit	No
SET4	Module type	Cannot be changed	Upper side
SET5	Watchdog timer	Cannot be changed	Left side

■ CCU link for PC2J



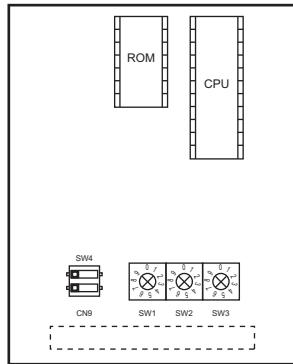
Switch No.	Setting Item	Set Value	
SW1	Node No. 10 digits	0	0
SW2	Node No. 1 digits	0	0
SW3	Baud rate	19200 bit/s	1
SW4	1 Not used	OFF at all times	OFF
	2 Module type	CCU link	ON
	3 Stop bit length	1 bit	ON
	4 Data length	7 bits	ON

■ Link Module (TPU-2785) for PC1



Switch No.	Setting Item	Set Value	
SW1	Node No. 10 digits	0	0
SW2	Node No. 1 digits	0	0
SW3	Link No.	1	1
SW4	Baud rate	19200 bit/s	1
SW5	1	Always set to ON	ON
	2	Stop bit	1 bit
	3	Data length	7 bits

■ CCU Link Module for F2



Switch No.	Setting Item	Set Value	
SW1	Node No. 10 digits	0	0
SW2	Node No. 1 digits	0	0
SW3	Baud Rate	19200 bit/s	1
SW4	1	Stop bit	1 bit
	2	Data length	7 bits

■ Standard Link Module for F2N

Set only the baud rate.

Set the value of the switch to "1" (19200 bit/s).



Communication condition setting range and default value for serial connection

● TOYOPUC-PC10 Series

Item	Setting Range	Default
Station No.	ON (0 to 37)	ON (0)
VT No.	-	-
PLC serial I/F	RS-422A, 2-wire	RS-422A, 2-wire
Baud Rate	9600, 19200, 38400, 57600 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	2 bits
Parity	Even	Even
Control mode	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● TOYOPUC-PC3 Series

Item	Setting Range	Default
PLC No.	ON (0 to 37)	ON (0)
VT No.	-	-
PLC serial I/F	RS-422A, 2-wire/4-wire	RS-422A, 2-wire
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● TOYOPUC-PC2 Series

Item	Setting Range	Default
PLC No.	ON (0 to 37)	ON (0)
VT No.	-	-
PLC serial I/F	RS-422A, 2-wire	RS-422A, 2-wire
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● TOYOPUC-PC1 Series

Item	Setting Range	Default
PLC No.	ON (0 to 37)	ON (0)
VT No.	-	-
PLC serial I/F	RS-422A, 2-wire	RS-422A, 2-wire
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	7 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-



Set up for connecting to Ethernet

This section describes the settings to connect VT5 series / Soft-VT and the target PLC via the Ethernet.

■ Confirmation before setting

For the Ethernet connection, it is necessary to decide IP address of the device to be connected and the port No. for communication etc. in advance.

Setting items according to the connection type are as follows. Check with the network

Connection type	Setting item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5 / Soft-VT (PC) • IP address assigned to PLC • Port No. used for communication
Other connections	<ul style="list-style-type: none"> • IP address assigned to VT5 / Soft-VT (PC) • IP address assigned to PLC • Port No. used for communication • Sub-net mask • Default gateway



Be careful not to duplicate "IP address assigned to VT5 / Soft-VT (PC)" with "IP address assigned to PLC".

■ Required settings for Ethernet connection

The settings necessary for Ethernet connection of VT5 series / Soft-VT and PLC are as follows.

● VT 5 series / Soft-VT

Required settings	Description	
Ethernet setting on VT5 / Soft-VT side	For VT5 series: Set up IP address and port No. to be assigned to VT5. Set with "System Setting" → "Ethernet / LANGUAGE" of "VT Main unit setting" on VT STUDIO. ¹ For Soft-VT: Set up IP address to be assigned to the PC that uses Soft-VT. Set with "Control Panel" → "Network Sharing Center" on Windows.	P.9-17
Communication condition setting with PLC	Set up IP address and port No. of the PLC to be connected. Set with "System Setting" → "PLC communication condition" of "Peripheral device connection" on VT STUDIO ² .	P.9-18
Ethernet setting on PLC side	Set up Ethernet on PLC side for connecting to VT5 series / Soft-VT. Communication conditions are performing with PCWin Ladder Software made by JTEKT (TOYODA).	P.9-19

*1 Settings can also be checked and changed from "VT main unit setting" of VT5 main unit system mode → "Ethernet setting".

*2 Settings can also be checked and changed from "PLC communication condition" of VT5 main unit system mode → "Ethernet setting".



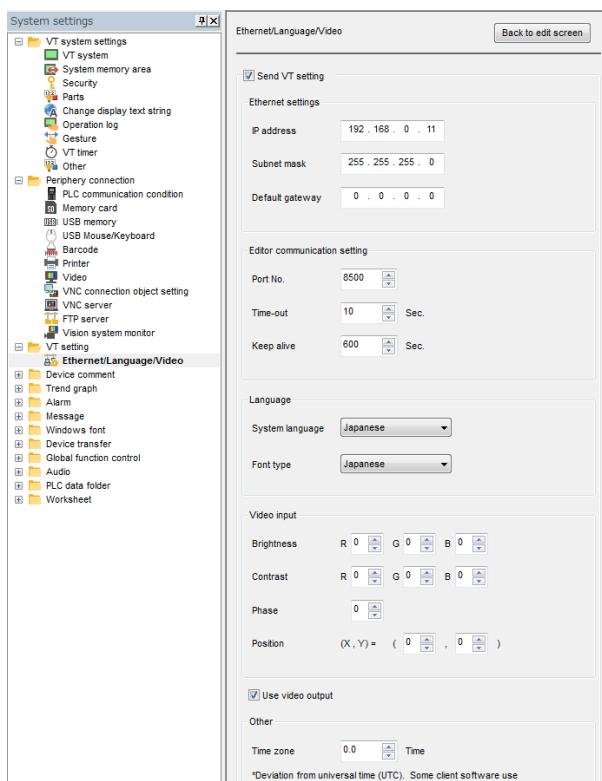
■ Setting for VT5 series Ethernet connection

Set the Ethernet setting for VT5 series in the following procedures.

1 Set up IP address etc. assigned to VT 5 with VT STUDIO.

Select [Resource (R)] → [VT Main Unit Individual Setting (J)] → [Ethernet / Language (E)] on VT STUDIO and set as follows.

"VT 5 Series Reference Manual (12-6 VT Main Unit Individual Setting)".



Item		Description
Send VT main unit individual setting		When checked, VT main unit individual setting will be sent to the VT5 main unit.
Ethernet settings	IP address	Set the IP address assigned to VT5.
	Sub-net mask	In case of direct connection, use the default setting. For other connections, set the checked subnet mask in advance.
	Default gateway	In case of direct connection, use the default setting. For other connections, set the checked default gateway in advance.
Editor communication settings	Port number	Set the port No. to be used when communicating with the PC application such as VT STUDIO, if necessary. Be careful not to duplicate with the port No. used for PLC communication.
	Keep alive	Set as necessary.
	Timeout time	Set as necessary.

Point

- For Ethernet settings, such as IP address assigned to VT5 series can also be checked and changed with VT5 main unit system mode.
The setting items are the same as those set with VT STUDIO.
 "VT 5 Series Hardware Manual (5-3 VT Main Unit Individual Setting)"
- Since Soft-VT uses the Ethernet setting of PC using Soft-VT, these settings are unnecessary.



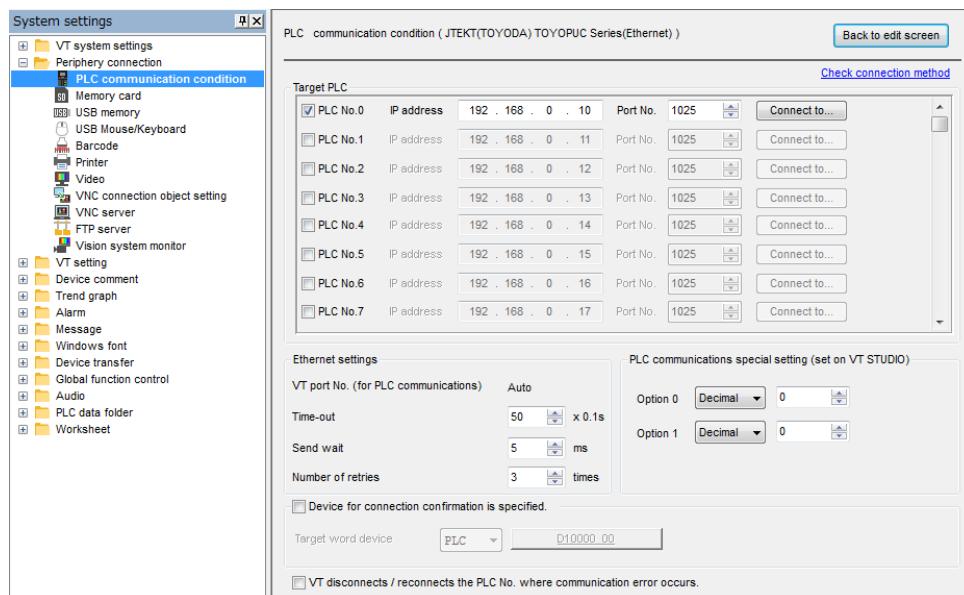
For VT3 series, the IP address assigned to VT3 can only be set on the system mode screen.
For VT5 series, you can do it with "VT Main Unit Setting" on VT STUDIO.

9-3 Unit Settings

2 Set the communication condition with PLC on VT STUDIO.

Select [Resource (R)] → [Peripheral device connection (C)] → [PLC communication condition (C)] on VT STUDIO and set as follows.

"VT 5 Series Reference Manual (Chapter 17 Ethernet Connection)".



Item		Description
Target PLC	PLC No.	Select the station No. (0 to 15) to use.
	IP address ^{*1}	Set the IP address to be assigned to the connected PLC (checked station No.).
	Port No. ^{*2}	Set the port No. (1024 to 65535) of the PLC (checked station number) to be connected.
	Connection destination list	Select a connection destination from the connection list file or add a connection destination.
Ethernet settings	VT Port No. (for PLC communication)	Setting is not necessary. The VT5 series automatically sets the VT port No. (for PLC communication).
	Timeout time	Normally, the setting is not necessary. If the network communication load is higher, please increase the time.
	Send weight	Normally, the setting is not necessary. If the network communication load is higher, please increase the time
	Number of retries	Normally, the setting is not necessary. When using it in a noisy environment etc., please increase the number of times.
PLC communication special setting (set with VT STUDIO)		Normally, the setting is not necessary.
Specify the device for checking connection	Target word device ^{*3}	Set the device to be used for confirming the connection when there is no communication for a certain period of time. Normally, the setting is not necessary.
Disconnect/ Recover communication error station No. ^{*4}		If checked, disconnects to communicate with the station No. where communication error occurred. For the disconnected station No., periodically monitors and resumes the communication when recovering from errors.

*1 Be careful that the IP address does not overlap with other devices within the same LAN.
The IP address is indicated by XXX.XXX.XXX.XXX (XXX is 0 to 255).

*2 To change the port No., do not use 0 to 1023. Also, be careful not to duplicate the number if there is another port number you are using.

*3 "PLC device" can be selected.

"VT5 Series Reference Manual (6-7 Device Settings)"

*4 It can be set when selecting a series that can be connected by 1: N in PLC model setting.



Settings of PLC communication conditions can also be checked and changed in the VT5 main unit system mode.

The setting items are the same as those set with VT STUDIO.

■ TOYOPUC PC 10 series setting

Communication conditions are set with ladder software (PCWin) and the main unit.

To set with PCWin

- 1** Open "Parameter" → "CPU operation mode" in the project tree, select "PC 10 mode" for PC 10 G or "PC 10 extension" for PC 10 GE.
- 2** Open "Parameter" → "Link parameter" in the project tree.
- 3** Select the link No. for link module setting, open "Link setting" and set as follows.

Item	Description
Rack No.	Select "Built-in".
Slot No.	Select "L1" or "L2".
Link module name	Select "Ethernet" or "Ethernet (32 ports)".

- 4** With the same link number selected, open "Advanced settings" and set as follows.

Item	Description
Own node IP address	Set the IP address to be assigned to the PLC.
Connection 1	Check "To use".
Protocol-open type	Select "TCP opponent unspecified passive".
Own node port No.	Set the port No. of PLC.
Initialization	Select "Initialize with link parameter".

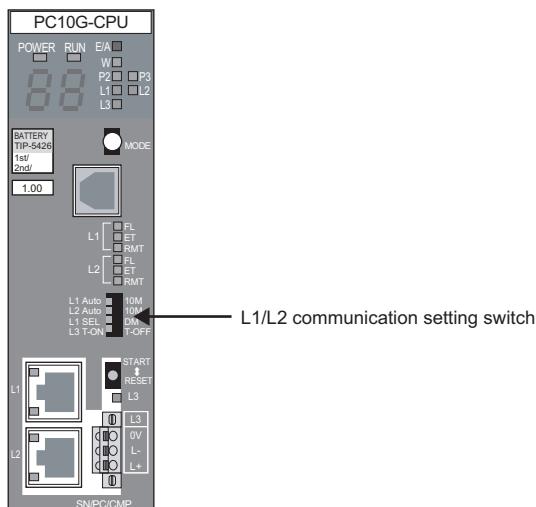


After completing the setting, turn off the power of CPU module.



9-3 Unit Settings

To set with the main unit.



Set the L1/L2 communication setting switch as follows.

Setting switch	Setting range	Setting value
L1	Auto, 10M	Any
L2	Auto, 10M	Any
L1	SEL, DM	SEL ^{*1}
L3	T-ON, T-OFF	T-OFF ^{*2}

*1 Be sure to set it to SEL.

*2 Be sure to set it to T-OFF.



■ TOYOPUC-Plus series setting

Communication conditions are set with ladder software (PCWin) and the main unit.

To set with PCWin

- 1** Open "Parameter" → "CPU operation mode" of the project tree and select "Standard" or "Extended" of Plus.
- 2** Open "Parameter" → "I/O module" in the project tree.
- 3** Select each slot No. and set the module as follows.

Item	Description
Slot No.0	Set "Plus CPU".
Slot No.2, 3	Set the module to be used.

- 4** Open "Parameter" → "Link parameter" in the project tree.
- 5** Select the link No. for link module setting, open "Link setting" and set as follows.

Item	Description
Rack No.	Select "Built-in" to connect with CPU built-in port, and "0" to connect with expansion board.
Slot No.	Select "L1" to connect to CPU built-in port, "2" to connect to expansion board (1st row), and "3" to connect to expansion board (2nd row).
Link module name	Select "Ethernet" or "Ethernet (32 ports)".

- 6** With the same link number selected, open "Advanced settings" and set as follows.

Item	Description
Own node IP address	Set the IP address to be assigned to the PLC.
Connection 1	Check "To use".
Protocol-open type	Select "TCP opponent unspecified passive".
Own node port No.	Set the port No. of PLC.
Initialization	Select "Initialize with link parameter".



After completing the setting, turn off the power of CPU module.

9-4 Available devices

Available devices for serial connection

■ TOYOPUC-PC10 Series

	Device	Address
Bit Device	Internal relay (0000 to 07FF) ^{*1}	M10000 to M307FF
	Input relay ^{*1}	X10000 to X307FF
	Output relay ^{*1}	Y10000 to Y307FF
	Keep relay ^{*1}	K10000 to K302FF
	Link relay(0000 to 07FF) ^{*1}	L10000 to L307FF
	Special relay(0000 to 00FF) ^{*1}	V10000 to V300FF
	Edge detection(0000 to 01FF) ^{*1}	P10000 to P301FF
	Timer (contact)(0000 to 01FF) ^{*1}	T10000 to T301FF
	Counter (contact)(0000 to 01FF) ^{*1}	C10000 to C301FF
	Extended internal relay	EM00000 to EM01FFF
	Extended input relay	EX00000 to EX007FF
	Extended output relay	EY00000 to EY007FF
	Extended output relay	EK00000 to EK00FFF
	Extended link relay	EL00000 to EL01FFF
	Expansion special relay	EV00000 to EV00FFF
	Extended edge detection	EP00000 to EP00FFF
	Extended timer (contact)	ET00000 to ET007FF
	Extended counter (contact)	EC00000 to EC007FF
	Extended internal relay	GM00000 to GM0FFFF
	Extended input relay	GX00000 to GX0FFFF
	Extended output relay	GY00000 to GY0FFFF
Word Device	Data register ^{*1}	D10000 to D30FFF
	Input relay ^{*1}	X10000 to X3007F
	Output relay ^{*1}	Y10000 to Y3007F
	Internal relay(000 to 07F) ^{*1}	M10000 to M3007F
	Keep relay ^{*1}	K10000 to K3002F
	Link relay(000 to 07F) ^{*1}	L10000 to L3007F
	Link register ^{*1}	R10000 to R307FF
	Special relay(000 to 00F) ^{*1}	V10000 to V3000F
	Special register(0000 to 03FF) ^{*1}	S10000 to S303FF
	Current value register(0000 to 01FF) ^{*1}	N10000 to N301FF
	Extended data resister	U00000 to U07FFF
	Extended input relay	EX00000 to EX0007F
	Extended output relay	EY00000 to EY0007F
	Extended internal relay	EM00000 to EM001FF
	Extended keep relay	EK00000 to EK000FF
	Extended link relay	EL00000 to EL001FF
	Expansion special relay	EV00000 to EV000FF
	Expansion special register	ES00000 to ES007FF
	Extended current value register	EN00000 to EN007FF
	Extended setting value register	H00000 to H007FF
	Expansion buffer resister	EB00000 to EB1FFFF
	Extended input relay	GX00000 to GX00FFF
	Extended output relay	GY00000 to GY00FFF
	Extended internal relay	GM00000 to GM0FFF

*1 The higher 1 bit refers to the program No.



Available devices are restricted according to the product model. Check the manual for the respective model.

■ TOYOPUC-PC3 Series

	Device	Address
Bit Devices	Internal relay	M0000 to M07FF
	Input relay	X0000 to X07FF
	Output relay	Y0000 to Y07FF
	Keep relay	K0000 to K02FF
	Link relay	L0000 to L07FF
	Edge detection	P0000 to P01FF
	Timer (contact)	T0000 to T01FF
	Counter (contact)	C0000 to C01FF
	Extended internal relay	EM0000 to EM1FFF
	Extended input relay	EX0000 to EX07FF
	Extended output relay	EY0000 to EY07FF
	Extended keep relay	EK0000 to EK0FFF
	Extended link relay	EL0000 to EL1FFF
	Extended edge detection	EP0000 to EP0FFF
	Extended timer (contact)	ET0000 to ET07FF
	Extended counter (contact)	EC0000 to EC07FF
	Data register	D0000 to D2FFF
Word Devices	Input relay	X0000 to X007F
	Output relay	Y0000 to Y007F
	Internal relay	M0000 to M007F
	Keep relay	K0000 to K002F
	Link relay	L0000 to L007F
	Link register	R0000 to R07FF
	File register	B0000 to B1FF
	Current value register	N0000 to N01FF
	Timer/counter setting value	S0000 to S01FF
	Extended data register	U0000 to U7FFF
	Extended input relay	EX0000 to EX007F
	Extended output relay	EY0000 to EY007F
	Extended internal relay	EM0000 to EM01FF
	Extended keep relay	EK0000 to EK00FF
	Extended link relay	EL0000 to EL01FF
	Extended current value register	EN0000 to EN07FF
	Extended set value register	H0000 to H07FF



Available devices are restricted according to the product model. Check the manual for the respective model.



■ TOYOPUC-PC1/PC2 Series

Device	Address	
	TOYOPUC-PC1 Series	TOYOPUC-PC2 Series
Bit Device	Input relay	X0000 to X07FF
	Output relay	Y0000 to Y07FF
	Internal relay	M0000 to M07FF
	Keep relay	-
	Link relay	-
	Edge detection	-
	Timer (contact)	-
	Counter (contact)	-
Word Device	Input relay	X0000 to X007F
	Output relay	Y0000 to Y007F
	Internal relay	M0000 to M007F
	Keep relay	-
	Link relay	-
	Data register	4000 to 7776
	Link register	-
	File register	-
	Current value register	-
	Timer/counter set value	-



Available devices are restricted according to the product model. Check the manual for the respective model.



Available devices for connecting to Ethernet

■ TOYOPUC-PC10 Series

	Device	Address
Bit Device	Internal relay(0000 to 07FF, 1000 to 17FF) ^{*1²}	M10000 to M317FF
	Input relay ^{*1}	X10000 to X307FF
	Output relay ^{*1}	Y10000 to Y307FF
	Keep relay ^{*1}	K10000 to K302FF
	Link relay(0000 to 07FF, 1000 to 2FFF) ^{*1²}	L10000 to L32FFF
	Special relay(0000 to 00FF, 1000 to 17FF) ^{*1²}	V10000 to V317FF
	Timer (contact)(0000 to 00FF, 1000 to 17FF) ^{*1²}	T10000 to T317FF
	Counter (contact)(0000 to 00FF, 1000 to 17FF) ^{*1²}	C10000 to C317FF
	Extended internal relay	EM00000 to EM01FFF
	Extended input relay	EX00000 to EX007FF
	Extended output relay	EY00000 to EY007FF
	Extended keep relay	EK00000 to EK00FFF
	Extended link relay	EL00000 to EL01FFF
	Expansion special relay	EV00000 to EV00FFF
	Timer (contact)	ET00000 to ET007FF
	Counter (contact)	EC00000 to EC007FF
	Extended internal relay	GM00000 to GM0FFFF
	Extended input relay	GX00000 to GX0FFFF
	Extended output relay	GY00000 to GY0FFFF
Word Device	Data register(0000 to 2FFF) ^{*1²}	D10000 to D32FFF
	Input relay ^{*1}	X10000 to X3007F
	Output relay ^{*1}	Y10000 to Y3007F
	Internal relay(000 to 07F, 100 to 17F) ^{*1²}	M10000 to M3017F
	Keep relay ^{*1}	K10000 to K3002F
	Link relay(000 to 07F, 100 to 2FF) ^{*1²}	L10000 to L302FF
	Link register ^{*1}	R10000 to R307FF
	Special relay(000 to 00F, 100 to 17F) ^{*1²}	V10000 to V3017F
	Special register(0000 to 03FF, 1000 to 13FF) ^{*1²}	S10000 to S313FF
	Current value register(0000 to 01FF, 1000 to 17FF) ^{*1²}	N10000 to N317FF
	Extended data register	U00000 to U1FFFF
	Extended input relay	EX00000 to EX0007F
	Extended output relay	EY00000 to EY0007F
	Extended internal relay	EM00000 to EM001FF
	Extended keep relay	EK00000 to EK000FF
	Extended link relay	EL00000 to EL001FF
	Expansion special relay	EV00000 to EV000FF
	Expansion special register	ES00000 to ES007FF
	Extended current value register	EN00000 to EN007FF
	Extended setting value register	H00000 to H007FF
	Expansion buffer register	EB00000 to EB3FFFF
	Extended flash register	FR000000 to FR1FFFFF
	Extended input relay	GX00000 to GX00FFF
	Extended output relay	GY00000 to GY00FFF
	Extended internal relay	GM00000 to GM00FFF

*1 The upper 1 digit represents the program No.

*2 Please use the range of existing devices.



Available devices are restricted according to the product model. Check the manual for the respective model.

■ TOYOPUC-Plus Series

	Device	Address
Bit Device	Internal relay(0000 to 07FF) ¹	M10000 to M307FF
	Input relay ¹	X10000 to X307FF
	Output relay ¹	Y10000 to Y307FF
	Keep relay ¹	K10000 to K302FF
	Link relay(0000 to 07FF) ¹	L10000 to L307FF
	Special relay(0000 to 00FF) ¹	V10000 to V300FF
	Timer (contact)(0000 to 01FF) ¹	T10000 to T301FF
	Counter (contact)(0000 to 01FF) ¹	C10000 to C301FF
	Extended internal relay	EM00000 to EM01FFF
	Extended input relay	EX00000 to EX007FF
	Extended output relay	EY00000 to EY007FF
	Extended keep relay	EK00000 to EK00FFF
	Extended link relay	EL00000 to EL01FFF
	Expansion special relay	EV00000 to EV00FFF
	Timer (contact)	ET00000 to ET007FF
	Counter (contact)	EC00000 to EC007FF
	Extended internal relay	GM00000 to GM0FFFF
	Extended input relay	GX00000 to GX0FFFF
	Extended output relay	GY00000 to GY0FFFF
Word Device	Data register(0000 to 0FFF) ¹	D10000 to D30FFF
	Input relay ¹	X10000 to X3007F
	Output relay ¹	Y10000 to Y3007F
	Internal relay(000 to 07F) ¹	M10000 to M3007F
	Keep relay ¹	K10000 to K3002F
	Link relay(000 to 07F) ¹	L10000 to L3007F
	Link register ¹	R10000 to R307FF
	Special relay(000 to 00F) ¹	V10000 to V3000F
	Special register(0000 to 03FF) ¹	S10000 to S303FF
	Current value register(0000 to 01FF) ¹	N10000 to N301FF
	Extended data register ²	U00000 to U07FFF
	Extended input relay	EX00000 to EX0007F
	Extended output relay	EY00000 to EY0007F
	Extended internal relay	EM00000 to EM001FF
	Extended keep relay	EK00000 to EK000FF
	Extended link relay	EL00000 to EL001FF
	Expansion special relay	EV00000 to EV000FF
	Expansion special register	ES00000 to ES007FF
	Extended current value register	EN00000 to EN007FF
	Extended setting value register	H00000 to H007FF
	Extended input relay ²	GX00000 to GX0FFF
	Extended output relay ²	GY00000 to GY0FFF
	Extended internal relay ²	GM00000 to GM0FFF

¹ The higher 1 bit refers to the program No.² It is available only when PLC is set to "extended mode".

Available devices are restricted according to the product model. Check the manual for the respective model.

9-5 Error Messages and Troubleshooting

The communication errors that occur when VT5/VT3 series is connected to a PLC made by JTEKT (TOYODA) are described.

Communication error list for serial connection

When a communication error occurs, the error message will be displayed at the bottom left of VT5/VT3 main unit screen. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages other than communication error, refer to the following manual.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

Communication errors list when connecting to Ethernet

Error messages displayed when connecting to the PLC with Ethernet is as follows.

The error message is displayed at the lower left of the VT5 / VT3 main unit screen when a communication error occurs.

Display message	Causes	How to handle
TimeOut Error (++)	There was an error response "80.10.01.00. **" from PLC with station No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLC Error [**(++)]	There was an error response "80.10.01.00. **" from PLC with station No. ++. You are about to set the device beyond the device setting range. A device that does not exist is to be set up	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals. Please reset the device setting within the range.
Device out of range error [**]	A device that does not exist is to be set up	Please reset the device setting within the range.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual

CONNECTING TO YOKOGAWA ELECTRIC CORPORATION PLCs

This chapter describes how to connect to a PLC made by Yokogawa Electric Corporation.

10-1	Checking Operation before Connection	10-2
10-2	System Configuration.....	10-4
10-3	Wiring Diagrams for Connections	10-6
10-4	Unit Settings.....	10-12
10-5	Available Devices.....	10-22
10-6	Handling Devices	10-23
10-7	Error Messages and Troubleshooting	10-24

10-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/Soft-VT/DT and PLC via serial interface or Ethernet.

For connection of other interfaces (VT2 Multi-Link), see each chapter.

□ Chapter 20 "VT2 MULTI-LINK"

(1) Make sure the PLC, link unit and Ethernet unit can be connected to VT5/VT3/Soft-VT/DT.

(2) Check whether or not a CPU, link unit or Ethernet settings are required.

(3) Confirm the name of the model to set as the target PLC.

Be sure to check the above 3 points before connecting to PLC.

□ "Procedure before Starting Communication", page 18

Serial connections

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
FA-M3	F3SP20 ¹ F3SP30 ¹ F3FP36 ¹ F3SP05/SP21/SP25 F3SP28/SP35/SP38 F3SP53/SP58	Programming tool connector	□ P.10-14	FA-M3 Series ³
		F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
		SIO port	□ P.10-14	
		F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
		F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
	F3SP67	F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
		F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
	F3SP71 F3SP76	F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
		F3LC11-1N F3LC11-2N F3LC11-1F F3LC12-1F F3LC11-2F	□ P.10-12	
FA500	FA500	LC01-0N LC02-0N	□ P.10-12	FA500 ^{2,3} , F3SP10 ^{2,3}
	F3SP10	F3LC01-1N	□ P.10-12	

*1 Cannot be connected to programming tool connector.

*2 Not supported by the VT5 Series.

*3 Not supported by Soft-VT.



The programming tool connector and PC link module cannot be used simultaneously to connect to the VT5/VT3/DT.

Ethernet connections

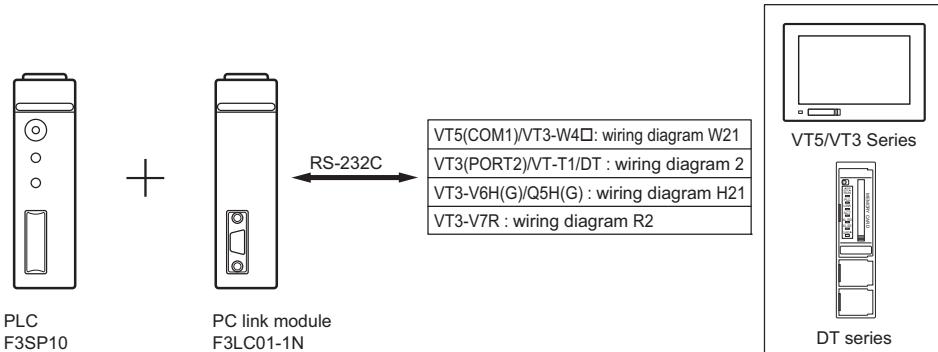
Series Name	PLC	Connection Methods	Unit Setting	Target PLC
FA-M3V Series	F3SP71-4N F3SP76-7N	Internal Ethernet port direct link		
		F3LE01-5T		
		F3LE11-0T		
		F3LE12-0T		
FA-M3R Series	F3SP21-0N F3SP25-2N F3SP28-3N F3SP35-5N F3SP38-6N F3SP53-4H F3SP58-6H F3SP28-3S F3SP38-6S F3SP53-4S F3SP58-6S F3SP59-7S	F3LE01-5T	P.10-21	FA-M3 Series (Ethernet UDP) FA-M3 Series (Ethernet TCP)
		F3LE11-0T		
		F3LE12-0T		
		Internal Ethernet port direct link		
		F3LE01-5T		
		F3LE11-0T		
		F3LE12-0T		

10-2 System Configuration

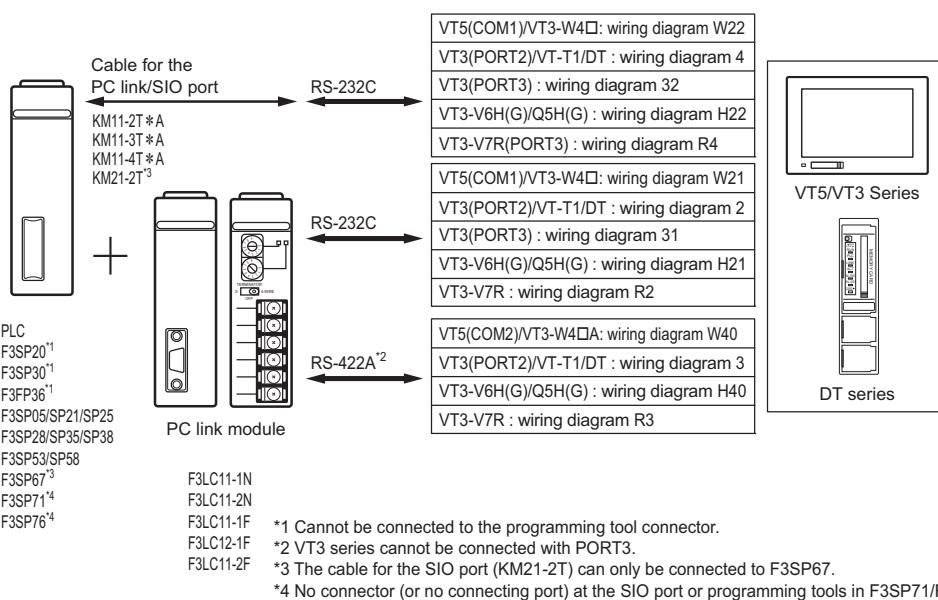
System configuration for serial connections

This section describes systems configured by a VT3/DT series and a PLC made by Yokogawa Electric, Ltd.

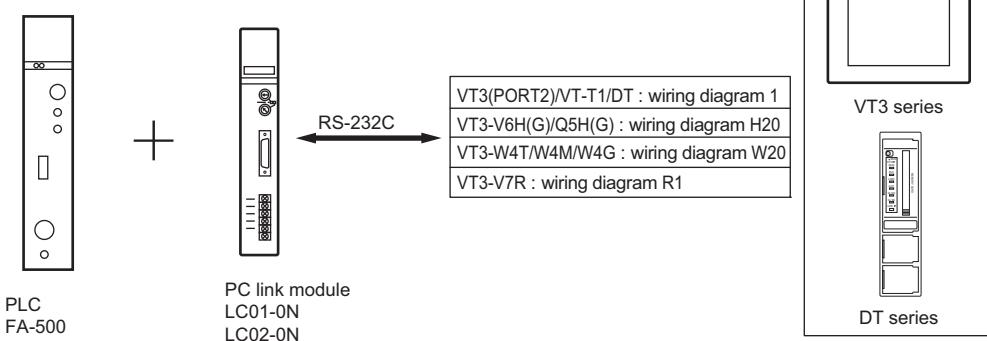
■ FA-M3



10

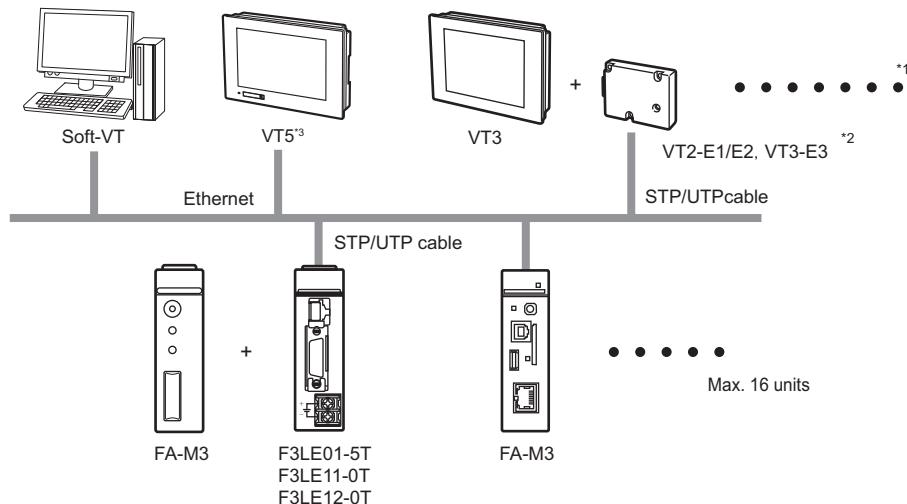


■ FA-500



System configuration for Ethernet connections

This section describes the system configuration of the VT5/VT3 Series and the FA-M3 Series.



- *1 • Use the CPU internal Ethernet port, F3LE11-0T or F3LE12-0T port for connections of multiple VT5/VT3 Series.
• Please note that with the increase in the number of VT5/VT3 Series units connected, the communications load also increases.

*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

*4



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

10-3 Wiring Diagrams for Connections

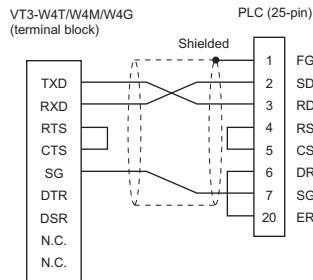
This section describes wiring of connector cables.

The Wiring diagrams recommended by Yokogawa Electric may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the Wiring diagrams in this manual.

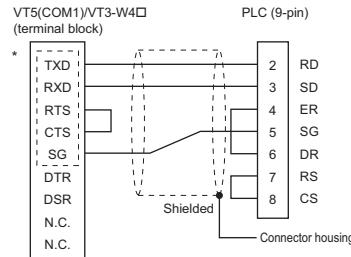
Wiring diagrams for serial connections

■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

● Wiring Diagram W20 (RS-232C)

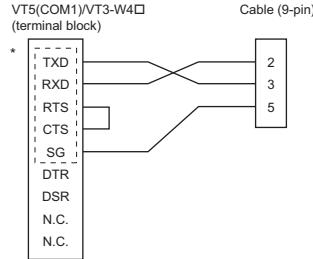


● Wiring Diagram W21 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

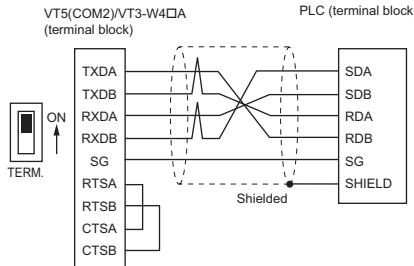
● Wiring Diagram W22 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

■ Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A)

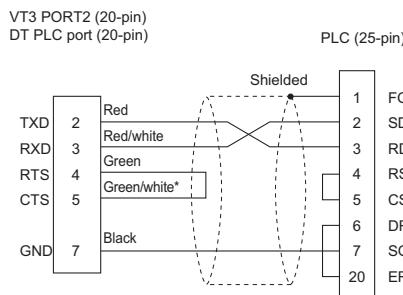
● Wiring Diagram W40 (RS-422A)



The naming of the A and B poles is reversed on the VT3 unit and the PLC. Do not mistake during connection.

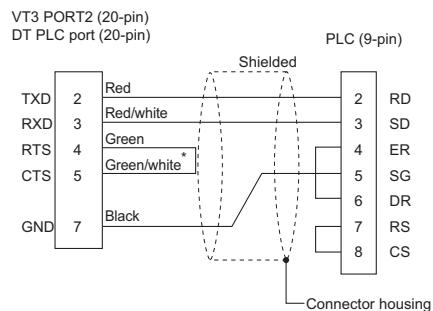
■ Connection to VT3 series (PORT2)/DT series

● Wiring Diagram 1 (RS-232C: OP-24027)



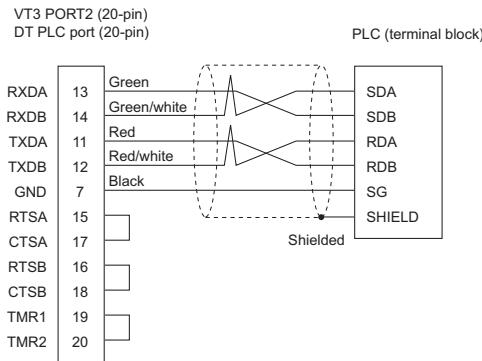
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 2 (RS-232C: OP-24027)

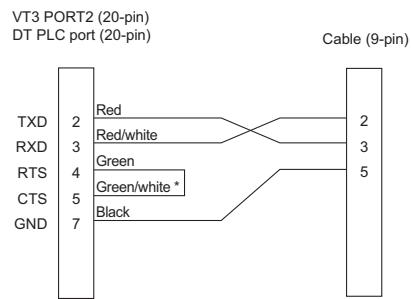


* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 3 (RS-422A: OP-24028)



● Wiring Diagram 4 (RS-232C: OP-24027)



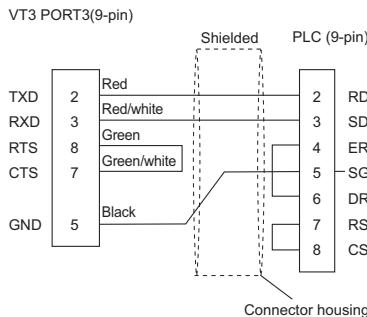
* Not wired for loopback test inside the connector.
Solder the signal lead.



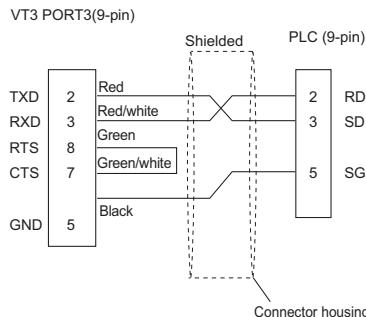
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

■ Connection to VT3 series (PORT3)

● Wiring Diagram 31 (RS-232C)



● Wiring Diagram 32 (RS-232C)



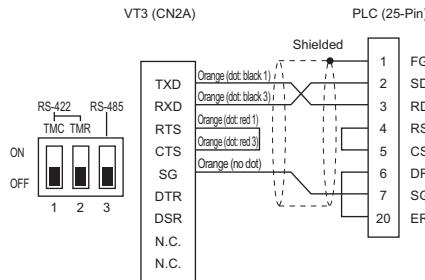
■ Connection with VT3 Handy Series



FG2 must be grounded.

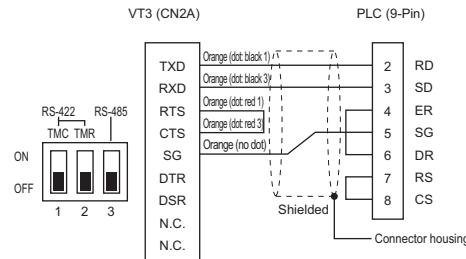
● Wiring Diagram H20 (RS-232C)

OP-87185:3m, OP-87186:5m,
OP-87187:10m
OP-87191:3m, OP-87192:5m,
OP-87193:10m



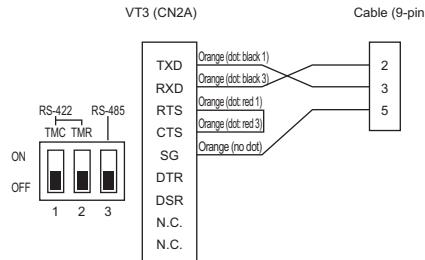
● Wiring Diagram H21 (RS-232C)

OP-87185:3m, OP-87186:5m,
OP-87187:10m
OP-87191:3m, OP-87192:5m,
OP-87193:10m



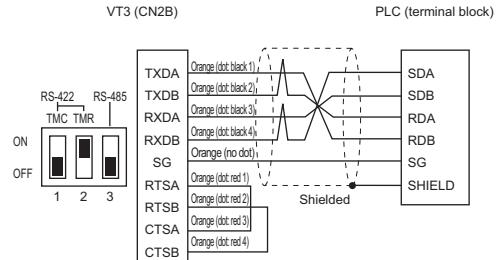
● Wiring Diagram H22 (RS-232C)

OP-87185:3m, OP-87186:5m,
OP-87187:10m
OP-87191:3m, OP-87192:5m,
OP-87193:10m



● Wiring Diagram H40 (RS-422A)

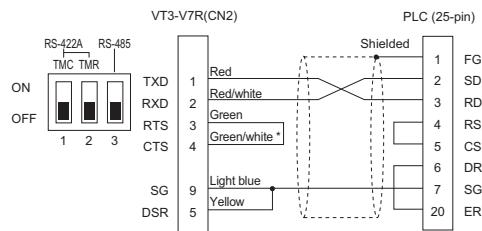
OP-87185:3m, OP-87186:5m,
OP-87187:10m
OP-87191:3m, OP-87192:5m,
OP-87193:10m



The naming of the A and B poles is reversed on the VT3 unit and the PLC. Do not mistake during connection.

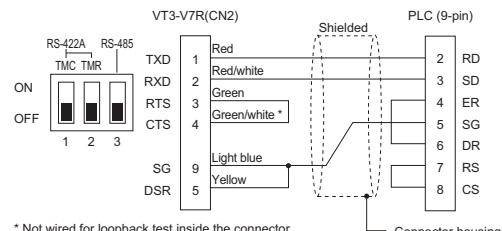
■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-232C: VT-C5R1)



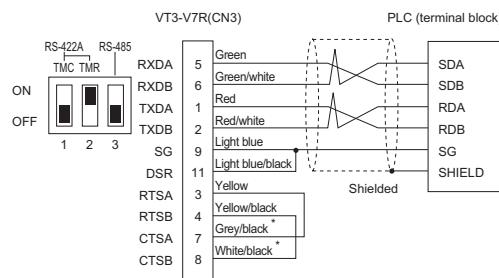
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R2 (RS-232C: VT-C5R1)



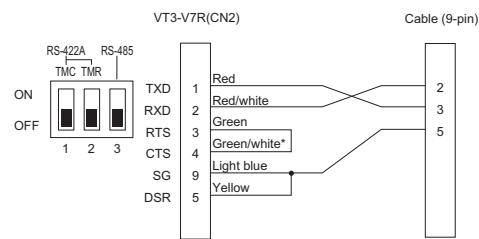
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-422A 4-wire: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R4 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), please ensure to read the □ "Connection Precautions", page A-13



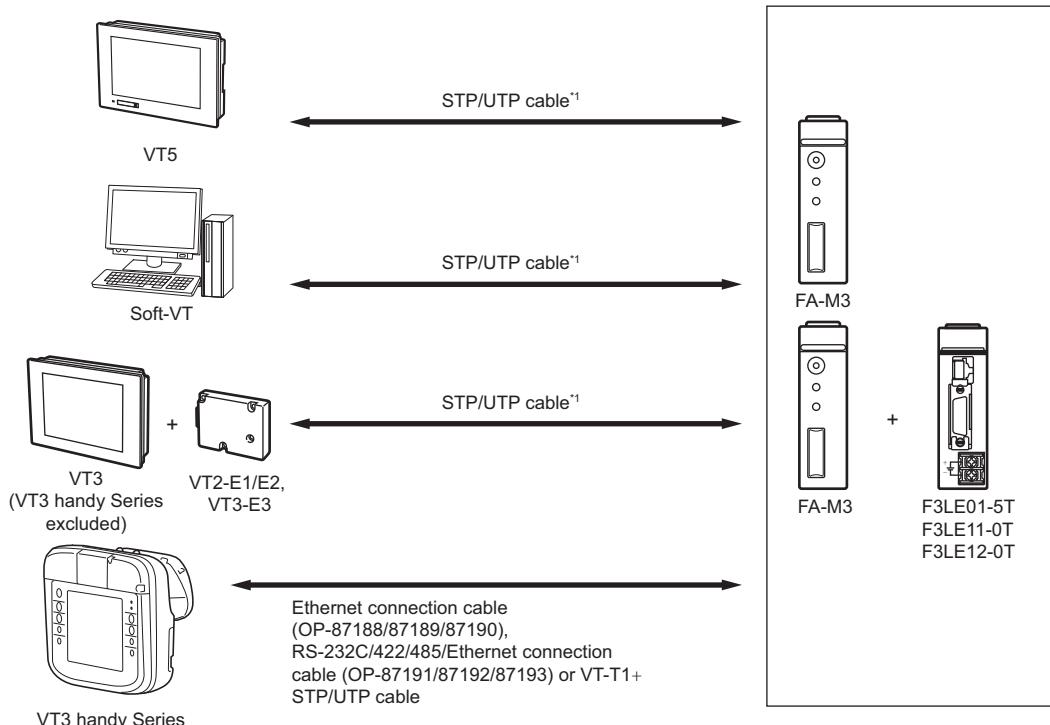
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

The following describes the cables used for the Ethernet connection for each of the connection types.

■ Direct connection (1:1)

Use the STP/UTP cable for the connection.

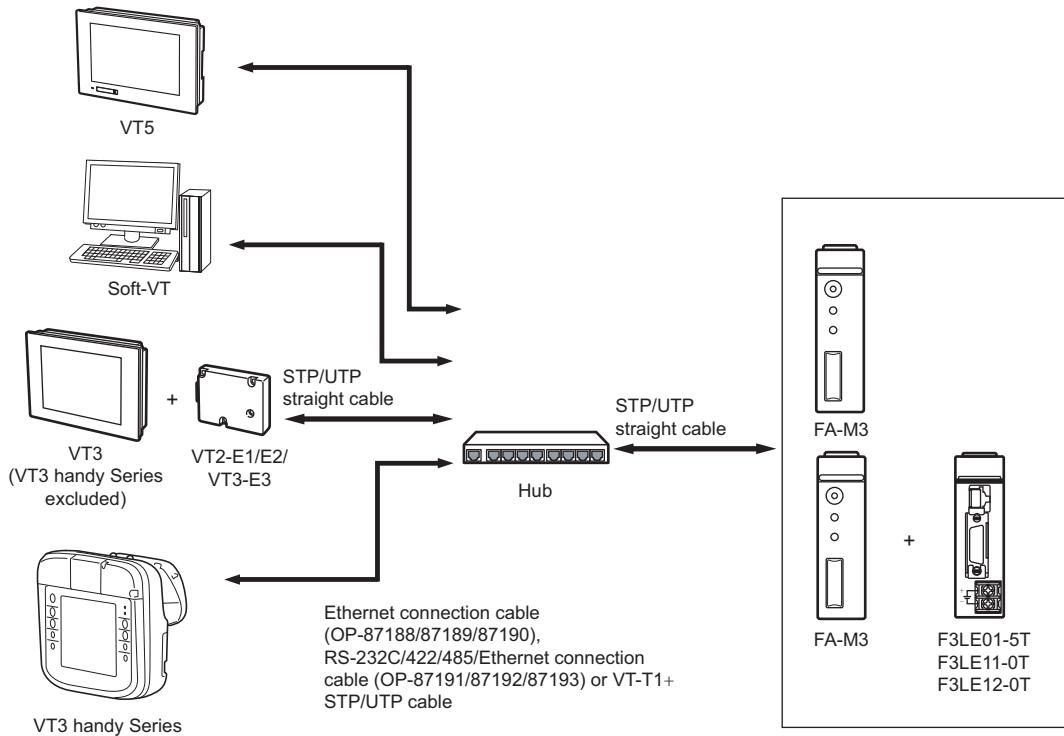


*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable.

■ Connection using a hub (1:N)



Connection of the VT5 Series, VT2-E1/E2, VT3-E3 and VT3 handy Series to a hub

- Use the STP/UTP straight cable.
- The VT5 Series, VT2-E1/E2, VT3-E3 and VT3 handy Series should be connected to a port other than the cascade port on a hub.

Hub connection with FA-M3 Series

- Use the STP/UTP straight cable.
- Do not connect the FA-M3 Series to a cascade port on the hub.



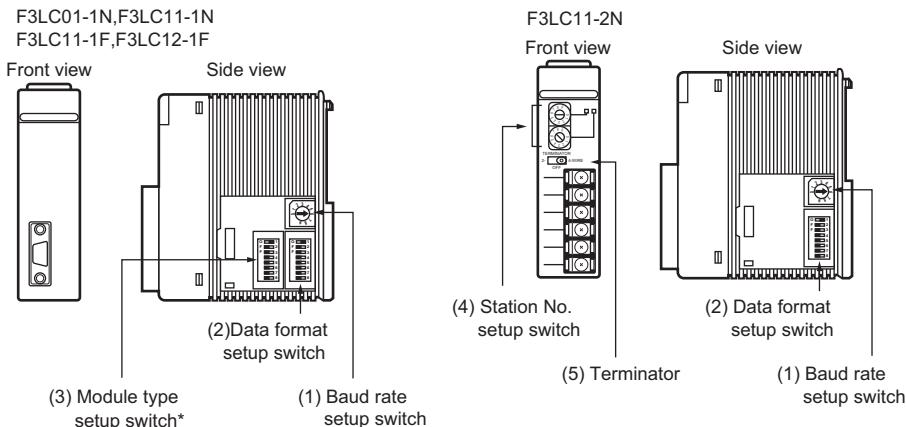
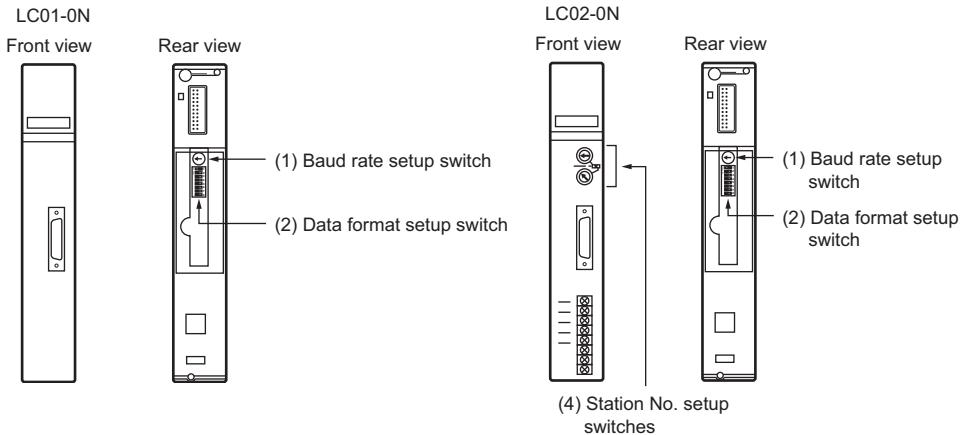
- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 or higher STP/UTP cable.

10-4 Unit Settings

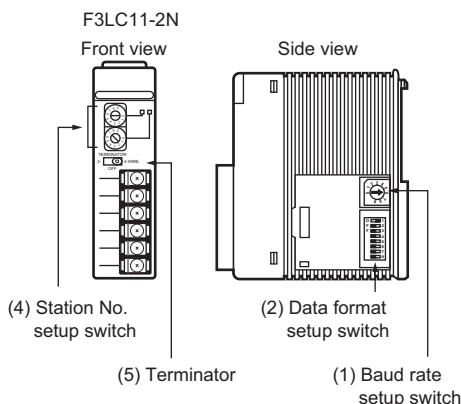
Method for making serial connections

The following describes the settings of the Link Unit matched to the default communications conditions.

■ LC01-0N, LC02-0N, F3LC01-1N, F3LC11-1N, F3LC11-2N, F3LC11-2F



*F3LC11-1F, F3LC12-1F only



(1) Baud rate setup switch

- In the case of LC01-0N, LC02-0N, F3LC01-1N, F3LC11-1N, F3LC11-2N

Settings	Baud rate (bit/s)
0	300 ^{*1}
1	600 ^{*1}
2	1200
3	2400
4	4800
5	9600
6	19200



- In the case of F3LC11-1F, F3LC12-1F, F3LC11-2F

Settings	Baud rate (bit/s)
0	300 ^{*1}
1	600 ^{*1}
2	1200
3	2400
4	4800
5	9600
6	14400 ^{*1}
7	19200
8	28800 ^{*1}
9	38400
A	57600
B	76800 ^{*1}
C	115200



*1 Not applicable during communication with VT3.

(2) Data format setup switch

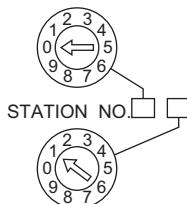
Setup Switch	Setting Item	Set Value	
ON OFF 	SW1	8 bits	ON
	SW2	None	OFF
	SW3	-	OFF
	SW4	1 bit	OFF
	SW5	Yes ^{*1}	ON
	SW6	None ^{*1}	OFF
	SW7	None ^{*1}	OFF
	SW8	-	OFF

*1 Set SW5 to ON, and SW6 and SW7 to OFF.

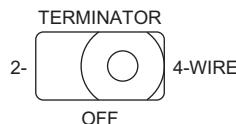
(3) Module function setup switch

Setup Switch	Setting Item	Set Value	
ON OFF 	SW1	-	-
	SW2	-	-
	SW3	-	-
	SW4	-	-
	SW5	-	-
	SW6	-	-
	SW7	Incompatible	OFF
	SW8	None	OFF

(4) Station No. setup switches



(5) Terminator



Point

When the LC01-0N, LC02-0N, F3LC01-1N, or F3LC11-1N are used to connect the RS-232C interface, the station No. setting in the communication conditions is fixed to "ON (1)".

■ F3SP05/SP21/SP25/SP28/SP35/SP38/SP53/SP58/SP67

● Configuration

Item		Description	
CPU communications port	Mode	Mode 0:	9600bit/s even parity
		Mode 1:	9600bit/s no parity
		Mode 2:	19200bit/s even parity
		Mode 3:	19200bit/s no parity
		Mode 4:	38400bit/s even parity ^{**1}
		Mode 5:	38400bit/s no parity ^{**1}
		Mode 6:	57600bit/s even parity ^{**1}
		Mode 7:	57600bit/s no parity ^{**1}
		Mode 8:	115200bit/s even parity ^{**1}
		Mode 9:	115200bit/s no parity ^{**1}
PC link function	Used/not used	Used	
	CheckSum	ON	
	End character	None	
	Protect function	None	

*1 These can be set only on the F3SP28, F3SP38, F3SP53, F3SP58 and F3SP67.

Point

For details on setting the configuration, refer to the manual for each PLC.

Communication Condition Setting Ranges and Defaults During Serial Communication

● FA-M3 Series

Item	Setting Range	Default
PLC No.	ON (1 to 32) ^{*1}	ON (1)
VT No.	-	-
PLC serie I/F ^{*2}	RS-232C, RS-422A 4-wire ^{*4}	RS-232C
Baud rate ^{*2,3}	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	19200 bit/s
Data bit ^{*2}	7 bits, 8 bits	8 bits
Stop bit ^{*2}	1 bit, 2 bits	1 bit
Parity ^{*2}	None, odd, even	None
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	ON	ON

*1 With the CPU direct link, the setting range is limited to "1".

*2 With the CPU direct link, select from the following setting ranges.

Item	Setting Range
PLC serial I/F	RS-232C
Baud Rate	9600, 19200, 38400, 57600, 115200 bit/s
Data bit	8 bits
Stop bit	1 bit
Parity	OFF, even

*3 Only baud rates 19200 bit/s or lower are supported when F3LC01-1N, F3LC11-1N or F3LC11-2N is used.

*4 Please use the RS-232C to connect to PORT3 of the VT3 series.

● FA500, F3SP10

Item	Setting Range	Default
PLC No.	ON (1 to 32)	ON (1)
VT No.	-	-
PLC serial I/F	RS-232C	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data bit	7 bits, 8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	None
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	ON	ON

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port No. of the connected units should be determined in advance. The following table shows the setting items corresponding to the connection type. Check these settings items with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • Assign an IP address to VT5/VT3 • IP Address to assign to PLC
Other connection	<ul style="list-style-type: none"> • Assign an IP address to VT5/VT3 • IP Address to assign to PLC • Subnet Mask • Default Gateway



- Make sure that "IP address to be assigned to VT5/VT3" differs from "the IP address to be assigned to the PLC".
- The port No. used for communications is fixed at 12289. Check with the network administrator whether or not port No. 12289 can be used.

■ Required Settings for Ethernet connections

The following settings must be made when connecting the VT5/VT3 Series to a PLC via Ethernet.

● VT5 Series

Required settings	Description	
VT5 Ethernet settings	Set the IP address and port number to be assigned to the VT5. Select "System settings"→"VT setting" in "Ethernet/language" in VT STUDIO. ^{*1}	P.10-17
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"Periphery connection" in "PLC communication conditions" in VT STUDIO. ^{*2}	P.10-18
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5 Series. Set the communication conditions on the Yokogawa Electric Corporation PLC.	P.10-21

*1 Select "VT Machine Setup"→"Ethernet settings" in VT5 system mode to confirm and change settings.

*2 Use "PLC Comm. Setup" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.10-19
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"VT system settings" in "PLC Communication Conditions" in VT STUDIO. ^{*1}	P.10-20
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Set the communication conditions on the Yokogawa Electric Corporation PLC.	P.10-21

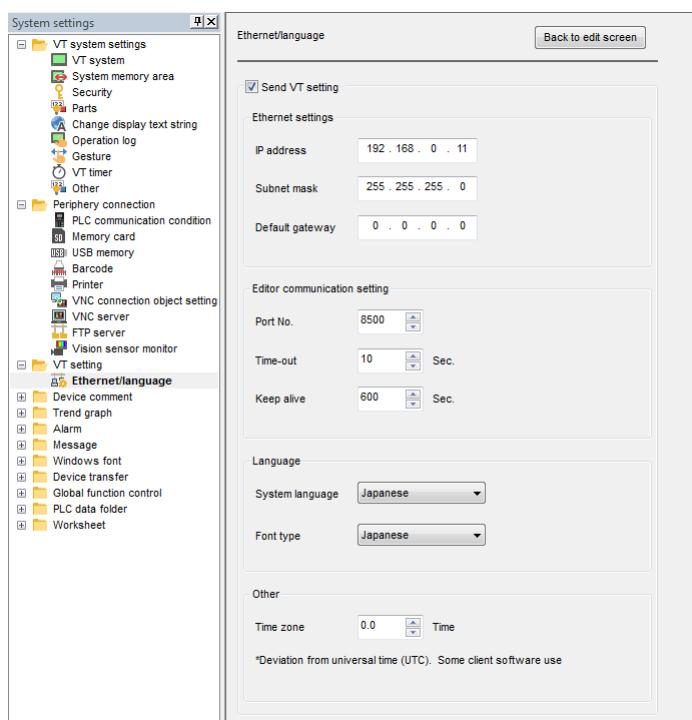
*1 Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.
 "12-6 VT setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.

The setting items are the same as those in VT STUDIO.

"5-3 VT Machine Setup", VT5 Series Hardware Manual

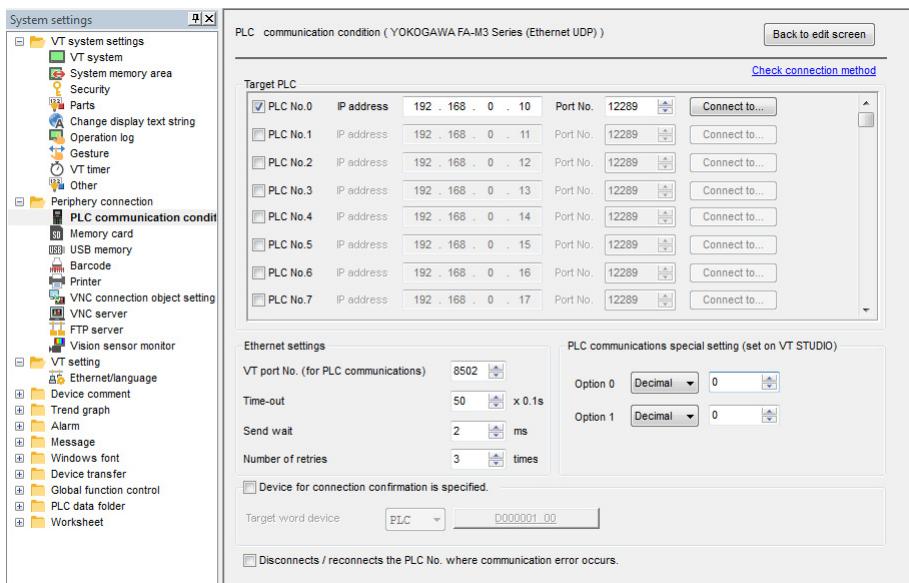


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Only station number 0 can be used.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC.
	Port number ^{*2}	Set "12289".
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	For the FA-M3 Series (Ethernet UDP): Set VT5 board number (for PLC communications) (1024 to 65535). For FA-M3 Series (Ethernet TCP): No need to set. VT5 series sets the port No. (for PLC communication) automatically.
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Use SX-Programmer Expert (D300Win) to set "Standard No. of self port".

Example: When "Standard No. of self port" is set to 773, set a port number of 1024 for the target PLC.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual



You can use VT5 system mode to check and change PLC Communication Condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	**.**.**.**.**.**				
				OK	Cancel
				Next page	
Ethernet Setup (2/3)				OK	Cancel
Port No.	8500			Next page	
Time-out	10 s				
Keep alive	600 s				
				OK	Cancel
				Next page	
Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				
				OK	Cancel
				Next page	

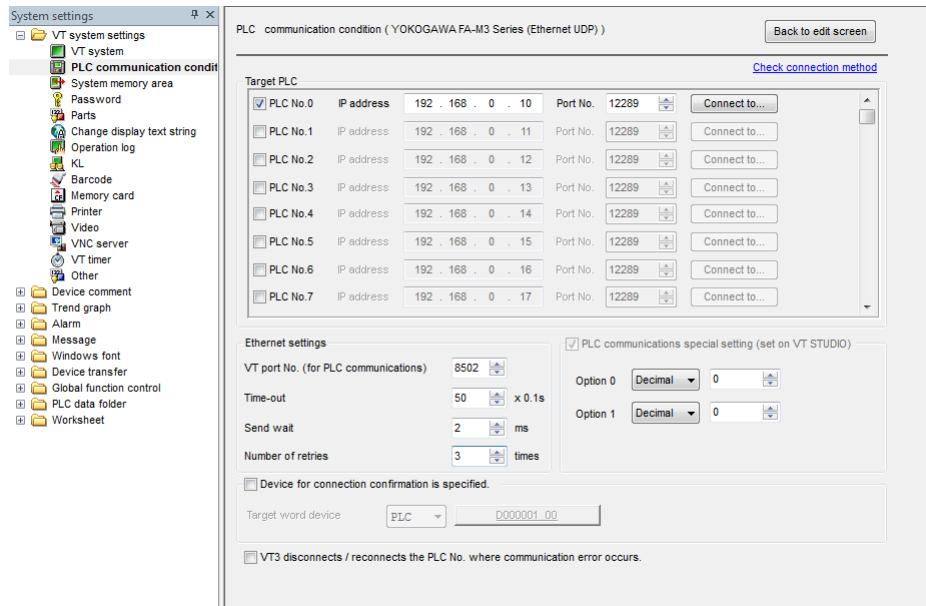
Item	Description
Baud rate	Normally, select "100/10 Mbps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup¹	Selects "Enable" only when using a router.

*1 "Chapter 8 ETHERNET", VT3 Series Reference Manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connection", VT3 Series Reference Manual



Item		Description
Target PLC	PLC No.	Selects the PLC No. (0 to 15) to be used.
	IP address ¹	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port no.	Please set "12289".
	Connect to...	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet Settings	VT port No. (for PLC communications)	<ul style="list-style-type: none"> For FA-M3 Series (Ethernet UDP): Sets the port No. (for PLC communications) (1024 to 65535) of the VT3. For FA-M3 Series (Ethernet TCP): No need to set. VT3 series sets the port No. (for PLC communication) automatically.
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ²	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
Disconnects / reconnects the PLC No. where communication error occurs ³		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP address to each equipment within the same LAN.
IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*2 Select "PLC Devices".

"6-7 Set up the Devices", VT3 Series Reference Manual

*3 This can be set up when a PLC model supporting 1-to-N connection is selected.



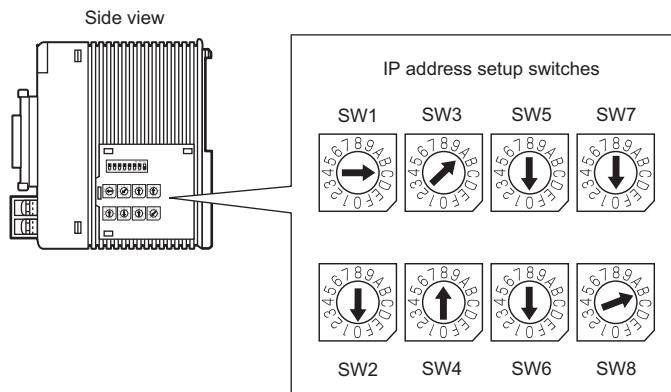
You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Setup", VT3 Series Hardware Manual

■ F3LE□□-□T setting

Set the IP address of the F3LE□□-□T by the IP address setup switch on the F3LE□□-□T.
Set SW9 to all OFF.



4 groups of hexadecimal numbers that are separated with “.” are used for the setup of the IP address.

[Example] When setting the IP address of the F3L□□-□T to "192.168.0.11".

192=the setting for C0H, 168=the setting for A8H, 0=the setting for 00H, 11=the setting for 0BH

SW1: C
SW2: 0

SW3: A
SW4: 8

SW5: 0
SW6: 0

SW7: 0
SW8: B

Set SW9 to all OFF.

■ CPU Internal Ethernet port

CPU Internal Ethernet port setting by WideField3.

To set up the following items of CPU attributes.

Item	Setting item	Description
NETWORK	NETWORK_SELECT	To be set to "1=ETHERNET".
ETHERNET	ETHER_MY_IPADDRESS	To set up IP address assigned on PLC side.
	ETHER_SUBNET_MASK	To set up subnet mask. To be set to the same value as subnet mask of VT3.
	ETHER_DEFAULT_GATEWAY	To set up default gateway.
HIGHER_LEVEL_LINK_SERVICE	HLLINK_PROTOCOL_A	To be set to "1=UDP/IP" for FA-M3 Series(Ethernet UDP). To be set to "0=TCP/IP" for FA-M3 Series(Ethernet TCP).
	HLLINK_DATA_FORMAT_A	To be set to "0=ASCII format".



Power supply of PLC must be ON again after setting.

10-5 Available Devices

■ FA-M3, FA500 Series

Device	Address			
	FA-M3V	FA-M3(R)	FA500	F3SP10
Bit Devices	I/O relay	X000201 to X371664 Y000201 to Y371664		X000201 to X361064 Y000201 to Y361064
	Internal relay	I000001 to I365535		I00001 to I32048
	Shared relay	E000001 to E304096	E00001 to E32048	-
	Link relay	L00001 to L378192	L00001 to L372048	L00001 to L31024
	Special relay	M000001 to M309984		M0001 to M3512
	Timer	T00001 to T33072		T0001 to T3256
	Counter	C00001 to C33072		C0001 to C3256
Word Devices	I/O relay ^{*1}	X000201 to X371649 Y000201 to Y371649		X000201 to X361049 Y000201 to Y361049
	Internal relay ^{*2}	I000001 to I365520		I00001 to I32033
	Shared relay ^{*2}	E000001 to E304081	E00001 to E32033	-
	Link relay ^{*2}	L00001 to L378177	L00001 to L372033	L00001 to L31009
	Special relay word ^{*2}	M000001 to M309969		M0001 to M3497
	Timer value (current value) countdown type	TP00001 to TP33072		TP0001 to TP3256
	Counter word (currents) countdown type	CP00001 to CP33072		CP0001 to CP3256
	Timer value (set value)	TS00001 to TS33072		TS0001 to TS3256
	Counter word (set)	CS00001 to CS33072		CS0001 to CS3256
	Timer value (current value) count-up type	TI00001 to TI33072		TI0001 to TI3256
	Counter word (currents) count-up type	CI00001 to CI33072		CI0001 to CI3256
	Data register	D000001 to D365535		D00001 to D32048
	Cash register	F0000001 to F3524288	-	-
	Link register	W000001 to W378192	W000001 to W372048	W00001 to W31024
	Special register	Z00001 to Z31024		Z001 to Z399
	Common register	R00001 to R304096	-	-
	Index register	V000001 to V300256	-	-
	Common register	-	B00001 to B32048	-
	File register	B000001 to B3262144		-

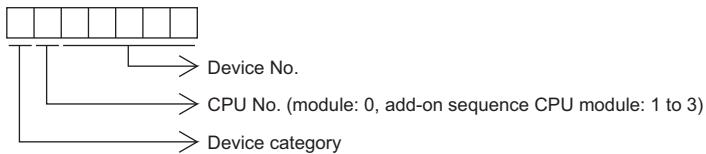
^{*1} When specifying the X and Y relays as word devices, set the lower two bits to 01, 17, 33 and 49.

^{*2} When specifying word devices, set a value obtained by adding "1" to a multiple of 16 (lower two bits) such as 01, 17, 33, 49...81...113 and so forth.

^{*3} The devices of CPUs below 100000 can not be monitored when VT5/VT3 is connected with F3LC11-1N, F3LC11-2N.

10-6 Handling Devices

Devices set using the VT5/VT3/DT are handled as described below.



[Example]

PLC	VT3/DT
Internal relay I00001 of 2nd add on CPU	I200001
X00501	X000501 X100501, X200501, X300501

I/O relays, shared relays, and link relays are used as common devices by multiple CPUs (CPU, add on CPU).

Any CPU number can be specified from the VT5/VT3/DT for these devices.

10-7 Error Messages and Troubleshooting

This section describes communication errors occurring in VT5/VT3 Series and Yokogawa Electric Corporation PLC connections.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT5/VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT5/VT3
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.

- For details on error messages other than communication errors, refer to the following manuals.

□ "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual

□ "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The following error messages are displayed when communicating with the PLC units over Ethernet.

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	<ul style="list-style-type: none"> Turn the VT3 unit OFF, mount VT2-E1/E2/VT3-E3, and then turn VT3 ON again.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[**(++)]	There was not error response ** from PLC No.++.	For more information about the response **, please refer to relevant PLC and Ethernet unit manuals.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

MEMO

10

CONNECTING TO YOKOGAWA ELECTRIC CORPORATION PLCs

CONNECTING TO KOYO ELECTRONICS INDUSTRIES CO., LTD. PLCS

This chapter describes how to connect to a PLC made by KOYO ELECTRONICS INDUSTRIES CO., LTD.

11-1	Checking Operation before Connection	11-2
11-2	Wiring Diagrams.....	11-4
11-3	Unit Settings.....	11-8
11-4	Communication Conditions and Available Devices	11-12
11-5	Handling Devices	11-14
11-6	Error Messages and Troubleshooting	11-15

11-1 Checking Operation before Connection

This section describes how to check the items required for connecting the PLC to the VT3/DT.

- (1) Make sure that the VT3/DT can be connected to the PLC or link unit.
- (2) Check whether or not CPU or link unit settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

■ Connection of KOSTAC SZ/SJ Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
SZ4 SJ	General-purpose communications port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 6	 P.11-8	SZ, SU, SG, SJ Series ^{*2 *3}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H22		
			VT3-W4T/W4M/W4G	Wiring diagram W22		
			VT3-V7R(CN2)	Wiring diagram R6		
	General-purpose communications port ^{*1}	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 5		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H21		
			VT3-W4T/W4M/W4G	Wiring diagram W21		
			VT3-V7R(CN2)	Wiring diagram R5		

*1 Use the connector adapter (S-25CNP1) to connect the PROGRAMMER cable (Z-20JP). Z-20JP and S-25CNP are options made by KOYO ELECTRONICS INDUSTRIES and must be prepared separately.

*2 Not supported by the VT5 Series.

*3 Not supported by Soft-VT.

■ Connection of KOSTAC SU Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
SU-5 ^{*1} SU-5E SU-6/6B/6M	General-purpose communications port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.11-8	SZ, SU, SG, SJ Series ^{*2 *3}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
	RS-422A	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R2		
	U-01DM	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.11-9	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		
		RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT3-W4TA/W4MA/W4GA	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R3		

*1 The SU-5 is not provided with an general-purpose communications port

*2 Not supported by the VT5 Series.

*3 Not supported by Soft-VT.

■ Connection of KOSTAC SG Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC	
SG-8	General-purpose communications port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	P.11-10	SZ, SU, SG, SJ Series ^{*1~2}	
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			
		RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 2			
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W40			
			VT3-V7R(CN3)	Wiring diagram R2			
	G-01DM	RS-422A (ch1)	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	P.11-11		
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W41			
			VT3-V7R(CN3)	Wiring diagram R3			
		RS-422A (ch2)	VT3(PORT2)/VT-T1/DT	Wiring diagram 4			
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H42			
			VT3-W4TA/W4MA/W4GA	Wiring diagram W42			
			VT3-V7R(CN3)	Wiring diagram R4			
		RS-232C (ch2)	VT3(PORT2)/VT-T1/DT	Wiring diagram 1			
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-W4T/W4M/W4G	Wiring diagram W20			
			VT3-V7R(CN2)	Wiring diagram R1			

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

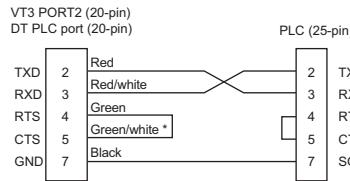
11-2 Wiring Diagrams

This section describes wiring of connector cables.

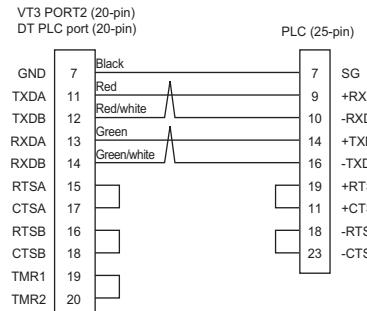
The wiring diagrams recommended by KOYO ELECTRONICS INDUSTRIES may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

Connecting the VT3/DT Series

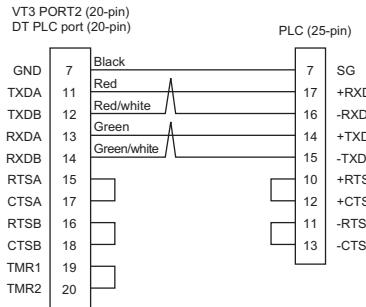
■ Wiring Diagram 1 (RS-232C: OP-24027)



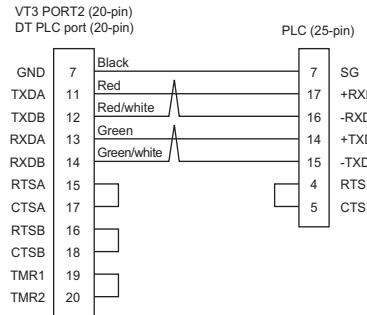
■ Wiring Diagram 2 (RS-422A: OP-24028)



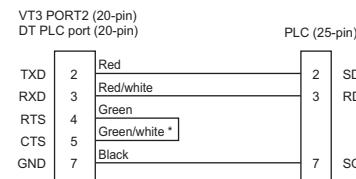
■ Wiring Diagram 3 (RS-422A: OP-24028)



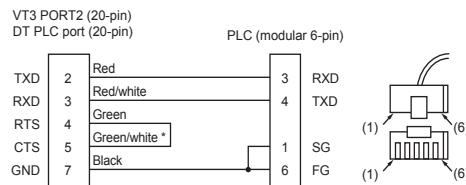
■ Wiring Diagram 4 (RS-422A: OP-24028)



■ Wiring Diagram 5 (RS-232C: OP-24027)



■ Wiring Diagram 6 (RS-232C: OP-24027)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

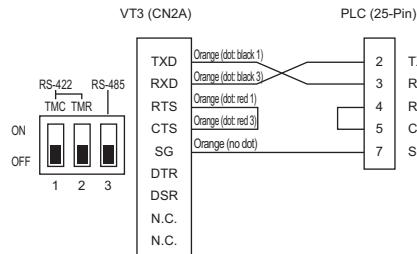
Connection with VT3 Handy Series



FG2 must be grounded.

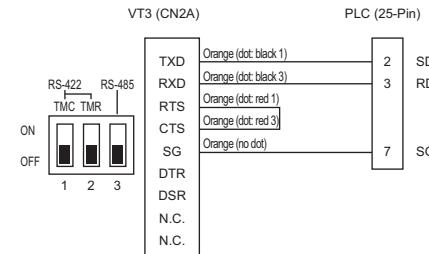
■ Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



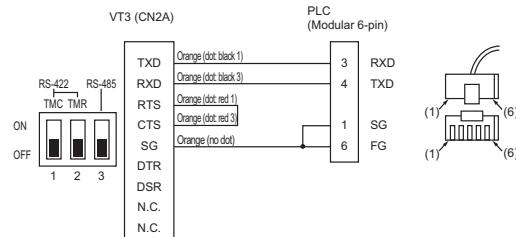
■ Wiring Diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



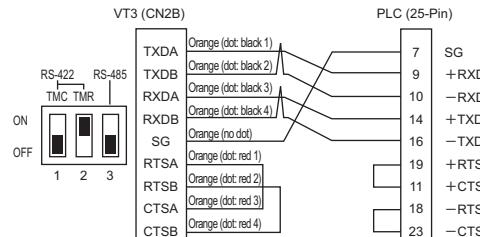
■ Wiring Diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



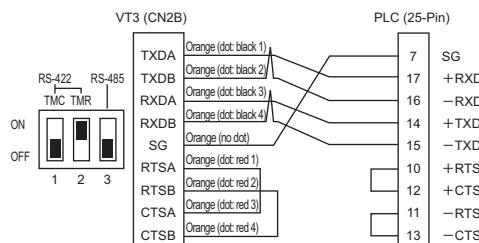
■ Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



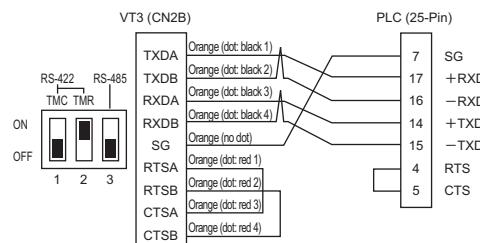
■ Wiring Diagram H41 (RS-422A)

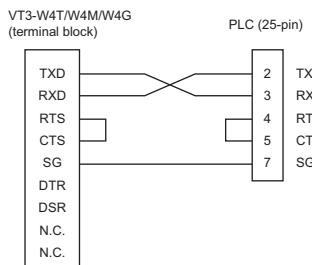
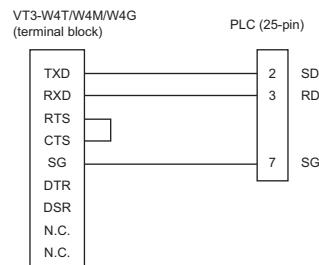
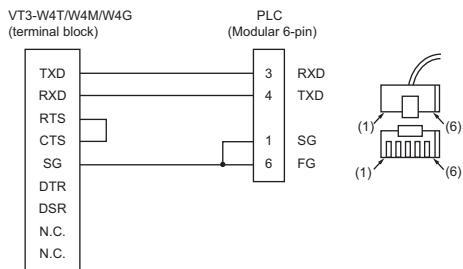
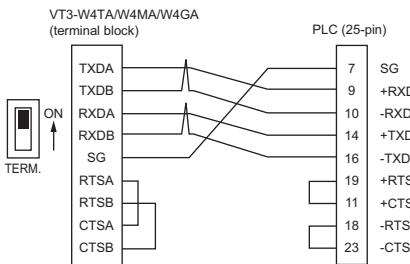
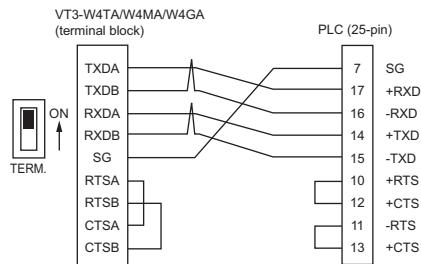
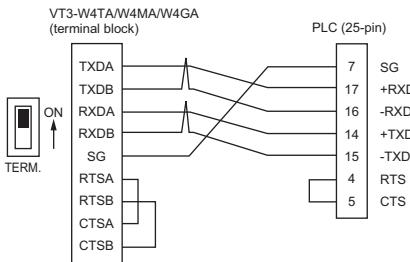
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



■ Wiring Diagram H42 (RS-422A)

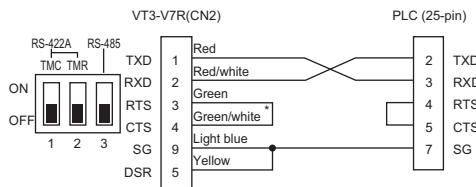
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



Connection to VT3-W4T/W4M/W4G (RS-232C)**■ Wiring Diagram W20 (RS-232C)****■ Wiring Diagram W21 (RS-232C)****■ Wiring Diagram W22 (RS-232C)****Connection to VT3-W4TA/W4MA/W4GA (RS-422A)****■ Wiring Diagram W40 (RS-422A)****■ Wiring Diagram W41 (RS-422A)****■ Wiring Diagram W42 (RS-422A)**

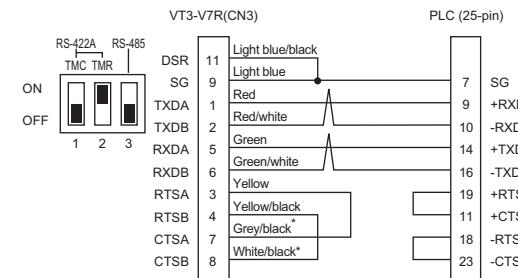
Connection to VT3-V7R

■ Wiring Diagram R1 (RS-232C: VT-C5R1)



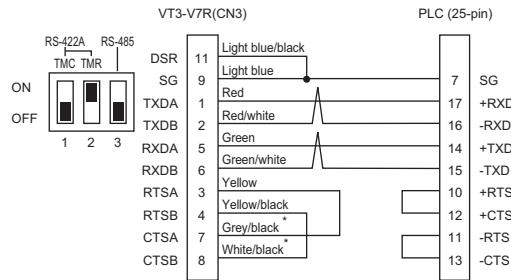
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring Diagram R2 (RS-422A: VT-C5R2/C15R2)



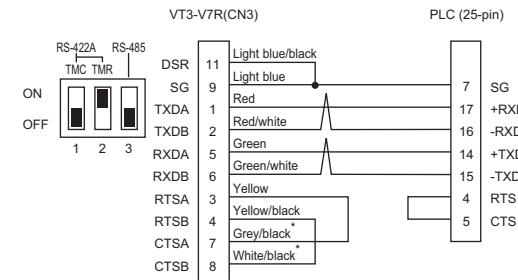
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring Diagram R3 (RS-422A: VT-C5R2/C15R2)



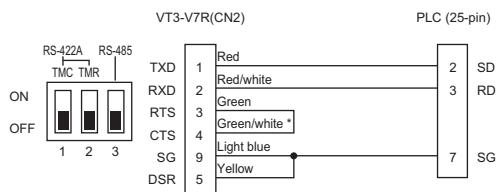
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring Diagram R4 (RS-422A: VT-C5R2/C15R2)



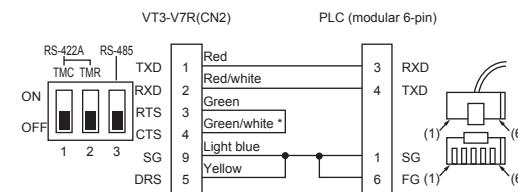
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring Diagram R5 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring Diagram R6 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), please ensure to read the "Connection Precautions", page A-13



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

11-3 Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ SZ-4 (general-purpose communications port)

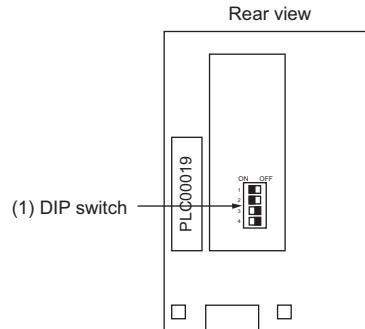
● CCM node No.

Set the CCM node No. using an instruction language programmer or personal computer programmer.

CCM Setting	Set Value
Node No. setting	01
Data format setting ^{*1}	Hex
Parity setting	Odd
Baud Rate	19200bit/s

*1 Set this item to Hex.

■ SU-5E/6/6B



(1) DIP switch

Set Value		Function	Set Value	
ON OFF 	1	Battery ON/OFF mode setting	ON	OFF
	2	CCM node No.	Node 01 (fixed)	OFF
	3	Baud Rate	19200 bit/s	ON
	4			ON

● CCM node No.

Set the CCM node No. using an instruction language programmer or personal computer programmer.

CCM Setting	Set Value
Node No. setting	01
Data format setting ^{*1}	Hex
Parity setting	Odd

*1 Set this item to Hex.

■ SU-6M

Set the communications conditions in Direct SOFT32.

■ SJ (common communication port)

Communication condition is set via Direct SOFT.

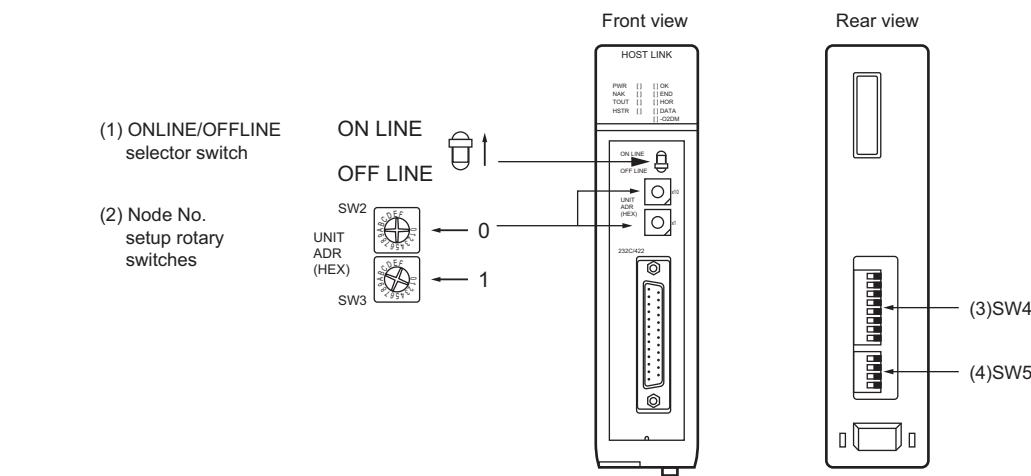
Item	Setting range	Default
Protocol	K Sequence program	ON/OFF
	DirectNET ¹	ON/OFF
	MODBUS	ON/OFF
	Non-procedural	ON/OFF
Station No.	1 to 90	1
Baudrate ²	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	9600
Stop bit	1, 2	1
Parity	None, Even, Odd	Odd
Model ³	HEX, ASCII	HEX

*1 Be sure to switch it ON.

*2 Be sure to set it within the range of 1200 to 115200 when communicating with VT3.

*3 Be sure to set it as "HEX".

■ U-01DM



(3)SW4

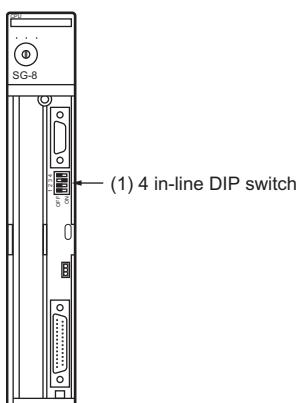
Set Value		Function	Set Value	
ON	1	Baud Rate	19200 bit/s	ON
	2			ON
	3	Parity	Odd	ON
	4			ON
	5	Self diagnostics	None	OFF
	6			OFF
	7	Response delay time	0 ms	OFF
	8			OFF

(4)SW5

Set Value		Function	Set Value	
ON	1	Peer-to-peer setting	None	OFF
	2	Master/slave setting	Slave	OFF
	3	Time-out setting	ON	OFF
	4	ASCII/Hex setting ¹	Hex	OFF

*1 Set this item to Hex.

■ SG-8 (general-purpose communications port)



(1)4 in-line DIP switch (COM communications port)

Setup Switch No.	Function		Set Value	
 OFF ON	1	RS-232C/422A switching setting	RS-232C	ON
	2	CCM node No. enabled/disabled setting	Node 01	ON
	3	CCM baud rate setting	19200 bit/s	ON
	4			ON

● CCM node No.

Set the CCM node No. using an instruction language programmer or personal computer programmer.

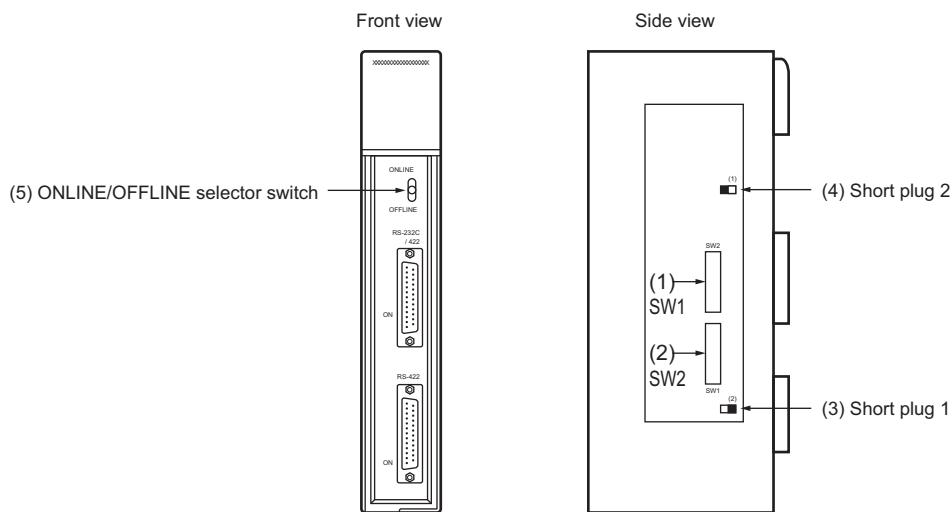
CCM Setting	Set Value
Node No. setting	01
Data format setting	Hex ^{*1}
Parity setting	Odd (fixed)

*1 Set this item to Hex.



This port cannot be used at the same time as the programmer communications port.

■ G-01DM



(1)SW1

Setting Switch	Setting Item	Set Value	
	Node No. setting 01	ON	
		OFF	
		None	OFF
		Slave	OFF

(2)SW2

Setting Switch	Setting Item	Set Value	
	Baud Rate 19200 bit/s	ON	
		ON	
		ON	
		Odd	ON
		None	OFF
		None	OFF
		OFF	OFF
		0 ms	OFF
		Hex	OFF

(3) Short plug 1

Set to match the operating conditions.

(4) Short plug 2

- 232C (ch2): Set to "232C ENABLE".
- 422A (ch1): Set to match the ch2 connection.
Set to "232C DISABLE" when only ch1 is used.
- 422A (ch2): Set to "232C DISABLE".

232C ENABLE {  } 232C DISABLE

(5) ONLINE/OFFLINE selector switch

Set to "ONLINE".



11-4 Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● SZ-4, SU-5/6, SG-8, SJ

Item	Setting Range	Default
PLC No.	ON (1 to 90)	ON (1)
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud rate ^{1)*2}	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit ²	1, 2 bit	1 bit
Parity ²	None, Even, Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	ON	ON

*1 SZ-4, SJ-5/6, SG-8 or 38400bit/s can only be set when data communication and U-01DM interface module are used.

*2 Baudrate: 57600, 115200bit/s, Stop bit: 2-bit, Parity: Even only can be used in SJ series.

■ Available Devices

● KOSTAC SZ/SU/SG Series

Device	Address				
	SZ-4	SJ	SU-5/5E/6/6B/6M	SG-8	
Bit Devices	Input Points	I000 to I477	I000 to I377	I000 to I477	I0000 to I1777
	Output	Q000 to Q477	Q000 to Q377	Q000 to Q477	Q0000 to Q1777
	GENIUS Input Points	--	-	--	GI0000 to GI3777
	GENIUS Output Points	--	-	--	GQ0000 to GQ3777
	Link relay ¹	--	-	GI000 to GI777	--
	Internal relay	M000 to M377	M000 to M377	M000 to M737	M0000 to M3777
	Special relay	SP000 to SP137	SP000 to SP337	SP000 to SP137	SP000 to SP777
		SP540 to SP617		SP320 to SP617	
	Timer	T000 to T177	T000 to T377	T000 to T177	T000 to T377
	Counter	C000 to C177	C000 to C177	C000 to C177	C000 to C377
	Stages	S000 to S777	S000 to S1777	S000 to S577	S0000 to S1777
Word Devices	Input Points	R40400 to R40423	R40400 to R40417	R40400 to R40423	R40400 to R40477
	Output	R40500 to R40523	R40500 to R40517	R40500 to R40523	R40500 to R40577
	GENIUS Input Points	--	-	--	R40000 to R40177
	GENIUS Output Points	--	-	--	R40200 to R40377
	Link relay ¹	--	-	R40000 to R40037	--
	Internal relay	R40600 to R40617	R40600 to R40777	R40600 to R40635	R40600 to R40777
	Special relay	R41200 to R41205	R41200 to R41217	R41200 to R41205	R41200 to R41237
		R41226 to R41230	R41226 to R41117	R41215 to R41230	
	Timer	R41100 to R41107	R41100 to R41147	R41100 to R41107	R41100 to R41117
	Counter	R41140 to R41147	R41140 to R41147	R41140 to R41147	R41140 to R41157
	Stages	R41000 to R41037	R41000 to R41077	R41000 to R41027	R41000 to R41077
	Timer (count)	R000 to R177	R000 to R377	R0000 to R0177	R0000 to R0377
	Counter (count)	R1000 to R1177	R1000 to R1177	R1000 to R1177	R1000 to R1377
	Data register (when extended memory is used)	--	R400 to R677 R700 to R777 ¹	--	1 R400 to R777
		--	-	R1400 to R1777	2a R1400 to R1777
		R2000 to R4377	R2000 to R7377	R2000 to R7377	2b ² R2000 to R7377
		--	R10000 to R17777	--	3R R10000 to R37777
	Special register	R7620 to R7737 R7746 to R7777	R7400 to R7777	R7400 to R7777	R7400 to R7777

*1 When the link relay is specified on SU-5/5E/6/6B/6M, select send to all nodes relay by VT STUDIO device settings.
When the SU-5/5E/6/6B/6M is being used, send to all nodes relays become link relays.

*2 R4000 to R4377 become nonvolatile registers.

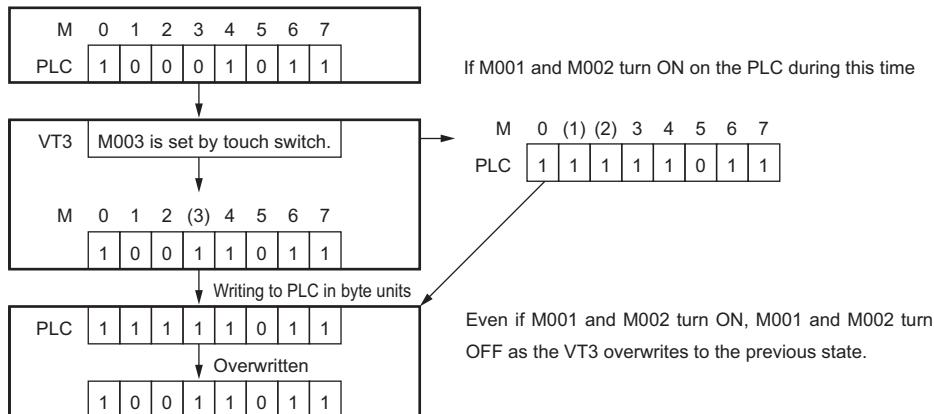


- During bit writing (when setting data directly to bit devices by a touch switch), pay attention to the description on the following page when preparing a ladder program. You need not pay attention to this when reading bit devices.
- Available devices are restricted according to the product model. Check the manual for the respective model.

11-5 Handling Devices

When the VT3 series is connected to a KOYO ELECTRONICS INDUSTRIES PLC, reading and writing of bit devices is performed in byte units. When writing to bits, the remaining seven bits (in the example, M000 to M002, and M004 to M007) are updated by the previous state in addition to changing of the state of the preset bit (in the example, M003) as writing is performed in byte units. Even if a bit (that is, one of the remaining seven bits) other than the bit preset during writing of this bit changes state, the bit is overwritten to the previous state during writing and does not change.

■ When using the VT3



The only restriction in writing to PLC bit devices from the VT3 is setting of bits (set, reset, reverse bit, set momentary) to bit devices by touch switches. For this reason, assign the area of the PLC device that is to perform bit setting in byte units to the bit device by touch switches, and then prepare the ladder program.

[Example] To turn internal relay M001 ON and OFF by setting bits to bit device by touch switches.

M000 to M007 (1 byte = 8 bits)

M000 to M007 (1 byte = 8 bits) is assigned as the area of the PLC device that is to perform data setting directly to the bit device by touch switches, and in the ladder program on the PLC, do not program output instructions such as OUT, SET or RES.

[Example] To turn internal relays M015, M107 and M154 ON and OFF by setting bits to bitdevice by touch switches.

M010 to M017 (1 byte = 8 bits)

M100 to M107 (1 byte = 8 bits)

M150 to M157 (1 byte = 8 bits)

Assign the following as the area of the PLC device that is to perform bit setting to the bit device by touch switches: An area of three bytes (=24 bits) for specifying bit devices in a staggered manner as shown above is required. For this reason, assign a continuous number such as M010, M011 and M012 to devices that are to perform bit setting to bit device by touch switches.



When using the "Reset trigger bit" function that is set on VT STUDIO, do not use the eight bits (in byte units) containing the trigger bit device on the PLC and VT.

(Example) When using trigger bit devices by enabling the "Reset trigger bit" function on M000, do not use M001 to M007 on the PLC or VT3.

■ When using the DT

Writing to bit devices on the PLC occurs from DT in the following instances:

- At "End detection" during logging
- At "Reset trigger bit" on bit device triggers

11-6 Error Messages and Troubleshooting

The communication errors that occur when VT3 series is connected to a PLC made by Koyo Electronics Corporation are described.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Communication setting error.	
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

MEMO

12

CONNECTING TO TOSHIBA CORPORATION PLCS

This chapter describes how to connect to a PLC made by TOSHIBA CORPORATION.

12-1	Checking Operation before Connection	12-2
12-2	System Configuration.....	12-4
12-3	Wiring Diagrams for Connections	12-6
12-4	Unit Settings.....	12-12
12-5	Available Devices.....	12-22
12-6	Error Messages and Troubleshooting	12-24

12

CONNECTING TO TOSHIBA CORPORATION PLCS

12-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT3/DT and PLC via serial interface or Ethernet.

- (1) Make sure the PLC, link unit and Ethernet unit can be connected to the VT3 and DT.
- (2) Check whether or not a CPU, link unit or Ethernet settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

Serial connections

■ Connection of V Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
S2PU72A PU672T PU612E	PC link port	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 4	 P.12-12	V Series ¹
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
			VT5(COM2) ¹ /VT3-W4□A	Wiring diagram W41		
			VT3-V7R(CN3)	Wiring diagram R4		

*1 Not supported by Soft-VT.

*2 VT5-W07M is not supported.

■ Connection of PROSEC T1 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
T1, T1S	Programmer port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.12-12	PROSEC T Series ¹
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT5(COM1)/VT3-W4□	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		

*1 Not supported by Soft-VT.

■ Connection of PROSEC T2 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
T2 (PU224 only)	CCU link port	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	 P.12-12	PROSEC T Series ²
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ¹ /VT3-W4□A	Wiring diagram W40		
			VT3-V7R (CN3)	Wiring diagram R3		
T2E	CM231E	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 4	 P.12-12	PROSEC T Series ²
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H41		
	CM232E	RS-232C	VT5(COM2) ¹ /VT3-W4□A	Wiring diagram W41	 P.12-12	
			VT3-V7R (CN3)	Wiring diagram R4		

*1 VT5-W07M is not supported.

*2 Not supported by Soft-VT.

■ Connection of PROSEC T3 Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
T3, T3H	CCU link port	RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 3	 P.12-12	PROSEC T Series ^{1,2}
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40		
			VT5(COM2) ¹ /VT3-W4□A	Wiring diagram W40		
			VT3-V7R(CN3)	Wiring diagram R3		

*1 VT5-W07M is not supported.

*2 Not supported by Soft-VT.

Ethernet connections

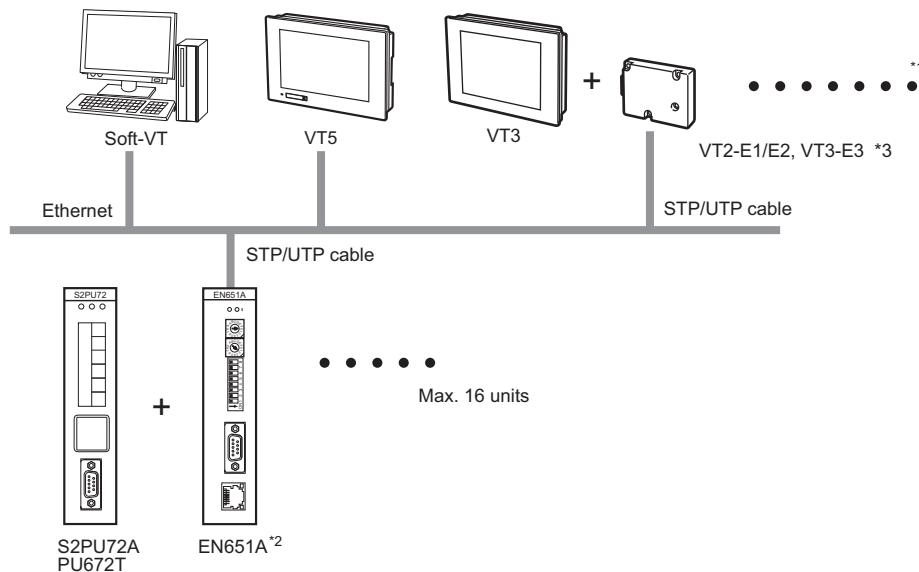
Series Name	PLC	Connection Methods	Unit Setting	Target PLC
nv Series type1 light	PUM12	Internal Ethernet port	P.12-20	nv Series (Ethernet) ^{*1}
		EN651A		
T Series	PU672T	EN651A		
V Series	S2PU72A	EN651A		V Series (Ethernet)

*1 VT3 series is not supported.

12-2 System Configuration

System configuration for Ethernet connections

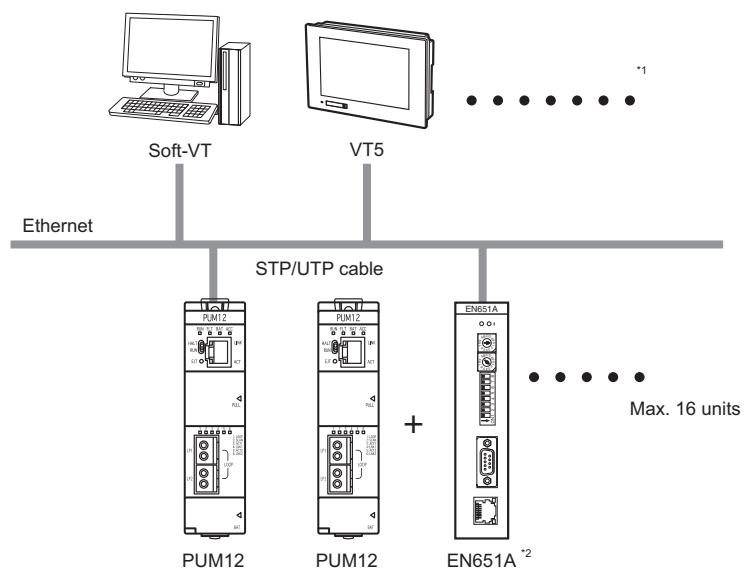
■ V Series



- *1 Be sure to use the S2PU72 (V Series S2)+EN651A to connect multiple VT5/VT3 Series, Soft-VT units. In addition, with the increase of number of VT3 units connected, the communication load also increases.
- *2 Be sure to use the EN-A connector of Toshiba V Series Ethernet module to connect with VT5/VT3 Series, Soft-VT. The EN-B connector cannot be used.
- *3 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

Point When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

■ nv Series



*1 When connecting multiple VT5 series and Soft-VT, please note that the communication volume increases according to the number of connected units.

*2 For connecting, please use EN-A connector of Toshiba V series Ethernet module.

12-3 Wiring Diagrams for Connections

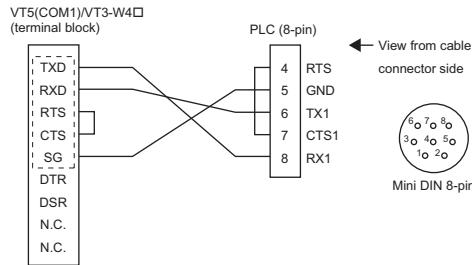
This section describes wiring of connector cables.

The wiring diagrams recommended by TOSHIBA may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

Wiring diagrams for serial connections

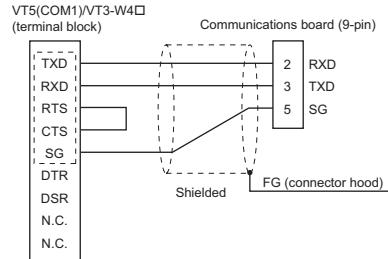
■ Connection to VT5 series (COM1), VT3-W4□ (RS-232C)

● Wiring Diagram W20 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

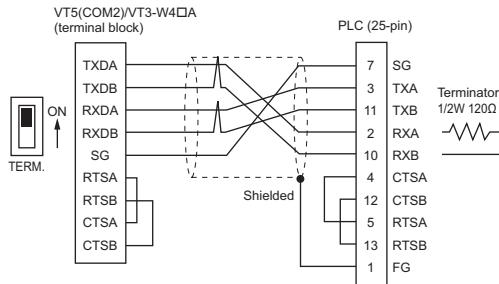
● Wiring Diagram W21 (RS-232C)



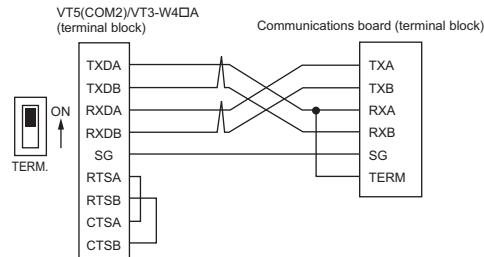
* [] indicates a terminal diagram for the VT5 Series.

■ Connection to VT5 series (COM2), VT3-W4□A (RS-422A)

● Wiring Diagram W40 (RS-422A)

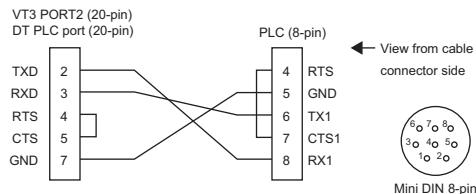


● Wiring Diagram W41 (RS-422A)



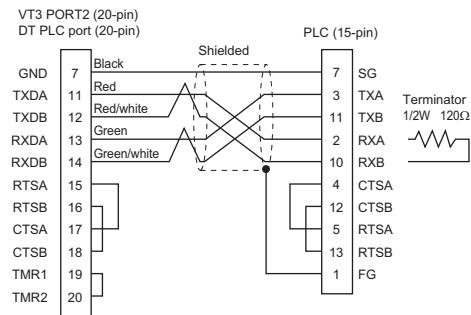
■ Connection to VT3 series/DT series

● Wiring Diagram 1 (RS-232C)



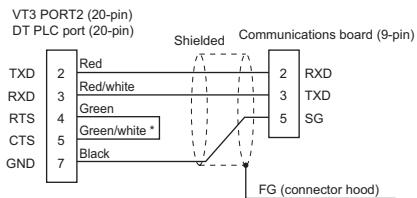
For wiring, use the cable (model No. PT16S * leads exposed on one side) for the TOSHIBA CCU link. For details, contact TOSHIBA.

● Wiring Diagram 3 (RS-422A: OP-24028)



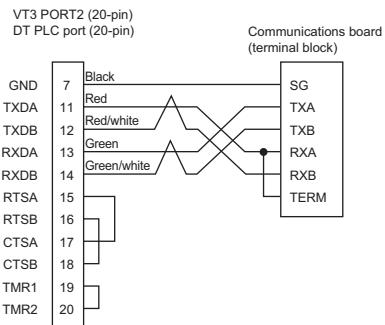
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

● Wiring Diagram 2 (RS-232C: FOP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 4 (RS-422A: OP-24028)



■ Connection with VT3 Handy Series



FG2 must be grounded.

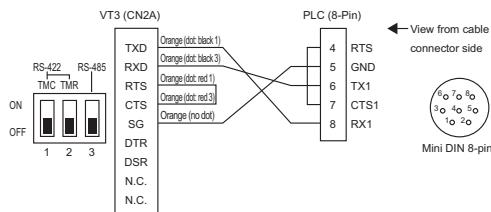
● Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



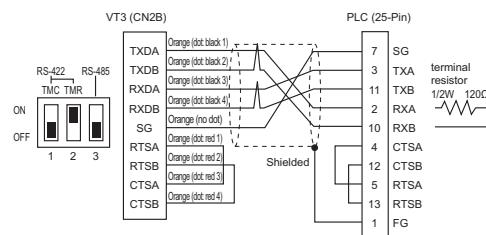
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



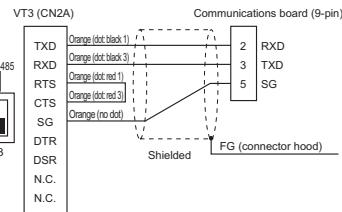
● Wiring Diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



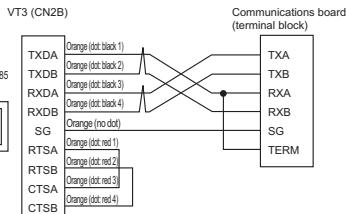
● Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

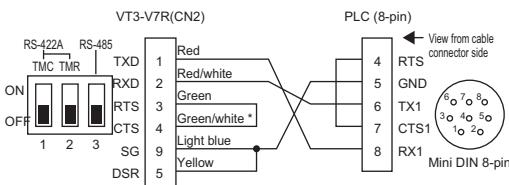
OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



■ Connection to VT3-V7R

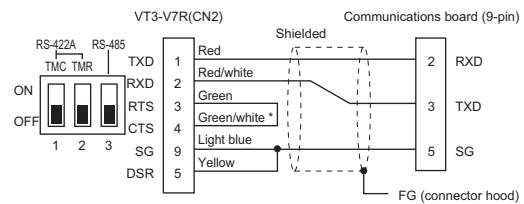
● Wiring Diagram R1 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

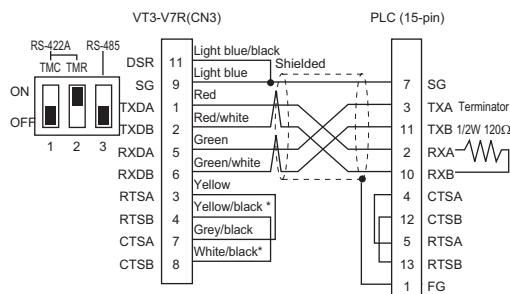
For wiring, use the cable (model No. PT16S * leads exposed on one side) for the TOSHIBA CCU link. For details, contact TOSHIBA.

● Wiring Diagram R2 (RS-232C: VT-C5R1)



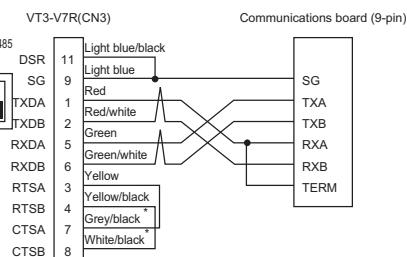
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R4 (RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.



**Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039),
please ensure to read the □ "Connection Precautions", page A-13**



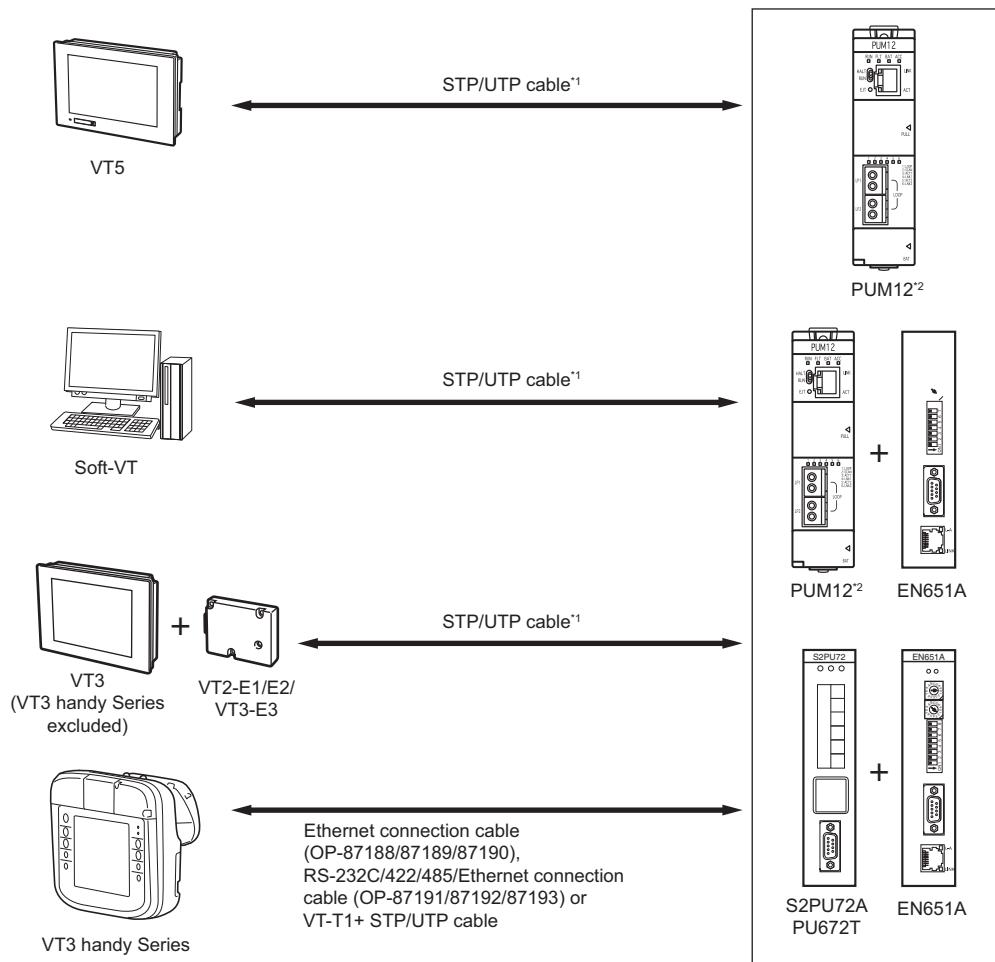
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

The following describes the cables used for the Ethernet connection for each of the connection types.

■ Direct connection (1:1)

Use the STP/UTP cable for connection.



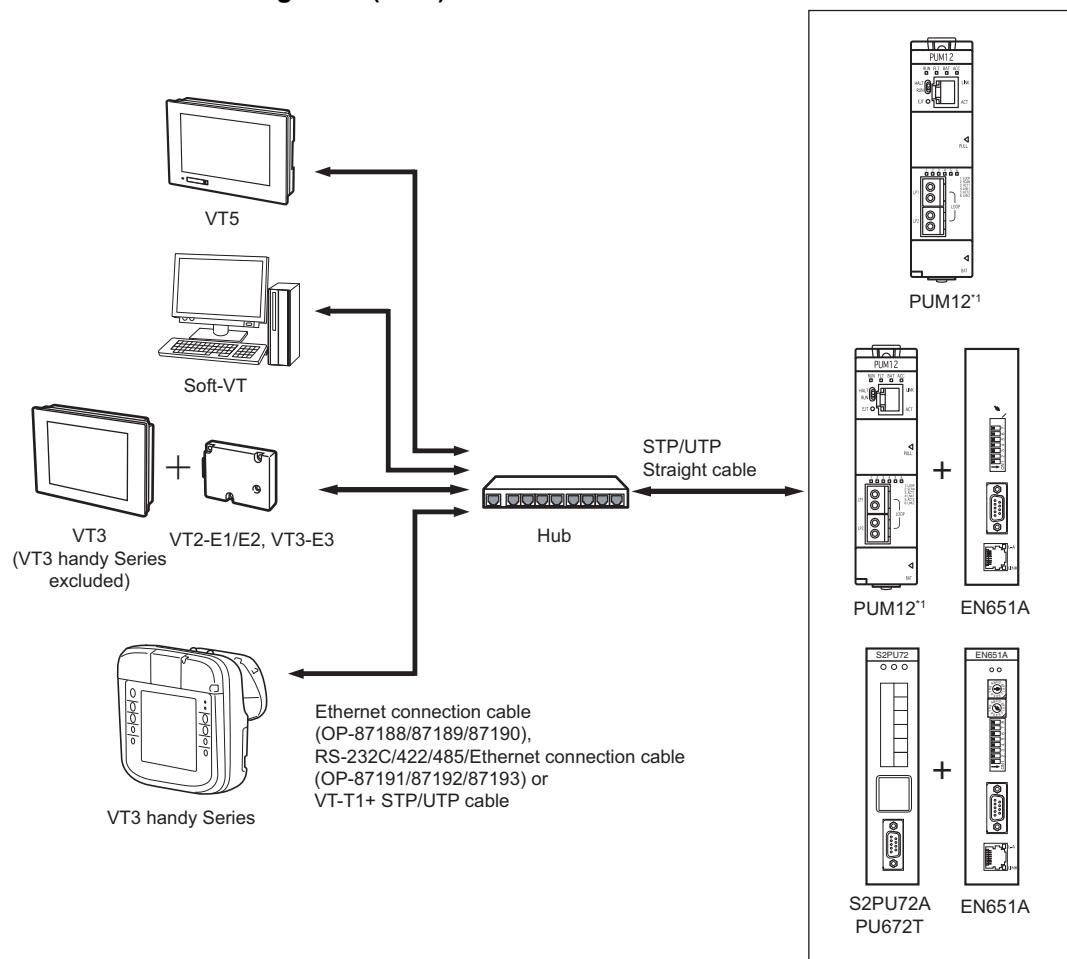
*1 MDI/MDI-X auto switch function is supported by VT 5 series and VT3-E3 whose serial number ends with "A". To connect any other device directly to a PLC, use an STP/UTP cross cable.

*2 VT3 series is not supported.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

■ Connecttoon using a hub(1 : N)



*1 VT3 series is not supported.

Connection of VT5 Series, Soft-VT, VT2-E1/E2, VT3-E3, VT3 handy Series and Soft-VT to a hub

- Use the STP/UTP straight cable.
- The VT5 Series, Soft-VT, VT2-E1/E2, VT3-E3, VT3 handy Series and Soft-VT should be connected to a port other than the cascade port on a hub.

Hub connection with PUM12, EN651A

- Use the STP/UTP straight cable.
- Do not connect the EN651A to a cascade port on the hub.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

12-4 Unit Settings

Method for making serial connections

The following describes the settings of the Link Unit matched to the default communications conditions.

■ Setting of V Series S2

When connecting S2 of V Series with VT3, "V Series engineering tool" must be used for communication setting. Do this with the module setting of "V Series engineering tool".

Items	Setting range	Default
RS485 Station No.	1 to 31	1
RS485 Baud rate (bit/s)	300, 600, 200, 2400, 4800, 9600, 19200bps ^{*1}	9600
RS485 parity specifying	None, odd, even	None
RS485 data length	7 bits, 8 bits ^{*2}	8 bits
RS485 stop bit	1 bit, 2 bits	1 bit

^{*1} For communication with VT, the setting range is 9600 to 19200.

^{*2} For communication with VT, 8 bits must be set.

■ Setting of V Series S2T/S2E

When connecting S2T/S2E of V Series and VT3, T-PDS32 must be used for communication setting. Be sure to set up this with the PC link setting.

Items	Setting range	Default
Station No.	1 to 31	1
Baud rate (bit/s)	300, 600, 1200, 2400, 4800, 9600, 19200bps ^{*1}	9600
Parity specifying	None, odd, even	Even
Data length	7 bits, 8 bits ^{*2}	8 bits
Stop bit	1 bit, 2 bits	1 bit

^{*1} For communication with VT, the setting range is 9600 to 19200.

^{*2} For communication with VT, 8 bits must be set.

■ T1, T1S

● Setting the transmission parameters

Set the PLC side transmission parameters on a programmer.

Set the parameters for CCU link items in the system control information on a programmer.

Set only "Station No." (1 to 32) as the item to be set. (Baud rate, parity, data length and stop bit are fixed and need not be set.)

Item	Settings
Station No.	1

■ T2 (PU224 only)

● Setting the transmission parameters

Set the PLC side transmission parameters on a programmer.

Set the parameters for CCU link items in the system control information on a programmer.

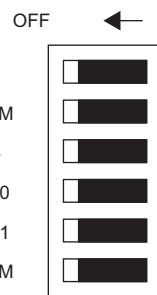
Item	Settings
Station No.	2
Baud Rate	9600 bit/s
Parity	Odd
Data length	8 bits
Stop bit	1 bit

■ Communications boards CM231E and CM232E for the T2E

● T2ECPU module DIP switch

Set the communications board functions on the DIP switch on the front panel of the T2ECPU module.

Always set the CM0 and CM1 switches to OFF.



● Setting the transmission parameters

Set the PLC side transmission parameters on a programmer.

Set the parameters for CCU link items in the system control information on a programmer.

Item	Settings
Station No.	1
Baud Rate	9600 bit/s
Parity	Odd
Data length	8 bits
Stop bit	1 bit

■ T3, T3H

Set in the same way as T2 (UP224 only).

Communication Condition Setting Ranges and Defaults During Serial Communication

● V Series

Item	Setting Range	Default
Station No.	ON (1 to 31)	ON (1)
VT No	-	-
PLC serial I/F	RS-422A, 4-wire	RS-422A, 4-wire
Baud rate	9600, 19200bps	9600bps
Data length	8 bits	8 bits
Stop bit	1, 2 bits	1bit
Parity	None, odd, even	None
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

● PROSEC T Series

Item	Setting Range	Default
PLC No.	ON (1 to 32)	ON (1)
VT No.	-	-
PLC serie I/F ¹	RS-232C, RS-422A 4-wire	RS-422A 4-wire
Baud Rate	1200, 2400, 4800, 9600, 19200 bit/s	9600 bit/s
Data bit	7 bits, 8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 Set RS-232C/RS-422A 4-wire to match the interface on the PLC.

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series/Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the Ethernet connection, the IP address and port numbers of the connected units should be determined in advance.

The following table shows the settings corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> IP address assigned to VT5/VT3/Soft-VT (PC) IP address to be assigned to PLC Port No. for communication
Other connection	<ul style="list-style-type: none"> IP address assigned to VT5/VT3/Soft-VT (PC) IP address to be assigned to PLC Port No. for communication Subnet Mask Default Gateway



Make sure that the "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to a PLC via Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in VT STUDIO. ¹	P.12-16
	Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.	-
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ²	P.12-17
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Use the nv Series/V Series engineering tools made by TOSHIBA to set communication conditions.	P.12-20

*1 Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

*2 You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.12-18
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.12-18
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Use the nv Series/V Series engineering tools made by TOSHIBA to set communication conditions.	P.12-20

*1 Use "PLC Communication Condition" in VT3 system mode to confirm and change settings.

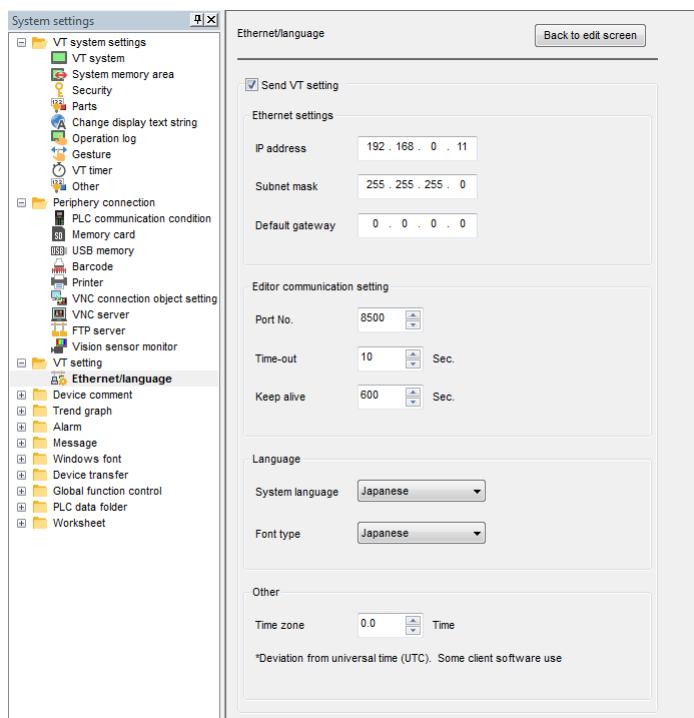
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.

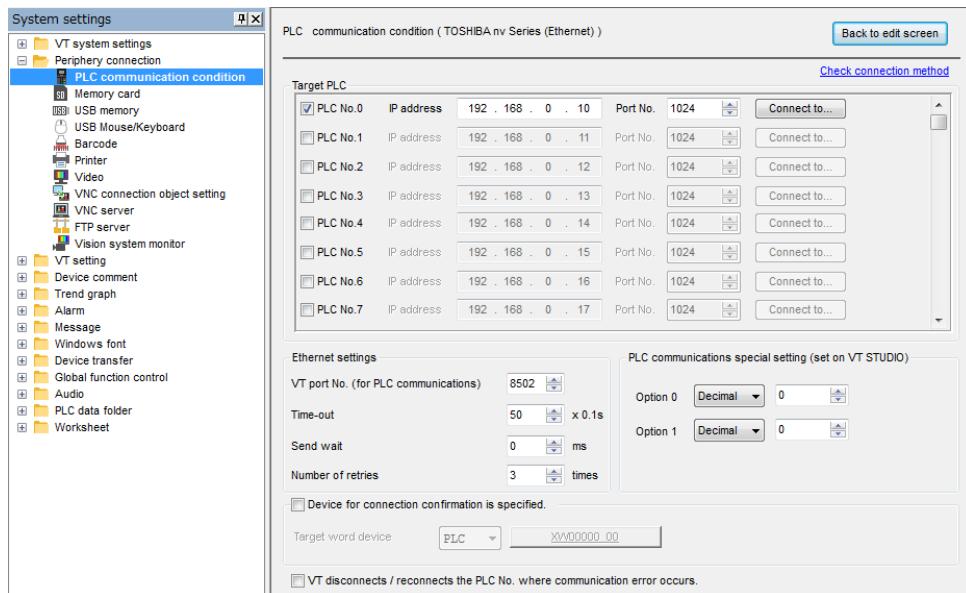


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Set the port number (1024 to 65535) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	Set VT5/Soft-VT port numbers (for PLC communications) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long time out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.
IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Do not change the port number to a number between 0 to 1023.
Also, take care not to use a port number already used by another device.

*3 Select "PLC device".
 "6-7 Device Setup", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set up "Option Setup" in the System mode on the VT3 unit.

VT3 Series Reference Manual "Chapter 5 SYSTEMMODE"

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	** . ** . ** . ** . ** . **				
				OK	Cancel
				Next page	

Ethernet Setup (2/3)				OK	Cancel
Port number	8500			Next page	
Time-out	10 s				
Keep Alive	600 s				
				OK	Cancel
				Next page	

Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				

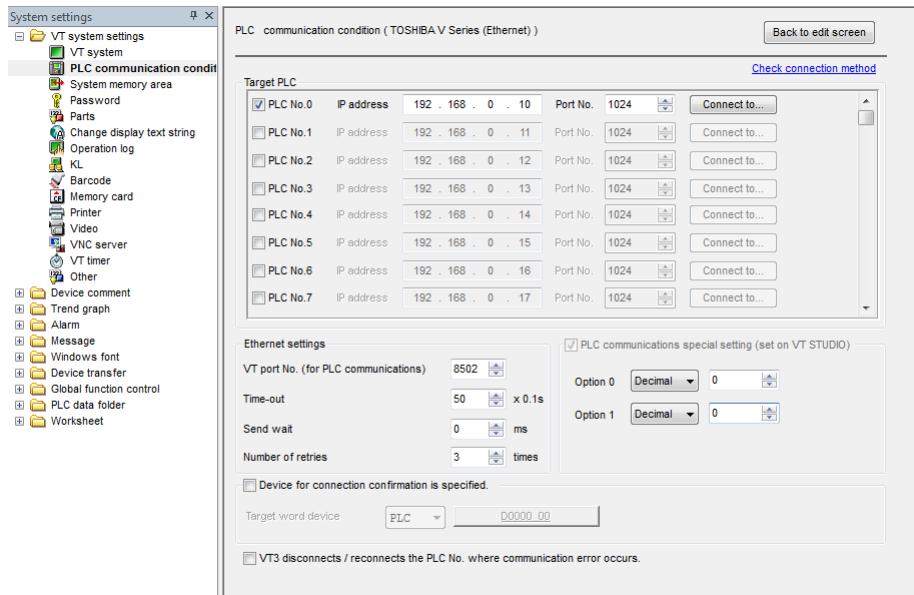
Items	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable. Select "10Mbps" only when communication is unstable.
IP address	Set the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting for direct connection. Set up a pre-confirmed subnet mask for other connections.
Default Gateway	Use the default setting for direct connection. Set up a pre-confirmed default gateway for other connections.
MAC address	Unique identification No. of VT3 Series. This cannot be set.
Port No.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup*	Select "Enable" only when using a router.

*1 VT3 Series Hardware Manual "Chapter 8 ETHERNET"

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

VT3 Series Reference Manual "Chapter 17 Ethernet"



Item		Description
Target PLC	Station No.	Selects the PLC No. (0 to 15) to be used.
	IP address^{*1}	Set up the IP address assigned to the PLC (marked PLC No.)
	Port No.^{*2}	Set up the port No. of the PLC (marked PLC No.) (1024 to 65535)
	List of connection destinations	Select the connection destination from the connection destination list file, or add connection destinations.
Ethernet Setting	VT port No. (for PLC communication)	Set up the port No. of VT3 (for PLC communication) (1024 to 65535).
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communication special settings (via VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device^{*3}	Set up the device which is used to check the connection when no communication is performed in a specific period. Normally, this is not required.
VT3 disconnects / reconnects the PLC No. where communication error occurs^{*4}		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 Be sure to set only unique IP address to each equipment within the same LAN.
The IP address is represented as XXX.XXX.XXX.XXX (XXX is 0 to 255).

*2 When changing the port No., do not use numbers 0 to 1023 as the new port No. Also, do not use another port No. that is already in use.

*3 "PLC device" can be selected.

VT3 Series Reference Manual "6-7 Device Setting"

*4 This can be set up when a PLC model that supports 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Conditions", VT3 Series Hardware Manual

■ Setting for nv series, V series S2

To connect the nv series, V series S2 and VT5 / VT3, Soft-VT, set the communication with "nv series / V series engineering tool".

Please set each item by referring to the following table.

For details of setting items and setting method, refer to the instruction manual of each device.

Item	PLC setting
Primary IP address	IP address of PLC
UDP Port No.	PLC port No.

● IP address setting

For nv series / V series, you can select the IP address from the three types: "Class B type", "CIEMAC 1200 type", and "Any (set from tool)".

Set up the IP address type using the operation mode switch of Ethernet module.

The IP address type can be set up by selecting IP1 or IP0 of the operation mode switch (except those reserved, all the IP address types can be used).



Since functions of the operation mode switch differ for each unit, please refer to the Ethernet module's manual of nv series or V series for details.

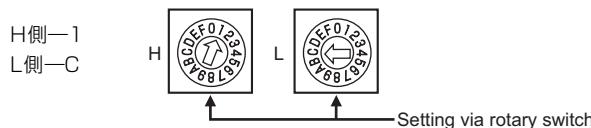
IP Address type	IP address	Subnet Mask	Operation mode button	
			IP1	IP0
Class B type	172.16.64.xx ²	255.255.192.0	OFF	OFF
Reserved (not used) ^{*1}	-	-	OFF	ON
CIEMAC1200 type	192.0.0.xx ²	255.255. 255.192	ON	OFF
Set up from tool	any ³	any ³	ON	ON

*1 When "Reserved (IP1: OFF, IP0 : ON)" is set, communication cannot be performed.

*2 Be sure to use the rotary switch on one side of the PLC Ethernet module to set up the last byte of the IP address.
Example) 192.168.000.028

Set up the station address (host ID) with a HEX number.

For example, if address is 28, it becomes IC after hexadecimal conversion.



*3 When an "Any type" address is selected, be sure to use the operation mode switch to set the IP address to "Set up from tool".



When communicating with VT5 / VT3 and Soft-VT, set the CPU module operation mode switch of nv series or V series to "RUN".

When the HALT mode is used for communication, firstly, set to RUN, then switch to HALT after communication being available.

■ Setting of V Series S2T + EN651A

To connect S2T of V Series and VT5/VT3, T-PDS32 should be used for creating a ladder program.
Set up the IP address with the following ladder program.

To execute the following program, set contact A of R503 to ON.



Set up the port No. with the following ladder program.

To execute the following program, set contact A of R502 to ON.



The IP address in V Series S2T can be selected from "Class B type", "CIEMAC1200 type", and "Any type (set up from tool)"

The IP address type can be set up with the operation mode switch of V Series Ethernet module.

The IP address type can be set up by selecting IP1 or IP0 of the operation mode switch (except those reserved, all the IP address types can be used).



Functions of the operation mode switch varies depending on the unit. For details, see the V series Ethernet Module Manual.

IP Address type	IP address	Subnet Mask	Operation mode button	
			IP1	IP0
Class B type	172.16.64.xx ²	255.255.192.0	OFF	OFF
Reserved (not used) ¹	-	-	OFF	ON
CIEMAC1200 type	192.0.0.xx ²	255.255. 255.192	ON	OFF
Set up from tool	any ³	any ³	ON	ON

*1 When "Reserved (IP1: OFF, IP0 : ON)" is set, communication cannot be performed.

*2 Be sure to use the rotary switch on one side of the PLC Ethernet module to set up the last byte of the IP address.
Example) 192.168.000.028

Set up the station adress (host ID) with a HEX number.

For example, if address is 28, it becomes IC after hexadecimal conversion.

*3 When an "Any type" address is selected, be sure to use the operation mode switch to set the IP address to "Set up from tool".



For communication with VT5/VT3, be sure to set the operation mode switch of V Series CPU module to RUN.

When the HALT mode is used for communication, firstly, set to RUN, then switch to HALT after communication being available.

12-5 Available Devices

■ V Series

● Available devices for S2

Device		Address
Bit Device	Input variable	X00000 to X3071F
	Output variable	Y00000 to Y3071F
	Auxiliary relay	R00000 to R4095F
	Special relay	S0000 to S511F
Word Device	Input variable	XW0000 to XW3071
	Output variable	YW0000 to YW3071
	Auxiliary register	RW0000 to RW4095
	Special register	SW000 to SW511
	Data register	D0000 to D4095

● Available devices for S2T/S2E

Device		Address
Bit Device	Input variable	X00000 to X0511F
	Output variable	Y00000 to Y0511F
	Auxiliary relay	R00000 to R0999F
	Special relay	S0000 to S255F
	Timer relay ^{*1}	T.000 to T.999
	Counter relay ^{*1}	C.000 to C.511
	Link register relay	Z0000 to Z999F
	Link relay	L0000 to L255F
Word Device	Input variable	XW0000 to XW0511
	Output variable	YW0000 to YW0511
	Auxiliary register	RW0000 to RW0999
	Special register	SW000 to SW255
	Timer register	T000 to T999
	Counter register	C000 to C511
	Link register	W0000 to W2047
	Link relay register	LW000 to LW255
	Data register	D0000 to D8191
	File register(user register)	F00000 to F32767
	Index register	I0
	Index register	J0
	Index register	K0

*1 Special device for reading.
Communication error occurs when writing.



Available devices are restricted according to the product model. Check the manual for the respective model.

● PROSEC T Series

	Device	Address
Bit Devices	Input device	X0000 to X511F
	Output device	Y0000 to Y511F
	Auxiliary relay	R0000 to R999F
	Special relay	S0000 to S255F
	Timer relay	T000 to T999
	Counter relay	C000 to C511
	Link register relay	Z0000 to Z999F
	Link relay	L0000 to L255F
Word Devices	Input register	XW000 to XW511
	Output register	YW000 to YW511
	Auxiliary register	RW000 to RW999
	Special register	SW000 to SW255
	Timer register (current)	T000 to T999
	Counter register (current)	C000 to C511
	Data register	D0000 to D8191
	Link register	W000 to W2047
	Link relay register	LW000 to LW255
	File register	F00000 to F32767



Available devices are restricted according to the product model. Check the manual for the respective model.

■ nv Series

	Device	Address
Bit Devices	External input	X000000 to X16383F
	External output	Y000000 to Y16383F
	Internal relay	R00000 to R8191F
	Input variable ^{*1}	I000000 to I16383F
	Output variable ^{*1}	Q000000 to Q16383F
	Special relay	S00000 to S1023F
Word Devices	External input	XW00000 to XW16383
	External output	YW00000 to YW16383
	Internal register	RW0000 to RW8191
	Input variable ^{*1}	IW00000 to IW16383
	Output variable ^{*1}	QW00000 to QW16383
	Special register	SW0000 to SW1023
	Data register ^{*1}	F00000 to F32767
	User global	UG000000 to UG262143

*1 It cannot be specified by variable name.



Available devices are restricted according to the product model. Check the manual for the respective model.

12-6 Error Messages and Troubleshooting

This section describes the communication error that occurs when connecting VT5/VT3 series and Soft-VT with PLC made by Toshiba Corporation.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

* • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.

• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

List of Communication Errors in Ethernet Connections

The following table shows the error messages displayed in Ethernet connection with PLC.

Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when communication errors occur.

Display Message	Cause	Remedy
TimeOutError(++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Please check to ensure the network is OK. Review the communications setup.
No Ethernet unit	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	<ul style="list-style-type: none"> Turn off the power of VT3 and then turn VT3 ON after VT2-E1/E2 or VT3-E3 is connected.
Protocol stack error	The protocol is in the startup process.	Wait a while in this state.
Link error	Linking errors of Ethernet unit.	<ul style="list-style-type: none"> Please check to ensure the cable is connected correctly. Please check to ensure the LINK LED of VT5 Series, VT2-E1/E2, VT3-E3 ,VT3 handy Series and PLC lights up.
PLC ERROR [PLC ERROR**(++)]	There was not error response** (DEC) from PLC No.++.	For details on response **, refer to the manuals for the respective PLC and the Ethernet Unit.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

MEMO

13

CONNECTING TO TOSHIBA MACHINE CO., LTD. PLCs

This chapter describes how to connect to PLCs made by TOSHIBA MACHINE Co., Ltd.

13-1	Checking Operation before Connection	13-2
13-2	Wiring Diagram	13-3
13-3	Unit Settings.....	13-5
13-4	Communication Conditions and Available Devices	13-6
13-5	Error Messages and Troubleshooting	13-8

13

13-1 Checking Operation before Connection

This section describes how to check the items required for connecting the PLC to the VT5/VT3/DT.

- (1) Make sure that the VT5/VT3/DT can be connected to the PLC or link unit.
- (2) Check whether or not CPU or link unit settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT5/VT3/DT.

 "Procedure before Starting Communication", page 18

■ Connection with TCmini

Series name	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC	
TC3-02	General-purpose communications port	RS-232C	VT5(COM1)/VT3-W4□	Wiring diagram W20	 P.13-5	TC Series ^{*1 *2}	
TC6-00	General-purpose communications port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.13-5		
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
TC8-00			VT5(COM1)/VT3-W4□	Wiring diagram W20	 P.13-5		
CN11port	RS-485	VT5(COM2) ^{*2}	Wiring diagram W20	 P.13-5			
TC9-00	CN11port	RS-485	VT5(COM2) ^{*2}	Wiring diagram W41	 P.13-5		

*1 Soft-VT is not supported.

*2 VT5-W07M is not supported.

■ Connection with TC200

Series name	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
TCCUH	General-purpose communications port	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	 P.13-5	TC Series ^{*1 *2}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20		
			VT5(COM1)/VT3-W4□ ^{*2}	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		

*1 Soft-VT is not supported.

*2 VT5-W07M is not supported.

13-2 Wiring Diagram

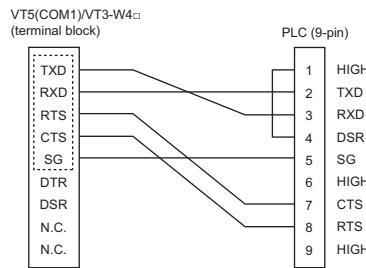
This section describes wiring of connector cables.

The wiring diagrams recommended by Toshiba Machine Co., Ltd. may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

Connection to VT5 series (COM 1)/VT3-W4 □(RS-232C)

■ Wiring Diagram W20 (RS-232C)

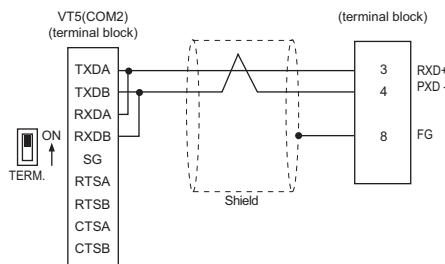
OP-24027: 5m



* Dashed line is VT5 series terminal diagram

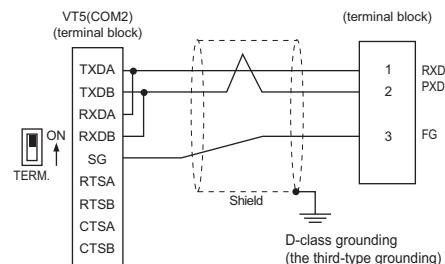
VT5 Series (COM2)

■ Wiring Diagram W40 (RS-485 : 2 wire type)



*1 Turn ON terminator switch.

■ Wiring Diagram W41 (RS-485 : 2 wire type)

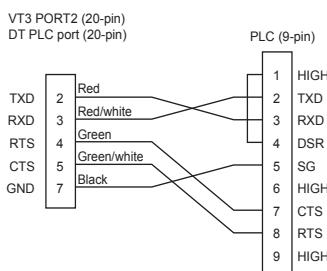


*1 Turn ON terminator switch.

Connection to VT3 series/DT series

■ Wiring Diagram 1 (RS-232C)

OP-24027: 5m



Reference

For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Connection with VT3 Handy Series



FG2 must be grounded.

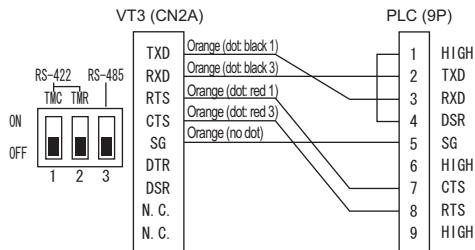
■ Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

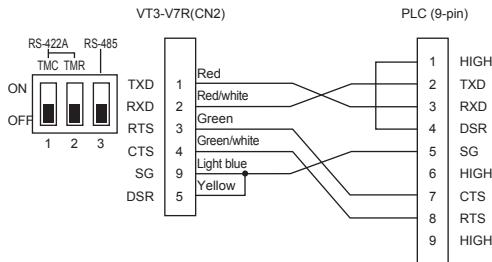
OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



Connection to VT3-V7R

■ Wiring Diagram R1 (RS-232C: VT-C5R1)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

13-3 Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ TC3-02, TC6-00, TC8-00

There is no setting for connected devices.

■ TC9-00

Use TCPRGOS-W(J) to set communication conditions.

● Communication Settings

- (1) Select "Register Editor" from "Tool" menu to display "Register Data" window.
- (2) Double click "HEX" in the register column and enter the following setting values from the ?Data change? dialog box.

Register	Setting value	Settings
D12E	0000h	Communications rate (9600bps)
	0001h	Communications rate (19200bps)
	0002h	Communications rate (38400bps)

- The following setting values are fixed.

Setting information	Value
Communication method	RS422/485 (2wire)
Data length	8 bits
Parity	None
Stop bit	2 bits

■ TC200 series

Set the communications speed. (There is no need to set other communications conditions).

Set the communications speed in the "special auxiliary relays."

Communications Speed (bps)	A00F	A154	A155
9600	OFF	OFF	OFF
19200	ON	OFF	OFF
38400*	-	ON	OFF
57600*	-	OFF	ON
115200*	-	ON	ON

There is no need to set items marked as "-".

* 38400, 57600, and 115200bit/s cannot be used in the TC200 series.

13-4 Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● TCmini, TC200 series

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC I/F	RS-232C	RS-232C
Baud Rate	9600,19200,38400*, 57600,115200bit/s	9600 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit/2 bits	1 bit
Parity	None	None
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

* 38400, 57600, and 115200bit/s cannot be used in the TC200 series.

■ Available Devices

● TCmini, TC200 series

	Device	Address
Bit Devices	External input relay	X000 to XF7F
	External input relay	I000 to IF7F
	External output relay	Y000 to YF7F
	External output relay	O000 to OF7F
	Internal relay	R000 to R77F
	Extended internal relay	G000 to GF7F
	Extended internal relay	H000 to HF7F
	Extended internal relay	J000 to JF7F
	Extended internal relay	K000 to KF7F
	Edge relay	E000 to E77F
	Latch relay	L000 to L07F
	Shift register	S000 to S07F
	Timer relay	T000 to T77F
	Counter relay	C000 to C77F
	Special auxiliary relay	A000 to A17F
Word Devices	External input relay	XW00 to XWF7
	External input relay	IW00 to IWF7
	External output relay	YW00 to YWF7
	External output relay	OW00 to OWF7
	Internal relay	RW00 to RW77
	Extended internal relay	GW00 to GWF7
	Extended internal relay	HW00 to HWF7
	Extended internal relay	JW00 to JWF7
	Extended internal relay	KW00 to KWF7
	Edge relay	EW00 to EW77
	Latch relay	LW00 to LW07
	Shift register	SW00 to SW07
	Timer relay	TW00 to TW77
	Counter relay	CW00 to CW77
	Special auxiliary relay	AW00 to AW17
	General-purpose data register	D000 to DF7F
	General-purpose data register	B000 to BF7F
	General-purpose data register	U000 to UF7F
	General-purpose data register	M000 to MF7F
	General-purpose data register	Q000 to QF7F
	T/C register (current value)	P000 to P77F
	T/C register (set value)	V000 to V77F



- Annotation of word devices partially differs from that of the PLC manual.
- Available devices are restricted according to the product model. Check the manual for the respective model.

13-5 Error Messages and Troubleshooting

The communication errors that occur when VT5/VT3 series is connected to a PLC made by Toshiba Machinery Co., Ltd. are described.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Communication setting error.	
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

14

CONNECTING TO FANUC LTD. MOTION CONTROLLERS

This chapter describes how to connect to a motion controller made by FANUC LTD.

14-1	Checking Operation before Connection	14-2
14-2	Wiring Diagram	14-3
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14-4	Communication Conditions and Available Devices	14-8
14-5	Error Messages and Troubleshooting	14-9

14

14-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/DT.

- (1) Make sure the PLC, link unit can be connected to VT5, VT3 and DT.
- (2) Check whether or not CPU or link unit settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

■ Connection of Power Mate Series

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
Power Mate-MODEL D, Power Mate-MODEL H	JD-14 port	RS-422A	VT5(COM2) ^{*1} / VT3-W4□A	Wiring diagram W40	 P.14-7	Power Mate Series ^{*2}
	M4 port + touch panel adapter A02B-0166-C240		VT3(PORT2)/VT-T1/DT	Wiring diagram 1		
			VT3-V6H(G)/ Q5H(G)(CN2B)	Wiring diagram H40		
			VT3-V7R(CN3)	Wiring diagram R1		
Power Mate i-MODEL D, Power Mate i-MODEL H	JD40 port	RS-422A	VT5(COM2) ^{*1} / VT3-W4□A	Wiring diagram W41	 P.14-7	Power Mate Series ^{*2}
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/ Q5H(G)(CN2B)	Wiring diagram H41		
			VT3-V7R(CN3)	Wiring diagram R2		
	JD42 port + RS-232C punch panel A02B-0259-C05*	RS-232C	VT5(COM1)/ VT3-W4□	Wiring diagram W20		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/ Q5H(G)(CN2A)	Wiring diagram H20		
			VT3-V7R(CN2)	Wiring diagram R3		

*1 Not supported by the VT5-W07M.

*2 Not supported by Soft-VT.



Some versions cannot be connected to the VT5 Series, VT3 Series and the DT series.
Contact FANUC LTD. to check whether their devices can be connected to the VT5 Series, VT3 Series and the DT Series.

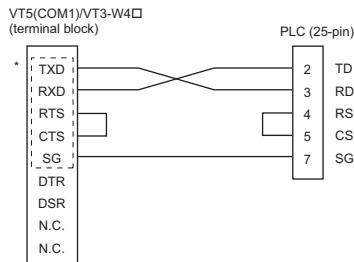
14-2 Wiring Diagram

This section describes wiring of connector cables.

The wiring diagrams recommended by FANUC may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

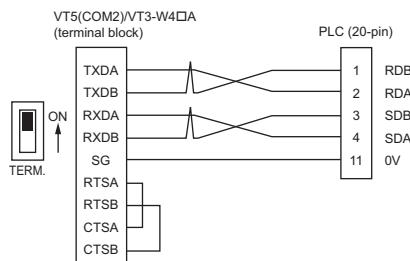
Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

■ Wiring Diagram W20 (RS-232C)

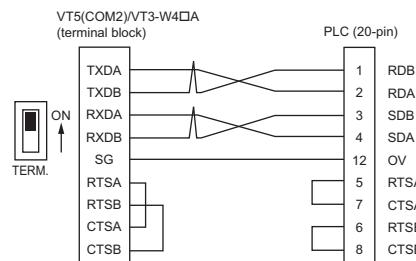


Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A)

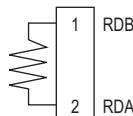
■ Wiring Diagram W40 (RS-422A)



■ Wiring Diagram W41 (RS-422A)



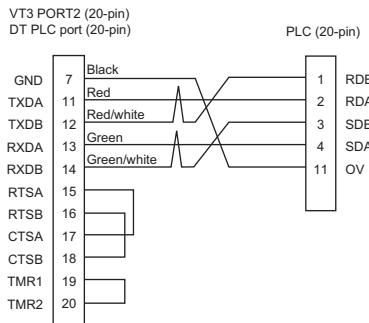
- Connect a termination resistor (100 Ohms 1/2 W) to the JD14 connector or JD15 connector on the motion controller side.



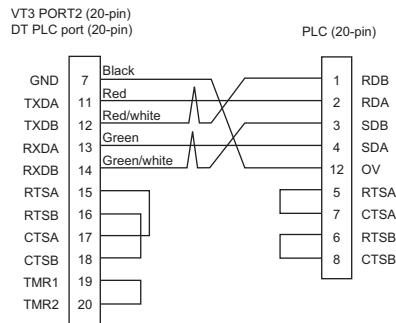
- Be sure to use the D-type grounding (the third-type grounding) for the FG terminal of motion controller.

Connection to VT3 series/DT series

■ Wiring Diagram 1 (RS-422A: OP-24028)

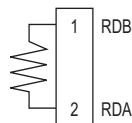


■ Wiring Diagram 2 (RS-422A: OP-24028)



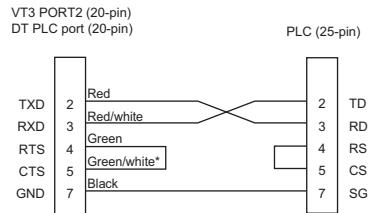
Point

- Connect a terminator (100 Ohms 1/2 W) to the JD14 connector or JD15 connector on the motion controller side.



- Be sure to use the D-type grounding (the third-type grounding) for the FG terminal on the motion controller.

■ Wiring Diagram 3 (RS-232C: OP-24027)



Reference

For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

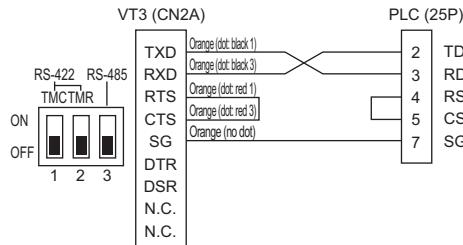
Connection with VT3 Handy Series



FG2 must be grounded.

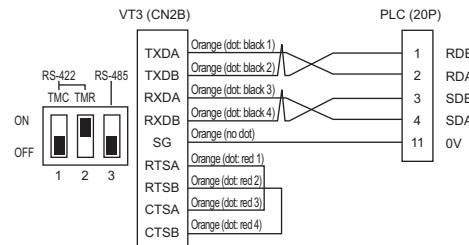
■ Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m

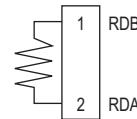


■ Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



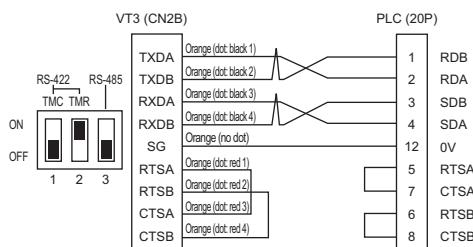
- Always connect a terminal resistor (100Ω 1/2W) on the JD14 connector or JD15 connector of the motion controller.



- Use D-type grounding (the third-type grounding) for the FG terminal of motion controller.

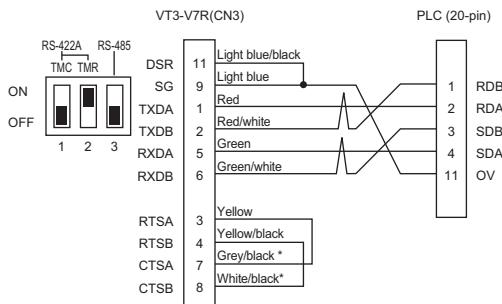
■ Wiring Diagram H41 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



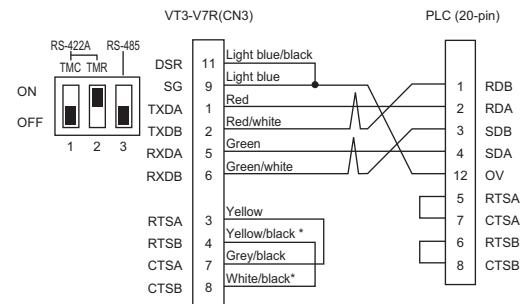
Connection to VT3-V7R

■ Wiring Diagram R1 (RS-422A: VT-C5R2/C15R2)



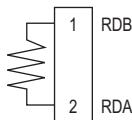
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring Diagram R2 (RS-422A: VT-C5R2/C15R2)



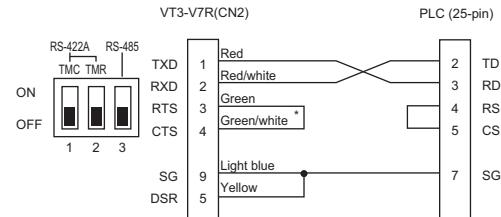
* Not wired for loopback test inside the connector.
Solder the signal lead.

- Point • Connect a terminator (100 Ohms 1/2 W) to the JD14 connector or JD15 connector on the motion controller side.



- Point • Be sure to use the D-type grounding (the third-type grounding) for the FG terminal of motion controller.

■ Wiring Diagram R3 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

- Point Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), please ensure to read the "Connection Precautions", page A-13



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

14-3 Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ Power Mate-MODEL D/H

Setting is not required.

■ Power Mate i-MODEL D/H

Set bit 5 (communications port selection) of PARAM & 3119 to match the communications port in use by the operation package software.

Set Value	Communications port
0	Used by RS-422A interface
1	Used by RS-232C interface

14-4 Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● Power Mate Series

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC I/F	RS-232C, RS-422A 4-wire ^{*1}	RS-422A 4-wire
Baud Rate	19200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

*1 The VT5-W07M does not support RS-422A connections.

■ Available Devices

● Power Mate Series

Device	Address
Bit device ^{*1}	Input relay X00000 to X10637
	Output relay Y00000 to Y10637
	Internal relay R00000 to R29997
	Keep relay K0000 to K9097
	Data table D00000 to D79997
Word devices ^{*2}	Input relay X0000 to X1062
	Output relay Y0000 to Y1062
	Internal relay R0000 to R2998
	Keep relay K000 to K908
	Data table D0000 to D7998
	Timer T000 to T298
	Counter C000 to C198

*1 Specify the LSB in octal as the device No.

*2 Specify only even numbers as byte addresses are handled in word units.



Available devices are restricted according to the product model. Check the manual for the respective model.

NOTICE

Available devices are restricted according to the product model. Check the manual for the respective model.

14-5 Error Messages and Troubleshooting

This section describes communication errors occurring in VT5/VT3 Series and FANUC LTD. motion controller connections.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 □ Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 □ Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

MEMO

15

CONNECTING TO GE INTELLIGENT PLATFORMS (GE FANUC AUTOMATION)

This chapter describes how to connect to a PLC made by GE Intelligent Platforms (GE Fanuc Automation).

15-1	Checking Operation before Connection	15-2
15-2	System Configuration.....	15-4
15-3	Wiring Diagrams for Connections	15-5
15-4	Unit Settings.....	15-11
15-5	Available Devices.....	15-18
15-6	Error Messages and Troubleshooting	15-19

15-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/DT.

- (1) Make sure the PLC, link unit can be connected to VT5, VT3 and DT.
- (2) Check whether or not CPU or link unit settings are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

Serial connections



Some versions cannot be connected to the VT5 Series and the VT3 Series. Contact GE Intelligent Platforms (GE Fanuc Automation) to check whether or not their devices can be connected to the VT5, VT3 and DT Series.

■ Connection with Series90 Micro

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
Micro-14pt, Micro-28pt	Serial port	RS-422A	VT5(COM2) ¹ /VT3-W4□	Wiring diagram W40	 P.15-11	Series 90 ²
			VT3(PORT2)/VT-T1/DT	Wiring diagram 1		
			VT3-V6H(G)/Q5H(G)/CN2B	Wiring diagram H40		
			VT3-V7R(CN3)	Wiring diagram R1		

*1 Not supported by the VT5-W07M.

*2 Not supported by Soft-VT.

■ Connection with Series90-30

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC	
CPU311, CPU331, CPU351, CPU352 IC693CMM311	Serial port	RS-422A	VT5(COM2) ¹ /VT3-W4□	Wiring diagram W40	 P.15-11	Series 90 ³	
			VT3(PORT2)/VT-T1/DT	Wiring diagram 1			
			VT3-V6H(G)/Q5H(G)/CN2B	Wiring diagram H40			
			VT3-V7R(CN3)	Wiring diagram R1			
	Communications module ² IC693CMM311	RS-232C	VT5(COM1)/VT3-W4□	Wiring diagram W20	 P.15-11		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2			
			VT3-V6H(G)/Q5H(G)/CN2A	Wiring diagram H20			
			VT3-V7R(CN2)	Wiring diagram R2			
		RS-422A	VT5(COM2) ¹ /VT3-W4□	Wiring diagram W41			
			VT3(PORT2)/VT-T1/DT	Wiring diagram 3			
			VT3-V6H(G)/Q5H(G)/CN2B	Wiring diagram H41			
			VT3-V7R(CN3)	Wiring diagram R3			

*1 Not supported by the VT5-W07M.

*2 Connect to the WYE cable provided with the communications module. Two VT5/VT3/DT Series units can be connected to the WYE cable PORT 1 and PORT 2.

*3 Not supported by Soft-VT.

■ Connection with Series90-70

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
CPU731, CPU732 CPU771, CPU772 CPU781, CPU782 IC697CMM711	Communications module ² IC697CMM711	RS-232C	VT5(COM1)/VT3-W4□	Wiring diagram W20	 P.15-11	Series 90 ³
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2		
			VT3-V6H(G)/Q5H(G)/CN2A	Wiring diagram H20		
			VT3-V7R(CN2)	Wiring diagram R2		
			VT5(COM2) ¹ /VT3-W4□	Wiring diagram W41		
		RS-422A	VT3(PORT2)/VT-T1/DT	Wiring diagram 3		
			VT3-V6H(G)/Q5H(G)/CN2B	Wiring diagram H41		
			VT3-V7R(CN3)	Wiring diagram R3		

*1 Not supported by the VT5-W07M.

*2 Two VT5/VT3/DT Series units cannot be connected to PORT 1 and PORT 2.

*3 Not supported by Soft-VT.

Ethernet connections

This section describes how to check the items required for connecting VT5/VT3 via Ethernet.

- (1) Make sure the PLC and link unit can be connected to VT5 and VT3.
- (2) Check whether or not the CPU or Ethernet Unit must be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

Series Name	PLC	Connection Methods	Unit Setting	Target PLC
Series 90-30 Series	Series 90-30	IC693CMM321	 P.15-17	90 Series (Ethernet TCP) ^{*1}
	CPU364, CPU372	CPU Internal Ethernet port		
		IC693CMM321		

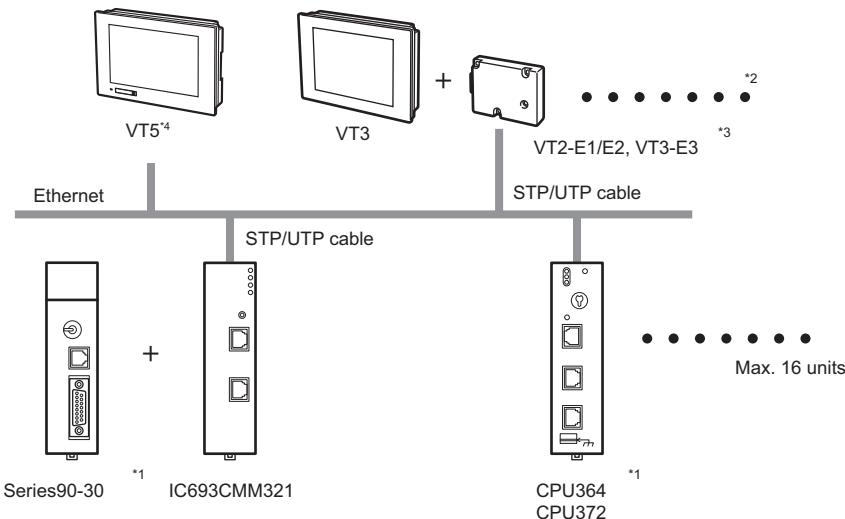
*1 Not supported by Soft-VT.

15-2 System Configuration

System configuration for Ethernet connections

This section describes the system configuration of the VT5/VT3 Series and Series 90.

■ Series90



*1 When multiple units of Series90 series are connected, a CPU unit of V6.50 above must be used.

*2 Please note that with the increase in the number of VT5 and VT3 Series units connected, the communications load also increases.

*3 The VT3 handheld series has a built-in Ethernet function, therefore, no VT2-E1/E2 or VT3-E3 is needed.

*4 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.



When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

15-3 Wiring Diagrams for Connections

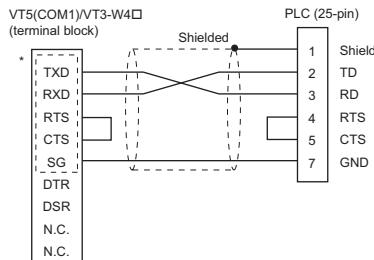
Wiring diagrams for serial connections

This section describes wiring of connector cables.

The wiring diagrams recommended by GE Intelligent Platforms (GE Fanuc Automation) may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

■ Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

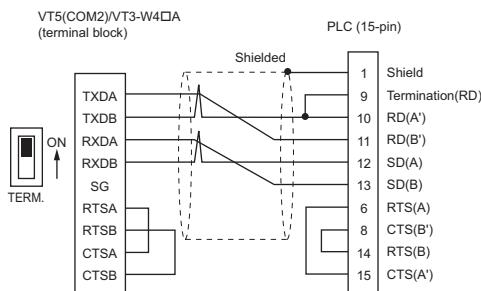
● Wiring Diagram W20 (RS-232C)



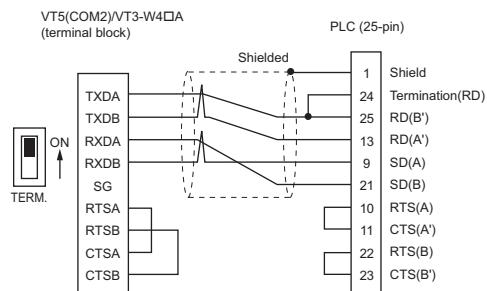
* - - - indicates a terminal diagram for the VT5 Series.

■ Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A)

● Wiring Diagram W40 (RS-422A)



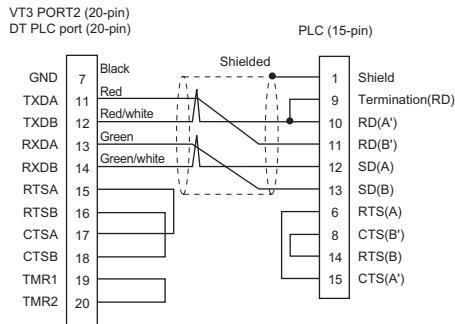
● Wiring Diagram W41 (RS-422A)



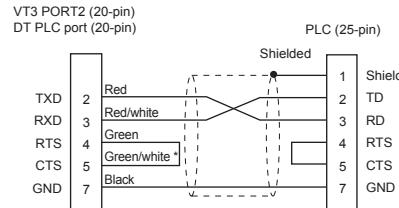
**The naming of the A and B poles
is reversed on the VT3 unit and
the PLC.
Do not mistake during connection.**

■ Connection to VT3 series/DT series

● Wiring Diagram 1 (RS-422A: OP-24028)

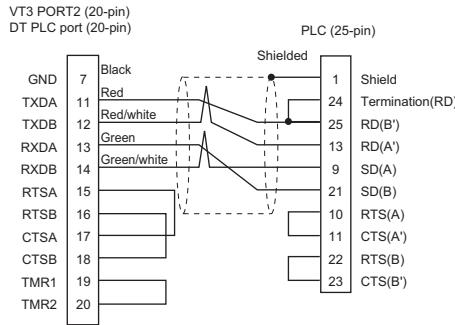


● Wiring Diagram 2 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 3 (RS-422A: OP-24028)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

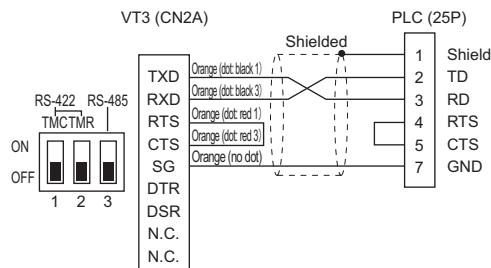
■ Connection with VT3 Handy Series



FG2 must be grounded.

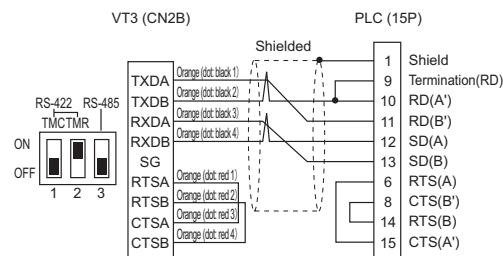
● Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



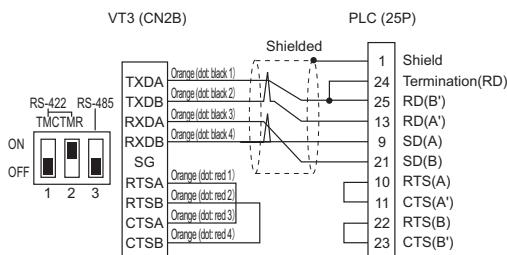
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



● Wiring Diagram H41 (RS-422A)

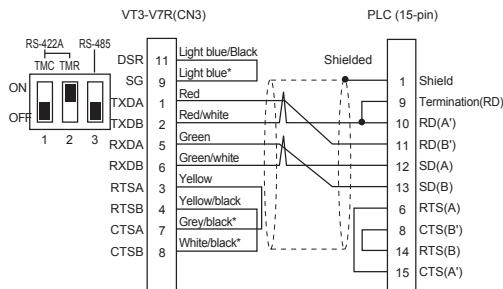
OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



**A-phase and B-phase have opposite names in host and PLC.
Please do not make error connection.**

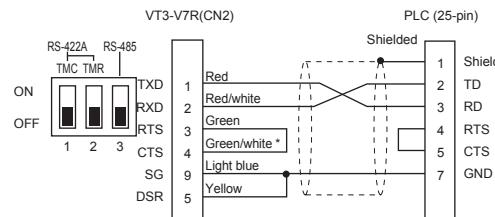
■ Connection to VT3-V7R

● Wiring Diagram R1 (RS-422A: VT-C5R2/C15R2)



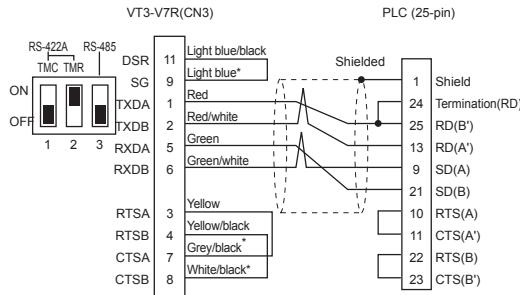
* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R2 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R3 (RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13



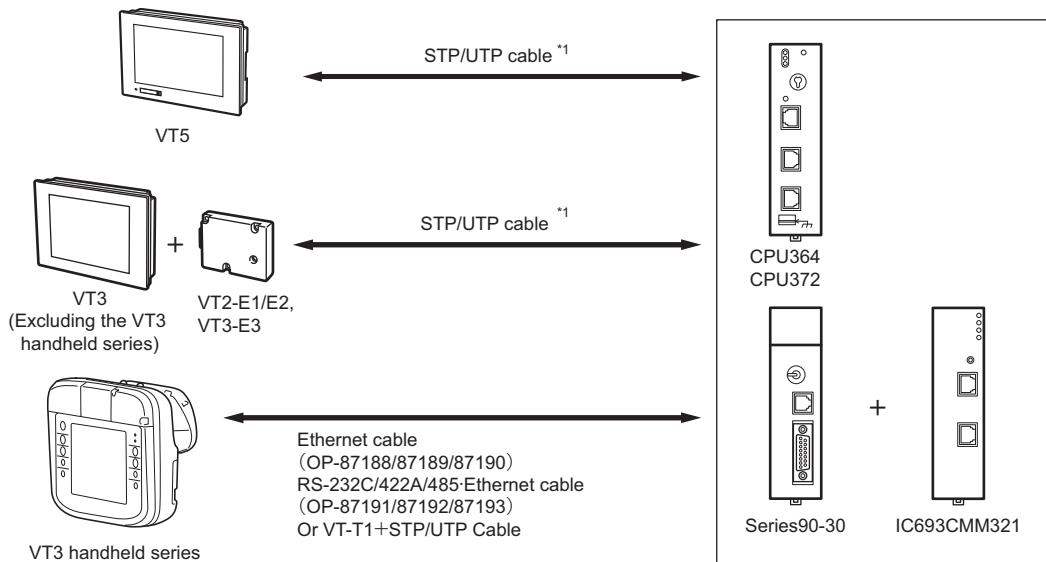
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

The connection cables used are described according to various connection modes.

■ Direct-connect (1:1 connection)

Connection is made using a STP/UTP cable.

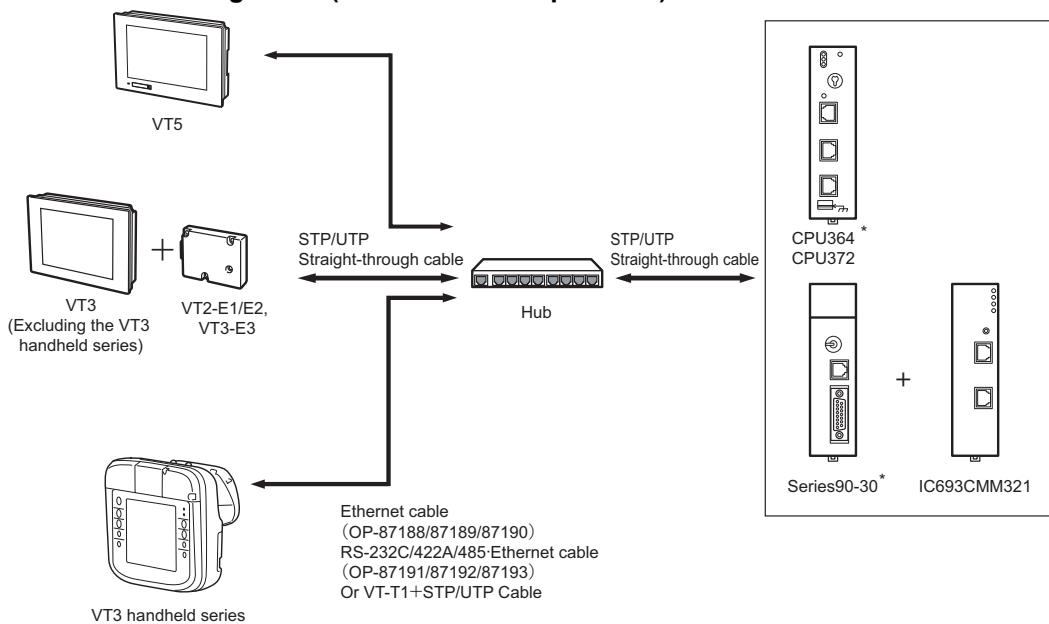


*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.



- In case of 10BASE-T, a STP/UDP cable of category3 above must be used.
- In case of 100BASE-TX, a STP/UDP cable of category5 must be used.

■ To connect using a hub (To connect multiple units)



* When multiple units of Series90 are connected, a CPU unit of V6.50 above must be used.

Connection of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series to a hub

- A straight-through cable must be used.
- The VT5, VT2-E1/E2, VT3-E3 and VT3 handy Series should be connected to a port other than the cascade port on a hub.

Connecting Series90 to a hub

- A straight-through cable must be used.
- It is not allowed to connect Series90 to the cascade port of a hub.



- In case of 10BASE-T, a STP/UDP cable of category3 above must be used.
- In case of 100BASE-TX, a STP/UDP cable of category5 must be used.

15-4 Unit Settings

Method for making serial connections

The following describes the settings of the Link Unit matched to the default communications conditions.

■ Series 90 Micro (serial port), Series90-30

Set the communications parameters in the software or programming console.
In addition to the communications parameters, set the protocol to the SNP-X protocol.

■ IC693CMM311, IC697CMM711

Set the communications parameters in the software or programming console.
In addition to the communications parameters, set the protocol to the SNP-X protocol.

Communication Condition Setting Ranges and Defaults During Serial Communication

● GE Fanuc Series 90

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C, RS-422A 4-wire	RS-232C
Baud Rate	2400, 4800, 9600, 19200bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	None, odd, even	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Ethernet Connection Methods

This section describes how to connect the VT5/VT3 Series to a PLC via Ethernet.

■ Precautions before setting up

When making Ethernet connection, you must determine the IP address and communication port No. of the connected equipment in advance.

The setting items related to connection are shown as follows. Please confirm them with the network administrator.

Connection type	Setting item
Direct connection	<ul style="list-style-type: none"> Assign an IP address to VT5/VT3 IP address assigned on Port No. for communication
Other connection mode	<ul style="list-style-type: none"> Assign an IP address to VT5/VT3 IP address assigned on Port No. for communication Subnet mask Default gateway



- Make sure that "IP address to be assigned to VT5/VT3" differs from "the IP address to be assigned to the PLC".
- Use the same port number for communications with the VT5/VT3 and PLC.

■ Required Settings for Ethernet connections

The following settings must be made when connecting the VT5/VT3 Series to a PLC via Ethernet.

● VT5 Series

Required settings	Description	
VT5 Ethernet settings	Set the IP address and port number to be assigned to the VT5. Select "System settings"→"VT setting" in "Ethernet/language" in VT STUDIO. ¹	P.15-13
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"Periphery connection" in "PLC communication conditions" in VT STUDIO. ²	P.15-14
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5 Series. Set communication conditions on "CIMPLICITY Machine Edition" from GE Intelligent Platforms (GE Fanuc Automation).	P.15-17

*1 Select "VT Machine Setup"→"Ethernet settings" in VT5 system mode to confirm and change settings.

*2 Use "PLC Comm. Setup" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in the VT3 system mode.	P.15-15
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"VT system settings" in "PLC Communication Conditions" in VT STUDIO. ¹	P.15-16
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Set communication conditions on "CIMPLICITY Machine Edition" from GE Intelligent Platforms (GE Fanuc Automation).	P.15-17

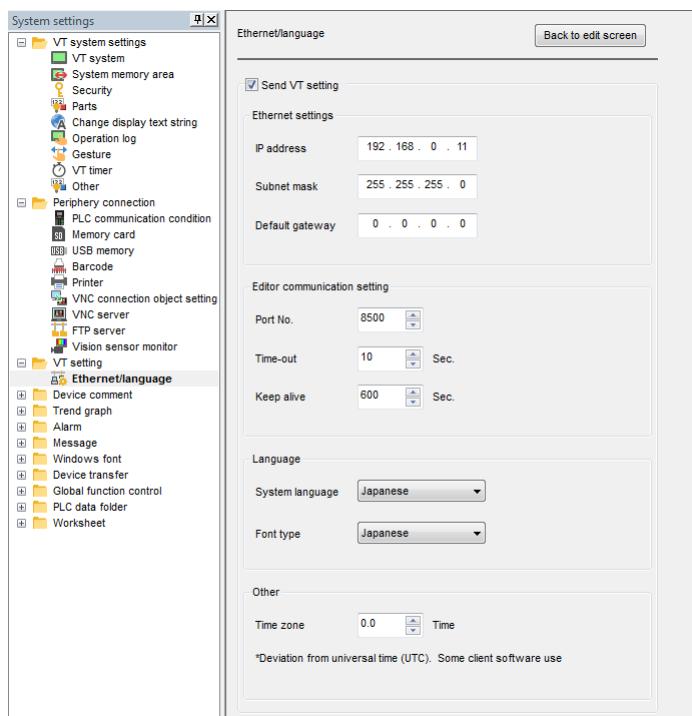
*1 Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.
 "12-6 VT Setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.

The setting items are the same as those in VT STUDIO.

"5-3 VT Machine Setup", VT5 Series Hardware Manual

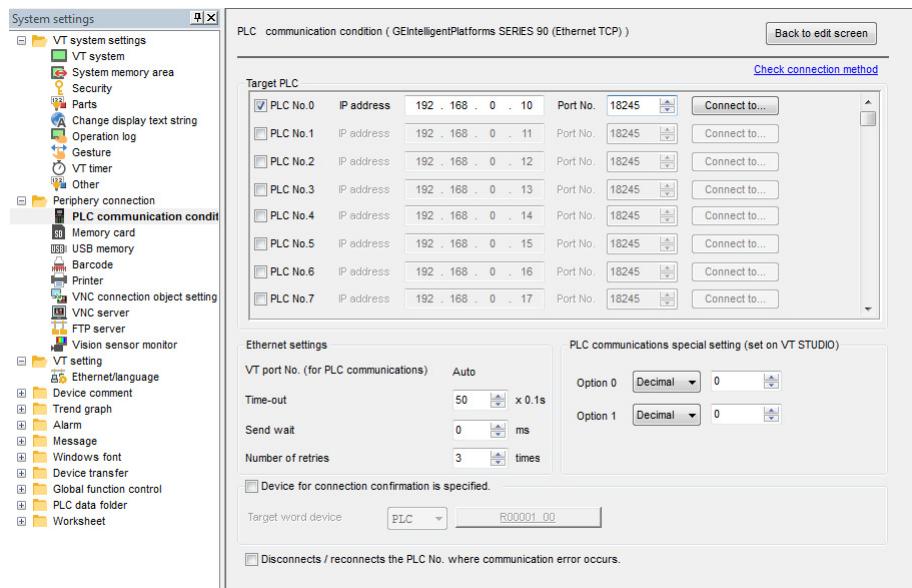


In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Only station number 0 can be used.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC.
	Port number ^{*2}	Set "18245".
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	This does not need to be set. The VT5 Series automatically sets VT port numbers (for PLC communications).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Use SX-Programmer Expert (D300Win) to set "Standard No. of self port".

Example: When "Standard No. of self port" is set to 773, set a port number of 1024 for the target PLC.

*3 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

You can set up via the system mode "Option settings" of the VT3 main unit.

"VT3 Series Hardware Manual" Chapter 5 System Mode.

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	**.**.**.**.**.**				
				OK	Cancel
				Next page	

Ethernet Setup (2/3)				OK	Cancel
Port number	8500			Next page	
Time-out	10 s				
Keep Alive	600 s				
				OK	Cancel
				Next page	

Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				

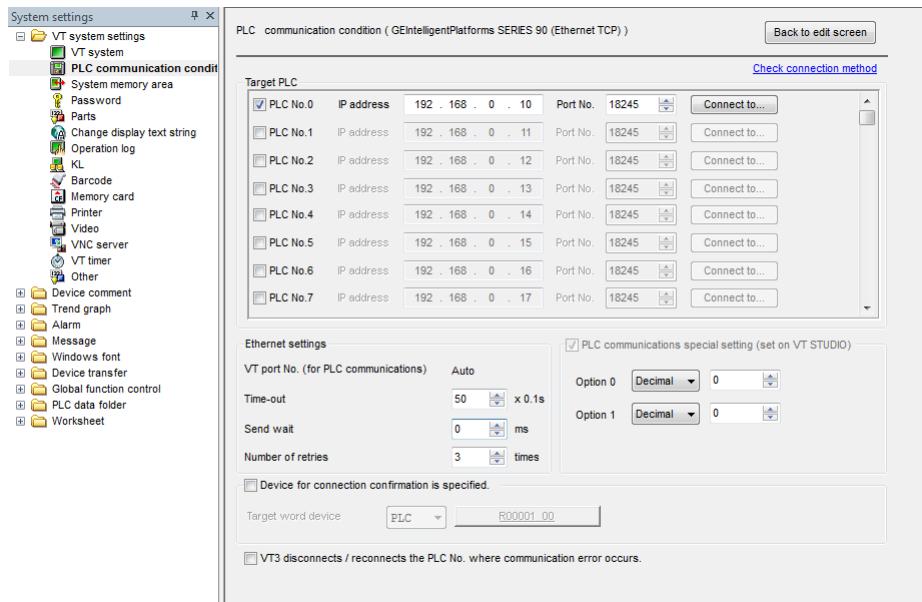
Item	Description
Communication speed	Generally, "100/10Mbps Auto" can be selected. "10Mbps" can be selected only when communication is unstable.
IP Address	To set up the IP address assigned on VT3.
Subnet Mask	In case of direction connection, the default setting will be used directly. For other connection modes, set up the subnet mask determined in advance.
Default Gateway	In case of direction connection, the default setting will be used directly. For other connection modes, set up the default gateway determined in advance.
MAC address	VT2-E1/E2 or VT3-E3-specific ID No. Cannot be set.
Port No.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Timeout	Must be set as required.
Keep-alive	Must be set as required.
FTP Setting	Must be set as required.
Routing setting*1	"Enable" should be selected only when a router is used.

*1 VT3 Series Hardware Manual, chapter 8 Ethernet

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

VT3 Series Reference Manual, chapter 17 Ethernet Connection



Item		Description
Target PLC	PLC No.	Select the station No. (0 to 15) to be used.
	IP address ^{*1}	Set up the IP address assigned on the connection destination PLC (the selected station No.).
	Port No.	Must be set to "18245".
	Connect to...	Select a connection target from the list of connection targets, or add a connection target to it.
Ethernet settings	VT Port No. (for PLC communication)	Needs not to be set. VT3 series will set the port No. of VT automatically (for PLC communication).
	Timeout	Needs not to be set generally. Please set a longer time if communication load on the network is large.
	Send wait	Needs not to be set generally. Please set a longer time if communication load on the network is large.
	Number of retries	Needs not to be set generally. Please set a larger number if it is used in an environment with much noise.
PLC communication / special setting (set on VT STUDIO)		Needs not to be set generally.
Device for connection confirmation is specified	Target word device ^{*2}	Connection verification will be performed when no communication occurs for certain period of time. You can set up the device used in this case. Needs not to be set generally.
VT3 disconnects / reconnects the PLC No. where communication error occurs ^{*3}		If this option is selected, communication with this station No. will be interrupted when communication error occurs. For the station No. whose communication is interrupted, monitoring will be performed regularly, and communication will be restarted after the error is cleared.

*1 Within the same LAN, a IP address must not be duplicate with that of another equipment.
IP address format is XXX.XXX.XXX.XXX (XXX is in the range of 0 to 255).

*2 It is possible to select "PLC device".

VT3 Series Reference Manual, 6-7 Device Setup

*3 In the PLC model settings, you can set this item when a series that can be connected in 1:N mode is selected.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those of VT STUDIO.

VT3 Series Hardware Manual, 5-4 PLC Communication Conditions

■ IC693CMM321 setup

The Ethernet unit IC693CMM321 can be set up via the ladder software iCIMPLICITY Machine Edition from GE Intelligent Platforms (GE Fanuc Automation).

The following items of the Ethernet unit must be set up.

Item	Description
IP Adress	To set the IP address (any) of the PLC
Subnet Mask	To set the subnet mask (any) of the PLC
Gateway IP Adress	To set the gateway IP address (any) of the PLC

■ CPU built-in Ethernet port setup

The CPU built-in Ethernet port can be set up via the ladder software iCIMPLICITY Machine Edition from GE Intelligent Platforms (GE Fanuc Automation).

The following items of the CPU unit must be set up.

Item	Description
IP Adress	To set the IP address (any) of the PLC
Subnet Mask	To set the subnet mask (any) of the PLC
Gateway IP Adress	To set the gateway IP address (any) of the PLC

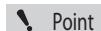
15-5 Available Devices

● GE Fanuc Series 90

Device		Address
Bit Devices	Input relay	I00001 to I12288
	Output relay	Q00001 to Q12288
	Temporary relay	T001 to T256
	Internal relay	M00001 to M12288
	Global relay	G0001 to G7680
	System relay A	SA001 to SA128
	System relay B	SB001 to SB128
	System relay C	SC001 to SC128
Word Devices	System relay	S001 to S128
	Input relay ¹	I00001 to I12273
	Output relay ¹	Q00001 to Q12273
	Temporary relay ¹	T001 to T241
	Internal relay ¹	M00001 to M12273
	Global relay ¹	G0001 to G7665
	System relay A ¹	SA001 to SA113
	System relay B ¹	SB001 to SB113
	System relay C ¹	SC001 to SC113
	System relay ^{1,2}	S001 to S113
	Register	R00001 to R16384
	Analog input	AI0001 to AI8192
	Analog output	AQ0001 to AQ8192

*1 To specify a relay as a word device, set the lower two digits as a value obtained by adding one to an integer multiple of 16, for example, 01, 17, 33, 49 and so forth.

*2 Read-only Writing is not possible.



Available devices are restricted according to the product model. Check the manual for the respective model.

15-6 Error Messages and Troubleshooting

This section describes communication errors occurring in VT5/VT3 Series and GE Intelligent Platforms (GE Fanuc Automation) PLC connections.

List of Communication Errors in Serial Connections

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 □ "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 □ "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The error messages when a PLC is connected to Ethernet are shown as follows.

Error messages are displayed at the bottom of the VT5/VT3 unit screen when a communications error occurs.

Display message	Causes	How to handle
TimeOutError(++)	Timeout error occurs on the PLC with station No.++.	<ul style="list-style-type: none"> Verify whether there is a problem with the network. Check communication settings.
No Ethernet unit	The Ethernet unit VT2-E1/E2 or VT3-E3 is not connected.	Please power off the VT3 main unit, install the VT2-E1/E2 or VT3-E3, then turn on the VT3 main unit again.
Protocol stack error	Startup processing of the protocol stack is being performed.	Wait a moment.
Link error	There is a connection error on the Ethernet unit.	<p>Verify whether the cables are connected correctly?</p> <ul style="list-style-type: none"> Make sure that LINK LED on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.
PLCError[****(++)]	Error response **** occurs on the PLC with station No.++.	For content of the response ****, see manuals of the PLCs from various companies and the Ethernet unit.

* Error code (****) is expressed in HEX; station No. (++) is expressed in DEC.

16

CONNECTING TO ROCKWELL (ALLEN-BRADLEY) PLCs

This chapter describes how to connect to a PLC made by Rockwell (Allen-Bradley).

16-1	Checking Operation before Connection	16-2
16-2	System Configuration.....	16-3
16-3	Wiring diagrams for connections	16-4
16-4	Unit Settings.....	16-7
16-5	Available Devices	16-16
16-6	Handling Devices	16-20
16-7	Error Messages and Troubleshooting	16-23

16

16-1 Checking Operation before Connection

This section describes how to check the items required for connecting VT5/VT3/Soft-VT/DT and PLC via serial interface or Ethernet.

- (1) Make sure the PLC, link unit and Ethernet unit can be connected to VT5/VT3/Soft-VT/DT.
- (2) Check whether or not a CPU, link unit or Ethernet unit settings are required.
- (3) Check the model name of the target PLC.

Be sure to check the above three points before making connections to a PLC.

□ "Procedure before Starting Communication", page 18

Serial connections

■ Connection with SLC500

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
SLC-5/03 SLC-5/04	Channel 0	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.16-7	SLC500 Series ^{*1 *2}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiringdiagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

■ Connection with CompactLogix

CPU	Connection Methods	Serial I/F	Connected Machine	Wiring Diagrams	Unit Setting	Target PLC
1769-L32E	Channel 0	RS-232C	VT3(PORT2)/VT-T1/DT	Wiring diagram 1	□ P.16-7	CompactLogix Series ^{*1 *2}
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiringdiagram H20		
			VT3-W4T/W4M/W4G	Wiring diagram W20		
			VT3-V7R(CN2)	Wiring diagram R1		

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

Ethernet connections

■ CompactLogix Series connections

CPU	Connection Methods	Unit Setting	Target PLC
1769-L24E*			
1769-L27E*			
1769-L30E*			
1769-L32E*	CPU internal Ethernet port	□ P.16-14	CompactLogix Series (Ethernet TCP) ^{*1}
1769-L33E*			
1769-L36E*			

*1 Not supported by the VT3 Series.

■ MicroLogix Series connections

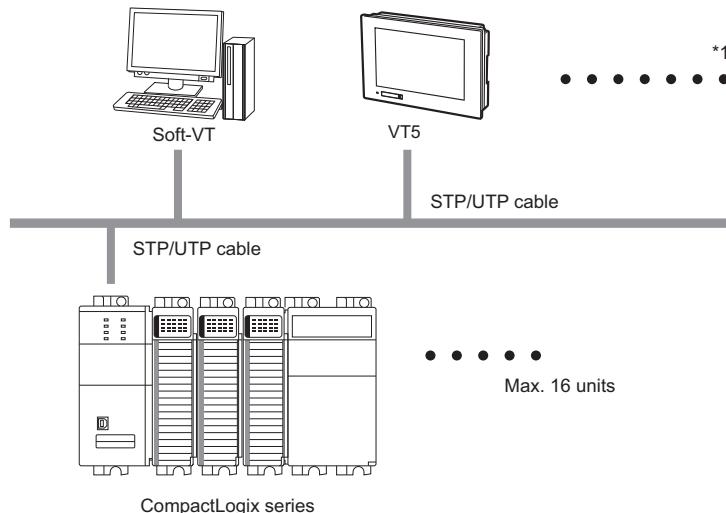
CPU	Connection Methods	Unit Setting	Target PLC
MicroLogix 1400	CPU internal Ethernet port	□ P.16-15	MicroLogix Series (Ethernet TCP) ^{*1}

*1 Not supported by the VT3 Series.

16-2 System Configuration

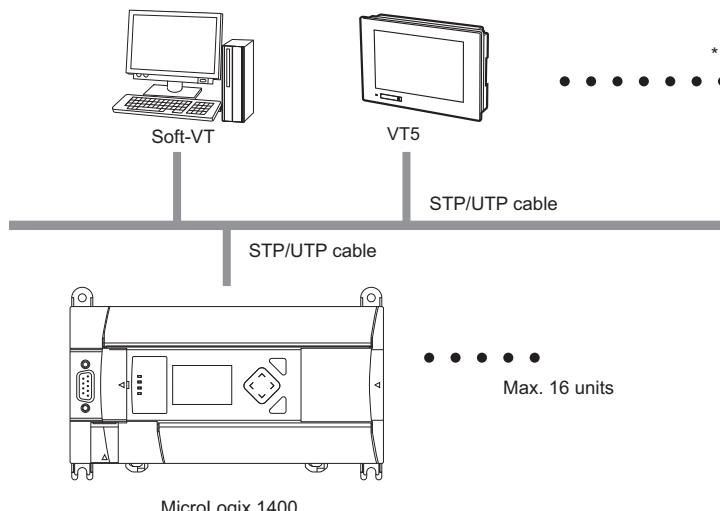
System configuration for Ethernet connections

■ CompactLogix Series



*1 Please note that with the increase in the number of VT5 Series and Soft-VT units connected, the communications load also increases.

■ MicroLogix Series



*1 Please note that with the increase in the number of VT5 Series and Soft-VT units connected, the communications load also increases.

16-3 Wiring diagrams for connections

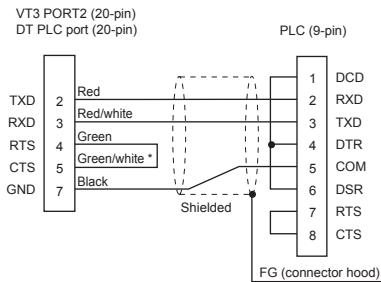
This section describes cable connections.

The wiring diagrams recommended by Rockwell (Allen-Bradley) may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

Wiring diagrams for serial connections

■ Connection to VT3 series/DT series

- **Wiring diagram 1 (RS-232C: OP-24027)**



* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Connection to VT3 Handy Series

FG2 must be grounded.

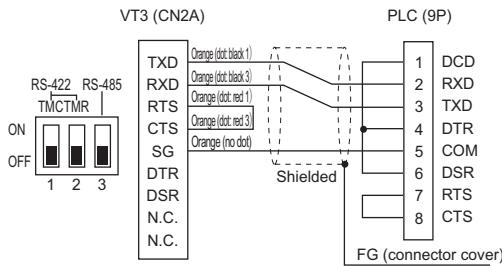
- **Wiring diagram H20 (RS-232C)**

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

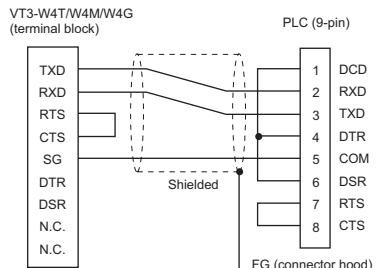
OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



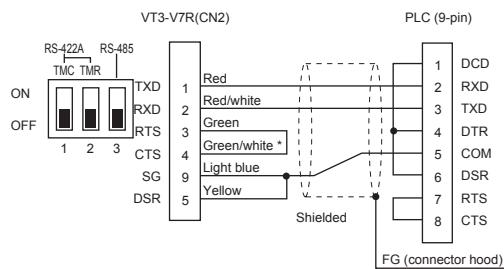
■ Connection to VT3-W4T/W4M/W4G (RS-232C)

- **Wiring diagram W20 (RS-232C)**



■ Connection to VT3-V7R

● Wiring diagram R1 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.



Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), please ensure to read the "Connection Precautions", page A-13



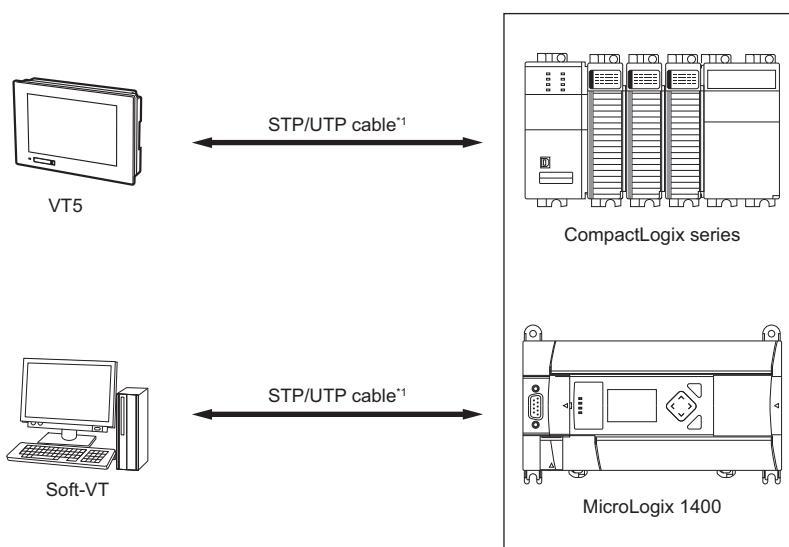
For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Ethernet Connection Methods

■ Direct connection (1:1 connection)

● CompactLogix Series, MicroLogix Series

Use STP/UTP cable for connection.



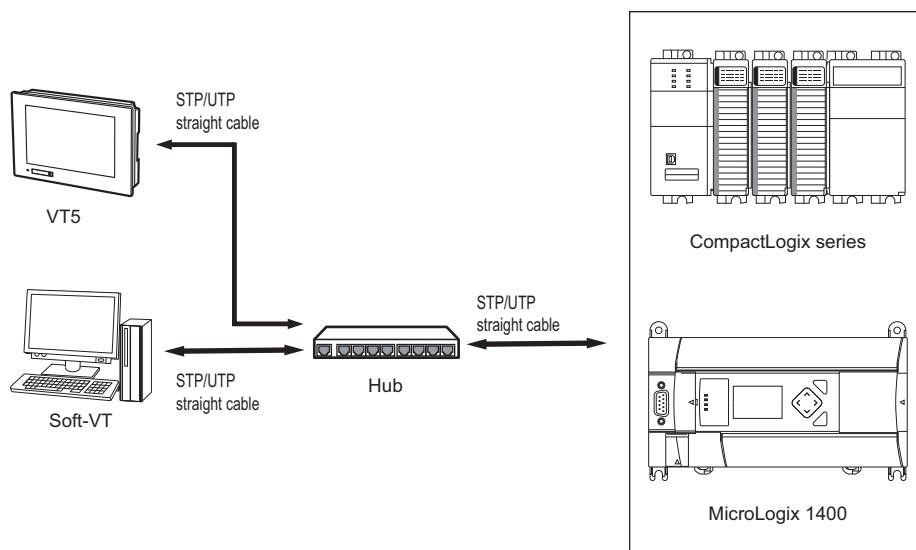
*1 The VT5 Series supports the MDI/MDI-X auto switching function.
Both STP and UTP cross cables and straight cables can be used.



- To build a network environment using 10BASE-T, use at least STP/UTP cable category 3.
- To build a network environment using 100BASE-TX, use at least STP/UTP cable category 5.

■ Connections using a hub (multiple connections)

● CompactLogix Series, MicroLogix Series



Connection of the VT5 Series and Soft-VT to a hub

- Use STP/UTP straight cable.
- The VT5 Series and Soft-VT should be connected to a port other than the cascade port on a hub.

Connection of the CompactLogix Series and MicroLogix Series to a hub

- Use STP/UTP straight cable.
- The CompactLogix should be connected to a port other than the cascade port on a hub.



- To build a network environment using 10BASE-T, use at least STP/UTP cable category 3.
- To build a network environment using 100BASE-TX, use at least STP/UTP cable category 5.

16-4 Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

Method for making serial connections

■ SLC-5/03, SLC-5/04 (CPU channel 0)

● DF1 half-duplex slave channel 0 configuration parameter

Set the communications parameters in the programming software.

Parameter notation sometimes changes as indicated in parentheses () depending on the programming software.

Parameter	Set value
Baud Rate (Baud)	19200 bit/s
Parity	Even
Communication Driver (Driver)	DF1 Half-Duplex Slave
Duplicate Packet Detection (Duplicate Packet Detect)	Disable
Error Detection	BCC
Control Line	No Handshaking
Station Address ^{**1} (Node Address)	0

*1 Set the Station Address and VT3/DT sides node No. to the same value.

■ 1769-L32E (CPU CHANNEL 0)

Set the communications parameters in the programming software.

the "RSLinx" and "RSLogix5000" of Rockwell Software should be pre-installed on the PC connected with PLC.

● The setup steps for RSLinx

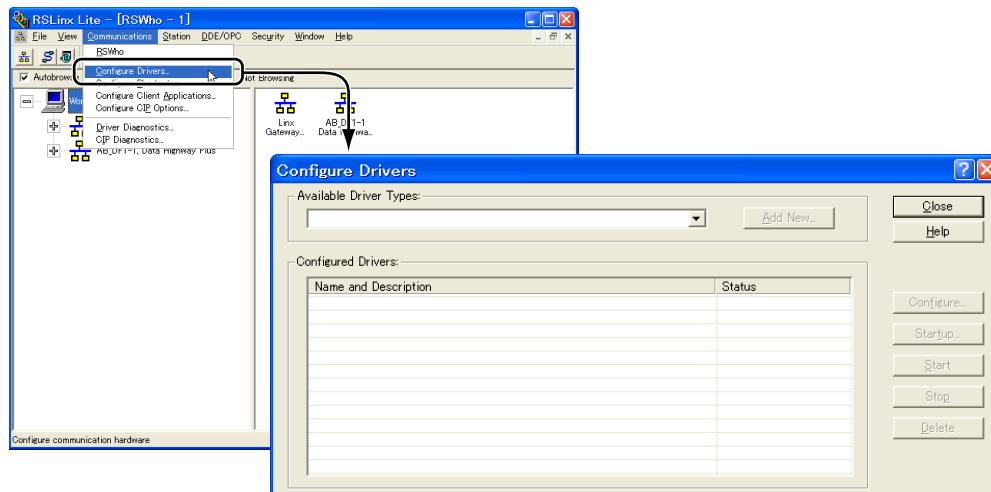
To set up RSLinx for the communication, please take the following steps.

- 1 Use the PC cable recommended by Rockwell (Allen-Bradley) to connect the serial port on the PC with the PLC RS-232C port (CHANNEL 0), and start RSLinx.



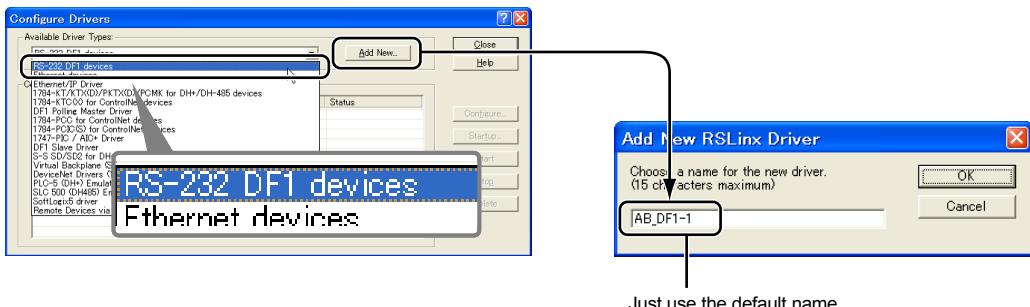
Please ensure to connect PLC with PC before starting RSLinx.

- 2 From the RSLinx menu, select "Communications" → "Configure Drivers" to open the "Configure Drivers" dialog box.



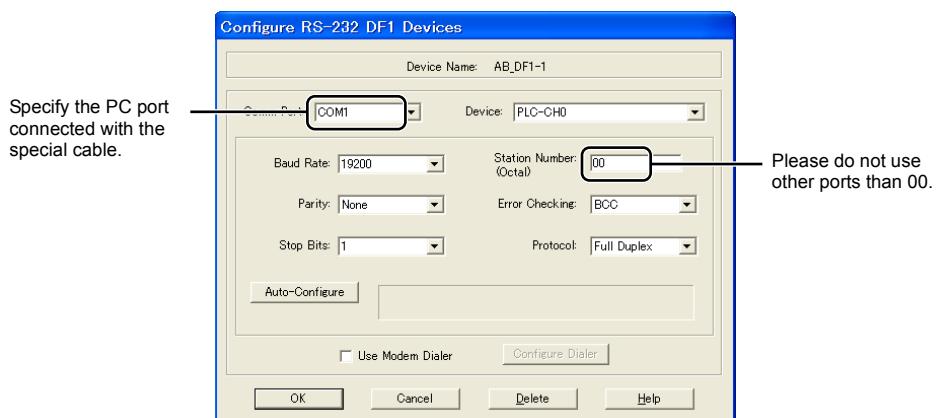
16-4 Unit Settings

- 3** From the drop-down list of "Available Driver Types", select "RS-232 DF1 devices". And click the "Add New" button. Enter the name of the driver, and click "OK".



- 4** Set up the communication conditions between PLC and PC.

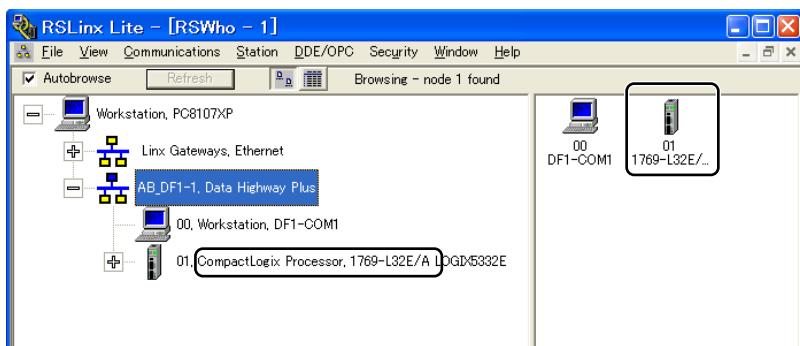
To set up the communication, please refer to the following dialog box*.



* In addition to "Comm Port", communication can take place under the default setting.

After the setup, click the "OK" button to return to the "Configure Drivers" dialog box. To exit, press the "Close" button.

- 5** From the RSLinx menu, select "Communications" → "RSWho" to display the following CompactLogix series. Now, you have completed the setup of RSLinx.



● The setup steps for RSLogix5000

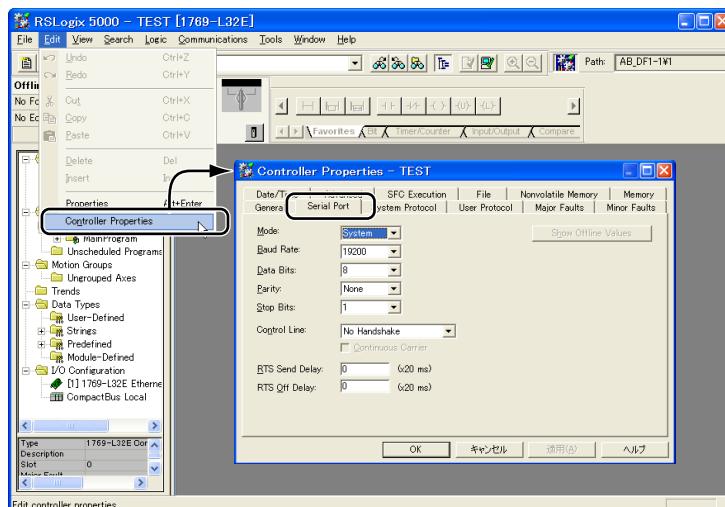
After the setup of RSLinx, please set up the PLC communication with RSLogix5000.

- 1 Please use the special cable to connect the PC serial port with the PLC RS-232C port (CHANNEL 0). Start RSLogix5000 after RSLinx is started.**

Point Please ensure to connect PLC with PC and start RSLinx before starting RSLogix5000.

- 2 To open the desired ladder diagram program (project), select "Edit" → "Controller Properties" from the RSLogix5000 menu to open the "Controller Properties" dialog box.**

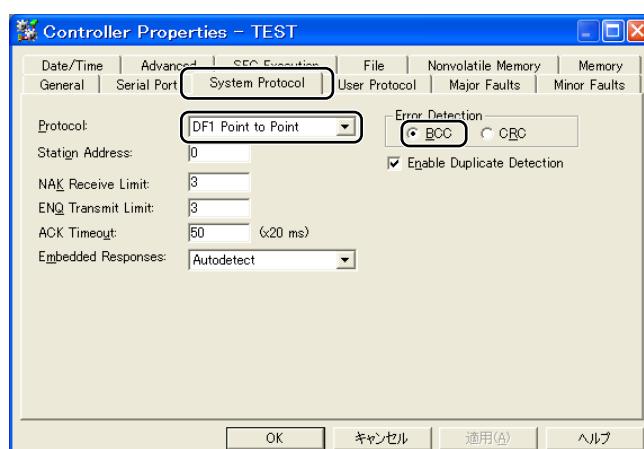
Please select the "Serial Port" tab and select the same option as the VT3 series (DT series)*.



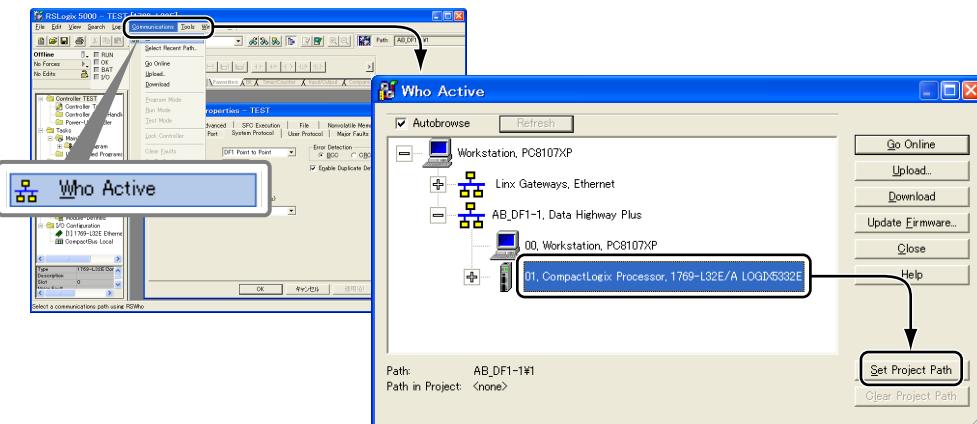
* Communication can happen under the default value.

Point To set up Control Line, please ensure to select "No Handshake".

- 3 Please select the "Controller Properties" option in the "System Protocol" tab and check to ensure Protocol is set to "DF1 Point to Point" and Error Detection to "BCC".**

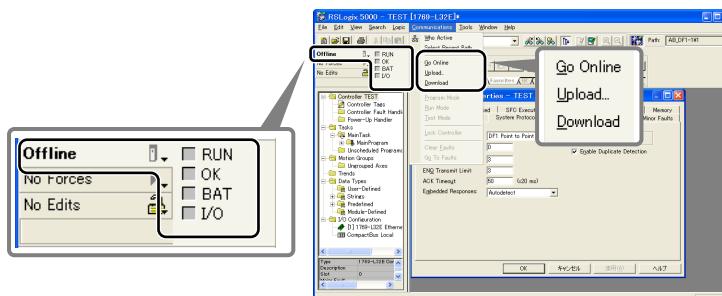


- 4** From the RSLogix5000 menu, select "Communications" → "Who Active". Select the communication setting created by RSLinx, then select "Set Project Path". Now communication can happen between PC and PLC.



After the communication state is enabled,

- Select "Go Online", "Upload", or "Download" from the "Communications" in the RSLogix5000 menu.
- "Offline" in the RSLogix5000 toolbar can be used.

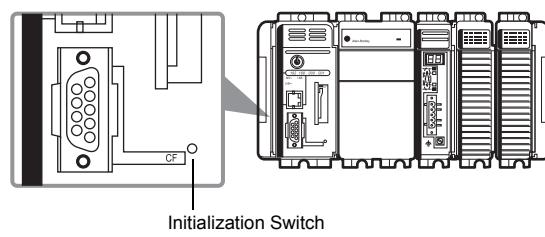


- After performing the above unit settings, the PLC communication settings become the following.

Parameter	Set value
Station No.	0
Baud Rate (Baud)	19200 bit/s
Data bit	8 (fixed)
Parity	None
Stop bit	1
Error Detection	BCC
Control Line	No Handshake
Communication Driver (Driver)	DF1 Point To Point
Duplicate Packet Detection	Enable

* Ensure to set Station No. to 0. Otherwise, no communication happens.

- To initialize the communication parameters, you can press the switch on the side of CH0 of the host.



Range of communication conditions and initial values in serial connections

■ SLC500 Series

Item	Setting Range	Default
PLC No.	ON (0 to 254)	ON (0)
VT No./DT No.	-	-
PLC I/F	RS-232C	RS-232C
Baud Rate	4800, 9600, 19200 bit/s	19200 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	OFF, even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

■ CompactLogix Series

Item	Setting Range	Default
PLC No.	-	-
VT No.	-	-
PLC I/F	RS-232C	RS-232C
Baud Rate	4800, 9600, 19200, 38400bit/s	19200 bit/s
Data bit	8 bits (fixed)	8 bits (fixed)
Stop bit	1.2 bits	1 bit
Parity	even, OFF	None
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Ethernet connection methods

This section describes how to connect the VT5 Series/Soft-VT to a PLC via Ethernet.

■ Checks to perform before making settings

To make an Ethernet connection, first determine the IP address and the communication port number for the devices you want to connect.

The table below shows the settings required for each connection mode. Check these settings with your network administrator.

Connection mode	Setting items
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/Soft-VT (PC) • IP address to be assigned to PLC • Port number for communication
Other settings	<ul style="list-style-type: none"> • IP address to be assigned to VT5/Soft-VT (PC) • IP address to be assigned to PLC • Port number for communication • Subnet mask • Default gateway



Make sure that "IP address to be assigned to VT5/Soft-VT (PC)" differs from "the IP address to be assigned to the PLC".

■ Required Settings for Ethernet connections

The following settings must be made when connecting the VT5/Soft-VT to a PLC via Ethernet.

Required settings	Description
VT5/Soft-VT Ethernet settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in VT STUDIO. ¹
	Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "Peripheral equipment connection" in "PLC Communication Conditions" in VT STUDIO. ²
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Use the Rockwell ladder software to set the communication conditions.

¹ Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

² You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

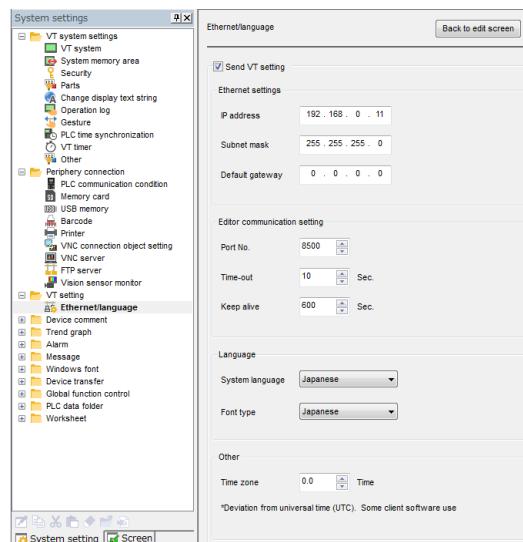
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address and other settings to be assigned to the VT5.

In VT STUDIO, select [Resource (R)] → [VT Individual Settings (J)] → [Ethernet/Language (E)] and make the following settings.

"12-6 VT Settings", VT5 Series Reference Manual



Item	Description	
Send VT Individual Settings	When checked, the VT individual settings are sent to the VT5.	
Ethernet Settings	IP address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.

 Point

- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
The setting items are the same as those in VT STUDIO.
 "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.

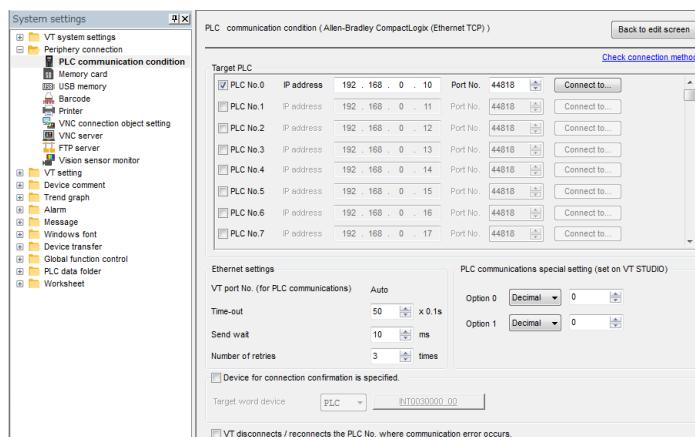
 Reference

In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT Individual Settings" in VT STUDIO.

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)] → [Peripheral Connections (C)] → [PLC Communication Conditions (C)] and make the following settings.

 "Chapter 17 ETHERNET CONNECTION", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station number (0 to 15) you want to use.
	IP Address ^{*1}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*2}	Fixed at 44818
	List of connected targets	Select connected targets from the list file of connected targets or add targets to the list.
Ethernet Settings	VT port numbers (for PLC communications)	This does not need to be set. The VT5 Series/Soft-VT automatically set VT port numbers (for PLC communications).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ^{*3}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Shut down/recover station number causing communication error ^{*4}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*2 Be sure to set 44818 as the target PLC port number.

*3 Select "PLC device."

 "6-7 Setting of Devices", VT5 Series Reference Manual

*4 Can be set up when a PLC model supporting 1-to-N connection is selected.



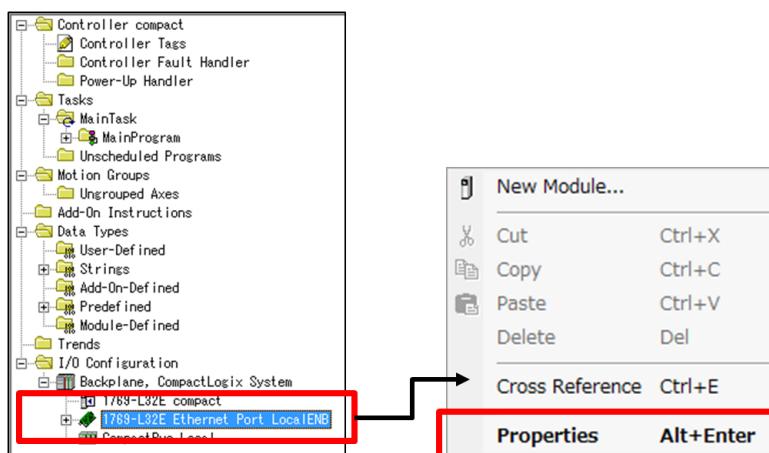
You can use VT5 system mode to check and change PLC Communication Condition settings.
The setting items are the same as those in VT STUDIO.
□ "5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ Communication settings for the CompactLogix Series

Use RSLogix5000, Rockwell's ladder software, to set communication settings for the CompactLogix Series.

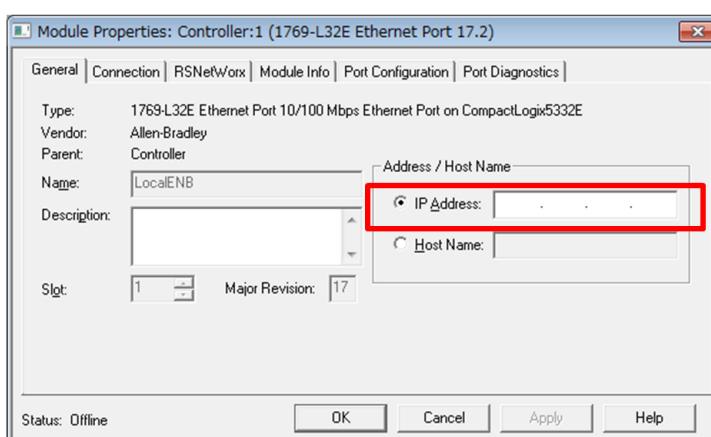
1 Select an Ethernet port from [I/O Configuration] from the RSLogix5000 project tree.

Right-click the name of the Ethernet port and select [Properties] from the menu that appears.



2 Select the IP address in the [General] tab of the [Module Properties] dialog box.

Then press the [OK] button to close the dialog box.



3 Download the settings to the PLC.

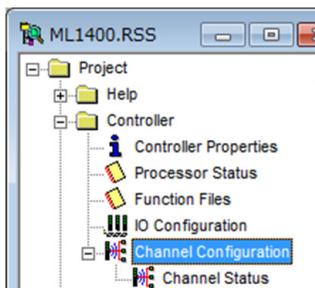


Turn the PLC off and then on again for the settings to take effect.

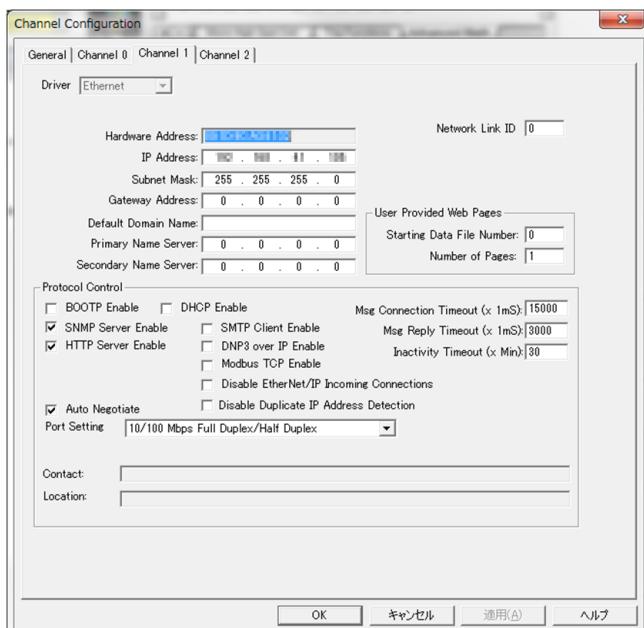
■ Communication settings for the MicroLogix Series

Use RSLogix5000, Rockwell's ladder software, to set communication settings for the MicroLogix Series.

- Double-click [Channel Configuration] in the RSLogix5000 project tree.



- Select an IP address in the [Channel 1] tab of the [Channel Configuration] dialog box.
Then press the [OK] button to close the dialog box.



- Download the settings to the PLC.



Turn the PLC off and then on again for the settings to take effect.

16-5 Available Devices

● SLC500, MicroLogix Series

Device		Address	
		SLC500	MicroLogix Series
Bit Devices	Bit	B0030000 to B003255F	B0030000 to B003255F B0090000 to B255255F
	Input	-	I0000000 to I008255F
	Output	-	O0000000 to O008255F
	Status	-	S0000000 to S000163F
	Timer (TN: completed)	TN0040000 to TN0042550	TN0040000 to TN0042550 TN0090000 to TN2552550
	Timer (TT: timing)	TT0040000 to TT0042550	TT0040000 to TT0042550 TT0090000 to TT2552550
	Counter (CN: completed)	CN0050000 to CN0052550	CN0050000 to CN0052550 CN0090000 to CN2552550
	Counter (CU: up)	CU0050000 to CU0052550	CU0050000 to CU0052550 CU0090000 to CU2552550
	Counter (CD: down)	CD0050000 to CD0052550	CD0050000 to CD0052550 CD0090000 to CD2552550
Word Device	Bit	B003000 to B003255	B003000 to B003255 B009000 to B255255
	Input	-	I000000 to I008255
	Output	-	O000000 to O008255
	Status	-	S000000 to S000163
	Timer (PRE: set value)	TP004000 to TP004255	TP004000 to TP004255 TP009000 to TP255255
	Timer (ACC: current value)	TA004000 to TA004255	TA004000 to TA004255 TA009000 to TA255255
	Counter (PRE: set value)	CP005000 to CP005255	CP005000 to CP005255 CP009000 to CP255255
	Counter (ACC: current value)	CA005000 to CA005255	CA005000 to CA005255 CA009000 to CA255255
	Integer	N007000 to N007255 N010000 to N064255	N007000 to N007255 N009000 to N255255
	Floating decimal point	F008000 to F008255	F008000 to F008255 F009000 to F255255
	Long word	-	L009000 to L255255

Point

- Bit writing (use the touch switch to directly set up data from the bit devices), To create the ladder diagram, please refer to "Handling Devices", page 16-20.
- Available devices are restricted according to the product model. Check the manual for the respective model.

■ CompactLogix Series

The PLC models that can be used

The following PLC models can be used by the VT3/DT series.

Model	Range
INT	16-bit signed device
SINT	8-bit signed device
DINT	32-bit device
REAL	32-bit floating-number device
BOOL	bit device

Range of Devices

Device Name	Range of Device
INT[*]	0030000 to 9999999
INT[*,*]	00300000 to 99999999
SINT[*]	0030000 to 9999999
SINT[*,*]	00300000 to 99999999
DINT[*]	0030000 to 9999999
DINT[*,*]	00300000 to 99999999
REAL[*]	0030000 to 9999999
REAL[*,*]	00300000 to 99999999
BOOL[*]	0030000 to 99998304

- * Since the SINT"/SINT"*,*" devices are processed in the word unit (16 bits), then ensure to define them with 2 above even numbers.

Since writing is performed in the byte unit (1 byte=2⁸ bits), then a value beyond the range is modified into a byte unit value before it is written (the remainder after dividing the written value by 256).



The PLC storage area used by each device should not exceed 1.5M bytes.

Set up the Tags

By setting up the tags, you can ensure the PLC storage area can be used by the devices that can be used by the VT3/DT series.

You can use RSLogix5000 to set up the Tags.

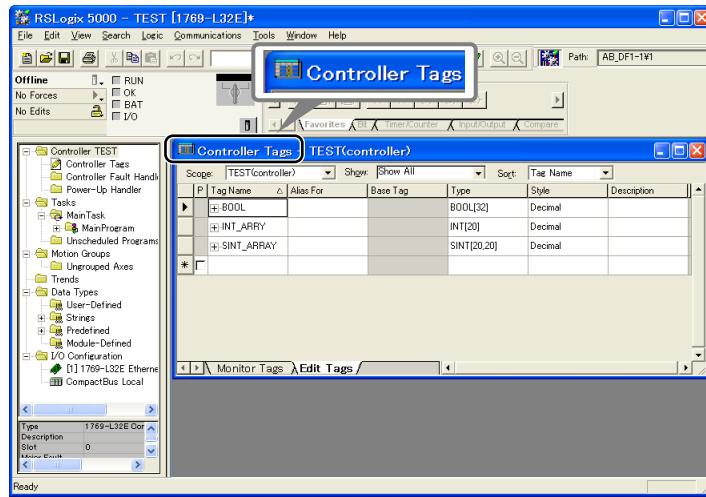
1 Please start RSLogix5000 to open your desired ladder diagram program (project).

2 From the RSLogix5000 menu, select "Logic" → "Edit Tags" to open the Controller Tags window

From the Controller Tags window, you can set up tags.



Please note that you cannot use the Controller Tags window to communicate with PLC.



To set up a tag, you can select Tag Name → Type → Style.

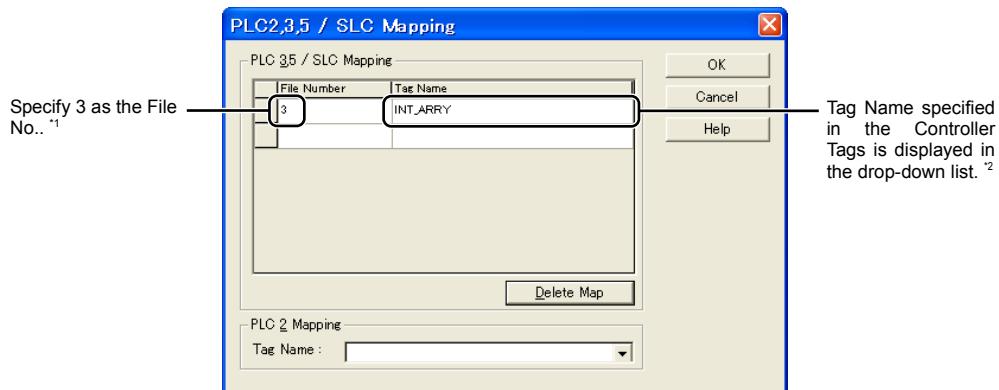
- Tag Name any name can be selected.
- Type determines the type and sequence of the type (1 or 2 units)
- Style select the display format.

Example I Tag Name: INT_ARRAY any name
 Type: INT"20" devices 0 to 19
 Style: Decimal the display format, decimal

Example II Tag Name: SINT_ARRAY any name
 Type: SINT"20,20" devices 0 to 399 (20X20)
 Style: Decimal the display format, decimal

3 The tag setup after "File No. 3" is assigned.

From the RSLogix5000 menu, select "Logic" → "Map PLC/SLC Messages" to open the PLC2,3,5/SLC Mapping dialog box. And assign the tag to File No. 3.



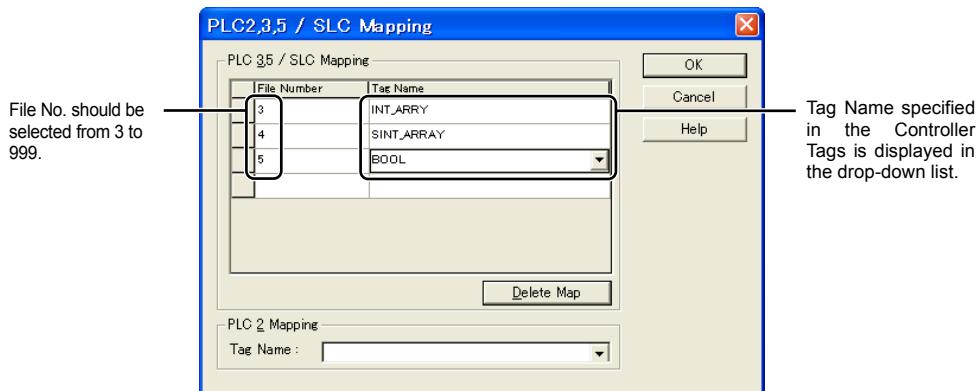
*1 Please ensure to assign the tag to File No. 3.

*2 Please assign the tag of any set type "INT, DINT, REAL, BOOL" to File No. 3.



The device type specified by the File No. 3 tag should not be the SINT type.
 To specify the SINT type, ensure to specify 2 above even numbers.

4 Assign the File No. to the rest set Tags.



Point

File No. should be selected from 3 to 999. 0 to 2 is the system area which cannot be used (a communication error may occur when being set up). In addition, File No. cannot be specified repeatedly.

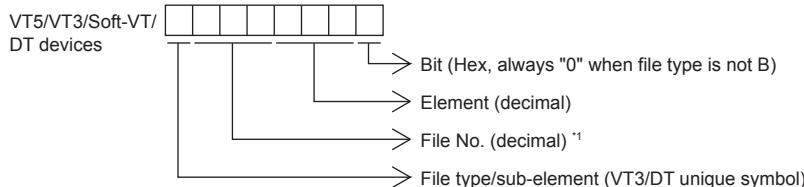
16-6 Handling Devices

This section describes how to handle devices set using the VT5/VT3/Soft-VT/DT.

Specifying Devices

■ SLC500, MicroLogix Series

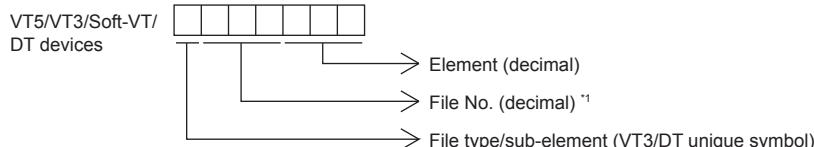
● Specifying bit devices



*1 Specifies the slot number when I = Input and O = Output.

[Example]	PLC	VT5/VT3/Soft-VT/DT
	B3:31/15	B003031F (Lowermost digit is Hex.)
	T4:7/TT	TT0040070 (Lowermost digit must be 0.)

● Specifying word devices



*1 Specifies the slot number when I = Input and O = Output.

[Example]	PLC	VT5/VT3/Soft-VT/DT
	N7:15	N007015
	T4:7/ACC	TA004007

■ CompactLogix Series

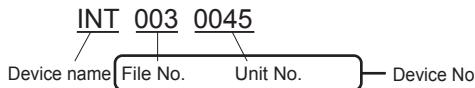
● The rules for the VT5/VT3/Soft-VT/DT device tags

Device tags used by PLC	Device tags used by VT5/VT3/Soft-VT/DT devices
INT[*]	(1-dimentional)
INT[*,*]	(2-dimentional)
SINT[*]	(1-dimentional)
SINT[*,*]	(2-dimentional)
DINT[*]	(1-dimentional)
DINT[*,*]	(2-dimentional)
REAL[*]	(1-dimentional)
REAL[*,*]	(2-dimentional)
BOOL[*]	(1-dimentional)

Specifying a 1-dimentional device

File No.	PLC Tag
3	INT"45"

When the above devices are used by VT5/VT3/Soft-VT/DT

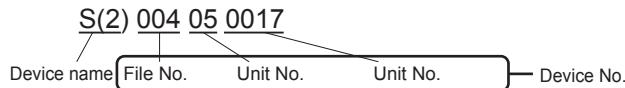


Device No. is 3 digits + 4 digits.

Specifying a 2-dimentional device

File No.	PLC Tag
4	SINT"5,17"

When the above devices are used by VT5/VT3/Soft-VT/DT

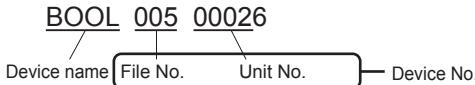


Device No. is 3 digits + 2 digits + 4 digits.

Specifying a BOOL-type device

File No.	PLC Tag
5	BOOL"26"

When the above devices are used by VT5/VT3/Soft-VT/DT



Device No. is 3 digits 5 digits.

When the PLC communication error "F006" appears on the VT5/VT3/Soft-VT screens after connecting the VT5/VT3/Soft-VT and PLC, this may be a result of the following cause.

- Not all the Tags are assigned to a File No..
 "Set up the Tags", page 16-17
- In the tag setup, devices that do not belong to the assured area are assigned to VT5/VT3/Soft-VT devices.
 "The rules for the VT5/VT3/Soft-VT/DT device tags", page 16-20



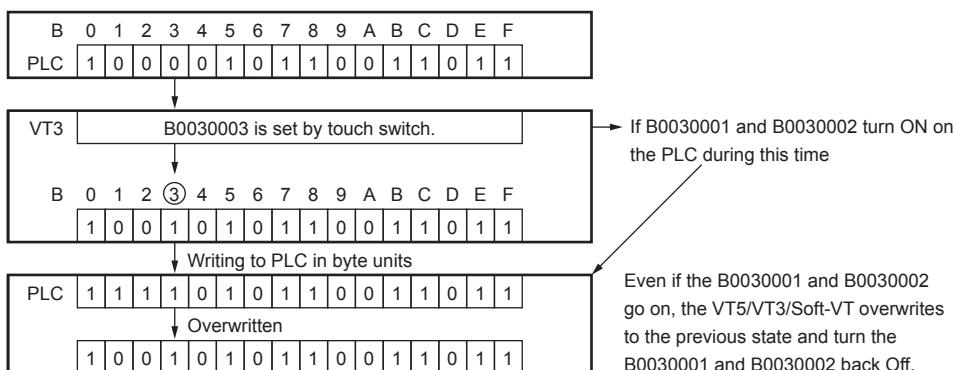
- Device No. cannot be specified with the zero suppression.
- The device types used by VT5/VT3/Soft-VT/DT must be the same type (TYPE) as the devices set in the Controller Tags window. Otherwise the system will not work normally.

How to use SLC500, MicroLogix Series bit devices

SLC500 bit devices set up using VT5/VT3/Soft-VT/DT are handled as described below.

After being connected with SLC500, the write and read of the bit devices become the word unit. The bit-write becomes the word unit-write. Except the set bit, therefore, the rest 15 bits (in this case, B0030000 to B0030002 and B0030004 to B003000F) were updated before this. Even if a bit (that is, one of the remaining 15 bits) other than the bit preset during writing of this bit changes state, the bit is overwritten to the previous state during writing and does not change state.

■ When using the VT5/VT3/Soft-VT



The only restriction in writing to bit devices from the VT5/VT3/Soft-VT is setting bits (set, reset, reverse bit, set momentary) to bit devices using touch switches. For this reason, assign the area of the PLC device that is to perform bit setting in byte units to the bit device by touch switches, and then prepare the ladder program.

[Example] To turn bit B0030001 ON/OFF by setting bits to bit devices by touch switches.

B003000 to B003000F (1 word=16 bits)

M000 to M007 (1 byte = 8 bits) is assigned as the area of the PLC device that is to perform data setting directly to the bit device by touch switches, and in the ladder program on the PLC, do not program output instructions such as OTE, OTL or OTU.

[Example] To turn bits B0030015, B0030107, and B0030154 ON/OFF by setting bits to bit devices by touch switches.

B0030010 to B003001F (1 word=16 bits)

B0030100 to B003010F (1 word=16 bits)

B0030150 to B003015F (1 word=16 bits)

Assign the following as the area of the PLC device that is to perform bit setting to the bit device by touch switches: An area of three words (=48 bits) for specifying bit devices in a staggered manner as shown above is required. For this reason, assign a continuous number such as B0030010, B0030011, and B0030012 to devices that are to perform bit setting to bit devices by touch switches.



When the "trigger bit reset" function set up by VT STUDIO is used, the 16-bits (one word unit) including the trigger bit device must not be used with PLC and VT5/VT3/Soft-VT.

Example: When B0030000 is used to enable the "trigger bit reset" function on a trigger bit device, B0030001 to B003000F must not be used on a PLC and VT5/VT3/Soft-VT.

■ When using the DT

Writing to bit devices on the PLC occurs from DT in the following instances:

- "End Notice" of the record.
- "Reset Trigger Bit" of the bit device trigger.

16-7 Error Messages and Troubleshooting

This section describes communication errors that occur when the VT5/VT3 Series or Soft-VT are connected to a PLC made by Rockwell (Allen-Bradley).

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 □ "Appendix-1 Errors and How to Remedy Errors", VT5 Series Hardware Manual
 □ "Appendix-1 Errors and How to Remedy Errors", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The following error messages may appear when a PLC is connected via Ethernet.

Error messages are displayed at the bottom left of the VT5/Soft-VT unit screen when a communications error occurs.

Displayed message	Cause	How to handle
Communication error [Timeout (+ +)]	A timeout error occurred at PLC with station number + +.	<ul style="list-style-type: none"> • Make sure that your network is operating normally. • Revise the communication settings.
Communication error [Protocol stack]	Starting up the protocol stack.	Please wait awhile.
Communication error [Link]	This is an Ethernet unit link error.	<ul style="list-style-type: none"> • Make sure that connecting cables have been correctly connected. • Make sure that LINK LED on the VT5 Series and the connected PLC are on.
PLC communication error [STS : ** (+ +)] PLC communication error [STS : ** / EXT : ** (+ +)]	+ + error response from PLC with station number * *.	Refer to the instruction manuals for the PLC unit or Ethernet unit for information on an * * response.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
 • For details on error messages other than communication errors, refer to the following manuals.
 □ "Appendix-1 Errors and How to Remedy Errors", VT5 Series Hardware Manual

CONNECTING TO SIEMENS PLCS

This chapter describes how to connect to a PLC made by Siemens Corporation.

17-1	Checking Operation before Connection	17-2
17-2	System Configuration.....	17-3
17-3	Connection Methods and Wiring Diagrams.....	17-4
17-4	Unit Settings.....	17-7
17-5	Available Devices.....	17-13
17-6	Error Messages and Troubleshooting	17-15

17-1 Checking Operation before Connection

This section describes the requirements to connect VT5/VT3/DT/Soft-VT to a PLC via Serial or Ethernet.

- (1) Confirm that a PLC, a link unit, or an Ethernet unit can connect to VT5/VT3/Soft-VT.
- (2) Check if settings for CPU, link unit, Ethernet CPU are required.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the PLC.

 "Procedure before Starting Communication" on page 18

Serial connection

■ Connection with SIMATIC S7-300 Series

Series Name	Connection Methods	Serial I/F	Connected Machine	Wiring Diagram	Unit Setting	Target PLC	
SIMATIC S7-300 Series	CP341-RS232C	RS-232C	VT5(COM1)/VT3-W4□	Wiring diagram W20	 P.17-7	S7 ^{*1}	
			VT3(PORT2)/VT-T1/DT	Wiring diagram 1			
			VT3-V6H(G)/Q5H(G)(CN2A)	Wiring diagram H20			
			VT3-V7R(CN2)	Wiring diagram R1			
	CP341-RS422/ 485	RS-422A (4-wire)	VT5(COM2)/VT3-W4□A	Wiring diagram W20	 P.17-7		
			VT3(PORT2)/VT-T1/DT	Wiring diagram 2			
			VT3-V6H(G)/Q5H(G)(CN2B)	Wiring diagram H40			
			VT3-V7R(CN3)	Wiring diagram R2			

*1 Not supported by Soft-VT.

Ethernet connection

Series Name	CPU	Connection Methods	Unit Setting	Target PLC
SIMATIC S7-1200 Series	S7-1200	CPU embedded	 P.17-12	S7 (Ethernet) ^{*1}
SIMATIC S7-1500 Series	S7-1500	Ethernet port		

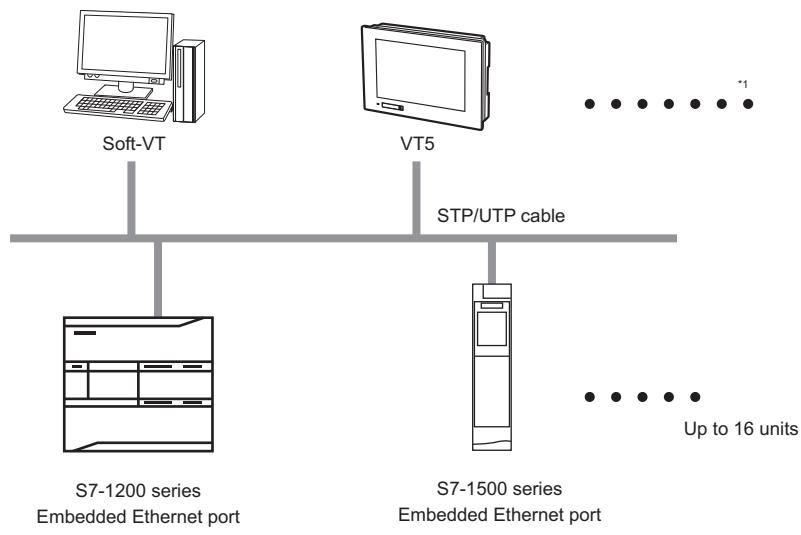
*1 VT3/DT series is not supported.

17-2 System Configuration

System configuration for Ethernet

This section describes the system configuration for VT5 and Siemens PLC SIMATIC S7-1200/S7-1500 series.

■ SIMATIC S7-1200/S7-1500 series



- *1 Please pay attention, for connection of multiple VT5 Series, Soft-VT, communication capacity increases correspondingly with the increase of number of connected units.

17-3 Connection Methods and Wiring Diagrams

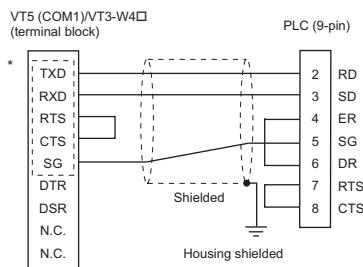
This section describes wiring of connector cables.

The wiring diagram in this manual may be different from that recommended by Siemens. But it can still be used for proper operation.

Wiring diagram for serial connection

■ VT5 series (COM1), VT3-W4□ (RS-232C) connection

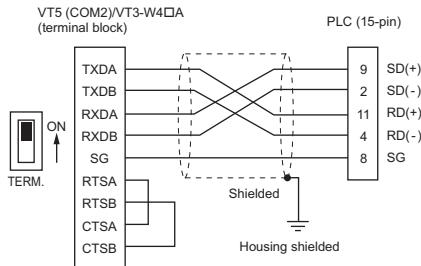
● Wiring Diagram W20 (RS-232C)



* [---] indicates a terminal diagram for the VT5 Series.

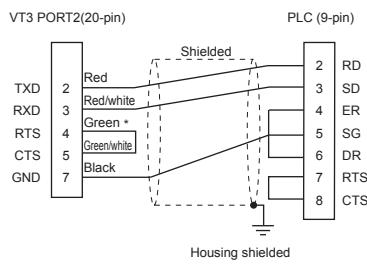
■ VT5 series (COM2), VT3-W4□A (RS-422A) connection

● Wiring Diagram W40 (RS-422A)



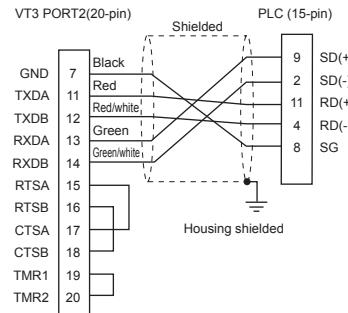
■ VT3 series (PORT2) connection

● Wiring Diagram 1 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram 2 (RS-422A: OP-24028)



For pin No. of connectors on VT3/DT Series side, please see the appendix at the end of this manual.

■ Connection to VT3 Handy Series



FG2 must be grounded.

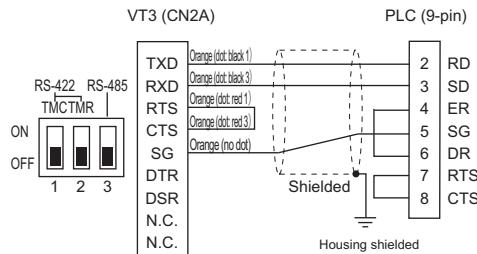
● Wiring Diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



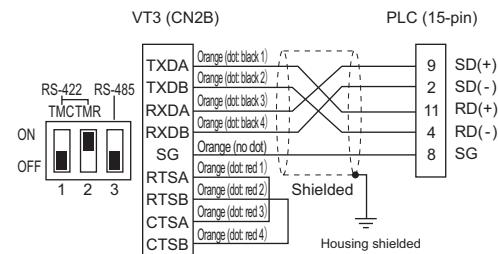
● Wiring Diagram H40 (RS-422A)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

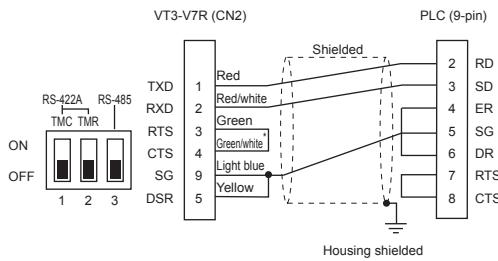
OP-87193:10m



■ Connection to VT3-V7R

● Wiring Diagram R1

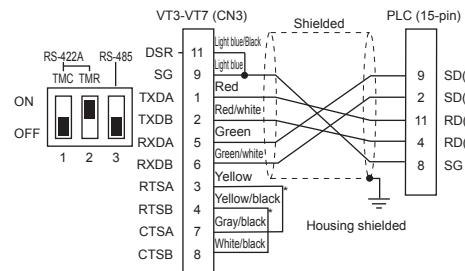
(RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

● Wiring Diagram R2

(RS-422A: VT-C5R2/C15R2)



* Not wired for loopback test inside the connector.
Solder the signal lead.



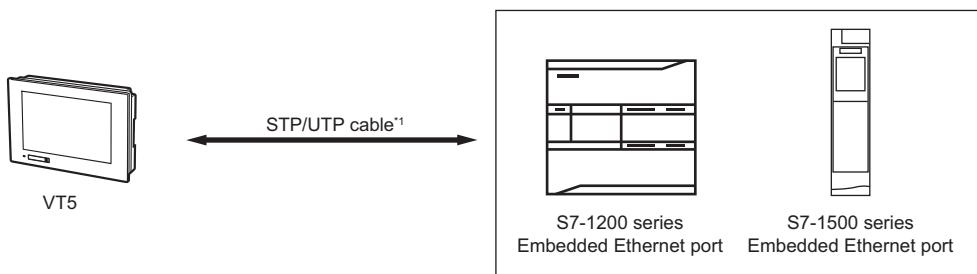
For pin No. of connectors on VT3/DT Series side, please see the appendix at the end of this manual.

Ethernet Connection Methods

■ Direct connection (1:1)

- SIMATIC S7-1200/S7-1500 series

Use STP/UTP cable for connection.



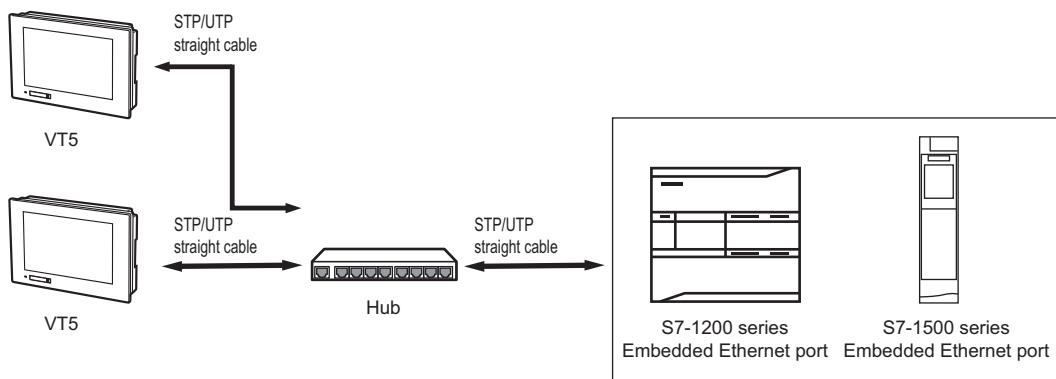
*1 The VT5 Series supports the MDI/MDI-X auto switching function.
Both STP/UTP cross cables and straight cables can be used.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 STP/UTP cable.

■ Hub connection (Multiple connection)

- SIMATIC S7-1200/S7-1500 series



Connection of VT5 Series with the hub

- Use the STP/UTP straight cable.
- VT5 Series cannot be connected with the cascade port of the hub.

Hub connection with SIMATIC S7-1200/S7-1500

- Use the STP/UTP straight cable.
- Do not connect the SIMATIC S7-1200/S7-1500 Series to a cascade port on the hub.



- When building an Ethernet connection using 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection using 100 Base-TX, use a Category 5 STP/UTP cable.

17-4 Unit Settings

This section describes the unit setting matched to the default communication conditions.

Settings for serial connection

■ Setting of SIMATIC S7-300 Series, CP341-RS232C and CP341- RS422/485

The ladder software of SIMATIC Manager (STEP7) for S7-300 Series and setting software for link unit can be used to set up.

1. Setting of CP341-RS232C and CP341- RS422/485

- (1) Start the Attribute dialog box of CP341-RS232C and CP341- RS422/485 from HW configuration.
- (2) Click the "Parameters" button and select RK512 from "Protocol" list box.
- (3) Set up as follows in the "RK512" tab in the "Protocol" dialog box.

Item	Set value
With Block Check	Checked
Use Default Values	Checked
Transmission Rate	Depending on VT setting
Stop Bits	Depending on VT setting
Parity	Depending on VT setting
Priority	Low

- (4) Set up as follows in the "Interface" tab* in the "Protocol" dialog box.

Item	Set value
Initial State of the Receive Line	None

* Can be set up only when CP341-RS422/485 used.

2. Ladder program setting

Please create the following ladder programs.

Add FB7 (R_RCV_RK) to the program block "OB1".

```
CALL "P_RCV_RK" , DB90
EN_R :=TRUE
R :=FALSE
LADDR :=256
DB_NO :=
DBB_NO :=
L_TYP :=
L_NO :=
L_OFFSET:=
L_CF_BYT:=
L_CF_BIT:=
NDR :=
ERROR :=
LEN :=
STATUS :=
```

DB90	Instance data blocks as examples. Any No. to DB can be assigned.
EN_R :=TRUE	Set data receive to "Enable". (setting: TRUE)
R :=FALSE	Set receive block to "Disable". (setting: FALSE)
LADDR :=256	CP341 basic address.
	Be sure to set to the value assigned by HW configuration.

Other parameter setting is not required.

Communication Condition Setting Ranges and Defaults During Serial Communication

● SIMATIC S7-300 Series

Item	Setting range	Default
Station No.	-	-
VT No,	-	-
PLC serial I/F	RS-232C, RS-422A, 4-wire	RS-232C
Baud rate	9600, 19200, 38400, 57600 bit/s	9600bps
Data bit	8 bits	8 bits
Stop bit	1, 2 bits	1 bit
Parity	None, odd, even	Even
Flow Control	-	-
CR	-	-
LF	-	-
CheckSum	-	-

Ethernet connection methods

This section describes how to connect the VT5 Series, Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

The Port No. for communications with the IP Addresses of devices to be connected must be determined in advance for the Ethernet connection.

The following table shows the setting items corresponding to the connection type. Check these settings items with your system administrator.

Connection mode	Setting Items
Direct connection	<ul style="list-style-type: none"> • IP address to be assigned to VT5 • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address to be assigned to VT5 • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



"IP address to be assigned to VT5" and "IP address to be assigned to PLC" cannot be duplicated.

■ Required Settings for Ethernet connections

The following settings must be made when connecting the VT5 Series to a PLC via Ethernet.

Required settings	Description
VT5 Ethernet settings	Set the IP address and port number to be assigned to the VT5. Select "System settings"→"VT setting" in "Ethernet/language" in VT STUDIO. ^{*1}
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings"→"Periphery connection" in "PLC communication conditions" in VT STUDIO. ^{*2}
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT5 Series. Set the communication conditions using a ladder software supporting S7-1200/S7-1500 series, such as "Totally Integrated Automation Portal."

*1 Select "VT Machine Setup"→"Ethernet settings" in VT5 system mode to confirm and change.

*2 Use "PLC Comm. Setup" in VT5 system mode to confirm and change settings.

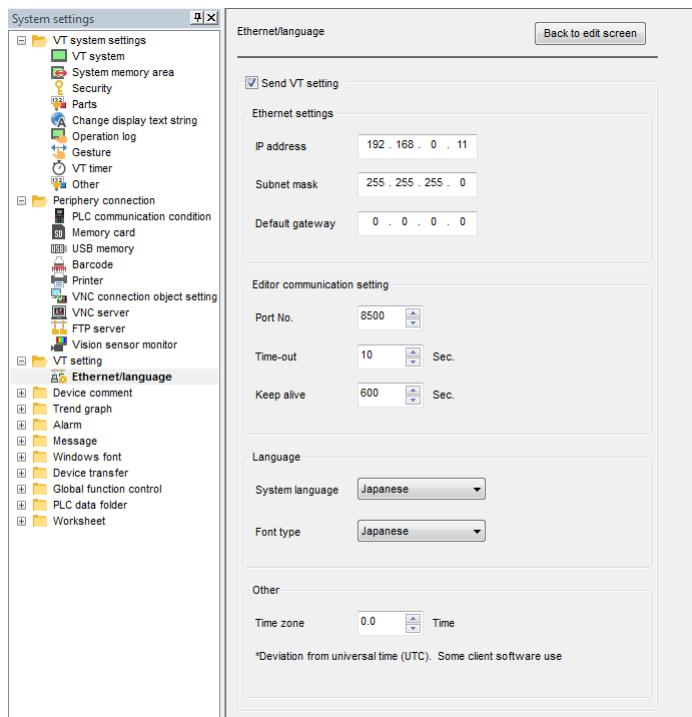
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
Editor communication settings	Keep Alive	Set as necessary.
	Timeout	Set as necessary.



You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.

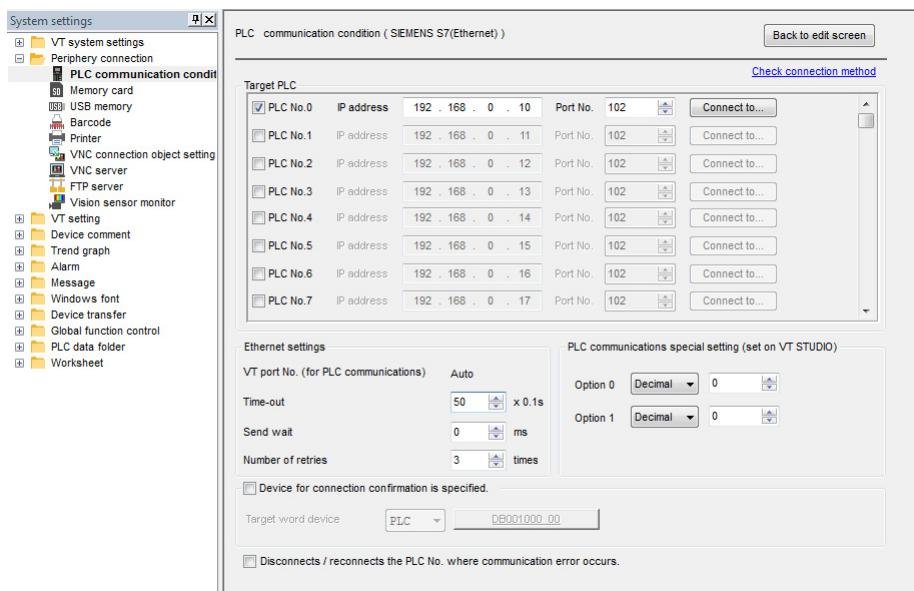
The setting items are the same as those in VT STUDIO.

"5-3 VT Machine Setup", VT5 Series Hardware Manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No.	Select the station No. (0 to 15) to be used.
	IP Address ¹	Set up the IP address assigned on the connection destination PLC (the selected station No.).
	Port number	Fixed to 102
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	This does not need to be set. The VT5 Series automatically sets VT port numbers (for PLC communications).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set in VT STUDIO)		Normally, this does not need to be set.
Specify a device to troubleshoot Ethernet connections	Target word device ²	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ³		If this option is selected, communication with this station No. will be interrupted when communication error occurs. For the station No. whose communication is interrupted, monitoring will be performed regularly, and communication will be restarted after the error is cleared.

*1 Within the same LAN, a IP address must not be duplicate with that of another equipment.
IP address format is XXX.XXX.XXX.XXX (XXX is in the range of 0 to 255).

*2 It is possible to select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

*3 In the PLC model settings, you can set this item when a series that can be connected in 1:N mode is selected.



You can use VT5 system mode to check and change PLC communication condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

■ SIMATIC S7-1200/S7-1500 series settings

● Settings for communication conditions

Use a ladder software supporting S7-1200/S7-1500 series, such as "Totally Integrated Automation Portal" to set the communication conditions.

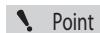
Perform the following settings on embedded Ethernet port.

Item	Description
IP address	Set the IP address to be assigned to the PLC.
Subnet mask	Set the PLC subnet mask.
Router address	Set the default IP address of the PLC router.

- * Data block (DB) settings are required to use the device DB.
Do not check "Optimized block access" in [Attributes] of Data block (DB).

● Permission settings of remote access

- *1 Right-click PLC from the project tree, and select "Properties".
- *2 Select "Protection" of the "General" tab. In "Access level", check "Full access", then check "Permit access with PUT/GET communication from remote partner", and click [OK].



- For S7-1200 this must be set if the CPU Version is Ver. 4.0 or later. There is no need to set this for other CPU versions.
- For S7-1500 this must be set if the CPU Version is Ver. 1.0 or later.

17-5 Available Devices

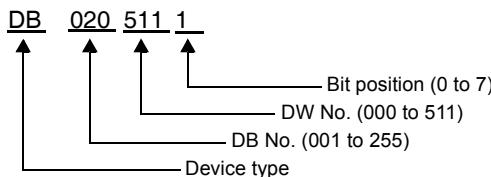
■ SIMATIC S7-300 series, SIMATIC S7-1200 series, SIMATIC S7-1500 series

	Device	Address
Bit Device ^{*1}	Data block ^{*2*5}	DB0010000 to DB2555117
	Input relay	I0000 to I2557
	Output relay	Q0000 to Q2557
	Internal memory	M0000 to M2557
Word Device	Data block ^{*3*4}	DB001000 to DB255510
	Input relay ^{*4}	I000 to I254
	Output relay ^{*4}	Q000 to Q254
	Internal memory ^{*4}	M000 to M254
	Timer ^{*9}	T000 to T255
	Counter ^{*9}	C000 to C255
	Data block (2 words) (0 to) ^{*3*6*7}	DBD001000 to DBD255504
	Data block (2 words) (2 to) ^{*3*6*8}	DBD001002 to DBD255506
	Input relay (2 words) (0 to) ^{*6*7}	ID000 to ID248
	Input relay (2 words) (2 to) ^{*6*8}	ID002 to ID250
	Output relay (2 words) (0 to) ^{*6*7}	QD000 to QD248
	Output relay (2 words) (2 to) ^{*6*8}	QD002 to QD250
	Internal memory (2 words) (0 to) ^{*6*7}	MD000 to MD248
	Internal memory (2 words) (2 to) ^{*6*8}	MD002 to MD250

*1 The lowest bit of bit device address is marked with an octal number.

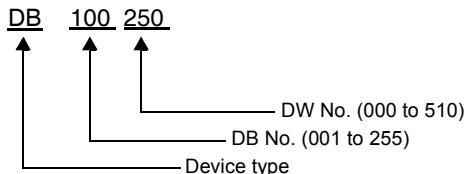
*2 The address of a data block (bit device) is marked with 3 higher bits 001 to 255 (DB No.), 3 mid bits 000 to 511 (DW No.) and 1 lower bit 0 to 7 (bit position).

Setting example) When PLC is marked as +511.1 of DB20 and data type BOOL, VT3 is marked as DB 0205111.



*3 The address of a data block (word device) is marked with 3 higher bits 001 to 255 (DB No.) and 3 lower bits 000 to 510 (DW No.).

Setting example) VT3 is marked as DB100250 when PLC is marked as +250.0 of DB100 and data type WORD.



*4 Specify byte addresses as even addresses handled by word.

*5 Data block (bit devices) is read and written in word.

Since bit write is performed in word, in addition to the change of set bits, the rest 15 bits are updated according to the previous status. Since previous status is overwritten during writing, change will not occur even though the bits (the rest 15 bits) other than the set bits are changed.

*6 32-bit device. The device No. must be specified as an even number.

*7 Since byte address is processed by every 2 words, the address must be specified as multiples of 4.

*8 Since the leading address is 2, and byte address is processed by every 2 words, the address must be specified as multiples of 4 + 2.

*9 Unavailable when the PLC is in "S7 (Ethernet)" setting.



- Among the devices, only data blocks can be written. Others can not be written.
- Available devices are restricted according to the product model. Check the manual for the respective model.

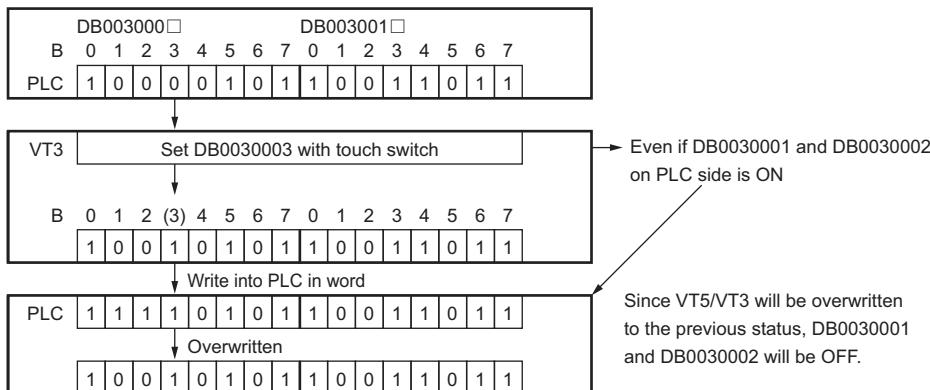
● How to handle data block (bit device)

Below is the method to handle the bit device for S7-300/S7-1200/S7-1500 series to set on VT5/VT3 series:



Among the devices, only data blocks can be written. Others can not be written.

Bit devices are read/written in word when connecting to the S7-300/S7-1200/S7-1500 Series. Since bit write is performed in word, in addition to the change of set bits (e.g. DB0030003), the rest 15 bits (e.g. DB0030000 to DB0030002, DB0030004 to DB0030007, and DB0030010 to DB0030017) are updated according to the previous status. Since previous status is overwritten during writing, change will not occur even though the bits (the rest 15 bits) other than the set bits are changed.



Writing from VT5/VT3 to PLC bit devices is limited to bit setting (set, reset, bit reverse, and instant reset) in bit device through the touch switch. Therefore, the area of the PLC device that is to perform bit setting in byte units is assigned to the bit device with touch switches in advance, and then the ladder program is created.



[Example] When bit DB0030001 ON/OFF in bit devices with touch switch by bit setting

Do not assign DB0030000 to DB0030007, DB0030010 to DB0030017 (1 word=16 bits) to bit devices with touch switch as the device area in PLC to perform direct data setting and create its commands in the ladder of PLC.



[Example] When bit DB0030005, DB0030107 and DB0030154 ON/OFF in the bit device with touch switch by bit setting

DB0030000 to DB0030007, DB0030010 to DB0030017(1 word =16 bits)

DB0030100 to DB0030107, DB0030110 to DB0030117(1 word =16 bits)

DB0030150 to DB0030157, DB0030160 to DB0030167(1 word =16 bits)

are assigned as the area of the PLC device that is to perform bit setting to the bit device by touch switches. An area of three words (=48 bits) for specifying scattered bit devices as shown above is required. For this reason, a series of continuous number such as DB0030010, DB0030011 and DB0030012 must be assigned to devices to perform bit setting to bit device by touch switches.



When using the "Reset trigger bit" function set by VT STUDIO, do not use the 16 bits (in word units) containing the trigger bit device on the PLC and VT5/VT3.

(Setting example) When the "Reset trigger bit" function is enabled and DB0030000 is used, do not use DB0030001 to DB0030007 and DB0030010 to DB0030017 for PLC and VT5/VT3.

17-6 Error Messages and Troubleshooting

The communication errors that occur when VT5/VT3 series/Soft-VT is connected to a PLC made by Siemens are described.

List of Communication Errors in Serial Connections

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT5/VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT5/VT3.
	Communication setting error.	
Framing Error	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT5/VT3.
Communication Error	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of Communication Errors in Ethernet Connections

The error messages when a PLC is connected to Ethernet are shown as follows.

Error messages are displayed at the bottom of the VT5/Soft-VT unit screen when a communications error occurs.

Message	Causes	How to handle
PLC Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code [**], refer to the user manual for the connected PLC.
TimeOut Error (++)	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
Protocol stack error	The protocol is in the startup process. Wait a while.	Wait a while.
Link error	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Verify whether the cables are connected correctly. Make sure that LINK LED on the VT5 Series and the connected PLC is on.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For error messages that belong to non-communication errors, see VT5 Series Hardware Manual,  "Appendix 1 Error Messages and Troubleshooting".

CONNECTION OF THERMOREGULATOR

This section describes connections of thermoregulators made by other manufacturers to the VT5/VT3 Series.



- Not supported by DT series.
- Not supported by Soft-VT.

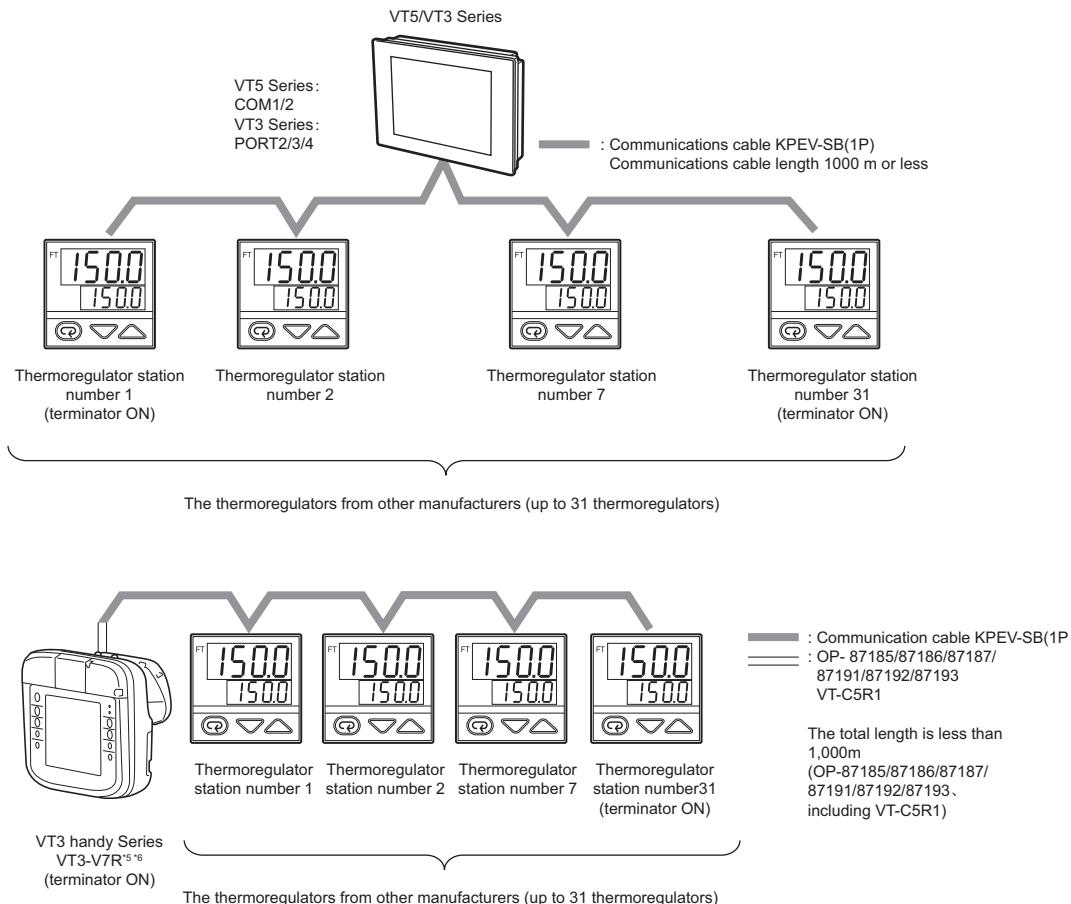
18-1	Connection of Thermoregulators	18-2
18-2	Connection of Thermoregulators from RKC Instrument	18-4
18-3	Connection of Thermoregulators from OMRON	18-27
18-4	Connection of Thermoregulators from Yokogawa Electric	18-41
18-5	Connection of Thermoregulators from Azbil Corporation	18-53
18-6	Connection of Thermoregulators from Shinko Technos	18-67
18-7	Connection of Thermoregulators from CHINO	18-77
18-8	Connections Using Adapter	18-87

18-1 Connection of Thermoregulators

Connecting Thermoregulator

The VT5/VT3 use the communication functions provided by thermoregulators from other manufacturers to make direct connections to them.

A total of 31 thermoregulators can be connected to one VT5/VT3 port ^{*1} and use of the MultiTalk function will allow connection of up to 62 units (2 ports ^{*2*3} × 31 units) thermoregulators can be connected to one VT5/VT3 ^{*4}.



- *1 For the 1:N connection, the RS-485 port on the thermoregulator should be used.
Connect the VT5/VT3 Series to a thermoregulator in series (in a single line).
- *2 When the thermoregulators are connected with VT3 PORT2/PORT3, VT-T1 with the 1:N method, the RS-232C↔RS-485 adapter (N-48) should be used.
- *3 The VT5 Series does not support connections that use an RS-232C↔RS-485 converter (N-48).
- *4 When you select a thermoregulator from both PLC_A/PLC_B with the MultiTalk function, PLC cannot be connected.
- *5 When VT3 handy Series VT3-V6H(G)/Q5H(G) uses multitalk function, RS-232C/422A/485/Ethernet connecting cable (OP-87191/87192/87193), or pluggable connection unit (VT-T1) + cable with removal connector (OP-87194/87195/87196) with removable connector is required.
In addition, VT3-V7R cannot use the MultiTalk function.
- *6 When connecting a thermoregulator to the VT3-V7R/V6H(G)/Q5H(G), be sure to connect the VT3-V7R/V6H(G)/Q5H(G) at the end of the communication line and turn on the terminator.



Point

Not supported by Soft-VT.

Precautions for Connection of Thermoregulator

■ About the internal device

For the 1: N thermoregulator connection, the following devices inform the connection state of the thermoregulator.

Device No.	Description	1 (ON)	0 (OFF)
MB00D00	PLC_A VT No. 0 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00D01	PLC_A VT No. 1 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00D0F	PLC_A VT No. 15 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00D20	PLC_A VT No. 16 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00D2F	PLC_A VT No. 31 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00D80	PLC_B VT No. 0 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00D8F	PLC_B VT No. 15 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00DA0	PLC_B VT No. 6 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00DAF	PLC_B VT No. 31 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3

For the thermoregulator connection, the connection state of the thermoregulator can be set up with the following internal devices.

Device No.	Description	1 (ON)	0 (OFF)
MB00D10	PLC_A Station No. 0 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
MB00D11	PLC_A Station No. 1 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00D1F	PLC_A Station No. 15 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
MB00D30	PLC_A Station No. 16 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00D3F	PLC_A Station No. 31 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
MB00D90	PLC_B Station No. 0 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00D9F	PLC_B Station No. 15 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
MB00DB0	PLC_B VT No. 6 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00DBF	PLC_B Station No. 31 connection setup	Connected with VT5/VT3	Not connected with VT5/VT3

□ "Chapter 6 Before You Set up the Parts", VT5 Series Reference Manual

□ "Chapter 6 Before You Set up the Parts", VT3 Series Reference Manual

18-2 Connection of Thermoregulators from RKC Instrument

This section describes how to connect RKC Instrument thermoregulators to the VT5/VT3 Series.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting RKC Instrument thermoregulators to the VT5/VT3.

- (1) Make sure that the VT5/VT3 can be connected to the thermoregulator.
- (2) Check to see if the thermoregulators need to be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the thermoregulator.

Series Name	Thermoregulator	I/F	Unit Setting	Target PLC
CB Series	CB100, CB400, CB500, CB700, CB900	RS-485	 P.18-16	CB Series (1: N) ^{*3}
SR-Mini HG Series	H-PCP-J-□□1-D*□□	RS-232C	 P.18-17	SR-Mini Series (1: 1) ^{*3}
	H-PCP-J-□5□-D*□□	RS-485	 P.18-17	SR-Mini Series (1: N) ^{*3}
REX-F Series	REX-F400, REX-F700, REX-F900	RS-232C	 P.18-16	REX-F Series (1: 1) ^{*2*3}
		RS-485	 P.18-16	REX-F Series (1: N) ^{*2*3}
SRZ Series	Z-TIO, Z-DIO, Z-CT	RS-485	 P.18-18	SRZ Series ^{*2*3}
	Z-COM (Z-TIO, Z-DIO, Z-CT) ^{*1}	RS-485	 P.18-20	SRZ Series (when Z-COM is used) ^{*2*3}

*1 Only supports RS-485

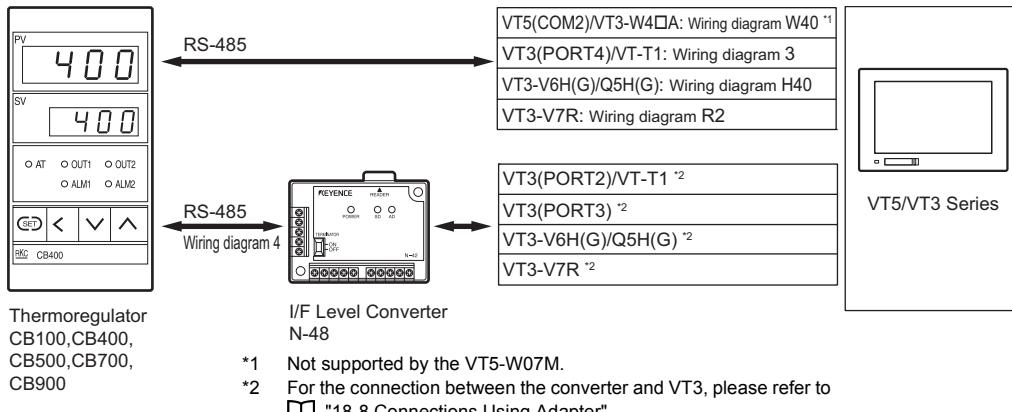
*2 Not supported by the VT5 Series.

*3 Not supported by Soft-VT.

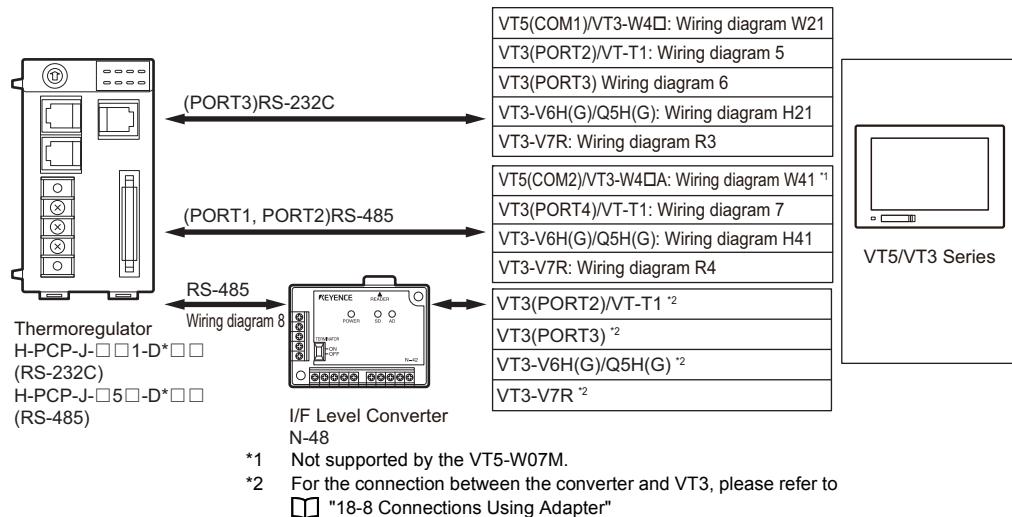
System Configuration

This section describes the configuration of the VT5/VT3 Series and a thermoregulator from RKC Instrument.

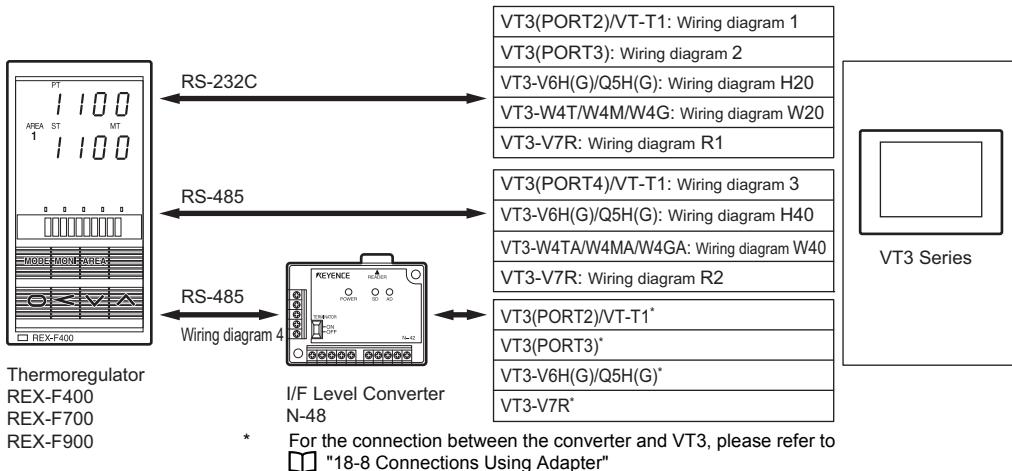
■ CB Series



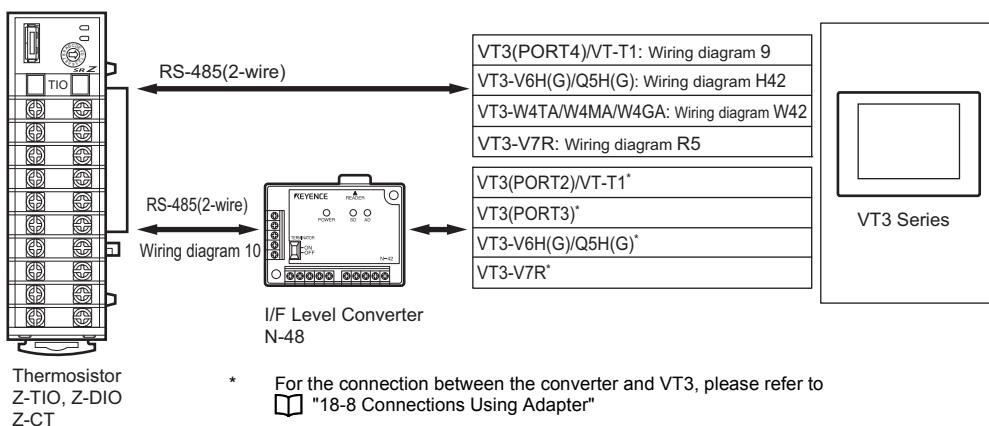
■ SR-Mini HG Series



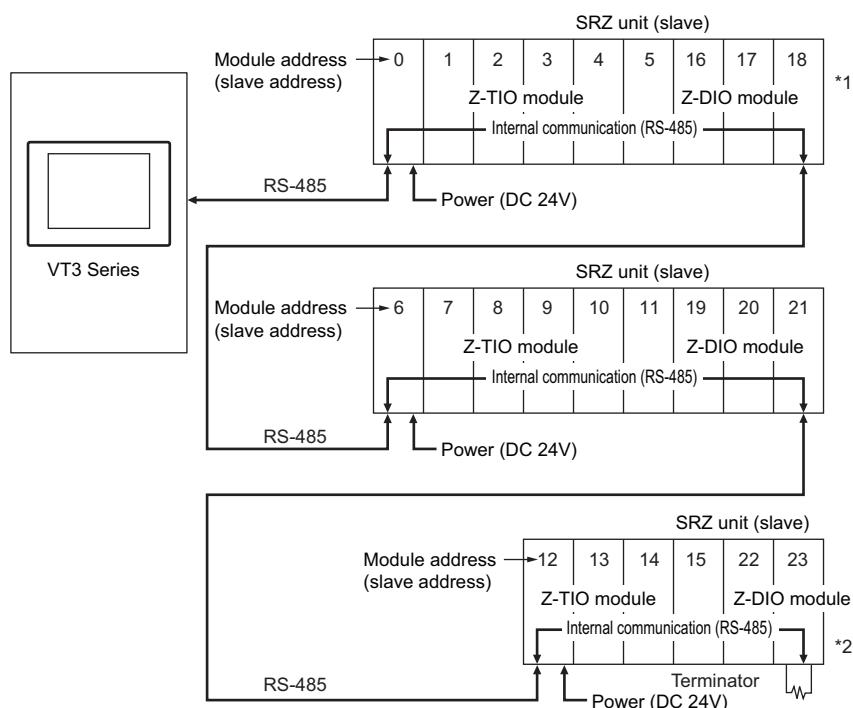
■ REX-F Series



■ SRZ Series



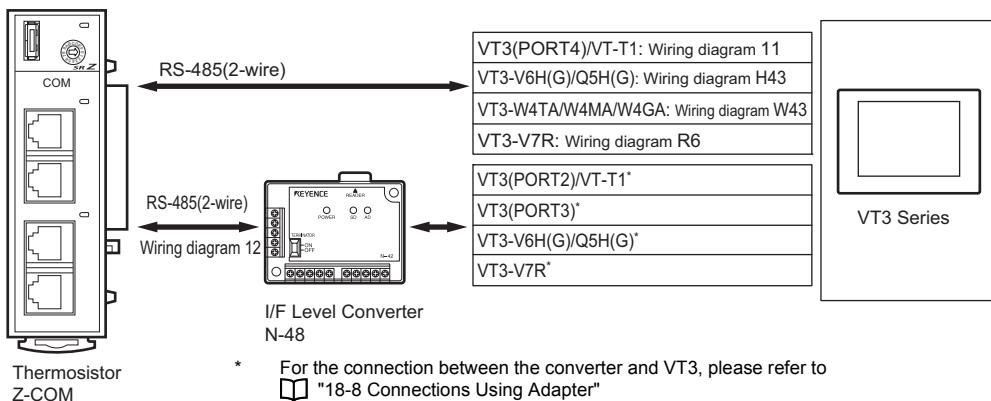
Z-COM module is not used in the system structure.



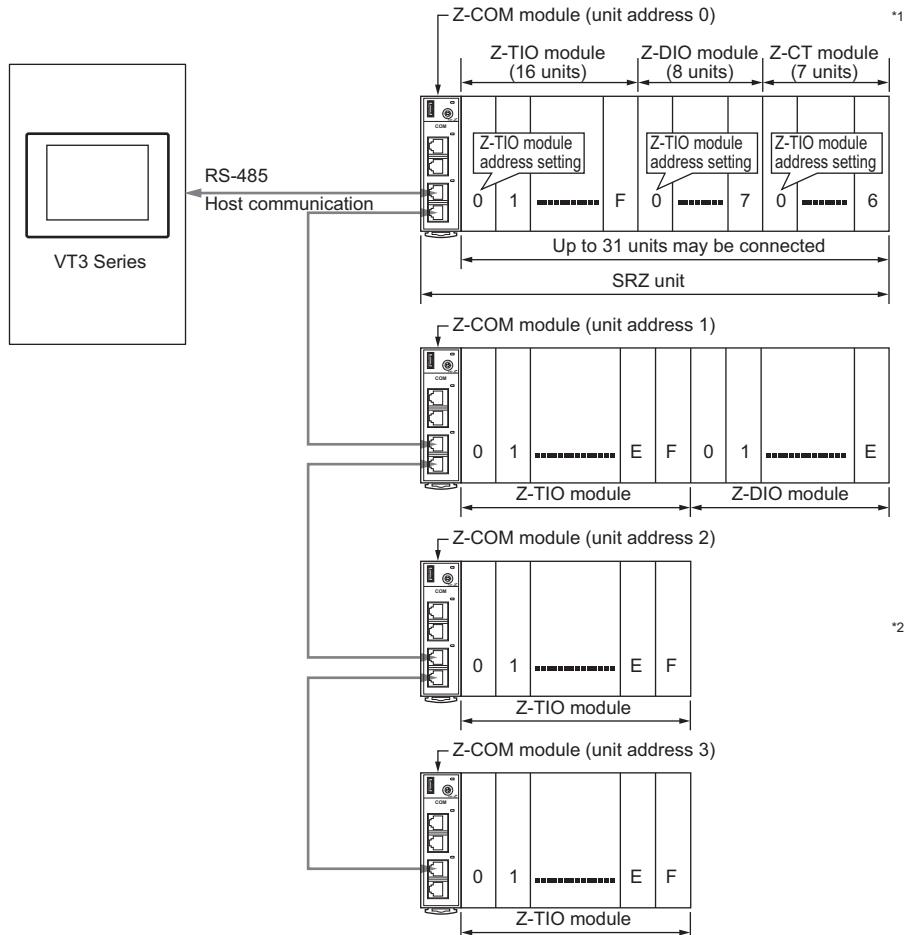
*1 For the connection between modules, communication lines are connected inside.

*2 Up to 31 units may be connected. However, identical module (Z-TIO, Z-DIO, Z-CT) may be connected with up to sixteen units respectively.

■ SRZ Series(when Z-COM is used)



Z-COM module is not used in the system structure.

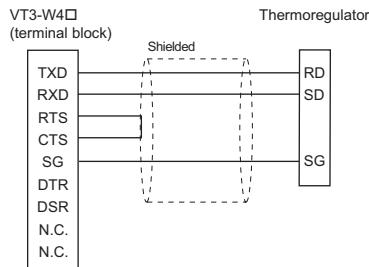


*1 One Z-COM may be connected with up to 31 units of Z-TIO, Z-DIO, Z-CT. However, up to 16 units may be connected for the same type of modules

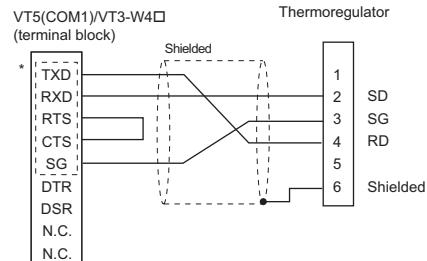
*2 Up to sixteen units of Z-COM may be connected.

Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

■ Wiring diagram W20 (RS-232C)



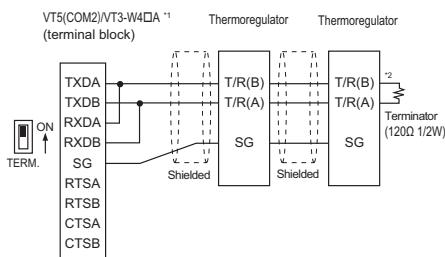
■ Wiring diagram W21 (RS-232C)



* [] indicates a terminal diagram for the VT5.

Connection to VT5 Series (COM2) and VT3-W4□A (RS-485)

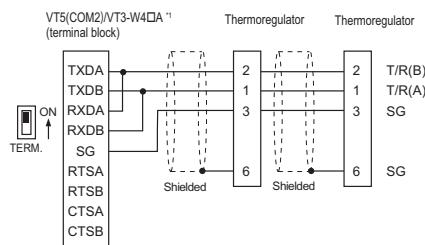
■ Wiring diagram W40 (RS-485: 2-wire)



*1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator switch to "ON".

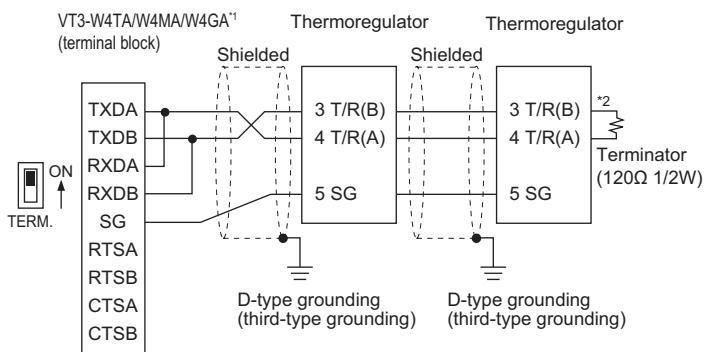
*2 A termination resistor (120Ω 1/2W) needs to be connected when the thermoregulator is at the end of the communication line.

■ Wiring diagram W41 (RS-485: 2-wire)

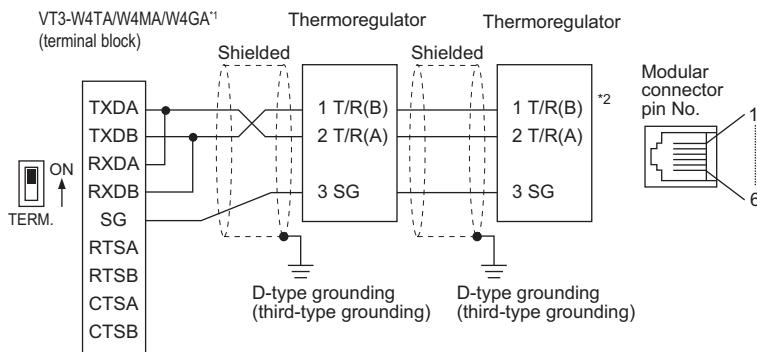


*1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator switch to "ON".

■ Wiring diagram W42 (RS-485: 2-wire)



■ Wiring diagram W43 (RS-485: 2-wire)

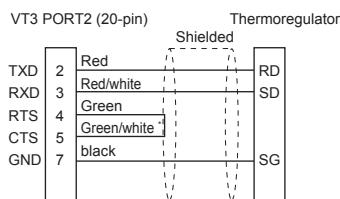


Connection to VT3 Series

The following describes wiring of connector cables.

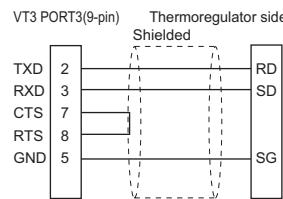
The wiring diagrams here may be different with those recommended by the RKC Instrument. The wiring diagrams here may be different with those recommended by the RKC Instrument.

■ Wiring diagram 1 (RS-232C: OP-24027)

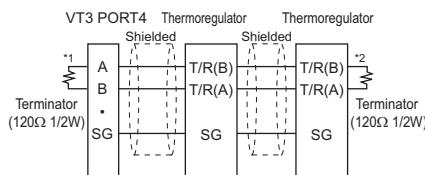


* The loopback is not used inside the connector.
Please solder the signal line.

■ Wiring diagram 2 (RS-232C)



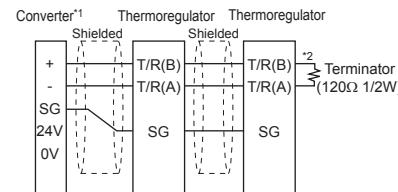
■ Wiring diagram 3 (RS-485)



*1 When VT3 is on one end of the communication line, install the terminator (120Ω, 1/2W) between A and B of PORT4.

*2 Install the termination resistor (120Ω, 1/2W) onto the thermoregulator connected to one end of the communication line.

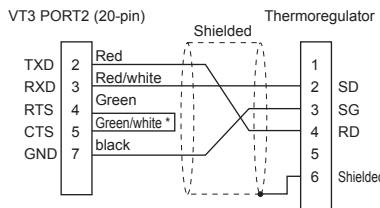
■ Wiring diagram 4 (RS-485)



*1 When converter is on one end of the communication line, make the terminator switch ON.

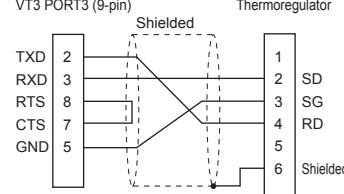
*2 Install the terminator (120Ω, 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram 5 (RS-232C: OP-24027)

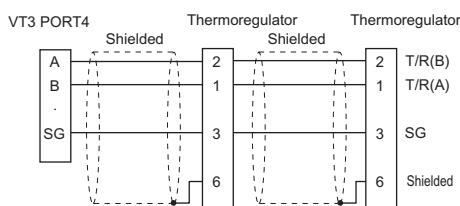


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 6 (RS-232C)



■ Wiring diagram 7 (RS-485)

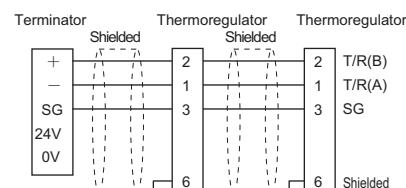


Please do not install terminal resistors on the ends of the RS-485 transmission channel.



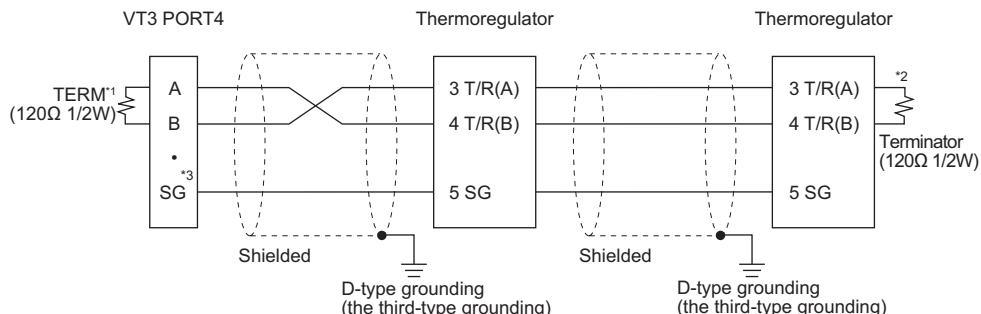
For the pin assignment number of the connectors on the VT3/DT series, please see the Appendix at the end of this manual.

■ Wiring diagram 8 (RS-485)



Please do not install terminal resistors on the ends of the RS-485 transmission channel.

■ Wiring diagram 9 (RS-485 2-wire)

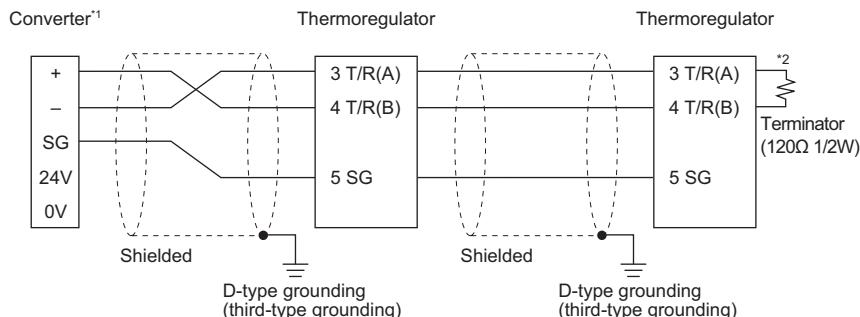


*1 When VT3 is on one side of the communication line, terminal resistance is installed between PORT4 AB (120Ω 1/2W).

*2 Install terminal resistance on the thermistor on one side of the communication line (120Ω 1/2W).

*3 VT-T1 terminal name is G.

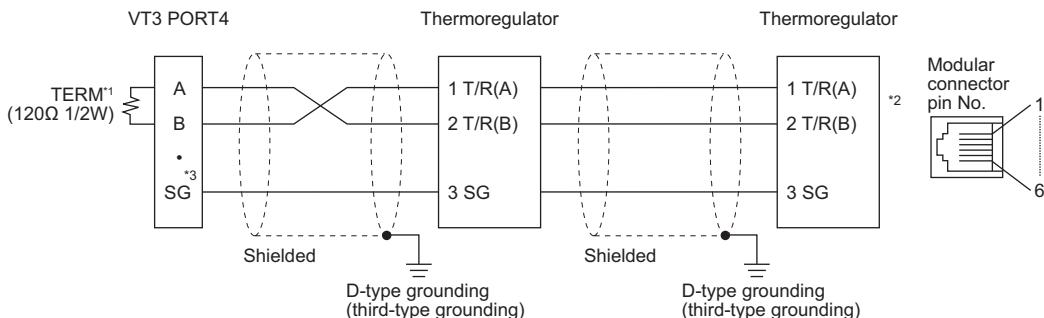
■ Wiring diagram 10 (RS-485 2-wire)



*1 When the converter is on one side of the communication line, terminal will be open.

*2 Install terminal resistance on the thermistor on one side of the communication line (120Ω 1/2W).

■ Wiring diagram 11 (RS-485 2-wire)

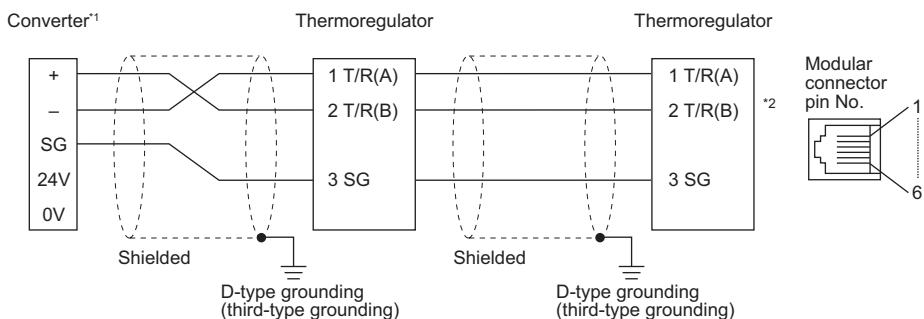


*1 When VT3 is on one side of the communication line, terminal resistance is installed between PORT4 AB (120Ω 1/2W).

*2 In Z-COM module on one side of the communication terminal, used on PORT2 when PORT1 is used, on PORT4 when PORT3 is used, Z-COM terminal resistance connector for the installation of RS-485 (W-BW-01).

*3 VT-T1 terminal name is G.

■ Wiring diagram 12 (RS-485 2-wire)



*1 When the converter is on one side of the communication line, terminal will be open.

*2 In Z-COM module on one side of the communication terminal, used on PORT2 when PORT1 is used, on PORT4 when PORT3 is used, Z-COM terminal resistance connector for the installation of RS-485 (W-BW-01).

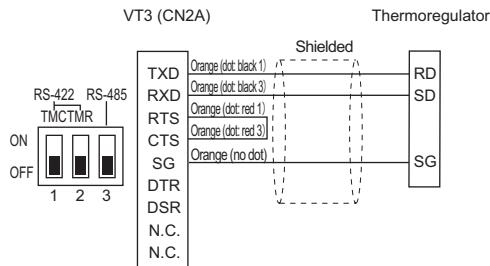
Connection with VT3 Handy Series



FG2 must be grounded.

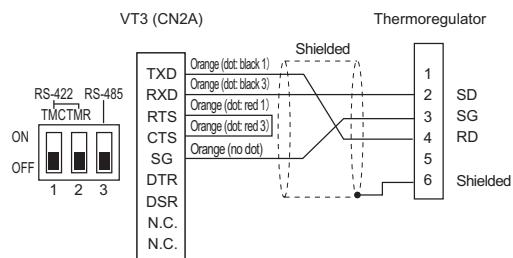
■ Wiring diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



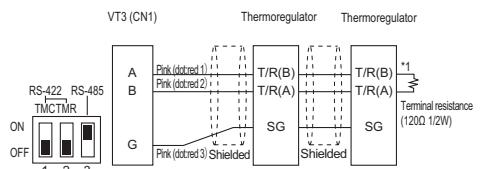
■ Wiring diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



■ Wiring diagram H40 (RS-485: 2-wire)

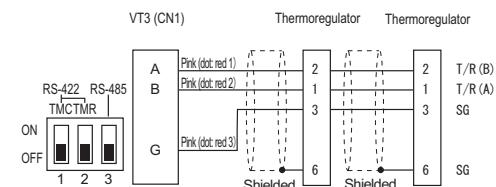
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



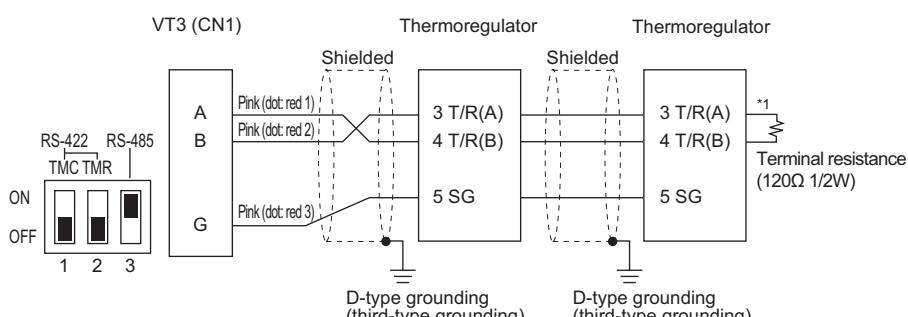
*1 The thermoregulator at communication cable end should be equipped with a terminal resistor (120Ω 1/2W).

■ Wiring diagram H41 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m

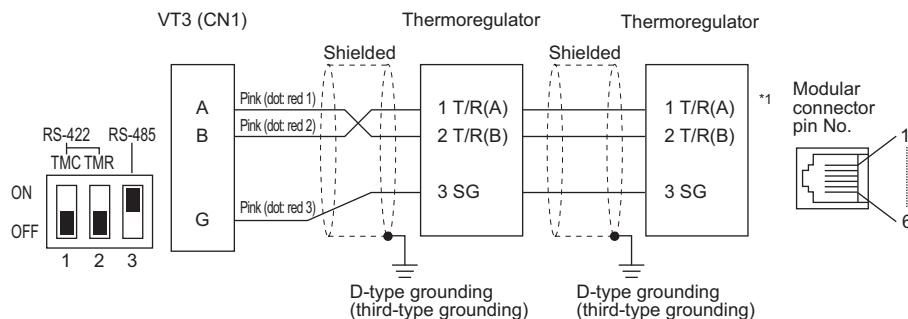


■ Wiring diagram H42 (RS-485: 2-wire)



*1 Install terminal resistance on the thermistor on one side of the communication line (120Ω 1/2W).

■ Wiring diagram H43 (RS-485: 2-wire)

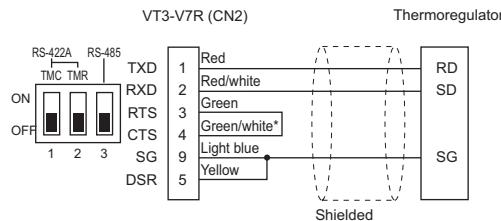


*1 In Z-COM module on one side of the communication terminal, used on PORT2 when PORT1 is used, on PORT4 when PORT3 is used, Z-COM terminal resistance connector for the installation of RS-485 (W-BW-01).

Connection to VT3-V7R

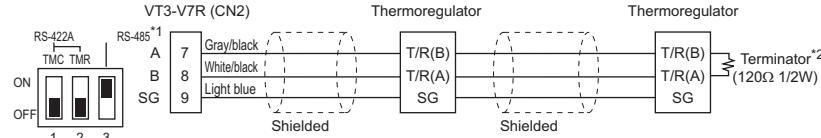
 Point Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13

■ Wiring diagram R1 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

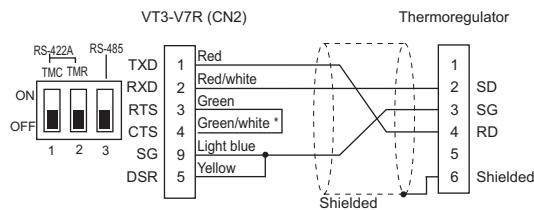
■ Wiring diagram R2 (RS-485: VT-C5R1)



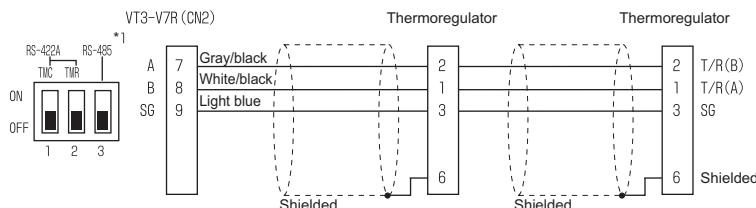
*1 Set the terminator to ON.

*2 Install the terminator (120Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram R3 (RS-232C: VT-C5R1)



■ Wiring diagram R4 (RS-485: VT-C5R1)

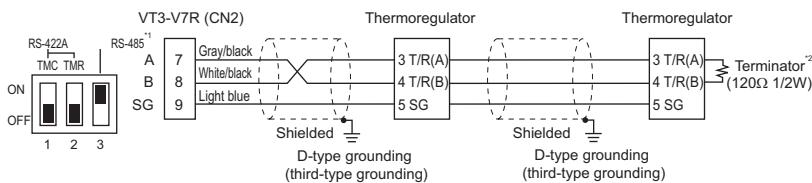


*1 Set the terminator to OFF.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

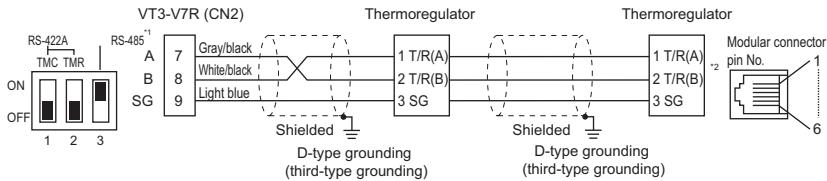
■ Wiring diagram R5 (RS-485: 2-wire)



*1 Set the terminator to ON.

*2 Install the terminator (120Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram R6 (RS-485: 2-wire)



*1 Set the terminator to ON.

*2 In Z-COM module on one side of the communication terminal, used on PORT2 when PORT1 is used, on PORT4 when PORT3 is used, Z-COM terminal resistance connector for the installation of RS-485 (W-BW-01).

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ CB Series and REX-F Series

● Communication setup for CB series

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Station No.	0 to 30	0
Baud rate	2400, 4800, 9600, 19200 bit/s	9600 bit/s
Data length	7, 8 bits ¹	8 bits
Parity	None/Odd/Even ¹	None
Stop bit	1 bit, 2 bits ¹	1 bit
Interval Time	0 to 150 ²	5

*1 Specific requirements on the data length, parity, and stop bit should be confirmed. For more information, please refer to the specific manuals.

*2 When the target PLC is set to "REX-F Series (1:N)", the interval time must be set up. Otherwise, no communication can be performed.

● Communication setup for REX-F series

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Station No.	0 to 30 ¹	0
Baud rate	1200, 2400, 4800, 9600, 19200 bit/s	9600 bit/s
Data length	7, 8 bits	7 bits
Parity	None/Odd/Even	Odd
Stop bit	1 bit, 2 bits	2 bits
Interval Time	0 to 250 ²	0

*1 When the target PLC is set to "REX-F Series (1:1)", ensure to set the Station No. to "0".

*2 When the target PLC is set to "REX-F Series (1:N)", the interval time must be set up. Otherwise, no communication can be performed.

● Set up the interval time

For more information, please refer to data sheets of the specific devices.

Baud Rate	CB Series	REX-F Series
	Interval Time (set values)	
1200	-	10
2400	4	6
4800	2	3
9600	1	2
19200	1	1

● Set up the Station No.

1 Set the action mode to STOP.

Please press the MODE button to select RUN/STOP mode.

The lighted one is the currently selected action mode.

When RUN lights (STOP, flickering), you can select the STOP mode by pressing the button.

2 Select the local mode

Please press the MODE button to select LOC/COMP mode.

The "LOC" mode lights. When "CMP" lights, please press the up key to light "LOC".

3 Set up the Station No..

You can be directed to the monitor mode by press the MONI key.

Under the Monitor mode, please press and hold the SET key for 5 seconds. The green letter "P" is displayed. And continue to hold the SET key for 5 seconds again. PG10 is displayed in the green color.

Please select the down key to select PG24.

And press and hold the SET key until Add is displayed in green color.

You can use the arrow keys to select your desired Station No..

4 Restart the power

To validate the setting, please restart the thermoregulator.

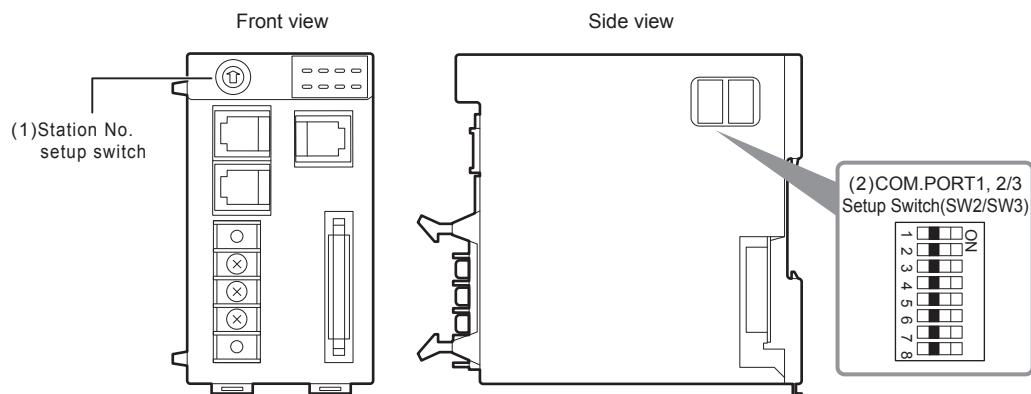
● To communicate with VT5/VT3

1 Set up the computer mode.

Please press the MODE button to select LOC/COMP mode.

Light the "COMP" mode. When "LOC" lights, please press the up key to light "COMP".

■ SR-Mini HG Series



(1) Station No. setup switch

Set the station No. to "0".



Set the station No. to "0". Ensure to set the station No. to "0".

Set up the station No.



(2) COM.PORT1, 2/3 setup switch (SW2/SW3)

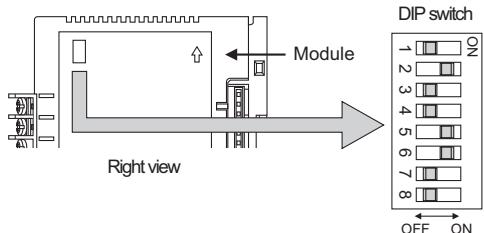
Setup Switch	Item	Setting Range		Default
	SW1 Data length	SW1:OFF	8 bits, no parity	8 bits, no parity
	SW2 Parity	SW2:OFF		
	SW3 Baud rate	SW3:OFF, SW4:OFF	9600 bit/s	
		SW3:ON, SW4:OFF	19200 bit/s	
	SW4	SW3:OFF, SW4:ON	38400 bit/s	
		SW3:ON, SW4:ON	According to settings	
	SW5 Communication protocol	SW5:ON	MODBUS protocol	MODBUS protocol
	SW6	SW6:OFF		
	SW7	SW7:OFF	--	--
	SW8	SW8:OFF		

■ SRZ Series



Power supply must be ON again after parameters are set.

1 Use lateral dip switch of each module to set data bit structure, communication protocol.



1	2	Communication speed ²
OFF	OFF	4800 bit/s
ON	OFF	9600 bit/s
OFF	ON	19200 bit/s (initial value)
ON	ON	38400 bit/s

5	6	7	Data bit structure
OFF	OFF	OFF	Data bit length 7 bits, no parity check, stop bit 1 bit
ON	OFF	OFF	Cannot be set
OFF	ON	OFF	Data bit length 7 bits, parity check even number, stop bit 1 bit
ON	ON	OFF	Data bit length 7 bits, parity check odd number, stop bit 1 bit
OFF	OFF	ON	Data bit length 8 bits, no parity check, stop bit 1 bit (initial value)
ON	OFF	ON	Cannot be set
OFF	ON	ON	Data bit length 8 bits, parity check even number, stop bit 1 bit
ON	ON	ON	Data bit length 8 bits, parity check odd number, stop bit 1 bit

*1 Please set switch 7 and 8 to OFF.

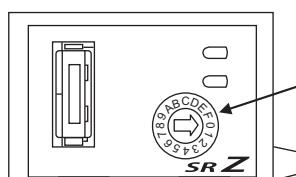
*2 4800 bit/s is unavailable for communication with VT3.

*3 It must be set to "MODBUS".

6	Communication protocol ³
OFF	RKC communication (INITIAL VALUE)
ON	MODBUS RTU

2 Use address setting switch of each module to set the station No. of each module.

With respect to the maximum number of connections of each module and the setting of address setting switch, station No. Relationship when viewed from VT3 is as follows.



Item	Z-TIO	Z-DIO	Z-CT
Maximum number of connected units ¹	16 units	8 units	7 units
The setting of address setting switch	0 to F	0 to 7	0 to 6
The station No. Viewed from VT3	0 to 15	16 to 23	24 to 30

*1 Maximum number of connected units on each module may be changed by special setting.

(Example) For the connection of 10 units of Z-TIO, two units of Z-DIO and one Z-FROM

Item	Z-TIO	Z-DIO	Z-CT
The setting of address setting switch	0 to 9	0 to 1	0
The station No. Viewed from VT3	0 to 9	16 to 17	24

PLC communication special setting

Maximum number of connected units on each module may be changed by special setting. Here, Maximum number of connected units set on each module and the station No. Viewed from VT3 will change.

Item	Setting range *1*2*3	Detail
Option 0	0 to 16	Set maximum number of connected units for Z-TIO.
Option 1	0 to 16	Set maximum number of connected units for Z-DIO.

*1 Total value in the setting range must be below 31.

*2 When value above "17" is set, station No. Corresponding to the set value is occupied.

*3 In case option 0 and option 1 are set to "0", the maximum number of units connected for Z-TIO is 16, and the maximum number for Z-DIO is 8.

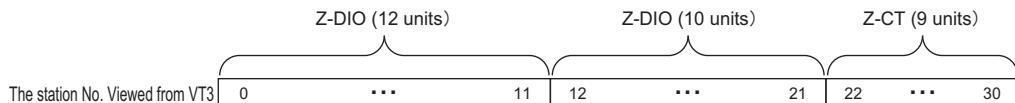
When special setting is used, the station No. viewed from VT3 is as follows.

Z-TIO : 0 to "value of option 0"-1

Z-DIO : "value of option 0" to "value of option 0"+"value of option 1"-1

Z-CT : "value of option 0"+"value of option 1" to 30

When special setting is used, the station No. viewed from VT3 changes as follows. Please consider system building after viewing the station No. From VT3 according to the special setting.

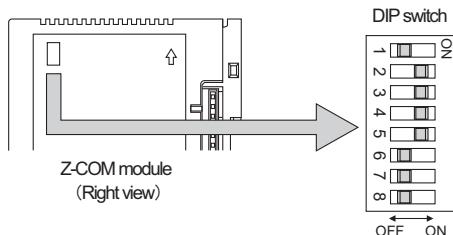
When special setting is not used**When special setting is used, and option 0 is set to "12", option 1 is set to "10"**

■ SRZ (when Z-COM is used) Series



Power supply must be ON again after parameters are set.

1 Set data bit structure, communication protocol via lateral dip switch of Z-COM module.



1	2	Communication speed ^{1,2}
OFF	OFF	4800 bit/s
ON	OFF	9600 bit/s
OFF	ON	19200 bit/s (initial value)
ON	ON	38400 bit/s

3 ⁵	Communication protocol, data bit structure ²	
OFF	Host communication (RKC communication) data bit length 8 bit, No parity check, stop bit 1 bit (initial value)	OFF
ON	Host communication (MODBUS) data bit length 8 bit, No parity check, stop bit 1 bit	ON

4	Communication speed ³
OFF	9600 bit/s (initial value)
ON	19200 bit/s

5 ⁶	6 ⁴	7 ⁴	Data bit structure ³
OFF	OFF	OFF	Host communication (RKC communication) Data bit length 8 bit, no parity check, stop bit 1 bit (initial value)
ON	OFF	OFF	Host communication (MODBUS) Data bit length 8 bit, no parity check, stop bit 1 bit
OFF	ON	OFF	PLC communication
ON	ON	OFF	PLC communication
OFF	OFF	ON	PLC communication
ON	OFF	ON	PLC communication
OFF	ON	ON	Cannot be set
ON	ON	ON	Cannot be set

*1 4800 bit/s is unavailable for communication with VT3.

*2 Please set up it when PORT1 or PORT2 is used.

*3 Please set up it when PORT3 or PORT4 is used.

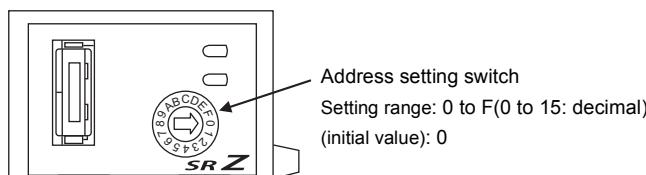
*4 It must be set to "ON".

8	Dip switch setting ⁴
OFF	Valid (initial value)
ON	Invalid

2 Use address setting switch of Z-COM module to set station No. Of each module.

With respect to maximum number of connections on Z-COM module and the setting of address setting switch, station No. Relationship when viewed from VT3

Is as follows.



3 Set Z-TIO, Z-DIO, Z-CT address setting switch connected with Z-COM module.

One Z-COM module may be connected with up to 31 Z-TIO, Z-DIO, Z-CT. (up to 16 units for the same module)
Please set address setting switch, avoid duplicate address.

Communication Conditions and Available Devices

● CB Series (1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C, RS-485	RS-485
Communication protocol	RKC protocol	RKC protocol
Baud rate	2400, 4800, 9600, 19200 bit/s	9600 bit/s
Data length	7 bits, 8 bits	8 bits
Parity	None/ Odd/ Even	None
Stop bit	1 bit, 2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

- * • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
• The VT5 Series does not support connections that use interface level converters (N-48).

● SR-Mini Series (1: 1)

Item	Setting Range	Default
PLC serial I/F	RS-232C	RS-232C
Communication protocol	MODBUS protocol	MODBUS protocol
Baud rate	9600, 19200, 38400 bit/s	9600 bit/s
Data length	8 bits	8 bits
Parity	None	None
Stop bit	1 bit	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

● SR-Mini Series (1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485	RS-485
Communication protocol	MODBUS protocol ²	MODBUS protocol
Baud rate	9600, 19200, 38400 bit/s	9600 bit/s
Data length	8 bits	8 bits
Parity	None	None
Stop bit	1 bit	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

- * • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
• The VT5 Series does not support connections that use interface level converters (N-48).

● REX-F Series (1: 1)

Item	Setting Range	Default
PLC serial I/F	RS-232C	RS-232C
Communication protocol	RKC protocol	RKC protocol
Baud rate	1200, 2400, 4800, 9600, 19200 bit/s	9600 bit/s
Data length	7 bits, 8 bits	7 bits
Parity	None/ Odd/ Even	Odd
Stop bit	1 bit, 2 bits	2 bits
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

● REX-F Series (1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C [†] , RS-485	RS-485
Communication protocol	RKC protocol	RKC protocol
Baud rate	1200, 2400, 4800, 9600, 19200 bit/s	9600 bit/s
Data length	7 bits, 8 bits	7 bits
Parity	None/ Odd/ Even	Odd
Stop bit	1 bit, 2 bits	2 bits
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

* An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

● SRZ Series, SRZ Series (when Z-COM is used)

Item	Setting range	Initial value
PLC serial I/F	RS-232C [†] , RS-485	RS-485
Communication protocol	MODBUS RTU	MODBUS RTU
Communication speed	9600, 19200, 38400 bit/s	115200 bit/s
Data bit length	8 bit	8 bit
Stop bit	1 bit	1 bit
Parity	None, odd number, even number	None
Control mode	ER CONTROL	ER CONTROL
Check sum	-	-
CR	-	-
LF	-	-

* An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

■ Available devices

Giving out information about the devices and scope of devices to be used by the thermoregulators.



For the devices that use the thermoregulator units like VT STUDIO, please convert the data format into the 16-bit integer. In case of floating-point numbers, an error may happen.

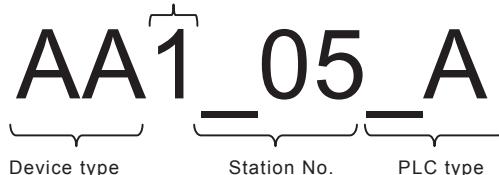
● CB Series and REX-F Series

For more information about the devices, please refer to their manuals.

type	Scope of Devices	
	REX-F Series	CB Series
Bit Devices	AA1 to DH0	AA1 to EM0
Word Device	M10 to LK0	M10 to ER0

Specifying Devices

Device No



- Device type : please ensure to use 2-position half-width numeric values.
- Device No. : please ensure to use 1-digit half-width numeric values.
- Station No. : when the "REX-F Series (1:N)" or "CB Series (1:N)" is selected as the target PLC, station No. can be selected from 0 to 30.
No information is available when the "REX-F Series (1:1)" or "SR-Mini Series (1:1)" is selected as the target PLC.
- PLC type : when the MultiTalk function is used, PLC_PLC_A/PLC_B can be selected. No information is available when the MultiTalk function is not used.

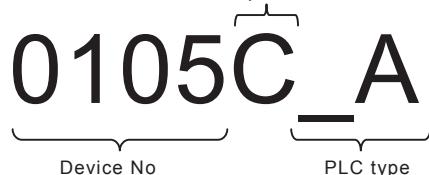
● SR-Mini Series

For more information about the devices, please refer to their manuals.

type	Scope of Devices
Bit device (hold register)	B00000 to B1FFFF
Word device (hold register)	0000 to 1FFF

Specifying Devices

Bit position



- Device No. : selected within the scope of the devices.
- Bit position : for bit devices, this is selected from 0 to F.
- PLC type : when the MultiTalk function is used, PLC_A/PLC_B can be selected. No information is available when the MultiTalk function is not used.



The MODBUS protocol of SR-Mini can only read and write the word device commands, and cannot read and write the bit devices directly.

To read bit devices, therefore, the bit position should be specified by referring to the word device with the specified address before bits are read.

Read the word device that modifies the specified bit position.

● SRZ Series

Item		Initial value
Bit device ^{*1}	Z-TIO REGISTER (bit)(TIOB)	TIOB00000 to TIOB100FF
	Z-DIO REGISTER (bit)(DIOB)	DIOB00000 to DIOB100FF
	Z-CT REGISTER (bit)(CTB)	CTB00000 to CTB01F1F
Word device ^{*1}	Z-TIO REGISTER (TIO) ^{*2}	TIOB0000 to TIOB150F
	Z-DIO REGISTER (DIO) ^{*2}	DIOB0000 to DIOB150F
	Z-CT REGISTER (CT) ^{*2}	CTB0000 to CTB01F1
	Connect diagnosis (DIA) ^{*3}	DIA0000

*1 Read-only device is available. For details, see appropriate manuals.

*2 Please use together with the module being used. When the register being used does not support various modules, error occurs.

*3 Connect the device for diagnosis. Always read 1234 (hexadecimal number). May be used in all modules.

● SRZ Series (when Z-COM is used)

Item		Initial value
Bit device ^{*1}	Z-COM REGISTER (bit)(COMB)	COMB00000 to COMB801BF
	Z-TIO REGISTER (bit)(TIOB)	TIOB01FC0 to TIOB3DABF
	Z-DIO REGISTER (bit)(DIOB)	DIOB3E6C0 to DIOB46ABF
	Z-CT REGISTER (bit)(CTB)	CTB46BC0 to CTB65ABF
Word device ^{*1}	Z-COM REGISTER (COM) ^{*2}	COM0000 to COM801B
	Z-TIO REGISTER (TIO) ^{*2}	TIO01FC to TIO3DAB
	Z-DIO REGISTER (DIO) ^{*2}	DIO3E6C to DIO46AB
	Z-CT REGISTER (CT) ^{*2}	CT46BC to CT65AB
	Connect diagnosis (DIA) ^{*3}	DIA0000

*1 Read-only device is available. For details, see appropriate manuals.

*2 Please use together with the module being used.

*3 Connect the device for diagnosis. Always read 1234 (hexadecimal number). May be used in all modules.



SRZ Series can only read and write the word device commands, and cannot read and write the bit devices directly.

To read bit devices, therefore, the bit position should be specified by referring to the word device with the specified address before bits are read.

Read the word device that modifies the specified bit position.

Error Message

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs.

The error messages are shown as follows.

Display message	Causes	How to handle
TimeOutError(++)/ UnitTimeOutError	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Thermoregulator is OFF.	Turn the Thermoregulator ON
	The Thermoregulator side is in error or fault status.	Please clear the error or fault on the Thermoregulator side.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.

Display message	Causes	How to handle
ParityError	A parity error occurred during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
OverRunError	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
FramingError	The stop bit cannot be detected during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
CommunicationError	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

■ CB series, REX-F series

Message	Causes	How to handle
COM ERROR [Identifier (++)]	The identifier received from the thermoregulator differs from that sent from VT5/VT3.	<ul style="list-style-type: none"> • Verify whether the RKC protocol is selected in communication settings of the thermoregulator. • Check whether the VT5/VT3 support the connected thermoregulator.
COM ERROR [RecvData(++)]	The VT5/VT3 received unexpected data from the thermoregulator.	Check whether the VT5/VT3 support the connected thermoregulator.
COM ERROR [NAK(++)]	Written value out of range	Check the values loaded from VT5/VT3.
	Devices that do not exist are configured on the screen.	Set up the devices within the range again.
	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
COM ERROR [BCC(++)]	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
	The value to be written is outside the range of the written device value.	Please write a value within the range.

■ SR-Mini Series

Message	Causes	How to handle
COM ERROR [Identifier(++)]	The identifier received from the thermoregulator differs from that sent from the VT5/VT3.	Check whether the VT5/VT3 support the connected thermoregulator.
COM ERROR [**(++)]	The device that is set is outside the range of the device setting range.	Set the device again within range.
	A nonexistent device has been set.	
	[**](DEC): error code of the thermoregulator	For the error code[**], see the User's Manual of the manufacturer for the connected thermoregulator.
CRC Error (++)	Checksum is not correct. The calculation method for check sum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.

■ SRZ Series

Error message	Reason	How to handle
COM ERROR [Identifier(++)]	The identifier received from the thermoregulator is different from that sent from VT3.	Verify whether the thermoregulator connected with VT3 is supported.
Error[**(++)]	The device that is set is outside the range of the device setting range.	Set the device again within range.
	A nonexistent device has been set.	
	[**](DEC): error code of the thermoregulator	For the error code[**], see the User's Manual of the manufacturer for the connected thermoregulator.
CRC Error (++)	Checksum is not correct. The calculation method for check sum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Device Kind Error (++)	Device type of station No. ++ does not support the module type assigned on the station No..	Please change to the device type supported by each module.

18-3 Connection of Thermoregulators from OMRON

This section describes how to connect Omron Corporation thermoregulators to VT5/VT3.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting Omron Corporation thermoregulators to VT5/VT3.

- (1) Make sure that VT5/VT3 can be connected to the thermoregulator.
- (2) Check to see if the thermoregulators need to be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the thermoregulator.

Series Name	Thermoregulator	I/F	Unit Setting	Target PLC
Thermac NEO series	E5AN, E5EN	RS-232C RS-485	□ P.18-34	E5*N Series (1: 1) ^{*2}
	E5CN, E5GN	RS-485	□ P.18-34	E5*N Series (1: N) ^{*2}
	E5AN-H, E5EN-H, E5CN-H	RS-232C RS-485	□ P.18-34	E5*N-H Series (1: 1) ^{*2}
	E5AN-H, E5EN-H	RS-422A ^{*1}	□ P.18-34	E5*N-H Series (1: N) ^{*2}
E5□C Digital controller	E5AC, E5EC, E5CC, E5DC	RS-485	□ P.18-34	
In-Panel NEO series	E5ZN	RS-485	□ P.18-35	E5ZN Series (1: N) ^{*2}

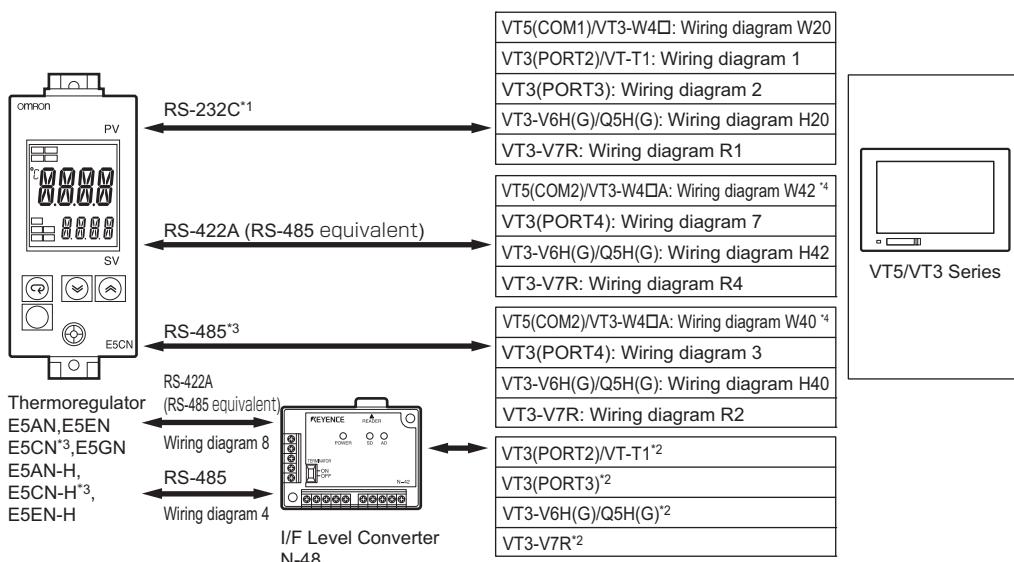
*1 Wiring and communication conform to RS-485 standard.

*2 Not supported by Soft-VT.

System Configuration

This section describes the system configuration of the VT5/VT3 Series and an Omron Corporation thermoregulator.

■ Thermac NEO series



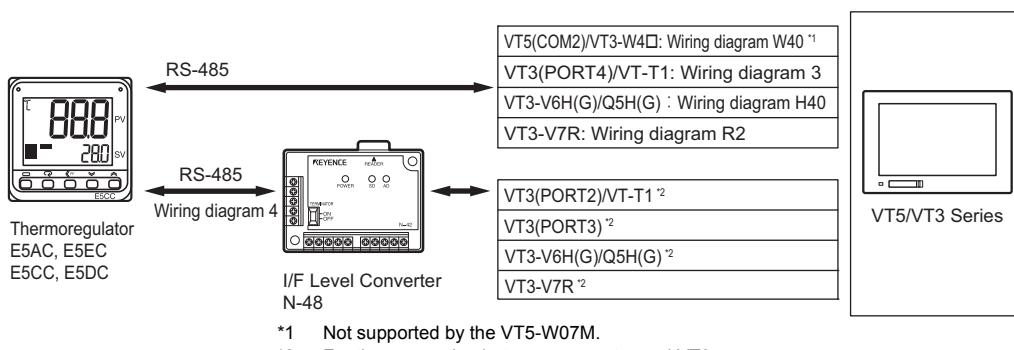
*1 E5CN and E5GN cannot be connected with RS-232C.

*2 For the connection between converter and VT3, see "18-8 Connections Using Adapter"

*3 When connecting E5CN(-H) with VT3(PORT4) or V7R from KEYENCE manufactured before November, 2010, please call VT support.

*4 Not supported by the VT5-W07M.

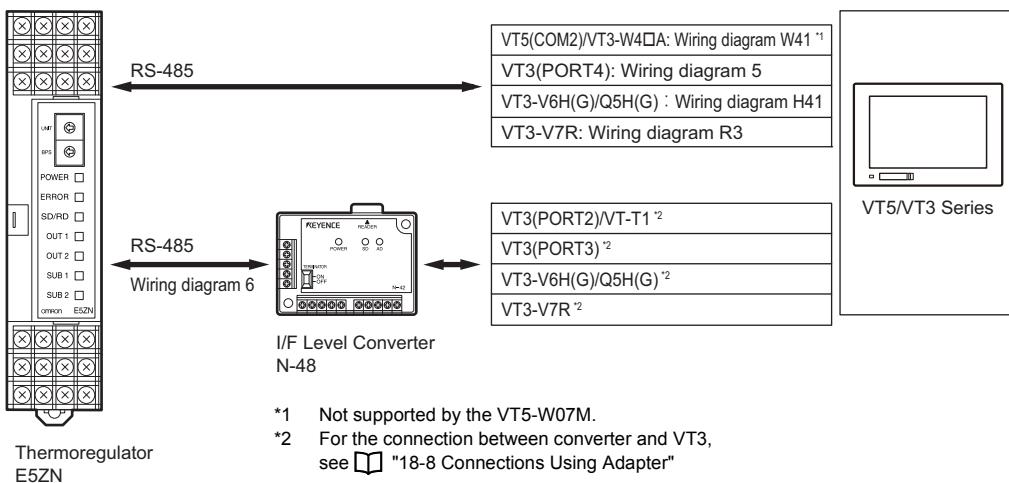
■ E5□C Digital controller



*1 Not supported by the VT5-W07M.

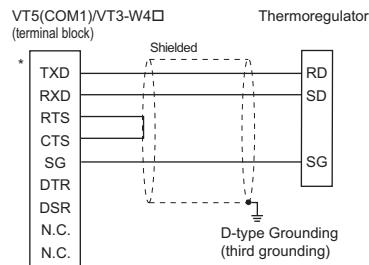
*2 For the connection between converter and VT3, see "18-8 Connections Using Adapter"

■ In-Panel NEO series



Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

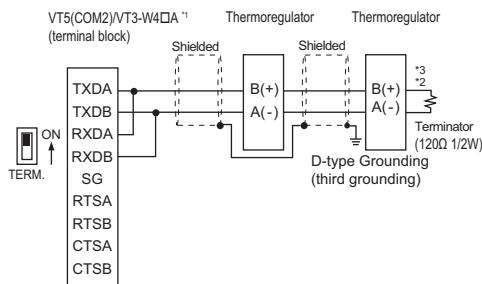
■ Wiring diagram W20 (RS-232C)



* [] indicates a terminal diagram for the VT5 Series.

Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A/485)

■ Wiring diagram W40 (RS-485: 2-wire)

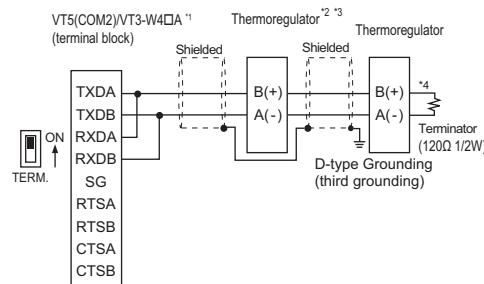


*1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator switch to "ON".

*2 A terminator (120Ω 1/2W) needs to be connected when the thermoregulator is at the end of the communication line.

*3 When unstable communication occurs for the thermostat manufactured after Dec 2007, remove the termination resistor.

■ Wiring diagram W41 (RS-485: 2-wire)



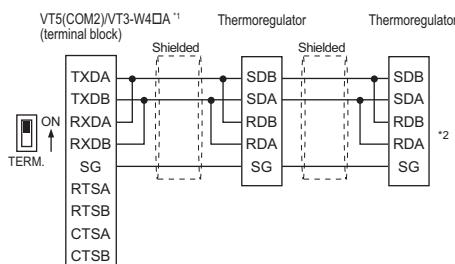
*1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator switch to "ON".

*2 When connecting E5ZN via RS-485, the "E5ZN-SCT24S" terminal unit with communication terminal has to be used.

*3 The "E5ZN + E5ZN-SCT16S" can be connected to "E5ZN + E5ZN-SCT24S".

*4 A terminator (120Ω 1/2W) needs to be connected when the thermoregulator is at the end of the communication line.

■ Wiring diagram W42 (RS-422A: 4-wire)



*1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator switch to "ON".

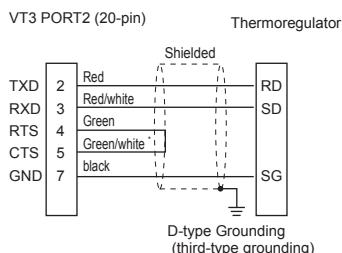
*2 Install a terminating resistor (120Ω 1/2W) on thermostat of the communication cable end.

Connection to VT3 Series

The following describes wiring of connector cables.

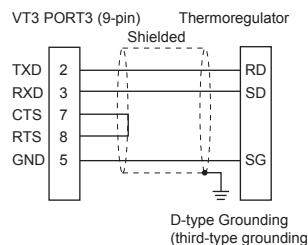
The wiring diagrams recommended by OMRON may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-232C: OP-24027)

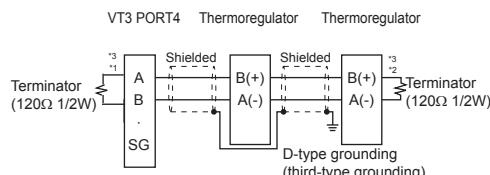


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 2 (RS-232C)

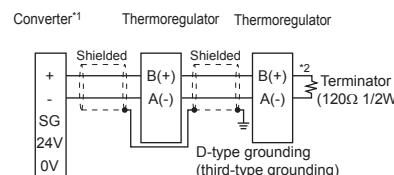


■ Wiring diagram 3 (RS-485)



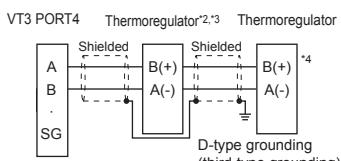
- *1 When VT3 is on one end of the communication line, install termination resistor (100Ω 1/2W) between A and B of PORT4.
- *2 Install the termination resistor (100Ω, 1/2W) onto the thermoregulator connected to one end of the communication line.
- *3 When unstable communication occurs in thermoregulator made after December, 2007, remove the terminator.

■ Wiring diagram 4 (RS-485)



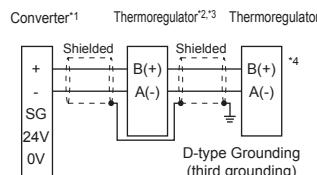
- *1 When the converter is connected to one end of the communication line, turn the terminator switch to ON.
- *2 Install the termination resistor (120Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram 5 (RS-485)



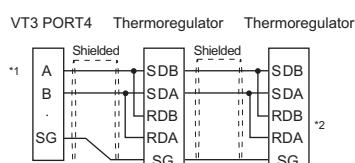
- *1 Not connect the short bar to VT3. (Terminator OFF)
- *2 When connecting E5ZN with RS-485, an additional terminal unit "E5ZN-SCT24S" with communication terminals should be used.
- *3 "E5ZN + E5ZNSCT18S" can be connected with "E5ZN+5ZNSCT24S".
- *4 Not install the termination resistor.

■ Wiring diagram 6 (RS-485)



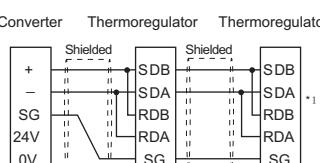
- *1 Turn the terminator switch of the converter to OFF.
- *2 When connecting E5ZN with RS-485, an additional terminal unit "E5ZN-SCT24S" with communication terminals should be used.
- *3 "E5ZN+E5ZN-SCT18S" can be connected with "E5ZN+E5ZN-SCT24S".
- *4 Not install the termination resistor.

■ Wiring diagram 7 (RS-422A: 4-wire)



- *1 Please do not install a shorting stick for VT3. (Terminator OFF)
- *2 Do not install a terminating resistor.

■ Wiring diagram 8 (RS-422A: 4-wire)



- *1 Do not install a terminating resistor.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Connection with VT3 Handy Series



Point FG2 must be grounded.

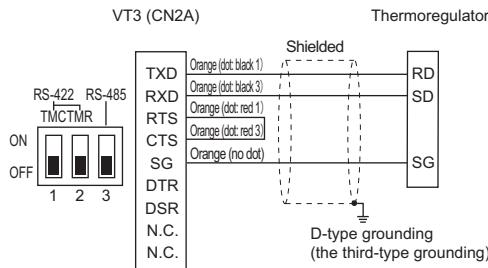
■ Wiring diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

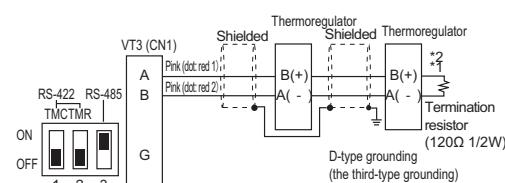
OP-87193:10m



■ Wiring diagram H40 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



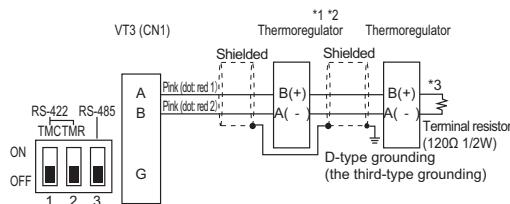
*1 Please install a terminal resistor (120Ω 1/2W) on the thermoregulator at communication cable end.

*2 If the thermoregulator used is produced after Dec. 2007, please remove the terminal resistor in case of unstable communication.

■ Wiring diagram H41 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



*1 For connection of E5ZN via RS-485, it is necessary to use the terminal unit E5ZN-SCT24S with communication terminal.

*2 "E5ZN + E5ZN-SCT18S" is connected to "E5ZN + E5ZN-SCT24S" for addition.

*3 The thermoregulator at communication cable end should be equipped with a terminal resistor (120Ω 1/2W).

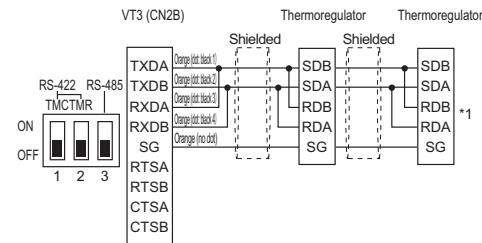
■ Wiring diagram H42 (RS-422A: 4-wire)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



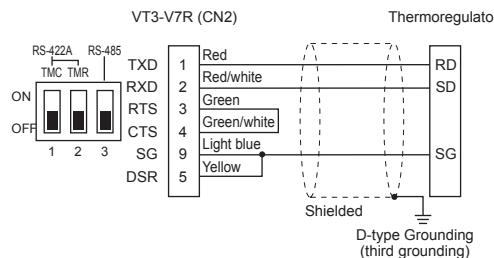
*1 The thermoregulator at communication cable end should be equipped with a terminal resistor (120Ω 1/2W).

Connection to VT3-V7R



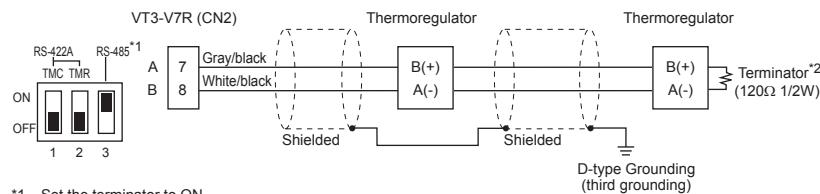
Point Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13

■ Wiring diagram R1 (RS-232C: VT-C5R1)



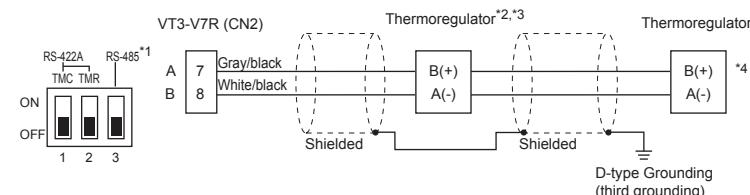
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram R2 (RS-485: VT-C5R1)



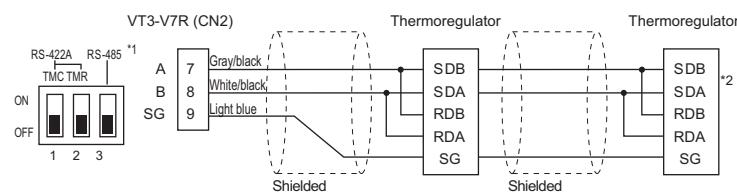
*1 Set the terminator to ON.
*2 Install the terminator (120Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram R3 (RS-485: VT-C5R1)



*1 Set the terminator to OFF.
*2 When connecting E5ZN with RS-485, an additional terminal unit "E5ZN-SCT24S" with communication terminals should be used.
*3 "E5ZN+E5ZNSCT18S" can be connected with "E5ZN+E5ZN-SCT24S".
*4 Not install the termination resistor.

■ Wiring diagram R4 (RS-422A: 4-wire)



*1 Turn off the terminator.

*2 Do not install a terminating resistor.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ Thermac NEO series

● Communication setting of E5AN, E5CN, E5EN and E5GN

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Station No.	0 to 30 ¹	1
Protocol Selection	CompoWay/F ²	CompoWay/F
Baud rate	1200, 2400, 4800, 9600, 19200, 38400 ³ bit/s	9600 bit/s
Data length	7, 8 bits	7 bits
Parity	None, odd, even	Even
Stop bit	1 bit, 2 bits	2 bits

*1 When the target PLC is set to "E5*N Series (1:1)", ensure to set the Station No. to "1".
otherwise, nothing happens.

*2 For the protocol selection, "CWF" should be selected from the "PSEL".

*3 38400bit/s cannot be set up for E5GN.

● Communication setting of E5AN-H, E5CN-H and E5EN-H

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Station No. ¹	0 to 99	1
Protocol Selection ²	CompoWay/F	CompoWay/F
Baud rate ³	1200, 2400, 4800, 9600, 19200, 38400, 57600 bit/s	9600 bit/s
Data length	7, 8 bits	7 bits
Parity	None, odd, even	Even
Stop bit	1 bit, 2 bits	2 bits

*1 The station No. can be set to 99 only when the PLC is selected as "E5*N-H series (1:1)".
When "E5*N-H series (1:N)" is selected, the station No. will be 0-30.

*2 Set the "PSEL" parameter of the thermostat to "CWF" when selecting a protocol.

*3 When the target PLC is "E5*N-H series (1:N)", it is only possible to select a communication speed of more than 9600bit/s.

■ E5□C Digital controller

● E5AC, E5EC, E5CC, E5DC communication settings

See the device manual for how to modify the settings.

Item	Setting Range	Default
Station No.	0 to 99	1
Protocol Selection ¹	CompoWay/F, Modbus	CompoWay/F
Baud rate	9600, 19200, 38400, 57600 bit/s	9600 bit/s
Data length	7, 8 bits	7 bits
Parity	None, odd, even	Even
Stop bit	1 bit, 2 bits	2 bits
Communication response wait time	0 to 99 ms	20 ms

*1 Be sure set Protocol Selection to "CompoWay/F".

● Write to the devices of thermoregulators

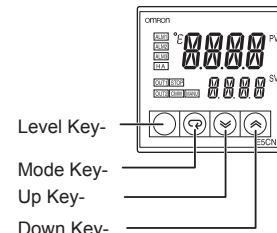
The following operations are required to write from the VT5/VT3 to the thermoregulator (Thermac NEO Series, E5□C digital controller) device.

1 Under the Run mode, press the Level Key of the thermoregulator.

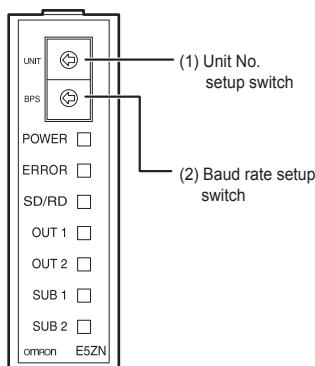
First check to ensure the thermoregulator is turned to the Run mode, then press the Level Key (no more than 1 second).

2 Press the Mode Key until "CMWT" is displayed.

3 Select ON by pressing the Up Key and Down Key.

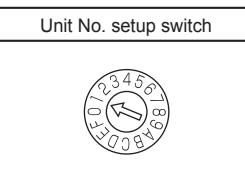


■ In-Panel NEO series



(1) Unit No. setup switch

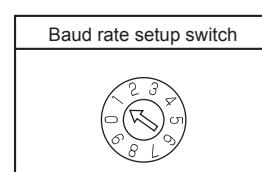
Used to set up the unit No.



(2) Baud rate setup switch

Used to set up the communications speed.

Set value	0	1	2	3	4 to 9
Communication Speed (bit/s)	4800	9600	19200	38400	Reserved



● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Unit Number	0 to F (0 to 15)	1
Baud rate	4800, 9600, 19200, 38400 bit/s	9600 bit/s
Data length	7, 8 bits	7 bits
Parity	None/Odd/Even	Even
Stop bit	1 bit, 2 bits	2 bits

- Devices that read thermoregulators

The following operations are required to write from the VT5/VT3 to the thermoregulator (In-Panel NEO Series) device.

- 1 Connect and set up the display screen E5ZN-SDL to E5ZN.

In addition, E5ZN-SDL is also needed for the setup change of E5ZN.

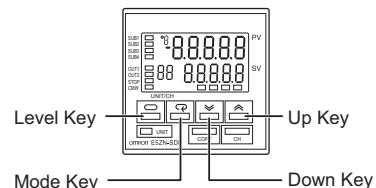
- 2 When the current value is displayed, press Level Key once.

- 3 Press the Mode Key until "CMWT" is displayed.

Press and hold the Mode Key until "CMWT" is displayed in the first display of E5ZN-SDL.

- 4 Press the Up Key.

Please press the Up Key to check to ensure that the second display is ON.



Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● Thermac NEO Series (1:1)

Item	Setting Range	Default
PLC serial I/F	RS-232C, RS-485	RS-232C
Communication protocol	CompoWay/F [*]	CompoWay/F
Baud rate	1200, 2400, 4800, 9600, 19200, 38400bit/s	9600 bit/s
Data length	7 bits, 8 bits	7 bits
Parity	None/ Odd/ Even	Even
Stop bit	1 bit, 2 bits	2 bits
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

* Only supported by CompoWay/F.

● Thermac NEO Series (1: N), E5□C digital controller (1:N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485 ³	RS-485
Communication protocol	CompoWay/F ³	CompoWay/F
Baud rate ⁴	1200, 2400, 4800, 9600, 19200, 38400, 57600bit/s	9600 bit/s
Data length	7 bits, 8 bits	7 bits
Parity	None/Odd/ Even	Even
Stop bit	1 bit, 2 bits	2 bits
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

¹ An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
The VT5 Series does not support connections that use interface level converters (N-48).

² Only CompoWay/F is supported.

³ The E5*N-H uses the RS-422A serial interface, but VT5/VT3 use the RS-485 serial interface (PORT4) for communication.

⁴ When the target PLC is "E5*N-H series", it is only possible to select a communication speed of more than 9600bit/s.

● In-Panel NEO Series (1:N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485	RS-485
Communication protocol	CompoWay/F	CompoWay/F
Baud rate	4800, 9600, 19200, 38400 bit/s	9600 bit/s
Data length	7 bits, 8 bits	7 bits
Parity	None/ Odd/ Even	Even
Stop bit	1 bit, 2 bits	2 bits
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

¹ An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
The VT5 Series does not support connections that use interface level converters (N-48).

■ Available devices

Giving out information about the devices and scope of devices to be used by the thermoregulators.



For the devices that use the thermoregulator units like VT STUDIO, please set the data format into binary (decimal), and set the data length to 2 words. In case of floating-point numbers, an error may happen.

● Thermac NEO Series (E5AN, E5EN, E5CN, E5GN)

For more information about the devices, please refer to their manuals.

Type	Scope of Devices
Bit device ^{*3 *4}	C1020 to C3340, 30000, ¹ 30010, ¹ 30020~30023, ¹ 30030, ¹ 30040, ¹ 30050, ¹ 30090, ¹ 300E0, ¹ 30110, ¹ C00100 to C00131, ² C01100 to C01131 ²
Word device ^{*3}	C0000 to C3370, 300C0 ¹

^{*1} Write-specific device. (Always be 0 when reading.)

^{*2} Read-specific device.

^{*3} Do not use the device range not mentioned in manuals.

^{*4} The following devices are not supported.

- Soft reset
- Set Area 1 line shift
- Protection level line shift

● Thermac NEO Series (E5AN-H, E5CN-H, E5EN-H),

E5□C digital controller (E5AC, E5EC, E5CC, E5DC)

For more information about the devices, please refer to their manuals.

Type	Scope of Devices
Bit device ^{*3}	C1020 to C3340, 30000, ¹ 30010, ¹ 30020~30023, ¹ 30030, ¹ 30040, ¹ 30050, ¹ 30090, ¹ 300E0, ¹ 30110, ¹ C00100 to C00131, ² C01100 to C01131 ²
Word device ^{*3}	C0000 to C3370, 300C0 ¹ C00000 to C00013, ² C10000 to C1004D, C30000 to C300CB, C40000 to C4007E, C50000 to C50077, A0000 to A0012 ¹

^{*1} Write-specific device. (Always be 0 when reading.)

^{*2} Read-specific device.

^{*3} Do not use the device range not mentioned in manuals.

Specifying Devices

Device No.



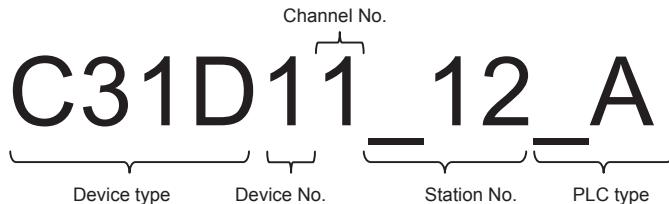
- | | |
|---------------|--|
| • Device type | : please ensure to use 4-position half-width numeric values, Only the operation commands (A00) are to be specified using a 3-digit number. |
| • Device No. | : please ensure to use 1-digit half-width numeric values. |
| • Station No. | : when the "E5*N Series (1:N) or E5*N-H Series (1:N)" is selected as the target PLC, the number can be selected from 0 to 30. |
| • PLC type | No information is available when "E5*N Series(1:1) or E5*N-H Series(1:1)" is selected as the target PLC.
when the MultiTalk function is used, PLC_A/PLC_B can be selected. No information is available when the MultiTalk function is not used. |

● In-Panel NEO Series (E5ZN)

For more information about the devices, please refer to their manuals.

Type	Scope of Devices
Bit Devices	C1020 to C33D0, 30000, 30011, 30012, 30021, 30022, 30031, 30032, 30040, 30050, 30091, 30092, 300A0, 30060, 30070, 30080, C001001 to C001312
Word Devices	C0001 to C33E0, 300C0, C00000 to C00106, C10000 to C10119, C30000 to C3013E, A0000 to A000C

Specifying Devices



- Device type : Ensure to use 4-position half-width numeric values.
- Device No. : Ensure to use 1-digit half-width numeric values (0 to 4).
- Channel No. : Ensure to use 1-digit half-width numeric values (0 to 2).
- Station No. : Select from 0 to 15.
- PLC type : When the MultiTalk is used, PLC_A/PLC_B should be specified. No information is available when the MultiTalk function is not used.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
DataError[****(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[****](HEX): Error code of Thermoregulator	For the error code[****], see "Connected Thermoregulator maker User's Manual".
Time Out Error(++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Thermoregulator is OFF.	Turn the Thermoregulator ON.
	The Thermoregulator side is in error or fault status.	Please clear the error or fault on the Thermoregulator side.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error(++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

18-4 Connection of Thermoregulators from Yokogawa Electric

This section describes how to connect Yokogawa Electric Corporation thermoregulators to the VT5/VT3 Series.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting a Yokogawa Electric Corporation thermoregulator to the VT5/VT3.

- (1) Make sure that the VT5/VT3 can be connected to the thermoregulator.
- (2) Check to see if the thermoregulators need to be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the thermoregulator.

Series Name	Thermoregulator	I/F	Unit Setting	Target PLC
UT Advanced Series	UT55A, UT52A, UP55A, UP35A	RS-485	□ P.18-48	UT Series (1: N) ²
UT Series	UT152, UT155, UT320, UT350		□ P.18-48	
UT2000 series	UT2400, UT2800		□ P.18-48	

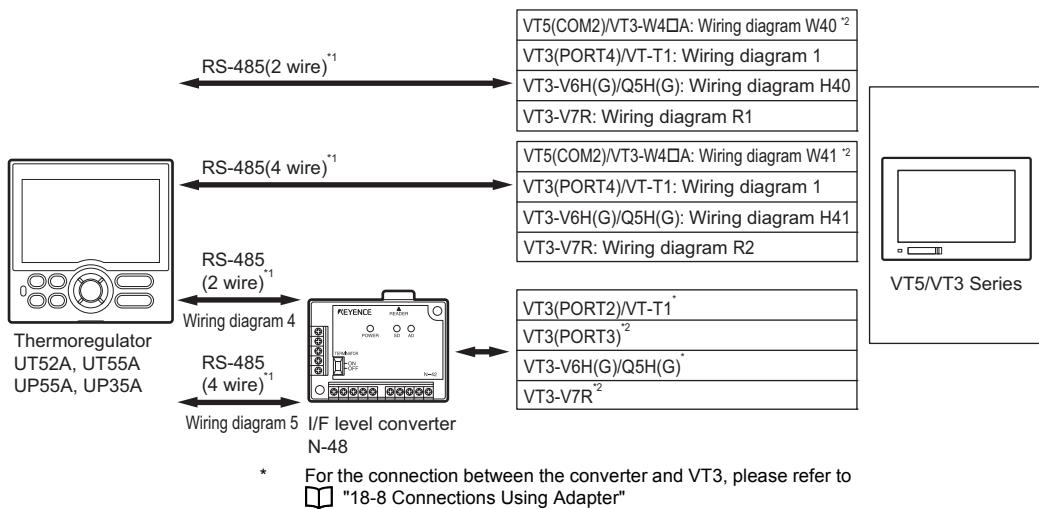
*1 With the wiring, the communication is equivalent to RS-485.

*2 Not supported by Soft-VT.

System Configuration

This section describes the configuration of the VT5/VT3 Series and a Yokogawa Electric Corporation thermoregulator.

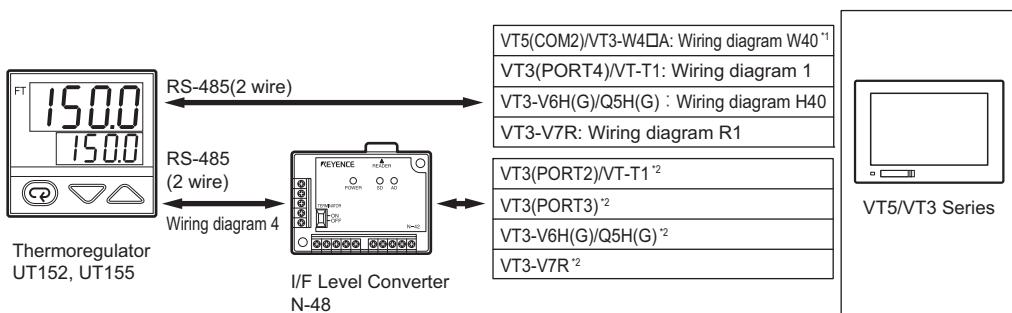
■ UT Advanced Series



*1 Available communication modes (RS-485 (2-wire system), RS-485 (4-wire system)) is related with type, please refer to the manual of various types.

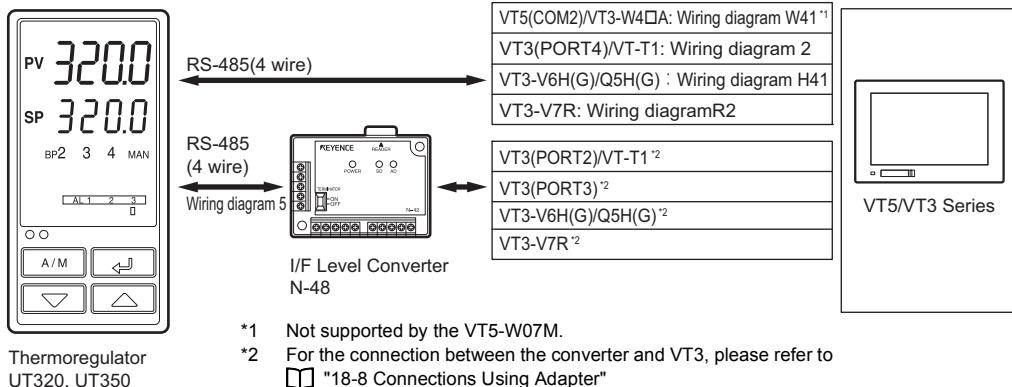
*2 Not supported by the VT5-W07M.

■ UT Series



*1 Not supported by the VT5-W07M.

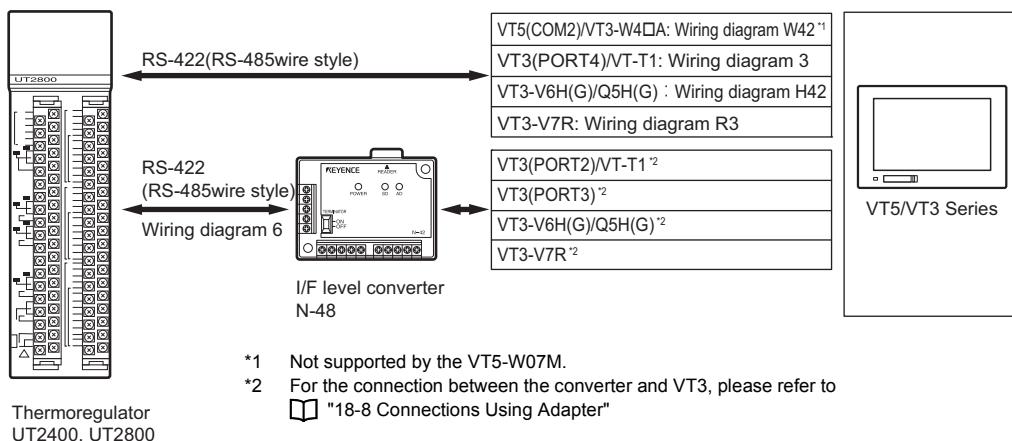
*2 For the connection between the converter and VT3, please refer to
"18-8 Connections Using Adapter"



*1 Not supported by the VT5-W07M.

*2 For the connection between the converter and VT3, please refer to
"18-8 Connections Using Adapter"

■ UT2000 series

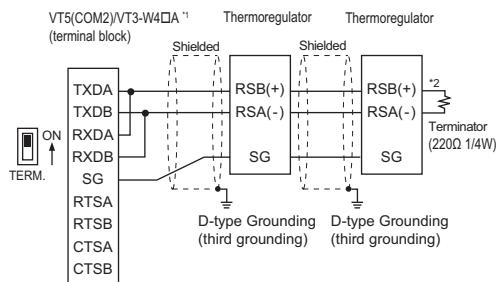


*1 Not supported by the VT5-W07M.

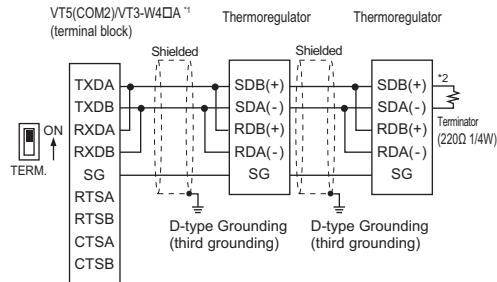
*2 For the connection between the converter and VT3, please refer to
"18-8 Connections Using Adapter"

Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A/485)

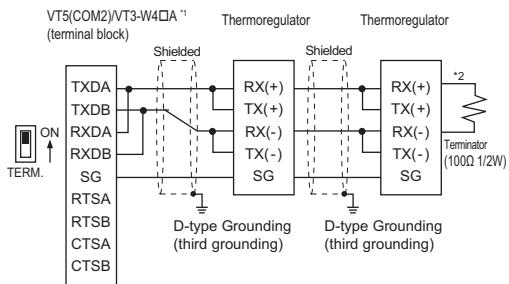
■ Wiring Diagram W40 (RS-485: 2-wire)



■ Wiring Diagram W41 (RS-485: 4-wire)



■ Wiring Diagram W42 (RS-422A: 4-wire)

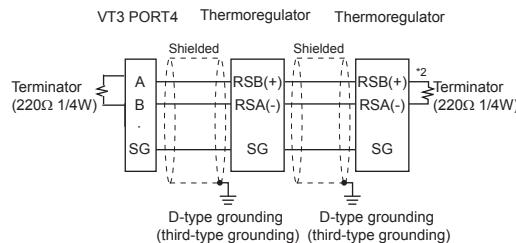


Connection to VT3 Series

The following describes wiring of connector cables.

The wiring diagrams recommended by Yokogawa Electric may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

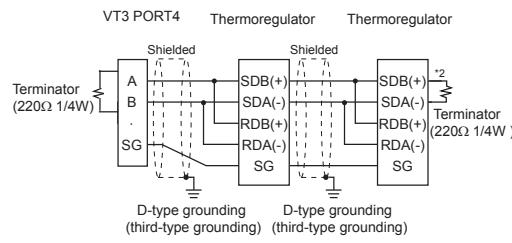
■ Wiring diagram 1 (RS-485: 2-wire)



*1 When VT3 is on one end of the communication line, install termination resistor (220Ω 1/4W) between A and B of PORT4 .

*2 Install the termination resistor (220Ω, 1/4W) onto the thermoregulator connected to one end of the communication line.

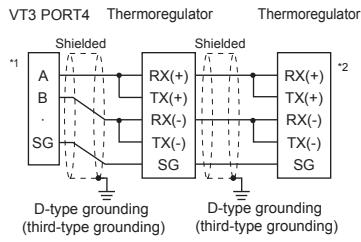
■ Wiring Diagram 2 (RS-485: 4-wire)



*1 When VT3 is on one end of the communication line, install termination resistor (220Ω 1/4W) between A and B of PORT4.

*2 Install the termination resistor (220Ω, 1/4W) onto the thermoregulator connected to one end of the communication line.

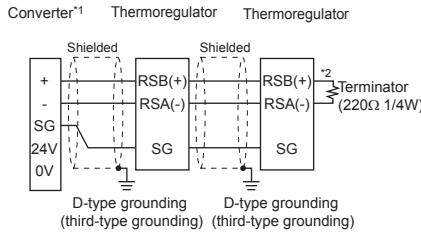
■ Wiring Diagram 3 (RS-485: 2-wire)



*1 Not connect short bar with VT3. (terminator OFF)

*2 Not install the termination resistor.

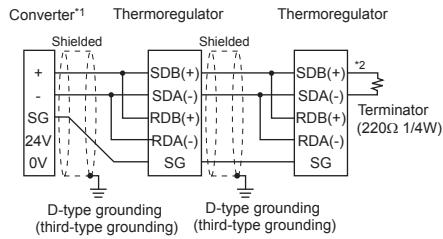
■ Wiring Diagram 4 (RS-485: 2-wire)



*1 When the converter is connected to one end of the communication line, set the terminator switch to ON.

*2 Install the termination resistor (220Ω, 1/4W) onto the thermoregulator connected to one end of the communication line.

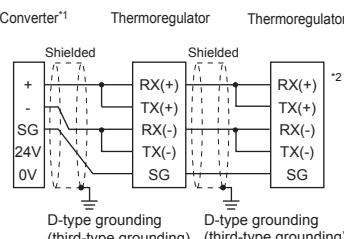
■ Wiring Diagram 5 (RS-485: 4-wire)



*1 When the converter is connected to one end of the communication line, set the terminator switch to ON.

*2 Install the termination resistor (220Ω, 1/4W) onto the thermoregulator connected to one end of the communication line.

■ Wiring Diagram 6 (RS-422A: 4-wire)



*1 Set the terminator switch of the converter to OFF.

*2 Not install the termination resistor.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

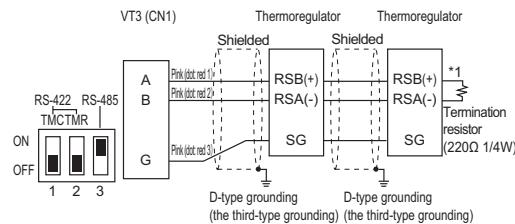
Connection with VT3 Handy Series



FG2 must be grounded.

■ Wiring Diagram H40 (RS-485: 2-wire)

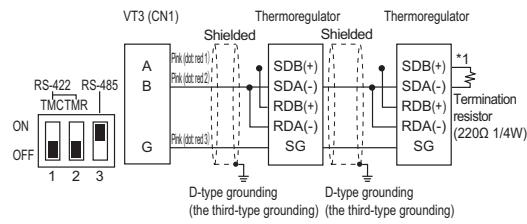
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



*1 The thermoregulator at communication cable end should be equipped with a terminal resistor(220Ω 1/4W).

■ Wiring Diagram H41 (RS-485: 4-wire)

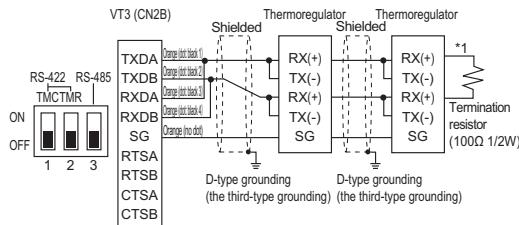
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



*1 The thermoregulator at communication cable end should be equipped with a terminal resistor(220Ω 1/4W).

■ Wiring Diagram H42 (RS-422: 4-wire)

OP-87185: 3m, OP-87186: 5m,
OP-87187:10m
OP-87191: 3m, OP-87192: 5m,
OP-87193:10m



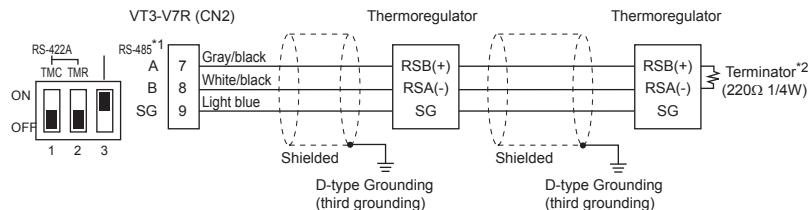
*1 The thermoregulator at communication cable end should be equipped with a terminal resistor(100Ω 1/2W).

Connection to VT3-V7R



Point Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13

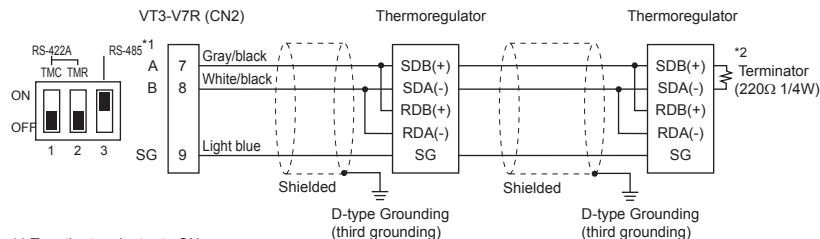
■ Wiring diagram R1 (RS-485: VT-C5R1)



*1 Turn the terminator to ON.

*2 Install the termination resistor (220Ω 1/4W) onto the thermoregulator connected to one end of the communication line.

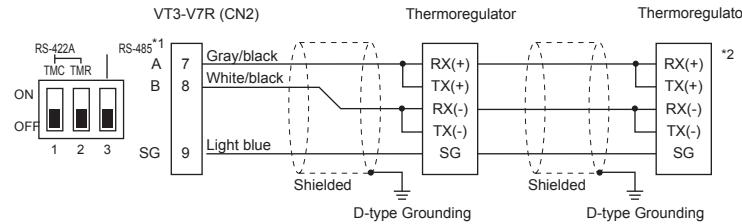
■ Wiring diagram R2 (RS-485: VT-C5R1)



*1 Turn the terminator to ON.

*2 Install the termination resistor (220Ω 1/4W) onto the thermoregulator connected to one end of the communication line.

■ Wiring Diagram R3 (RS-422A, 4-wire: VT-C5R2/C15R2)



*1 Turn the terminator to OFF.

*2 Not install the termination resistor.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ UT Advanced Series

Item	Initial value	Changed value
Protocol selection^{*1}	0: computer link communication 1: computer link communication (with check sum) 2: trapezoid communication 3: master coordination station 4: coordination substation 7: Modbus communication (ASCII) 8: Modbus communication(RTU) 9: master coordination station (2 cycle mode) 10: coordination substation (cycle 1 mode) 11: coordination substation(2 cycle mode) 12: communication between equipments	8: Modbus communication (RTU)
Station No.	1-99 ²	1
Communication speed^{*3}	600, 1200, 2400, 4800, 9600bps, 19200bps, 38400bps	19200bps
Data length	7 bits, 8 bits	8 bits
Parity check	None, odd number, even number	Even number
Stop bit	1 bit, 2 bits	1bit
Minimum response time	0-10 (X10ms)	0

*1 For the protocol selection, select from the following options from the "PSL" option of the thermoregulator.

- 0: computer link communication
- 1: computer link communication (with check sum)

*2 In communications with VT5/VT3 set a value in the range 1 to 31.

*3 In communications with VT5/VT3 set a speed of 9600bit/s or higher.

■ UT Series

● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Protocol Selection	0 to 1 ^{*1}	0
Station No.	1 to 99	0
Baud rate	9600 bit/s	9600 bit/s
Data length	7.8 bits	8 bits
Parity	None/Odd/Even	Even
Stop bit	1 bit, 2 bits	1 bit
CheckSum	ON, OFF	None
Minimum response time^{*2}	0 to 10(X10ms)	0

*1 For the protocol selection, select from the following options from the "PSL" option of the thermoregulator.

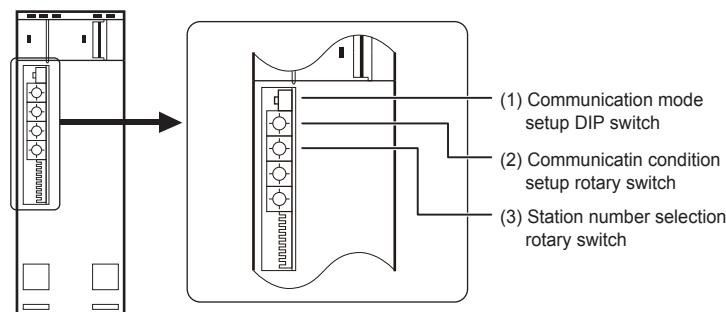
- 0: without the PC connection protocol and checksum.
- 1: with the PC connection protocol and checksum.

*2 In communications with VT5/VT3 set a value in the range 1 to 31.

*3 In communications with VT5/VT3 set a speed of 9600bit/s or higher.

*4 Cannot be set up for UT152/155. The min response time must be higher than 1.

■ UT2000 series

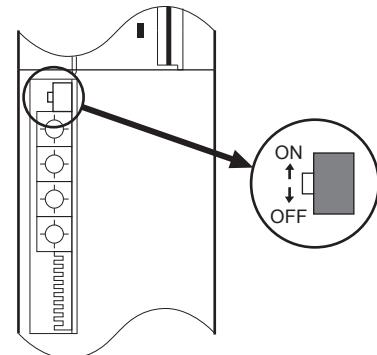


(1) Communication mode setup DIP switch

For communication setup.

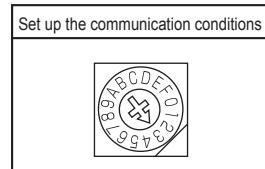
Switch	ON	OFF
Mode	PC communication mode	Ladder diagram communication mode*

- * The ladder diagram communication mode is not supported.
Please do not select this mode.



(2) Set up the communication conditions for the Communicatin condition

setup rotary switch.



Set value	0(F)	1	2	3	4	5	6	7	8	9	C	Ca	Cb	Cc	Cd
Baudrate (bit/s)	9600		4800		2400		1200		600	*					
Data bit											8 bits (fixed)				
Stop bit											1 bit (fixed)				
Parity	None	Odd	Even	None	Odd	Even	None	Odd	Even	None	Odd	Even	None	Odd	Even

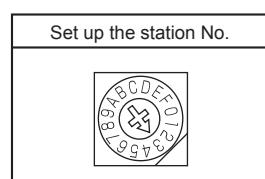
* A communication speed of 600bit/s can be set on the thermoregulator, but not for communications with the VT5/VT3.

(3) Station No. selection rotary switch

Set up the station No..

The station No. is the number that you get by adding 1 to the value of the rotary switch.

[Example] When A is specified with the rotary switch, the Station No. becomes B.



● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Protocol Selection	ON	ON
Station No.	1 to 16	1
Baud rate *	1200, 2400, 4800, 9600 bit/s	9600 bit/s
Data length	8 bits	8 bits
Parity	None/Odd/ Even	None
Stop bit	1 bit	1 bit
CheckSum	None	None

- * For the communication speed, select 600bit/s from the thermoregulator side. This can not be set up for the communication with VT3.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● UT Series (1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485 ^{2~5}	RS-485
Communication protocol	PC connection protocol	PC connection protocol
Baud rate	9600, 19200, 38400 bit/s	9600 bit/s
Data length	7 bit, 8 bits	8 bits
Parity	None/Odd/Even	Even
Stop bit	1 bit	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	ON, OFF	None

- *1 An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
- *2 The VT5 Series does not support connections that use interface level converters (N-48).
- *3 In communications with VT5/VT3 set a speed of 9600bit/s or higher.
- *4 2-bit setting of stop bit is available for UT Advanced Series only.
- *5 The VT5-W07M does not support RS-485 connections.

■ Available devices

Giving out information about the devices and scope of devices to be used by the thermoregulators.



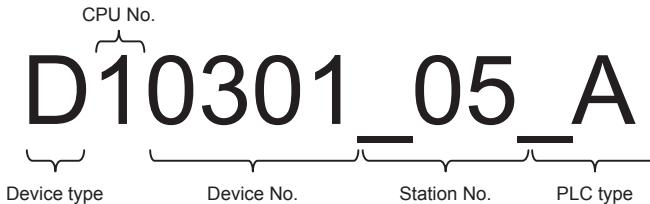
For the devices that use the thermoregulator units like VT STUDIO, please convert the data format into the 16-bit integer. In case of floating-point numbers, an error may happen.

● UT Series and UT2000 Series

For more information about the devices, please refer to their manuals.

type	Scope of Devices
Bit Devices	I10001 to I22048
Word Devices	D10001 to D29000

Specifying Devices



- Device type : select D or I.
- CPU No.* : select 1 or 2.
- Device No. : please ensure to use 4-position half-width numeric values.
- Station No. : specify the Station No. of the thermoregulator.
- PLC type : when the MultiTalk function is used, PLC_A/PLC_B can be selected. No information is available when the MultiTalk function is not used.

* Only UT2800 can select 2.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
Data Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**](HEX): Error code of Thermoregulator.	For the error code[**], see "Connected Thermoregulator maker User's Manual".
Time Out Error (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Thermoregulator is OFF.	Turn the Thermoregulator ON.
	The Thermoregulator side is in error or fault status.	Please clear the error or fault on the Thermoregulator side.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

18-5 Connection of Thermoregulators from Azbil Corporation

This section describes how to connect thermoregulators from Azbil Corporation (Yamatake) to the VT5/VT3 Series.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting a thermoregulator from Azbil Corporation (Yamatake) to the VT5/VT3.

- (1) Make sure that VT5/VT3 can be connected to the thermoregulator.
- (2) Check to see if the thermoregulators need to be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the thermoregulator.

Series Name	Thermoregulator	I/F	Unit Setting	Target PLC
SDC20 Series	SDC20, SDC21	RS-232C	 P.18-61	SDC20/21(1: 1) ^{*1 *2}
	SDC15, SDC25, SDC26	RS-485	 P.18-61	SDC15/20/21/25/26 (1: N) ^{*2}
SDC30 Series	SDC30, SDC31	RS-485	 P.18-61	SDC30/31/35/36 (1:N) ^{*2}
	SDC35, SDC36		 P.18-61	
SDC40 Series	SDC40A	RS-232C	 P.18-61	SDC40(1: 1) ^{*1 *2}
	SDC40G	RS-485	 P.18-61	SDC40(1: N) ^{*1 *2}
DMC Series	DMC10	RS-485	 P.18-62	DMC(1: N) ^{*1 *2}

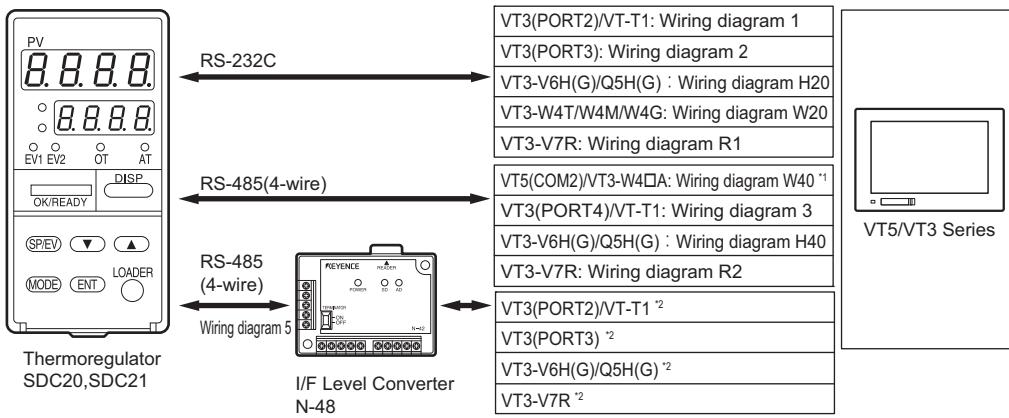
*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

System Configuration

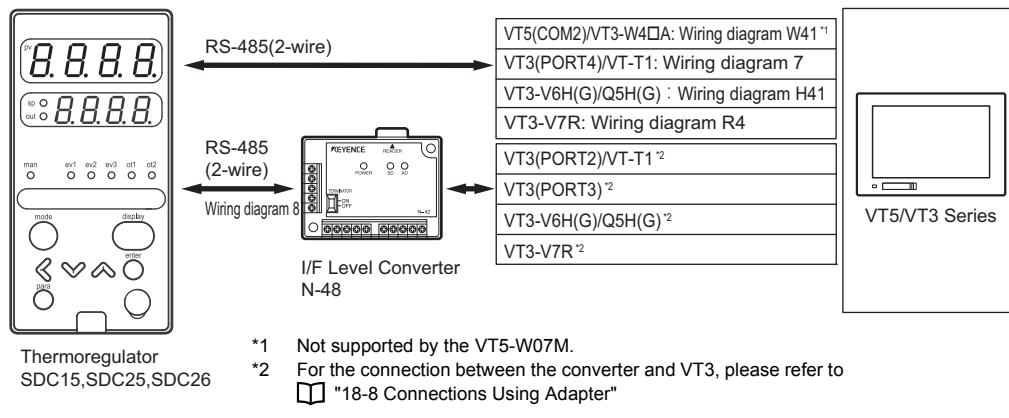
This section describes the system configuration of the VT5/VT3 Series and thermoregulators from Azbil Corporation (Yamatake).

■ SDC20 Series



^{*1} Not supported by the VT5-W07M.

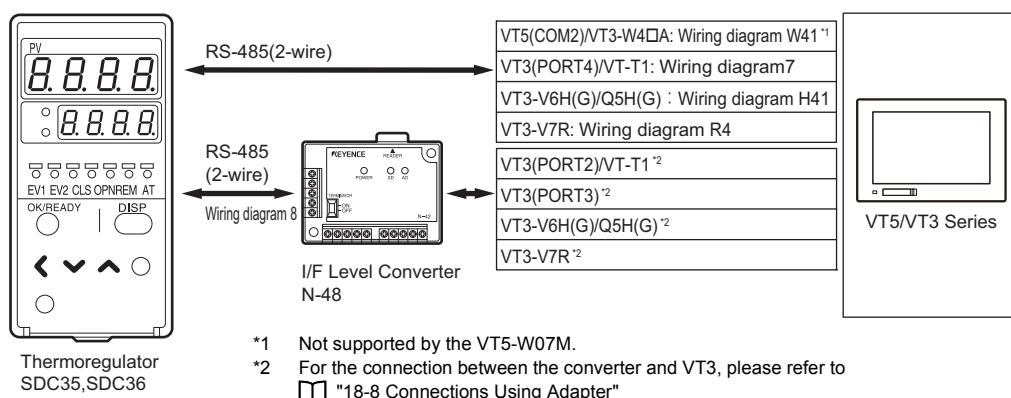
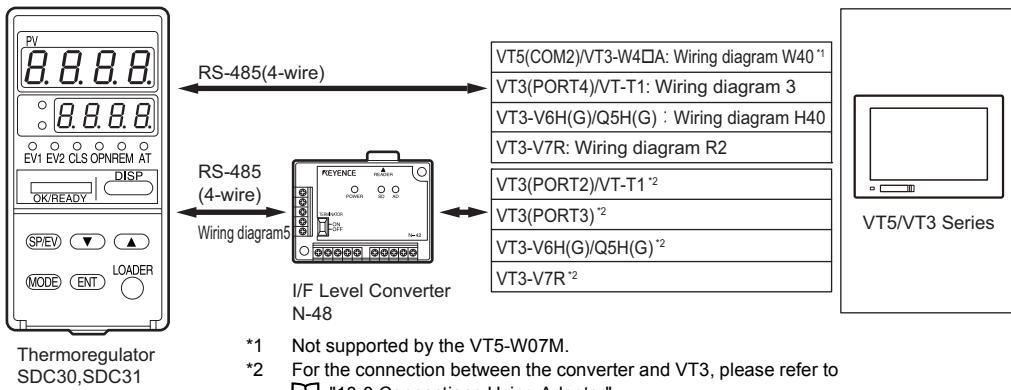
^{*2} For the connection between the converter and VT3, please refer to
"18-8 Connections Using Adapter"



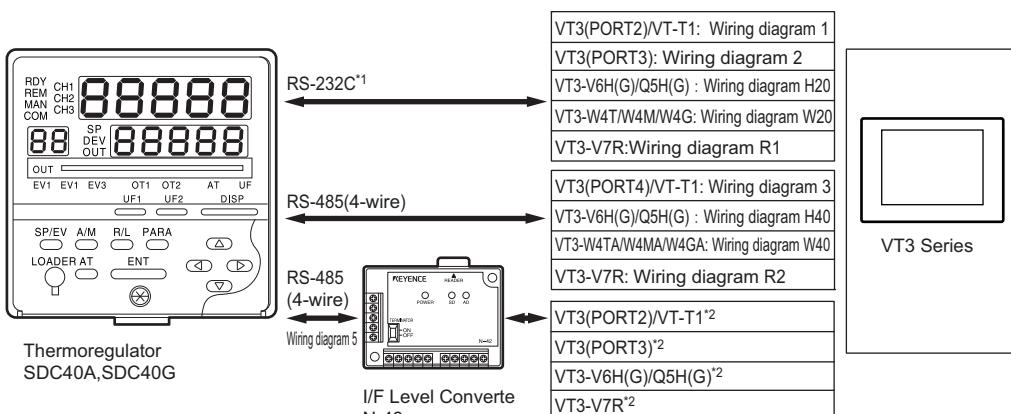
^{*1} Not supported by the VT5-W07M.

^{*2} For the connection between the converter and VT3, please refer to
"18-8 Connections Using Adapter"

■ SDC30 Series



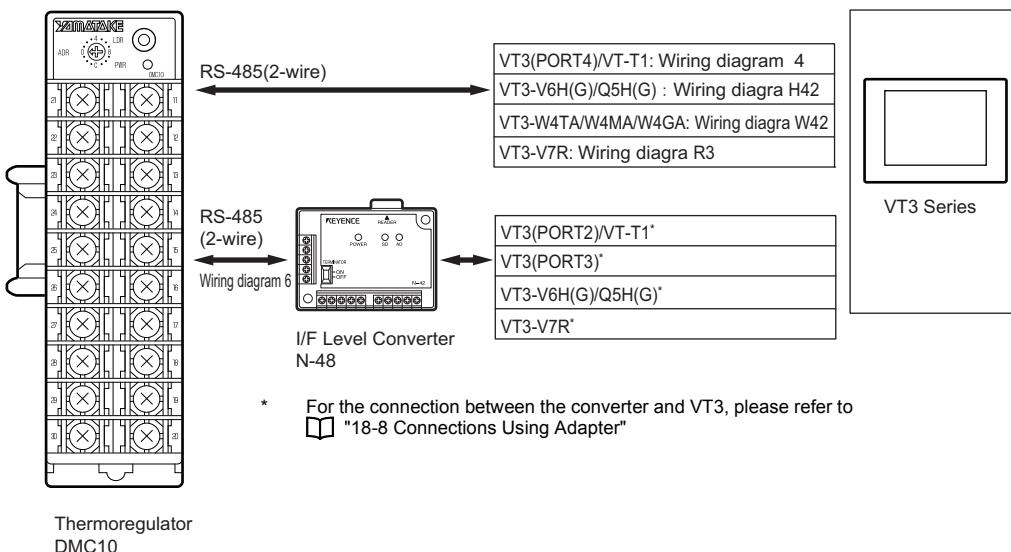
■ SDC40 Series



*1 SDC40G cannot use RS-232C.

*2 For the connection between the converter and VT3, please refer to
"18-8 Connections Using Adapter"

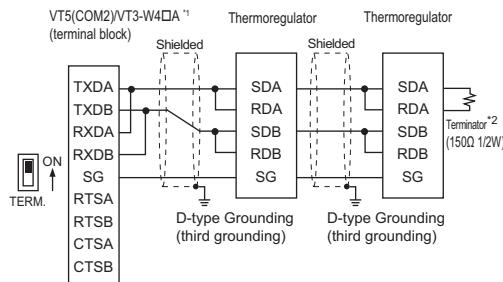
■ DMC Series



Thermoregulator
DMC10

Connection to VT5 Series (COM2) and VT3-W4□A (RS-485)

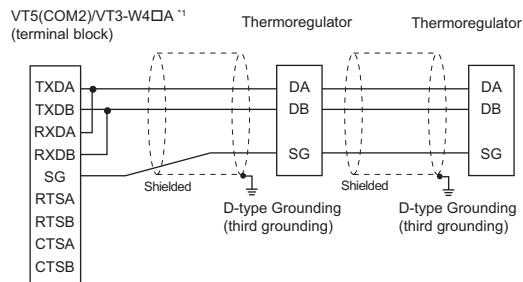
■ Wiring diagram W40 (RS-485: 4-wire)



*1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator switch to "ON".

*2 A termination resistor (150Ω 1/2W) needs to be connected when the thermoregulator is at the end of the communication line.

■ Wiring diagram W41 (RS-485: 2-wire)

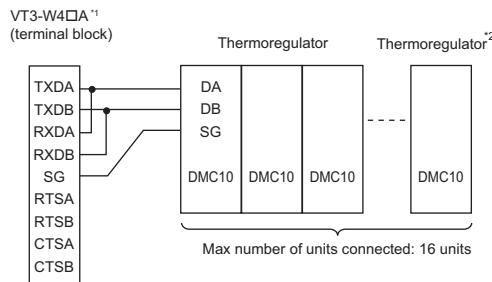


*1 Set the terminator switch on the VT5/VT3-W4 Series to "OFF".



Do not install the termination resistor on both ends of the RS-485 transmission channel of SDC35 and 36.

■ Wiring diagram W42 (RS-485: 2-wire)

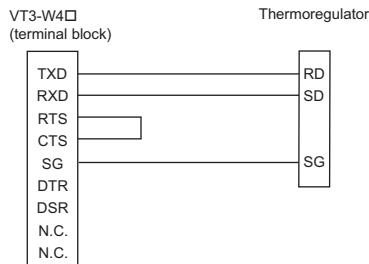


*1 Set the terminator switch of VT3-W4 series to OFF.

*2 Do not install termination resistor.

Connection to VT3-W4□ (RS-232C)

■ Wiring diagram W20 (RS-232C)

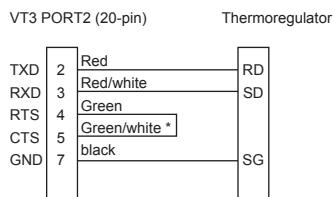


Connection to VT3 Series

The following describes wiring of connector cables.

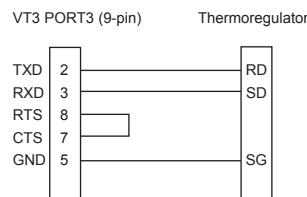
The wiring diagrams here may be different with those recommended by the Azbil Corporation. But nothing is worried about even if you use the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-232C: OP-24027)

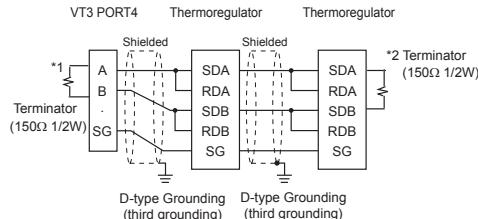


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 2 (RS-232C)



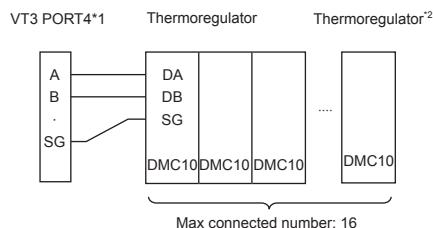
■ Wiring Diagram 3 (RS-485: 4-wire)



*1 When VT3 is on one end of the communication line, install termination resistor (150Ω 1/2W) between A and B of PORT4.

*2 When thermoregulator is on one end of the communication line, install the termination resistor (150Ω 1/2W).

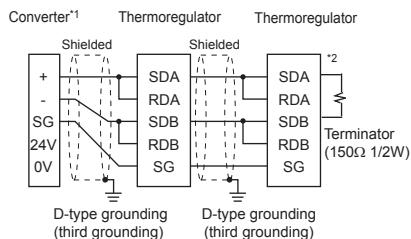
■ Wiring diagram 4 (RS-485: 2-wire)



*1 Do not install the short bar on VT3.(Terminator OFF)

*2 Do not install the termination resistor.

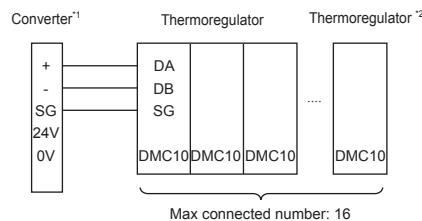
■ Wiring diagram 5 (RS-485: 4-wire)



*1 When the converter is connected to one end of the communication line, turn ON the terminator switch.

*2 When thermoregulator is on one end of the communication line, install the termination resistor (150Ω 1/2W).

■ Wiring diagram 6 (RS-485: 2-wire)



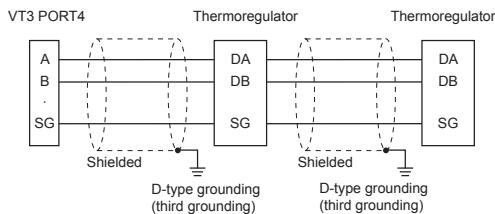
*1 Normally the terminator of the converter is set to OFF.

*2 Do not install the termination resistor.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

■ Wiring diagram 7(RS-485: 2-wire)

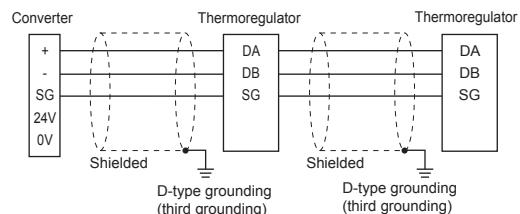


Do not install the termination resistor on both ends of the RS-485 transmission channel.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

■ Wiring diagram 8(RS-485: 2-wire)



Do not install the termination resistor on both ends of the RS-485 transmission channel.

Connection with VT3 Handy Series



FG2 must be grounded.

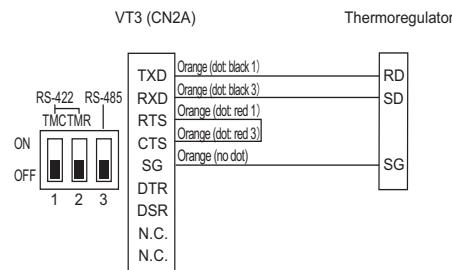
■ Wiring diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

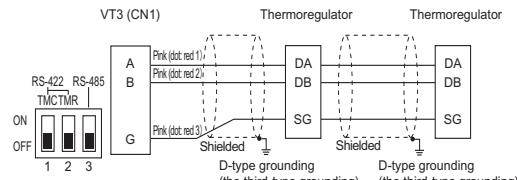
OP-87193:10m



■ Wiring diagram H41 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m

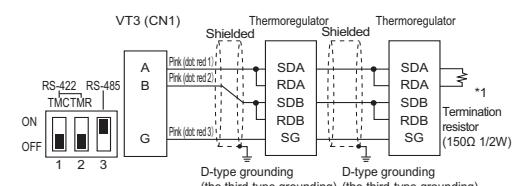


Please do not install terminal resistor on either end of RS-485 transfer line.

■ Wiring diagram H40 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m

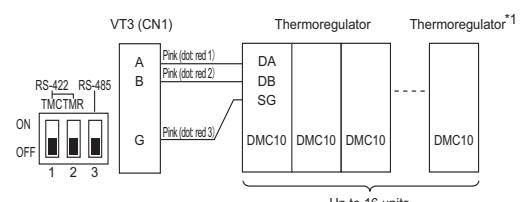


*1 The thermoregulator at communication cable end should be equipped with a terminal resistor(150Ω 1/2W).

■ Wiring diagram H42 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



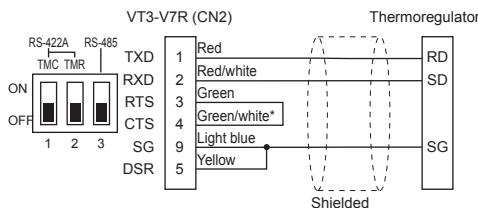
*1 Please do not install terminal resistor.

Connection to VT3-V7R



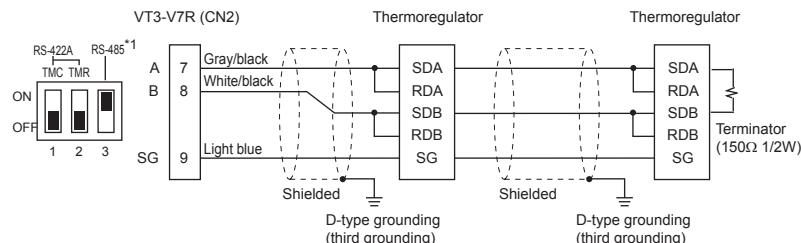
Point Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13

■ Wiring diagram R1 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector. Solder the signal lead.

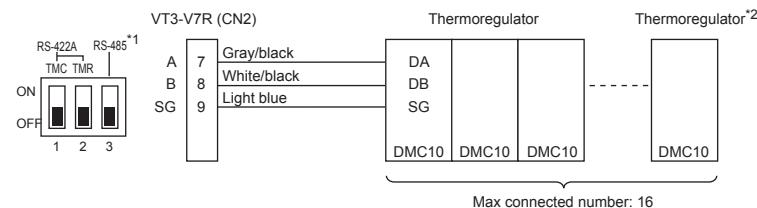
■ Wiring diagram R2 (RS-485 4-wire: VT-C5R1)



*1 Turn the terminator to ON.

*2 When thermoregulator is on one end of the communication line, install termination resistor (150Ω 1/2W).

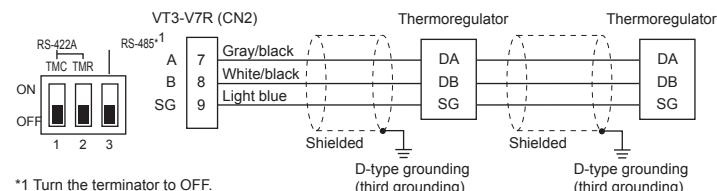
■ Wiring diagram R3 (RS-485 2-wire: VT-C5R1)



*1 Turn the terminator to OFF.

*2 Do not install the termination resistor.

■ Wiring diagram R4 (RS-485 2-wire: VT-C5R1)



*1 Turn the terminator to OFF.



Point Do not install the termination resistor on both ends of the RS-485 transmission channel of SDC35 and 36.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ SDC Series (SDC20/21, SDC30/31, SDC40A, SDC40G)

● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Station No.	1 to 31 ¹	0
Baud rate	9600 bit/s	9600 bit/s
Data length/Parity/Stop bit ²	8 bits/Even/1 bit 8 bits/None/2 bits	8 bits/Even/1 bit

¹ Communicatin cannot be performed when the initial value is "0". Please select from 1 to 31.

² Data length, Parity, or Stop bit cannot be indiviually set up.



For SDC30/31, communication settings cannot be changed under the RUN mode. Please change to the READY mode before changing the settings.

■ SDC Series (SDC15/25/26/35/36)

● Communications settings

For more information, please refer to data sheets of the specific devices.

To change the settings of SDC15/25/26/35/36, please follow the below steps.

- 1 Press and hold the "para" button of the thermoregulator for 2 seconds above.
- 2 After the display is changed, do the following.
 - For SDC15, press and hold the "para" button for 2 seconds above again.
 - For SDC25/26/35/36, press the "V" key until "StUP" is displayed.
- 3 After "StUP" is displayed, press the "<" key.
- 4 Refer to the following table to make necessary changes.

Item	Adjusted Items	Setting Range	Default
Communication Type	C64	0: CPL 1: MODBUS ASCII format 2: MODBUS RTU format	0 ¹
Station No.	C65	0 to 127 ²	0
Baud rate	C66	0: 4800 1: 9600 2: 19200 3: 38400 bit/s	2
Data length	C67	0: 7 bits 1: 8 bits	1
Parity	C68	0: even parity 1: odd parity 2: OFF	0
Stop bit	C69	0: 1 bit 1: 2 bits	0
Min communication response time	C70	1 to 250ms	3 ³

¹ Ensure to set the Station No. to "0".

² Communicatin cannot be performed when the initial value is "0". Please select from 1 to 31.

³ Communication may not happen if the min response time is not set up.

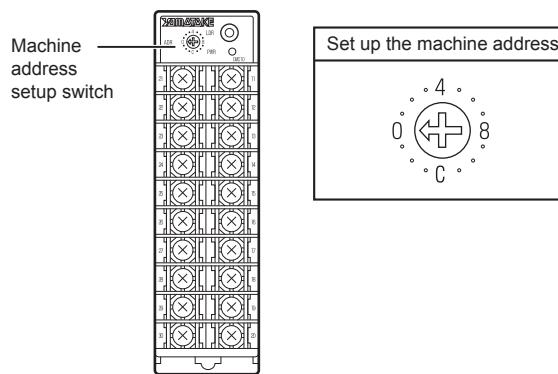
Please set up "Min Communication Response Time", "Min Communication Response Time Addition Value"

■ DMC10

● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Machine Address ^{*1}	1 to F (1 to 15)	0 ^{*2}
Baud rate	2400, 4800, 9600, 19200 bit/s	19200 bit/s
Data length/Parity/Stop bit ^{*3}	8 bits/Even/1 bit 8 bits/None/2 bits	8 bits/Even/1 bit
Min communication response time ^{*4}	0 to 3(1 to 200ms)	1(10ms)
Min communication response time addition value ^{*4}	0 to 100ms	0



- *1 The machine address is selected from the machine address rotary switch on the upper part of the front of DMC10.
- *2 Communicatin cannot be performed when the initial value is "0". Please select from 1 to F.
- *3 Data length, Parity, or Stop bit cannot be individually set up.
- *4 No communication may happen under the default min communication response time and addition value. Set as necessary.

Communication Conditions and Available Devices

■ Communication Conditions, Setting Ranges and Defaults

● SDC20/21(1: 1), SDC40(1: 1)

Item	Setting Range	Default
PLC serial I/F	RS-232C	RS-232C
Communication protocol	CPL protocol	CPL protocol
Baud rate	1200,2400,4800,9600 bit/s ¹	9600 bit/s
Data length ²	8 bits	8 bits
Parity ²	None/Even	Even
Stop bit ²	1 bit, 2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

*1 When "SDC40(1:1)" is selected as the target PLC, the baud rate can only select 9600bit/s and 4800bit/s.

*2 The data length, parity, and stop bit can be set as follows.

- 8 bits,Even,1 bit
- 8 bits,None,2 bits

Otherwise, no communication happens.

● SDC20/21(1: N), SDC30/31(1: N), SDC40(1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485 ³	RS-485
Communication protocol	CPL protocol	CPL protocol
Baud rate	9600 bit/s	9600 bit/s
Data length ²	8 bits	8 bits
Parity ²	None/Even	Even
Stop bit ²	1 bit, 2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

*1 • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

• The VT5 Series does not support connections that use interface level converters (N-48).

*2 The data length, parity, and stop bit can be set as follows.

- 8 bits, Even, 1 bit
- 8 bits, None, 2 bits

Otherwise, no communication happens.

*3 The VT5-W07M does not support RS-485 connections.

● SDC15/25/26(1: N), SDC35/36(1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485 ²	RS-485
Communication protocol	CPL protocol	CPL protocol
Baud rate	4800,C9600,C19200,C38400 bit/s	9600 bit/s
Data length	7 bits, 8 bits	8 bits
Parity	None, even,odd	Even
Stop bit	1 bit, 2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

*1 • ZAn interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

• The VT5 Series does not support connections that use interface level converters (N-48).

*2 The VT5-W07M does not support RS-485 connections.

● DMC(1: N)

Item	Setting Range	Default
PLC serial I/F	RS-232C ¹ , RS-485	RS-485
Communication protocol	CPL protocol	CPL protocol
Baud rate	2400,4800,9600,19200 bit/s	19200 bit/s
Data length ²	8 bits	8 bits
Parity ²	None/Even	Even
Stop bit ²	1 bit, 2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

*1 • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

• The VT5 Series does not support connections that use interface level converters (N-48).

*2 The data length, parity, and stop bit can be set as follows.

- 8 bits,Even,1 bit
- 8 bits,None,2 bits

Otherwise, no communication happens.

■ Available devices

Giving out information about the devices and scope of devices to be used by the thermoregulators.



- For the devices that use the thermoregulator units like VT STUDIO, please convert the data format into the 16-bit integer. In case of floating-point numbers, an error may happen.
- Devices that have no functions cannot be read.

● SDC20/21

For more information about the devices, please refer to their manuals.

type	Scope of Devices
Bit Devices	B3010 to B690F
Word Devices	301 to 690

● SDC30/31

For more information about the devices, please refer to their manuals.

type	Scope of Devices
Bit Devices	B5010 to B6049F
Word Devices	501 to 6049

● SDC15/25/26, SDC35/36

For more information about the devices, please refer to their manuals.

type	Scope of Devices
Bit Devices	B2730 to B31243F
Word Devices	273 to 31243

● SDC40A/40G

For more information about the devices, please refer to their manuals.

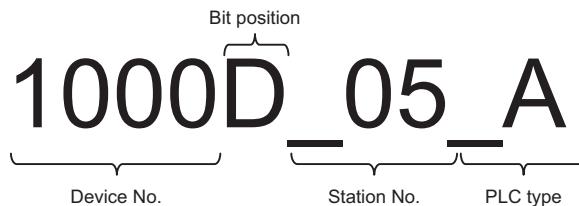
type	Scope of Devices
Bit Devices	B5010 to B6100F
Word Devices	501 to 6100

● DMC10

For more information about the devices, please refer to their manuals.

Type	Scope of Devices
Bit Devices	B10000 to B8999F
Word Devices	1000 to 8999

Specifying Devices



- Device type : no device type is available. Please leave it empty.
To connect with SDC15/25/26, please choose "RAM/EEPROM(SDC15/25/26)" as the device type (the display becomes blank).
To connect with SDC35/36, please choose "RAM/EEPROM(SDC35/36)" as the device type (the display becomes blank).
- Device No. : please use decimal numbers.
- Bit position : please choose a hexadecimal value from 0 to F. No information about the word device read is available.
- Station No. : when "SDC15/20/21/25/26(1:N), SDC30/31/35/36(1:N), SDC40(1:N), DMC(1:N)" is selected as the target PLC and 1 to 31(DMC1:N) is selected, the number can be specified from 1 to 15.
No information is available when "SDC20/21(1:1), SDC40(1:1)" is selected as the target PLC.
- PLC type : when the MultiTalk function is used, PLC_A/PLC_B can be selected. No information is available when the MultiTalk function is not used.



The CPL protocol can only read and write the word device commands, and cannot read and write the bit devices directly.

To read bit devices, therefore, the bit position should be specified by referring to the word device with the specified address before bits are read.

Read the word device that modifies the specified bit position.



The Device No. (address) should be a decimal value. And cannot use a hexadecimal value.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communications error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
COM ERROR [RecvData **(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**](DEC): Error code of Thermoregulator	For the error code[**], see "Connected Thermoregulator maker User's Manual".
COM ERROR [Timeout(++)]	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Thermoregulator is OFF.	Turn the Thermoregulator ON.
	The Thermoregulator side is in error or fault status.	Please clear the error or fault on the Thermoregulator side.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
COM ERROR [SUM(++)]	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	VT5/VT3 receive buffer overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
FramingError	The stop bit cannot be detected during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

18-6 Connection of Thermoregulators from Shinko Technos

This section describes the connection of VT3 with the thermoregulators from the Shinko Technos company.

Checks to Perform before Making Connections

The following items should be checked.

- (1) Check to ensure that VT3 can be connected with the thermoregulators.
- (2) Check to see if the thermoregulators need to be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the thermoregulator.

Series Name	Thermoregulator	I/F	Unit Setting	Target PLC
DCL-33A Series	DCL-33A-□/M, □, C5	RS-485	P.18-73	DCL-33A Series (1: N) ^{*1 *2}
GCS Series	GCS-33□-□/□, C5	RS-485	P.18-73	GCS Series (1: N) ^{*1 *2}
FC Series	FCR-1□A-□/M, C	RS-232C	P.18-73	FC Series (1: 1) ^{*1 *2}
	FCR-1□A-□/M, C5	RS-485		FC Series (1: N) ^{*1 *2}

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

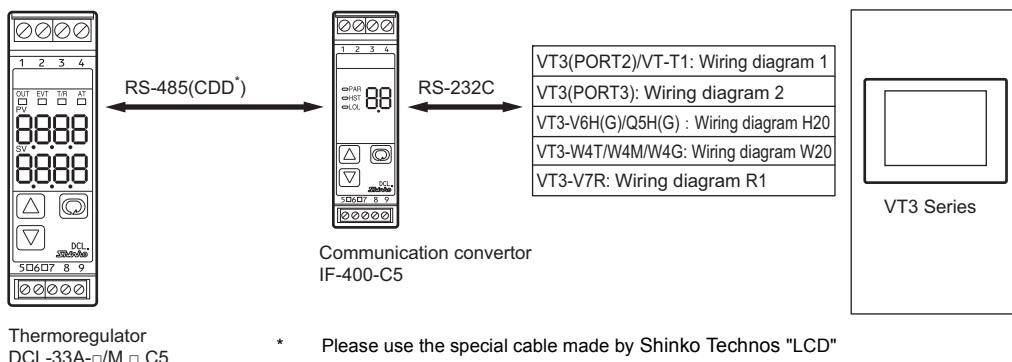
System Configuration

Here, the system structure of the VT3 series and thermoregulators made by the Shinko Technos company is introduced.



To connect the thermoregulators with VT3, please ensure to use the communication adapter (IF-400-C5) made by Shinko Technos. They cannot be directly connected with PORT4 on VT3.

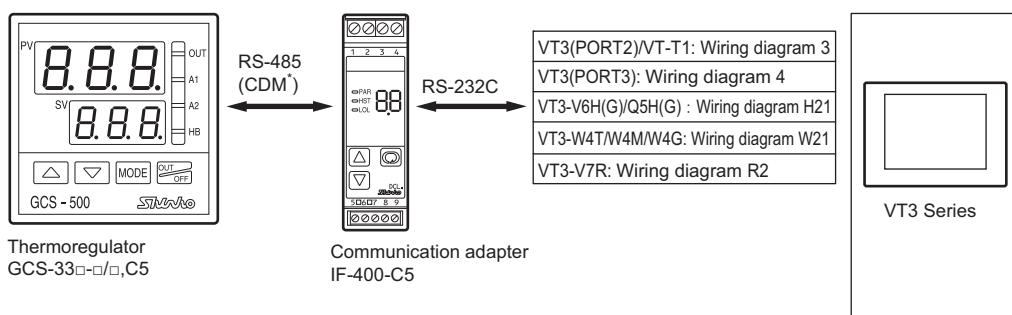
DCL-33A Series



Thermoregulator
DCL-33A-□/M,□,C5

* Please use the special cable made by Shinko Technos "LCD".

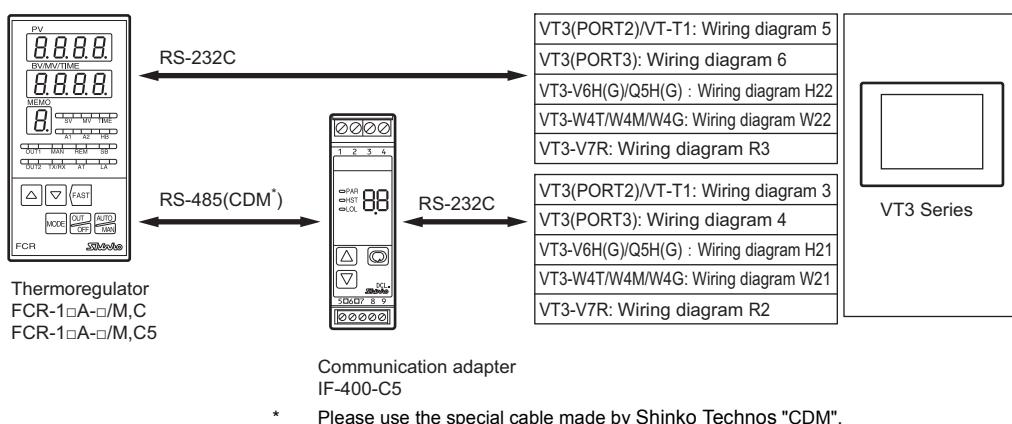
GCS Series



Thermoregulator
GCS-33-□/□,C5

* Please use the special cable made by Shinko Technos "CDM".

FC Series



Thermoregulator
FCR-1□A-□/M,C
FCR-1□A-□/M,C5

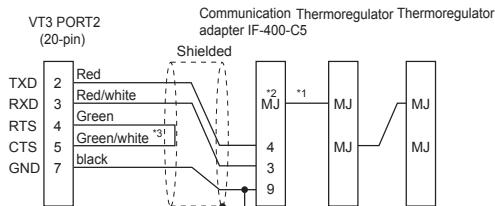
Communication adapter
IF-400-C5

* Please use the special cable made by Shinko Technos "CDM".

Connection to VT3 Series

The following describes wiring of connector cables. The wiring diagrams here may be different with those recommended by the Shinko Technos company. But nothing is worried about even if you use the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-232C: OP-24027)



*1 Use the cables "CDD" made by TECHNOS for the connection between the thermoregulators and communication adapter.

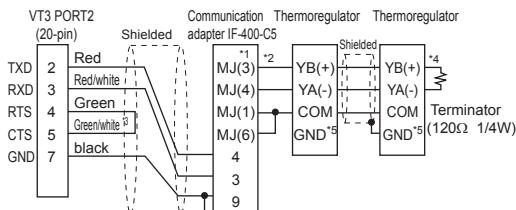
*2 MJ represents the module port.

*3 The loopback is not used inside the connector. Please solder the signal line.



Do not connect the termination resistor (terminator).

■ Wiring diagram 3 (RS-232C: OP-24027)



1 MJ() represents the terminal number of the module port.

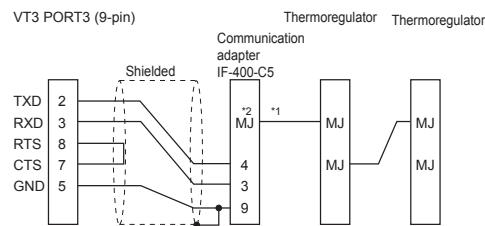
*2 Please use the cables "CDM" made by TECHNOS for the connection between the thermoregulators and communication adapter.

*3 The loopback is not used inside the connector. Please solder the signal line.

*4 Install the termination resistor (120Ω 1/4W) onto the thermoregulator connected to one end of the communication line.

*5 Since the GC series have not the GND terminal, please then use the D-type grounding (third grounding) for the shield.

■ Wiring diagram 2 (RS-232C)



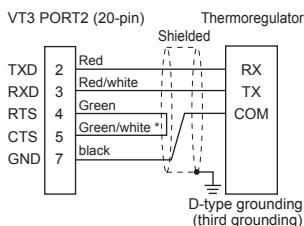
*1 Please use the cables "CDD" made by Shinko Technos for the connection between the thermoregulators and communication adapter.

*2 MJ represents the module port.



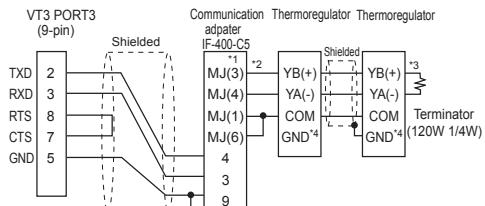
Do not use the termination resistor (terminator).

■ Wiring diagram 5 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 4 (RS-232C)



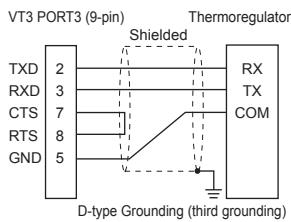
1 MJ() represents the terminal number of the module port.

*2 Please use the cables "CDM" made by Shinko Technos for the connection between the thermoregulators and communication adapter.

*3 Install the termination resistor (120Ω 1/4W) onto the thermoregulator connected to one end of the communication line.

*4 Since the GC series have not the GND terminal, please then use the D-type grounding (third grounding) for the shield.

■ Wiring diagram 6 (RS-232C)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Connection with VT3 Handy Series



FG2 must be grounded.

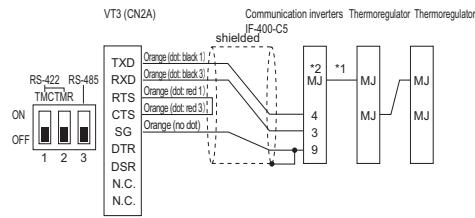
■ Wiring diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



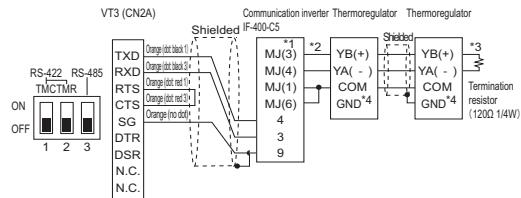
■ Wiring diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187:10m

OP-87191: 3m, OP-87192: 5m,

OP-87193:10m



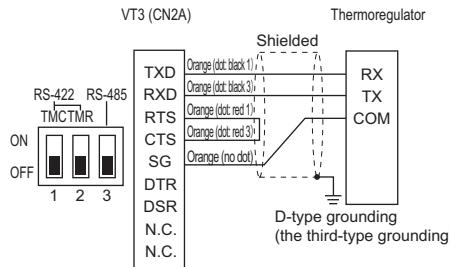
■ Wiring diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

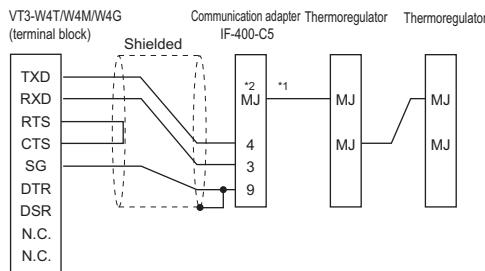
OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



Connection to VT3-W4T/W4M/W4G (RS-232C)

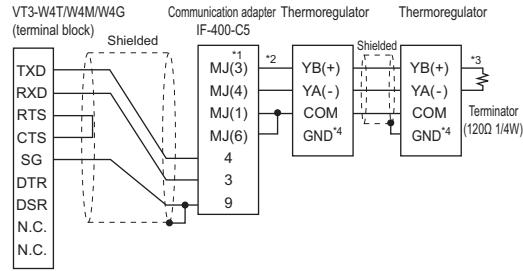
■ Wiring diagram W20 (RS-232C)



*1 For the connection between thermoregulators and adapters, use a "CDD" cable manufactured by Shinko Technos.

*2 MJ represents the module port.

■ Wiring diagram W21 (RS-232C)



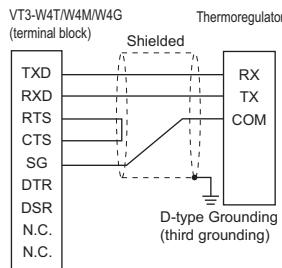
1 MJ() represents terminal No.of module port.

*2 For the connection between thermoregulators and adapters, please use a "CDM" cable manufactured by Shinko Technos.

*3 A termination resistor (120Ω 1/4W) needs to be connected when the thermoregulator is at the end of the communication line.

*4 Please use a D-type grounding shield (third grounding) since no GND terminal exist in GC series.

■ Wiring diagram W22 (RS-232C)

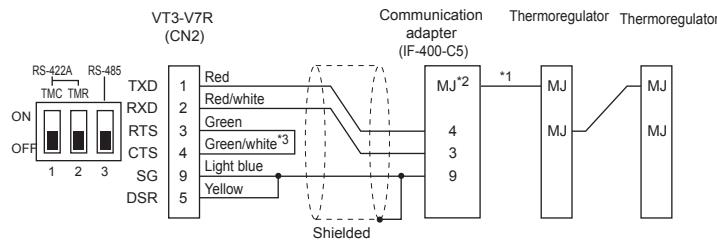


Connection to VT3-V7R



Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13

■ Wiring diagram R1 (RS-232C: VT-C5R1)

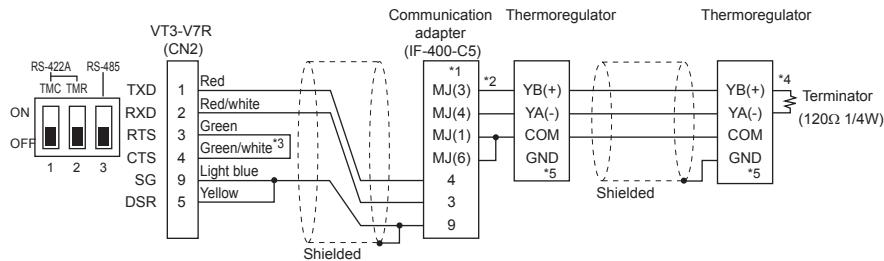


*1 Please use the cables "CDD" made by Shinko Technos for the connection between the thermoregulators and communication adapter.

*2 MJ represents the module port.

*3 Not wired for loopback test inside the connector. Solder the signal lead.

■ Wiring diagram R2 (RS-232C: VT-C5R1)



1 MJ() represents the terminal number of the module port.

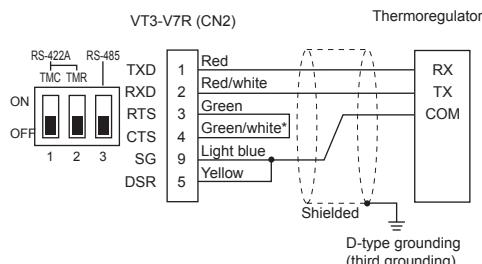
*2 Please use the cables "CDM" made by Shinko Technos for the connection between the thermoregulators and communication adapter.

*3 Not wired for loopback test inside the connector. Solder the signal lead.

*4 Install the termination resistor (120Ω 1/4W) onto the thermoregulator connected to one end of the communication line.

*5 Since the GC series doesn't have GND terminal, use the D-type grounding (third grounding) for shielding.

■ Wiring diagram R3 (RS-232C: VT-C5R1)



* Not wired for loopback test inside the connector. Solder the signal lead.



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Setting Range	Default
Station No.	0 to 30 ¹	0
Communication protocol	Standard protocol ²	Standard protocol
Baud rate	2400, 4800, 9600, 19200 bit/s	9600
Data length	7 bits	7
Parity	Even	Even
Stop bit	1 bit	1 bit

¹*1 When the FC series (1:1) are connected, please ensure to set the station No. to "0". Otherwise, no action takes place.

²*2 For the setup of the communication protocol, please set the icmsl of the Auxiliary Function Mode 1 to "nom!". If not, no communication takes place.

● Set up the Station No.

DCL-33A Series

1 Move to the "Auxiliary Function Mode 1".

Simultaneously press the Down Key (▽) and Mode Key (MODE) for 3 seconds to enter the "Auxiliary Function Mode 1".

2 After entering the "Auxiliary Function Mode 1", press and hold the Mode Key until "cmno" is displayed.

3 Please use the Up Key/Down Key to set up the Station No..

GCS Series/FC Series

1 Move to the "Auxiliary Function Mode 1".

Simultaneously press the Down Key (▽) and Mode Key (MODE) for 3 seconds to enter the "Auxiliary Function Mode 1".

2 After entering the "Auxiliary Function Mode 1", press and hold the Mode Key until "cmno" is displayed.

3 Please use the Up Key/Down Key to set up the Station No..

● Set up the IF-400-C5

For more information, please refer to data sheets of the specific devices.

Baud Rate

Character Display	Baud rate
2	2400 bit/s
4	4800 bit/s
9	9600 bit/s
19	19200 bit/s

* Please set up the baud rate based on the thermoregulator and communication speed of VT3.

Receive and Transmit Switching Time

Character Display	Receive and Transmit Switching Time
1C	1 character
2C	2 characters

* For the receive and transmit time, please ensure to set to "1C".

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● DCL-33A Series (1: N), GCS Series (1: N), FC Series (1: N)

Item	Setting Range	Default
PLC serial I/F (port No.)	RS-232C(PORT2,PORT3)*	RS-232C(PORT2)
Communication protocol	Standard protocol	Standard protocol
Baud rate	2400,4800,9600,19200 bit/s	9600 bit/s
Data length	7 bits	7 bits
Parity	Even	Even
Stop bit	1 bit	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

* When RS-232C is selected, please ensure to use the communication adapter (IF-400-C5) made by Shinko Technos.

● FC Series (1: 1)

Item	Setting Range	Default
PLC serial I/F (port No.)	RS-232C(PORT2,PORT3)	RS-232C(PORT2)
Communication protocol	Standard protocol	Standard protocol
Baud rate	2400,4800,9600,19200 bit/s	9600 bit/s
Data length	7 bits	7 bits
Parity	Even	Even
Stop bit	1 bit	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

■ Available devices

Giving out information about the devices and scope of devices to be used by the thermoregulators.



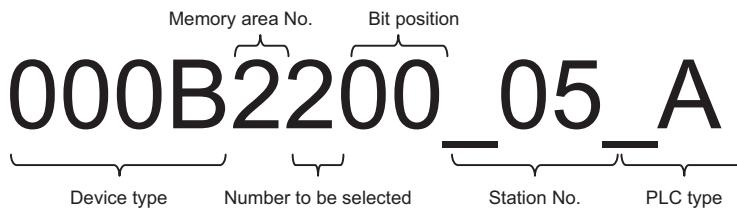
For the devices that use the thermoregulator units like VT STUDIO, please convert the data format into the 16-bit integer. In case of floating-point numbers, an error may happen.

● DCL-33A Series/GCS Series/FC Series

For more information about the devices, please refer to their manuals.

type	Scope of Devices		
	DCL-33A Series	GCS Series	FC Series
Bit Devices	00030000,00420000, 006F0000,00700000	00030000,00700000	00030000
Word Device	00010000 to 00850000	00010000 to 00850000	00011000 to 00850000

Specifying Devices



- Device type : please ensure to use 4-position half-width numeric values.
- Memory area No. : please ensure to use 1-digit half-width numeric values.
- Number to be selected : from 0 to 4. Represents the alarm number and main setup number, etc.
- Bit position : normally set to 00.
- Station No. : when the "DCL-33A Series (1:N)", "GCS Series (1:N)", or "FC Series (1:N)" is selected as the target PLC, the number can be selected from 0 to 30.
No information is available when "FC Series(1:1)" is selected as the target PLC.
- PLC type : when the MultiTalk function is used, PLC_A/PLC_B can be selected. No information is available when the MultiTalk function is not used.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
Data Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**](HEX): Error code of Thermoregulator	For the error code[**], see "Connected Thermoregulator maker User's Manual".
Time Out Error (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Thermoregulator is OFF.	Turn the Thermoregulator ON.
	The Thermoregulator side is in error or fault status.	Please clear the error or fault on the Thermoregulator side.
	Communication setting error.	Keep the communication settings consistent between Thermoregulator and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between Thermoregulator and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between Thermoregulator and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between Thermoregulator and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between Thermoregulator and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

18-7 Connection of Thermoregulators from CHINO

This section describes the connection of VT5/VT3 with the thermoregulators from the CHINO company.

Checks to Perform before Making Connections

The following items should be checked.

- (1) Check to ensure that VT5/VT3 can be connected with the thermoregulators.
- (2) Check to see if the thermoregulators need to be set up.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the thermoregulator.

Series Name	Thermoregulator	I/F	Unit Setting	Target PLC
LT200 Series	LT230	RS-485	P.18-83	LT200/300 Series(1: N) ^{*1*2}
LT300 Series	LT350,LT370	RS-232C	P.18-83	LT300 Series(1: N) ^{*1*2}
		RS-485	P.18-83	LT200/300 Series(1: N) ^{*1*2}
LT400 Series	LT450,LT470	RS-232C	P.18-83	LT400 Series(1: 1) ^{*2}
		RS-485	P.18-83	LT400 Series(1: N) ^{*2}

*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

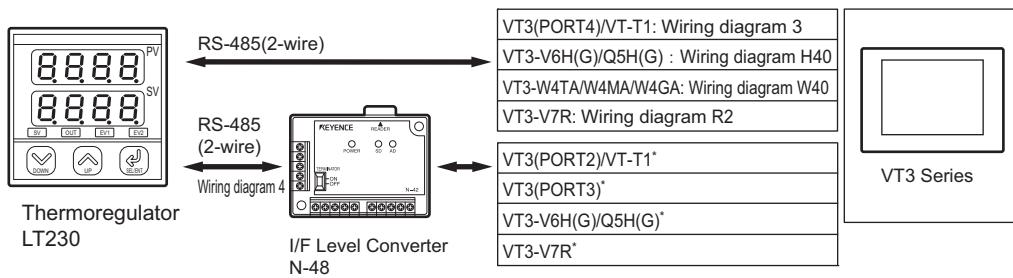


The Control Output 1 of some models includes Switch Servo or Remote Signal Input (option), etc. Depending on the specifications on the thermoregulator side, the communication with VT5/VT3 may be delayed.

System Configuration

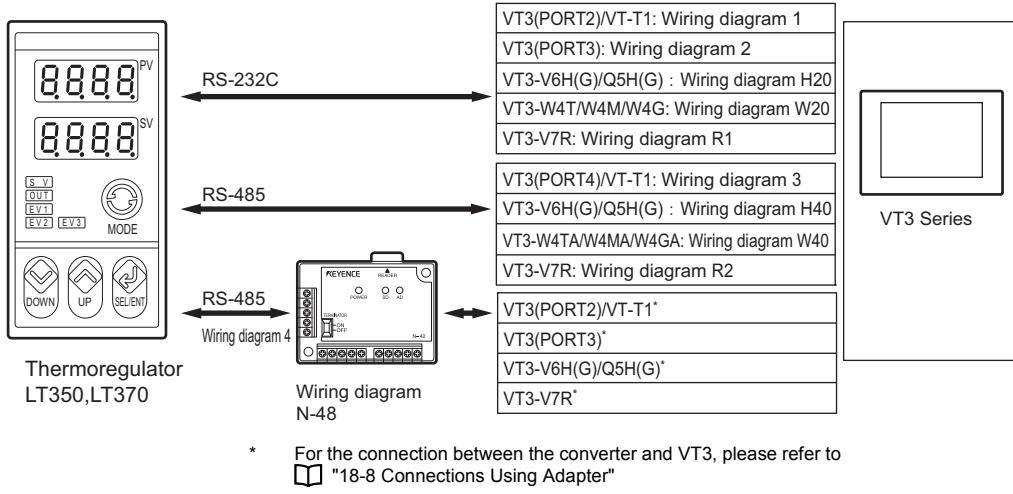
Here, the system structure of the VT5/VT3 series and thermoregulators made by the CHINO company is introduced.

■ LT200 Series

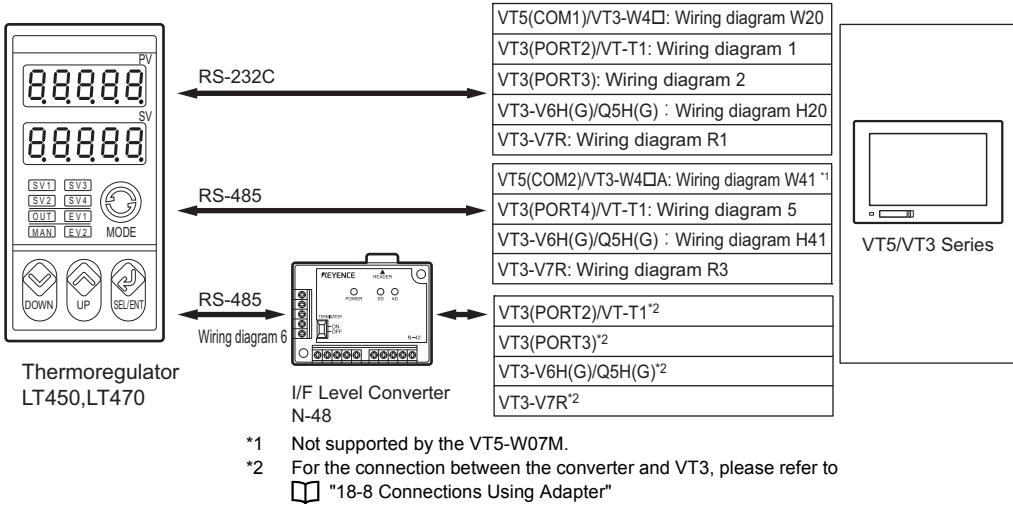


* For the connection between the converter and VT3, please refer to
 "18-8 Connections Using Adapter"

■ LT300 Series

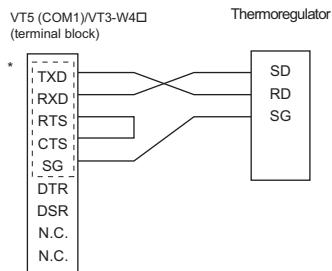


■ LT400 Series



Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

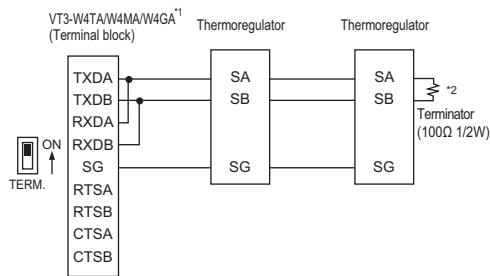
■ Wiring diagram W20 (RS-232C)



* indicates a terminal diagram for the VT5.

Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

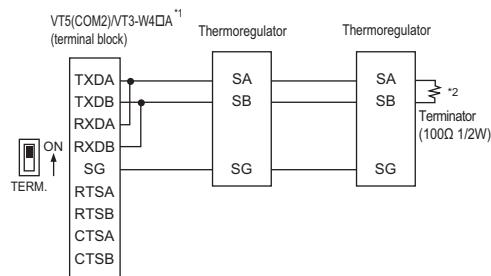
■ Wiring diagram W40 (RS-485: 2-wire)



*1 Please set the terminator switch to ON when VT3-W4 Series is at the end of the communications line.

*2 A termination resistor (100Ω 1/2W) needs to be connected when the thermostat is at the end of the communications line.

■ Wiring diagram W41 (RS-485: 2-wire)



*1 Please set the terminator switch to ON when VT5/VT3-W4 Series is at the end of the communications line.

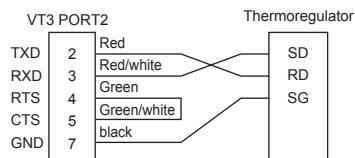
*2 A termination resistor (100Ω 1/2W) needs to be connected when the thermostat is at the end of the communications line.

Connection to VT3 Series

The following describes wiring of connector cables.

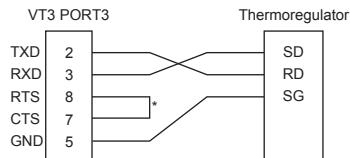
The wiring diagrams here may be different with those recommended by the CHINO company. But nothing is worried about even if you use the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-232C: OP-24027)



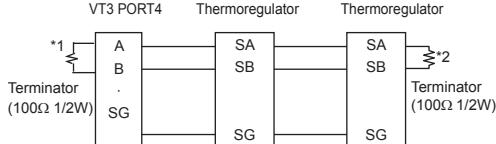
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 2 (RS-232C)



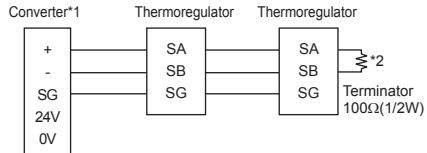
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 3 (RS-485)



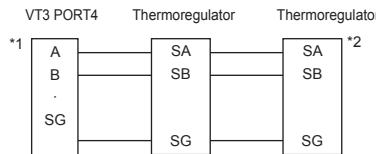
*1 When VT3 is on one end of the communication line, install termination resistor (100Ω 1/2W) between A and B of PORT4.
*2 Install the termination resistor (100Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram 4 (RS-485)



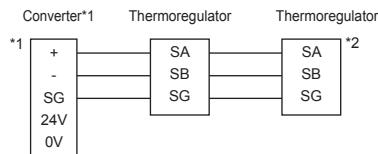
*1 When the adapter is located on the communication end, open the terminator.
*2 Install the termination resistor (100Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram 5 (RS-485)



*1 Not connect the short bar of PORT4.
*2 Not install the termination resistor.

■ Wiring diagram 6 (RS-485)



*1 Turn the terminator switch of convertor to OFF.
*2 Not install the termination resistor.

Connection with VT3 Handy Series



FG2 must be grounded.

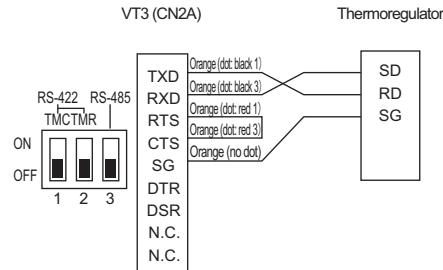
■ Wiring diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

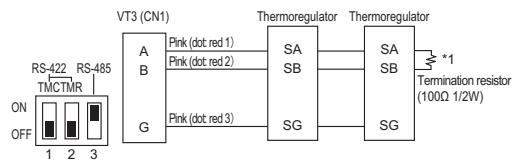
OP-87193: 10m



■ Wiring diagram H40 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m

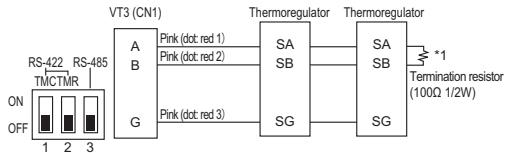


*1 The thermoregulator at communication cable end should be equipped with a terminal resistor (100Ω 1/2W).

■ Wiring diagram H41 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m,

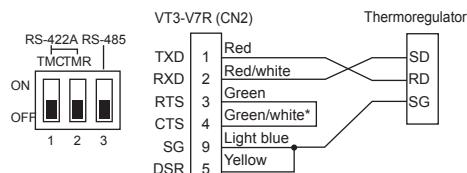
OP-87193: 10m



*1 The thermoregulator at communication cable end should be equipped with a terminal resistor (100Ω 1/2W).

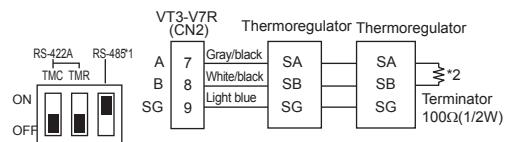
Connection to VT3-V7R

■ Wiring diagram R1 (RS-232C: VT-C5R1)



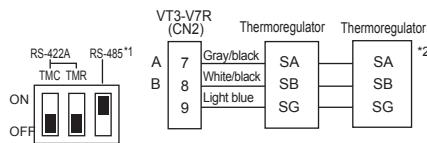
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram R2 (RS-485: VT-C5R1)



*1 Turn the terminator to ON.
*2 Install the termination resistor (120 Ω 1/2W) onto the thermoregulator connected to one end of the communication line.

■ Wiring diagram R3 (RS-485: VT-C5R1)



*1 Turn the terminator switch OFF.
*2 Not install the termination resistor.

Unit Settings

Here the unit settings that are in line with the communication conditions are dealt with.

■ LT Series

● Communications settings

For more information, please refer to data sheets of the specific devices.

Item	Display items	Setting Range				Default
Protocol	PrtCL	rtU: MODBUS RTU ASC.: MODBUS ASCII Pr.VE: Special (special protocol)				rtU ¹
Communications function	FUnC	CoM: This is selected for the communication with the PC. trS.2: Digital communication can take place between the LT series.				CoM ²
Machine code number	AdrS	1 to 99				1 ³
Baud rate	rAtE	9600, 19200				9600
Option	CHArA	Key Lock	Bit length	Parity	Stop bit	
		8n1	8	None	1	8n1
		8n2			2	
		8E1		Even	1	
		8E2			2	
		8o1		Odd	1	
		8o2			2	
Character	Lock	UNLOCK,LOCK1,LOCK2,LOCK3,LOCK4				UNLOCK ⁴

*1 Ensure to select rtU.

*2 Ensure to select CoM.

*3 Since up to 31 can be set up as the Station No. on the VT5/VT3 side, please then select from 1 to 31.

*4 When reading from VT5/VT3, please ensure to select LOCK4. Communication Error 12 may happen when reading from VT5/VT3, although communication can also take place when selecting other options than LOCK4.

To set up the protocol, communication function, Station No., communication speed, and characters, please use the following steps.

- 1 When the LT200 series are used, press and hold the "SEL/ENT" button for 2 seconds above to display "ModE.0".
When LT300 is used, press the "MODE" button to display "ModE.0".
- 2 To display "ModE.7", press the "^" key 7 times.
- 3 Press and hold the "SEL/ENT" button until "PrtCL (protocol)" is displayed. Then select rtu with the "^" or "V" key, and validate the choice by setting the "SEL/ENT" button.
- 4 Press and hold the "SEL/ENT" button until "FunC (communication function)" is displayed. Then select CoM with the "^" or "V" key, and validate the choice by setting the "SEL/ENT" button.
- 5 Press and hold the "SEL/ENT" button until "AdrS (Station No.)" is displayed. Then select any station number with the "^" or "V" key, and validate the choice by setting the "SEL/ENT" button.
- 6 Press and hold the "SEL/ENT" button until "rAtE (communication speed)" is displayed. Then select any communication speed with the "^" or "V" key, and validate the choice by setting the "SEL/ENT" button.
- 7 Press and hold the "SEL/ENT" button until "CHArA (character)" is displayed. Then select any character number with the "^" or "V" key, and validate the choice by setting the "SEL/ENT" button.

● Set up the Key Lock

When reading the thermoregulator from VT5/VT3, please set up Key Lock to "LOCK4".

- 1** To display "ModE.0", press the "MODE" button.
- 2** To display "ModE.1", press the "^" key 1 time.
- 3** Press and hold the "SEL/ENT" button until "LoCK (key lock)" is displayed. Then select Lock4 with the "^" or "V" key, and validate the choice by setting the "SEL/ENT" button.



If "LOCK4" is not selected, an error may happen when reading the thermoregulator from VT5/VT3.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● LT200, LT300, LT400 Series(1: 1)

Item	Setting Range	Default
PLC No.	1 to 31	1
PLC serial I/F(port No.)	RS-232C(PORT2,PORT3)	RS-232C(PORT2)
Communication protocol	MODBUS RTU	MODBUS RTU
Baud rate	9600, 19200 bit/s	9600 bit/s
Data length	8 bits	8 bits
Parity	None, even, odd	None
Stop bit	1 bit ,2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

● LT200, LT300, LT400 Series(1:N)

Item	Setting Range	Default
PLC No.	1 to 31	1
PLC serial I/F(port No.)	RS-232C(PORT2,PORT3) [†] RS-485(PORT4)	RS-485(PORT4)
Communication protocol	MODBUS RTU	MODBUS RTU
Baud rate	9600, 19200 bit/s	9600 bit/s
Data length	8 bits	8 bits
Parity	None, even, odd	None
Stop bit	1 bit ,2 bits	1 bit
Flow Control	ER control	ER control
CR	--	--
LF	--	--
CheckSum	--	--

*1 When RS-232C is selected, please ensure to use the I/F level converter (N-48).

■ Available devices

Giving out information about the devices and scope of devices to be used by the thermoregulators.



For the devices that use the thermoregulator units like VT STUDIO, please convert the data format into the 16-bit integer. In case of floating-point numbers, an error may happen.

● LT200, LT300, LT400 Series

For more information about the devices, please refer to their manuals.

Item		Scope of Devices
Bit Devices	Numeric value	00101 to 00109
	Entered numeric value	10002 to 10124
Word Devices	Entered analog data	30101 to 30142
	Analog set value	40001 to 49512

Device type

0 0101

{

Device No.

- Device type : please ensure to use 1-digit half-width numeric values.
- Device No. : selected within the scope of the devices.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**](HEX): Error code of Thermoregulator	For the error code[**], see "Connected Thermoregulator maker User's Manual".
Time Out Error (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Thermoregulator is OFF.	Turn the Thermoregulator ON.
	The Thermoregulator side is in error or fault status.	Please clear the error or fault on the Thermoregulator side.
	Communication setting error.	Keep the communication settings consistent between Thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
CRC Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between Thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between Thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT5/VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between Thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Thermoregulator.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between Thermoregulator and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

18-8 Connections Using Adapter

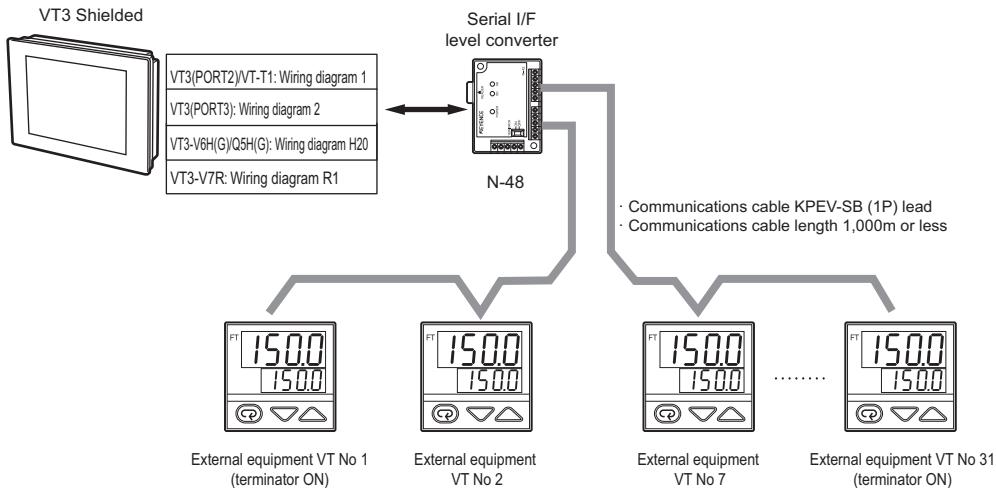
When the thermoregulator is connected via RS-485 in the 1:N way, PORT4 on VT3 should be used. When the PORT4 on VT3 is used for the MegaLink and KL communications, however, please use the serial I/F level converter (N-48) to connect the thermoregulator to PORT2/PORTR on VT3 in the 1:N way.



- Not supported by the VT5 Series/Soft-VT.
- The VT3-W4T(A)/W4M(A)/W4G(A) cannot be connected.

■ When the VT3 series are connected with the thermoregulators (1:N connection)

Connection Methods

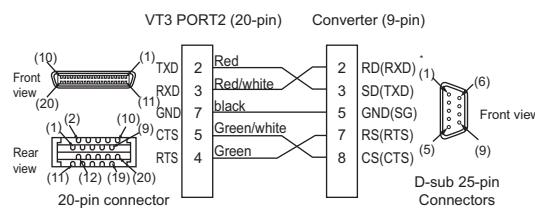


Connection of VT3 with Converter



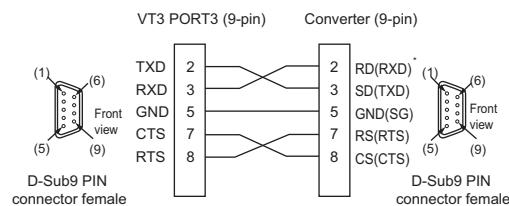
Before connecting the unit cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), please ensure to read the "Connection Precautions", page A-13

■ Wiring diagram 1 (OP-24027)



* The signal name on the converter side becomes the signal name of the output object.

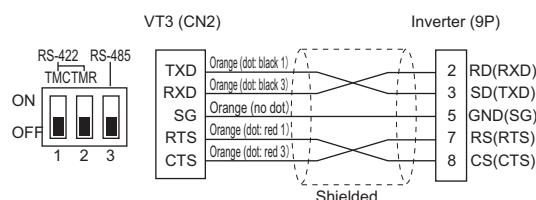
■ Wiring diagram 2



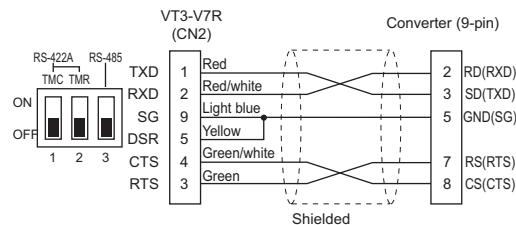
*The signal name on the converter side becomes the signal name of the output object.

■ Wiring diagram H20 (RS-232C)

OP-87191: 3m, OP-8719: 5m, OP-87193: 10m



■ Wiring diagram R1 (RS-232C: VT-C5R1)



For the pin assignment number of the connectors on the VT3 series/DT series, please see the Appendix at the end of this manual.

MULTI-LINK

This chapter describes Multi-link.



Point

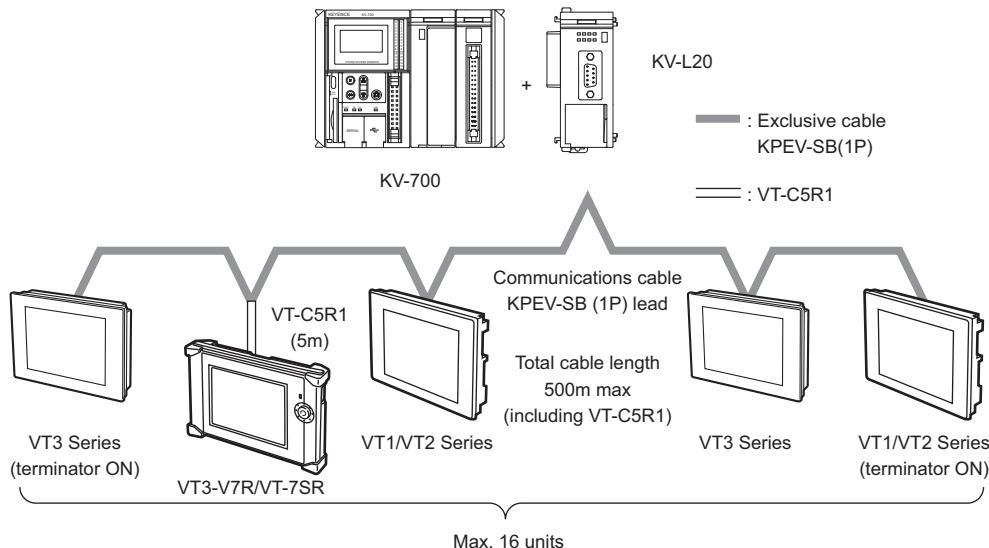
Not supported by the VT5 Series, Soft-VT, VT3-W4T/W4M/W4G (RS-232C model) and DT Series.

19-1	What is Multi-Link.....	19-2
19-2	Checking Operation before Connection.....	19-3
19-3	System Configuration.....	19-4
19-4	Connections and Wirings	19-6
19-5	Unit Settings.....	19-11
19-6	Communication Conditions Setting Ranges and Defaults	19-17
19-7	VT3 Setup	19-19
19-8	Available Devices.....	19-24
19-9	Maintenance and Installation Environment.....	19-27
19-10	Troubleshooting	19-28
19-11	General Specifications of VT-L16Z/L16CA	19-29
19-12	Dimensional Drawing of VT-L16Z/L16CA	19-30

19-1 What is Multi-Link

Multi-Link

A single Multi-Link Unit VT-L16Z/L16CA and Multi-communication Unit KV-L20 can control up to 16 VT3s.
(Number of units that can be connected to a single CPU) x 16 VT3s can be controlled.



Point

- Not supported by the VT5 Series/Soft-VT.
- Failed to connect VT3-W4T/W4M/W4G.
- Multi-Link can not be used together with MegaLink, VT2 Multi-Link, and KL Link.
- When the VT3 series are connected, the MultiTalk function cannot be used.
- When Multi-Link is connected, the unit monitor of VT3 cannot be used.
- VT3 handy Series can only be connected to both ends of the wiring.
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.

Reference

The VT3/VT2/VT1 series can be connected within the same Multi-Link.

However, any of these series is regarded as the same VT, so the same restrictions in the maximum number of connectable units and total cable length as for when only VT3 units are connected apply. Set the same communication conditions for VT1 and VT2 units as for VT3 units.

19-2 Checking Operation before Connection

This section describes how to check the items required for connecting the PLC to the VT3.

- (1) Make sure that the VT3 can be connected to the PLC or link unit.
- (2) Confirm the name of the model to set as the target PLC.

Be sure to check the above two points before connecting the PLC to the VT3.

□ "Procedure before Starting Communication", page 18

Company Name	Series Name	CPU	Connection Methods	Unit Setting	Target PLC
Keyence Corporation	KZ	KZ-300/350	VT-L16Z	□ P.19-11	KZ-300/350 (VT-L16Z) ³
		KZ-A500			KZ-A500 (VT-L16Z) ³
	KV	KV-700	KV-L20 (VT Multi-link mode)	□ P.19-13	KV-L20 (VT Multi-link) ³
MITSUBISHI ELECTRIC CORPORATION.	MELSEC-AnS	A1S, A1SH, A1SJ, A1SJH, A2S, A2SH, A171S, A171SH	VT-L16CA (A-MODE)	□ P.19-14	MITSUBISHI VT-L16CA (A-MODE) ³
		A1SCPUC24-R2			
		A2US, A2USH			
		A0J2H			
	MELSEC-A0J2	A1N, A2N, A3N	VT-L16CA (C-MODE)	□ P.19-14	Omron VT-L16CA (C-MODE) ³
	MELSEC-AnN	A2A, A3A			
	MELSEC-AnA	A2U, A3U, A4U			
	MELSEC-AnU	C200HE-CPU32 ¹ C200HE-CPU42			
OMRON Corporation	SYSMAC α	C200HG-CPU33 ¹ C200HG-CPU43 C200HG-CPU53 ¹ C200HG-CPU63	VT-L16CA (C-MODE)	□ P.19-14	Omron VT-L16CA (C-MODE) ³
		C200HX-CPU34 ¹ C200HX-CPU44 C200HX-CPU54 ¹ C200HX-CPU64 C200HX-CPU65-Z C200HX-CPU85-Z	Communications board + VT-L16CA (C-MODE)		
		C200HG-CPU33 ¹ C200HG-CPU43 C200HG-CPU53 ¹ C200HG-CPU63	VT-L16CA (C-MODE)		
		C200HX-CPU34 ¹ C200HX-CPU44 C200HX-CPU54 ¹ C200HX-CPU64	Communications board + VT-L16CA (C-MODE)		
		C200HX-CPU65-Z C200HX-CPU85-Z	VT-L16CA (C-MODE)		

Communication board for OMRON SYSMACa series

C200HW-COM02/COM04/COM05
C200HW-COM06²

*1 The CPU is not provided with an RS-232C port. Connect to the communication board.

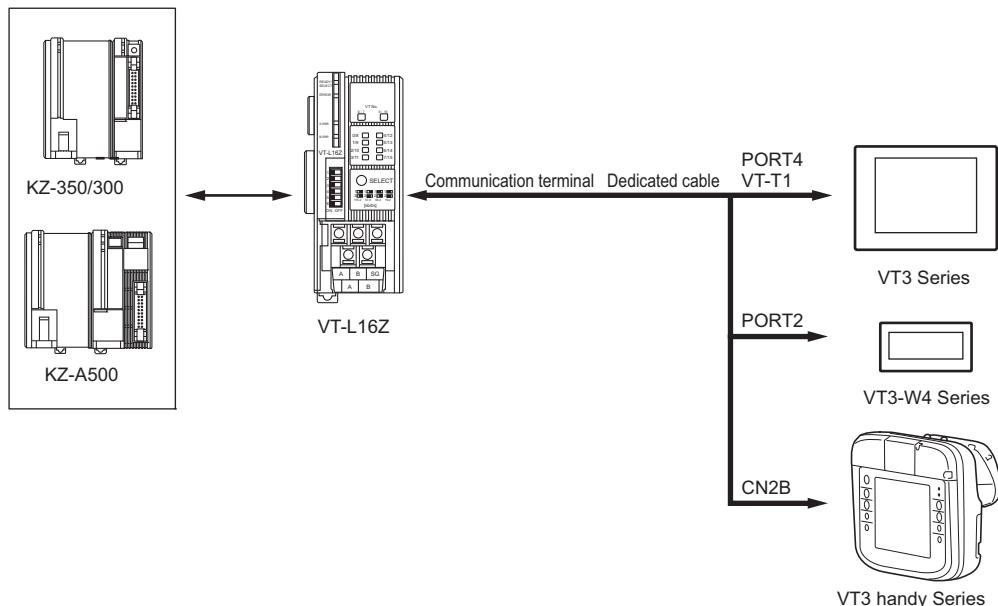
*2 The RS-422A/485 port (port A) cannot be used. Connect to the RS-232C port (PORTB).

*3 Not supported by Soft-VT.

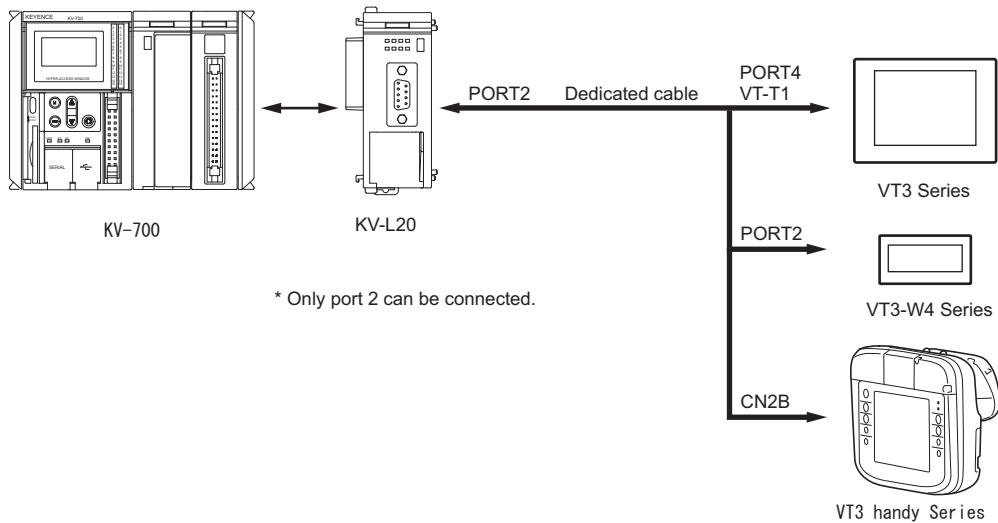
19-3 System Configuration

Keyence KZ, KV Series

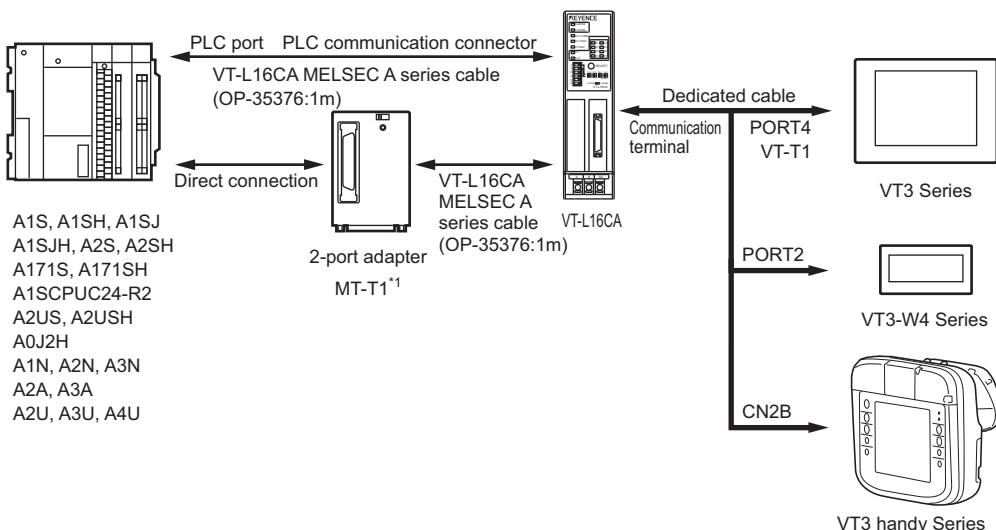
■ KZ-300/350, KZ-A500



■ KV-700



MITSUBISHI ELECTRIC MELSEC-A Series

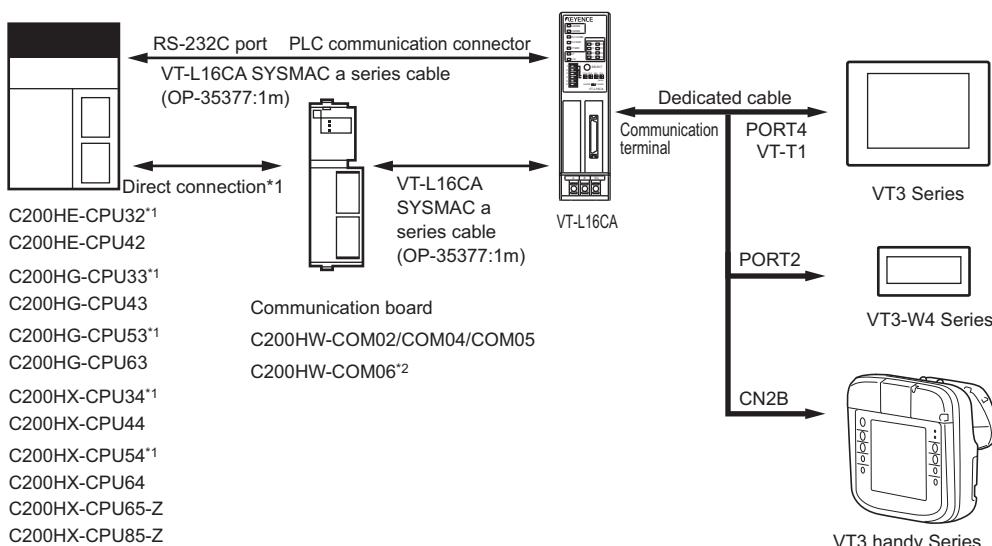


*1 Supported only on products shipped from Keyence from April 7, 1999 onwards.
Products supporting this have their serial No. either prefixed by "A" or appended by "G".

NOTICE

When the ladder diagram software made by the Mitsubishi Electric company is used, a communication error which is incurred by the ladder diagram software may occur when the PLC program is written in the RUN mode (automatically transmitted during the conversion) using MT-T1.

OMRON SYSMAC α Series



*1 The CPU is not provided with an RS-232C port.

Connect to the communication board.

*2 The RS-422A/485 port (port A) cannot be used.

Connect to the RS-232C port (PORTB).

19-4 Connections and Wirings

This section describes how to connect and wire Multi-link.

Connection Cables

Be sure to wire using the exclusive connector cables shown in the following table. Operation using cables other than the exclusive cables cannot be guaranteed.

Company Name	Product Name	Contact
Keyence Corporation	OP-30591(20m), OP-30592(100m) * Conductor cross-section area 0.75mm ²	Consult the shop nearest to you. Please read the list of shops on the back cover.
FURUKAWA ELECTRIC CO., LTD.	KPEV-SB (1P) (with 2-core twisted shielded cable) * Conductor cross-section area 0.5 to 1.25 mm ²	Furukawa ELECOM TEL: 03-5297-8730 FAX: 03-5297-8703
Nihon Electric Wire & Cable Co., Ltd.	KNPEV-SB (1P) (with 2-core twisted shielded cable) * Conductor cross-section area 0.5 to 1.25 mm ²	Nihon Electric Wire & Cable Co., Ltd. TEL: 072-871-0364 FAX: 072-871-0341
TATSUTA ELECTRIC WIRE & CABLE CO., LTD.	Cable model PCPEV-SB (1P) (KPEV-SB or equivalent) 0.5 to 1.25mm ² x 1P	Tatsuta Electric Wire & Cable Osaka Shop TEL: 06-6721-3333 FAX: 06-6725-2376

* The cross-section of conductor for connecting VT3-W4 Series is 0.08 to 0.75mm².

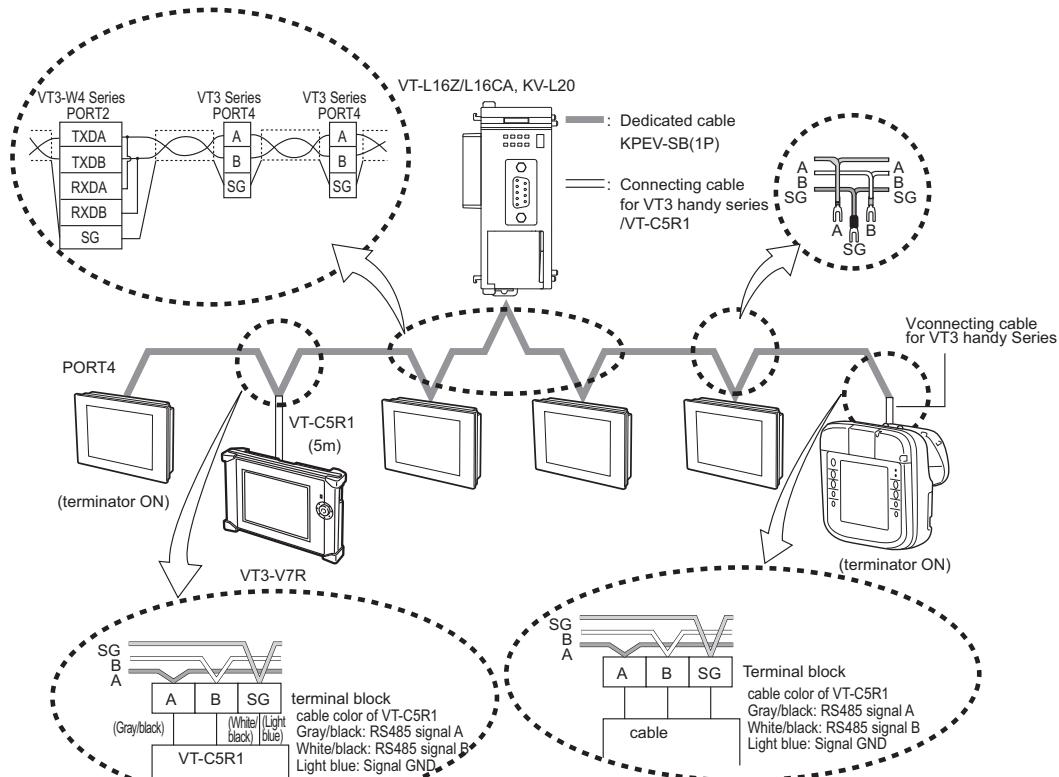


When VT3-V7R is used, please use the RS-232C/485 link cable VT-C5R1(5m) specially designed for VT3-V7R.

When extending the cable, wire the dedicated cable to the VT-C5R1 for use.

Connection Methods

Pay attention to the following points when wiring the VT3 series to the VT-L16Z/L16CA, KV-L20.



"Wiring Precautions", page 19-8

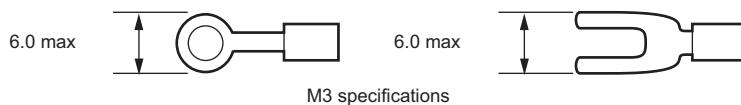
Point

- Please series-connect the VT3 series with the units.
- Limit the total cable length to 500 m. For connection with VT3 handy Series, also including OP-87191/87192/87193 or VT-T1 + OP-87194/87195/87196; for connection with VT3-V7R, also including VT-C5R1 (5m).
- Be sure to set the terminator on units connected to both ends of the wiring to ON. Be sure to set other units to OFF.
 - "Set up the VT3 Terminator", page 19-9
- For details about unit settings**
 - "19-5 Unit Settings"
- Operation using a cable other than the exclusive cable cannot be assured.
 - "Connection Cables", page 19-6
- Use an exclusive cable having the same conductor cross-section area. Operation when using cables different cross-sectional area cannot be assured.
 - "Connection Cables", page 19-6

Terminal Connections

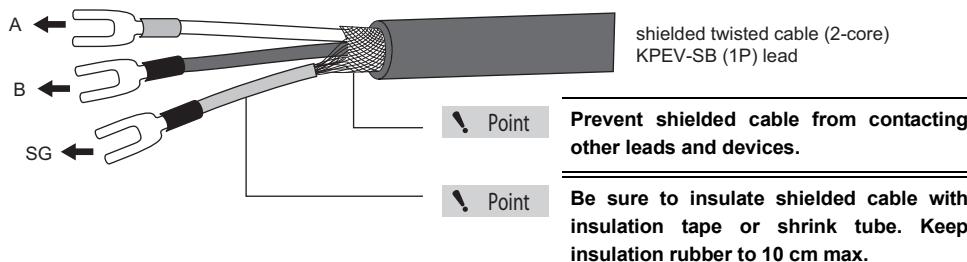
Use M3 terminal screws for the VT-L16Z/L16CA and KV-L20.

If you are connecting using crimped terminals, make sure that they conform to the following specifications.

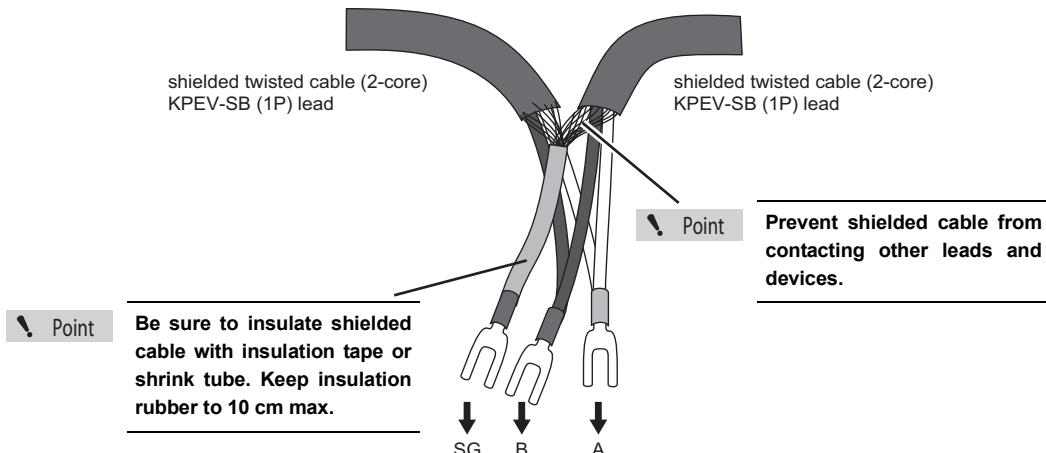


In addition, please observe the following precautions when wiring

Cable terminals

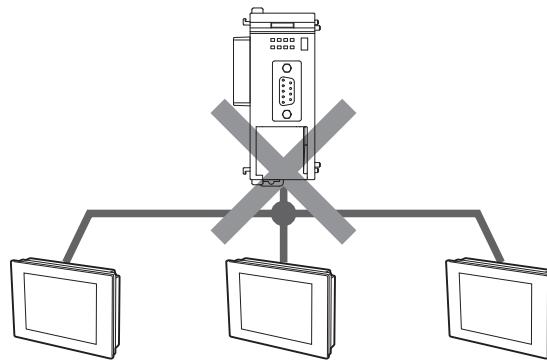


Cable branches

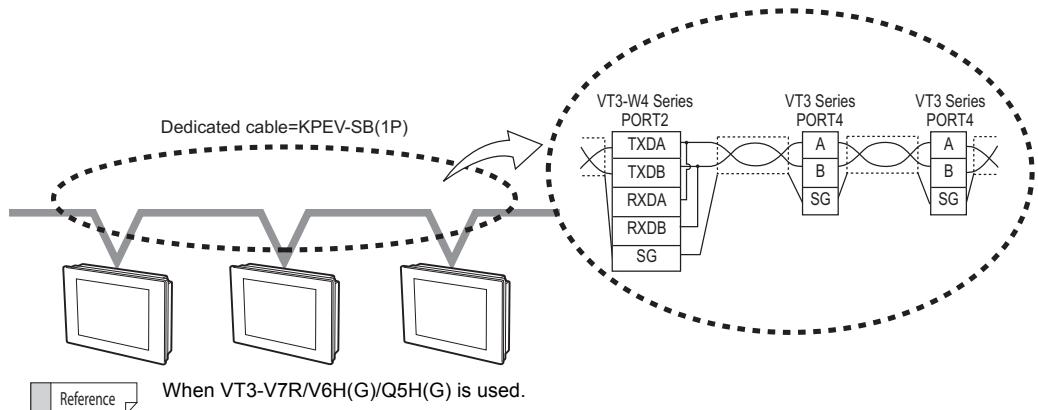


Wiring Precautions

- Do not configure branches when wiring as indicated in the figure below. Be sure to wire in series.

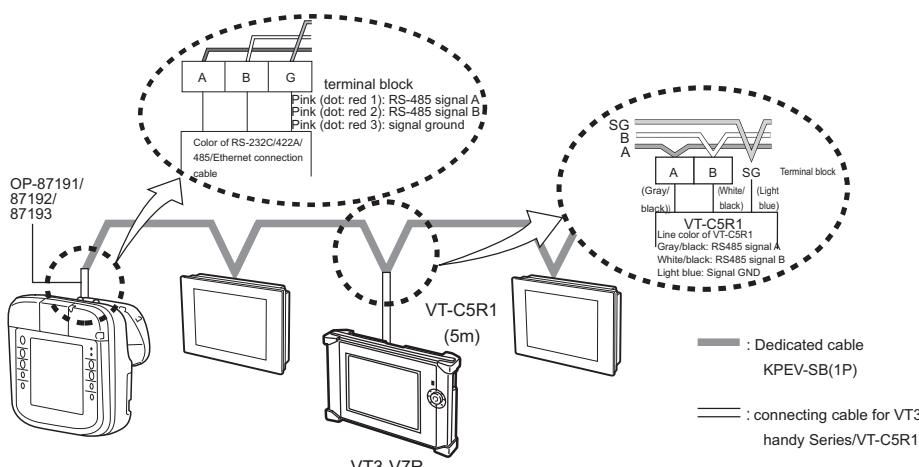


- If exclusive cables are brought close to the power lead, the cable may be influenced by high voltage or large current and cause the VT to malfunction. When wiring, maintain at least 100 mm between the exclusive cables and power leads.
- When using ducts for wiring, make sure that the duct is properly grounded.
- Wire leads crossing each VT3 unit as follows:



Point

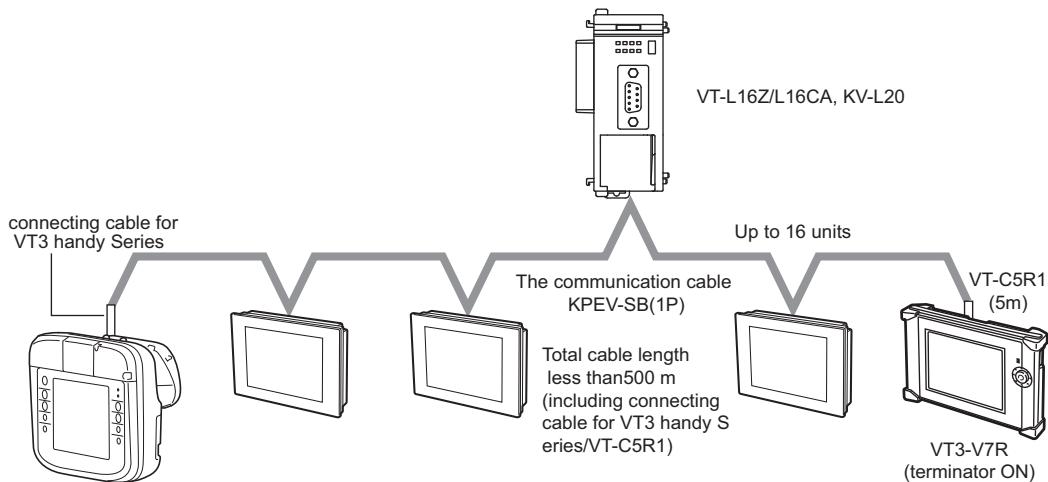
With respect to the connection from dedicated cable to VT3-V7R/V6H(G)/Q5H(G), use VTC5R1 for VT3-V7R; and use OP-87191/87192/87193 or VT-T1 + OP-87194/87195/87196 for VT3-V6H(G)/Q5H(G). Do not extend the above-mentioned cable for the connection with dedicated cable.



Set up the VT3 Terminator

When connecting a Multi-link, connect the terminator on the VT3 series or VT-L16Z/L16CA and KV-L20 units connected at both ends of the communications cable to ON.

The following describes how to set the terminator on the VT3 series.



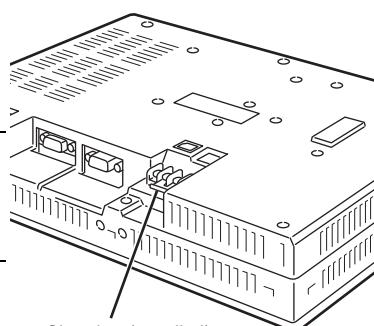
To turn the terminator of the VT3 series (excluding VT3-V7R/V6H(G)/Q5H(G)/W4TA/W4MA/W4GA) ON, insert the short bar (supplied) across the "B" and "T" TERM terminals on PORT4. When the VT3 series is shipped, the short bar is inserted to turn the terminator ON.

Remove the short bar from PORT4 to turn the terminator OFF.



When the short bar is removed from the VT3 series (excluding VT3-V7R/V6H(G)/Q5H(G)/W4TA/W4MA/W4GA), store the short bar in a safe place to prevent it from becoming lost.

Connect the short bar as follows



Short bar (supplied)

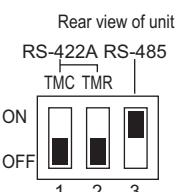


- VT3-V7R/V6H(G)/Q5H(G) is used

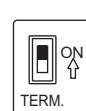
To set the terminator of VT3-V7R/V6H(G)/Q5H(G) to ON, set the DIP switch No. 3 on the rear of the unit to ON.

To set the terminator to OFF, set the DIP switch No.3 to OFF.
(ex-factory setting: ON)

Set DIP switch No.3 to ON.



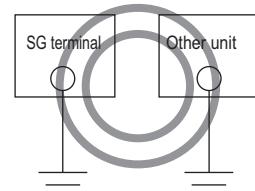
- When VT3-W4TA/W4MA/W4GA is used
- To set the terminal load of VT3-W4TA/W4MA/W4GA to ON, set the terminator switch (TERM.) on the rear of VT3-W4TA/W4MA/W4GA to ON. (ex-factory setting: ON)



Grounding Precautions

Noise countermeasures have already been implemented on the VT3 series. Normally, the KL series can be used in a non-grounded state. However, the KL series must be grounded if the KL series is used in environments subject to a lot of noise. When grounding the KL series, pay attention to the following points:

- The SG terminal of VT-L16Z/L16CA and KV-L20 should be grounded separately. Please use the D-type grounding (third-type grounding). Provide a D-type grounding (maximum resistance of 100 Ohms) for the grounded device.
- Where separate grounding is not practical, please use the common ground. In this case, however, the same wire type and length should be used.
- Do not ground the SG terminal on the VT3 series.



D-type Grounding (third-type grounding)

- "3-3 Connecting the Power Supply", VT3 Series Reference Manual
 "3-4 Grounding Precautions", VT3 Series Reference Manual

Connect the shield lead (FG) of the VT-C5R1 cable to the FG terminal of the power supply, and provide a D-type grounding (maximum resistance of 100 Ohms).

19-5 Unit Settings

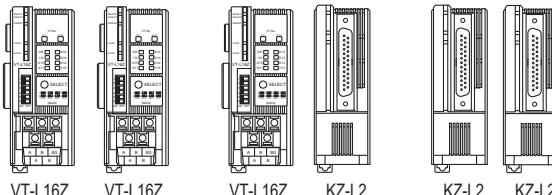
This section describes how to install and set the Multi-link Unit VT-L16Z/L16CA and the Multi-communication Unit KV-L20.

VT-L16Z

■ VT-L16Z restrictions

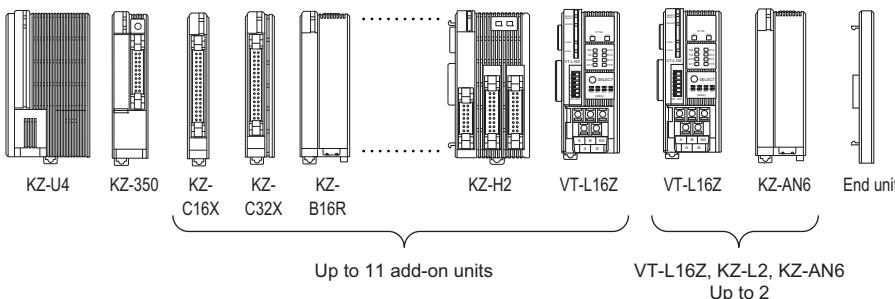
● When connecting to KZ-300/350

- For a KZ-300/350, the VT-L16Z is a special unit, and is treated in the same way as the PC Link Unit KZ-L2.
□ "2-3 Relay No. Assignments", KZ-300/350 User's Manual.
- Up to two VT-L16Zs can be connected to KZ-300/350. Note, however, that the total number of VT-L16Zs and KZ-L2s is two when KZ-L2 is included in the connection.



- When connecting the A/D / D/A conversion unit KZ-AN6, connect the VT-L16Z to the left side of the KZ-AN6. If the VT-L16Z is connected to the right side, it will no longer function normally.

Up to 11 add-on units can be connected to KZ-300/350. Note, however, that up to 13 add-on units can be connected if a VT-L16Z, KZ-L2 or KZ-AN6 is included in the connection.

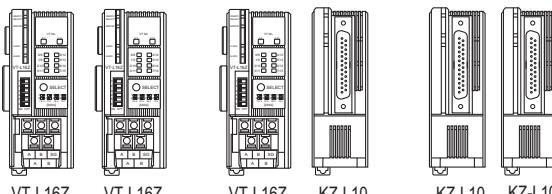


The following shows the maximum number of special units that can be connected to KZ-300/350

VT-L16Z/KZ-L2	2 units (total)	KZ-H2	7 units
KZ-AN6	5 units	KZ-TC4/TH4	7 units (total)

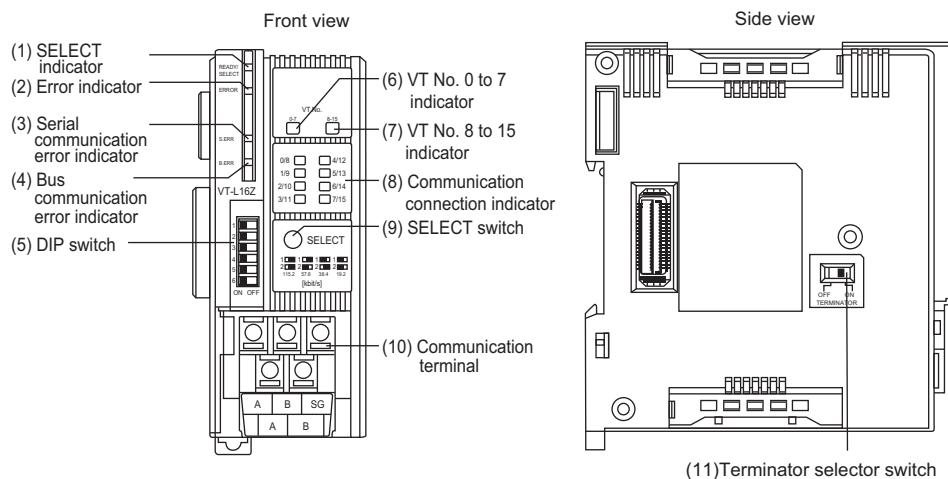
● When connecting to KZ-A500

- For a KZ-A500, the VT-L16Z is a special unit, and is treated in the same way as the PC Link Unit KZ-L10.
□ "3-3 I/O Device Assignments", KZ-A500 Series User's Manual.
- Up to two VT-L16Zs can be connected to KZ-A500. Note, however, that the total number of VT-L16Zs and KZ-L10s is two when KZ-L10 is included in the connection.



- The VT-L16Z occupies 128 (eight channels) I/O relays.
- When connecting the A/D / D/A conversion unit KZ-AN6, connect the VT-L16Z to the left side of the KZ-AN6. If the VT-L16Z is connected to the right side, it will no longer function normally.

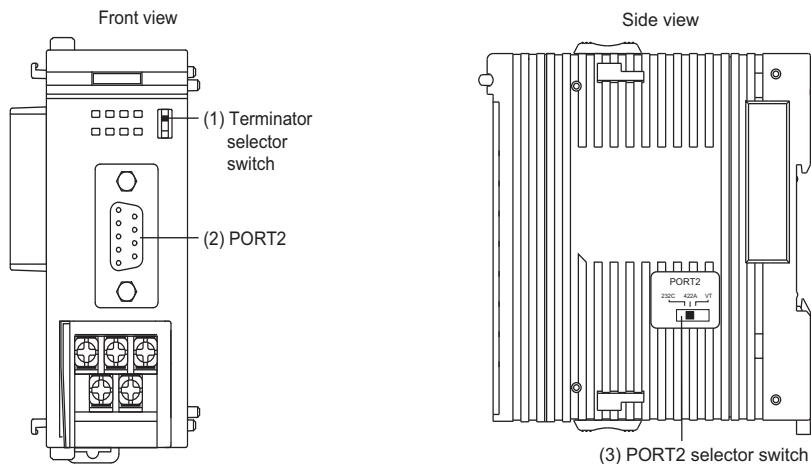
■ Names and Functions of Parts on VT-L16Z



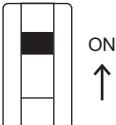
Designation	Description										
(1) SELECT indicator	This indicator lights (green) when the power is turned ON. This indicator blinks when VT-L16Z is selected at the input/output display on the KZ-A500 when connected to the KZ-A500. This indicator lights at all times when the KZ-350/300 is used.										
(2) Error indicator	This indicator lights (red) when an error occurs.										
(3) Serial communication error indicator ¹	This indicator lights (yellow) when an error occurs in communications between the VT3 series and the VT-L16Z.										
(4) Bus communication error indicator ¹	This indicator lights (yellow) when an error occurs in bus communications between the KZ-300/350, KZ-A500 and VT-L16Z.										
(5) DIP switch	Set the baud rate on DIP switches No.1 and 2. <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">2</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> Switch Nos.3 to 6 are not used, and are always set to OFF. Please always set it to OFF. If you changed the terminator settings, be sure to turn the power back ON again.	1					2				
1											
2											
(6) VT No. 0 to 7 indicator ²	When this indicator is lit (green), you can check the communications state of VT No. 0 to 7 on the communications connector indicator.										
(7) VT No. 8 to 15 indicator ²	When this indicator is lit (green), you can check the communications state of VT No. 8 to 15 on the communications connector indicator.										
(8) Communications connection indicator ²	The unit No. of the VT (VT No.) that is currently communicating with the VT-L16Z is lit and indicated (red). VT No. 0 to 15 are indicated by toggling between 0 to 7 and 8 to 15 by the SELECT switch.										
(9) SELECT switch ²	Each press of this switch toggles the VT No. indicator between 0 to 7 and indicator 8 to 15.										
(10) Communication terminal	This terminal is for connecting the communications lead. Signal terminals A and B are both internal common terminals.										
(11) Terminator selector switch	Sets the terminator ON/OFF. (default: OFF) Set this switch ON when there is a VT-L16Z installed at both ends of the communications cable.										

*1 "19-10 Troubleshooting"

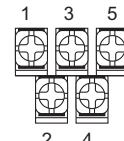
*2 "Connection State", page 19-19

KV-L20**(1) Terminator selector switch**

Turn this switch ON when the KV-L20 is located at either of the two ends of the communications cable.

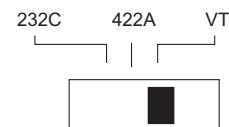
**(2) PORT2**

Terminal No.	Signal name	Terminal No.	Signal name
1	SG (signal GND)	4	A (signal A)
2	B (signal B)	5	A (signal A)
3	B (signal B)		

**(3) PORT2 selector switch**

Set to "VT Multi-link".

VT Multi-link: VT (right side)

**(4) Unit Editor**

Item	Setting Range	Default
Operation mode	VT Multi-link mode	VT Multi-link mode
Interface	VT Multi-link	VT Multi-link
PLC No.	0	0
Baud Rate	19200, 38400, 57600, 115200 bit/s	38400 bit/s
Data bit	8 bits	8 bits
Start bit	1 bit	1 bit
Stop bit	1 bit	1 bit
Parity	Odd	Odd
CheckSum	None	None

Point

- The VT Multi-link connection is not possible on PORT1 of KV-L20.
- When connecting a VT Multi-link on the KV-L20, set both (3) PORT2 selector switch and (4) Unit Editor. The KV-L20 will not function normally if both settings do not match.

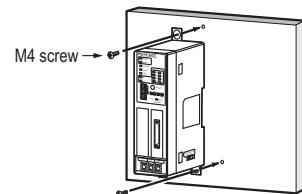
VT-L16CA

There are three ways of installing the Multi-link Unit VT-L16CA.

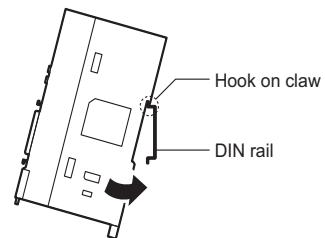
- Mounting directly on the panel surface
- Mounting on a panel surface using a DIN rail.
- Mounting onto the MELSEC A series base unit using the special fixture.

■ Mounting directly on the panel surface

Mount the rear surface of the VT-L16CA onto the panel surface using the metal fixture.

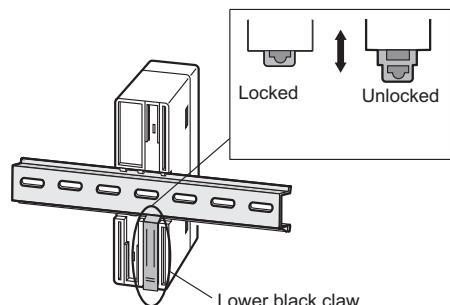
**■ Mounting on the panel surface using a DIN rail**

- 1 Hook the groove at the top of the DIN rail onto the DIN rail mounting claw at the VT-L16CA.

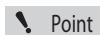


- 2 Hook the VT-L16CA onto the bottom of the DIN rail.

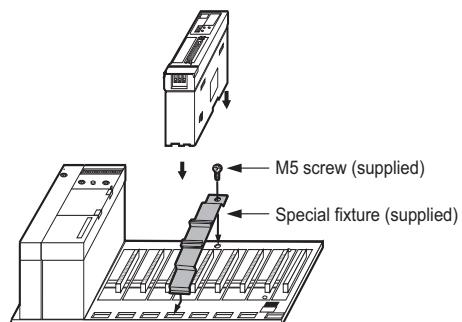
- The claw for mounting the VT-L16CA onto the DIN rail is designed to move by a spring. Press the VT-L16CA against the DIN rail until you hear it click.
- Make sure that the DIN rail mounting claw for the VT-L16CA is pressed in (locked).

**■ Using the special fixture (supplied) for fitting the VT-L16CA onto the MELSEC A series base unit.**

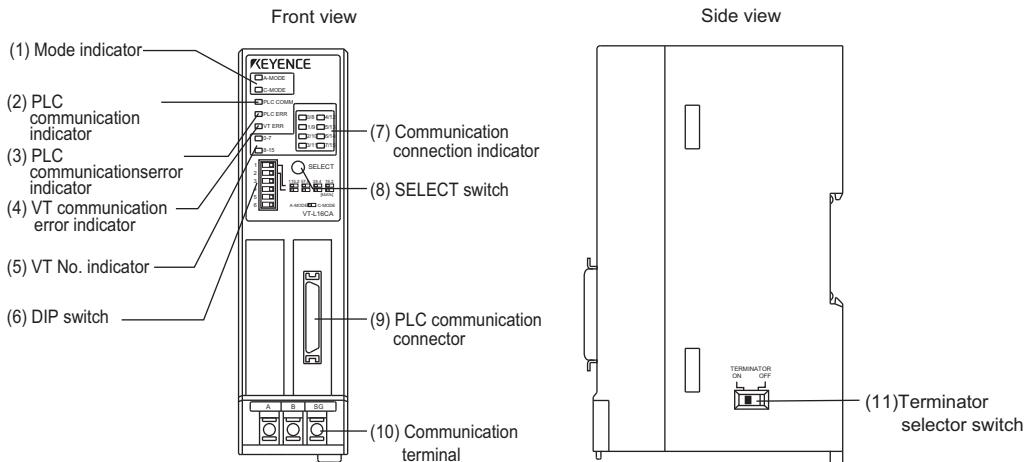
Insert the bottom side of the special mounting fixture into the square hole at the bottom side of the base unit, and tighten the top side with the screw. Then, mount the VT-L16CA in the same way as when you mount on the panel surface using a DIN rail.



The special mounting fixture is for MELSEC-AnS series (small) base units.



■ Names and Functions of Parts on VT-L16CA



Designation	Description
(1) Mode indicator	This indicator lights (green) when the power is turned ON. Either of "A-MODE" or "C-MODE" lights by the setting of DIP switch No.6.
(2) PLC communication indicator	This indicator lights (yellow) during communications with a PLC (MELSEC A series or SYSMAC α series).
(3) PLC communication error indicator ^{*1}	This indicator lights (red) when an error occurs during communications with between the VT-L16CA and a PLC (MELSEC A series or SYSMAC α series).
(4) VT communication error indicator ^{*1}	This indicator lights (yellow) when an error occurs in communications between the VT3 series and the VT-L16CA.
(5) VT No. indicator ^{*2}	The connection state of VT3can be checked. When "0-7" green indicators light, you can check the connection state of VT No.0 to 7; when "8-15" green indicators light, you can check the connection state of VT No.8 to 15.
(6) DIP switch ^{*2}	Set the baud rate on DIP switches Nos.1 and 2. 1 2 115.2kbit/s 57.6kbit/s 38.4kbit/s 19.2kbit/s (default) Set the operation mode at DIP switch No.6. When connected with MELSEC A series (A-MODE) When the SYSMAC α series are used: (C-MODE) A-MODE C-MODE Switch Nos.3 to 5 are not used, and are always set to OFF. If you changed the terminator settings, be sure to turn the power back ON again.
(7) Communication connection indicator ^{*2}	The unit No. (VT No.) of the VT3 that is currently communicating with the VT-L16CA is lit and indicated (red). VT Nos. 0 to 15 are indicated by toggling between 0 to 7 and 8 to 15 by the SELECT switch.
(8) SELECT switch ^{*2}	Each press of this switch toggles the VT No. indicator between 0 to 7 and 8 to 15.
(9) PLC communication connector	Connect the VT-L16CA special cable. MELSEC A series cable(1 m) (OP-35376) SYSMAC α series cable(1 m) (OP-35377)
(10) Communication terminal	This terminal is for connecting the communications lead. Signal terminals A and B are internally connected.
(11) Terminator selector switch	Sets the terminator ON/OFF. (default: OFF) Set this switch ON when there is a VT-16CA installed at both ends of the communications cable.

*1 "19-10 Troubleshooting"

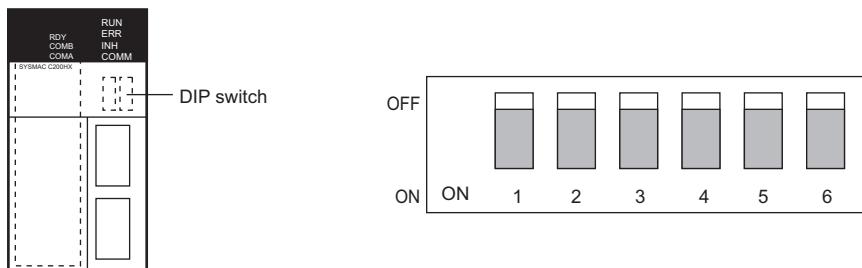
*2 "Connection State", page 19-19

■ MELSEC A series

- Set DIP switch No.6 on the VT-L16CA to "A-MODE".
- The MELSEC A series CPU need not be set.

■ SYSMAC α Series

- Set DIP switch No.6 on the VT-L16CA to "C-MODE".
- Set DIP switch No.5 to "OFF".



- Set the conditions for communications with the VT3 in the PC system settings in CX-Programmer or on a programming console.

When CX-Programmer is used to change the PC system settings, change the PC system settings after reading the PC system settings on the CPU. After changing these settings, transfer them to the CPU again.

For details, refer to the manual for the respective CPU or CX-Programmer.

[Example] Also helps to set up the initial values of VT3

"19-6 Communication Conditions Setting Ranges and Defaults"

- (1) Open the tab for the connection destination port.
- (2) Mark the user settings checkbox. (Unmark the default settings.)
- (3) Baudrate: 19200, Parameter: 1,8,1,0 Mode: NT Link (one-to-one)



PThe PC system setting area cannot be written to in the ladder program. Be sure to write to this area by the CX-Programmer or on a programming console.

Communications cannot be performed normally after the PC system setting area (DM) is written to by the ladder program.



When the PC system settings are changed on a programming console, directly change the PC system setting area (DM) in the following table.

RS-232C Port Connection	Communication Board Connection	Bit	Setting Item	Set Value (hex)
DM6645	Port A DM6555 Port B DM6550	12 to 15	Mode setting 0: NT link	4000

19-6 Communication Conditions Setting Ranges and Defaults

The following table shows setting ranges for each communications condition and their defaults.



Point Be sure to set individual VT Nos. on each VT3. VT3s will not function properly unless unique VT Nos. are set.

■ KEYENCE KZ-300/350(VT-L16Z)

Item	Setting Range	Default
PLC No.	None	None
VT No.	0 to 15	0
PLC serial I/F	RS-485	RS-485
Baud Rate	19200, 38400, 57600, 115200 bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Depending on the application requirement.

■ Keyence KZ-A500(VT-L16Z)

Item	Setting Range	Default
PLC No.	None	None
VT No.	0 to 15	0
PLC serial I/F	RS-485	RS-485
Baud Rate	19200, 38400, 57600, 115200 bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Depending on the application requirement.

■ KEYENCE KV-L20(VT Multi-Link)

Item	Setting Range	Default
PLC No.	None	None
VT No.	0 to 15	0
PLC serial I/F	RS-485	RS-485
Baud Rate	19200, 38400, 57600, 115200bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Set up based on KV-L20.

■ Mitsubishi VT-L16CA (Mode A)

Item	Setting Range	Default
PLC No.	None	None
VT No.	0 to 15	0
PLC serial I/F	RS-485	RS-485
Baud Rate	19200, 38400, 57600, 115200bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Depending on the application requirement.

■ OMRON VT-L16CA (Mode C)

Item	Setting Range	Default
PLC No.	None	None
VT No.	0 to 15	0
PLC serial I/F	RS-485	RS-485
Baud Rate	19200, 38400, 57600, 115200bit/s	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Odd	Odd
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

Depending on the application requirement.

19-7 VT3 Setup

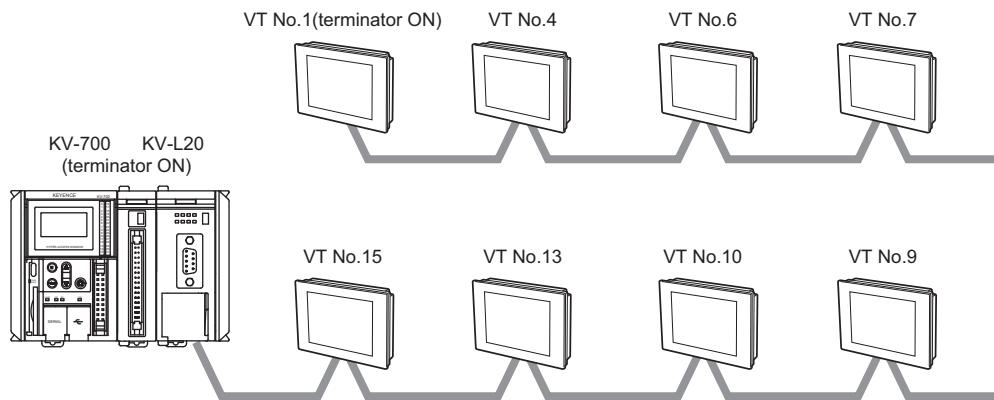
System Mode Settings

When using the Multi-link, set "KL: not used" from the system mode.

- "5-3 VT System Setup", VT3 Series Reference Manual
- "12-4 Setup of VT Series System", VT3 Series Reference Manual

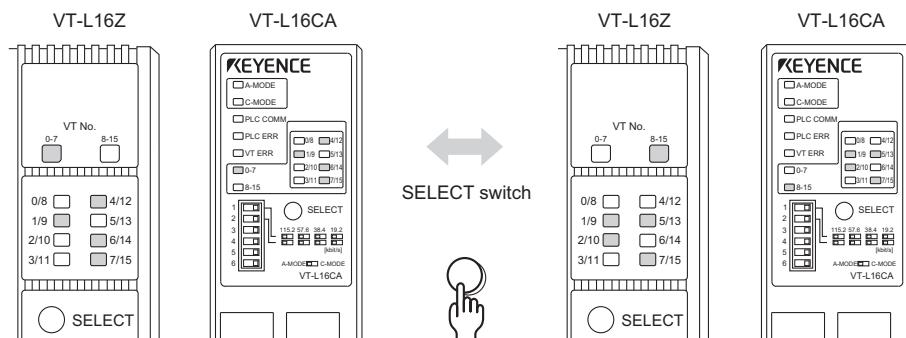
Connection State

The VT3 whose VT No. indicator is lit indicates that it is currently communicating with the VT-L16Z/L16CA, KV-L20. When connections are made and communications are in progress as indicated below, the VT No. indicator lights as follows. If there is a VT3 that cannot communicate, the indicator of that VT No. goes out. When communications is restored, the indicator is automatically restored to the lit state.



For VT-L16Z/L16CA

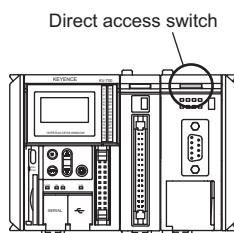
Each press of the SELECT switch switches the display between VT No.0 to 7 and VT No.8 to 15 to enable you to confirm which VT3 is communicating.



For KV-L20

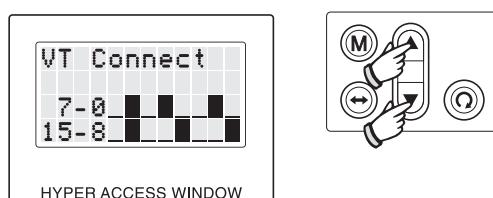
- 1** Press the direct access switch of the KV-L20 whose connection state you want to confirm.

The details of the mode on PORT1 of the KV-L20 you selected are displayed.



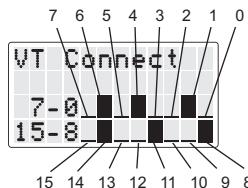
- 2** Select "VT Connect" (VT connection information) using the "▲" or "▼" key.

The VT3 connection information is displayed. Check the VT3 connection state.



■ :Indicates non-connected state.
■ :Indicates connected state.

The number on the left is the No. of the currently connected VT. 0 to 7 indicates VT No.0 to VT No.7, and 15 to 8 indicate VT No.8 to VT No.15. In the above figure, VT No.1, VT No.4, VT No.6, VT No.8, VT No.11, and VT No.14 are connected.

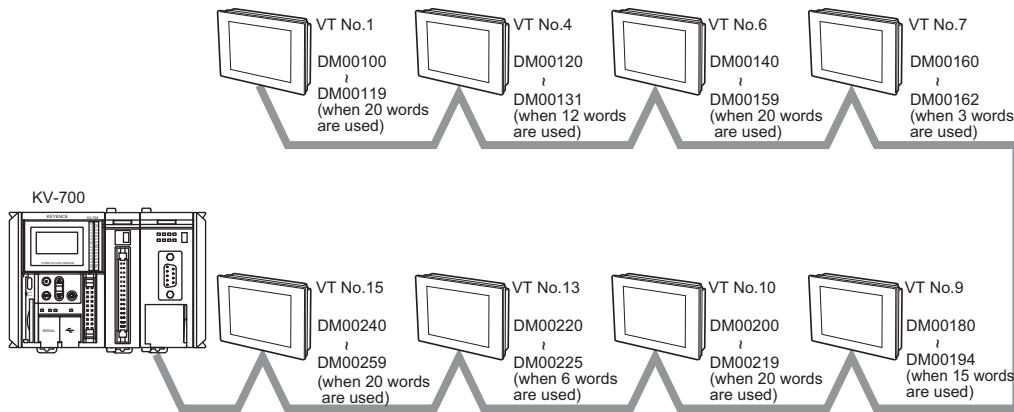


Outline of System Memory Area in a Multi-link

The system memory areas of the VT3s should not be repeatedly set up.

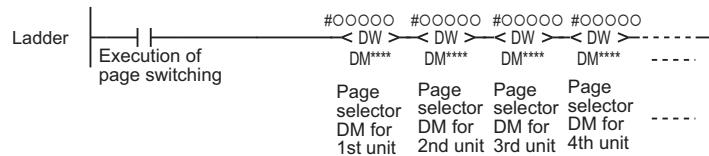
"Chapter 14 System Storage Area", VT3 Series Reference Manual

[Example] In VT mode (0 to 20 words variable)



Even when controlling multiple VT3 displays in exactly the same way, set the system memory areas to have unique addresses. In this kind of instance, apply the same control on each area by the PLC's program.

[Example] To display the same page on all VT3s



* #00000 → Page No. to be displayed (all same values)



The number of words is fixed to 16 in the MT mode.

Key Protection

Key protection is a control function for disabling entry of specific VT3 switches among the VT3s that are connected in a Multi-link.

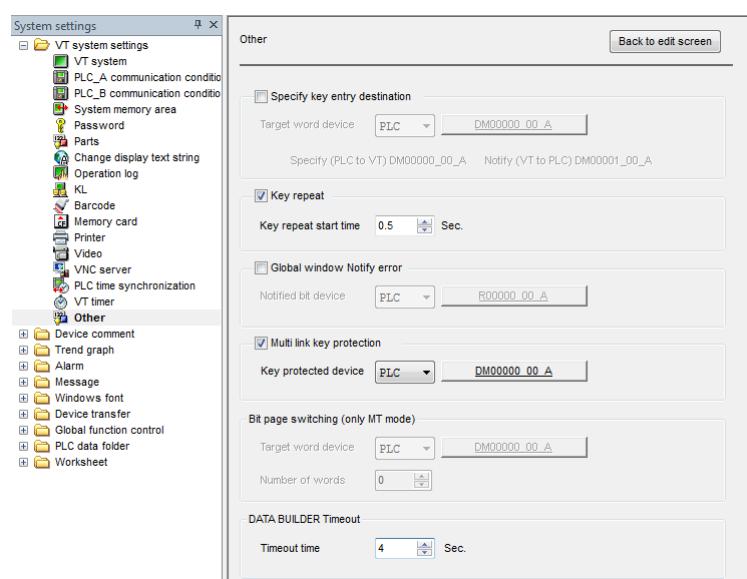
On VT3s on which key protection is enabled, switch entry is enabled when key-protected devices are OFF, and is disabled when key protected devices are ON. On VT3s on which key protection is disabled, switch entry is enabled at all times.

■ Setting key protection

1 Display the System Setting screen on VT STUDIO by either of the following methods:

- Select "Resources(R)" → "VT system settings(S)" → "Other(O)" from the menu.
 - Select "VT system settings(S)" → "Other(O)" from the "System Settings" tab in the workspace.
- "12-4 Setup of VT Host System" in the VT3 Series Reference Manual

2 Check the "Multi-Link Key Protection (Only for Multi-Link)"



3 Set the key protected device.

Specify the same key protected device for all VT3s by the leading No. or 1-word device (16 bits) of the bit device (for 1 channel or 16 bits).

With the Multi-link, up to 16 VT3s can be connected to a single VT-16Z/L16CA and KV-L20. Key protection on each VT3 can be enabled/disabled by turning 16 continuous bits on bit devices ON and OFF, or by turning each bit in a word on word devices ON and OFF.

Bits are assigned based on unit Nos. (VT No.) on key protected devices on each VT3.

Devices assigned by key protected device and unit No. (VT No.)

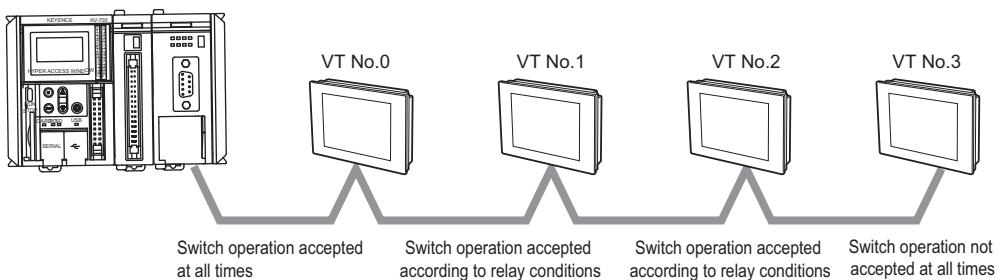
Device to Set	Unit No. (VT No.)					
	VT No.0	VT No.1	VT No.2	...	VT No.14	VT No.15
Internal auxiliary relay 1000	1000	1001	1002	...	1014	1015
Internal relay M0	M0	M1	M2	...	M14	M15
Data memory D0	D0: Bit 0	D0: Bit 1	D0: Bit 2	...	D0: Bit 14	D0: Bit 15



- Set key protected devices to the same device on all VT3.
- The VT No. of VT3 should be unique.

[Example] When the operation conditions of the VT3s set to VT No.0 to 3 are as shown in the following diagram, the key protection settings and ON/OFF states of key protected devices (relays) are as follows:

KV-700



Unit No. (VT No.)	VT No.0	VT No.1	VT No.2	VT No. 3
Key protect setting	Not checked	Checked	Checked	Checked
No. of set device	-	1000	1000	1000
No. of assigned device	-	1001	1002	1003
VT3 action	-	1001 OFF : Switch enabled 1001 ON : Switch disabled	1002 OFF : Switch enabled 1002 ON : Switch disabled	1003 ON at all times (switch disabled)

19-8 Available Devices

■ KZ-300/350

	Device	Address
Bit Devices	Input/output relay ¹	0000 to 0915, 7000 to 17915
	Internal auxiliary relay	1000 to 1915, 3000 to 6915
	Special auxiliary relay	2000 to 2915
	Timer (contact)	T000 to T249
	Counter (contact)	C000 to C249
	High-speed counter comparator (contact) ²	CTC0 to CTC3
Word Devices	I/O relay ^{1,3}	0000 to 0900, 7000 to 17900
	Internal auxiliary relay ³	1000 to 1900, 3000 to 6900
	Analog timer ⁴	AT0 to AT1
	Timer (set)	TS000 to TS249
	Timer (current value)	TC000 to TC249
	Counter (set)	CS000 to CS249
	Counter (current value)	CC000 to CC249
	High-speed counter (current value)	CTH0 to CTH1
	High-speed counter comparator (set)	CTC0 to CTC3
	Data memory	DM0000 to DM9999
	Temporary data memory	TM00 to TM31

*1 The address to which the unit is currently connected is read-only.

*2 Only reading is possible on the high-speed counter comparator for bit devices.

*3 Lower two digits become "00".

*4 Read-only

■ KZ-A500

	Device	Address
Bit Devices	Input relay ¹	X000000 to X0007FF
	Output relay ¹	Y000000 to Y0007FF
	Internal relay	M000000 to M008191
	Hold relay	L000000 to L008191
	Link relay	B000000 to B000FFF
	Timer (contact)	TS00000 to TS02047
	Timer (coil)	TC00000 to TC02047
	Counter (contact)	CS00000 to CS01023
	Timer (coil)	CC00000 to CC01023
Word Devices	Input relay ²	X000000 to X0007F0
	Output relay ²	Y000000 to Y0007F0
	Internal relay ³	M000000 to M008176
	Hold relay ³	L000000 to L008176
	Link relay ²	B000000 to B000FF0
	Data register	D000000 to D006143
	Link register	W000000 to W000FFF
	File register	R000000 to R008191
	Timer (current value)	TN00000 to TN02047
	Counter (current value)	CN00000 to CN01023

*1 The address to which the unit is currently connected is read-only.

*2 Only d the values whose lower digit is "0".

*3 Value divisible by 16

■ KV-L20

	Device	Address
Bit Devices	Relay	00000 to 59915
	Control relay	CR0000 to CR3915
	Timer (contact)	T000 to T511
	Counter (contact)	C000 to C511
	High-speed counter comparator (contact) ¹	CTC0 to CTC3
Word Devices	Relay ²	00000 to 59900
	Trimmer ³	TRM0 to TRM7
	Timer (set)	TS000 to TS511
	Timer (current value)	TC000 to TC511
	Counter (set)	CS000 to CS511
	Counter (current value)	CC000 to CC511
	High-speed counter (current value)	CTH0 to CTH1
	High-speed counter comparator (set)	CTC0 to CTC3
	Data memory	DM00000 to DM39999
	Control memory	CM0000 to CM3999
	Temporary data memory	TM000 to TM511

*1 Only reading is possible on the high-speed counter comparator for bit devices.

*2 Lower two digits become "00".

*3 Read-only

■ MELSEC-A series

	Device	Address
Bit Devices	Input relay	X000000 to X001FFF
	Output relay	Y000000 to Y001FFF
	Internal relay	M000000 to M008191
	Latch relay	L000000 to L008191
	Link relay	B000000 to B001FFF
	Timer (contact)	TS00000 to TS02047
	Timer (coil)	TC00000 to TC02047
	Timer (coil)	CC00000 to CC01023
Word Devices	Input relay ¹	X000000 to X001FF0
	Output relay ¹	Y000000 to Y001FF0
	Internal relay ²	M000000 to M008176
	Latch relay ²	L000000 to L008176
	Link relay ¹	B000000 to B001FF0
	Timer (current value)	TN00000 to TN02047
	Counter (current value)	CN00000 to CN01023
	Data register	D000000 to D008191
	Link register	W000000 to W001FFF

*1 Only d the values whose lower digit is "0".

*2 Value divisible by 16



Available devices are restricted according to the product model. Check the manual for the respective model.

■ SYSMAC α Series

Device		Address
Bit Devices	I/O relay and internal auxiliary relay	00000 to 51115
	Data link relay	LR0000 to LR6315
	Hold relay	HR0000 to HR9915
Word Devices	I/O relay and internal auxiliary relay	000 to 511
	Data memory	DM0000 to DM6655
	Timer (current value)	TIM000 to TIM511
	Counter (current value)	CNT000 to CNT511



Available devices are restricted according to the product model. Check the manual for the respective model.

19-9 Maintenance and Installation Environment

This section describes the inspection and installation environment when using the Multi-link Unit.

Inspection

This section describes how to inspect Multi-link Units.

When the Multi-link units and other units are used for a long time, connector connections, for example, become loose. Continued use in this condition may cause the Multi-link units and units to malfunction.

For this reason, periodically inspect the wiring, etc. of the Multi-link units and units.

Inspect the following items:

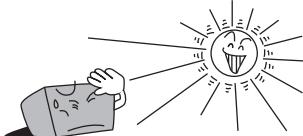
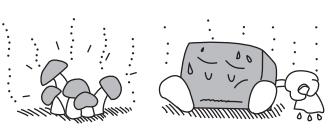
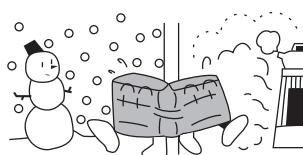
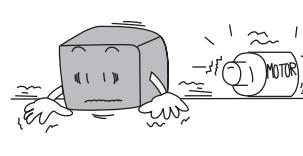
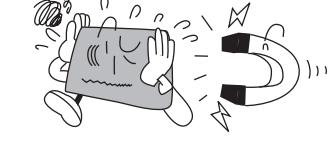
- Are unit connectors unlocked or loose?
- Are the terminal screws on the terminal blocks loose?
- Are wiring cables between units and devices worn?

Operating Environment

The following describes the installation environment, mounting position and cautions when wiring the VT3.

■ Installation location

Do not install the VT3 in the following places.

Locations subject to direct sunlight	Locations subject to ambient temperature out of 0 to 50° range	Locations subject to ambient humidity out of 35 to 85%RH range
		
Locations subject to condensation caused by sudden temperature change	Locations subject to corrosive and flammable gases	Locations subject to large amounts of dirt and dust, salt, iron and oil smoke
		
Locations directly subject to vibration and shock	Locations that may be splashed with water, oil or chemical mist	Locations where strong magnetic and electrical fields are generated
		

NOTICE

Install the VT3 as far away as possible from locations where radios, etc. are located.
Radio waves emitted by the VT3 may cause noise to occur on the radio.

19-10 Troubleshooting

If the VT-L16Z/L16CA, KV-L20 does not function properly, first look for the cause of the problem in the following table and remedy the problem according to the indicated remedy.

Problem	Cause	Solution
The VT No. that should be connected does not light and communications with the VT3 is not possible. (S.ERR LED or VT ERR LED is lit.)	The cable connected in a multi-drop configuration is broken or shorted.	Check the cable wiring.
	The terminator is set incorrectly.	Of the VT3 or VT-L16Z/L16CA currently connected, set the terminator only on the units at both ends of the communications line. Do not set the terminator on other units.
	The communications speed is not matched.	Check the baud rate setting for the VT-L16Z/L16CA and VT3.
The connected VT No. doesn't light, and cannot communicate with VT3(S.ERR LED or VT ERR LED goes out)	The power of VT3 is OFF.	Please turn on the power of VT3.
	The same VT No. to be set on VT STUDIO is already set.	In the System mode, make sure that VT Nos. are unique.
	The cable connected in a multi-drop configuration is broken or shorted.	Check the cable wiring.
B.ERR LED lights.	The terminator is set incorrectly.	Of the VT3 or VT-L16Z/L16CA currently connected, set the terminator only on the units at both ends of the communications line. Do not set the terminator on other units.
	The communications speed is not matched.	Check the baud rate setting for the VT-L16Z/L16CA and VT3.
	The connection between the VT-L16Z and the KZ unit has become loose.	Check the connections and connecting fixtures between the units.
PLC ERR LED lights.	The number of connected KZ unit conditions are not satisfied.	Check the number of VT-L16Zs and KZ-L10s (L2) or total number of units.
	The PLC is OFF.	Turn the PLC ON.
	The cable connection with the PLC is broken.	Check the cable.
PLC error or malfunction	PLC error or malfunction	Remedy the error or malfunction on the PLC.
	Wrong communications protocol settings	Match the communications protocol between the PLC and VT-L16CA.
Communications influenced by noise.	Communications influenced by noise.	Check the surrounding area for noise sources. If there is a noise source, remove it as far away as possible from the VT-L16CA.

The general specifications and communications specifications of VT-L16Z/L16CA are as follows.

General Specifications

Item	Specifications	
Model	VT-L16Z	VT-L16CA
Power voltage	DC24V(supplied from KZ-U4/U5 via CPU unit)	DC5V(supplied from PLC via connector cable)
Power consumption	100 mA max.	300mA max.
Ambient operating temperature	0 to 50°C	
Operating surrounding air humidity	35 to 85% (no condensation allowed)	
Noise resistance	1500 Vp-p at power common Pulse width 1μs, 50 ns (by noise simulator)	
Vibrating resistance	10 to 55 Hz peak-to-peak, 1.5mm, for 2 hours each in X, Y and Z directions	
Insulating resistance	50MΩ or more (across external terminal and case using a 500 VDC megger)	
Operating atmosphere	No dust and corrosive gas allowed	
Weight	Approx. 130g	Approx. 170g

Communication Specifications Between Multi-link Unit and VT

Item	Specifications
Interface	RS-485
Communications system	Half-duplex
Synchronization mode	Start-stop
Baud Rate	19200, 38400, 57600, 115200 bit/s
Transmission path	Total length within 500 m
Connection mode	Multi-drop (branches not allowed)

Communication Specifications Between VT-L16CA and CPU

When connected with MELSEC-A series (A-MODE)

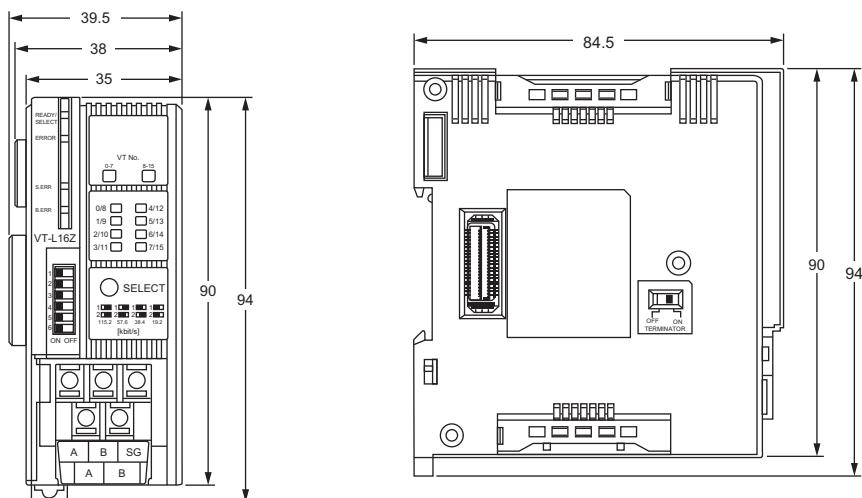
Item	Specifications
Interface	RS-422A 4 wire
Communications system	Full duplex
Synchronization mode	Start-stop
Baud Rate	9600 bit/s
Transmission path	Within 5m.
Data bit	8 bits
Stop bit	1 bit
Parity	Odd

When connected with SYSMAC α (Mode C)

Item	Specifications
Interface	RS-232C
Communications system	Full duplex
Synchronization mode	Start-stop
Baud Rate	19200 bit/s
Transmission path	Within 5m.
Data bit	8 bits
Stop bit	1 bit
Parity	Odd

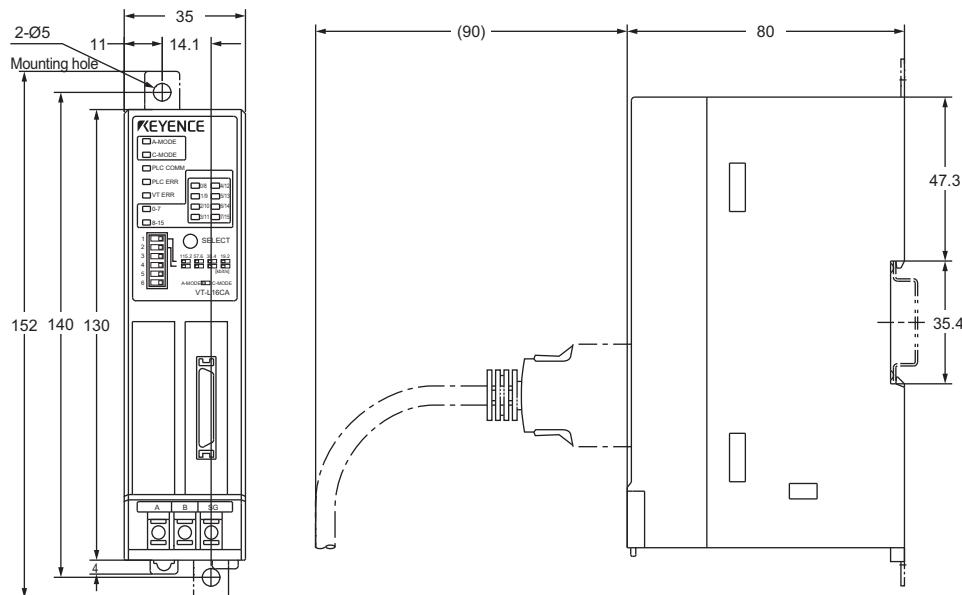
19-12 Dimensional Drawing of VT-L16Z/L16CA

■ VT-L16Z



Unit: mm

■ VT-L16CA



Unit: mm

VT2 MULTI-LINK

This chapter provides a brief description of VT2 Multi-link and how to connect VT2 Multi-link.



Not supported by the VT5 Series, Soft-VT, VT3-W4T/W4M/W4G (RS-232C model), VT1 Series, DT-80/80A and DT-100.

20-1	What is VT2 Multi-Link	20-2
20-2	Checking Operation before Connection	20-4
20-3	System Configuration.....	20-5
20-4	Connections and Wirings	20-6
20-5	Communication Specifications	20-12
20-6	VT3 Setup	20-15
20-7	DT-100A Setup.....	20-17
20-8	Troubleshooting	20-19

20-1 What is VT2 Multi-Link

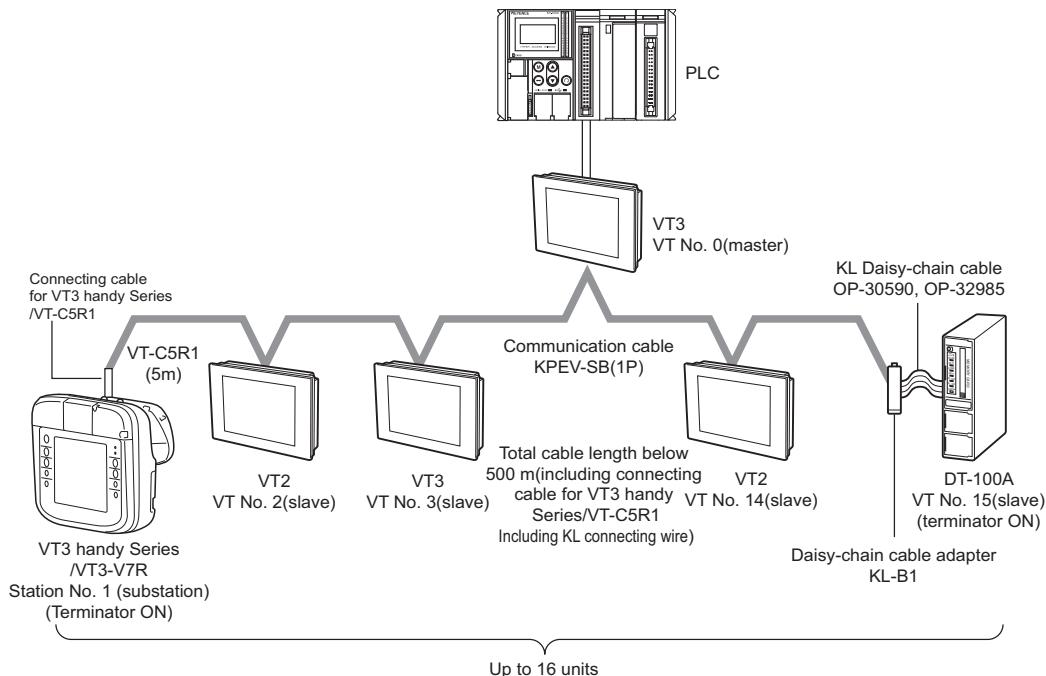
VT2 Multi-Link

When VT2 Multi-Link is used, up to 16 VT3/VT2 series and DT-100A units can be connected with 1 PC without using special hardware.

You can build a network where the VT3 (VT No. 0) connected to the PLC is defined as the master and VT No. 1 to 15 are defined as the slaves.

The master VT3 communicates directly with the PLC, and slaves VT3/DT-100A communicate with the PLC via the master.

Communications between master (VT3) and the PLC is not reliant on the communications speed of the PLC. As the maximum communications speed between slaves (VT3/DT-100A) is 1 Mbit/s, this means that you can achieve a network capable of high-speed communications.



Point

- Not supported by the VT5 Series/Soft-VT.
 - VT2 Multi-Link can not be used together with MegaLink, VT2 Multi-Link, and KL Link.
 - When the MultiTalk function is used, both the master and slaves use VT2 Multi-Link.
 - VT2 Multi-Link supports all the models of the VT3/VT2 series and DT-100A. It is not supported on the VT1 Series (including the VT-7SR).
- When the VT2 series are used via VT2 Multi-Link, the versions of the VT2 system program and PLC files should all be higher than Ver.2.5. Versions lower than Ver.2.5 cannot be used.
- DT-80/80A and DT-100 are not supported.
 - Only one DT-100A unit can be connected with VT2 Multi-Link.
 - DT-100A can be used as the slave (cannot be used as the master).
 - DT-100A can also be connected as the branch unit of VT2 Multi-Link even if it is used as the terminator of DT-500.
 - VT3-W4T/W4M/W4G (RS-232C) are not supported.
 - VT3-V7R, VT3 handy Series, VT3-W4TA/W4MA/W4GA (RS-422/485 type) cannot be used as master station.
 - VT3-V7R and VT3 handy Series can only be connected to both ends of the wiring.
 - For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.

Precautions When Using the VT2 Multi-link

■ Precautions When Using the VT2 Multi-link

- DT-100A can only be used as the slave (node No. 1 to 15).
- Sometimes, due to comparatively heavy loads, the picture update of the VT3 master may get lower. In this case, reduce the number of devices that communicate on the slave.
- When a PLC data folder is run on the slave VT3 series, the update speed of all the slaves connected by VT2 Multi-Link may get lower.
- When the system picture is called up with the slave VT3 series, the communication between the slaves and the master may be temporarily stopped during this period (the communication with the other slaves continue). Also, it may take time until the slave can start VT2 Multi-link communications when the operation screen is returned to from a system screen call-up.
- Even if the slave VT3 series are set to "Communication with PLC:disabled", the communication between the master and slaves continues. The slaves that are set to "Communication with PLC:disabled", however, cannot use PLC data folders, device monitors, and unit monitors.

■ Functions that are limited when the VT2 Multi-link is used

- The 2-port function with the KV-1000/700 can be used only on the master. It cannot be used on slaves.
While the 2-port function is used, a PLC Error "Master" occurs on all slaves.
- Both the master and slaves can use the simulator function of the VT3 series. Directly connect the VT3 to the PC. When the simulator function is used on slaves, 1:1 communications is performed between the PC and slave. slave. The other master (VT3) and slaves (VT3/DT-100A) continue to use VT2 Multi-Link.
- When the simulator function is in use on the master, all slaves communicate with the PC via the master.
- VT2 Multi-link communications stops when the master is in the following states.
When VT2 Multi-link communications stop, the communications error "Time-out" is displayed on slaves.
 - System mode (not including system screen call-up)
 - During transmission/reception of screen data or PLC data folders
 - When the power is OFF
- The slave moves to the following states when PLC data folder or system screen call-up is executed on the master:
 - Updating of PLC device values stops.
 - Page switching, global window switching, form picture printing, worksheet running, system screen call-up, and running of PLC data folders are all stopped.
 - DT-100A stops to receive data.

At the moment that execution of the above ends on the master, processing that was stopped is automatically resumed.
- Cannot use unit monitors from the slaves.

20-2 Checking Operation before Connection

This section describes how to check the items required for connecting VT3 series/DT-100A and PLC with VT2 Multi-Link.

- (1) Check to ensure PLC and linking units can be connected with the VT3 series/DT-100A.

Connect the master VT3 to the PLC.

- (2) Check whether or not CPU or link unit settings are required.

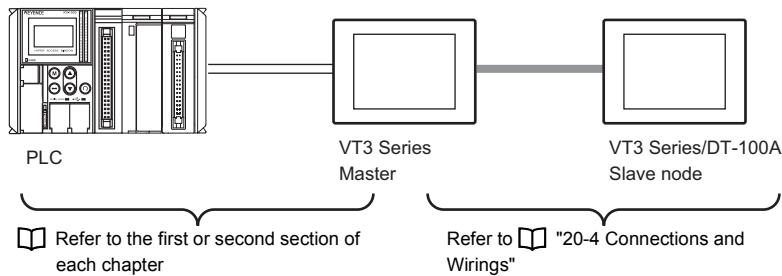
- (3) Confirm the name of the model to set as the target PLC. Transfer the screen data of the same target PLC to the master and slaves.

Be sure to check the above three points before connecting the PLC to the VT3/DT.

 "Procedure before Starting Communication", page 18

20-3 System Configuration

This section describes the system configuration of the VT2 Multi-link.



- To perform communications on the VT2 Multi-link, communications between the PLC and the VT3 master must be established.
[book icon] Refer to the first or second section of each chapter.
- For the setup of VT3 master and DT-100A slave, please refer to [book icon] "20-4 Connections and Wirings".

20-4 Connections and Wirings

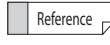
This section describes the connections and wiring of the VT2 Multi-link.

Connection Cables

Be sure to wire using the exclusive connector cables shown in the following table. Operation using cables other than the exclusive cables cannot be guaranteed.

Company Name	Product Name	Contact
KEYENCE CORPORATION	OP-30591(20m), OP-30592(100m) * Conductor cross-section area 0.75mm ²	Consult the shop nearest to you. Please read the list of shops on the back cover.
FURUKAWA ELECTRIC CO., LTD.	KPEV-SB (1P) (with 2-core twisted shielded cable) * Conductor cross-section area 0.5 to 1.25 mm ²	Furukawa Electric CO., LTD.
Nihon Electric Wire & Cable CO., LTD.	KNPEV-SB (1P) (with 2-core twisted shielded cable) * Conductor cross-section area 0.5 to 1.25 mm ²	Nihon Electric Wire & Cable CO., LTD.
TATSUTA ELECTRIC WIRE & CABLE CO., LTD.	Cable model PCPEV-SB (1P) (KPEV-SB or equivalent) 0.5 to 1.25mm ² x 1P	Tatsuta Electric Wire & Cable CO., LTD.

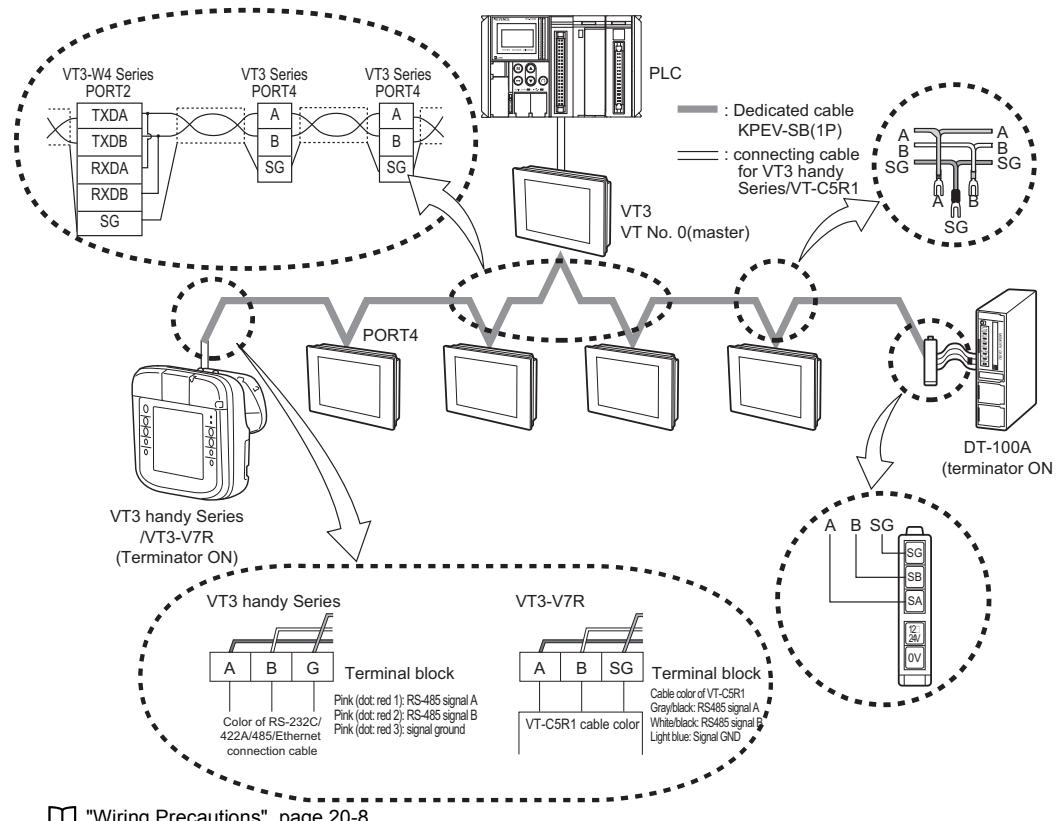
* The cross-section of conductor for connecting VT3-W4 Series is 0.5 to 0.75mm²

 When VT3-V7R is used, please use the RS-232C/485 link cable VT-C5R1(5m) specially designed for VT3-V7R.

For VT3 handy Series, always use OP-87191/87192/87193 or VT-T1 + OP-87194/87195/87196.
In addition, dedicated cables must be used for extension of various cables.

Connection Methods

For the wiring of the VT3 series and DT series, pay attention to the following precautions.



 "Wiring Precautions", page 20-8

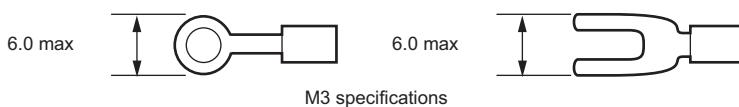
 Point

- Not supported by the VT5 Series/Soft-VT.
- When connecting, all the equipment should be series-connected.
- VT2 Multi-Link can not be used together with MegaLink, Multi-Link and KL Link.
- MultiTalk function can not be used together with VT2 Multi-Link.
- VT2 Multi-Link is supported by all models of VT3/VT2 series and DT100A. It is not supported by VT1 Series (including the VT-7SR). When the VT2 series are used via VT2 Multi-Link, the versions of the VT2 system program and PLC files should all be higher than Ver.2.5. system program and PLC information files of versions below Ver. 2.5 cannot be used.
- DT-500/80A and DT-100 are not supported.
- Only 1 DT-100A unit can be used for the VT2 Multi-Link connection.
- DT-100A can be used as the slave (cannot be used as the master).
- Connection between the VT3 master and PLC is the same as when connecting each PLC in a 1:1 connection. Refer to the first or second section of each chapter.
- The total cable length varies depending on the baud rate.  "20-5 Communication Specifications" Please observe the baud rate limit when connecting.
- Be sure to set the terminator on units connected to both ends of the wiring to ON. Be sure to set other units to OFF.
 -  "Set up the terminator", page 20-10
 -  "Set up the Termination Connector of DT-100", page 20-10
- Operation using a cable other than the dedicated cable cannot be assured.
 -  "Connection Cables", page 20-6
- Use a dedicated cable with the same conductor cross-section area. Otherwise, no guarantee is given.
- VT3-V7R, VT3 handy Series, VT3-W4TA/W4MA/W4GA (RS-422/485 type) cannot be used as master station
- VT3-V7R and VT3 handy Series can only be connected to both ends of the wiring
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.

Terminal Connections

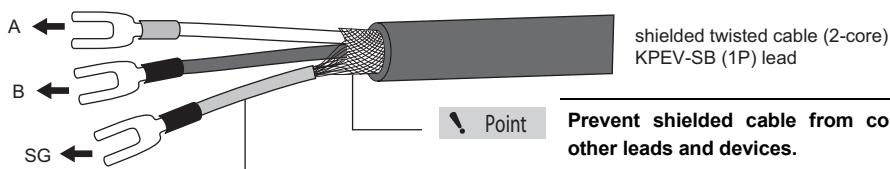
VT3(PORT4) and KL-BI use the M3 terminal screws.

If you are connecting using crimped terminals, make sure that they conform to the following specifications.

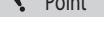


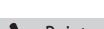
In addition, please observe the following precautions when wiring

■ Cable terminals

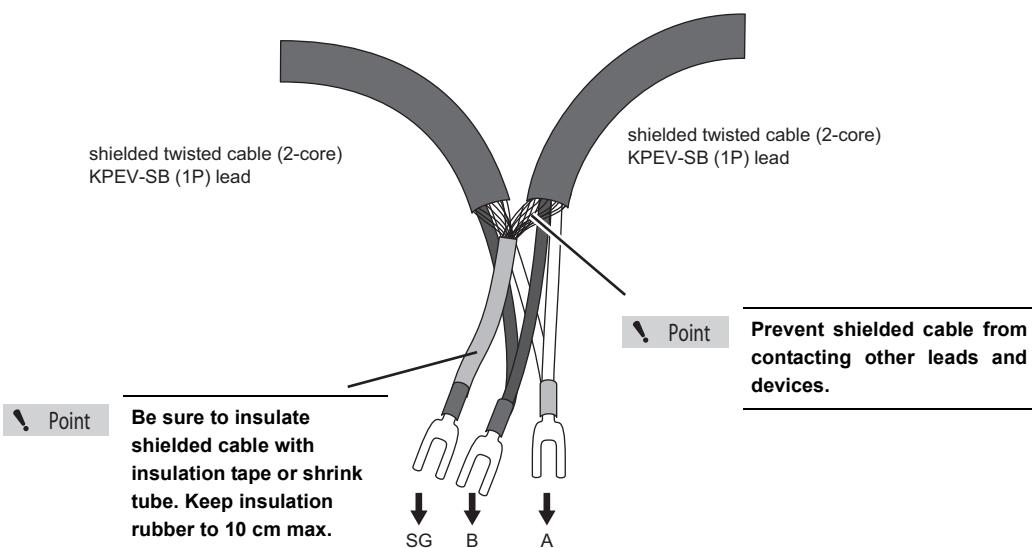


shielded twisted cable (2-core)
KPEV-SB (1P) lead

 Point
Prevent shielded cable from contacting other leads and devices.

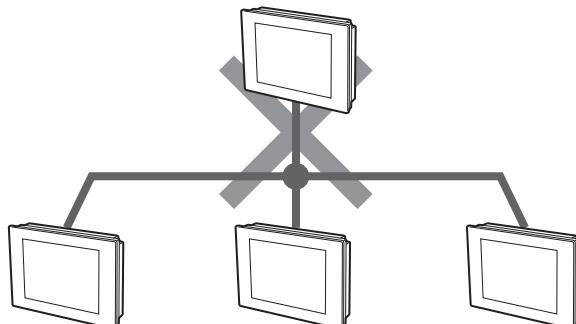
 Point
Be sure to insulate shielded cable with insulation tape or shrink tube. Keep insulation rubber to 10 cm max.

■ Cable branches

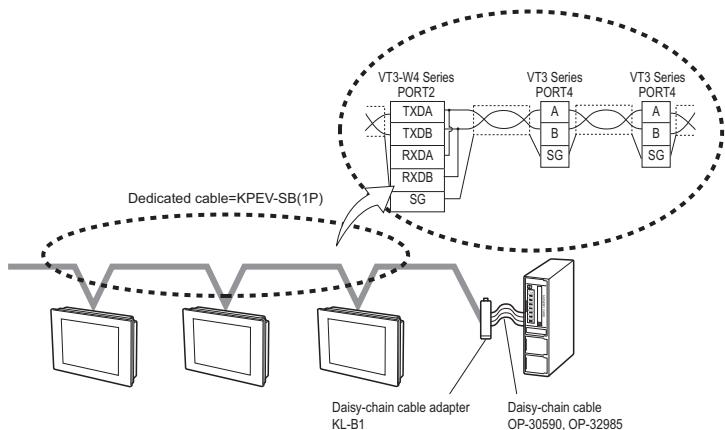


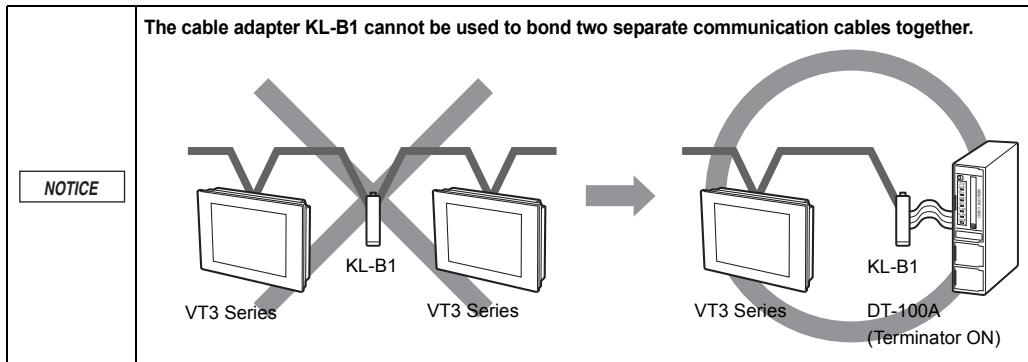
Wiring Precautions

- Do not configure branches when wiring as indicated in the figure below. Be sure to wire in series.

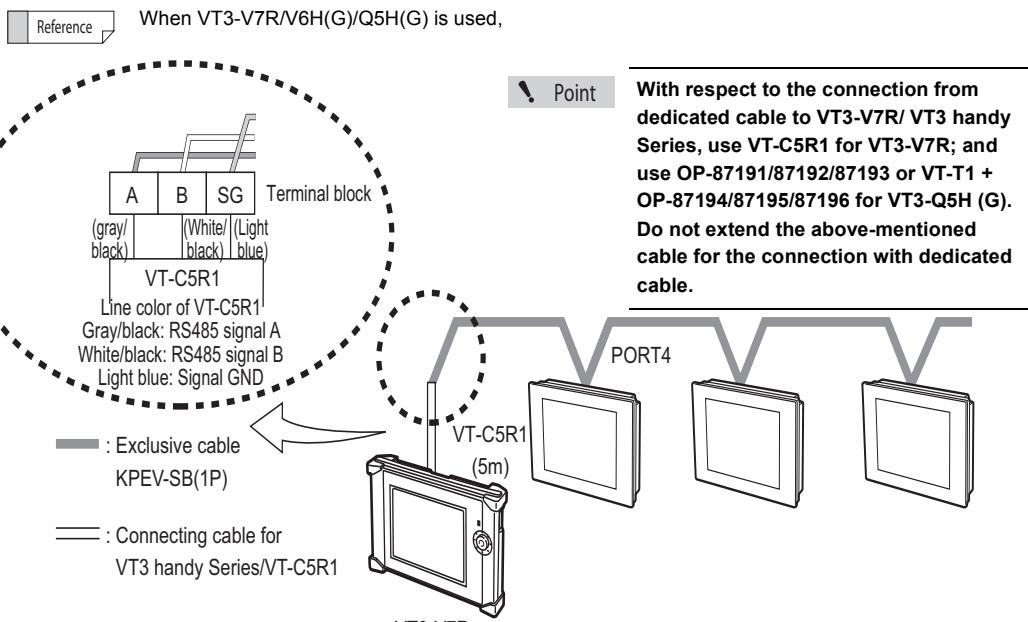
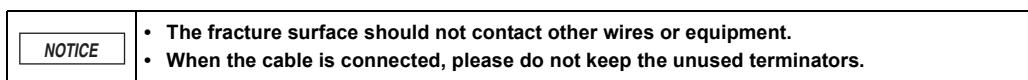
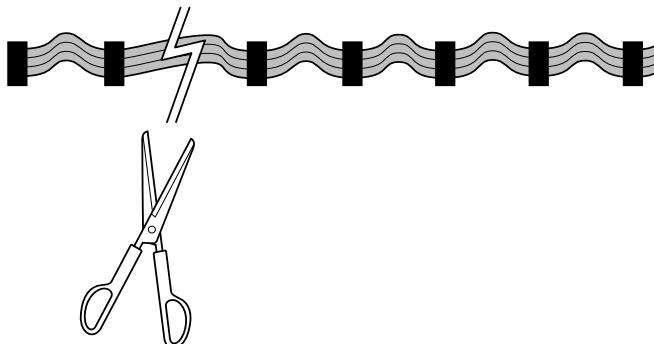


- If exclusive cables are brought close to the power lead, the cable may be influenced by high voltage or large current and cause the VT to malfunction. When wiring, maintain at least 100 mm between the exclusive cables and power leads.
- When using ducts for wiring, make sure that the duct is properly grounded.
- The wires connecting the equipment should meet the following requirements.





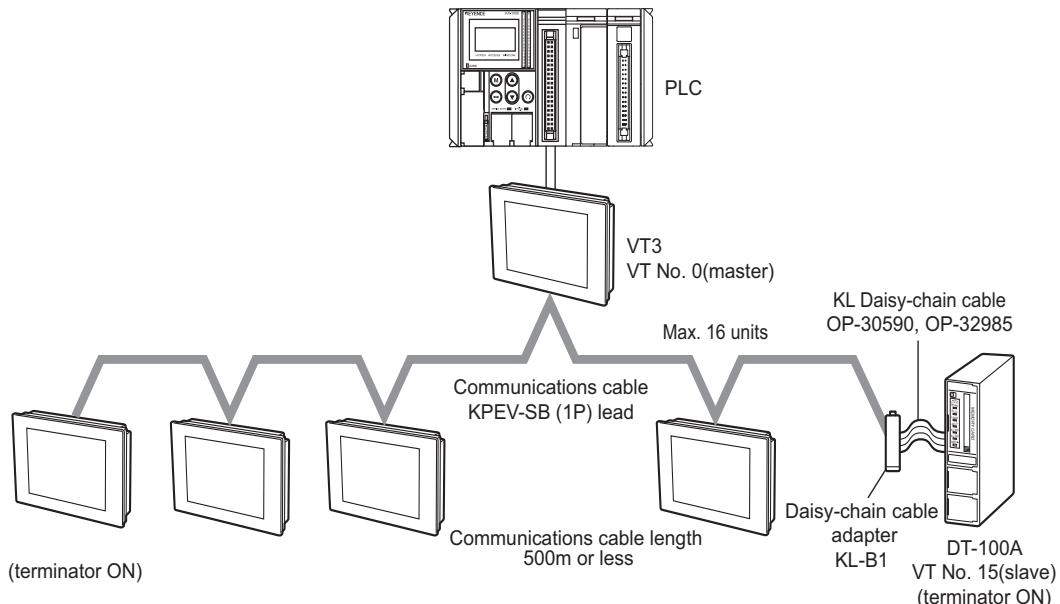
- To connect DT-100A, please ensure to use our own cables OP-30590, OP-32985, and cable bonding adapter KL-B1 (please open the termination connector).
- The cable (OP-30590 or OP-32985) has multiple terminators. So please cut off the unused part before you use it.



Set up the terminator

When VT2 Multi-Link is used, please set the terminator on VT3 or DT-100A connected to both ends of the communication cable to ON.

The following describes how to set the terminator on the VT3 series.



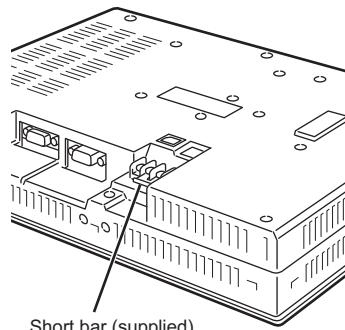
To turn the terminator of the VT3 series (excluding VT3-V7R/V6H(G)/Q5H(G)/W4TA/W4MA/W4GA) ON, insert the short bar (supplied) across the "B" and " ." TERM terminals on PORT4. When the VT3 series is shipped, the short bar is inserted to turn the terminator ON.

Close the terminator and remove the short bar from PORT4.

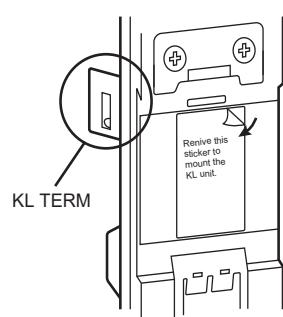


Point
When the short bar is removed from the VT3 series (VT3-V7R/V6H(G)/Q5H(G)/W4TA/W4MA/W4GA excluded), store the short bar in a safe place to prevent it from becoming lost.

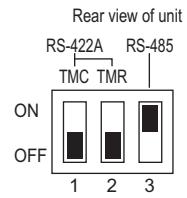
Connect the short bar as follows



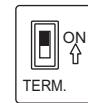
- When DT-100A is used
To turn the terminator of DT-100A to ON, turn KLTERM on the side of DT-100A to ON.



- When VT3-V7R/V6H(G)/Q5H(G) is used
To set the terminator of VT3-V7R/V6H(G)/Q5H(G) to ON, set the DIP switch "3" on the rear of VT3-V7R/V6H(G)/Q5H(G) to ON.
To set the terminator OFF, set DIP switch No.3 to OFF. (ex-factory setting: ON)
- Set DIP switch No.3 to ON.



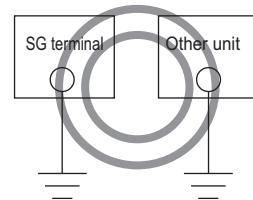
- When VT3-W4TA/W4MA/W4GA is used
To set the terminator of VT3-W4TA/W4MA/W4GA to ON, set the terminator switch (TERM.) on the rear of VT3-W4TA/W4MA/W4GA to ON. (ex-factory setting: ON)



Grounding Precautions

Noise countermeasures have already been implemented on the VT3 series. When it is used in the locations subject to heavy noise, however, grounding is needed. When grounding the KL series, pay attention to the following points:

- Please ground any one equipment connected in the VT2 Multi-Link and do not ground the rest of the equipment.
- Please use the D-type grounding (third-type grounding). In addition, the grounding resistance, in this case, should be below 100Ω.



D-type grounding (third-type grounding)

- "3-3 Connecting the Power Supply", VT3 Series Reference Manual
 "3-4 Grounding Precautions", VT3 Series Reference Manual

Connect the shield lead (FG) of the VT-C5R1 cable to the FG terminal of the power supply, and provide a D-type grounding (maximum resistance of 100 Ohms).

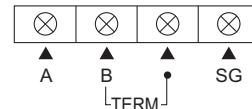
20-5 Communication Specifications

This section describes the communications specifications of the VT2 Multi-link.

VT2 Multi-link Communications Specifications

■ Serial I/F (PORT4): during VT2 Multi-link

Item	Specifications
Applicable standard	RS-485
Synchronization mode	Start-stop, half-duplex
Baud rate	19200, 115200, 0.5M, 1.0Mbit/s
Transmission distance(total length)	19200bit/s : Within 500m. 115200bit/s : Within 500m. 0.5Mbit/s : Within 100m. 1.0Mbit/s : Within 50m.
Data bit	8 bits
Stop bit	1 bit
Parity	Odd
Connection mode	Multi-drop (branches not allowed)
Number of connected units	Max. 16 (selected in System mode on host unit)



Terminal block specification

Item	Specifications
A	Communications lead A of VT2 Multi-link
B	Communications lead B of VT2 Multi-link
TERM	Terminator settings of VT2 Multi-link
SG	Communications lead SG of VT2 Multi-link

Item	Specifications
Wire gage	AWG14-22
Tightening torque	0.5N·m
Wire material	Copper
Lead type	Stranded wire

Communication Conditions Setting Ranges and Defaults

Item	Setting Range	Default
No. ¹	0 to 15	0
Baud Rate ²	19200, 115200, 0.5M, 1.0Mbit/s	115200 bit/s
Message display	ON, OFF	ON
Retry times (master only) ³	0 to 99	3
Number of connected units (master only) ³	4/16	4

*1 For DT-100A, the number should be selected from "1 to 15" ("0" cannot be used).

*2 For a mixed use of VT3-W4TA/W4MA/W4GA, the max communication speed is "115200bit/s".

*3 VT3-W4TA/W4MA/W4GA can only be connected as a slave station.

Internal Special Devices

When VT2 Multi-Link is used, the internal special devices on VT3 are used to control the various states via VT2 Multi-Link.

 "6-6 About the Devices", VT3 Series Reference Manual

Device No.	Description		R/W Attribute
MW003F	Self VT No.		R
MW00C0 (host only)	0(MB00C00)	VT No. 0 connection state	R
	1(MB00C01)	VT No. 1 connection state	R
	2(MB00C02)	VT No. 2 connection state	R
	⋮	⋮	⋮
	E(MB00C0E)	VT No. 14 connection state	R
	F(MB00C0F)	VT No. 15 connection state	R
MW00C1 (host only)	0(MB00C10)	VT No. 0 communications error	R
	1(MB00C11)	VT No. 1 communications error	R
	2(MB00C12)	VT No. 2 communications error	R
	⋮	⋮	⋮
	E(MB00C1E)	VT No. 14 communications error	R
	F(MB00C1F)	VT No. 15 communications error	R

About R/W attributes

R : Only reading can be used.

■ VT No. (MW003F)

Stores the VT No. set in the System mode.

Data Format	Setting Range
Binary	0 to 15

■ Connection state (MW00C0: master only)

This is equivalent to the bit ON state of the internal special device on VT3 (master) that is connected with other equipment. The value of only the master is stored.

The bit turns ON even if the equipment is connected midway while communications on the VT2 Multi-link is in progress.

When there is a slave that is not connected on the VT2 Multi-link, the communications error (MW00C1) bit corresponding to the VT No. of the slave turns ON.

 "Connection State", page 20-16

Bit	Description	When 1 (ON)	When 0 (OFF)
0	VT No. 0 connection state	Always ON	--
1	VT No. 1 connection state	Connected to master	Not connected to master
2	VT No. 2 connection state	Connected to master	Not connected to master
⋮	⋮	⋮	⋮
14	VT No. 14 connection state	Connected to master	Not connected to master
15	VT No. 15 connection state	Connected to master	Not connected to master

■ Communication error (MW00C1: master only)

This is equivalent to the bit ON state of the internal special device on VT3 (master) that is encountered with an communication error. The value of only the master is stored.

The bit turns OFF when communications is restored.

When the communications error frequently occurs, the bit of the connection state (MW00C0) corresponding to the VT No. of the slave turns OFF. The communications error stays ON.

The following states are entered when a communications error is occurring:

- A Multi-link communications error occurs on the slave side.
- The target PLC error occurs on the slave side.
- A PLC communications error (master) occurs on the slave side.
- A Multi-link communications error occurs on the slave side.

 "20-8 Troubleshooting"

 "Appendices 1 Errors and How to Remedy Errors", VT3 Series Reference Manual

Bit	Description	When 1 (ON)	When 0 (OFF)
0	VT No. 0 communications error	-	OFF at all times
1	VT No. 1 communications error	Communications error with master	No abnormality
2	VT No. 2 communications error	Communications error with master	No abnormality
⋮	⋮	⋮	⋮
14	VT No. 14 communications error	Communications error with master	No abnormality
15	VT No. 15 communications error	Communications error with master	No abnormality

20-6 VT3 Setup

System Mode Settings

To use the VT2 Multi-link, the VT3 System mode must be set as follows.

1 Send to the VT3 series the project created by VT STUDIO.

The project to be sent should be set up with the PLC and the "Use the MultiTalk function" checkbox should be unchecked.

"12-3 Setup of the PLC Models", VT3 Series Reference Manual

Point When the MultiTalk function is used, VT2 Multi-Link cannot be used.

2 Set the VT3 series to the System mode.

"Chapter 5 SYSTEMMODE", VT3 Series Reference Manual

3 From the System Mode screen, press [Option Settings].

4 From the Option Settings window, press [Next page] to set the "Multi-Link" project to [Used].

[Settings] is displayed in the "Multi-Link" project.

5 Press [Setup] to move to the Multi-link setting screen, and set the VT2 Multi-link.

(1) Sets the "VT No." Set the master to "0" and slaves to "1 to 15" (1 to 3 in the case of "Connections: 4").

(2) Sets the "baud rate." The same baud rate must be set to the master and all slaves.

(3) Sets display message ON/OFF. On the VT2 Multi-link, messages for the VT2 Multi-Link are displayed. When "OFF" is set, messages are no longer displayed.

"Message", page 20-19

Set the following only on the master.

(4) Sets the number of connected units. Select either "4" or "16" as the number of connected units.

The number of connected units includes the master VT3, DT-100A and all slaves.

Set "4" when there are less than four connected units. As only node Nos.0 to 3 are recognized, communications faster than those with "16" set is possible.

(5) Set the "Retry" in communications between the master and slaves. Normally, use at the default setting "3".

6 Click [OK].

7 Exit the System mode, and move to the Run mode.

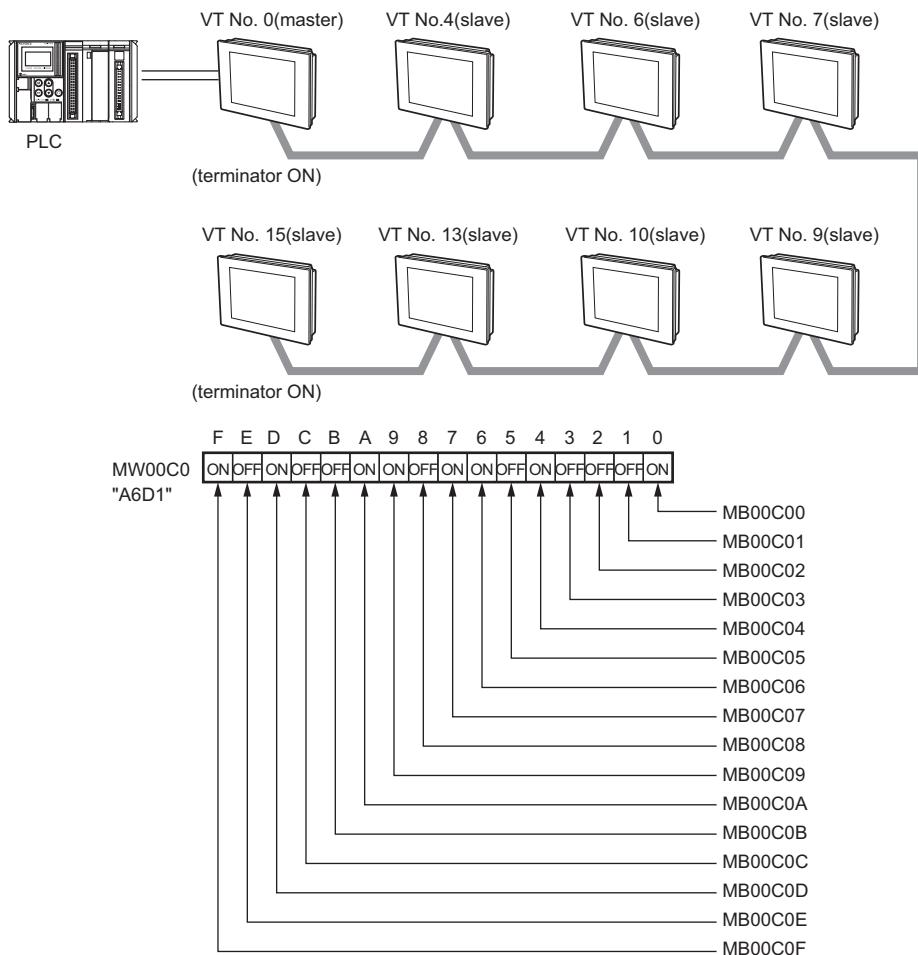
Point

- VT2 Multi-Link can not be used together with MegaLink, VT2 Multi-Link, and KL Link simultaneously.
When the VT2 Multi-link is used, set to "KL Setup: No Use" in the VT System Parameters screen in the System mode.
- When the "Number of Connected Units:4 units" option is selected, the slaves starting from the fifth unit (the station No.s behind station No. 4) cannot be processed by VT2 Multi-Link. Therefore, the connection states and errors of these units cannot be identified (Not ON).

Connection State

When VT2 Multi-Link is used, inform the internal special devices on VT3 (master) of the various states of VT2 Multi-Link.

"Internal Special Devices", page 20-13



Outline of System Memory Area in a VT2 Multi-link

For more information, please refer to the "19-7 VT3 Setup", "Outline of System Memory Area in a Multi-link"

Key Protection

For more information, please refer to the "19-7 VT3 Setup", "Key Protection"

Available Devices

For details on devices that can be used on the VT2 Multi-link, see "Available devices" in each chapter.

20-7 DT-100A Setup

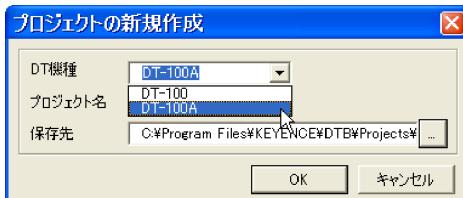
Set up DT BUILDER

When DT-100A is connected via VT2 Multi-Link, DT BUILDER Ver.4 or above needs to be used.



Ensure to use DT BUILDER Ver.4 or above. DT-100A with the Ver.1 to 3 cannot be used.

1 From the "New Project" window, set the DT Models to "DT-100A".

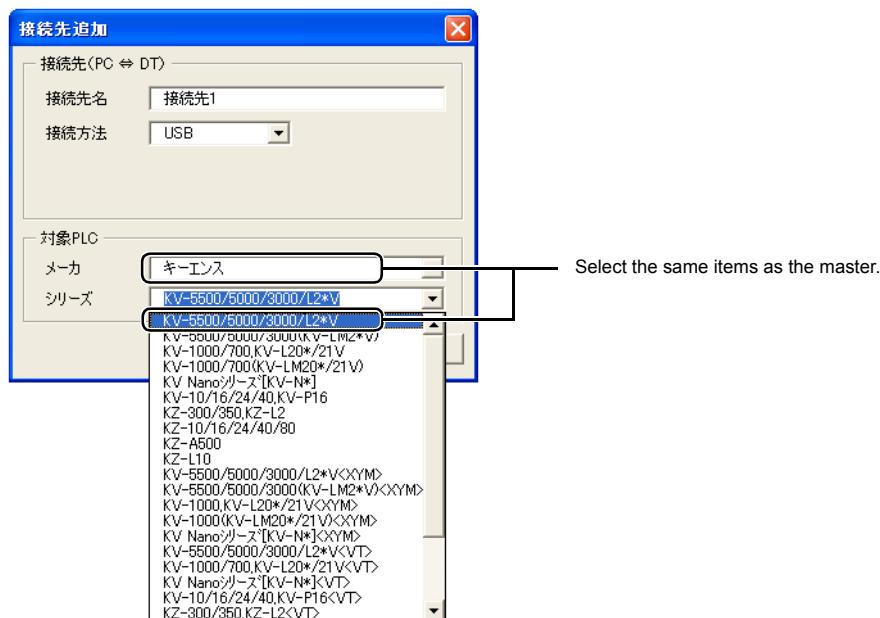


When DT-100A is used by the projects created DT BUILDER Ver.1 to 3, you need change the DT model to DT-100 → DT-100A from "Change all the connected DT models" option in the "Connected Targets" dialog box of DT BUILDER Ver. 4 or above.

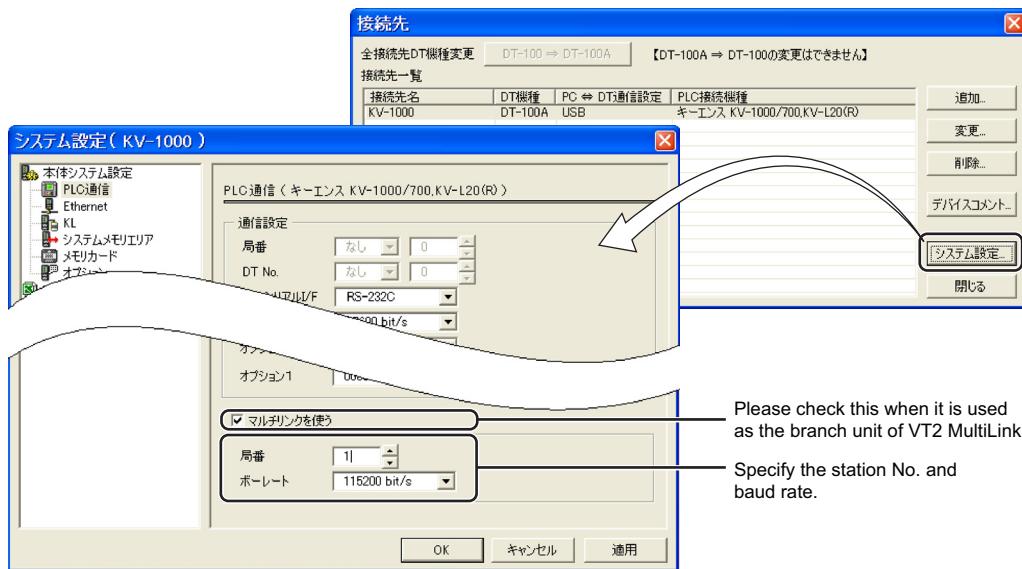


- When DT-100A is selected for the DT Models, the DT model change DT-100A → DT-100 cannot be made.
- DT-100 and DT-100A cannot be mixed in one same project.

2 The selected options in the "Manufacturers" and "Series" drop-down lists of the newly added target PLCs in the "Add a Connected Target" window should be the same as the settings for the master "VT3".



- 3** Click the “Setup System” button in the “Connected Targets” dialog box to select the station No. and baud rate (communication speed) for VT2 Multi-Link.



Point

- The station No. and baud rate can be set up only when the "Use Multi-Link" checkbox is checked.
- The station No. can be selected from 1 to 15. In this case, special attention should be paid to using a unique station No. for each connected unit, especially the branch units of VT2 Multi-Link.
- The baud rate should be the same as that of other equipment.

Connection State

For more information, please refer to "20-6 VT3 Setup", "Connection State"

Available Devices

For details on devices that can be used on the VT2 Multi-link, see "Available devices" in each chapter.

20-8 Troubleshooting

This section describes the causes of trouble that occur when the VT2 Multi-link does not function properly and how to remedy trouble. If the trouble cannot be remedied, contact your sales agent.

Message

The following describes error messages that are displayed and how to remedy each according to each of the status messages.

For the error messages other than those mentioned below, see the error messages in the chapters regarding various connection equipment.

■ Prompts on VT3 (master)

Message	Cause
Changing screen [Slave] ¹	A page is being switched or a screen being switched by system screen call-up on a slave (VT3) on the VT2 Multi-link.
Target Error	The PLC information file is not compatible with the VT2 Multi-link. Update the version of the PLC information file to Ver.2.5.

*1 Messages are not displayed when "Display message: OFF" is set.

■ Prompts on VT3 (slaves) / DT-100A (slaves)¹

Message	Cause
Multi-link communications error	There are displayed in the case that an error occurs to the communication between two units connected with each other.
Target Error	The model of the target PLC differs from the slave.
PLC communication errors (Master) ²	An error occurred in communications between the VT3 and PLC on the slave of the VT2 Multi-link. Or, a nonexistent device has been set in the device settings on the slave device, or the device range has been exceeded.
System Mode (Master) ²	The slave on the VT2 Multi-link is displaying a system screen by system screen call-up. "8-2 Set up the Switches", VT3 Series Reference Manual This error is displayed only when a system screen is displayed by system screen call-up. It is not displayed in other instances. "Chapter 5 SYSTEMMODE", VT 3 Series Reference Manual
PLC data folder (Master) ²	The master node on the VT2 Multi-link is executing a PLC data folder during operation. This message is not displayed if a PLC data folder is executed in the System mode.

*1 Display when unit monitor is performed through DT BUILDER.

*2 Messages are not displayed when "Display message: OFF" is set.

Troubleshooting

When a "communications error [time-out]," or "Multi-link communications error" occurs or screen operations are no longer possible on a slave that should be connected, search for the cause of the trouble in the following table, and remedy according to the trouble.

Cause	Remedy
The slave VT3 is OFF.	Please start the power of VT3 (master).
Duplicate VT No. have been set.	Make sure that VT No. are not duplicated in the System mode.
The communications speed is not matched.	Check the "Baud Rate" setting in the System mode.
The VT No. is a value outside of the VT No. range.	When "Connections" on the VT2 Multi-link is set to four in the System mode on the Master, set the VT No. of the slave between 1 to 3.
A non-existent device has been set in the device settings, or the device range has been exceeded.	Check the device settings.
The cable currently connected on the VT2 Multi-link is broken or a short-circuit has occurred.	Check the cable wiring.
The terminator setting is incorrect.	Please only open the terminators of the units on both ends of the connection. Please turn off other connected units.
Communications influenced by noise.	Check the surrounding area for noise sources. Check the surrounding area for noise sources. Please place the connected units and VT2 Multi-Link cables as far from the noise sources, if any, as possible.

MEMO

MEGALINK

This chapter describes the connections with the high-speed Multi-Link unit (KV-LM21V/LM20V/LM20) and VT3 series (DT-100A).



Not supported by the VT5 Series, Soft-VT, VT3-W4T/W4M/W4G (RS-232C model), VT1 Series, DT-80/80A and DT-100.

21-1	What is MegaLink.....	21-2
21-2	Checking Operation before Connection	21-5
21-3	Connections and Wirings	21-6
21-4	VT3 Setup	21-8
21-5	VT2 Setup	21-12
21-6	DT-100A Setup.....	21-13
21-7	Unit Settings.....	21-15
21-8	Error Messages and Troubleshooting	21-17

21-1 What is MegaLink

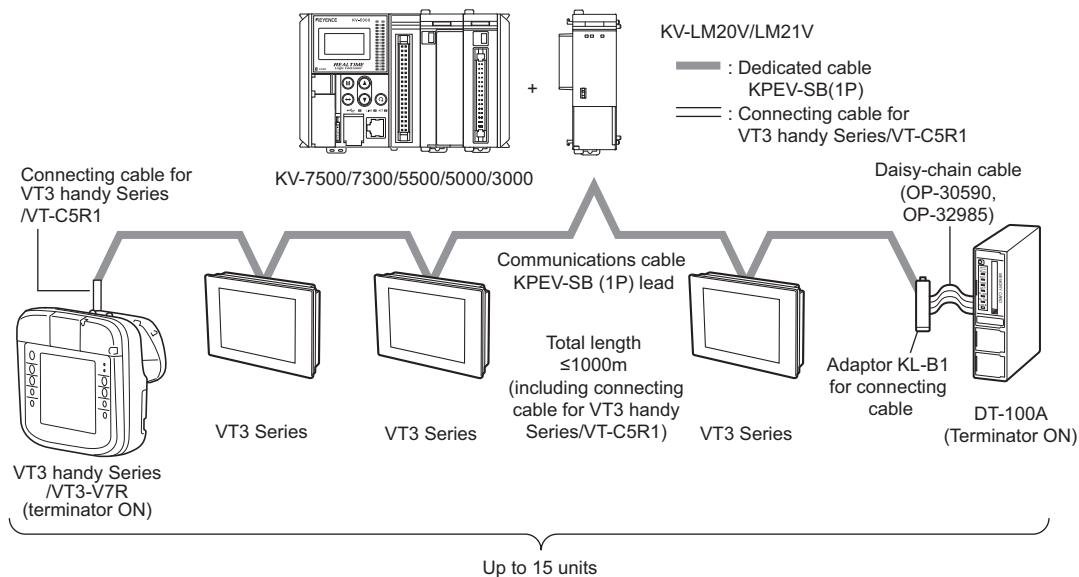
MegaLink

One high-speed KV-LM20(V)/LM21V Multi-link unit in the KV-7500/7300/5500/5000/3000/1000/700 special units can control up to 15 VT3/VT2/DT-100A units.

With MegaLink, a max communication speed of 2Mbit/s (1Mbit/s when VT2 is also used, 115200bit/s when VT3-W4TA/W4MA/W4GA is also used) can be realized between the units, thus allowing a high-speed communication network to be established.

 Reference Up to (the number of KV-LM20(V)/LM21V units that can be connected with 1 CPU) X(15 VT3/VT2/DT-100A units) can be controlled.

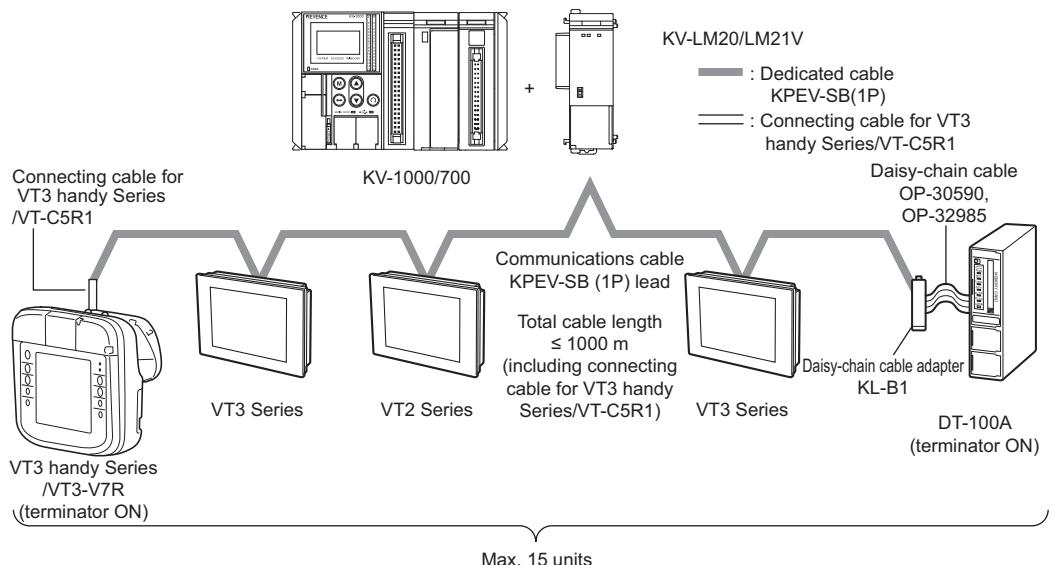
■ KV-7500/7300/5500/5000/3000+KV-LM20V/LM21V



Point

- Not supported by the VT5 Series/Soft-VT.
- When KV-7500/7300 are used, DT-100A cannot be connected.
- Not supported by VT3-W4T/W4M/W4G (RS-232C).
- Not supported by VT1 Series (including the VT-7SR) and VT2 Series.
- Not supported by DT-80/80A and DT-100.
- For one MegaLink, only one DT-100A can be connected.
- DT-100A, when used as the terminal of DT-500, can also use for MegaLink connection.
- VT3-V7R and handy Series can only be connected to both ends of the wiring.
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status

■ KV-1000/700+KV-LM20(V)/LM21V



Point

- Not supported by the VT5 Series/Soft-VT.
- Not supported by VT3-W4T/W4M/W4G (RS-232C).
- MegaLink cannot be used together with Multi-Link, VT2 Multi-Link, and KL Link.
- MegaLink supports all the VT3/VT2 series and DT-100A. It is not supported on the VT1 Series (including the VT-7SR).
For the VT2 series, however, the versions of the VT2 system program/PLC information files must be higher than Ver.2.5. VT2 BUILDER, the VT2 system program and PLC information files of versions earlier than Ver.2.5 cannot be used.
- DT-80/80A and DT-100 are not supported.
- For DT-100A, only 1 unit can be connected by MegaLink.
- VT3-V7R and handy Series can only be connected to both ends of the wiring
- For connection with VT3 handy Series using VT-T1, never remove VT-T1 and OP-87194/87195/87196 in power on status.

■ 2-port function of MegaLink

All the connected VT3 units can use the 2-port function when MegaLink is used. When the VT2 series are also connected, however, all the connected units cannot use the 2-port function.

● Softwares to be used

The following software can be used for the 2-port function of MegaLink.

For the VT3 Series

- KV STUDIO(Ver.2.50 or above)
- KV BUILDER (Ver.4.70 or above)
- MOTION BUILDER (Ver.2.30 or above)*
- MV LINK STUDIO (Ver.1.10 or above)*
- PROTOCOL STUDIO (Ver.1.20 or above)*

For DT-100A

- KV STUDIO (Ver. 3.00 or above)
- MOTION BUILDER (Ver.2.40 or above)*
- MV LINK STUDIO (Ver.1.20 or above)*
- PROTOCOL STUDIO (Ver.1.30 or above)*
- * "MOTION BUILDER", "MV LINK STUDIO", and "PROTOCOL STUDIO", even the versions that support MegaLink, can still not be used if "KV STUDIO" and "KV BUILDER" don't support the version of MegaLink.

■ DB routing function of MegaLink

With MegaLink, all the connected VT3/DT-100 A units can use the DB routing function. The DB routing, even if VT3/DT-100A is in use, also works.



- For VT3/DT-100A, the DB routing function, even if the VT2 series are connected in MegaLink, also works. For the VT2 series, the DB routing function doesn't work.
- DATA BUILDER Ver.2.06 or above is supported.
- KV-5500/5000/3000 supports DATA BUILDER Ver.2.10 and above.
- When DT-100A uses DB gateway function, USB connection cannot be used.
- When KV-7500/7300 are used, the DB gateway function cannot be connected.

■ Precautions to be observed when using MegaLink

- For the connected CPU unit of KV-1000/700, when the 2-port function of VT3/DT-100A in MegaLink connection is used to transfer ladders (read/write ladder programs/device comments) from KV STUDIO to PLC, the communications of all the units connected are suspended.
- MegaLink communication will stop as soon as the power of KV-LM20V/LM21V is OFF. Communication error "timeout" will be displayed on VT3 (VT2) when MegaLink communication stops.
- The VT2 Series cannot be connected to MegaLink when the KV-7500/7300/5500/5000/3000 CPU units are connected to the KV-LM20V/LM21V (but the KV-1000/700 CPU units allow MegaLink connection).
- Although the VT3 series, VT2 series and DT-100A can be mixed and connected in the same MegaLink, the following precautions should be observed.
 - When KV-7500/7300 are used, DT-100A cannot be connected.
 - When the VT2 series are also mixed in the connection, the communication speed becomes 1Mbit/s at the most.
 - When the VT2 series are also mixed in the connection, all the units connected by MegaLink cannot use the 2-port function.
 - One DT-100A can be connected with only one MegaLink.
 - VT3-V7R/V6H(G)/Q5H(G) can only be connected to either end of the connection.
- When multiple PCs attempt to use the 2-port function by connecting with multiple VT3s or DT-100As in the same MegaLink, the following restriction may be encountered.
 - The transmission and read of the ladder diagram program and device comments cannot be performed on multiple PCs simultaneously.
 - The high-speed time chart monitor cannot be run on multiple PCs simultaneously.
- When VT3, DT-100A and VT2 are mixed and connected in the same MegaLink, the max number of connected units and total cable length, among others, are the same as the case when only VT3 is connected.
- For more information about the setup of KV-LM20, please refer to the "High-speed Multi-Link Unit KV-LM20 User's Manual".
- For the setting of KV-LM20V/LM21V, see "KV-LM20V/LM21V High-speed Multi-Link Unit User's Manual".

21-2 Checking Operation before Connection

This section describes how to check the items required for MegaLink connection of the connected units and KV-LM20(V)/LM21V units.

- (1) Check to ensure the readily-connected units and KV-LM20(V)/LM21V units can be connected.
- (2) Check to ensure KV-LM20(V)/LM21V is correctly set up.
- (3) Confirm the name of the model to set as the target PLC.

Ensure to check the above three items before the connection.

PLCs that support MegaLink

MegaLink supports the following PLCs.

CPU	Connection Methods	Connected Equipment	Target PLC
KV-7500/7300	KV-LM20V/LM21V	VT3 Series ¹	KV-7000 Series (KV-LM2*V) KV-7000 Series (KV-LM2*V)<XYM>
KV-5500/5000/3000	KV-LM20V/LM21V	VT3 Series ² DT-100A	KV-5500/5000/3000(KV-LM2*V) KV-5500/5000/3000(KV-LM2*V)<XYM>
KV-1000/700	KV-LM20(V)/LM21V	VT3 Series ³ DT-100A	KV-1000/700(KV-LM20*/21V) KV-1000(KV-LM20*/21V)<XYM>
		VT2 Series	KV-1000/700, KV-L20(R)

*1 Failed to connect VT3-W4T/W4M/W4G (RS-232C).

The equipment that supports MegaLink

MegaLink supports the following equipment.

Connected Equipment	Setting Method	Remarks
VT3 Series	□ page 21-8	Cannot connect VT3-W4T/W4M/W4G.
VT2 Series	□ page 21-12	KV-7500/7300/5500/5000/3000+KV-LM20V/LM21V cannot be connected.
DT-100A	□ page 21-13	



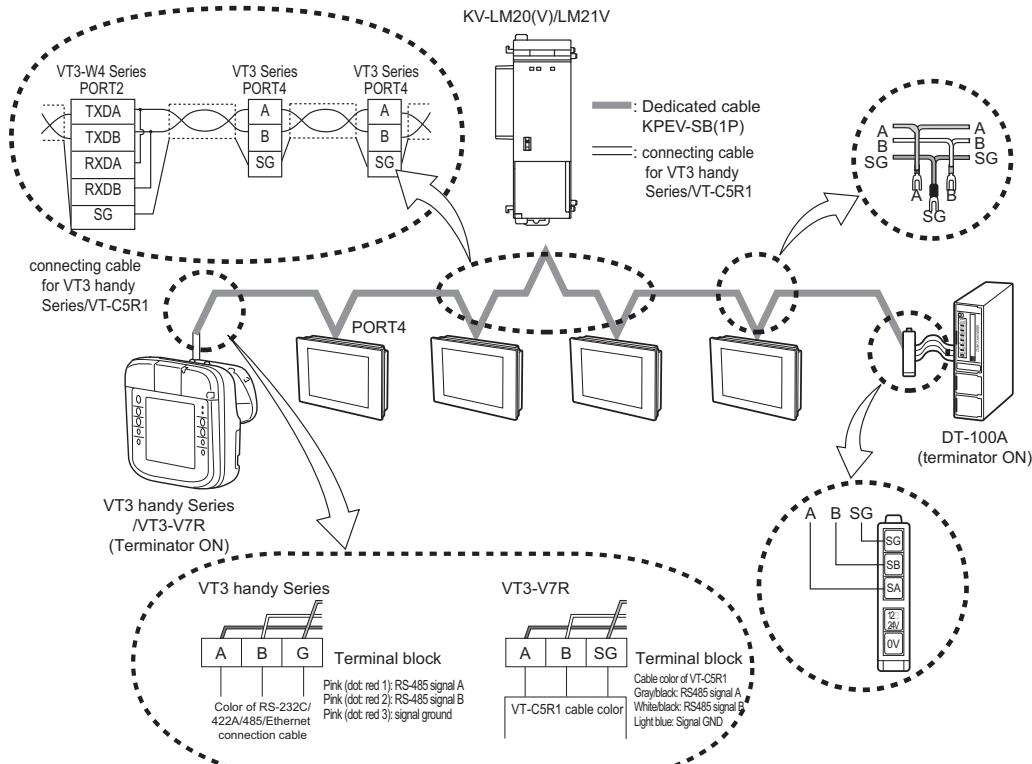
- The VT2 Series cannot be connected to MegaLink when the KV-7500/7300/5500/5000/3000 CPU units are connected to KV-LM20V/LM21V.
- The VT5 Series/Soft-VT does not support MegaLink connections.

21-3 Connections and Wirings

This section describes the connections/wirings of MegaLink.

Connection Methods

Please use the dedicated cables to series-connect KV-LM20(V)/LM21V with other equipment connected with MegaLink.



- All the connected units should be series-connected.
- The total cable length is 1km at the most (the total length may vary depending on the communication speed)
 - "3-1 Precautions to be observed when wiring", High-speed Multi-Link Unit KV-LM20(V)/LM21V User's Manual
- The cable length includes "OP-87191/87192/87193", "VT-T1 + OP-87194/87195/87196", "VT-C5R1", "KL-B1" and "OP-30590, OP-32985".
- Up to 15 units can be connected.
- For the units that are connected to either end of the connection, be sure to set the terminator to ON and other units to OFF.
- When KV-7500/7300 are used, DT-100A cannot be connected.

Wiring

For more information, please refer to the following items in the "20-4 Connections and Wirings"

- "Connection Cables", page 20-6
 - Be sure to use the dedicated cable as the connector cable. Operation using a cable other than the dedicated cable cannot be assured.
 - Use a dedicated cable having the same conductor cross-section area. Operation using cables with different cross-sectional area cannot be assured.
- "Terminal Connections", page 20-7
- "Wiring Precautions", page 20-8
- "Grounding Precautions", page 20-11
 - Any one unit or KV-LM20(V)/LM21V can be grounded in MegaLink, and the rest units cannot be grounded. The SG terminal of the grounded unit or KV-LM20(V)/LM21V is connected to the ground.
 - Please use the D-type grounding (third-type grounding). In addition, the grounding resistance, in this case, should be below 100Ω.

21-4 VT3 Setup

Here, the necessary settings for the VT3 MegaLink connection are detailed.

System Mode Settings

When VT3 is connected with MegaLink, select "Option Setup(2/2)" → "Multi-Link:not used" from the System Mode.

- "5-3 VT System Setup", VT3 Series Reference Manual
- "12-4 Setup of VT Series System", VT3 Series Reference Manual

Set up using VT STUDIO

When VT3 is connected with MegaLink, the following settings should be made with VT STUDIO.

■ Set up the PLC models

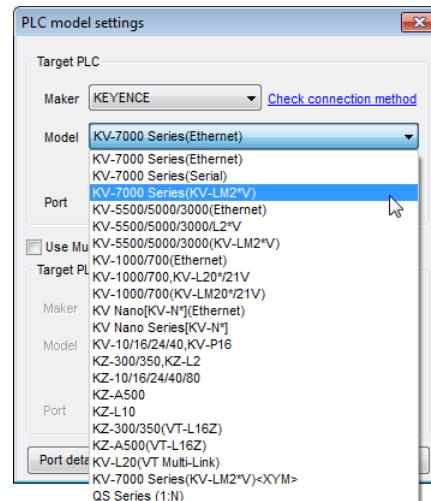
Select "Resource(R)" → "Set up PLC Models (P)" from VT STUDIO, and then make the following settings.

Manufacturer: KEYENCE

Series : KV-7000 Series (KV-LM2*V)
KV-7000 Series (KV-LM2*V) <XYM>
KV-5500/5000/3000(KV-LM2*V)
KV-5500/5000/3000(KV-LM2*V)
<XYM>
KV-1000/700(KV-LM20*/21V),
KV-1000(KV-LM20*/21V)<XYM>

Port : PORT4

(The port cannot be set up when "VT3-W4T*" or
"VT3-W4M/G*" is selected as the VT model.)



Settings other than the above cannot be supported by MegaLink.

● When the MultiTalk is used

When MultiTalk is used to connect 2 PLCs, thermoregulators, or other devices to VT3 (excluding VT3-W4T(A)/W4M(A)/W4G(A)), MegaLink can be used when the KV-7500/7300 (KV-LM2*V), 5500/5000/3000 (KV-LM2*V) and KV-1000/700 (KV-LM20*/21V) are connected to either PLC_A or PLC_B. But the following limitations exist when they are connected to PLC_B.

Available functions when using MegaLink

MultiTalk function	2-port Function	DB routing	VT Through communication	Special unit monitor/device monitor
PLC_A	O	O	O	O
PLC_B	Not used	Not used	Not used	Not used



- For the MegaLink, the remote COM port tool cannot be used.
- MultiTalk function is not supported by VT3-W4T (A)/W4M(A)/W4G(A).

■ PLC Communication Condition Setup

Select "Resource(R)" → "Setup of VT Host System (S)" → "PLC_A Communication Conditions (C)" from VT STUDIO*, and then make the following settings.

* When the MultiTalk function is used, select either one of "PLC_A Communication Conditions"/"PLC_B Communication Conditions".

Item	Setting Range	Default
VT No.¹	1 to 15	1
PLC serial I/F	RS-485	RS-485
Baud rate²	19200, 115200, 0.5M, 1M, 2Mbit/s ³	2Mbit/s
Data Bits	8 bits	8 bits
Stop Bits	1 bits	1 bits
Parity	Odd	Odd
Flow Control	None	None
CheckSum	---	---
CR	---	---
LF	---	---

*1 VT No. cannot be repeated. VT No. connection is not needed.

*2 Baud rate should be the same for all the connected units.

*3 • The upper limit of baud rate is 115200bit/s when VT3-W4TA/W4MA/W4GA Series are connected.

• The upper limit of the baud rate is 1Mbit/s when VT2 Series are connected.

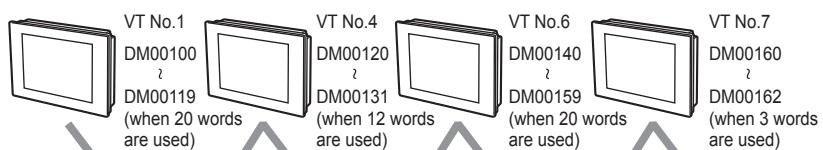
 About the settings for the VT2 MegaLink connection, please refer to  "21-5 VT2 Setup".

Outline of the System Memory Area When MegaLink is Used

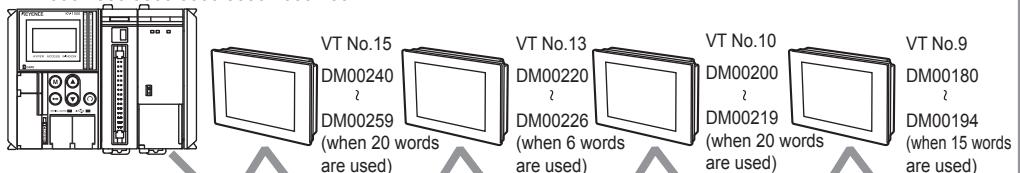
To control all the VT3 units from the PLC, the following setting should be made. The system memory areas of all the VT3 units should not be repeated.

 "Chapter 14 System Memory Area", VT3 Series Reference Manual

[Example] In VT mode (0 to 20 words variable)



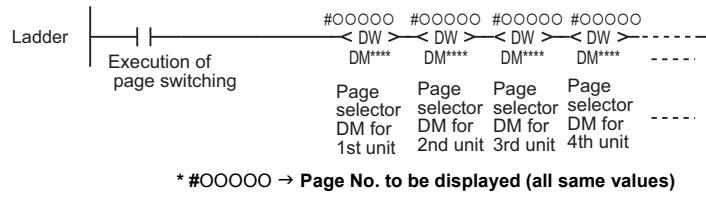
KV-7500/7300/5500/5000/3000/1000/700



Point

Even when controlling multiple VT3 displays in exactly the same way, set the system memory areas to have unique addresses. In this case, please use the PLC program to control multiple VT3 units in the same way.

[Example] To display the same page on all VT3s

**Reference**

The number of words is fixed to 16 in the MT mode.

Key Protection

Key protection is a function that disables switch entry for specific VT3 connected by MegaLink.

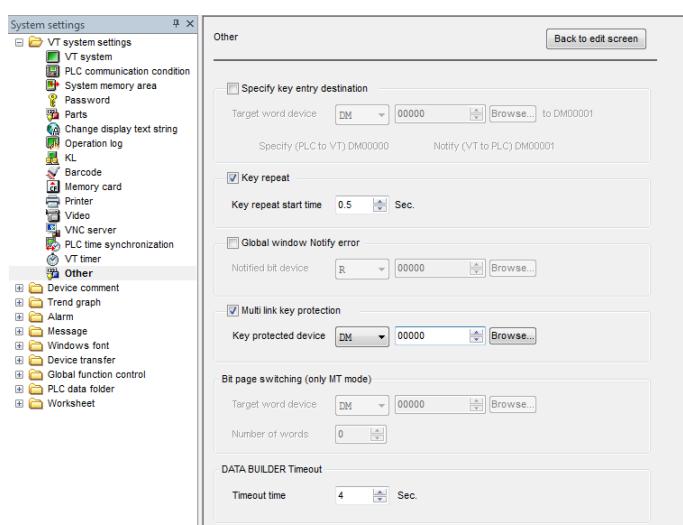
On VT3s on which key protection is enabled, switch entry is enabled when key-protected devices are OFF, and is disabled when key protected devices are ON. On VT3s on which key protection is disabled, switch entry is enabled at all times.

■ Setting key protection

1 Display the "System Settings" screen on VT STUDIO by either of the following methods:

- Select "Resources(R)" → "VT system settings(S)" → "Other(O)" from the menu.
 - Select "VT system settings(S)" → "Other(O)" from the "System Settings" tab in the workspace.
- "12-4 Setup of VT Series System", VT3 Series Reference Manual

2 Check the "Multi-Link Key Protection (Only for Multi-Link)"



3 Set the key protected device.

Specify the same key protected device for all VT3s by the leading No. or 1-word device (16 bits) of the bit device (for 1 channel or 16 bits).

With MegaLink, one KV-LM20 can connect up to 15 VT3 units. In the cases of bit devices and 15 continuous bit and word devices, the individual bit (not including the start bit) in one word can set the key protection of the individual VT3 unit to Enabled/Disabled through ON/OFF.

Bits are assigned based on unit Nos. (VT No.) on key protected devices on each VT3.

Devices assigned by key protected device and unit No. (VT No.)

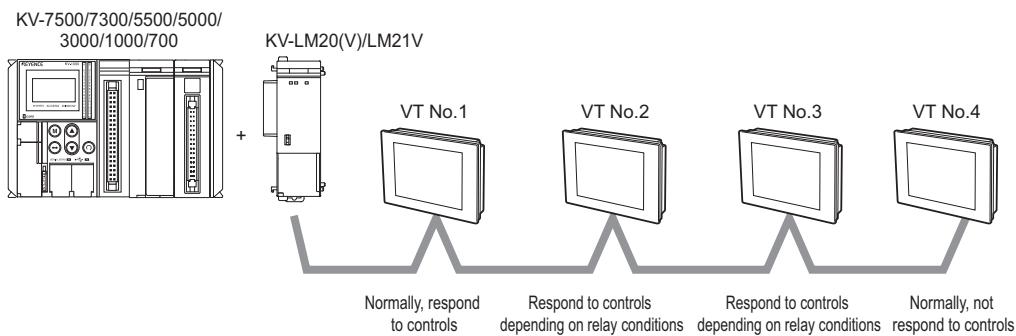
Device to Set	Unit No. (VT No.)					
	VT No.0	VT No.1	VT No.2	...	VT No.14	VT No.15
Bit device :1000	Not used	1001	1002	...	1014	1015
Word Device:DM0	Not used	DM0: bit 1	DM0: bit 2	...	DM0: bit 14	DM0: bit 15



- Set key protected devices to the same device on all VT3.
- The VT No. of VT3 should be unique.
- The starting bit device among the key protection devices is not used when Megalink is used.

[Example]

When the operation conditions of the VT3s set to VT Nos. 1 to 4 are as shown in the following diagram, the key protection settings and ON/OFF states of key protected devices (relays) are as follows:



Normally, respond to controls Respond to controls depending on relay conditions Respond to controls depending on relay conditions Normally, not respond to controls

Unit No. (VT No.)	VT No.1	VT No.2	VT No.3	VT No.4
Key protect setting	Not checked	Checked	Checked	Checked
No. of set device	-	MR1000	MR1000	MR1000
No. of assigned device	-	MR1002	MR1003	MR1004
VT3 action	-	MR1002 OFF: switch enabled MR1002 ON: switch disabled	MR1003 OFF: switch enabled MR1003 ON: switch disabled	MR1004 normally ON (switch disabled)

21-5 VT2 Setup

This section describes the necessary settings for the VT2 MegaLink connection.



- The VT2 Series cannot be connected to MegaLink when the KV-7500/7300/5500/5000/3000 CPU units are connected to KV-LM20V/LM21V.
- MegaLink supports all the models of VT2 series when the connected CPU is KV-1000/700+KV-LM20(V)/LM21V.
The versions of the VT2 system program and PLC files when using MegaLink, however, should be Ver.2.5 or above. Version lower than Ver.2.5 can not be used.

System Mode Settings

To connect VT2 with MegaLink, select "Option Setup(2/2)" → "Multi-Link:Used" from the System Mode to make the following settings.

Item	Setting Range	Default
Unit No. ¹	0 to 15 ²	0 ²
Baud rate ³	19200, 115200, 0.5M, 1Mbit/s	19200bit/s
Message display	No/Yes	ON

¹*1 The unit No. and VT No. should be unique. VT No. connection is not needed.

²*2 The unit No. can be selected from 0 to 15. No. 0, however, cannot be selected. Please ensure to select from 1 to 15.

³*3 Baud rate should be the same for all the connected units. When VT3 units are also connected, please set their baud rate to below 1Mbit/s in order to match the VT2 baud rate.

- "5-3 VT System Setup", VT2 Series Reference Manual
- "11-3 Setup of VT Series System", VT2 Series Reference Manual

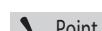
Set up using VT STUDIO/VT2 BUILDER

When VT2 units are MegaLinked, use VT STUDIO/VT2 BUILDER to make the following settings.

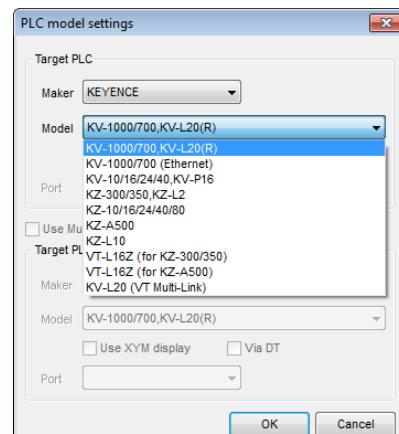
■ Set up the PLC models

Select "Resource(R)" → "Set up PLC Models (P)" from VT STUDIO, and then make the following settings.

Manufacturer: KEYENCE
Series : KV-1000/700, KV-L20(R)



Settings other than the above cannot be supported by MegaLink.



■ PLC Communication Condition Setup

The settings made by selecting "Resource(R)" → "Setup of VT Host System (S)" → "PLC Communication Conditions (C)" from VT STUDIO/VT2 BUILDER can not be used by MegaLink (the settings are neglected). Make communication settings under all the system modes.

■ Setting key protection

For more information, see "Key Protection", page 20-16

21-6 DT-100A Setup

Set up DT BUILDER

When DT-100A is MegaLinked, DT BUILDER Ver.4 or above should be used to make the following settings.

Point

- Ensure to use DT BUILDER Ver.4 or above. DT-100A with the Ver.1 to 3 cannot be used.
- When KV-7500/7300 are used, DT-100A cannot be connected.

1 From the New Project dialog box, set the DT Models to "DT-100A".



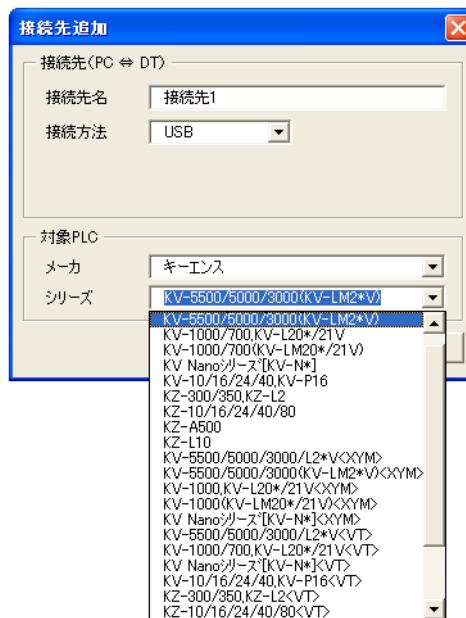
Reference

When DT-100A is used by the projects created with DT BUILDER Ver.1 to 3, you need change the DT model to DT-100 → DT-100A from "Change all the connected DT models" option in the "Connected Targets" dialog box of DT BUILDER Ver.4 or above.

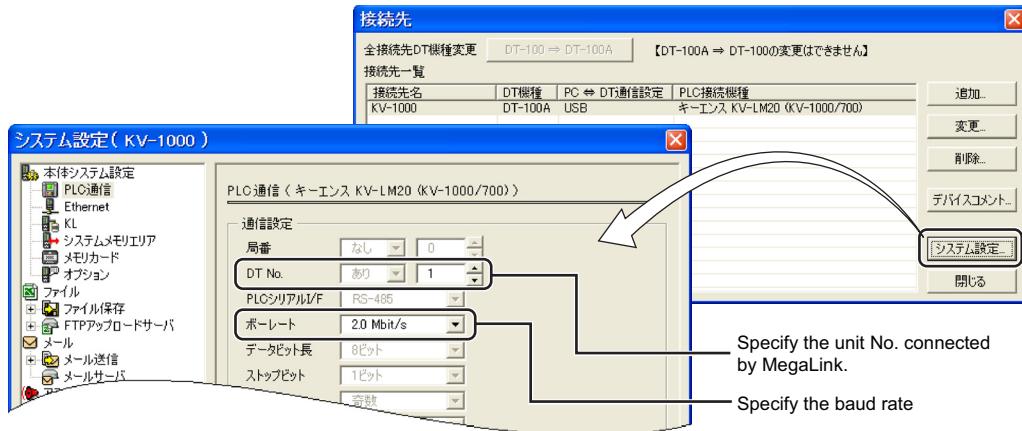
Point

- When DT-100A is selected for the DT Models, the DT model change DT-100A → DT-100 cannot be made.

2 From the targeted PLC in the "Add a Connected Target" dialog box, select "KEYENCE" from "Manu facturers" and "KV-5500/5000/3000(KV-LM2*V)", or "KV-5500/5000/3000(KV-LM2*V)<XYM>", or "KV-1000/700(KV-LM20*/21V)", or "KV-1000(KV-LM20*/21V)<XYM>", from the "Series".



- 3** Click the "System Settings" button in the "Connected Target" dialog box to select the station No. and baud rate (communication speed) for MegaLink.



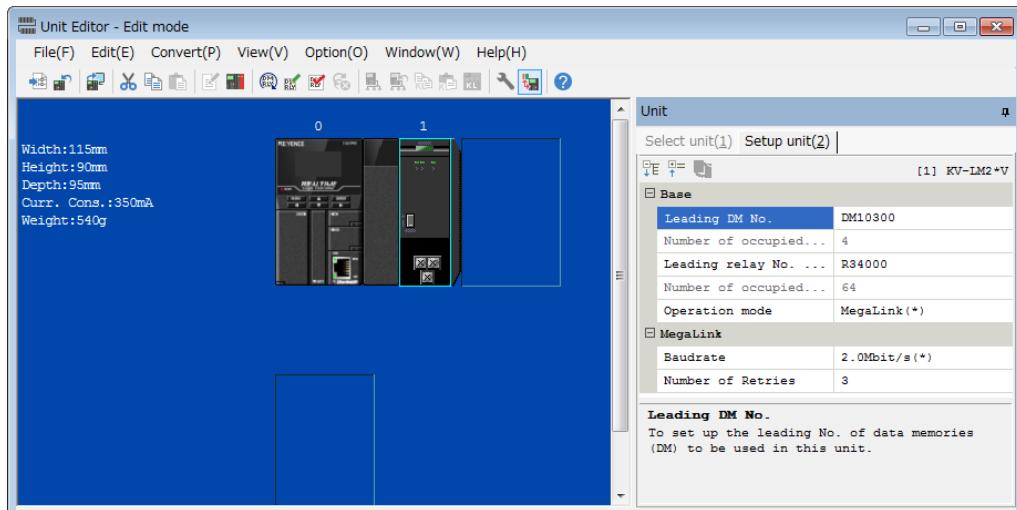
Point

- The connected unit No. (DT No.) should be selected from 1 to 15. In this case, the number should be unique.
- The baud rate should be the same as that of other equipment.
- If the units to connect include a VT3-W4TA, VT3-W4MA, or VT3-W4GA, the upper limit of the baud rate is 115200 bit/s. If a VT2 unit is included in the units to connect, the upper limit is 1 Mbit/s or less.

21-7 Unit Settings

KV-7500/7300+KV-LM2*V Setting

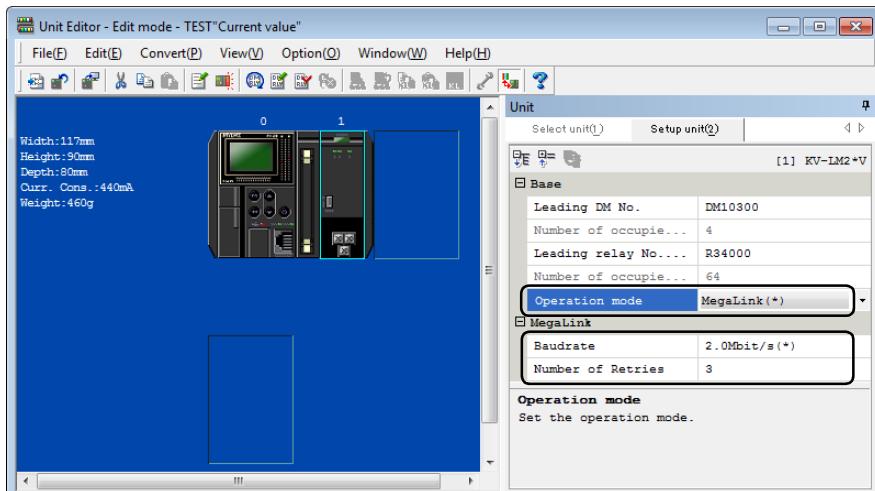
Use the KV STUDIO Unit Editor to set up.



Item	Description
Operating mode	Select "MegaLink (*)".
Baud rate	Set the communication speed set for the VT3 Baud rate.
Retry	Set the number of retries when a communication error occurs.

KV-5500/5000/3000+KV-LM2*V Setting

This is set up via the Unit Editor in KV STUDIO.



Item	Description
Operation mode	Select "MegaLink(*)".
Baud rate	Set the communication speed set for the VT3 baud rate.
Number of Retries	Set the number of retries when a communication error occurs.

KV-1000/700+KV-LM20(V) Setting

This is set up via the Unit Editor in KV STUDIO.

Item	Description
Baud Rate	Set the communication speed set for the VT3 baud rate.
Retry Times	Set the number of retries when a communication error occurs.

21-8 Error Messages and Troubleshooting

The communication errors that occur when VT3 series is connected to MEGALINK are described.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit.

The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between PLC and VT3.
	Communication setting error.	
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between PLC and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.
Multi-link communication error	Duplicated VT No.	Check the VT No. for each VT3.

- * • When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
• For error messages that belong to non-communication errors, see VT3 Series Hardware Manual, "Appendix 1 Error Messages and Troubleshooting".

MEMO

VT/DT THROUGH COMMUNICATION

This chapter describes the connections that enable the communication between DT/VT and the PLC units from other manufacturers through VT/DT that is connected with the PLC units from other manufacturers.



Point

Not supported by the VT1/VT5 Series and Soft-VT.

22-1	What is VT/DT Through Communication	22-2
22-2	Checking Operation before Connection.....	22-4
22-3	System Structure and Wiring Diagrams	22-5
22-4	Communication Conditions Setting Ranges and Defaults	22-8
22-5	Error Messages and Remedies.....	22-9

22-1 What is VT/DT Through Communication

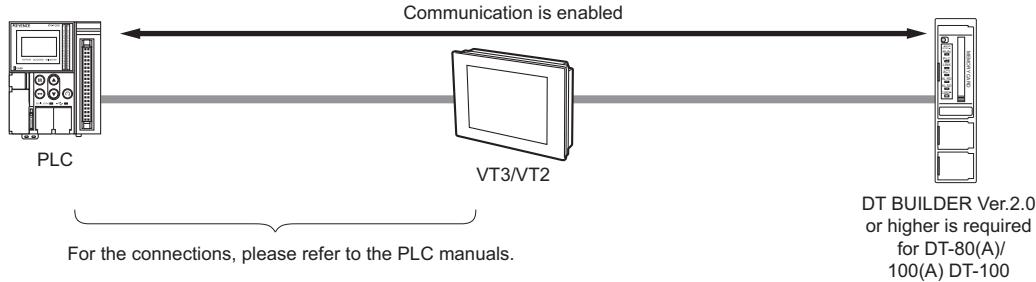
This section describes the connections that enable the communication between DT/VT and the PLC units from other manufacturers through VT/DT that is connected with the PLC units from other manufacturers.

VT/DT Series Cables

It is possible to enable the communications between DT/VT and the PLC units from other manufacturers through VT/DT that is connected with the PLC units from other manufacturers.

Since the data transmission serial port "PORT1" on VT/DT is used, then no additional port is needed on the PLC side.

■ Connect DT through VT



Point

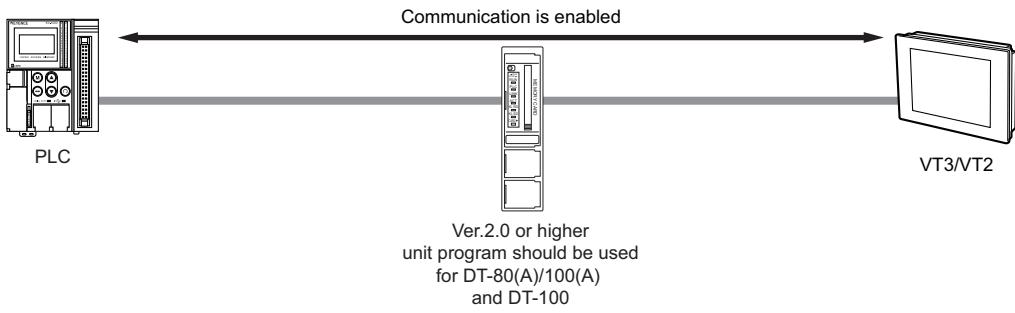
- For DT-100, connection destination settings of DT BUILDER Ver.2.0 or higher should be selected from VT routing. However, when DT-100 is used in DT-500 system, Ver.3.0 or above must be used.
- When DT-80(A) is used, settings for PLC are selected from VT routing in the DT STUDIO.
- Communication speed is lower than that of VT and DT used separately.
- In case the communication between PLC and VT is stopped, an error may occur to the communication between DT and PLC.
- For through communication via VT2 Series, Ver.2.0 or higher should be used.
- Not supported by VT1 Series .
- VT3 handy Series is not supported.
- Not supported by VT3-V7R .
- Not supported by VT3-W4T(A)/W4M(A)/W4G(A) .
- Not supported by the VT5 Series/Soft-VT.



Since the scope of the devices used by DT are the same as the Direct Link, please refer to specific chapters that contain the information about PLC connections.

22-1 What is VT/DT Through Communication

■ Connect VT through DT



For the connections, please refer to the specific PLC manuals.

Point

- The DT-100 connected with PLC supports VT/DT routing through communication via system program Ver.2.0 or higher. However, when DT-100 is used in the DT-500 system, the version of the DT-100 system program should be Ver.3.0 or higher.
- Select connection destination setting of VT STUDIO from DT routing.
- Communication speed is lower than that of VT and DT used separately.
- In case the communication between DT and PLC is stopped, an error may occur to the communication between VT and PLC.
- Not supported by VT1 series.
- Not supported by VT3-W4TA/W4MA/W4GA.
- Not supported by the VT5 Series/Soft-VT.

Reference

Since the scope of the devices used by DT are the same as the Direct Link, then please refer to specific chapters that contain the information about PLC connections.

22-2 Checking Operation before Connection

Check the items required for connecting the PLC to the VT/DT.

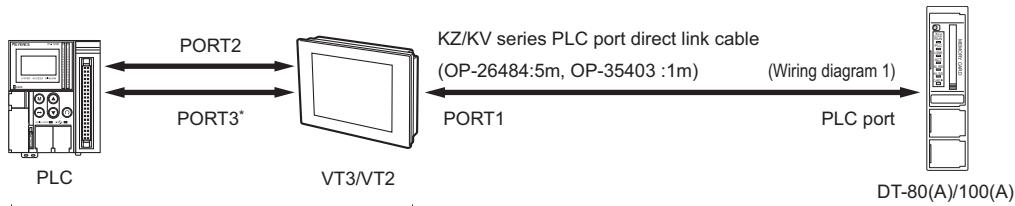
Maker	Series	Connected Machine
Keyence Corporation	KV	KV-5500/5000/3000, L2~V KV-5500/5000/3000, L2~V<XYM> KV-1000/700, KV-L20*/L21V KV-1000, KV-L20*/L21<XYM> KV Nano Series[KV-N*] KV Nano Series[KV-N*]<XYM> KV-10/16/24/40, KV-P16
	KZ	KZ-300/350, KZ-L2 KZ10/16/24/40/80 KZ-A500 KZ-L10
MITSUBISHI ELECTRIC CORPORATION.	MELSEC-A	A series CPU Direct AnA series Computer Link AnN series Computer Link
	MELSEC-QnA	QnA series CPU Direct QnA series Computer Link
	MELSEC-F	FX series FX1N/2N series FX3 series FX series (Computer Link)
	MELSEC-Q	Q series (Mode A) Computer Link Q series (Mode Q) Computer Link Q series (Mode A) CPU Direct Q series (Mode Q) CPU Direct QnU series CPU Direct QUTE series CPU Direct
OMRON Corporation	SYSMAC-C	C series (upper level Link) C series (NTLink) CV series (NTLink) CJ/CSI series (upper level Link)
Panasonic Corporation	MEWINET-FP	MEWNET-FP series
Sharp (corporation)	New satellite JW	JW series JW300 series
Fuji Electric (corporation)	MICREX-F	MICREX-F series
	FLEX-PC	FLEX-PC series MICREX-SX series
Hitachi, Ltd. Hitachi Industrial Equipment Systems Co., Ltd.	HIDIC-S10α	HIDIC-S10α series
	HIDIC-H	HIDIC-M series EHV series
Yaskawa Electric (corporation)	MP/CP	MP/CP series
	MEMOCOM-SC	MEMOCOM-SC series
Yokogawa Electric Corporation	FACTORY ACE	FA500, F3SP10 FA-M3 Series
Koyo Electronics Industries (corporation)	KOSTAC	SZ, SU, SG series
GE Intelligent Platforms (GE Fanuc Automation)	Series90	Series 90
Rockwell (Allen-Bredley)	SLC500	SLC500 series
	L32E	Compact Logix series
Toshiba	PROSEC-T	PROSEC-T series V series
Toshiba Machine (corporation)	TC	TC series
FANUC (corporation)	Power Mate	Power Mate series
JTEKT (TOYODA)	TOYOPUC-PC1	TOYOPUC-PC1 series
	TOYOPUC-PC2	TOYOPUC-PC2 series
	TOYOPUC-PC3	TOYOPUC-PC3 series
SIEMENS	S7	S7

22-3 System Structure and Wiring Diagrams

This section describes the system structure for the VT/DT Through communications.

■ Connect DT through VT

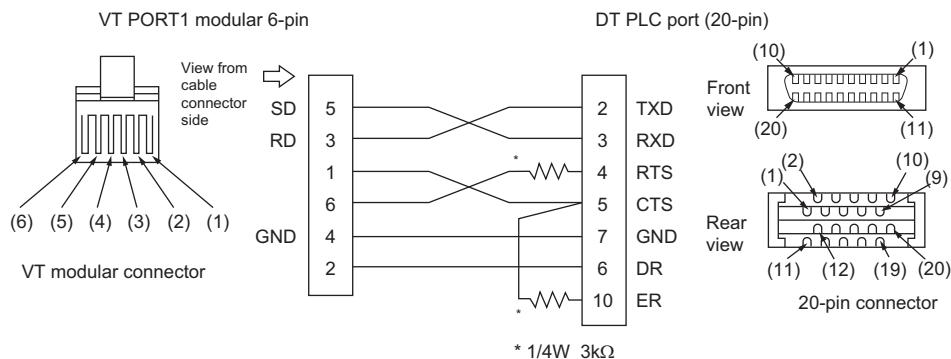
System Configuration



Please refer to specific chapters.

*There is restrictions on connectable PLC model of PORT3. See appropriate sections for details

Wiring Diagram 1 (direct link OP-26484:5m, OP-35403:1m)

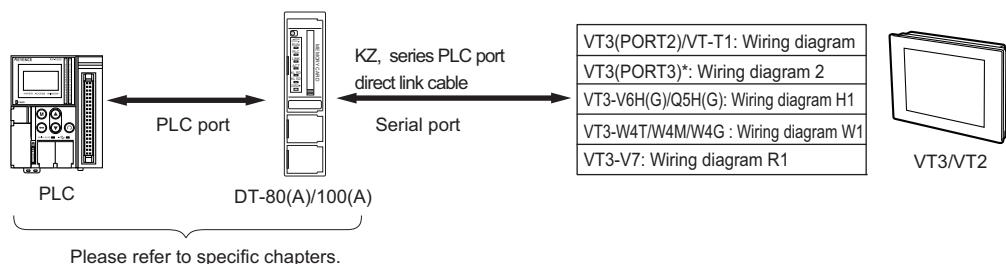


When the MultiTalk function is used by VT3, the VT Through communications are only available to PLC_A.

22-3 System Structure and Wiring Diagrams

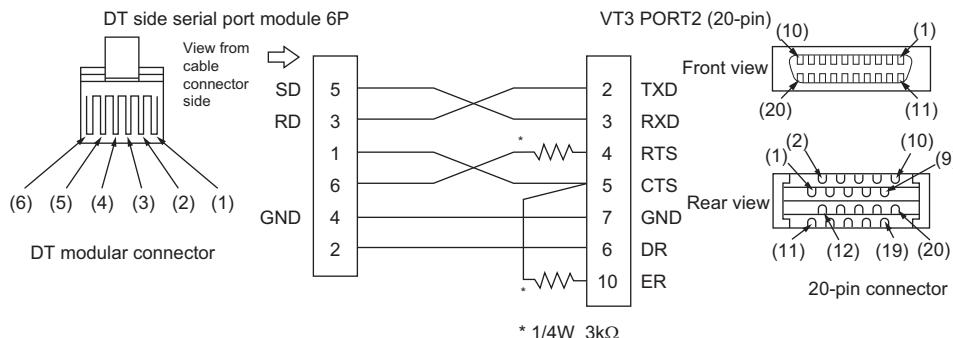
■ Connect VT through DT

System Configuration

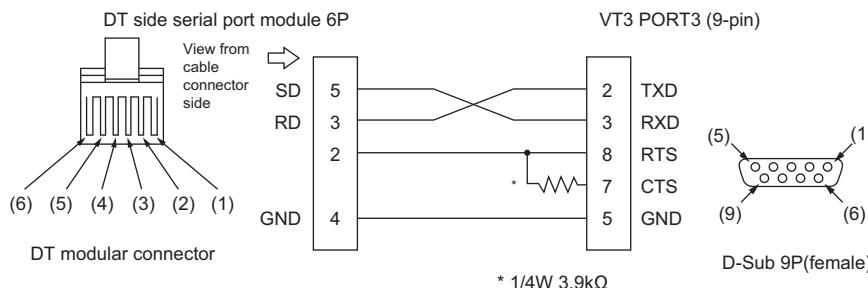


There is restrictions on connectable PLC model of PORT3. See appropriate sections for details.

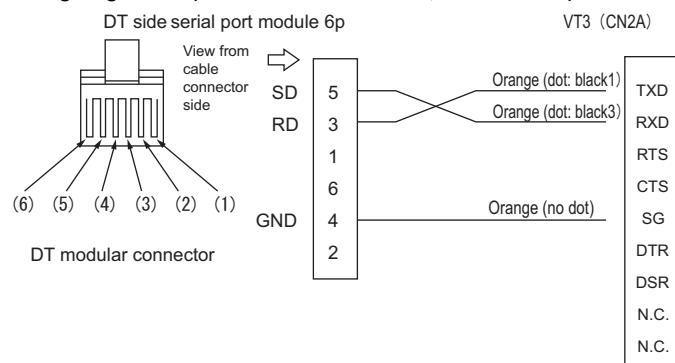
Wiring diagram 1 (direct link OP-26484:5m, OP-35403:1m)



Wiring diagram 2 (D-sub 9-pin connector OP-26486+OP24045:1m, OP-24025:5m)

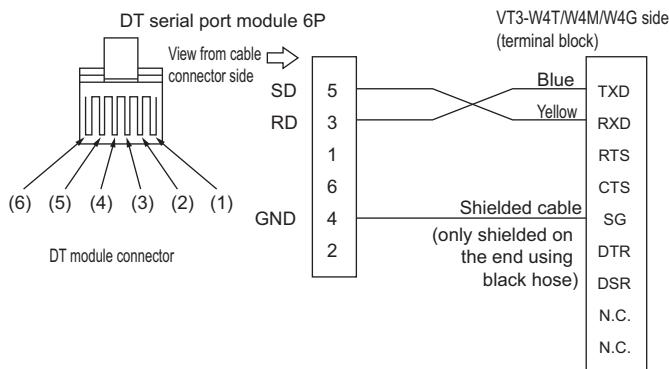


Wiring diagram H1 (direct link OP-87180: 3m, OP-87181:5m)

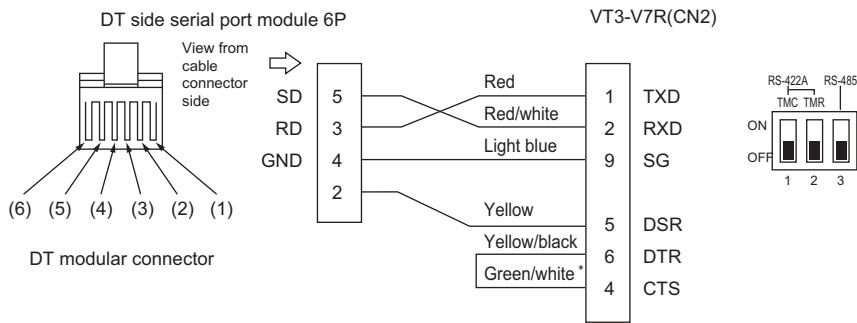


22-3 System Structure and Wiring Diagrams

Wiring diagram W1(PLC port direct link OP-86917: 5m, OP-86916: 1m)



Wiring diagram R1 (direct link: VT-C5K1)



* Not wired for loopback test inside the connector.
Solder the signal lead.

22-4 Communication Conditions Setting Ranges and Defaults

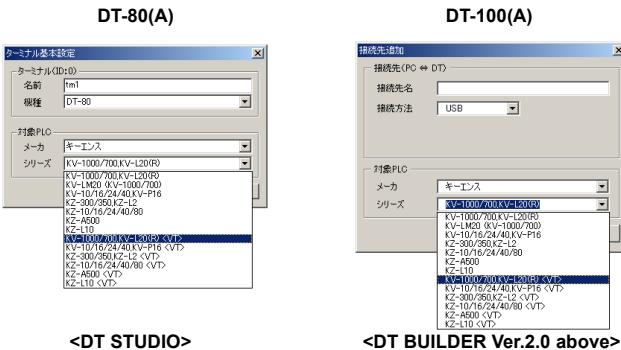
This section describes setting ranges for each communications condition and their defaults.

Settings for the VT/DT Through communications

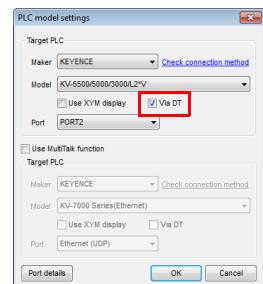
DT STUDIO/DT BUILDER/VT STUDIO is used to set up the target PLC.

Set the series to VT Through (PLC name<VT>)/via DT

Connecting DT-80(A)/100(A) through VT



Connecting VT through DT



<VT STUDIO>

When DT-100(A) is used as the terminal of DT-500, both DT STUDIO and DT BUILDER should be set up. Please refer to "6-1 Used as the Terminator of DT-500", DT-100/100A User's Manual Details

Communication Conditions Setting Ranges and Defaults

The allowable communication conditions that can be set up for the VT/DT Through communications are listed in the following table.

Please make your settings based on your communication requirements.

Item	Setting Range	Default
PLC No.	None	None
VT No.	-	-
PLC serial I/F	RS-232C	RS-232C
Baud Rate	9600, 19200, 38400, 57600, 115200 bit/s	115200 bit/s
Data Bits	8 bits	8 bits
Stop Bits	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CR	-	-
LF	-	-
CheckSum	-	-

22-5 Error Messages and Remedies

This section describes the possible VT/DT Through communications errors.

Error messages are informed to DT and VT that are connected through VT. You can read an error state from the error state of the iHost Monitor in DT STUDIO/DT BUILDER and the web server as well as the VT error display.

For the error messages other than those mentioned below, see the error messages in the chapters regarding various connection equipment.

■ Connect DT through VT

Error messages	Cause	Solutions
Target Error	The targeted PLC model specified through DT is different from the actual PLC model connected to VT.	Please verify the DT's targeted PLC models with the VT's targeted PLC models.
PLCError[4d]	VT cannot communicate with PLC when the mode is changed into the system mode.	Please restore VT to the Run Mode.
PLCError[51]	An error occurs to the communications between VT and PLC.	Please check to ensure that the connections and communication settings between VT and PLC are correct.
	An error occurs to the communications between the Plugin-connected DT and PLC.	Please check the settings of DT. It is possible that devices that don't belong to PLC's targeted scope are selected by DT.
PLCError[52]	During the change of the VT mode, DT doesn't work.	Please restore VT to the Run Mode.
Invalid system version	The version of the system program of DT-100 that is connected through VT is lower than Ver.2.	Please upgrade the system.

■ Connect VT through DT

Error messages	Cause	Solutions
Target Error	The targeted PLC model specified through VT is different from the actual PLC model connected to VT.	Please verify the DT is targeted PLC models with the VT's targeted PLC models.
PLCError[4d]	DT cannot communicate with PLC when the mode is changed into the STOP mode.	Please restore DT to the RUN Mode.
PLCError[51]	An error occurs to the communications between DT and PLC.	Please check to ensure that the connections and communication settings between DT and PLC are correct.
	An error occurs to the communications between the VT connected through DT and PLC.	Please check the settings of VT. It is possible that devices that don't belong to PLC's targeted scope are selected by VT.
PLCError[52]	During the change of the DT mode, VT doesn't work.	Please restore DT to the RUN Mode.
Invalid system version	The system program of VT doesn't support the Through communications.	Please upgrade the system.

23

UNIVERSAL SERIAL/ ETHERNET COMMUNICATION

This chapter describes universal serial/Ethernet communication using PC etc external equipment.



- This is not supported on the DT series.
- The VT3-V7R/Q5M(W)/Q5M(W)A/W4T(A)/W4M(A)/W4G(A) do not support Ethernet communications.
- Not supported by Soft-VT.

23-1	What is Universal Serial/Ethernet Communication	23-2
23-2	Wiring Diagrams.....	23-3
23-3	Setting of Universal Serial Communication.....	23-7
23-4	Setting of Universal Ethernet Communication	23-8
23-5	About Device.....	23-13
23-6	System Memory Area.....	23-14
23-7	Command/Response Format	23-28
23-8	Command/Response	23-34
23-9	ASCII Code Table.....	23-44
23-10	Error Messages and Troubleshooting	23-45

23-1 What is Universal Serial/Ethernet Communication

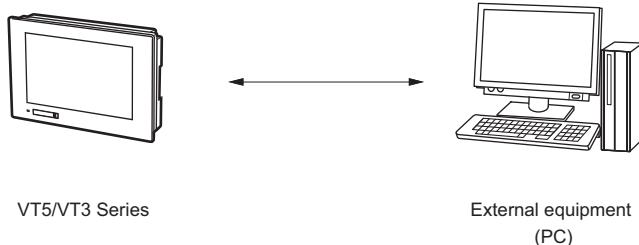
This section describes outline and communication steps of universal serial/Ethernet communication using PC etc external equipment.

23

UNIVERSAL SERIAL/ETHERNET COMMUNICATION

Outline of Universal Serial/Ethernet Communication

Universal serial/Ethernet communication (universal ASCII mode, universal binary mode) allows you to send commands from a computer or other external device to VT5/VT3 to load data to an internal device or read data from an internal device.



In case of universal serial/Ethernet communication, external equipment is changed into unit (master).

You can use a computer or other external devices to connect one (1:1 communications) or multiple (1:n communications) VT5/VT3 units.

The use of universal Ethernet communications allows you to connect personal computers and multiple (up to 16 units) external devices to one VT5/VT3 in an n:1 configuration.

Universal serial/Ethernet communication data use ASCII code or binary code.

Universal ASCII mode: data of ASCII code may be received and sent via universal serial communication.

Universal binary mode: data of binary code may be received and sent via universal serial communication.

Universal binary mode (Ethernet): data of binary code may be received and sent via universal Ethernet communication.

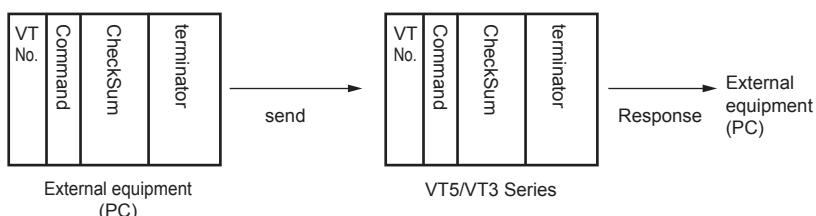


- The VT3 system program and PLC data files must be in Ver. 2.0 or later version to enable use of the universal binary mode (Ethernet) by the VT3 Series.
- Not supported by Soft-VT.

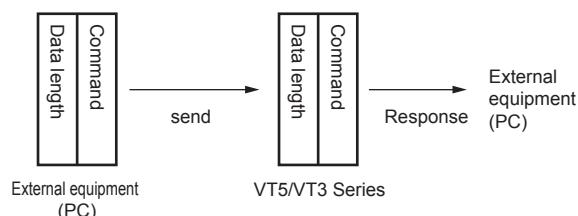
Communication Steps

In Universal serial/Ethernet communications, the VT5/VT3 automatically responds to commands sent from a personal computer or other external device.

● Universal serial communication



● Universal Ethernet communication (UDP)



23-2 Wiring Diagrams

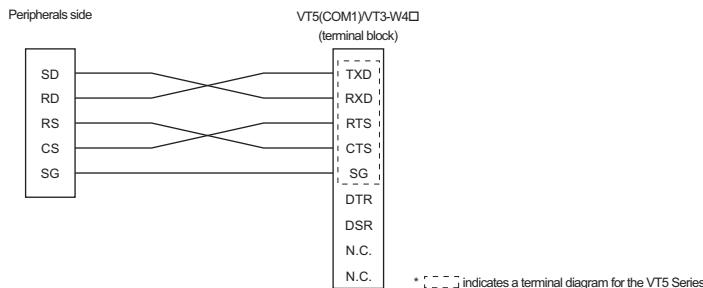
This section describes wiring for universal serial/Ethernet communication.

Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)



The VT3-W4 Series cannot be connected to the Ethernet.

■ RS-232C

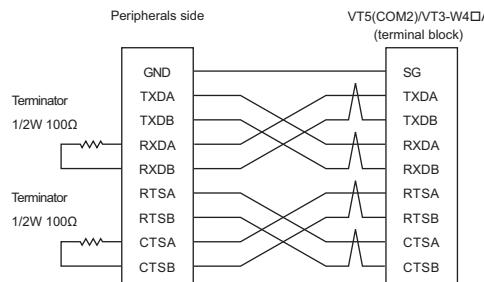


Connection to VT5 Series (COM2) and VT3-W4□A (RS-422A/485)

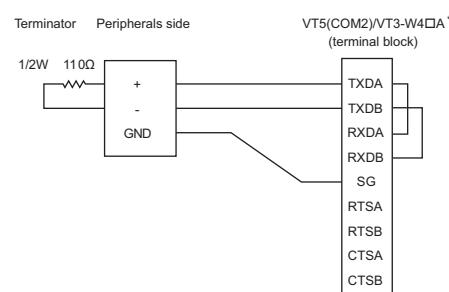


The VT3-W4 Series cannot be connected to the Ethernet.

■ RS-422A

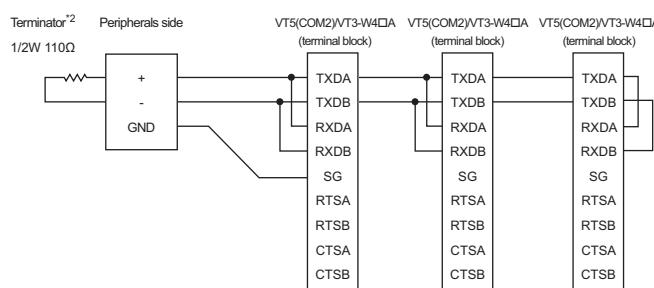


■ RS-485 (1:1)



* Set terminator switch (TERM.) to ON.

■ RS-485 (1:n¹)



*1 n=16max

*2 The terminator must be installed when peripherals are on the end of the communication line.

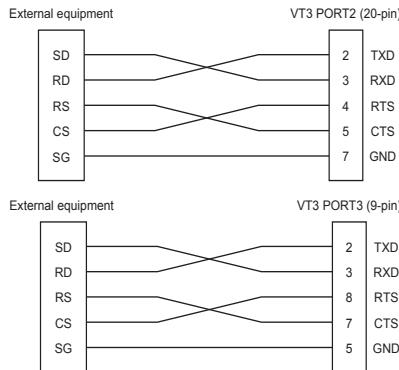
*3 When the VT5/VT3 are at the end of the communication line, set the terminator to "ON".



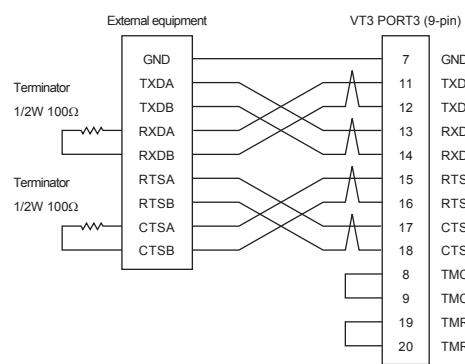
Connect the VT5/VT3 Series to external device in series (in a single line).

Connecting the VT3 Series

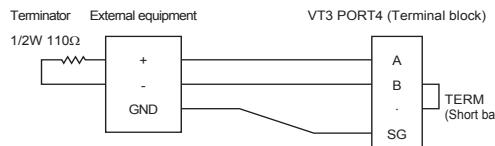
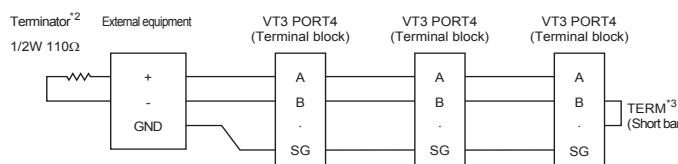
■ RS-232C



■ RS-422A



■ RS-485(1:1)

■ RS-485(1:n¹)¹n=16max²Install terminal resistor when external equipment is located on one end of communication line.³Open VT3 terminal unit at one end of communication line.

Please perform wiring in series for VT3 series and external equipment.

VT5 Series/VT3 Series Ethernet connection

When construct via 10BASE-T, please use STP/UTP cable above Category 3; when construct via 100BASE-TX, please use STP/UTP cable above category 5.

Always use Ethernet connecting cable (OP-87188/87189/87190), or RS-232C/422/485/Ethernet connecting cable (OP-87191/87192/87193) for common Ethernet communication of VT3 handy Series..



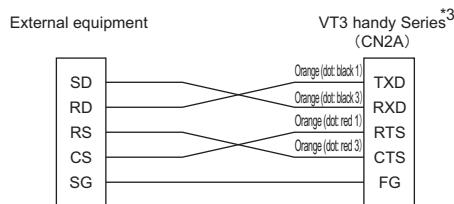
- To connect VT3 (except VT3 handy Series) series via Ethernet, VT2-E1/E2 is required.
- When VT3 series +VT2-E1/E2 VT3-E3 Or VT3 handy Series and is connected directly with external equipment (PC), please use STP/UTP cable.
- VT3-V7R/Q5M(W)/Q5M(W)A/W4T(A)/W4M(A)/W4G(A) cannot be connected via Ethernet.
- When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

Connection with VT3 Handy Series

Point FG2 must be grounded.

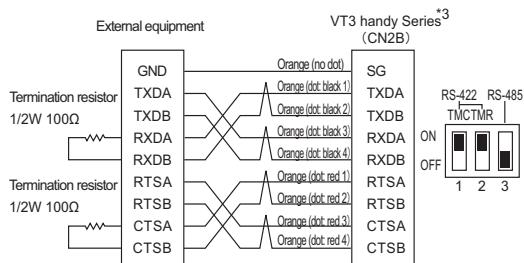
■ RS-232C

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87194: 3m, OP-87195: 5m,
OP-87106: 10m



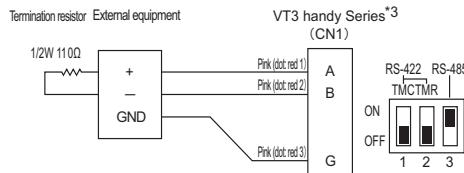
■ RS-422A

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87194: 3m, OP-87195: 5m,
OP-87106: 10m



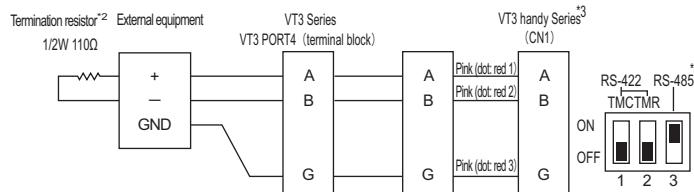
■ RS-485 (1:1)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m



■ RS-485 (1:n¹)

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m



*1 n=16max (VT3-V7R could only be connected to wiring terminal).

*2 The terminator must be installed when peripherals are on the end of the communication line.

*3 Connection cable color.

*4 The terminator on the VT3 at the end of the communication line must be ON.

Point VT3 Series should be connected with peripherals in Series (on a one-time basis).

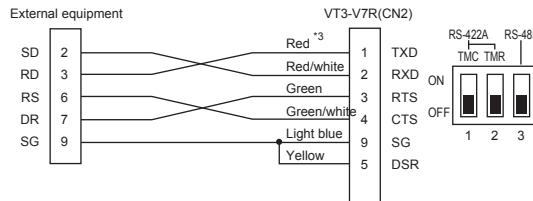
23-2 Wiring Diagrams

Connection to VT3-V7R

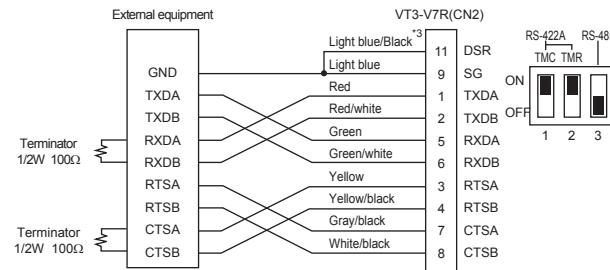


VT3-V7R cannot be connected with Ethernet.

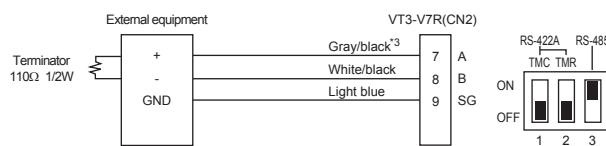
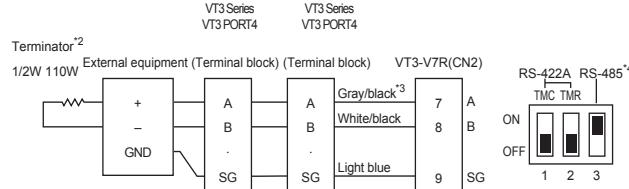
■ RS-232C



■ RS-422A



■ RS-485(1:1)

■ RS-485(1:n¹)¹ n=16 max (VT3-V7R could only be connected to wiring terminal).² When external equipment is located on one end of communication line, install terminal resistor.³ Wiring color of VT-C5R1 (RS-232C/485 Link cable)⁴ Open VT3 terminal unit at one end of communication line.

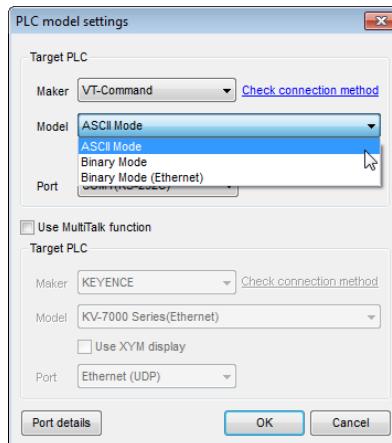
Please perform wiring in series for VT3 series and external equipment.

23-3 Setting of Universal Serial Communication

How to Set up Universal Serial Communication

Set destination PLC via VT STUDIO.

Set to "manufacturer: universal serial communication", "series: ASCII mode or binary mode".



When MultiTalk function is used, PLC_A and PLC_B cannot be set to universal serial/Ethernet communication.

Communication Conditions Setting Ranges and Defaults

In universal serial communication, set table communication conditions are shown in the table below.

Please set according to communication condition.

Setting Item	Setting Range	Default
PLC No.	None	None
VT No.	None, 0 to 15 (decimal)	None
PLC serial I/F ¹	RS-232C, RS-422A 4 wire, RS-485	RS-232C
Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	19200 bit/s
Data Bits	7 bits, 8 bits	8 bits
Stop Bits	1 bit/ 2 bits	1 bits
Parity	No parity, odd number, even number	Even
Flow Control	ER Control/XON/XOFF Cntl.	ER control
CR ²	OFF, ON	ON
LF ²	OFF, ON	None
CheckSum	OFF, ON	ON

¹ The VT5-W07M does not support RS-422A (4-wire)/RS-485 connections.

² Only universal ASCII mode could be set.

23-4 Setting of Universal Ethernet Communication

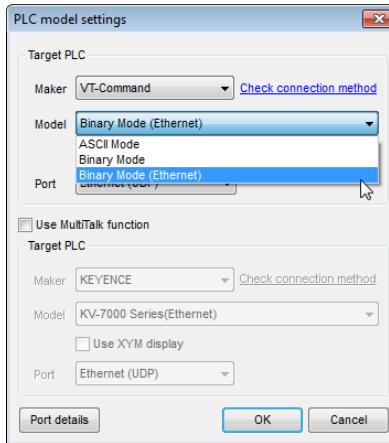
23

UNIVERSAL SERIAL/ETHERNET COMMUNICATION

How to Set up Universal Ethernet Communication

Set destination PLC via VT STUDIO.

Set to "manufacturer: universal serial communication", "series: binary mode (Ethernet)".



When MultiTalk function is used, PLC_A and PLC_B cannot be set to universal serial/Ethernet communication.

Communications Specifications

The following table summarizes the communications cable and communications speed in detail.

Item	10Base-T	100Base-TX
Compliant standard	IEEE802.3	
Baud rate	10Mbps	100Mbps
Transmission medium	STP or UTP cable Category 3 or higher	STP or UTP cable Category 5 or higher
Max. cable length	100m	
Max. number of hub connections	4 units	2 units
Transmission protocol	UDP/IP	
Number of connectable PLCs	Max. 16 units	

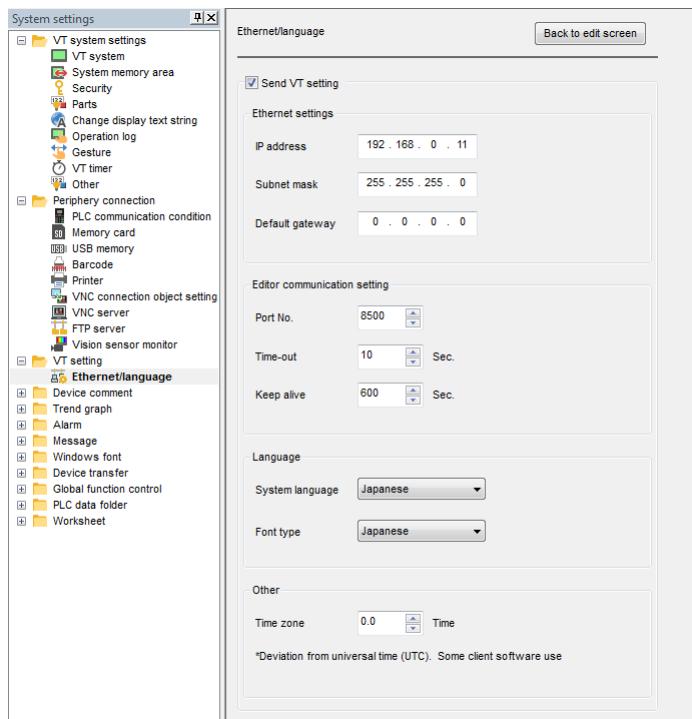
Universal Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address and other settings to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



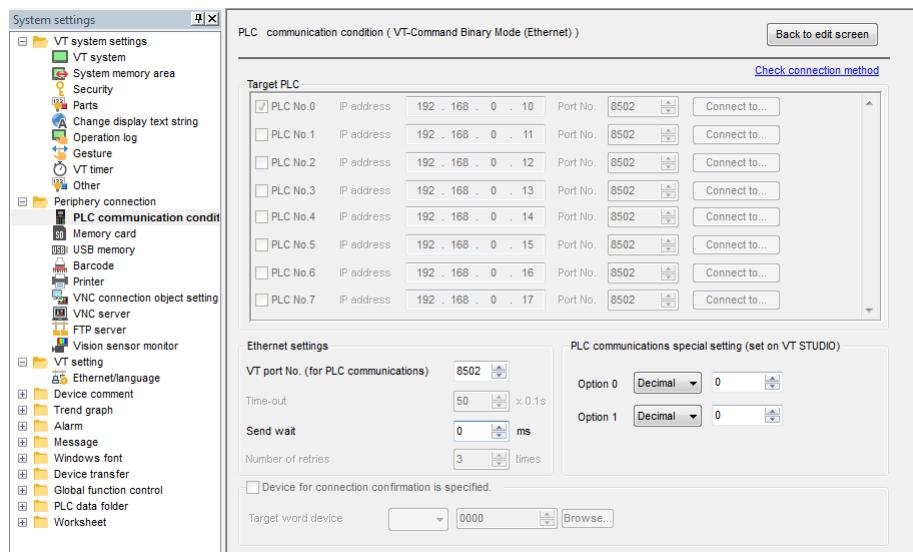
Item		Description
Send VT setting		When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address	Set the IP address to be assigned to the VT5.
	Subnet mask	Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway	Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number	If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive	Set as necessary.
	Timeout	Set as necessary.

23-4 Setting of Universal Ethernet Communication

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Condition (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



	Item	Description
Target PLC	Station No.	This does not need to be set.
	IP Address ^{*1}	
	Port number ^{*2}	
	List of connected targets	
Ethernet settings	VT port numbers (for PLC communications)	Set VT5 port numbers (for PLC communications) (1024 to 65535). ^{*1}
	Timeout	Not set
	Send Wait	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Retry	Not set
PLC communications special settings (set on VT STUDIO)		Normally, this does not need to be set.

*1 Do not change the port number to a number between 0 to 1023.

Also, take care not to use a port number already used by another device.



You can use VT5 system mode to check and change PLC Communication Condition settings.
The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

Universal Ethernet settings for the VT3 Series

Use the following steps to make Ethernet settings for the VT3 Series.

1 Use the VT3 System mode to set an IP address or make other settings to be assigned to the VT3.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup(1/3)				OK	Cancel
Baud rate	100/10Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	*****				
				OK	Cancel
				Next page	

Ethernet Setup(2/3)				OK	Cancel
Port no	8500			Next page	
Time-out	10	Sec			
Keep Alive	600	Sec			
				OK	Cancel
				Next page	

Ethernet Setup(3/3)				OK	Cancel
FTP Setup	Enable	Password Setup		Next page	
Routing Setup					
No.0(disable)	Setting				
No.1(disable)	Setting				
No.2(disable)	Setting				
No.3(disable)	Setting				
				OK	Cancel
				Next page	

Item	Description
Baud rate	Normally, select "100/10 Mbps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	This is the ID No. unique to VT2-E1/E2. This cannot be set.
Port no.	Set as necessary. Note, however, that a No. different from the port No. used for communications must be set.
Time-out	Set as necessary.
Keep alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup^{*1}	Selects "Enable" only when using a router.

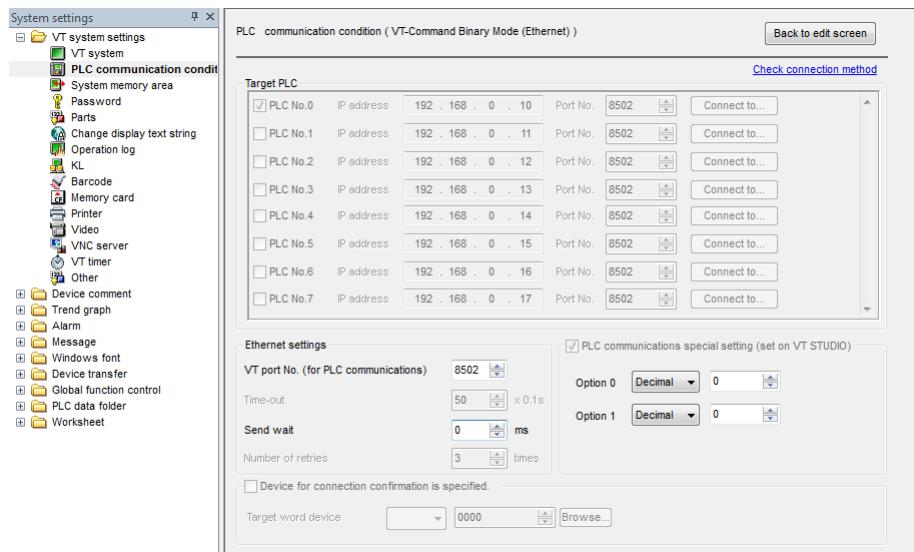
*1 "Chapter 8 ETHERNET", VT3 Series Reference Manual

23-4 Setting of Universal Ethernet Communication

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet connection", VT3 series reference manual



	Item	Description
Target PLC	PLC No.	Unset
	IP Address	
	Port no.	
	Connect to...	
Ethernet Settings	VT port No. (for PLC communications)	Sets the port No. (for PLC communications) (1024 to 65535) of the VT3. ^{*1}
	Timeout	Unset
	Wait for sending	Normally, this does not need to be set. When network communication attachment is large, please prolong time.
	Retry	Unset
PLC communication special settings (set via VT STUDIO)		Normally, this does not need to be set.

*1 Do not change the port number to a number between 0 to 1023. Also, take care not to use a port number already used by another device.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those in VT STUDIO.

"5-4 PLC Communication Conditions", VT3 Series Hardware Manual

23-5 About Device

Available Devices

Devices that may be used for universal serial/Ethernet communication are as follows.

- "6-6 Devices", VT5 Series Reference Manual
- "6-6 About Device", VT3 Series Reference Manual

	Device No.	Description	R/W Attribute	
VT internal device	MW0000 to 000F	System memory area for universal serial/Ethernet (MT compatible mode)	R or R/W	
	MW0010 to 001F	Reserved	-	
	MW0020 to 0023	VT timer (timer ID = 0 to 3) current count value	R	
	MW0024 to 003F	Reserved	-	
	MW0040 to 005F	General serial/Ethernet-specific system storage areas (VT compatible mode)	R or R/W	
	MW0060 to 00FF	Reserved	-	
	MW0100 to 0FFF	Free	R/W	
Link Device	LNW0000 to 007F	KL exchange communication area (128 words) ^{*1}	R or R/W	
	LNW0080 to 008F	KL connection message ^{*1}	R	
	LNW0090	0(LNB00900) 1(LNB00901) 2(LNB00902) 3 to F (LNB00903 to 0090F)	KL disconnection error message ^{*1} KL send lamp ^{*1} KL receive lamp ^{*1} Reserved ^{*1}	R R R -
	LNW0091 to 00BF	Reserved	-	
	LNW00C0	Bar code data reading length	R	
	LNW00C1	0(LNB00C10)	Bar code read completion notification bit	R/W
	LNW00C2 to 10C1	Bar code data storage area	R	
	LNW10C2 to 10FF	Reserved	-	

*1 Reserved on the VT5.

NOTICE	When the VT5/VT3 are turned off, or screen data is transferred to the VT5/VT3, data is cleared from internal devices and link devices (become 0).
---------------	---



Point Reserved areas cannot be used by the user.

■ About R/W attributes

- "R or R/W" : internal device (system memory area)
 - R Attribute: Only reading from Read can be used.
 - R/W Attribute: Both reading and writing from Read/Write can be used.
- Link Device
 - R Only reading from a KL input unit can be used.
 - R/W Both reading and writing from a KL output unit can be used.
- "R/W"
 - : Both reading and writing can be used.
 - R : Only reading can be used.

The so-called reading refers to processing via reading command (all commands).

The so-called writing refers to processing via writing command (WW, EWW, WB, EWB).

23-6 System Memory Area

To enable the VT5/VT3 units to communicate with external devices, (to read and control VT5/VT3 unit display states), part of an internal VT5/VT3 resource needs to be occupied. That resource is the system memory area.

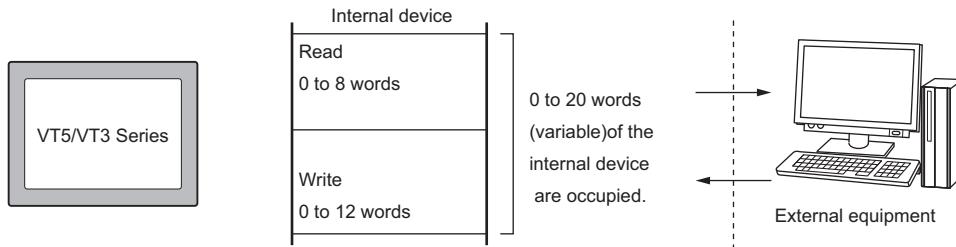
23

UNIVERSAL SERIAL/ETHERNET COMMUNICATION

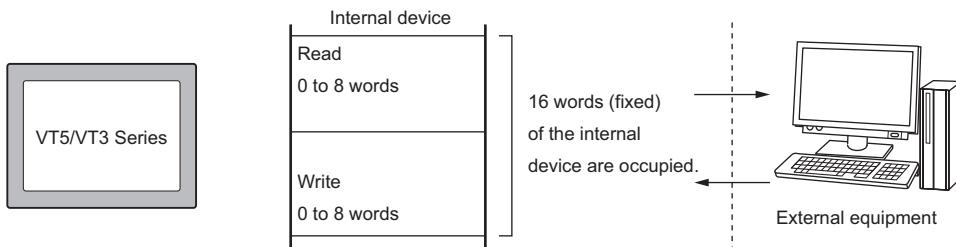
System Memory Area

System memory area is in one of two modes, VT mode or MT mode. Word devices on the PLC are occupied for each of these modes as follows:

■ VT mode



■ MT mode



When the system memory area is used for any purpose other than reading and writing system information, there is a risk that the VT5/VT3 display may be cleared and pages may abruptly change. Therefore, please never use it for any other purpose.
Use of VT5/VT3 functions requires an adequate understanding of the system memory area.

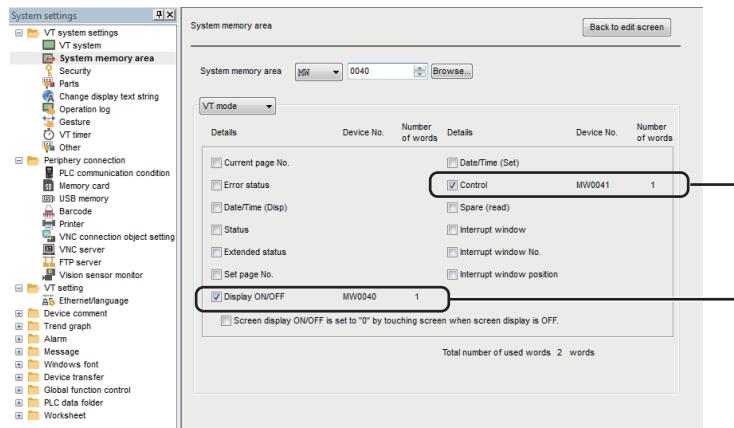
Setting System Memory Area

The system memory area setup screen can be displayed by one of the following methods.

- By selecting "System memory area" from the "VT system settings" folder on the "System Settings" tab in the workspace.
- By selecting "Resources(R)" → "VT system settings(S)" → "System memory area(M)" from Menu in that order.

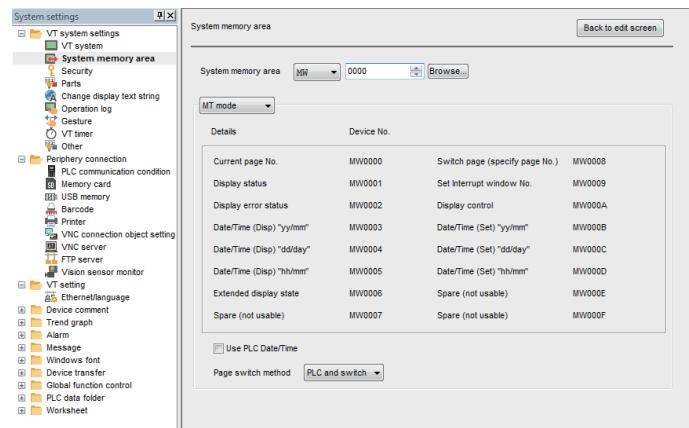
● System memory area setup screen

VT mode



In VT mode, device No. and words used will be displayed on checked items.

MT mode



VT Mode List

To set, please only check required items. After checking, distributed device No. will be displayed beside the checked item. Only consecutive internal devices corresponding to checked quantity are occupied from MW0040.



All of unused areas in MW0040 to MW005F are reserved areas. External equipment should not use reserved areas.

Description	Bit	Remarks	R/W Attribute
Error status	-	0 to 9999 (8999) (BCD/binary) ^{*7}	
	0	Reserved	
	1	Memory Card access error ^{*6}	
	2	System memory error	
	3	Reserved	
	4	Framing error	
	5	Parity error	
	6	Overrun error	
	7 to 10	Reserved	
	11	External equipment communication abnormal	
Date/Time (Disp) "year"	12 to 15	Reserved	R
	-	Lower two digit of year (BCD)	
	-	01 to 12 "month" (BCD)	
	-	01 to 31 "day" (BCD)	
	-	00 to 23 "hours", 00 to 59 "minutes" (BCD)	
Status	0	Backlight OFF ^{*1}	
	1	Reserved	
	2	Printing ^{*2 *6}	
	3	Reserved	
	4	Video play/pause ^{*3 *8}	
	5	Memory Card is being accessed. ^{*6}	
	6	Memory Card usable state ^{*6}	
	7 to 9	Reserved	
	10	Window 1 display state	
	11	Window 2 display state	
	12	Window 3 display state	
	13	Window 1 display specified state	
	14	Window 2 display specified state	
	15	Window 3 display specified state	
Extended status	0	Device Monitor screen currently displayed	
	1	Save log data to Memory Card screen currently displayed ^{*6}	
	2	PLC data folder currently being executed	
	3	Just executing remote COM port tool	
	4	Just displaying operation log previewer image ^{*6}	
	5 to 15	Reserved	

Description	Bit	Remarks	R/W Attribute
Set page No.	-	0 to 9999 (8999) (BCD/binary) ^{*7}	
Display ON/OFF	-	LCD display OFF when set to FFFF Hex	
Date/Time (Set) "year"	-	Calendar timer rewrite and lower two digits of year (BCD)	
Date/Time (Set) "month"	-	01 to 12 "month" (BCD)	
Date/Time (Set) "day"	-	01 to 31 "day" (BCD)	
Date/Time (Set) "hours/ minutes"	-	00 to 23 "hours", 00 to 59 "minutes" (BCD)	
Control	0	Backlight OFF	R/W
	1	Buzzer ON ^{*5}	
	2	Begin to print ^{*4 *6}	
	3 to 7	Reserved	
	8	Video display/hide ^{*3 *8}	
	9	Clear Memory Card access error ^{*6}	
	10	Window 1 display	
	11	Window 2 display	
	12	Window 3 display	
	13	Window 1 specified display	
	14	Window 2 specified display	
	15	Window 3 specified display	
Reserved	-		
Interrupt Window	-	Display interrupt window	
Interrupt window No.	-	Page No. 0 to 9999 (8999) of interrupt window (BCD/binary) ^{*7}	
Interrupt window position (X-axis)	-	Display position on top left corner of the window (binary)	
Interrupt window position (Y-axis)	-		

*1 This item also becomes "1" (ON) when Auto-backlight is OFF.

*2 This item also becomes "1" (ON) during "Save to Memory Card".

*3 Only for VT3-X15/S12/S10/V10/V8. It becomes reserved for other models.

*4 Printing is also started at the rising edge of OFF (0) → ON (1) during "Save to Memory Card".

Only "save to memory card" is possible for since VT3-Q5M(W)/Q5M(W)A/V6H(G)/Q5H(G)/V7R cannot be connected to printer unit (VT2-P1/P2) and Ethernet unit (VT2-E1/E2, VT3-E3).

*5 Alarm buzzer of VT3-V7R becomes 1 (ON).

*6 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).

*7 Page No. range on the VT5 Series: 0 to 9999, VT3 Series: 0 to 8999

*8 Reserved on the VT5 Series.



Reserved areas cannot be used by user.



When the LCD has turned OFF by "Display ON/OFF", and the backlight has turned OFF by "Control" bit 0, both the LCD and backlight turn OFF in both cases.

Details of VT Mode

Initial number of system memory area is fixed as MW0040.



- The specified internal device in the system memory area must not be used for any purpose other than communications between the VT5/VT3 and external devices. Failure to heed this warning may prevent normal operation of the units.
- User cannot use reserved area. Otherwise, it cannot act normally.



To set, please only check required items. After checking, distributed device No. will be displayed beside the checked item. Only consecutive internal devices corresponding to checked quantity are occupied from MW0040.

■ Just displaying page No. (attribute: Read)

Reads the currently displayed page No. within the following ranges.

Data Format	Setting Range
Binary	VT5: 0 to 9999, VT3: 0 to 8999
BCD	VT5: 0 to 9999, VT3: 0 to 8999

Set the data format at "Page No. specify mode" in the VT system settings.

- "12-4 VT Series System Settings", VT5 Series Reference Manual
 - "12-4 VT Series System Settings", VT3 series reference manual

■ Error state (attribute: Read)

Reads the VT5/VT3 error information.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Reserved		
1	Memory Card access error	Error occurred during accessing of Memory Card	No abnormality
2	System memory error	VT5/VT3 internal system memory is abnormal	No abnormality
3	Reserved		
4	Framing error	In communication with external equipment, framing error occurs	No abnormality
5	Parity error	In communication with external equipment, parity error occurs	No abnormality
6	Overrun error	In communication with external equipment, overrun error occurs	No abnormality
7 to 10	Reserved		
11	Communications error	Communication with external equipment is abnormal. Details, bit 4 to 6	No abnormality
12 to 15	Reserved		



Details on each error and how to remedy the error

- ["Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual]
 - ["Appendix-1 Errors and How to Remedy Errors", VT3 Series Reference Manual]



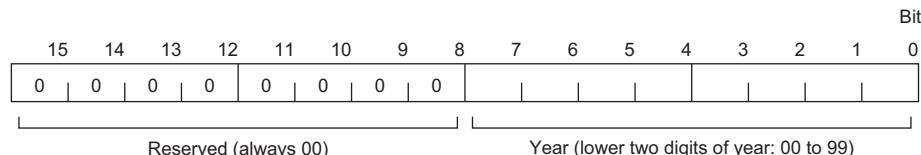
Bit related with abnormal communication (4 to 6, 11), once it is set to ON, in the process of running, it will keep ON state. In order to change it to OFF, turn off power supply of VT3, or firstly enter system mode, then switch to running mode, eliminate error state.

To turn the ON state of bit 1 OFF, clear Memory Card access error in "Control" by turning the OFF bit ON.

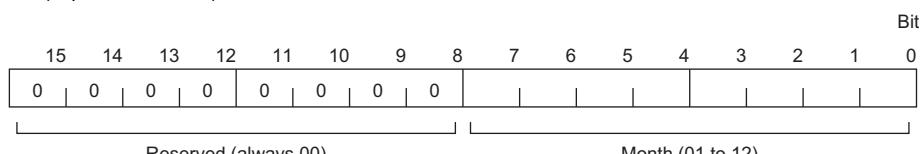
■ Calendar timer current value (attribute: Read)

Reads the current value of the VT5/VT3 calendar timer in the BCD format.

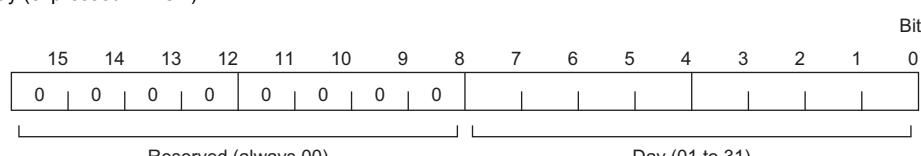
Year (expressed in BCD)



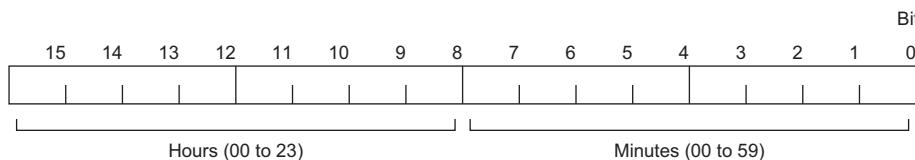
Month (expressed in BCD)



Day (expressed in BCD)



Hour/minute (expressed in BCD)



■ State (attribute: Read)

Reads the state of the VT5/VT3.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Backlight OFF state ^{*1}	Backlight OFF	Backlight ON
1	Reserved		
2	Printing ^{*2 *4}	Printout in progress	Printout not in progress
3	Reserved		
4	Video play/pause ^{*3 *6}	Pause screen	Video image
5	Memory Card is being accessed.	Memory Card is being accessed.	Memory Card is not being accessed.
6	Memory card use is enabled ^{*4}	Memory Card is inserted in Memory Card slot, and Memory Card slot cover is closed. ^{*5}	Memory Card is not inserted in Memory Card slot, or Memory Card slot cover is open. ^{*5}
7 to 9	Reserved		
10	Window 1 display state	Window 1 screen assumed display state.	Window 1 screen assumed hidden state.
11	Window 2 display state	Window 2 screen assumed display state.	Window 2 screen assumed hidden state.
12	Window 3 display state	Window 3 screen assumed display state.	Window 3 screen assumed hidden state.
13	Window 1 display specified state	Specify via external equipment	Specify by touch switch
14	Window 2 display specified state	Specify via external equipment	Specify by touch switch
15	Window 3 display specified state	Specify via external equipment	Specify by touch switch

^{*1} "Backlight OFF status" of Bit0 becomes "1" (ON) even if Auto-backlight is OFF.For Backlight OFF, see "12-4 VT System Setting" in VT3 Series Reference Manual^{*2} Printing is also started at the rising edge of OFF (0) → ON (1) during "Save to Memory Card."

Only "save to memory card" is possible for since VT3-Q5M(W)/Q5M(W)/V6H(G)/Q5H(G)/V7R cannot be connected to printer unit (VT2-P1/P2) and Ethernet unit (VT2-E1/E2, VT3-E3).

^{*3} Only for VT3-X15/S12/S10/V10/V8. It becomes reserved for other models.^{*4} It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).^{*5} The VT5 Series is not provided with a memory card slot cover. There is a bit change when a memory card is inserted.^{*6} Reserved on the VT5 Series.

Bit 4 "Video play/pause" notifies the video display state of channel 1 or RGB.

■ Expansion state (attribute: Read)

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Device Monitor screen currently displayed	Device Monitor screen currently displayed ^{*1}	Device monitor screen not displayed
1	Just displaying image saved in record data memory card	Just displaying image saved in record data memory card	Save record data to Memory Card screen not displayed
2	PLC data folder currently being executed	PLC data folder currently being executed	PLC data folder not being executed
3	Just using remote COM port tool	Just using remote COM port tool ^{*2}	Do not use remote COM port tool
4	Just displaying operation log previewer image	Just displaying operation log previewer image	Do not display operation log previewer image
5 to 15	Reserved		

^{*1} Device monitor isn't ON during window display. It is ON when displaying in system mode.^{*2} It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).^{*3} It isn't ON when "Maintain operation status of object machine of remote COM port" is set via remote COM port tool.

■ Change over page No. (attribute: Read/Write)

Specify the page No. to be displayed via command on external equipment side in the following range.

Data Format	Setting Range
Binary	VT5: 0 to 9999, VT3: 0 to 8999
BCD	VT5: 0 to 9999, VT3: 0 to 8999

Set the data format at "Page No. specify mode" in the VT system settings.

■ Screen display ON/OFF (attribute: Read/Write)

Turns the LCD and backlight ON and OFF.

LCD and Backlight	Setting Range
OFF	FFFFh
ON	Value other than above

● Setting "Display ON/OFF" to "0" by touching the screen during screen display OFF.

Selecting this checkbox will allow you to turn on the LCD and backlight by touching the VT5/VT3 screen when they have been turned off by pressing Display ON/OFF.

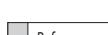
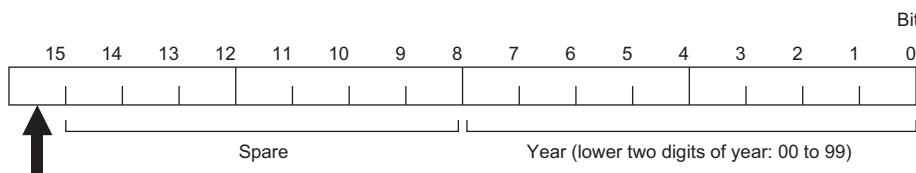


When the backlight is turned off by setting "Control" bit 0 to 1 (ON), it will not be possible to turn on the backlight by touching the VT5/VT3 screen. Please firstly set bit 0 of icontrol to 0 (OFF), then turn on backlight.

■ Calendar timer set value (attribute: Read/Write)

Sets the "year" (lower two digits of year) and the calendar timer rewrite flag. Set "00" for the year 2000.

Year (expressed in BCD)

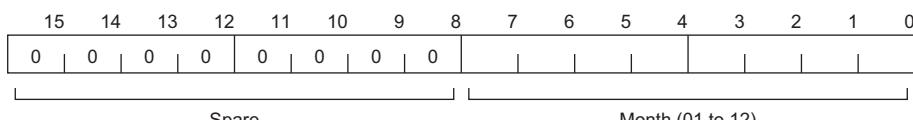


When calendar timer changes mark to ON, and calendar timer set value changes, it may also be changed to current value.

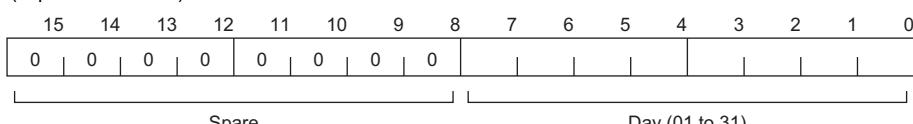
■ Calendar timer set value (attribute: Read/Write)

Sets "month", "day" and "hours/minutes".

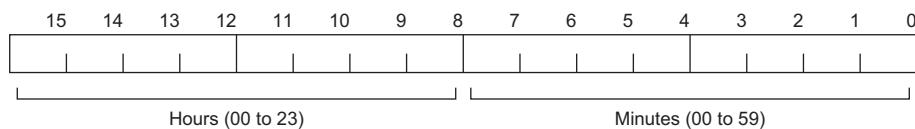
Month (expressed in BCD)



Day (expressed in BCD)



Hour/minute (expressed in BCD)



- "5-3 VT Machine Setup", VT5 Series Hardware Manual.
- "5-2 Option Settings", VT3 series hardware manual

■ Control (attribute: Read/Write)

Use these functions to set various VT5/VT3 controls.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Backlight OFF	Backlight OFF	Backlight ON
1	Buzzer ON ^{*3}	Buzzer output ON	Buzzer output OFF
2	Print start ^{*1 *4}	Printout is executed by bit state changing from OFF to ON.	
3 to 7	Reserved		
8	Video display/hide ^{*2 *5}	Video image is displayed.	Video image is not displayed.
9	Clear Memory Card access error	Memory Card access error is cleared by bit state changing from OFF to ON.	
10	Window 1 display	Window 1 screen assumed display state.	Window 1 screen assumed hidden state.
11	Window 2 display	Window 2 screen assumed display state.	Window 2 screen assumed hidden state.
12	Window 3 display	Window 3 screen assumed display state.	Window 3 screen assumed hidden state.
13	Window 1 specified display	Specify on PLC	Specify by touch switch
14	Window 2 specified display	Specify on PLC	Specify by touch switch
15	Window 3 specified display	Specify on PLC	Specify by touch switch

- *1 Printing is started when the bit state changes from OFF (0) to ON (1) also during "Save to Memory Card." Only "save to memory card" is possible for since VT3-V7R/Q5M(W)/Q5M(W)/A/V6H(G)/Q5H(G)/W4T(A)/W4M(A)/W4G(A) cannot be connected to printer unit (VT2-P1/P2) and Ethernet unit (VT2-E1/E2, VT3-E3).
- *2 Only for VT3-X15/S12/S10/V10/V8. It becomes reserved for other models.
Video images are displayed at all times when "Control" is not used.
- *3 Alarm buzzer of VT3-V7R becomes ON.
- *4 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).
- *5 Reserved on the VT5 Series.



- All four channels are controlled by bit 8 "Video display/hide".
(It is controlled both for video input and for RGB input)
- Video (moving images) are displayed as video display when bit 8 is set to "1" (ON).
- When a vertical screen is used on the VT5/VT3, the bitmap file that is saved on memory card by bit 2 "Print start" is rotated by 90 degrees when it is opened on the PC screen.
- When the display of interrupt window on VT1 is ON, bit 12 "Window 3 display" is also set to 1 (ON), but the VT5/VT3 is not set to 1 (ON).



- "14-5 PLC Window turned On/Off from PLC", VT5 Series Reference Manual
- "14-5 Window ON/OFF Based on PLC", VT3 series reference manual

■ Interrupt window (attribute: Read/Write)

Display control of setting window.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Display control	Display	No display
1 to 15	Reserved		



- "14-6 Interrupt Window Display on PLC", VT5 Series Reference Manual
- "14-6 Interrupt Window Display Based on PLC", VT3 Series Reference Manual

■ Interrupt window No. (attribute: Read/Write)

Specifies the page No. of the interrupt window that is displayed by bit 0 of the interrupt window.

Data Format	Setting Range
Binary	VT5: 0 to 9999, VT3: 0 to 8999
BCD	VT5: 0 to 9999, VT3: 0 to 8999

Set the data format at "Page No. specify mode" in the VT system settings.

- "12-4 VT Series System Settings", VT5 Series Reference Manual
- "12-4 VT Series System Settings", VT3 Series Reference Manual

■ Interrupt window coordinate (attribute: Read/Write)

Display position on top left corner of the interrupt window to be displayed may be Specifyd via bit 0 of interrupt window.

Type		X-axis Coordinate Range	Y-axis Coordinate Range
VT5-X15/X12/X10	Horizontal screen	0 to 1023	0 to 767
	Vertical screen	0 to 767	0 to 1023
VT5-W10	Horizontal screen	0 to 1023	0 to 599
	Vertical screen	0 to 599	0 to 1023
VT5-W07/W07M	Horizontal screen	0 to 799	0 to 479
	Vertical screen	0 to 479	0 to 799
VT3-X15	Horizontal screen	0 to 1023	0 to 767
	Vertical screen	0 to 767	0 to 1023
VT3-S12/S10	Horizontal screen	0 to 799	0 to 599
	Vertical screen	0 to 599	0 to 799
VT3-V10/V8/V7/V7R/ V6H(G)	Horizontal screen	0 to 639	0 to 479
	Vertical screen	0 to 479	0 to 639
VT3-Q5T(W)/Q5S(W)/ Q5M(W)/Q5T(W)A/ Q5M(W)A/V6H(G)/Q5H(G)	Horizontal screen	0 to 319	0 to 239
	Vertical screen	0 to 239	0 to 319
VT3-W4T (A)/W4M (A)/ W4G (A)	Horizontal screen	0 to 319	0 to 127
	Vertical screen	0 to 127	0 to 319



Origin (0,0) is the top left corner of the screen.

- Subject to window size, it has certain influence on the coordinate value that could be Specifyd. To set, please do not exceed limit.

MT Mode List

In MT compatible mode, MW0000 to MW000F is occupied.

Device No.	Description	Bit	Remarks	R/W Attribute
MW0000	Current page No.	-	0 to 9999 (8999) (BCD/binary) ^{*6}	
MW0001	Display state	0	Printing ^{*1~*5}	
		1	Reserved	
		2	Backlight OFF state ^{*2}	
		3	Video play/pause ^{*3~*7}	
		4	Memory Card is being accessed. ^{*5}	
		5	Page switching setting state	
		6	Page switching mode	
		7	Memory Card usable state ^{*5}	
		8	Window 1 display state	
		9	Window 2 display state	
		10	Window 3 display state	
		11	Window 1 display specified state	
		12	Window 2 display specified state	
		13	Window 3 display specified state	
		14	Reserved	
		15	Interrupt window display state	
MW0002	Display error state	0	System memory error	R
		1	Reserved	
		2	Memory Card access error ^{*5}	
		3 to 7	Reserved	
		8	Communications error	
		9	Overrun error	
		10	Framing error	
		11	Parity error	
		12	Communication state is abnormal on external equipment side	
		13	Time-out error	
		14	Checksum error	
		15	Reserved	
MW0003	Date/Time (Disp) "yy/ mm"	-	"Year (lower two digit)/month" (BCD)	
MW0004	Date/Time (Disp) "dd/ day"	-	"Day/day of the week" (BCD)	
MW0005	Date/Time (Disp) "hh/ mm"	-	"Hours/minutes" (BCD)	
MW0006	Extended display state	0	Device Monitor screen currently displayed	
		1	Save log data to Memory Card screen currently displayed ^{*5}	
		2	PLC data folder currently being executed	
		3	Just executing remote COM port tool	
		4	Just displaying operation log previewer image ^{*5}	
		5 to 15	Reserved	
MW0007	Reserved	-		
MW0008	Switch page (specify page No.)	-	Page No. specification (BCD/ decimal)	R/W
MW0009	Set interrupt window No.	-	Page No. specification (BCD/ decimal)	

Device No.	Description	Bit	Remarks	R/W Attribute
MW000A	Display control	0	Execute printing *4~5	R/W
		1	Reserved	
		2	Backlight OFF	
		3	Date/Time setting (year/month/day/day of week) changed	
		4	Date/Time setting (hours/minutes) changed	
		5	Page switching setting	
		6	Page switching mode	
		7	Clear error	
		8	Window 1 display	
		9	Window 2 display	
		10	Window 3 display	
		11	Window 1 specified display	
		12	Window 2 specified display	
		13	Window 3 specified display	
		14	Reserved	
		15	Interrupt window display state	
MW000B	Date/Time (Set) "yy/mm"	-	"Year (lower two digit)/month" (BCD)	
MW000C	Date/Time (Set) "dd/day"	-	"Day/day of the week" (BCD)	
MW000D	Date/Time (Set) "hh/mm"	-	"Hours/minutes" (BCD)	
MW000E	Reserved	-	Not Usable	
MW000F	Reserved	-	Not Usable	

*1 This item becomes "1" (ON) also during "Save to Memory Card."

*2 This item also becomes "1" (ON) when Auto-backlight is OFF.

*3 Only for VT3-X15/S12/S10/V10/V8. It becomes reserved for other models.

*4 Printing is also started at the rising edge of OFF (0) → ON (1) during "Save to Memory Card."

Only "save to memory card" is possible for since VT3-V7R/Q5M(W)/Q5M(W)A/V6H(G)/Q5H(G)/W4T(A)/W4M(A)/W4G(A) cannot be connected to printer unit (VT2-P1/P2) and Ethernet unit (VT2-E1/E2, VT3-E3).

*5 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).

*6 Page No. range on the VT5 Series: 0 to 9999, VT3 Series: 0 to 8999

*7 Reserved on the VT5 Series.



- Reserved areas cannot be used by the user.
- In MT compatible mode, do not control video display/non-display (only for VT3-X15/S12/S10/V10/V8). Often in display state.



When the backlight has turned OFF by "Display control" bit 2, both the LCD and backlight turn OFF.

Details of MT Mode

Initial number of system memory area is fixed as MW0000.



- Specifyd internal device area in system memory area, please do not use it for any purpose other than communication between VT3 and external equipment. Otherwise, it cannot act normally.
- User cannot use reserved area. Otherwise, it cannot act normally.

■ Displaying page No.: MW0000 (attribute: Read)

Reads the currently displayed page No. within the following ranges.

Data Format	Setting Range
Binary	VT5: 0 to 9999, VT3: 0 to 8999
BCD	VT5: 0 to 9999, VT3: 0 to 8999

Set the data format at "Page No. specify mode" in the VT system settings.

□ "12-4 VT Series System Settings", VT5 Series Reference Manual

□ "12-4 VT Series System Settings", VT3 series reference manual

■ Display state: MW0001 (attribute: Read)

Reads the state of the VT5/VT3.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Printing ^{*1~4}	Printout in progress	Printout not in progress
1	Reserved		
2	Backlight OFF state ^{*2}	Backlight OFF	Backlight ON
3	Video play/pause ^{*3~6}	Pause screen	Video image
4	Memory Card is being accessed.	Memory Card is being accessed.	Memory Card is not being accessed.
5	Page switching setting state	Change over via external equipment	Switch by touch switch
6	Page switching mode	Bit page switching	Change over via page transition (MW0008)
7	Memory card plug-pull state ^{*4}	Memory Card is inserted in Memory Card slot, and Memory Card slot cover is closed. ^{*5}	Memory Card is not inserted in Memory Card slot, or Memory Card slot cover is open. ^{*5}
8	Window 1 display state	Window 1 display	Window 1 hide
9	Window 2 display state	Window 2 display	Window 2 hide
10	Window 3 display state	Window 3 display	Window 3 hide
11	Window 1 display specified state	Specify via external equipment	Specify by touch switch
12	Window 2 display specified state	Specify via external equipment	Specify by touch switch
13	Window 3 display specified state	Specify via external equipment	Specify by touch switch
14	Reserved		
15	Interrupt window display state	Display interrupt window	Hide interrupt window

*1 This item becomes "1" (ON) also during "Save to Memory Card." The VT3-V7R/Q5M(W)/Q5M(W)A/V6H(G)/Q5H(G) cannot be connected to the Printer Unit (VT2-P1/P2) and Ethernet Unit (VT2-E1/E2). Only saving to Memory Card is possible.

*2 Bit 2 "Backlight OFF state" turns "1" (ON) even when Auto-backlight is OFF. About Auto-backlight OFF
 VT3 series reference manual "12-4 VT host system settings"

*3 Only for VT3-X15/S12/S10/V10/V8. In other types, change into "reserved".

*4 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).

*5 The VT5 Series is not provided with a memory card slot cover. There is a bit change when a memory card is inserted.

*6 Reserved on the VT5 Series.



Bit 3 "Video play/pause" notifies the video display state of channel 1 or RGB.

■ Display error state: MW0002 (attribute: Read)

Reads the VT5/VT3 error information.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	System memory error	VT5/VT3 internal system memory is abnormal	
1	Reserved		
2	Memory Card access error	Error occurred during accessing of Memory Card	No abnormality
3 to 7	Reserved		
8	Communications error	One of following communications errors occurring:	No abnormality
9	Overrun error	Overrun error	No abnormality
10	Framing error	Framing error	No abnormality
11	Parity error	Parity Error	No abnormality
12	Communication state is abnormal on external equipment side	Abnormal communication occurs on external equipment side	No abnormality
13	Time-out error	Time-out error	No abnormality
14	Checksum error	Checksum error	No abnormality
15	Reserved		

*1 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).

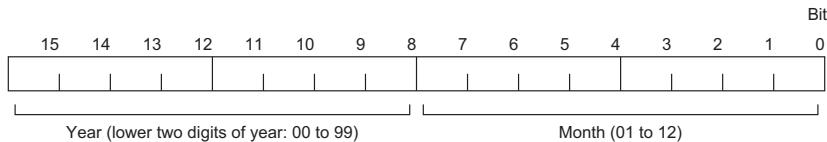


Once bit of error messages (2,8 to 14) is started, it will keep ON state in running state. In order to close ON state of bit (2,8 to 14), perform OFF → ON by eliminating communication error of display control (MW000A), it may be eliminated. You can also clear an error state by turning off the VT5/VT3, or by engaging system mode and then returning to operation mode.

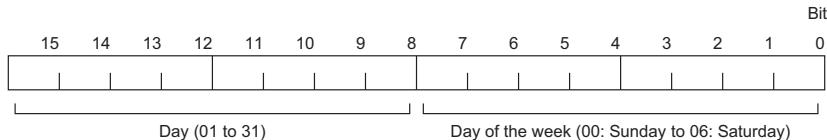
■ Calendar timer current value: MW0003 to MW0005 (attribute: Read)

Reads the current value of the VT5/VT3 calendar timer in the BCD format.

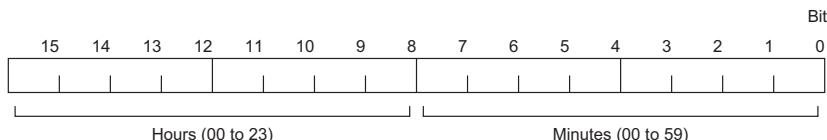
Year/month (BCD) (MW0003)



Day/day of week (BCD) (MW0004)



Hour/minute (BCD)(MW0005)



■ Expanded display: MW0006 (attribute: Read)

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Device Monitor screen currently displayed	Device Monitor screen currently displayed ^{*1}	Device monitor screen not displayed
1	Save log data to Memory Card screen currently displayed	Save log data to Memory Card screen currently displayed	Save record data to Memory Card screen not displayed
2	PLC data folder currently being executed	PLC data folder currently being executed	PLC data folder not being executed
3	Just using remote COM port tool	Just using remote COM port tool ^{*2}	Do not use remote COM port tool
4	Just displaying operation log previewer image	Just displaying operation log previewer image	Do not display operation log previewer image
5 to 15	Reserved		

*1 It is not started in case of window display for device monitor. It is activated when display in system mode.

*2 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).

*3 When remote COM port tool is set to "Keep Alive state of remote COM port destination equipment", do not open.

■ Page transition (page No. specification): MW0008 (attribute: Read/Write)

Specify the page No. you want to display within the following range.

Data Format	Setting Range
Binary	VT5: 0 to 9999, VT3: 0 to 8999
BCD	VT5: 0 to 9999, VT3: 0 to 8999

Set the data format at "Page No. specify mode" in the VT system settings.

□ "12-4 VT System Settings", VT5 Series Reference Manual

□ "12-4 VT host system settings", VT3 Series Reference Manual

■ Interrupt window No. specification: MW0009 (attribute: Read/Write)

Set the data format at "Page No. specify mode" in the VT system settings.

Data Format	Setting Range
Binary	VT5: 0 to 9999, VT3: 0 to 8999
BCD	VT5: 0 to 9999, VT3: 0 to 8999

Set the data format at "Page No. specify mode" in the VT system settings.

□ "12-4 VT Series System Settings", VT5 Series Reference Manual

□ "12-4 VT Series System Settings", VT3 Series Reference Manual

■ Display control: MW000A (attribute: Read/Write)

Be sure to make these settings to use the VT5/VT3 units to communicate with external devices.

Bit	Description	When 1 (ON)	When 0 (OFF)
0	Execute printing ^①	Printing is executed by bit state changing to ON from OFF.	
1	Reserved		
2	Backlight OFF	Backlight OFF	Backlight ON
3	Date/Time setting (year/month/day/day of week) changed	(year/month/day/day of week) changed by bit state changing to ON from OFF	
4	Date/Time setting (hours/minutes) changed	(hours/minutes) changed by bit state changing to ON from OFF	
5	Page switching setting	Change over via external equipment	Switch by touch switch
6	Page switching mode	Bit page switching	Switch by page switching (leading No. +8)
7	Clear error	Communications error and Memory Card access error bit are cleared by the bit state changing from OFF to ON.	
8	Window 1 display ON	Window 1 display ON	Window 1 display OFF
9	Window 2 display ON	Window 2 display ON	Window 2 display OFF
10	Window 3 display ON	Window 3 display ON	Window 3 display OFF
11	Window 1 display setting	Specify via external equipment	Specify by touch switch
12	Window 2 display setting	Specify via external equipment	Specify by touch switch
13	Window 3 display setting	Specify via external equipment	Specify by touch switch
14	Reserved		
15	Execution of interrupt window display	Display interrupt window	Hide interrupt window

*1 Printing is started when the bit state changes from OFF (0) to ON (1) also during "Save to Memory Card."

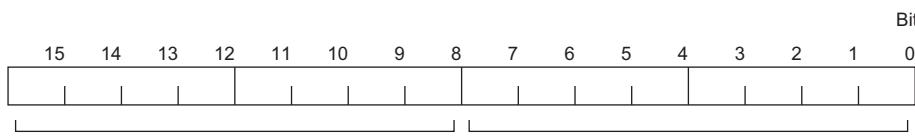
*2 It becomes reserved for VT3-W4T(A)/W4M(A)/W4G(A).



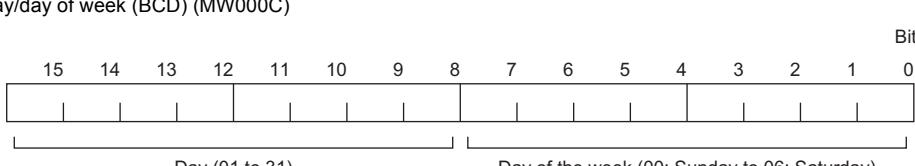
- In MT compatible mode, video display/non-display (only for VT3-X15/S12/S10/V10/V8) is not controlled. Often in display state.
- When a vertical screen is used on the VT5/VT3, the bitmap file that is saved on memory card by bit 0 "Execute print" is rotated by 90 degrees when it is opened on the PC screen.

■ Calendar timer set value: MW000B to 000D (attribute: Read/Write)

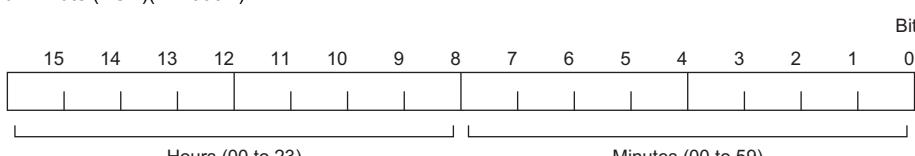
Year/month (BCD) (MW000B)



Day/day of week (BCD) (MW000C)



Hour/minute (BCD)(MW000D)



"5-3 VT Machine Setup", VT5 Series Hardware Manual

"5-2 Option Settings", VT3 Series Hardware Manual

23-7 Command/Response Format

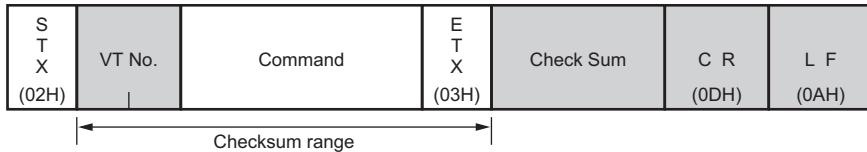
This section describes commands and responses for universal serial/Ethernet communication.

23

UNIVERSAL SERIAL/ETHERNET COMMUNICATION

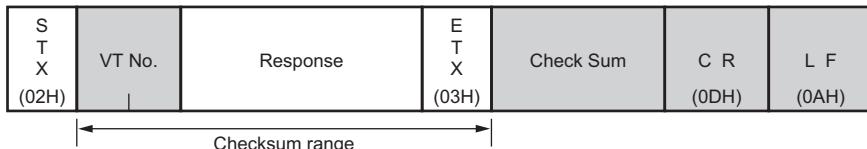
Universal ASCII Mode

■ Command format

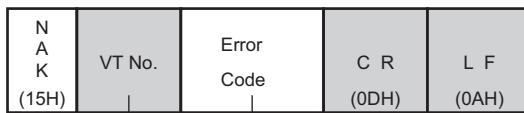


■ Response format

(Normal response)



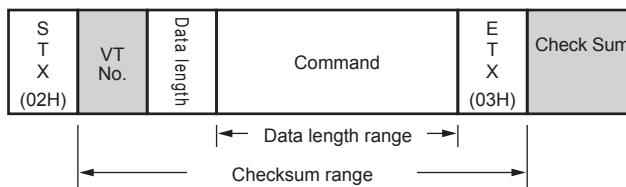
(Abnormal answer)



- [] may be set as Yes or No according to communication condition.
- English letter expression is ASCII code in upper case.
- VT No. is set via decimal ASCII expression.
(Example) In case of VT No.10, set to "1", "0" (31H, 30H).
- Checksum value is set via hexadecimal ASCII expression.
(Example) In case the value is 1AH, set to "1", "A" (31H, 41H).

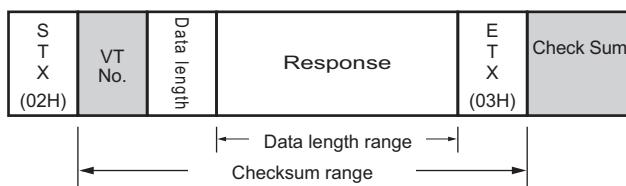
Universal Binary Mode

■ Command format

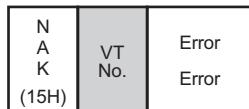


■ Response format

(Normal response)



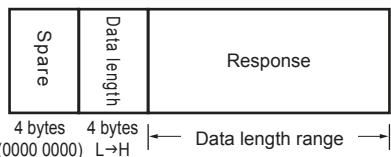
(Abnormal answer)



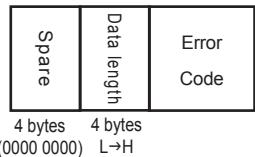
- [] may be set as Yes or No according to communication condition.
- English letter expression is ASCII code in upper case.

Universal Binary Mode(Ethernet)**■ Command format****■ Response format**

(Normal response)



(Abnormal answer)



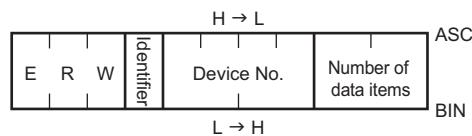
Point

English letter expression is ASCII code in upper case.

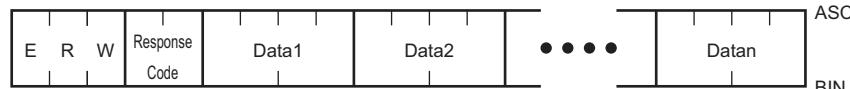
Identification Method of Command/Response

Identification method of command/response part in communication format is introduced as follows.

Command



Response



■ Identification method

Scale

Scale in the figure represents number of bytes.

Upper scale : universal ASCII mode (ASC)

Lower scale : universal binary mode•universal binary mode (Ethernet) (BIN)

Command name

Universal ASCII mode and universal binary mode•universal binary mode (Ethernet) use ASCII code for juxtaposition by means of every other 1 word.

Identifier

Universal ASCII mode and universal binary mode•universal binary mode (Ethernet) are expressed as ASCII code. Add when expansion command is used.

Device No.

Sending sequence of device No. part is as follows.

Universal ASCII mode : from upper bit, juxtapose via ASCII code by means of every other 1 word.

Universal binary mode : from lower bit, separate by means of 2 words as 1 byte, according to lower → upper sequence, use binary code for juxtaposition.

Universal binary mode (Ethernet) : from lower bit, separate by means of 2 words as 1 byte, according to lower → upper sequence, use binary code for juxtaposition.

Response code

Universal ASCII mode : ASCII code

Universal binary mode : binary code

Universal binary mode (Ethernet) : binary code

Data

Universal ASCII mode : from upper bit, juxtapose via ASCII code by means of every other 1 word.

Universal binary mode : from lower bit, separate by means of 2 words as 1 byte, according to lower → upper sequence, use binary code for juxtaposition.

Universal binary mode (Ethernet) : from lower bit, separate by means of 2 words as 1 byte, according to lower → upper sequence, use binary code for juxtaposition.

23-7 Command/Response Format

[Example] When reading 3 data from MW0100 using command ERW (word Reading)

MW0100 : 1234(HEX)
 MW0101 : 0100(HEX)
 MW0102 : 0001(HEX)

Universal ASCII mode

Command

E	R	W	M	0	1	0	0	0	3
45	52	57	4D	30	31	30	30	30	33 (HEX)

Response

E	R	W	0	0	1	2	3	4	0	1	0	0	0	1
45	52	57	30	30	31	32	33	34	30	31	30	30	30	31 (HEX)

Universal binary mode universal binary mode (Ethernet)

Command

E	R	W	M	00	01	03
45	52	57	4D	00	01	03 (HEX)

Response

E	R	W	00	34	12	00	01	01	00 (HEX)
45	52	57	00	34	12	00	01	01	00

Error Code

When the VT5/VT3 cannot process received commands, an error code is sent to the PC or other external devices.

Error code	Meaning	Cause	Remedy
00	Normal termination	-	-
01	Check sum error	Checksum error. Might due to inspection and calculation error or noise etc factors.	Please confirm Checksum calculation method. If the cause lies in noise etc, please send command again.
02	Format error	Command format error.	Please confirm command format firstly, then send again.
08	Parity error ^{*1}	The VT5/VT3 detected a parity error during reception of a command.	Might due to noise etc factors. Resend the command.
10	Overrun error ^{*1}	The VT5/VT3 received the next command during reception of the previous command.	VT5/VT3 needs more time for processing. Wait for the response from the VT5/VT3 before sending the next command.
20	Framing error ^{*1}	VT5/VT3 could not detect the stop bit during command reception.	Might due to noise etc factors. Resend the command.

^{*1} Sometimes will appear simultaneously.

Example) it changes into 28 when 20 and 08 appear simultaneously.

Inspection and Calculation Method

Perform binary addition for inspection and range data according to 1 byte unit, take lower 1 byte from the result.

In ASCII mode, take ASCII code value of 2 bytes as Checksum.

In binary mode, take binary value of 1 byte as Checksum.

Inspection and calculation range of command/response in universal ASCII mode

■ Command

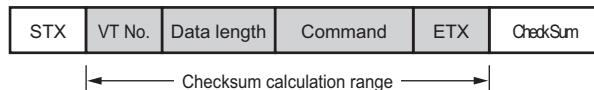


■ Response

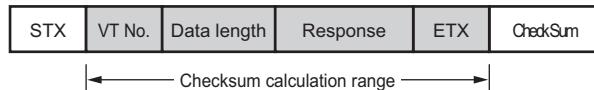


Inspection and calculation range of command/response in universal binary mode

■ Command



■ Response



[Example] Calculation of Checksum when send command "RB 00201H" to VT No.3

In ASCII mode

VT No.=03: "0"=48, "3"=51, command: R=82, B=66, "0"=48, "0"=48, "2"=50, "0"=48, "1"=49 ETX=3

Checksum =48+51+82+66+48+48+50+48+49+3=493 (1EDH)

As Checksum, convert lower 2 bits of 1EDH into "E"=69, "D"=68 of ASCII code, totally 2 bytes in this sequence.

In binary mode

VT No.=3, data length =4, command: R=82, B=66, 1, 2, ETX=3

Checksum =3+4+82+66+1+2+3=161 (=A1H)

As Checksum, use A1H by binary 1 byte.

23-8 Command/Response

This section describes communication commands and responses.

23

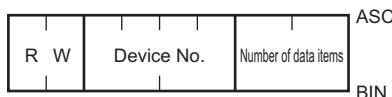
UNIVERSAL SERIAL/ETHERNET COMMUNICATION

Standard Command and Expansion Command

■ Standard command

- The so-called standard command refers to upper compatible command of VT1 series.
- Use this command only for internal devices on the VT5/VT3. Link devices cannot be used.
- To Specify device, set via the value of device No.. It is not required to attach identification name (MB, MW).

Command



Response



Device No.*¹ : 0000 to 0FFF (hexadecimal)

Data number *¹ : 01 to 64 (decimal)

*1 Do not include RB, ERB, EWB.

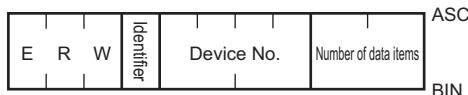


In universal binary mode (Ethernet), cannot use standard command.

■ Expansion command

- The so-called expansion command refers to the expansion of command to process link device on standard command.
- This command can be used on the VT5/VT3/VT2 Series.
- Device designation refers to designation via value of this device No. by selecting internal device (MB, MW) or Link device (LNB, LNW) through identifier (M, L). It is not required to attach identification name (MB, MW, LNB, LNW).
- Internal device and Link device (excluding ESE, EQE) cannot be processed simultaneously by one command.

Command



Response



Identifier : "M" internal device

: "L" Link device

Device No.*¹ : 0000 to 0FFF (internal device: hexadecimal)

0000 to 10FF (Link device: hexadecimal)

Data number *¹ : 01 to 64 (decimal)

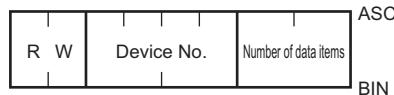
*1 RB, ERB, WB, EWB are not included.

Word Reading (RW/ERW)

Read device value in words.

■ Standard command

Command

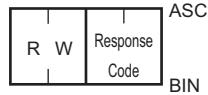


Response

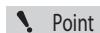
(Normal response)



(Abnormal response)



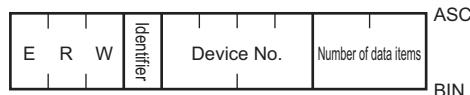
Response code : "00" normal
 "01" command format error
 "02" out of the range of Specifyd device No.



In universal binary mode (Ethernet), cannot use standard command.

■ Expansion command

Command

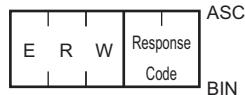


Response

(Normal response)



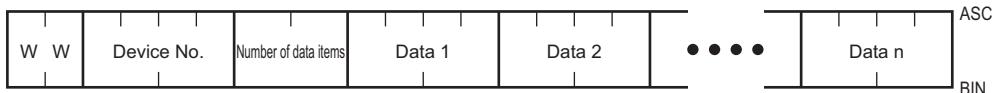
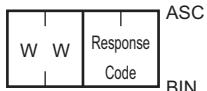
(Abnormal response)



Response code : "00" normal
 "01" command format error
 "02" out of the range of Specifyd device No.

Word Writing (WW/EWW)

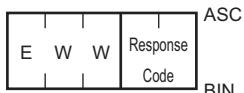
Write any value in the device in words.

■ Standard command**Command****Response**

Response code : "00" normal
 "01" command format error
 "02" out of the range of Specifyd device No.



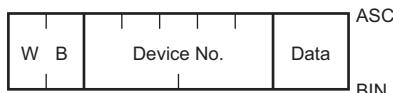
In universal binary mode (Ethernet), cannot use standard command.

■ Expansion command**Command****Response**

Response code : "00" normal
 "01" command format error
 "02" out of the range of Specifyd device No.

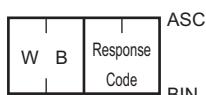
Bit Writing (WB/EWB)

Write "0", "1" in the device in bits.

■ Standard command**Command**

Device No. : 00000 to 0FFFF (hexadecimal)

Data : OFF=0, ON=1

Response

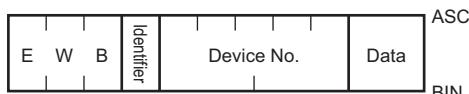
Response code : "00" normal

"01" command format error

"02" out of the range of Specifyd device No.



In universal binary mode (Ethernet), cannot use standard command.

■ Expansion command**Command**

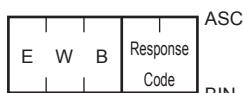
Identifier : "M" internal device

: "L" Link device

Device No. : 0000 to 0FFFF (internal device: hexadecimal)

: 00000 to 0FFFF (Link device: hexadecimal)

Data : OFF=0, ON=1

Response

Response code : "00" normal

"01" command format error

"02" out of the range of Specifyd device No.

Event Monitor Device Register (SE/ESE)

Set devices to register event monitor. 64 pieces may be registered at the most.

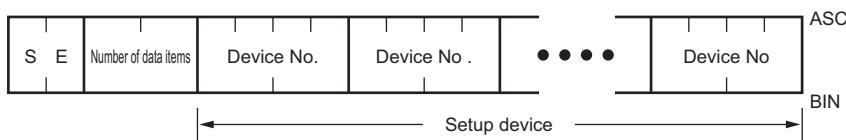
"About Event Monitor", page 23-43



After register, when execute re-register, previously registered device No. is overwritten, and changed to ineffective. After change, device data left in buffer area are also deleted. It will be overwritten in all cases when standard command is used on standard command, expansion command is used on expansion command or standard command and expansion command are used simultaneously etc.

■ Standard command

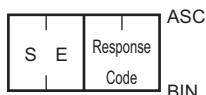
Command



Device No. : 0000 to 0FFF (hexadecimal)

Data number : 01 to 64 (decimal) 00: cancel

Response



Response code : "00" normal

"01" command format error

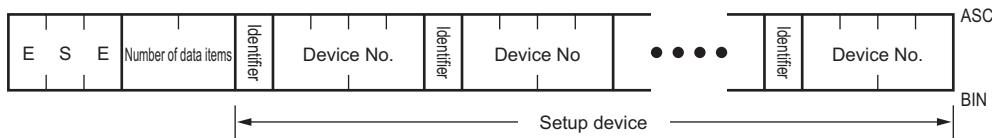
"02" out of the range of Specified device No.



In universal binary mode (Ethernet), cannot use standard command.

■ Expansion command

Command

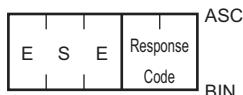


Device No. : 0000 to 0FFF (internal device: hexadecimal)

: 0000 to 10FF (Link device: hexadecimal)

Data number : 01 to 64 (decimal) 00: cancel

Response



Response code : "00" normal

"01" command format error

"02" out of the range of Specified device No.

Event Monitor Interruption Enabled/Disabled (SI)

Event monitoring interrupt enable is a function where an external device need not execute an event monitoring query (QE). Instead, the VT5/VT3 will notify a device that has been registered for event monitoring (SE) of a data change. Initial state is disabled.

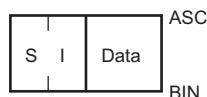
"About Event Monitor", page 23-43



- SI cannot be used in RS-485 communication.
- With respect to standard command (SE) and expansion command (ESE) for any event monitor register, SI is effective.

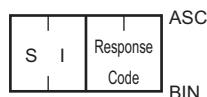
■ Standard command expansion command

Command



Data : interruption enabled =1, interruption disabled=0

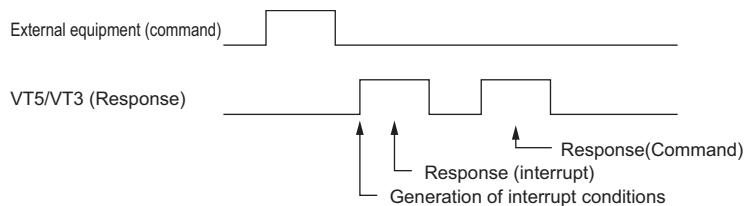
Response



Response code : "00" normal
 "01" command format error
 "03" already set.

■ Interrupt timing

When an external device sends a command and the VT5/VT3 are in interrupt enable state, they will not immediately respond to this command if an interrupt occurs before they have time to respond to the command. Instead, they will first process the interrupt before responding to the command.



- To use interruption, please program external equipment, so that interruption response may be detected when receiving response of ordinary command.
- Please send new command for interruption response after receiving response of previously sent ordinary command.

Event Monitor Inquiry (QE/EQE)

When a data change occurs in a device that has been registered as an event monitoring device, the VT5/VT3 saves the device No. and the data in an internal buffer. This data can later be read by sending a QE. The VT5/VT3 buffer has a capacity of 48 words.

In event monitoring interrupt enable, an external device need not send an event monitoring query (QE). The VT5/VT3 will notify the external device when a device change occurs.

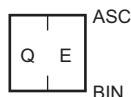
 "About Event Monitor", page 23-43



For event monitor register and event monitor inquiry, please comply with standard command, expansion command. It is not enabled to firstly register via standard command, then inquire via expansion command, or firstly use expansion command to register, then inquire via standard command.

■ Standard command

Command

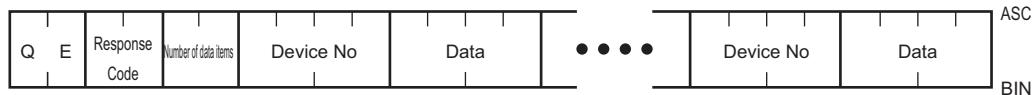


ASC

BIN

Response

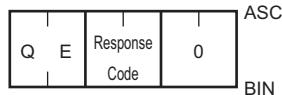
(Normal response)



ASC

BIN

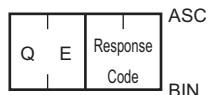
(Normal response when data No. is 0)



ASC

BIN

(Abnormal response)



ASC

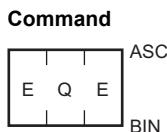
BIN

- | | | |
|---------------|---|--|
| Response code | : | "00" normal |
| | : | "01" command format |
| | : | "04" setting of event monitor device (SE) is not done. |



- Please send QE according to the period of FIFO buffer memory without overflow.
- When buffer memory overflows, data will be deleted in turn from old ones.
- In universal binary mode (Ethernet), cannot use standard command.

■ Expansion command

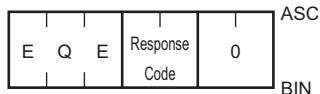


Response

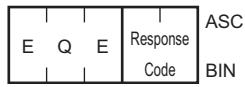
(Normal response)



(Normal response when data No. is 0)



(Abnormal response)



Response code : "00"normal
 "01"command format error
 "04"event monitor device register (EQE) is not done.



Please send EQE according to the period of FIFO buffer memory without overflow.
 When buffer memory overflows, data will be deleted in turn from old ones.

About Event Monitor

■ What is event monitor

In event monitoring, internal devices and link devices in the VT5/VT3 are pre-registered (SE/ESE) from an external device.

The VT5/VT3 have a 48-word buffer that will temporarily store the device No. and the data when there is a change in registered devices.

By sending an event monitoring query (QE/EQE) to the VT5/VT3, the VT5/VT3 will send the device No. and data stored in the buffer as a response to the external device.

For sequence of sent data, the data will be sent in turn from those change earliest.

By setting event monitoring interrupt enable (SI), an external device need not send a query as the VT5/VT3 will notify it when a device change occurs. Devices etc that are operated, modified via touch switch may be understood immediately via external equipment.

■ Precautions of event monitor

Maximum quantity of event monitor device register is 64.

When the VT5/VT3 have sent notification, the buffer is cleared.

When the VT5/VT3 buffer capacity of 48 words is exceeded, a buffer overrun occurs causing data to be cleared starting from the oldest data item.

To save event monitor device register, previously registered device No. and the data will disappear completely.

After registering the event monitor device, if the power is turned off, the system mode is switched, image data is transmitted, or the remote COM ports are executed, the previously registered device No. and the data will disappear completely.

23-9 ASCII Code Table

This section describes ASCII code table.

23

UNIVERSAL SERIAL/ETHERNET COMMUNICATION

Hex	Upper 4 bits															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Bin	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	N _U _L	D _L _E	(SP)	0	@	P	`	p			一	夕	ミ		
1	0001	S _O _H	D _C ₁	!	1	A	Q	a	q	.		ア	チ	ム		
2	0010	S _T _X	D _C ₂	"	2	B	R	b	r			「	イ	ツ	メ	
3	0011	E _T _X	D _C ₃	#	3	C	S	c	s			」	ウ	テ	モ	
4	0100	E _O _T	D _C ₄	\$	4	D	T	d	t			、	エ	ト	ヤ	
5	0101	E _N _Q	N _A _K	%	5	E	U	e	u			・	オ	ナ	ユ	
6	0110	A _C _K	S _Y _N	&	6	F	V	f	v			ヲ	カ	ニ	ヨ	
7	0111	B _E _L	E _T _B	,	7	G	W	g	w			ア	キ	ヌ	ラ	
8	1000	B _S	C _A _N	(8	H	X	h	x			イ	ク	ネ	リ	
9	1001	H _T	E _M)	9	I	Y	i	y			ウ	ケ	ノ	ル	
A	1010	L _F	S _U _B	*	:	J	Z	j	z			エ	コ	ハ	レ	
B	1011	V _T	E _S _C	+	;	K	[k	{			オ	サ	ヒ	□	
C	1100	F _F	→	,	<	L	¥	l				ヤ	シ	フ	ワ	
D	1101	C _R	←	—	=	M]	m	}			ユ	ス	ヘ	ン	
E	1110	S _O	↑	.	>	N	^	n	—			ヨ	セ	ホ	゛	
F	1111	S _I	↓	/	?	O	—	o				ツ	ソ	マ	°	

: Not displayed on the VT5/VT3 units.

This section describes communication errors occurring in VT5/VT3 Series and universal serial/Ethernet connections.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
PLC Error [**]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error / Unit Time Out Error	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An overrun occurred in the VT5/VT3 receive buffer,	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

Display message	Causes	How to handle
Communication error [link]	This is an Ethernet unit link error.	Check whether connecting cables have been correctly connected. Make sure that LINK LEDs on the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC are on.
PLC communication error	Multiple communication errors have occurred.	Refer to the remedies for the communication errors listed above.

- * • "++" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

MODBUS PROTOCOL

This chapter describes connections of thermoregulators and other devices that use the MODBUS protocol to the VT5/VT3 Series/Soft-VT.



Point

- Not supported on the DT series.
- MODBUS/TCP (Ethernet) is not supported by VT3-V7R/Q5M(W)/Q5M(W)A/W4T(A)/W4M(A)/W4G(A).
- Soft-VT does not support MODBUS RTU mode (1:1) and RTU mode (1:N).

24-1	What is MODBUS Protocol	24-2
24-2	Wiring Diagrams and Communication Settings in MODBUS RTU Mode	24-3
24-3	MODBUS/TCP System Configuration and Communications Settings	24-8
24-4	MODBUS/TCP Communication Settings	24-9
24-5	Device	24-16
24-6	Special Setup	24-17
24-7	Error Messages and Troubleshooting	24-20

24-1 What is MODBUS Protocol

This section describes the communication settings and steps to connect thermoregulators, PLCs and other equipment to the VT5/VT3 using the MODBUS protocol.

What is MODBUS

MODBUS, as a communication protocol, is the networks in which the MODBUS protocol is implemented.

The MODBUS protocol is a PLC communication protocol developed by Modicon Inc.(AEG Schneider Automation International S.A.S.)

MODBUS, as an open protocol, is easy to use. That is why it is widely used in FA(Factory Automation) and PA(Process Automation) to name a few. In addition, what is different from other fieldbus standards (CC-Link and DeviceNet, etc.) is that it needs no authorization and certification.

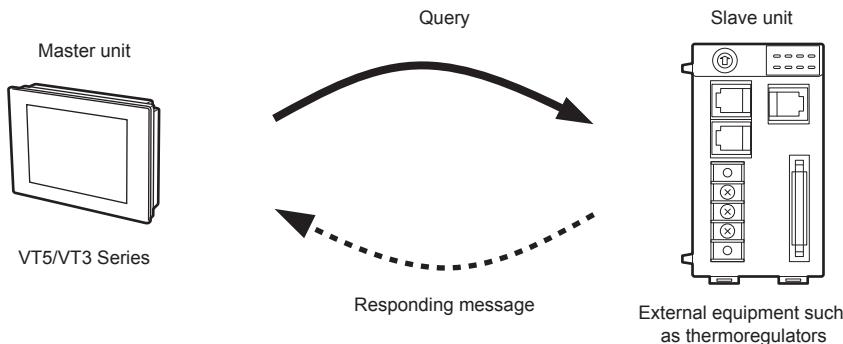
So please check to ensure it can be used for your connections.

About the Communication Method

The communication method of the MODBUS protocol uses the single master/multiple slaves method. Only the master can pose a query (start the communication).

The slave, after receiving this query, executes the specifying function to return the responding messages.

The VT5/VT3 Series supports MODBUS RTU (1:1), MODBUS RTU (1:N) and MODBUS/TCP (Ethernet).



Point

- MODBUS/TCP (Ethernet) is not supported by VT3-V7R/Q5M(W)/Q5M(W)A/W4T(A)/W4M(A)/W4G(A).
- Soft-VT does not support MODBUS RTU mode (1:1) and RTU mode (1:N).
- The VT5/VT3 Series can only be used as the master since it does not have a slave function.

24-2 Wiring Diagrams and Communication Settings in MODBUS RTU Mode

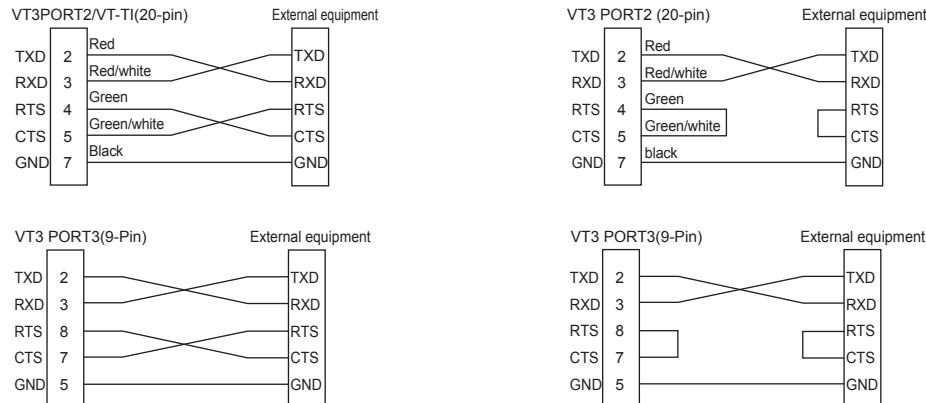
This section describes wiring examples and communication settings for MODBUS RTU mode communication.



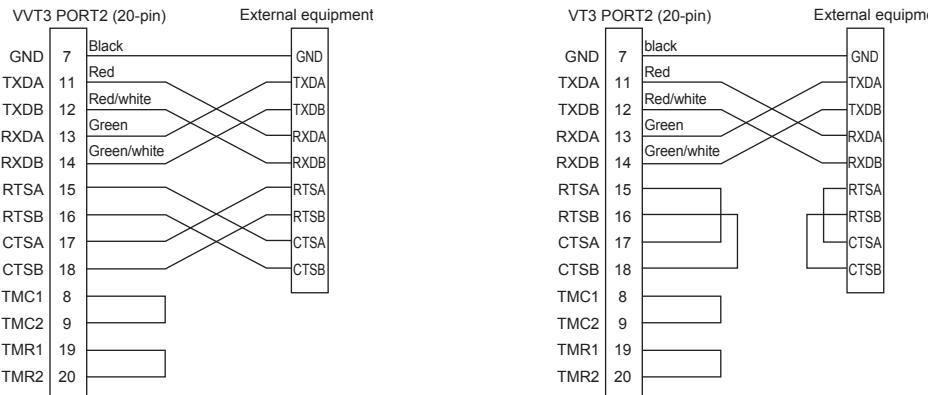
These wiring diagrams are only used as the exemplary purpose. Wiring methods may vary depending on the connected units. Ensure to check before you use them.

Connection to VT3 series

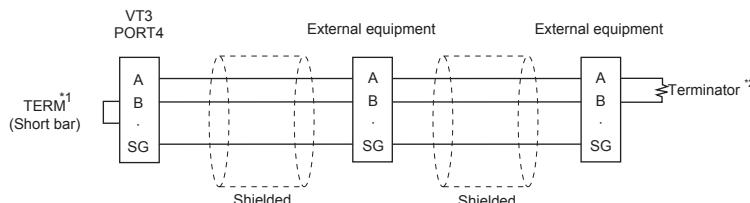
■ RS-232C (OP-24027)



■ RS-422A (OP-24028)



■ RS-485



*1 When VT3 is on either end of the communication line, connect the short bar to PORT4, and turn the terminator to ON.

*2 Please install termination resistors based on the requirements of the external equipments.

*3 For VT-T1 the terminal name is G.

24-2 Wiring Diagrams and Communication Settings in MODBUS RTU Mode

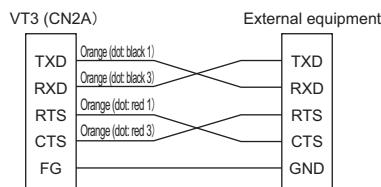
Connection With VT3 Handy Series



- FG2 must be grounded.
- See the "connection with VT3 Series" when VT-T1 is used.

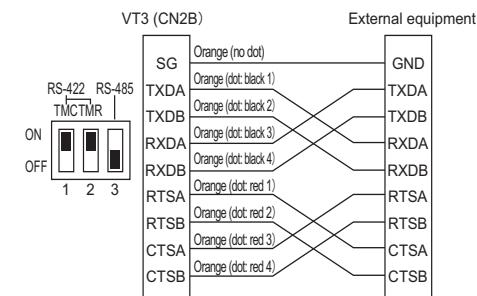
■ RS-232C

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



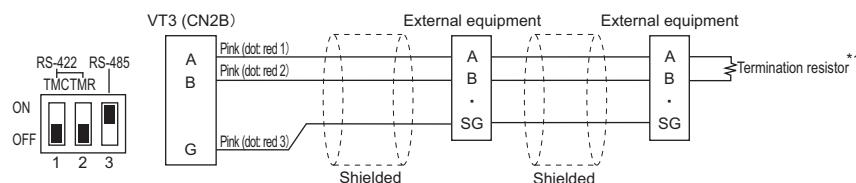
■ RS-422A

OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m
OP-87191: 3m, OP-87192: 5m,
OP-87193: 10m



■ RS-485

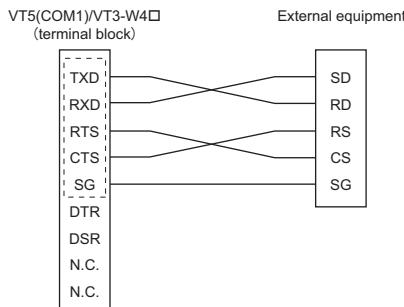
OP-87185: 3m, OP-87186: 5m,
OP-87187: 10m



*1 Install the terminator as indicated by peripherals.

Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

■ RS-232C

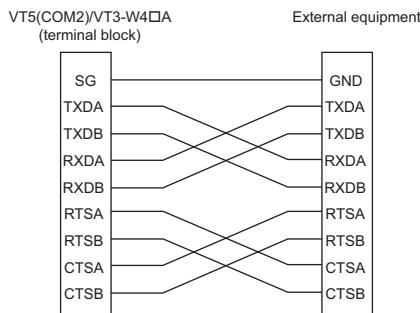


* [---] indicates a terminal diagram for the VT5 Series.

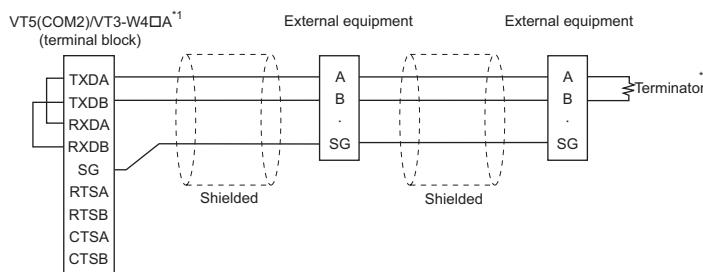
Connection to VT5 Series (COM2), VT3-W4□A (RS-422A/485)

- Point The VT5-W07M does not support RS-422/485 connections.

■ RS-422A



■ RS-485



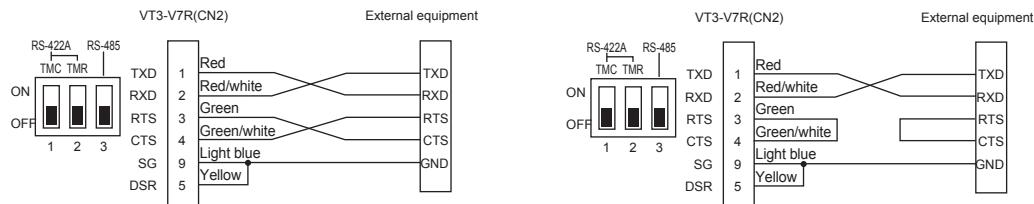
*1 When the VT5/VT3 Series are at the end of the communication line, set the terminator switch (TERM.) to "ON".

*2 Install the terminator as indicated by peripherals.

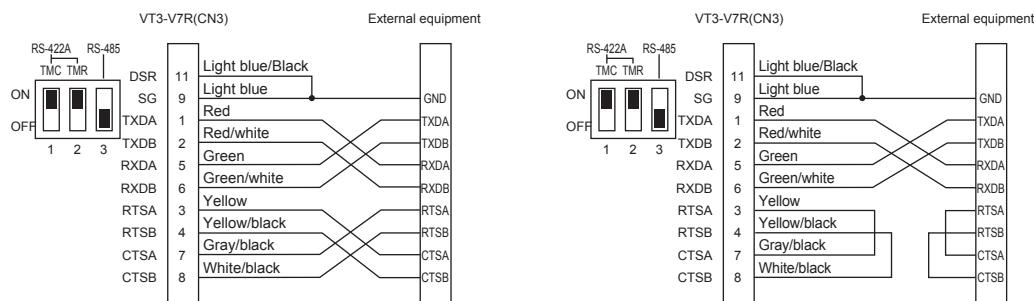
24-2 Wiring Diagrams and Communication Settings in MODBUS RTU Mode

Connection to VT3-V7R

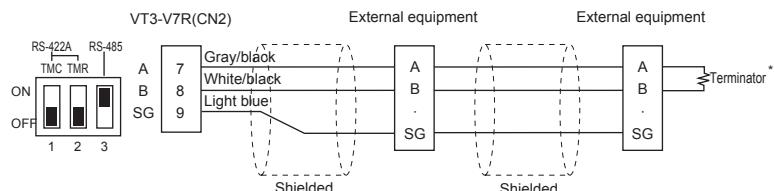
■ RS-232C (VT-C5R1)



■ RS-422A (VT-C5R2/C15R2)



■ RS-485(VT-C5R1)



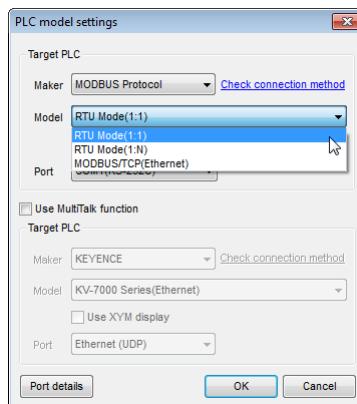
*1 Please install termination resistors based on the requirements of the external equipments.

24-2 Wiring Diagrams and Communication Settings in MODBUS RTU Mode

Setting Up MODBUS RTU Mode

Set up the target PLC with VT STUDIO.

Select "Maker MODBUS Protocol", "Model: RTU Mode(1:1) or RTU Mode(1:N)"



Communication Conditions Setting Ranges and Defaults

The settable communication conditions for the MODBUS RTU mode are as follows.

Please make your settings based on your communication requirements.

■ RTU Mode (1:1)

Item	Setting Range	Default
PLC I/F ¹	RS-232C, RS-422A ³	RS-232C
Communication protocols	MODBUS	MODBUS
Transmission mode	RTU Mode ²	RTU Mode
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	19200 bit/s
Data length	8 bits	8 bits
Stop Bits	1 bit/ 2 bits	1 bits
Parity	None, odd, even	Even

*1 Please set to RS-232C in VT3-W4T/W4M/W4G, please set to RS-422A in VT3-W4TA/W4MA/W4GA.

*2 The transmission mode cannot select "ASCII Mode".

*3 The VT5-W07M does not support RS-422A connections.

■ RTU mode(1:N)

Item	Setting Range	Default
PLC I/F ¹	RS-232C ² , RS-485 ⁴	RS-485
Communication protocols	MODBUS	MODBUS
Transmission mode	RTU mode ³	RTU Mode
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bit/s	19200 bit/s
Data length	8 bits	8 bits
Stop Bits	1 bit/ 2 bits	1 bits
Parity	None, odd, even	Even

*1 Set the VT3-W4TA/W4MA/W4GA to RS-485.

*2 • When RS-232C is selected, please ensure to use the I/F level converter (N-48).
• The VT5 Series does not support connections that use interface level converters (N-48).
• When RS-232C is selected, please ensure to use the I/F level converter (N-48). If I/F level converter (N-48) is not used, special settings need to be made.
 □ "Special Setup", page 24-17

*3 The transmission mode cannot select "ASCII Mode".

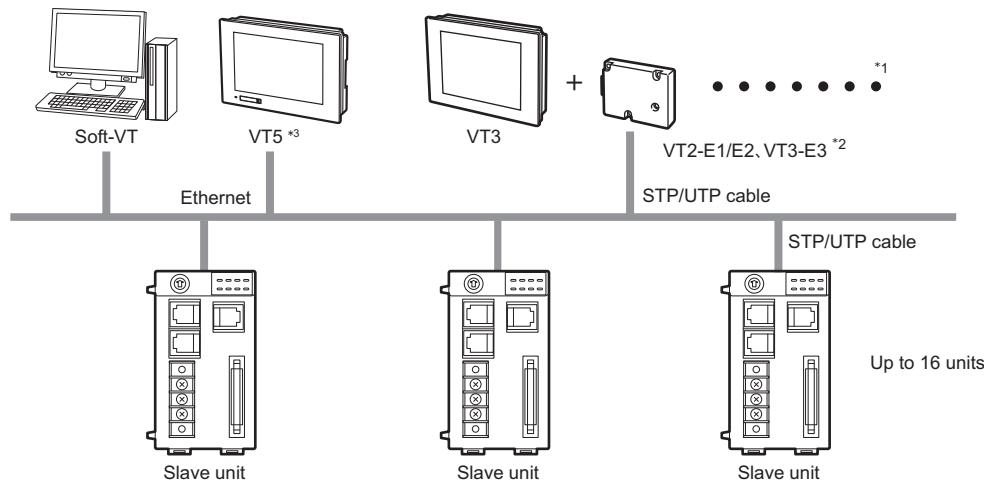
*4 The VT5-W07M does not support RS-485 connections.

24-3 MODBUS/TCP System Configuration and Communications Settings

This section describes the system configuration and communication settings when connecting the VT5/VT3 and MODBUS slave devices via MODBUS/TCP (Ethernet).

System Configuration

This section describes the system configuration of the VT5/VT3 Series and MODBUS slave units.



*1 Please note that with the increase in the number of VT5 and VT3 Series, Soft-VT units connected, the communications load also increases.

*2 VT3 handy Series has built-in Ethernet function, so VT2-E1/E2 and VT3-E3 are not required.

*3 The VT5 Series has a built-in Ethernet function and does not require the VT2-E1/E2 and VT3-E3.

Point

- MODBUS/TCP (Ethernet) connection cannot be used together with multi-link/VT2 multi-link.
- A MODBUS/TCP (Ethernet) connection supports the VT5/VT3 Series (excluding the VT3-Q5M(W)/Q5M(W)A, VT3-W4T(A)/W4M(A)/W4G(A) and VT3-V7R) and Soft-VT.
- When the MultiTalk function is used, MODBUS/TCP (Ethernet) connection cannot be selected for both PLC_A and PLC_B. When multiple PLC units are connected via an Ethernet connection, please specify the station No. before use.
- Use a MODBUS slave unit with the unit ID fixed at 1. When an ID other than 1 is required, use the special settings to change the unit ID of the VT5/VT3 Series, or use the MODBUS slave device after disabling the unit ID.
- When the serial number of the VT3-E3 ends in A or later, the VT3 system program must be in Ver. 4.51 or later to enable connection to the VT3 Series.

Communication Specifications

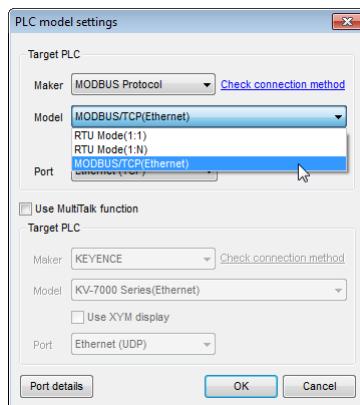
The following table summarizes the communications cable and communication speed in detail.

Item	10Base-T	100Base-TX
Compliant standard	IEEE802.3	
Baud rate	10Mbps	100Mbps
Transmission medium	STP or UTP cable, Category 3 or higher	
Max. cable length	100m (when VT-T1 is used: 90m)	
Max. number of hub connections	4 units	
Transmission protocol	TCP/IP	
Number of connectable PLCs	Max. 16 units	
User ID	1 to 247 (Default: 1)	

24-4 MODBUS/TCP Communication Settings

Settings for the MODBUS/TCP (Ethernet)

Select "Maker MODBUS Protocol", "Model: MODBUS/TCP (Ethernet)".

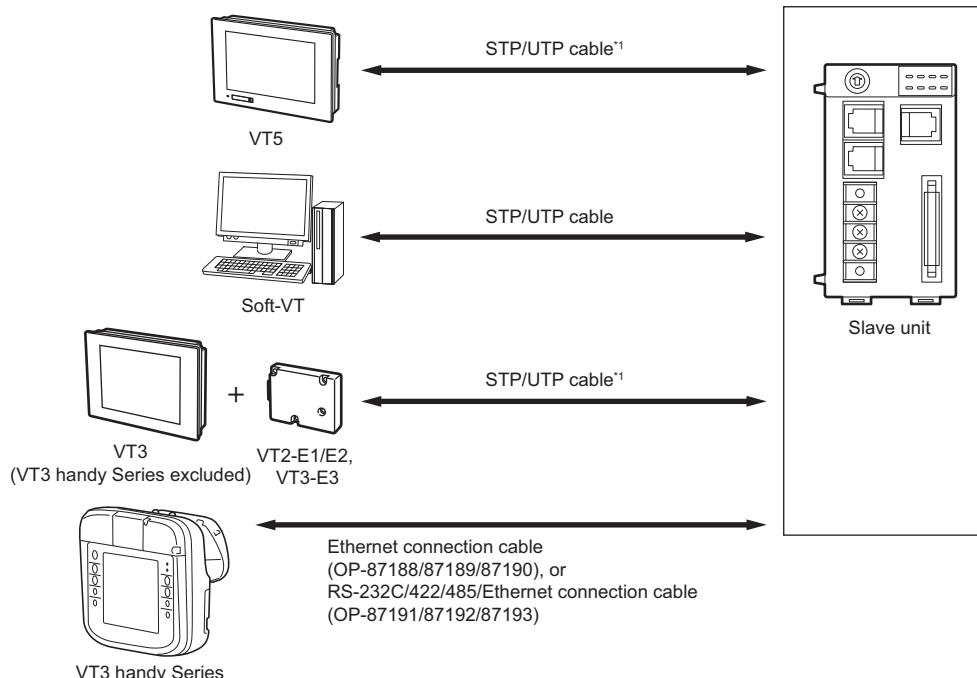


Connection Methods

The following describes the cables used for the Ethernet connection for each of the connection types.

■ Direct connection (1:1)

Use STP/UTP cable for connection.



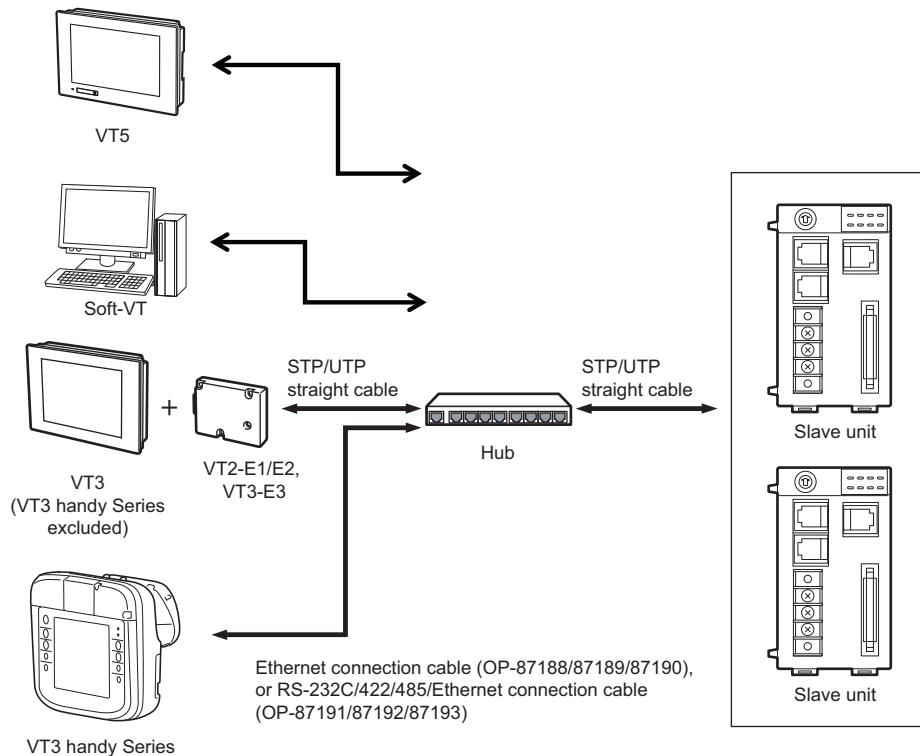
*1 The VT5 Series and VT3-E3 whose serial numbers end in an "A", support the MDI/MDI-X auto switching function. To connect any other device directly to a PLC, use an STP/UTP cross cable.



- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable

24-4 MODBUS/TCP Communication Settings

■ Connection using a hub (multiple connections)



VT3 handy Series

Connection of VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series to a hub

- Use the STP/UTP straight cable.
- The VT5, VT2-E1/E2, VT3-E3 and VT3 handy Series, Soft-VT should be connected to a port other than the cascade port on a hub.

Connection of Hub with the MODBUS slave device

- Use the STP/UTP straight cable.
- Do not connect the MODBUS slave device to the cascade port on the hub.

Point

- When building an Ethernet connection with 10 Base-T, use a Category 3 or higher STP/UTP cable.
- When building an Ethernet connection with 100 Base-TX, use a Category 5 or higher STP/UTP cable.

Ethernet connection methods

This section describes how to connect the VT5/VT3 Series, Soft-VT to a PLC via Ethernet.

■ Checks to perform before making setting

For the MODBUS/TCP (Ethernet) connection, the IP address and port No. of the connected units should be determined in advance.

The following table shows the setting items corresponding to the connection type. Check these settings with your system administrator.

Connection mode	Setting Item
Direct connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication
Other connection	<ul style="list-style-type: none"> • IP address assigned to VT5/VT3/Soft-VT (PC) • IP address to be assigned to PLC • Port No. for communication • Subnet Mask • Default Gateway



Make sure that "IP address assigned to VT5/VT3/Soft-VT (PC)" differs from "the IP address assigned to the PLC".

■ Required Settings for Ethernet Connections

The following settings must be made when connecting the VT5/VT3 Series and Soft-VT to Ethernet.

● VT5 Series/Soft-VT

Required settings	Description	
VT5/Soft-VT Ethernet Settings	VT5 Series: Set the IP address, port number and other settings to be assigned to the VT5. In "Ethernet/Language," select "System settings" → "VT individual settings" in "Ethernet/Language" in VT STUDIO. ^{*1}	P.24-12
	Soft-VT: Set the IP address assigned to the PC that Soft-VT is running on. Use "Control Panel" → "Network and Sharing Center" in Windows to make this setting.	-
Setting Communication Conditions with PLC	Set the IP address, port number and other settings of the connected PLC. In "PLC Communication Conditions," select "System settings" → "Peripheral equipment connection" in VT STUDIO. ^{*2}	P.24-13
PLC Ethernet Settings	Make Ethernet settings on the PLC to connect it to the VT5 Series/Soft-VT. Set communication conditions on the device that will be connected.	-

*1 Select "VT Individual Settings" → "Ethernet settings" in VT5 system mode to confirm and change settings.

*2 You can also use "PLC Communication Conditions" in VT5 system mode to confirm and change settings.

● VT3 Series

Required settings	Description	
VT3 Ethernet settings	Set the IP address, port number and other settings to be assigned to the VT3. Use the "Option settings" in VT3 system mode.	P.24-14
Setting communication conditions with PLC	Set the IP address, port number and other settings of the connected PLC. Select "System settings" → "VT system settings" in "PLC Communication Conditions" in VT STUDIO. ^{*1}	P.24-15
PLC Ethernet settings	Make Ethernet settings on the PLC to connect it to the VT3 Series. Set communication conditions on the device that will be connected.	-

*1 Use "PLC Comm. Setup" in VT3 system mode to confirm and change settings.

24-4 MODBUS/TCP Communication Settings

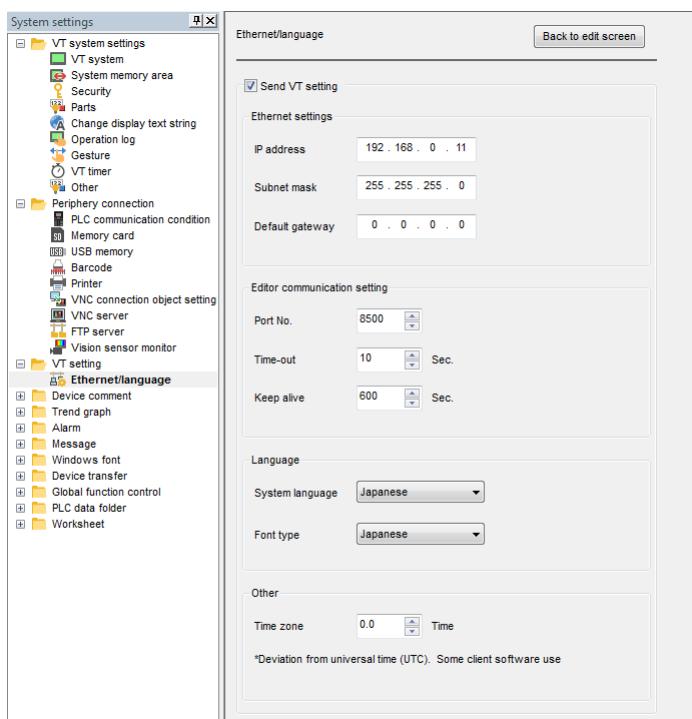
■ Making Ethernet settings for the VT5 Series

Use the following steps to make Ethernet settings for the VT5 Series.

1 Use VT STUDIO to set the IP address and other settings to be assigned to the VT5.

In VT STUDIO, select [Resource (R)]→[VT setting (J)]→[Ethernet/language (E)] and make the following settings.

"12-6 VT setting", VT5 Series Reference Manual



Item	Description
Send VT setting	When checked, the VT settings are sent to the VT5.
Ethernet settings	IP Address Set the IP address to be assigned to the VT5.
	Subnet mask Use the default settings to make a direct connection. For all other connections, set a subnet mask whose operation you have verified.
	Default gateway Use the default settings to make a direct connection. For all other connections, set a default gateway whose operation you have verified.
Editor communication settings	Port number If required, set a port number for communications with VT STUDIO and other PC applications. Be sure to set a port number that is not also used for PLC communications.
	Keep Alive Set as necessary.
	Timeout Set as necessary.



- You can use VT5 system mode to check and change Ethernet settings such as IP addresses to be assigned to the VT5 Series.
- The setting items are the same as those in VT STUDIO.
- "5-3 VT Machine Setup", VT5 Series Hardware Manual
- These settings are not required for Soft-VT since it uses the Ethernet settings of the PC it runs on.



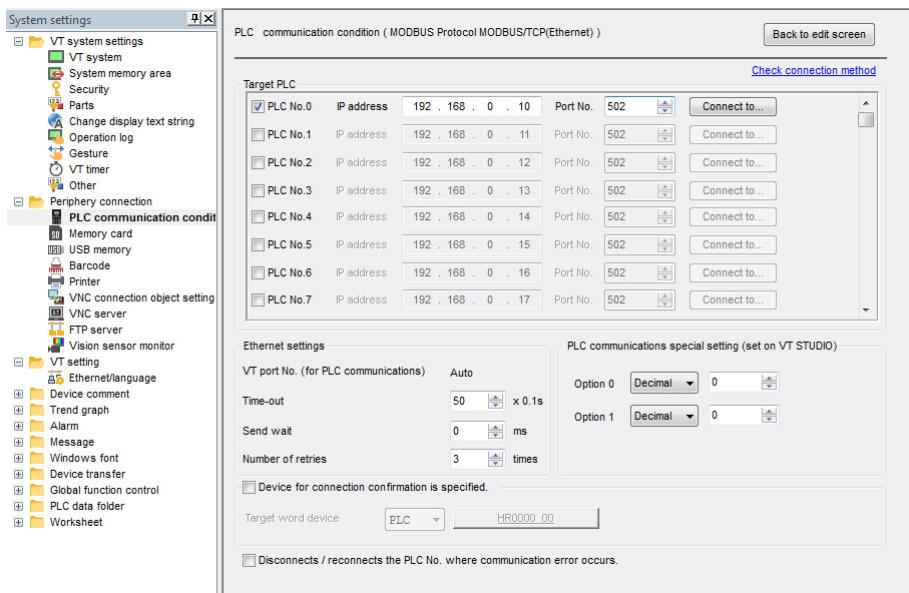
In the VT3 Series, IP addresses to be assigned to the VT3 were set only in the system mode screen.
In the VT5 Series, they are set in the "VT setting" in VT STUDIO.

24-4 MODBUS/TCP Communication Settings

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[Periphery connection]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connections", VT5 Series Reference Manual



Item		Description
Target PLC	Station No. ^{*1}	Select the station number (0 to 15) you want to use.
	IP Address ^{*2}	Set the IP address to be assigned to the connected PLC (the checked station number).
	Port number ^{*3}	Set the port number (1 to 65535, default value: 502) of the connected PLC (the checked station number).
	List of connected targets	Select connected targets from the list of connected targets or add targets to the list.
Ethernet settings	VT port numbers (for PLC communications)	This does not need to be set. The VT5 Series/Soft-VT automatically sets VT port numbers (for PLC communications).
	Timeout	Normally, this does not need to be set. Set a long timeout when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long send wait when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		The MODBUS protocol settings can be changed. 24-6 "Special Setup"
Specify a device to troubleshoot Ethernet connections	Target word device ^{*4}	In an interval with no communications, select a device to check connections. Normally, this does not need to be set.
Disconnects / reconnects the PLC No. where communication error occurs ^{*5}		When checked, communications with a station number causing a communication error are shut down. A station number that has been shut down is regularly monitored and communications are resumed when the station recovers.

*1 Set this station No. to identify multiple PLCs on the VT5 Series, Soft-VT. It is not the same as the MODBUS slave unit ID.

*2 Be sure to set unique IP addresses for each device in the same LAN.

IP addresses are expressed as XXX.XXX.XXX.XXX (XXX indicates a number in the range 0 to 255).

*3 Take care not to use a port number already used by another device.

*4 Select "PLC device".

"6-7 Device Setup", VT5 Series Reference Manual

*5 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT5 system mode to check and change PLC Communication Condition settings.

The setting items are the same as those in VT STUDIO.

"5-5 PLC Communication Setup", VT5 Series Hardware Manual

24-4 MODBUS/TCP Communication Settings

■ VT3 Series Ethernet connection settings

Use the following steps to make Ethernet settings for the VT3 Series.

24

1 Use the VT3 system mode to set an IP address or make other settings to be assigned to the VT3.

Set at "Option Setup" in the System mode on the VT3 unit.

"Chapter 5 SYSTEM MODE", VT3 Series Reference Manual

Ethernet Setup (1/3)				OK	Cancel
Baud rate	100/10 Mbps Auto			Next page	
IP Address	192	168	1	10	
Subnet Mask	255	255	255	0	
Default Gateway	0	0	0	0	
MAC address	**.**:**.**:**.**:**				
				OK	Cancel
				Next page	

Ethernet Setup (2/3)				OK	Cancel
Port No.	8500				
Time-out	10			s	
Keep alive	600			s	
				OK	Cancel
				Next page	

Ethernet Setup (3/3)				OK	Cancel
FTP Setup	Enable	Password	Next page		
Routing setup					
No.0 (Disabled)	Setup				
No.1 (Disabled)	Setup				
No.2 (Disabled)	Setup				
No.3 (Disabled)	Setup				

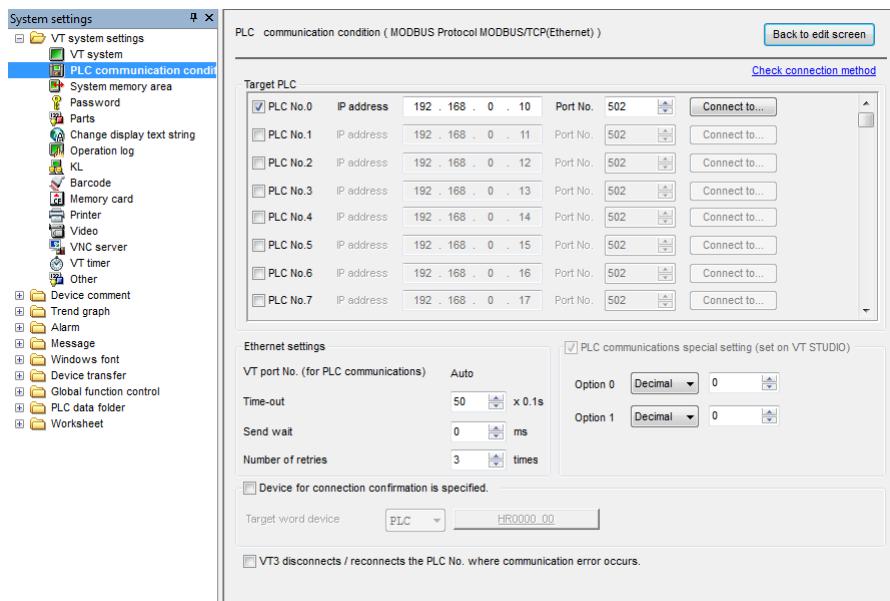
Item	Description
Baud rate	Normally, select "100/10M bps Auto". Selects "10 Mbps" only when communications is unstable.
IP Address	Sets the IP address to be assigned to the VT3.
Subnet Mask	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged subnet mask for other connections.
Default Gateway	Use the default setting as it is in the case of a direct connection. Sets a pre-acknowledged default gateway for other connections.
MAC address	This is the ID No. unique to VT3 Series. This cannot be set.
Port no.	Please set the port No. for communicating with a PC application such as VT STUDIO as required. Duplication with the PLC communication port No. must be avoided.
Time-out	Set as necessary.
Keep Alive	Set as necessary.
FTP Setup	Set as necessary.
Routing Setup*	Selects "Enable" only when using a router.

*1 "Chapter 8 ETHERNET", VT3 Series Reference Manual

2 Use VT STUDIO to set communication conditions with PLC.

In VT STUDIO, select [Resource (R)]→[VT System Settings (S)]→[PLC Communication Conditions (C)] and make the following settings.

"Chapter 17 Ethernet Connection", VT3 Series Reference Manual



Item		Description
Target PLC	PLC No. ¹	Selects the PLC No. (0 to 15) to be used.
	IP address ²	Sets the IP address to be assigned to the connection destination PLC (marked PLC No.).
	Port No. ³	Sets the port No. (1 to 65535 Default: 502) of the connection destination PLC (marked PLC No.).
	Connect to	Selects the connection destination from the connection destination list file, or adds connection destinations.
Ethernet Settings	VT port No. (for PLC communications)	Does not need to be set. The VLC series automatically sets a VT port number (for PLC communication).
	Timeout	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Send Wait	Normally, this does not need to be set. Set a long time-out when the communications load on the network is large.
	Retry	Normally, this does not need to be set. Increase the number of retries when the unit is used in an environment with a lot of noise.
PLC communications special settings (set on VT STUDIO)		The MODBUS protocol settings can be changed. 24-6 "Special Setup".
Specify a device to troubleshoot Ethernet connections	Target word device ⁴	Used to set up a device that troubleshoots Ethernet connections. Normally no need to be set up
VT3 disconnects / reconnects the PLC No. where communication error occurs ⁵		Once selected, the communication with an erroneous station is cut off. And this number is regularly monitored and re-connected once the error is removed.

*1 The PLC No. is set to differentiate between several PLC on the VT3 Series side. It is not the same as the Modbus Slave unit ID.

*2 Be sure to set only unique IP addresses to each device within the same LAN.

IP addresses are expressed as XXX.XXX.XXXX.XXX (XXX is a number within the range 0 to 255).

*3 Take care not to use a port No. that is already in use.

*4 Select "PLC Devices"

"6-7 Set up the Devices", VT3 Series Reference Manual

*5 Can be set up when a PLC model supporting 1-to-N connection is selected.



You can use VT3 system mode to check and change PLC communication conditions.

The setting items are the same as those when setting on VT STUDIO.

"5-4 PLC Communication Condition", VT3 Series Hardware Manual

24-5 Device

The following describes used devices for the MODBUS protocol.



The devices that can be used in MODBUS RTU mode and MODBUS/TCP (Ethernet) are the same.

Available Devices

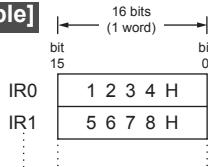
The following devices can be used by the MODBUS protocol.

Type	Device Name	Device Range	Attributes
Bit Devices	CB (Coil)	0000 to FFFF	R/W
	ISB (Input status)	0000 to FFFF	R
Word Device	CW (Coil) ^{*1}	0000 to FFFF	R/W
	ISW (Input status) ^{*1}	0000 to FFFF	R
	IR (Input Register)	0000 to FFFF	R
	HR(Hold register)	0000 to FFFF	R/W
	DHR (2-word hold register (interchangeable between the higher and lower levels)) ^{*2}	0000 to FFFE	R
	About the writing of the HR (hold register) and DHR(2 (2-word hold register (interchangeable between the higher and lower levels)) ^{*2}	0000 to FFFE	R/W

*1 The word devices of CW and ISW cannot be used by some models.

*2 32-bit devices. The 2 words are processed by the connected units in the order of "upper level word•lower level word".

[Example]



•When IR0 is used as the 2-word device:

IR0 displays "56781234H".

•When DIR0 is used as the 2-word device:

DIR0 displays "12345678H".



For more information, please refer to specific external equipment manuals.

■ Attributes

"R/W" : both read and write can be used.

"R" : Only reading can be used.

24-6 Special Setup

With the special setup, more general communication functions can be enabled through the MODBUS protocol.



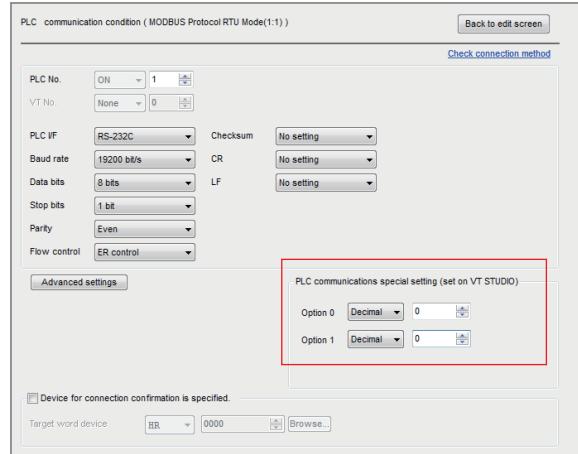
The special setup for MODBUS RTU mode and MODBUS/TCP (Ethernet) is the same.

Special Setup

24

MODBUS PROTOCOL

The special setup is made from the "PLC Communication Conditions" window of VT STUDIO



Item		Setting Range	Default
Option 0	Dec	0000 to 65535	0000
	Hex	0000 to FFFF	
Option 1	Dec	0000 to 65535	0000
	Hex	0000 to FFFF	

■ Initial State

Under the initial state, the special setup is "Option 0:0000, Option 1:0000"

This allows the master (VT5/VT3 Series/Soft-VT) to perform the following processes.

Item	Device	Processes performed by master (VT5/VT3/Soft-VT)
Read	CB (Coil)	Continuously read (continuous number=1)
	ISB (Input status)	Continuously read (continuous number=1)
	IR (Input Register)	Continuously read (continuous number=1)
	HR(Hold register)	Continuously read (continuous number=1)
	DIR (2-word input register (interchangeable between the higher and lower levels))	Continuously read (continuous number=1)
	DHR (2-word hold register (interchangeable between the higher and lower levels))	Continuously read (continuous number=1)
Write	CB (Coil)	Continuously write in whole (continuous number=1)
	HR(Hold register)	Continuously write in whole (continuous number=1)
	DHR(2-word hold register (interchangeable between the higher and lower levels))	Continuously write in whole (continuous number=1)

■ Writing of the CB (coil)

By selecting the "Option 0" from the special setup, the writing method of the CB and CW (coil) can be changed.

Option 0	Option 1	The writing method of CB (coil)	Details
0000H	----	Continuously write in whole	Please set the 16th bit in Option 0 to 0. Reference [0] 0000 0000 0000 0000(=0000H)
8000H	----	1 point write	Please set the 16th bit in Option 0 to 1. Reference [1] 0000 0000 0000 0000(=8000H)

This is set up when the connected slave unit doesn't support the Continuously Write in Whole method.

■ Writing of the HR (hold register) and DHR(2-word hold register (interchangeable between the higher and lower levels))

By selecting the "Option 0" from the special setup, the writing method of the HR (hold register) and DHR (2-word hold register(interchangeable between the higher and lower levels))can be changed.

Option 0	Option 1	HR•DHR Write methods	Details
0000H	----	Continuously write in whole	Please set the 15th bit in Option 0 to 0. Reference [0] 00 0000 0000 0000(=0000H)
4000H	----	1 point write*	Please set the 15th bit in Option 0 to 1. Reference [1] 00 0000 0000 0000(=4000H)

* Using the Continuously Write in Whole method, a command can be written every 2 words through DHR (2-word hold register (interchangeable between the higher and lower levels)).

This is set up when the connected slave unit doesn't support the Continuously Write in Whole method.

■ Continuous numbers written continuously in whole

By selecting the "Option 0" from the special setup, the continuous numbers written in whole of the CB (coil), HR (hold register), and DHR (2-word hold register (interchangeable between the higher and lower levels)) can be changed.

Option 0	Option 1	Written continuous numbers(CB,CW,H R)	Details
0000H to 003FH	----	1 to 63*	Set up the lower 6 bits (the 1st bit to 6th bit) in Option 0. Reference [0000 0000 00 000000] (=0000H) to [0000 0000 00 111111] (=003FH)

* The 1/2 of the continuous number that is set with the special setup (Option 0) is used as the DHR (2-word hold register (interchangeable between the higher and lower levels)) continuous number.
When an odd number is set up with the special setup (Option 0), the number that is left out the remainder is the continuous number.

- The set written continuous number is the general purpose setting in the CB (coil) and HR (hold register).
- When the 16th bit (or 15th bit) in Option 0 becomes 1 (1 point write setup), the written continuous number is invalid.(Example: 1100 0000 0011 1111(=C03FH))

■ Continuous numbers read continuously in whole

By selecting the "Option 1" from the special setup, the continuous numbers wholly read by all the devices can be changed.

Option 0	Option 1	Read continuous numbers (CB,ISB,IR,HR, DIR,DHR)	Details
---	0000H to 003FH	1 to 63*	Set up the lower-level 6 bits (the 1st bit to 6th bit) in Option 1. Reference 0000 0000 00 00 0000 (=0000H) to 0000 0000 00 11 1111 (=003FH)

- * The 1/2 of the continuous number that is set with the special setup (Option 1) is used as the DIR (2-word input register (interchangeable between the higher and lower levels)) and DHR (2-word hold register (interchangeable between the higher and lower levels)) read continuous number.
- When an odd number is set up with the special setup (Option 1), the number that is left out the remainder is the continuous number.

- Reference
- The set read continuous numbers are the general-purpose settings for all the devices.
 - When the device data length displayed on the VT5/VT3/Soft-VT is set to 2 words, data may be momentarily displayed incorrectly under the default settings. And this can be solved, if the targeted unit supports continuous read, by setting the read continuous number to 2 or above.

■ When the I/F level converters made by other companies are used (MODBUS RTU mode only)

When the RS-485 → RS-232C I/F level converters made by other companies are used, the following settings, depending on the specifications of the converters, should be made to the "Option 1" in the special setup.

● When the echoback converters are used

The following settings should be made in the special setup for the echoback converters.

Option 0	Option 1	Details	Precautions
---	0000H	Please set the 16th bit in Option 1 to 0. Reference <input checked="" type="checkbox"/> 000 0000 0000 0000 (=0000H)	When N-48 (made by KEYENCE) is used, please set Option 1 to "0000H".

- * Setting switch-based switching method

● When the non-echoback converters are used

The following settings should be made in the special setup for the non-echoback converters.

Option 0	Option 1	Details	Precautions
---	8000H	Please set the 16th bit in Option 1 to 1. Reference <input checked="" type="checkbox"/> 000 0000 0000 0000 (=8000H)	

■ Setting the Unit ID (Unit Identifier) (MODBUS/TCP (Ethernet) only)

The PLC Unit ID (Unit Identifier) value used for the communication protocol can be changed by selecting "Option 1" from the special setup. Set the Unit ID between 1 and 247 in the upper-level 8 bits in Option 1. If the value is invalid, it is automatically set to 1.

Option 0	Option 1	Unit ID	Details
---	0000H (default) to F700H	1 to 247	Set the upper-level 8 bits (the 8th bit to 15th bit) in Option 1. Reference <input checked="" type="checkbox"/> 0000 0000 0000 0000 (= 0000H) to 1111 0111 0000 0000 (= F700H) Default Unit ID (Unit Identifier) = 1



The default unit ID of the VT5/VT3 Series, Soft-VT is set to 1. To use the VT5/VT3 Series, Soft-VT in the default settings, fix the unit ID of the MODBUS slave device to 1, or use the MODBUS slave unit after disabling the unit ID.

24-7 Error Messages and Troubleshooting

List of Communication Errors in MODBUS RTU Mode

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
Error[**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of PLC	For the error code[**], see "Connected PLC maker User's Manual".
Time Out Error(++)	Cable is not connected with PLC correctly.	Please check again whether the cable is connected correctly.
	Power of the PLC is OFF.	Turn the PLC ON.
	The PLC side is in error or fault status.	Please clear the error or fault on the PLC side.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Sum Check Error	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An overrun occurred in the VT5/VT3 receive buffer.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with PLC.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the PLC and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

List of MODBUS/TCP (Ethernet) Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3/Soft-VT unit screen when a communication error occurs.

The error messages displayed are as follows.

Message	Causes	How to handle
PLC Error [**(++)]	The device that is set is outside the range of the device setting range. Please set it again within the device setting range.	Please set it again within the device setting range.
	A non-existent device has been set.	
	[**]: Error code of PLC	For the error code [**], see the user manual for the connected PLC.
Communication error [Time Out (++)]	A time-out occurred on PLC No. ++.	<ul style="list-style-type: none"> Check the network for any problems. Review the communications setup.
Communication error [No Ethernet unit]	Ethernet Unit VT2-E1/E2/VT3-E3 is not connected.	Turn the VT3 unit OFF, mount VT2-E1/E2/VT3-E3, and then turn VT3 ON again.
Communication error [Protocol stack error]	The protocol is in the startup process. Wait a while.	Wait a while.
Communication error [Link error]	A linking error has occurred to the Ethernet unit.	<ul style="list-style-type: none"> Make sure that the connector cables are correctly connected. Make sure that LINK LED of the VT5 Series, VT2-E1/E2, VT3-E3, VT3 handy Series and the connected PLC is on.

- * • When the MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

MEMO

EXTERNAL EQUIPMENT CONNECTION

This chapter describes how to connect inverters, servos and other external devices from other manufacturers to the VT5/VT3 Series.



- Not supported by DT series.
- Not supported by Soft-VT.

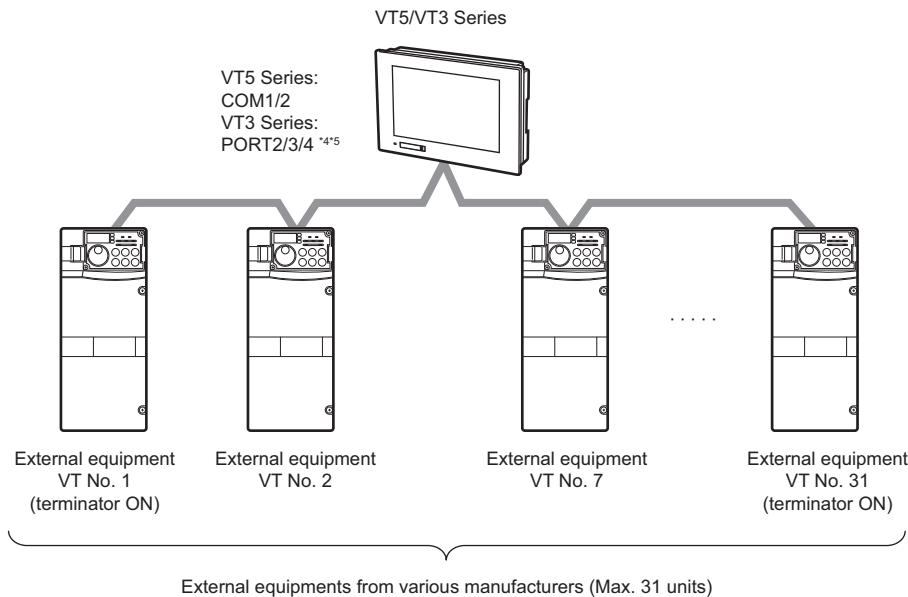
25-1	External Equipment Connection.....	25-2
25-2	Connecting to the Keyence Stepping Motor	25-4
25-3	Connecting a Stepping Motor from Oriental Motor Co., Ltd.....	25-12
25-4	Connection to Inverters from MITSUBISHI ELECTRIC.....	25-22
25-5	Connection to Inverters from Yaskawa Electric....	25-36
25-6	Connection to Inverters from Fuji Electric	25-48
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25-9	Connection to Robots from IAI	25-80
25-10	Connection to Eco-Power Meters from Panasonic.....	25-102
25-11	Connection with Converters	25-109

25-1 External Equipment Connection

What's External Equipment Connection?

The VT5/VT3 use the communication functions that external devices from other manufacturers provide to make direct connections to them.

A total of 31 external devices can be connected to one VT5/VT3 port. MultiTalk will allow connection of up to 62 units (2 ports *1 *2 ×31 units) to one VT5/VT3. *3



- *1 An RS-232C↔RS-485 converter (N-48) is required to make 1:N connections to port 2/port 3 on the VT3 (excluding VT3-W4T(A)/W4M(A)/W4G(A)) and to the VT-T1.
- *2 The VT5 Series does not support connections that use an RS-232C↔RS-485 converter (N-48).
- *3 If MultiTalk is used to select thermoregulators for both PLC_A and PLC_B, PLC connection will not be possible.
- *4 To use MultiTalk on the VT3-V6H(G)/Q5H(G), RS-232C/422A/485 and an Ethernet cable (OP-87191/87192/87193), relay terminal block (VT-T1) and a cable with a removable connector (OP-87194/87195/87196) are needed. In addition, MultiTalk function cannot be used in VT3-V7R/W4T(A)/W4M(A)/W4G(A).
- *5 When connecting an external device to the VT3-V7R/V6H(G)/Q5H(G), be sure to connect the VT3-V7R/V6H(G)/Q5H(G) at the end of the communication line and turn on the terminator.



Point

Not supported by Soft-VT.

Precautions on External Equipment Connection

■ Internal special device

When external equipments are connected, the connection state of external equipments shall be notified in the following internal devices.

Device No.	Description	1(ON)	0(OFF)
MB00D00	PLC_A VT No. 0 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00D01	PLC_A VT No. 1 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00D0F	PLC_A VT No. 1 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00D20	PLC_A VT No. 16 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00D2F	PLC_A VT No. 31 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00D80	PLC_B VT No. 0 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00D8F	PLC_B VT No. 15 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
MB00DA0	PLC_B VT No. 16 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3
⋮	⋮	⋮	⋮
MB00DAF	PLC_B VT No. 31 connection state	Connecting with VT5/VT3	Not connecting with VT5/VT3

When external equipments are connected, the connection state of external equipments can be set in the following internal devices.

Device No.	Contents	1(ON)	0(OFF)
MB00D10	PLC_A VT No.0 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
MB00D11	PLC_A VT No.1 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00D1F	PLC_A VT No.15 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
MB00D30	PLC_A VT No. 16 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00D3F	PLC_A VT No. 31 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
MB00D90	PLC_B VT No. 0 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00D9F	PLC_B VT No. 15 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
MB00DB0	PLC_B VT No. 16 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3
⋮	⋮	⋮	⋮
MB00DBF	PLC_B VT No. 31 connection setting	Connected with VT5/VT3	Not connected with VT5/VT3

"Chapter 6 Before You Set up the Parts", VT5 Series Reference Manual

"Chapter 6 Prior to Parts Setting", VT3 Series Reference Manual

■ Operations for "cut off/reset station No. in communication error"

Communication with the station No. in communication error is cut off when the "cutoff/reset station No. in communication error" checkbox is selected. And this No. is regularly monitored and communication is started again once the error is removed.

Operations in case of a communication error are as follows:

- No operation is taken even if a timeout error occurs.
- The device value of the station No. in communication error is as follows.
 - In communication before cut-off Hold value
 - When updating 0
 - During write operation Disabled

25-2 Connecting to the Keyence Stepping Motor

This section describes how to connect a stepping motor from Keyence to the VT5/VT3.

Checks to Perform before Making Connections

The following describes the steps to connect the VT5/VT3 to a stepping motor (driver) from Keyence.

- (1) Make sure the stepping motor can be connected to the VT5 and VT3.
- (2) Check whether the stepping motor has to be set up.
- (3) Confirm that the model name is set in the target PLC.

Be sure to confirm the three points above before connecting to the applicable device.

Series name	Driver name	Connection port	Serial I/F	Unit setting	Target PLC
QS Series	QS-10N QS-10P QS-10H	QS-MB1 serial communication port	RS-485	 P.25-8	QS Series

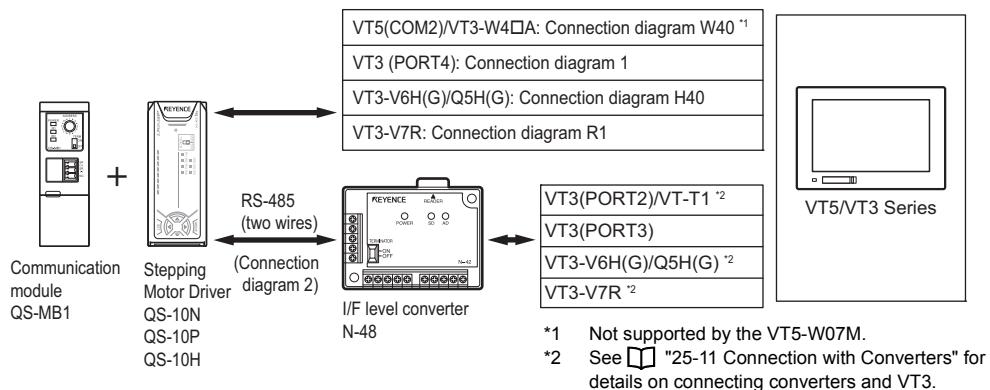
Point

- QS Series devices can connect up to 16 axes.
- Up to 8 axes can be connected per QS-MB1 device.
- Not supported by the VT5-W07M.
- Not supported by Soft-VT.

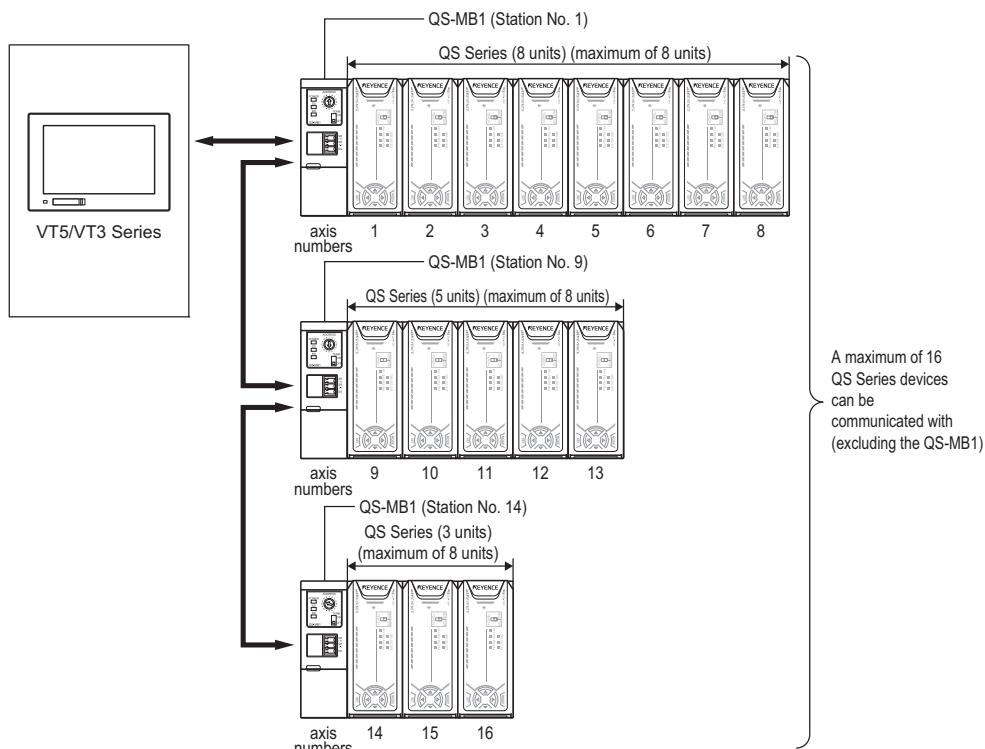
System Configuration

This section describes the system configuration of the VT3 Series and Keyence Stepping Motor.

■ QS Series



Refer to the following diagram to connect multiple QS-MB1 to the VT5/VT3.



- Two terminals per signal line are available for the QS-MB1 communication connector, which can be used to branch the wiring when using multiple units.



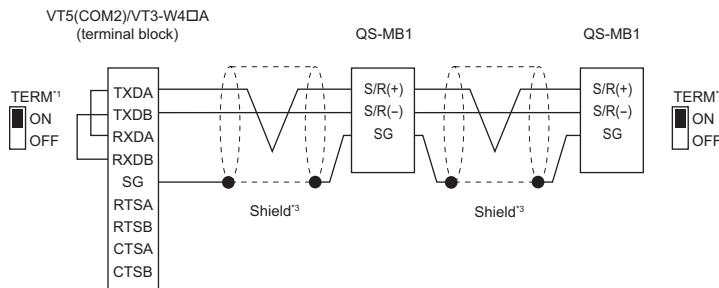
- To use the QS-MB1 to communicate with the VT5/VT3 Series, set the above axis numbers as station numbers.
- QS Series axis numbers are automatically assigned as consecutive numbers starting from the right side of the QS-MB1.
- Set a station number for the QS-MB1 to avoid axis numbers overlapping.

25-2 Connecting to the Keyence Stepping Motor

Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

 Point The VT5-W07M does not support RS-485 connections.

■ Connection diagram W40 (RS-485: two wires)



*1 When the VT5/VT3 Series are at the end of the communication line, set the terminator switch (TERM.) to "ON".

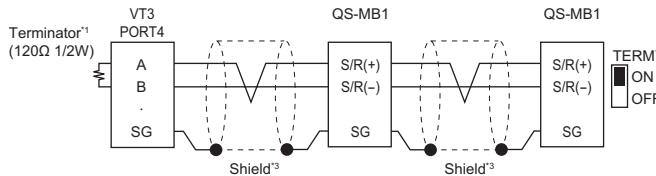
*2 Turn ON the terminator switch for the QS-MB1 at the end of the communication line.

*3 Ensure that the shielded line does not come into contact with other signal lines and the terminal block.

Connecting to the VT3 Series

This section describes the wiring connection of the VT3 Series.

■ Connection diagram 1 (RS-485: two wires)

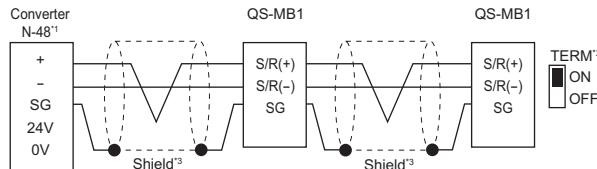


*1 Mount the terminator (120Ω 1/2W) between A and B of PORT4 in VT3 at the end of the communication line.

*2 Turn ON the terminator switch for the QS-MB1 at the end of the communication line.

*3 Ensure that the shielded line does not come into contact with other signal lines and the terminal block.

■ Connection diagram 2



*1 Turn the terminator ON when the converter is at the end of the communication line.

*2 Turn ON the terminator switch for the QS-MB1 at the end of the communication line.

*3 Ensure that the shielded line does not come into contact with other signal lines and the terminal block.

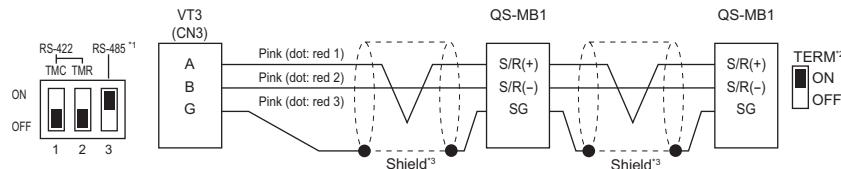
Connecting to the VT3 Handy Series



- Be sure to read "Connection Precautions", page A-13 when using the main unit's connection cables (OP-87191/87192/87193) to connect the VT3 Handy Series.
- Be sure to earth FG2.

■ Connection diagram H40 (RS-485: two wires)

OP-87191:3m, OP-87192:5m, OP-87193:10m



*1 Turn ON the terminator when VT3 is at the end of the communication line.

*2 Turn ON the terminator switch for the QS-MB1 at the end of the communication line.

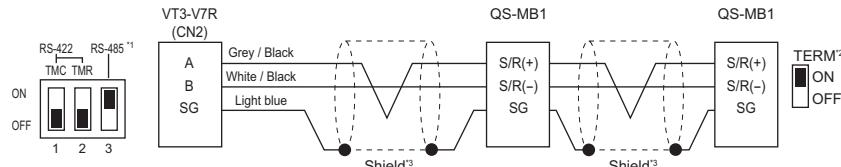
*3 Ensure that the shielded line does not come into contact with other signal lines and the terminal block.

Connecting to the VT3-V7R



- Be sure to read "Connection Precautions", page A-13 when using the main unit's connection cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039) to connect the VT3 Handy Series.

■ Connection diagram R1 (RS-485: two wires)



*1 Turn ON the terminator when VT3 is at the end of the communication line.

*2 Turn ON the terminator switch for the QS-MB1 at the end of the communication line.

*3 Ensure that the shielded line does not come into contact with other signal lines and the terminal block.

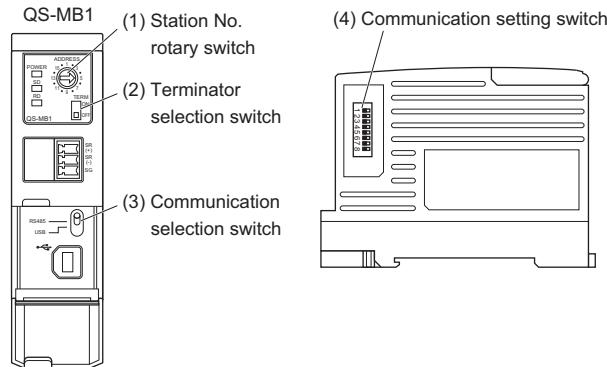
Unit setting

This section describes how to set units in line with default communication condition settings.

■ QS Series communication settings

25

EXTERNAL EQUIPMENT CONNECTION



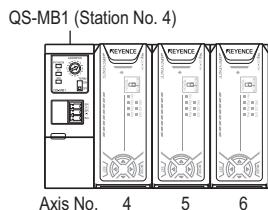
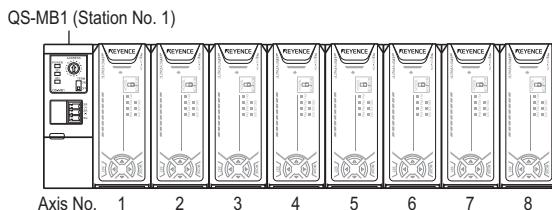
(1) Station No. rotary switch

This sets the QS-MB1 station number.

QS Series axis numbers are automatically assigned as consecutive numbers starting from the right side of the QS-MB1.



System configuration example

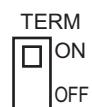


When communicating with several QS-MB1 devices, set the station numbers so that axis numbers assigned to the QS Series do not overlap.

(2) Terminator selection switch

This sets the terminator.

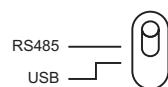
Turn the terminator switch ON for the QS-MB1 at the end of the transmission line.



(3) Communication selection switch

This sets the communication method.

Be sure to select RS-485 when connecting to the VT5/VT3.



(4) Communication setting switch

This sets communication methods such as the baud rate.

Switch No.	Setting	Description			
1	Baud rate	9600 bps → ON 	19200 bps → ON 	38400 bps → ON 	57600 bps → ON 
2		115200 bps → ON 	230400 bps* → ON 		
3					* This is the setting at time of shipment.
4	Stop bits	1 bit* → ON 	2 bit → ON 		* This is the setting at time of shipment.
5	Parity check	Even* → ON 	Odd → ON 	None → ON 	
6					* This is the setting at time of shipment.
7	Send communication wait time	3 ms* → ON 	10 ms → ON 	50 ms → ON 	100 ms → ON 
8					* This is the setting at time of shipment.

Point

- Set the Baud rate in the range 9600 to 115200 bps when connecting to the VT5/VT3.
- When the hold register 1091H value is anything other than "0", the send communication wait time will follow the value of the hold register rather than the communication setting switch setting.
- Be sure to turn the power ON again when changing the setting of any parameter.

Communication conditions and usable devices

■ Setting range and default values of communication conditions

● QS Series

Item	Setting range	Default
PLC serial I/F	RS-232C ¹ , RS-485 ²	RS-485
Communication speed	9600, 19200, 38400, 57600, 115200bps	115200bps
Data bit length	Bits	8 bits
Stop bits	1, 2 bits	1 bit
Parity	None / Odd / Even	Even
Control method	ER control	ER control
Checksum	--	--
CR	--	--
LF	--	--

*1 An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
The VT5 Series does not support connections that use interface level converters (N-48).

*2 The VT5-W07M does not support RS-485 connections.

■ Usable devices

This section describes devices that can be used with each driver and the device range.

● QS Series

Classification	Device name	Device range
Bit device	Coil	CB0000 to FFFF
	Input ¹	IB0000 to FFFF
Word device	Hold register	HR0000 to FFFF

*1 Only reading is possible.

Error messages and countermeasures

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs.

The following error messages are displayed.

Displayed message	Cause	Countermeasure
Communication error [**(++)]	The user tried to set the device beyond its setting range.	Reset the device within its setting range.
	A device that does not exist has been set.	
	[**]: An error code for the Stepping Motor (driver)	See "Details of the communication error[**]", page 1-60 to learn about [**] error codes.
Communication error [timeout]	The cable connection wiring is incorrect.	Rewire the cable wiring connection correctly.
	The Stepping Motor (driver) power is OFF.	Turn the Stepping Motor (driver) ON.
	Stepping Motor (driver) error or breakdown.	Rectify the Stepping Motor (driver) error or breakdown.
	The communication settings are incorrect.	Keep the communication settings consistent between the stepping motor (driver) and the VT5/VT3.
	The communication is affected by noise.	Check whether there is a noise source nearby. If there is, maintain as much distance between the noise source and main unit as possible.
Communication error [CRC error (++)]	The checksum is incorrect. There is an error in the checksum calculation method.	Review the checksum calculation method.
	The connection of connecting cables is poor.	Check whether a cable has become disconnected or there is poor electrical contact.
	The communication settings are incorrect.	Keep the communication settings consistent between the stepping motor (driver) and the VT5/VT3.
	The communication is affected by noise.	Check whether there is a noise source nearby. If there is, maintain as much distance between the noise source and main unit as possible.

Displayed message	Cause	Countermeasure
Communication error [parity]	A parity error occurred while communicating with the Stepping Motor (driver).	Check whether a cable has become disconnected or there is poor electrical contact.
	The connection of connecting cables is poor.	
	The communication settings are incorrect.	Keep the communication settings consistent between the stepping motor (driver) and the VT5/VT3.
	The communication is affected by noise.	Check whether there is a noise source nearby. If there is, maintain as much distance between the noise source and main unit as possible.
Communication error [overrun]	An overrun occurred in the VT5/VT3 receive buffer.	Reduce the communication speed (baud rate).
	The connection of connecting cables is poor. The communication settings are incorrect.	Check whether a cable has become disconnected or there is poor electrical contact. Keep the communication settings consistent between the stepping motor (driver) and the VT5/VT3.
	The communication is affected by noise.	Check whether there is a noise source nearby. If there is, maintain as much distance between the noise source and main unit as possible.
Communication error [framing]	The stop bit could not be detected while communicating with the Stepping Motor (driver).	Check whether a cable has become disconnected or there is poor electrical contact.
	The connection of connecting cables is poor.	
	The communication protocol settings are incorrect.	Keep the communication protocol consistent between the stepping motor (driver) and the VT5/VT3.
	The communication is affected by noise.	Check whether there is a noise source nearby. If there is, maintain as much distance between the noise source and main unit as possible.
PLC communication error	Compounded communication errors	Refer to the countermeasures for the communication errors described above.

- * "(++)" is the station number of the error.
- * When using the MultiTalk function, "A:" or "B:" will be added to the beginning of the above error messages to indicate the device from which the error originated.
- For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

Communication error [**(++)] details

This section describes [**(++)] communication errors that occur when connecting to the QS Series device.

Displayed message	Cause	Countermeasure
Communication error [02(++)]	The QS-MB1 is specifying an unsupported device.	Correct the device number.

Warning: ****(++) details

This section describes ****(++) warnings that occur when connecting to the QS Series device.

Displayed message	Cause	Countermeasure
Warning: Written value outside range (++)	A setting value outside the range has been sent to the QS Series device.	Amend the setting value.
Warning: Slave busy (++)	The QS Series device could not accept the command for any of the following reasons: • An operation command was received while READY was OFF • Teaching was executed before the device was stopped • A command that could not be executed while in TEACH mode was received	Set to MONITOR mode and then change the device setting. Set the conditions to allow the QS Series device to accept commands, and then execute the operation again.

25-3 Connecting a Stepping Motor from Oriental Motor Co., Ltd.

This section describes how to connect a stepping motor from Oriental Motor Co., Ltd. to the VT5/VT3.

Acknowledgement before Connection

The following describes the steps to connect the VT5/VT3 and a stepping motor (driver) from Oriental Motor Co., Ltd.

- (1) Make sure that the VT5/VT3 can be connected to the stepping motor (driver).
- (2) Check whether the stepping motor (driver) needs to be set.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the target device.

■ Stepper motor unit

Series name	Driver	I/F	Unit setting	Object PLC
AR series	ARD-AD, ARD-CD, ARD-KD	RS-485	P.25-17	
AZ series	AZD-AD, AZD-CD, AZD-KD	RS-485	P.25-18	
RK II series	RKSD503-AD, RKSD503-CD, RKSD507-AD, RKSD507-CD	RS-485	P.25-17	
CRK series	CRD503-KD, CRD507H-KD, CRD507-KD, CRD514-KD	RS-485	P.25-16	CRK series
EAS series	ARD-AD, ARD-CD, ARD-KD, LSD-KD, LSD-AD, LSD-CD	RS-485	P.25-17	
EAC series	ARD-AD, ARD-CD, ARD-KD	RS-485	P.25-17	
DG II series	LSD-KD, LSD-AD, LSD-CD	RS-485	P.25-17	

* Only the FLEX type drivers (automation and motion control function embedded) can be connected.



- Not supported by the VT5-W07M.
- Not supported by Soft-VT.

■ Driver embedde 5 phase stepper motor

Series name	Driver	I/F	Unit setting	Object PLC
PKA series	PKA544KD, PKA566KD	RS-485	P.25-19	CRK series

* Only the FLEX type drivers (automation and motion control function embedded) can be connected.



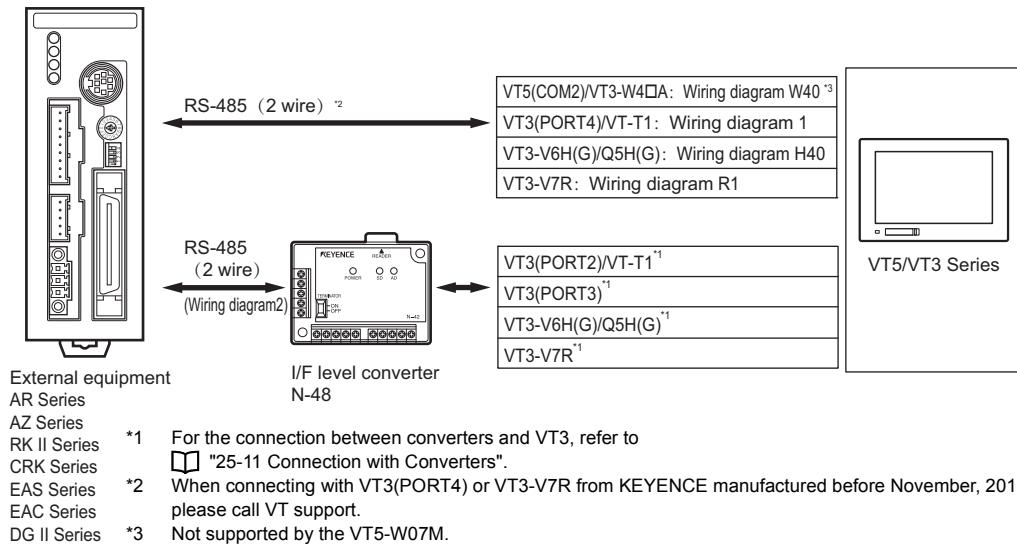
- Not supported by the VT5-W07M.
- Not supported by Soft-VT.

25-3 Connecting a Stepping Motor from Oriental Motor Co., Ltd.

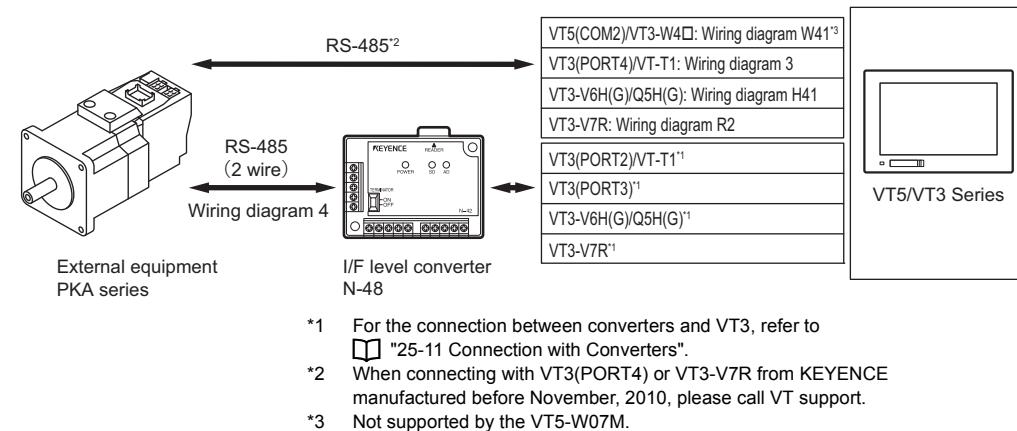
System Structure

This section describes the system configuration of the VT5/VT3 Series and a stepping motor (driver) from Oriental Motor Co., Ltd.

■ Stepping motor unit



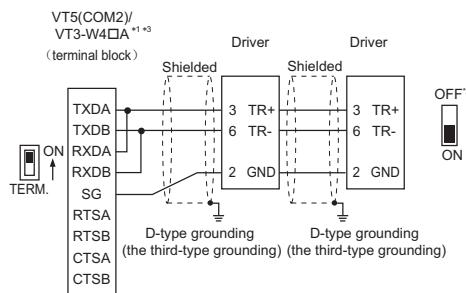
■ Driver embedded 5 phase stepper motor



- ^{*1} For the connection between converters and VT3, refer to
"25-11 Connection with Converters".
- ^{*2} When connecting with VT3(PORT4) or VT3-V7R from KEYENCE manufactured before November, 2010, please call VT support.
- ^{*3} Not supported by the VT5-W07M.

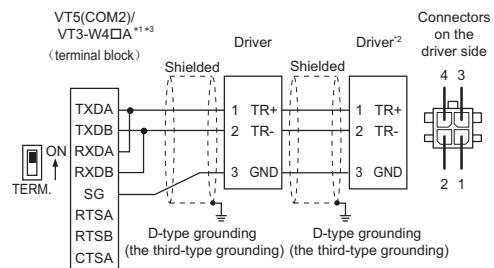
Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

■ Wiring diagram W40 (RS-485: 2-wire)



- *1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator to "ON".
- *2 When the driver is on one side of the communication line, open terminal resistance switch.
- *3 Not supported by the VT5-W07M.

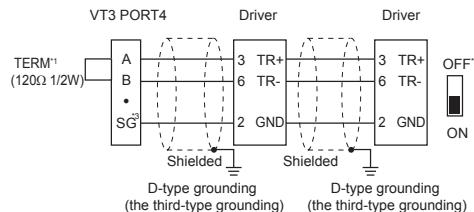
■ Wiring diagram W41 (RS-485: 2-wire)



- *1 When the VT5/VT3-W4 Series are at the end of the communication line, set the terminator to "ON".
- *2 When the driver is on one side of the communication line, open terminal resistance switch.
- *3 Not supported by the VT5-W07M.

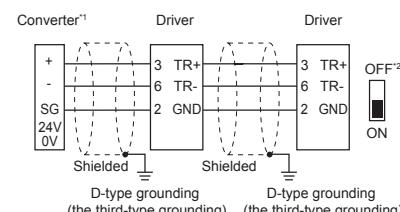
Connection with VT3 Series

■ Wiring diagram 1 (RS-485: 2-wire)



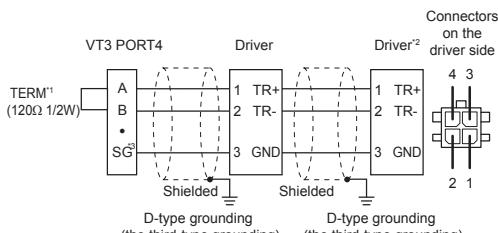
- *1 When VT3 is on one side of the communication line, install termination resistor (120Ω 1/2W) between A and B of PORT4.
- *2 When the driver is on one side of the communication line, open terminal resistance switch.
- *3 VT-T1 terminal name is G.

■ Wiring diagram 2 (RS-485: 2-wire)



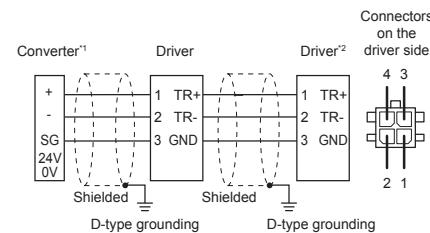
- *1 When the converter is on one side of the communication line, terminal will be open.
- *2 When the driver is on one side of the communication line, open terminal resistance switch.

■ Wiring diagram 3 (RS-485: 2-wire)



- *1 When VT3 is on one side of the communication line, install termination resistor (120Ω 1/2W) between A and B of PORT4.
- *2 When the driver is on one side of the communication line, open terminal resistance switch.
- *3 VT-T1 terminal name is G.

■ Wiring diagram 4 (RS-485: 2-wire)

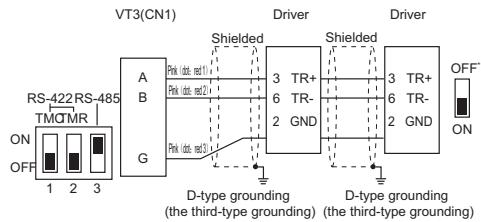


- *1 When the converter is on one side of the communication line, terminal will be open.
- *2 When the driver is on one side of the communication line, open terminal resistance switch.

25-3 Connecting a Stepping Motor from Oriental Motor Co., Ltd.

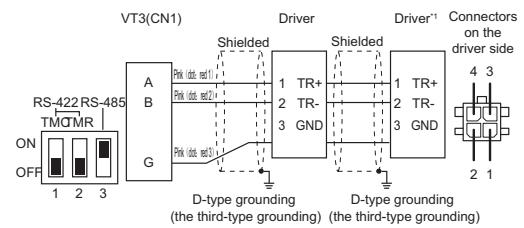
Connection with VT3 Handy Series

■ Wiring diagram H40 (RS-485: 2-wire)



*1 When the driver is on one side of the communication line, open terminal resistance switch.

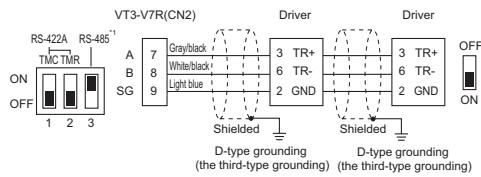
■ Wiring diagram H41 (RS-485: 2-wire)



*1 When the driver is on one side of the communication line, open terminal resistance switch.

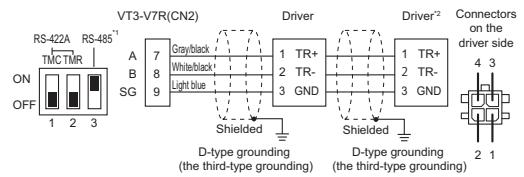
Connection to VT3-V7R

■ Wiring diagram R1 (RS-485: 2-wire)



*1 Terminal will be open.
*2 When the driver is on one side of the communication line, open terminal resistance switch.

■ Wiring diagram R2 (RS-485: 2-wire)



*1 Terminal will be open.
*2 When the driver is on one side of the communication line, open terminal resistance switch.

Unit Setting

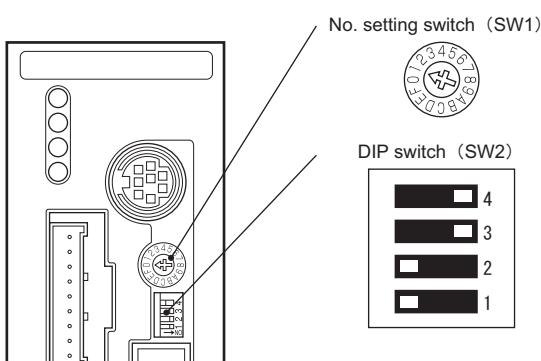
Unit setting corresponding to the initial value of communication conditions is described.

■ CRK series

Set communication for each item according to the following steps.

- 1 Use unit setting switch (SW1) on the face of the driver to set unit (slave address).**
Set within the scope of 1 to 31.
- 2 Use the dip switch on the face of the driver to set communication speed and RS-485 communication target.**

Dip switch is set to “1: OFF, 2: OFF, 3: ON, 4: ON” in turn.



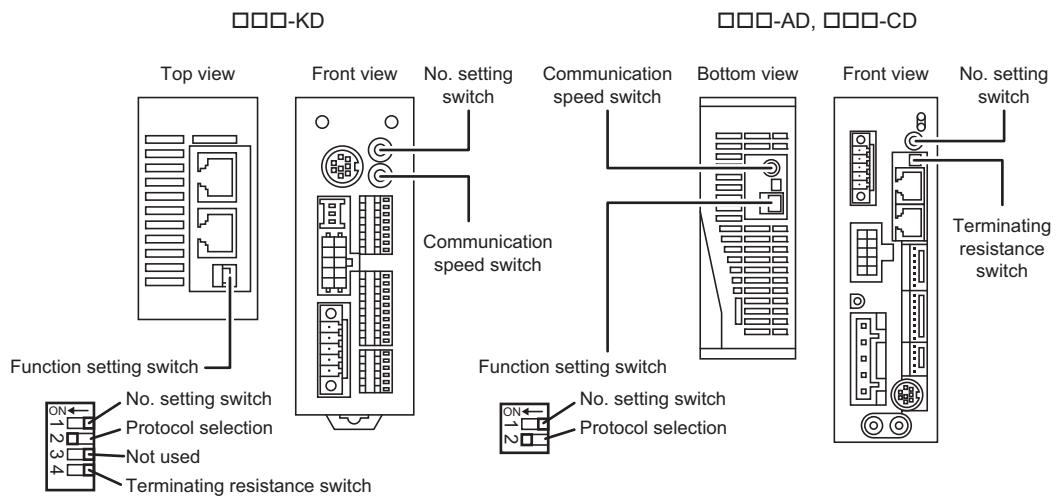
- 3 Use data setup device or data setter to set other communications via CRK series.**

With respect to the setting method, please refer to operating instructions of the equipment.

Item	Setting range	Initial value	Set value
Protocol	0 : MODBUS RTU 1 : gwprotocol Ver.1	0	0 ^{*1}
Parity	0 : none 1 : even number 2 : odd number	1	1
Stop bit	0 : 1 bit 1 : 2 bits	0	0

*1 Must be set to the recorded value.

■ AR series/RK II series/EAS series/EAC series/DG II series



(1) Communication protocol

Use the function setting switch No.2 for communication protocol settings.
Set the function setting switch No.2 to ON (MODBUS protocol).

(2) Slave address

Use the "No. setting switch" and the "function setting switch No.1" for slave address settings.

No. setting switch	Function setting switch No.3	Slave address
0 to F	OFF	0 to 15
	ON	16 to 31

(3) Communication speed

Use the "Communication speed switch" to modify the communication speed settings.

Communication speed switch					
0	1	2	3	4	5 to F
9600	19200	38400	57600	115200	Not used

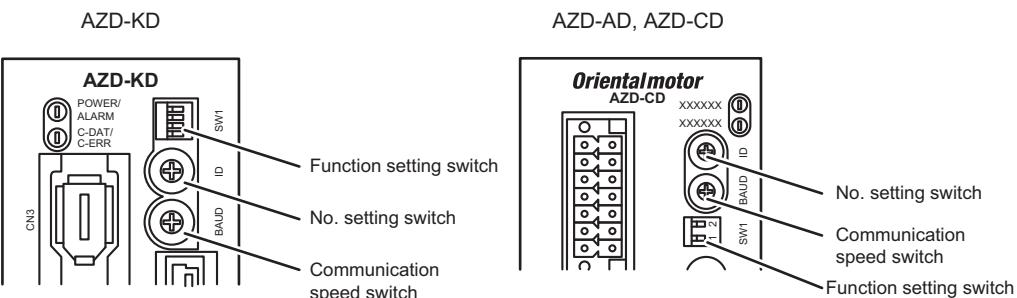
(4) Other communication settings

Use the Oriental Motor's "MEXE02" to modify other communication settings.
Set the following item settings.

Item	Setting range	Default value
Communication timeout [ms]	0 to 10000	0
Communication error alarm	1 to 10	3
Parity bits	None, Even, Odd	Even
Stop bits	1 bit, 2 bits	1 bit
Wait time [ms]	0.0 to 1000.0	10.0

25-3 Connecting a Stepping Motor from Oriental Motor Co., Ltd.

AZ series



(1) Communication protocol

Use the "function setting switch No.2" for communication protocol settings.
Set the function setting switch No.2 to ON (MODBUS protocol).

(2) Slave address

Use the "No. setting switch" and the "function setting switch No.3" for slave address settings.

No. setting switch	Function setting switch No.3	Slave address
0 to F	OFF	0 to 15
	ON	16 to 31

(3) Communication speed

Use the "communication speed setting switch" for communication speed settings.

Communication speed switch					
0	1	2	3	4	5 to F
9600	19200	38400	57600	115200	Not used

(4) Other communication settings

Use the Oriental Motor's "MEXE02" to modify other communication settings.

Set the following item settings.

Item	Setting range	Default value
Communication ID (Modbus)	Complies with RotSw/DipSW settings ¹ , 0 to 31 ²	Complies with RotSw/DipSW settings
Baudrate (Modbus)	Complies with RotSw settings ³ , 9600, 19200, 38400, 57600, 115200, 230400 bps	Complies with RotSw settings
Parity (Modbus)	None, Even, Odd	Even
Stop bits (Modbus)	1 bit, 2 bits	1 bit
Communication timeout [ms] (Modbus)	0 to 10000	0
Communication error alarm (Modbus)	1 to 10	3
Wait time [ms] (Modbus)	0.0 to 1000.0	10.0

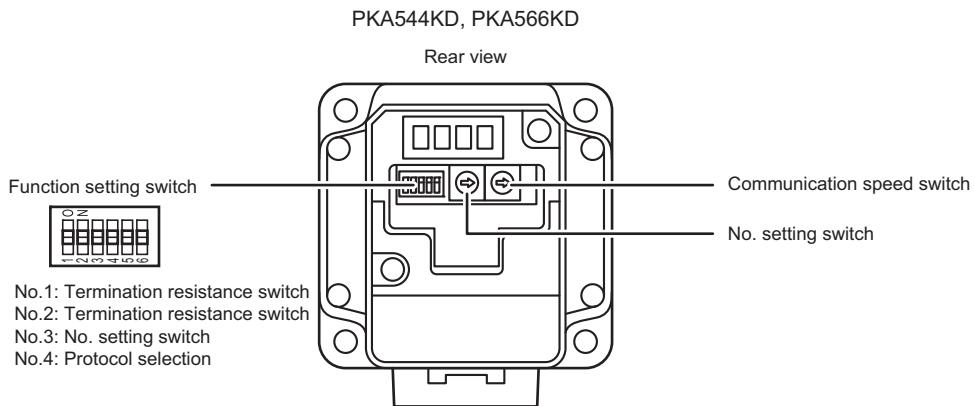
*1 When set to "Complies with RotSw/DipSW settings", the No. setting switch and function setting switch can be set.

*2 When setting on "MEXE02", set within the range of 1 to 31.

*3 When set to "Complies with RotSw settings", the communication speed switch can be set.

*4 When setting on ""MEXE02"", set within the range of 9600 to 115200 bps.

■ PKA series



(1) Communication protocol

Use the "function setting switch No.4" for communication protocol settings.
Set the function setting switch No.4 to ON (MODBUS protocol).

(2) Slave address

Use the "No. setting switch" and the "function setting switch No.3" for slave address settings.

No. setting switch	Function setting switch No.3	Slave address
0 to F	OFF	0 to 15
	ON	16 to 31

(3) Communication speed

Use the "communication speed setting switch" for communication speed settings.

Communication speed switch					
0	1	2	3	4	5 to F
9600	19200	38400	57600	115200	Not used

(4) Other communication settings

Use the Oriental Motor's "MEXE02" to modify other communication settings.
Set the following item settings.

Item	Setting range	Default value
Communication timeout [ms]	0 to 10000	0
Communication error alarm	1 to 10	3
Parity bits	None, Even, Odd	Even
Stop bits	1 bit, 2 bits	1 bit
Wait time [ms]	0.0 to 1000.0	10.0

Communication conditions and available devices

■ Setting range of the communication conditions and the initial value

Item	Setting range	Initial value
PLC serial port I/F	RS-232C ^{*1} , RS-485 ^{*2}	RS-485
Communication protocol	MODBUS RTU	MODBUS RTU
Communication speed	9600, 19200, 38400, 57600, 115200 bit/s	115200 bit/s
Data bit length	8 bits	8 bits
Stop bit	1bit, 2bits	1 bit
Parity	None, odd number, even number	Even number
Control mode	ER CONTROL	ER CONTROL
Check sum	-	-
CR	-	-
LF	-	-

*1 • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

• The VT5 Series does not support connections that use interface level converters (N-48).

*2 The VT5-W07M does not support RS-485 connections.

■ Available devices

The device that may be used in each drive and device scope are described.

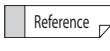
Item	Initial value
Bit device	Holding register(bit) (BHR)
	Holding register (HR)
Word device	2 data holding register (DHR)
	Connect diagnosis (DIA)

*1 Device No. Must be represented by hexadecimal number.

*2 There are certain read-only devices.

*3 Connect the device for diagnosis. Always read 1234 (hexadecimal number).

*4 32 bit device. Only even No. May be designated for the device No..

 CRK Series can only read and write the word device commands, and cannot read and write the bit devices directly.

To read bit devices, therefore, the bit position should be specified by referring to the word device with the specified address before bits are read.

Read the word device that modifies the specified bit position.



You must write "0" to the required hold register in advance to perform the following operations on the VT5/VT3 during RS-485 communications. When the register is in its default value, each input terminal takes priority and VT5/VT3 operation is disabled.

Item	Setting range	Initial value
START input	0 : RS-485 communication, 1 : I/O	1
I/O STOP input	0 : Disable, 1 : Enable	1
Excitation	0 : RS-485 communication, 1 : I/O	1
HOME/FWD/RVS INPUT	0 : RS-485 communication, 1 : I/O	1
Data No. Input	0 : RS-485 communication, 1 : I/O	1

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of Step motor	For the error code[**], see "Connected Step motor User's Manual".
Time Out Error (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Step motor is OFF.	Turn the Step motor ON.
	The Step motor side is in error or fault status.	Please clear the error or fault on the Step motor side.
	Communication setting error.	Keep the communication settings consistent between the stepping motor and the VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
CRC Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the stepping motor and the VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Step motor.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the stepping motor and the VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An overrun occurred in the VT5/VT3 receive buffer.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the stepping motor and the VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Step motor.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the stepping motor and the VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-4 Connection to Inverters from MITSUBISHI ELECTRIC

This section describes how to connect an inverter from Mitsubishi Electric to the VT5/VT3.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting an inverter from Mitsubishi Electric to the VT5/VT3.

- (1) Make sure that the inverter can be connected to the VT5/VT3.
- (2) Make sure if inverter setting is necessary.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the inverter.

Series Name	Inverters	I/F	Unit Setting	Target PLC
FR-A700 series	FR-A720-□K, FR-A740-□K			
FR-F700 series	FR-F720-□K, FR-F740-□K			
FR-E700 series	FR-E720-□K, FR-E740-□K FR-E720-□K/FR-E7TR(Control port option) FR-E740-□K/FR-E7TR(Control port option)			
FR-D700 series	FR-D720-□K, FR-D740-□K	RS-485	P.25-33	FREQROL series
FR-E500 series	FR-E520-□K, FR-E540-□K, FR-E520S-□K, FR-E510W-□K			
FR-S500 series	FR-S520-□K, FR-S540-□K, FR-S520S-□K, FR-S510W-□K, FR-S520E-□K, FR-S540E-□K, FR-S520SE-□K, FR-S510WE-□K			

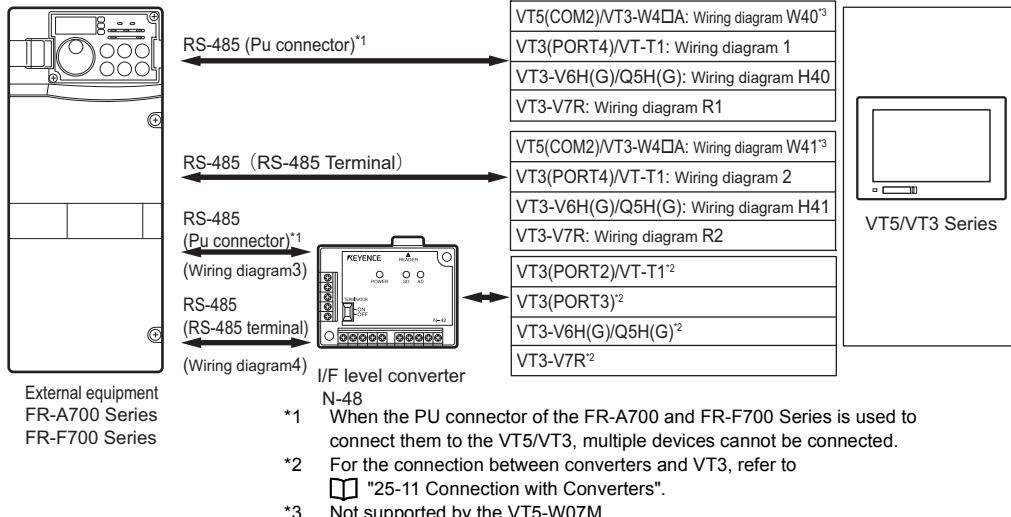


- Not supported by the VT5-W07M.
- Not supported by Soft-VT.

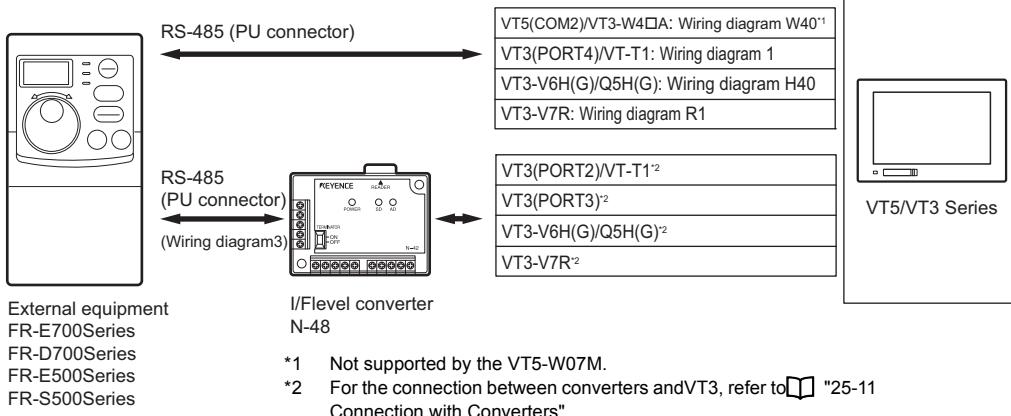
System Configuration

This section describes the system configuration of the VT5/VT3 Series and an inverter from Mitsubishi Electric.

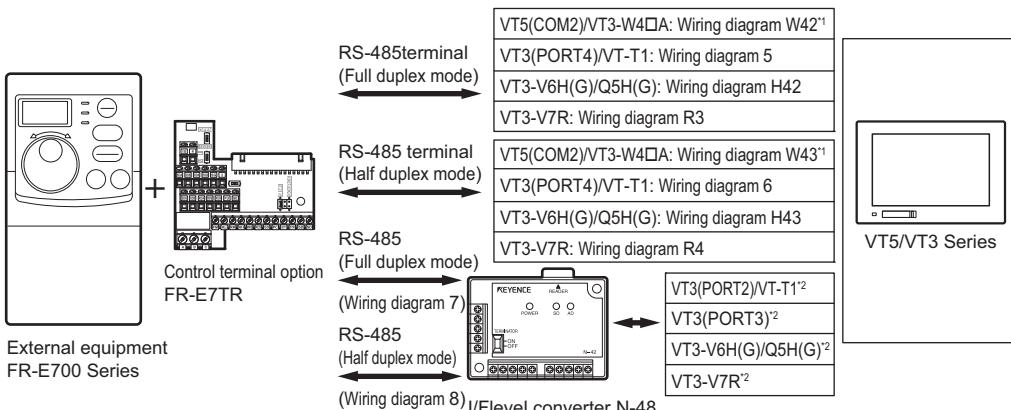
■ FR-A700, FR-F700 series



■ FR-E700, FR-D700, FR-E500, FR-S500 Series



■ FR-E700 Series + FR-E7TR



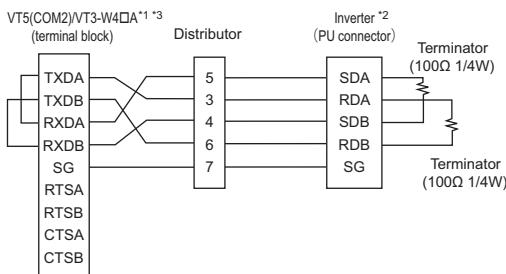
- *1** Not supported by the VT5-W07M.
***2** For the connection between converters and VT3, refer to "25-11 Connection with Converters".

Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

The following describes wiring of connector cables.

The wiring diagrams recommended by MITSUBISHI ELECTRIC may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

■ Wiring diagram W40 (RS-485: 4-wire)



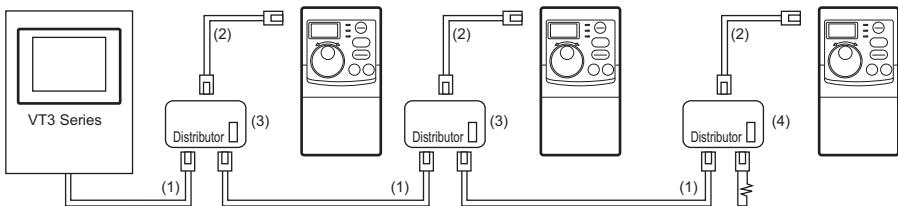
*1 Set the terminator switch (TERM.) on the VT5/VT3-W4TA/W4MA/W4GA to OFF.

*2 When the inverter is at the end of the communication line, a terminator (100Ω 1/4W) needs to be connected.

*3 Not supported by the VT5-W07M.



Refer to the following diagram to connect the PU connector of the inverter to the VT5/VT3.



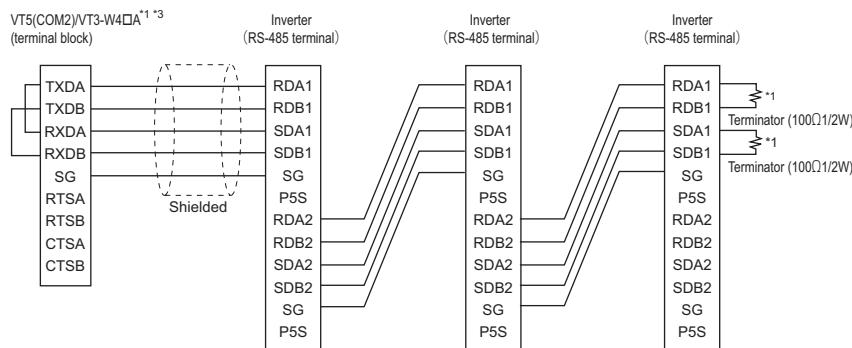
Item	Model	Manufacturer	Remarks
(1) Cable	-	-	EIA568 cable (10BASE-T cable etc.)
(2) Cable	-	-	EIA568 cable (10BASE-T cable etc.)
(3) Distributor	BMJ-8	Hachiko Electric	Without terminator
(4) Distributor	BMJ-8P		With terminator



- Be sure to place the VT5/VT3 at the terminal.
- Max. branch line length (cable of (2)) is 5m.
- A terminator 100Ω (1/4W) needs to be connected to the terminal distributor.
- Max. trunk line length (total of (1)) is 250m.

25-4 Connection to Inverters from MITSUBISHI ELECTRIC

■ Wiring diagram W41 (RS-485: 4-wire)

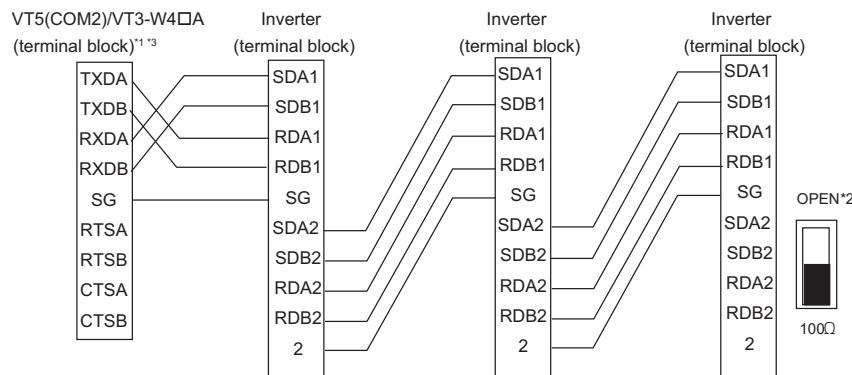


*1 A terminator (1000Ω 1/2W) needs to be connected for the inverter at the end of the communication line.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

*3 Not supported by the VT5-W07M.

■ Wiring diagram W42 (RS-485, full duplex mode)

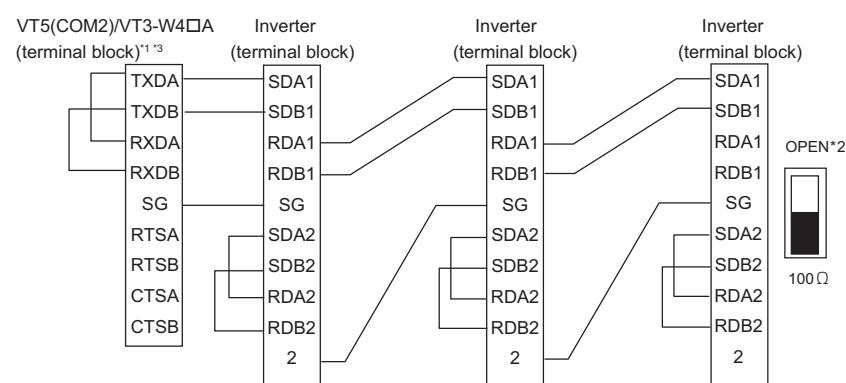


*1 Set the terminator switch (TERM) on the VT5/VT3-W4TA/W4MA/W4GA to OFF.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

*3 Not supported by the VT5-W07M.

■ Wiring diagram W43 (RS-485, half duplex mode)



*1 Set the terminator switch (TERM) on the VT5/VT3-W4TA/W4MA/W4GA to OFF.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

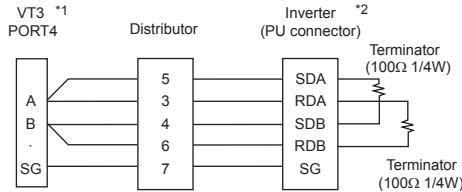
*3 Not supported by the VT5-W07M.

Connection to VT3 Series

The following describes wiring of connector cables.

The wiring diagrams recommended by MITSUBISHI ELECTRIC may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-485: 4-wire)

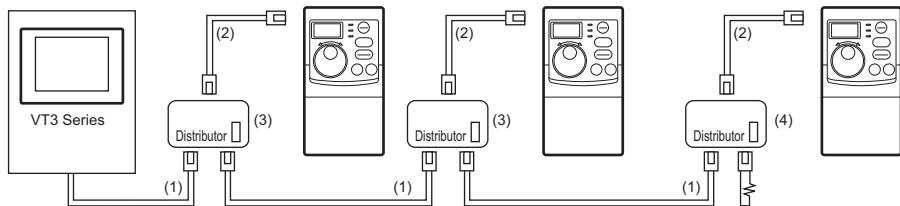


*1 Do not attach a short bar on the VT3 side. (Terminator Off)

*2 Install a terminal resistor (100 ohm, 1/4 W) on the inverter at end of the communication line.



The following diagram shall be referenced when PU connectors for inverters are connected to VT3.

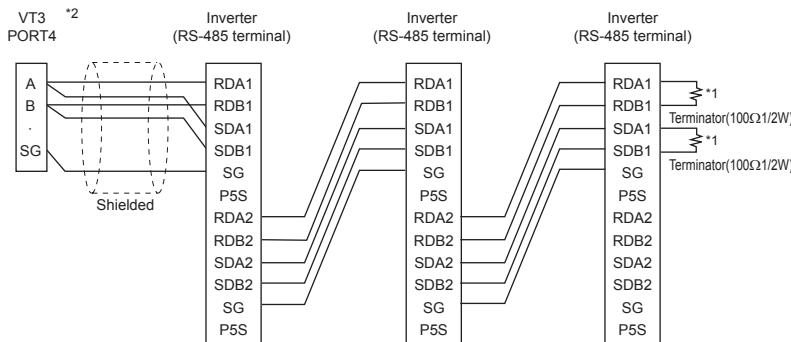


Item	Model	Manufacturer	Remarks
(1) Cable	-	-	Refer to EIA 568 cables(10BASE-T cable, etc)
(2) Cable	-	-	Refer to EIA 568 cables(10BASE-T cable, etc)
(3) Distributor	BMJ-8	Hachiko Electric	With terminator
(4) Distributor	BMJ-8P		With terminator



- Be sure to configure VT3 at the termination.
- The maximum length of branch line (cable of (2)) is 5m.
- Install terminator 100W (1/4W) at the terminal distributor.
- The maximum length of trunk line (total of (1)) is 250m.

■ Wiring diagram 2 (RS-485:4-wire)

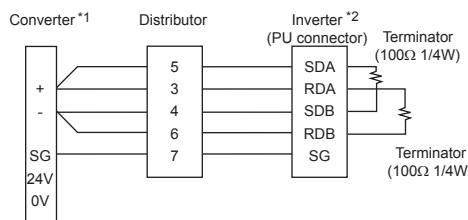


*1 Install terminato to inverters at one end of communication cable (100W 1/2W).

*2 Do not attach a short bar on the VT3 side. (Terminator Off)

25-4 Connection to Inverters from MITSUBISHI ELECTRIC

■ Wiring diagram3 (RS-485:4-wire)

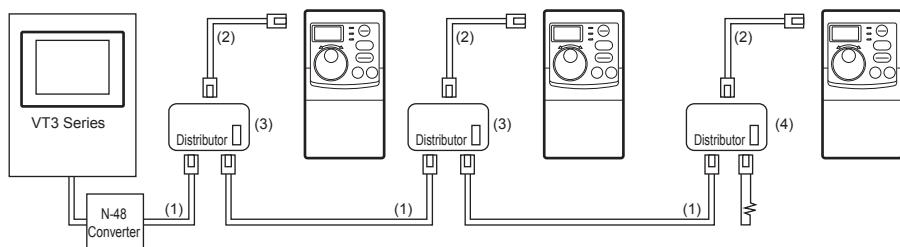


*1 Set the terminator OFF.

*2 Terminal resistance is already added into inverters at one end of communication cable(100Ω 1/4W).



The following diagram shall be referenced when PU connectors for inverters are connected to VT3.

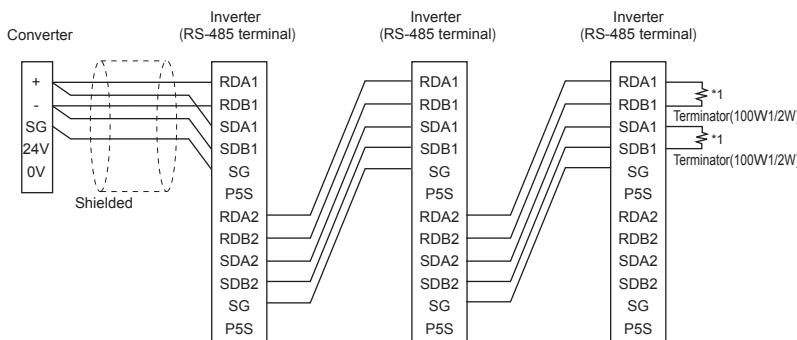


	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	EIA 568 cables (10BASE-T cable, etc)
(2)	Cable	-	-	EIA 568 cables (10BASE-T cable, etc)
(3)	Distributor	BMJ-8	Hachiko Electric	With terminator
(4)	Distributor	BMJ-8P		With terminator



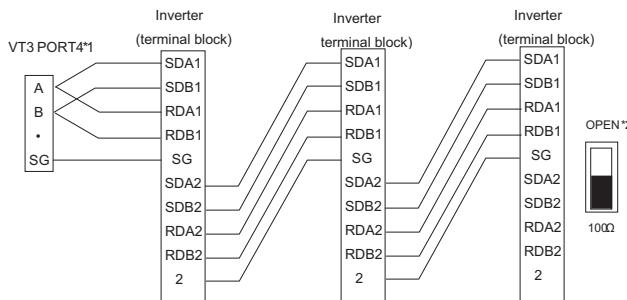
- Be sure to configure VT3 at the termination.
- The maximum length of branch line(cable of (2)) is 5m.
- Please add terminal resistor 100W (1/4W) at the terminal distributor.
- The maximum length of trunk line (total of (1)) is 250m.

■ Wiring diagram 4 (RS-485:4-wire)



*1 Terminal resistance is already added into inverters at one end of communication cable(100Ω 1/2W).

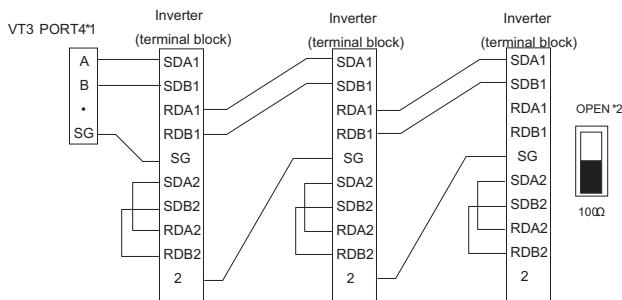
■ Wiring diagram 5 (RS-485, full duplex mode)



*1 Do not attach a short bar on the VT3 side. (Terminator Off)

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

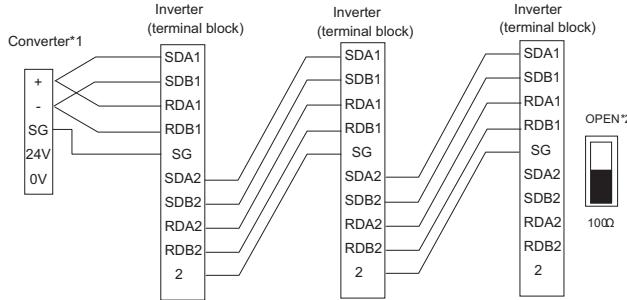
■ Wiring diagram 6 (RS-485, half duplex mode)



*1 Do not attach a short bar on the VT3 side. (Terminator Off)

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

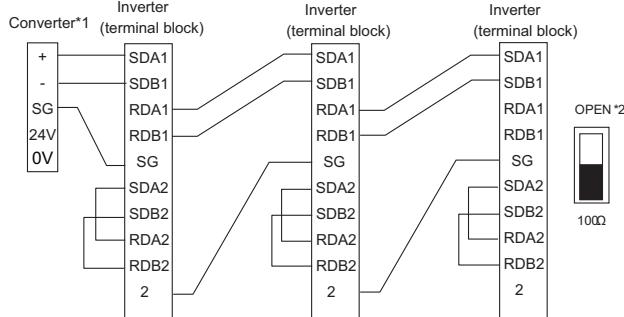
■ Wiring diagram 7 (RS-485, full duplex mode)



*1 Set the terminator to OFF.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

■ Wiring diagram 8 (RS-485, half duplex mode)



*1 Set the terminator to OFF.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

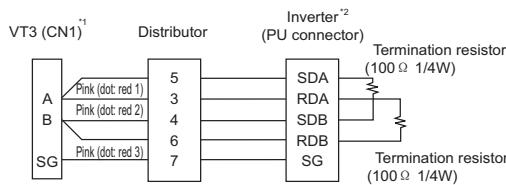
Connection with VT3 Handy Series



Point For the use of unit connecting cable (OP-87191/87192/87193), please always read "Precautions on Connection", on Page A-13

■ Wiring diagram H40 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

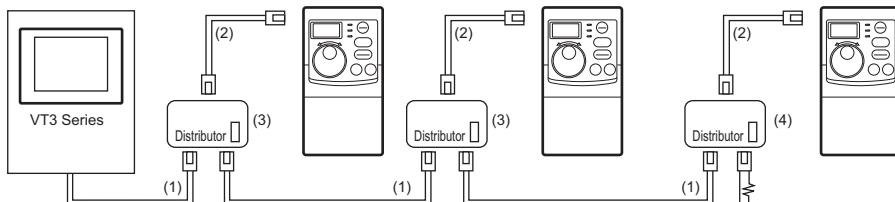


*1 Please set the terminator to OFF.

*2 The adapter on communication line end should be equipped with a terminal resistor (100Ω 1/4W).



For the connection with VT3 using the PU connector of the inverter, please refer to the diagram below.



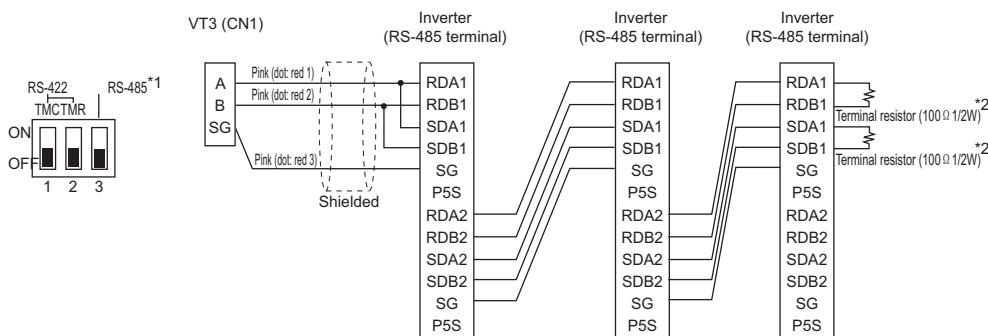
Item	Model	Manufacturer	Remarks
(1) Cable	-	-	EIA568 cable (10BASE-T cable etc.)
(2) Cable	-	-	EIA568 cable (10BASE-T cable etc.)
(3) Distributor	BMJ-8	Hachiko Electric	Without terminator
(4) Distributor	BMJ-8P	Hachiko Electric	With terminator



- Be sure to configure VT3 at the termination.
- Max. branch line length (cable of (2)) is 5m.
- A terminator 100Ω (1/4W) needs to be connected to the terminal distributor.
- Max. trunk line length (total of (1)) is 250m.

■ Wiring diagram H41 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

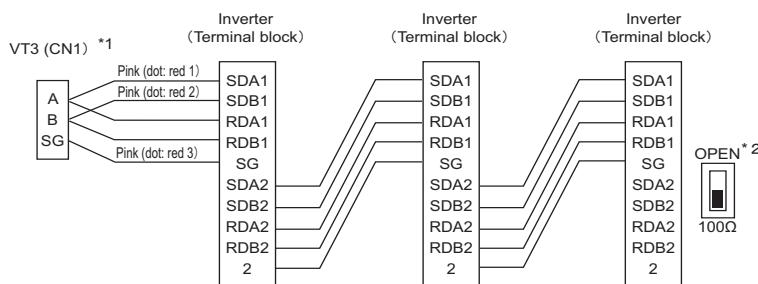


*1 Please set the terminator to OFF.

*2 The adapter on communication line end should be equipped with a terminal resistor (100Ω 1/2W).

■ Wiring diagram H42 (RS-485, full duplex mode)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

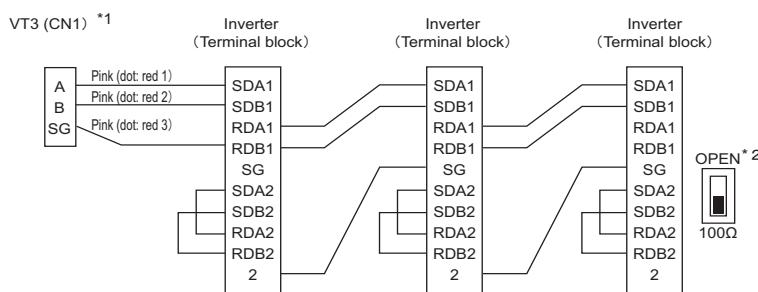


*1 Please set the terminator to OFF.

*2 For the inverter on one end of the communication cable, set the terminal resistor switch to ON.

■ Wiring diagram H43 (RS-485, half duplex mode)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m



*1 Please set the terminator to OFF.

*2 For the inverter on one end of the communication cable, set the terminal resistor switch to ON.

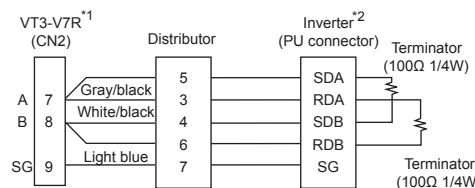
25-4 Connection to Inverters from MITSUBISHI ELECTRIC

Connection to VT3-V7R



When using connecting cable of the unit (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read "Connection Precautions", page A-13.

■ Wiring diagram R1 (RS-485: 4-wire)

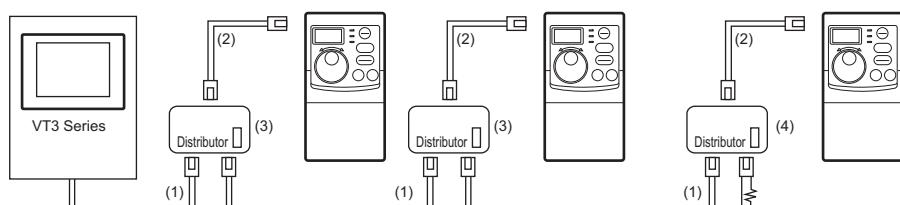


*1 Set the terminator OFF.

*2 Install terminator (100Ω 1/4W) to inverters at one end of communication cable.



The following diagram shall be referenced when PU connectors for inverters are connected to VT3.

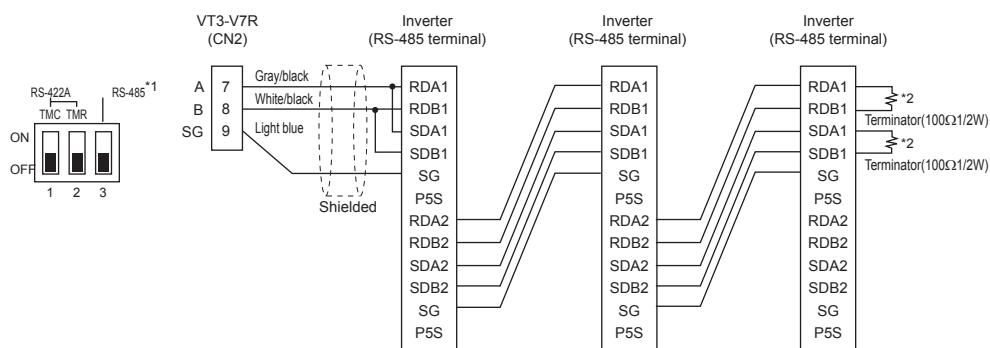


	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	EIA 568 cables(10BASE-T cable, etc)
(2)	Cable	-	-	EIA 568 cables(10BASE-T cable, etc)
(3)	Distributor	BMJ-8	Hachiko Electric	Without terminator
(4)	Distributor	BMJ-8P		With terminator



- Be sure to configure VT3 at the termination.
- The maximum length of branch line (cable of (2)) is 5m.
- Install terminator 100Ω (1/4W) at the terminal distributor.
- The maximum length of trunk line (total of (1)) is 250m.

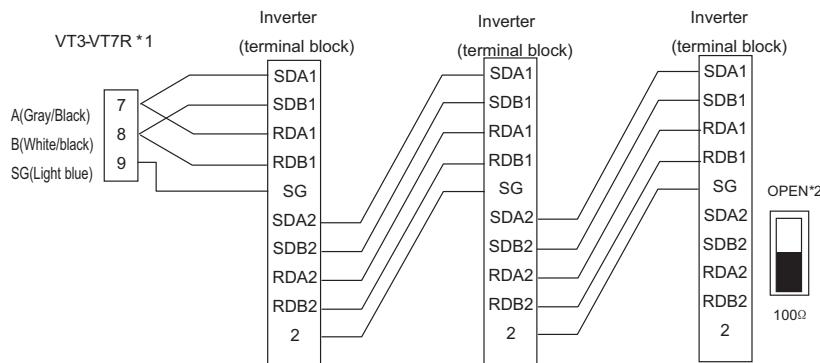
■ Wiring diagram R2 (RS-485: 4-wire)



*1 Set the terminator OFF.

*2 Install terminator (100Ω 1/2W) to inverters at one end of communication cable.

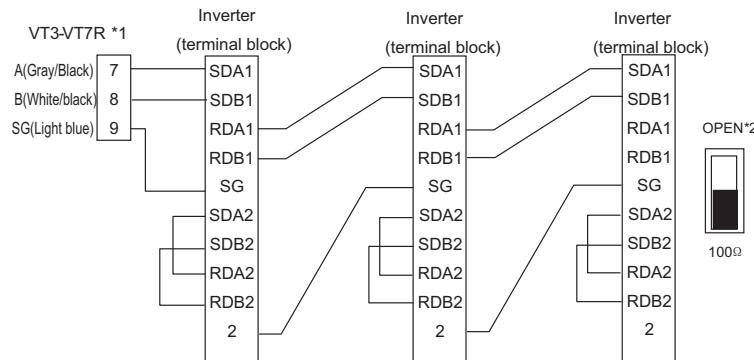
■ Wiring diagram R3 (RS-485, full duplex mode)



*1 Turn off the terminator.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

■ Wiring diagram R4 (RS-485, half duplex mode)



*1 Turn off the terminator.

*2 Turn on switch of the terminating resistor on the converter of the communication cable end.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.



Be sure to turn power on again after the settings of parameters. Otherwise, communication is impossible in the case of any change of communication-related parameters.

■ Communication settings of FR-A700/FR-F700/FR-E700/FR-D700/FR-E500/FR-S500 series

For the setting methods, refer to operating instruction of various equipment.

Item	Parameter No.				Setting Range	Default
	FR-A700 ^{*1}	FR-F700 ^{*1}	FR-E700 FR-D700 FR-E500	FR-S500		
Communication station No.	Pr117 (Pr331)	Pr117 (Pr331)	Pr117	n1	0 to 31	0
Baud rate	Pr118 (Pr332)	Pr118 (Pr332)	Pr118	n2	48,96,192,384 ^{*2} (x100bit/s)	192
Stop bit length/ Data length	Pr119 (Pr333)	Pr119 (Pr333)	Pr119	n3	0 :Data length 8; stop bit 1 1 :Data length 8; stop bit 2 10 :Data length 7; stop bit 1 11 :Data length 7; stop bit 2	1
Parity check	Pr120 (Pr334)	Pr120 (Pr334)	Pr120	n4	0: OFF 1: Odd 2: Even	2
Communication retry frequency	Pr121 (Pr335)	Pr121 (Pr335)	Pr121	n5	0 to 10, 9999 ^{*3~7}	1
Communication check time interval	Pr122 (Pr336)	Pr122 (Pr336)	Pr122	n6	0 ^{*4} , 0.1 to 999.8, 9999 ^{*5~7}	0
Setting of waiting time	Pr123 (Pr337)	Pr123 (Pr337)	Pr123	n7	0 to 150, 9999 ^{*6~7}	9999
CR/LF	Pr124 (Pr341)	Pr124 (Pr341)	Pr124	n11	0:CR No, LF No 1:CR Yes, LF No 2:CR Yes, LF Yes	1 ^{*8}

*1 Included in the parenthesis is the parameter No. when RS-485 terminal is used for communication.

*2 384 (38400 bit/s) is only selected to connect FR-A700/FR-F700/FR-E700/FR-D700.

*3 The inverters don't stop abnormally even if data receiving error occurs.

*4 No communication is made when "0" is set.

*5 Stop communication check when "9999" is set.

*6 No communication is made when 9999 is set. Set the value from 0 to 150.

*7 The setting value "9999" has special meaning. To load a "9999" setting from the VT5/VT3, write "65535".

*8 Don't set other than of "1".



- In a connection using the PU connector, the inverter operation mode must first be set to "PU operation" to rewrite inverter parameters from the VT5/VT3.
- To rewrite inverter parameters from the VT5/VT3 in an RS-485 connection, the inverter operation mode must first be set to "NET mode operation" and communication settings must be "enabled".
(NET operation mode... Pr340: 10 or 12, Pr79: 2)
- When the PU connector is used to connect FR-E700, the operation mode should be changed to "NET operation mode".
- When FR-E500/FR-S500 is connected, please don't set the communication speed as "384".
- Be sure to set the power "ON" again after initializing parameter setting. Otherwise, communication is impossible.
- Some of inverter models may require adjustment of waiting time. Select "VT System Settings (S)" → "PLC Communication Condition (C)" → "Advanced Settings" and set the waiting time by the unit of 1ms. For the detail of waiting time, refer to the instruction manual of the inverter.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● FREQROL series

Item	Setting Range	Default
PLC I/F	RS-232C ^{*1} , RS-485 ^{*2}	RS-485
Communication protocols	Start/stop synchro-half duplex mode(ASCII format)	--
Baud rate	4800,9600,19200,38400 ^{*3} bit/s	19200 bit/s
Data bit	7 bits, 8 bits	8 bits
Stop bit	1 bit, 2 bits	2 bits
Parity	Without, odd, even	Even
Flow Control	ER control	ER control
CheckSum	--	--
CR	--	--
LF	--	--

*1 An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

• The VT5 Series does not support connections that use interface level converters (N-48).

*2 Not supported by the VT5-W07M.

*3 38400bit/s can be used only in FR-A700/FR-F700/FR-E700/FR-D700 series.

■ Available devices

The following describes the available devices and range of devices of various converters.

● FREQROL series

For the details of devices, see the manuals.

Type	Device Name	Device Range
Bit Devices	Inverter monitoring state ^{*1}	RSB0 to RSB7
	Operating command ^{*2}	WSB0 to WSB7
	Inverter monitor state (expanded) ^{*1}	RSBe00 to RSBe15
	Operating command (expanded) ^{*2}	WSBe00 to WSBe15
Word Device	Inverter monitoring state ^{*1}	RS0
	Operating command ^{*2}	WS0
	Inverter monitor state (expanded) ^{*1}	RSe0
	Operating command (expanded) ^{*2}	WSe0
	Alarm code ^{*1}	A0 to A7
	Parameter ^{*3}	Pr000 to Pr993
	Special parameters	SP108 to SP127
	Inverter reset ^{*2}	RST0
Parameter emptying /empty all ^{*2}		CLR0

*1 Read special devices.

*2 Write special devices. It is displayed always as "0" during reading.

*3 The parameters that can be monitored on the VT5/VT3 differ with the inverter model. Please refer to the manual of inverters.

Specifying Devices



- Device type : specify in device range.
- Device No : specify in device range.
- Station No : specify in the range of 0-31.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs.

The error messages are shown as follows.

Display message	Causes	How to handle
COM ERROR [NAK ⁽⁺⁺⁾]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of Inverter	For the error code[**], see "Connected Inverter User's Manual".
COM ERROR [Timeout ⁽⁺⁺⁾]	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Inverter is OFF.	Turn the Inverter ON.
	The Inverter side is in error or fault status.	Please clear the error or fault on the Inverter side.
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
COM ERROR [SUM ⁽⁺⁺⁾]	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An overrun occurred in VT5/VT3 receive buffer.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-5 Connection to Inverters from Yaskawa Electric

This section describes how to connect an inverter from Yaskawa Electric to the VT5/VT3 Series.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting an inverter from Yaskawa Electric to the VT5/VT3.

- (1) Make sure that the inverter can be connected to the VT5/VT3.
- (2) Make sure if inverter setting is necessary.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the inverter.

Series Name	Inverters	I/F	Unit Setting	Target PLC
VS mini series	A1000	RS-485	 P.25-43	VS mini series
	V1000			
	J1000			
	VS mini V7			
	VS mini J7			

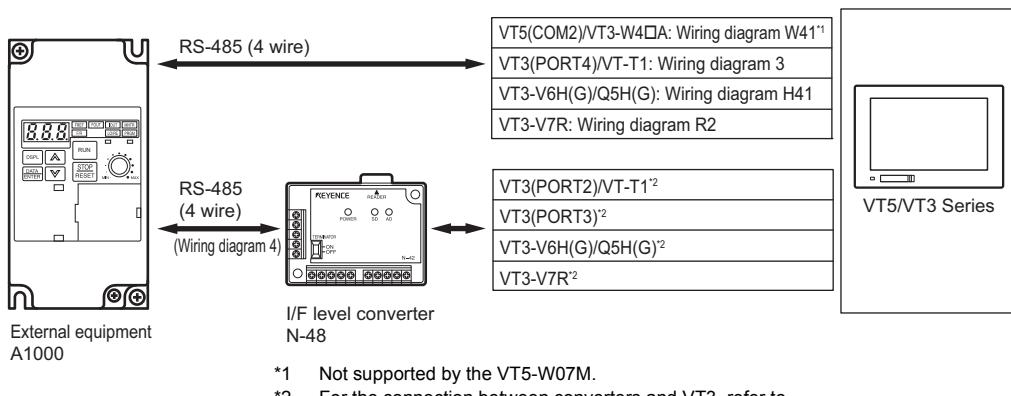


- Not supported by the VT5-W07M.
- Not supported by Soft-VT.

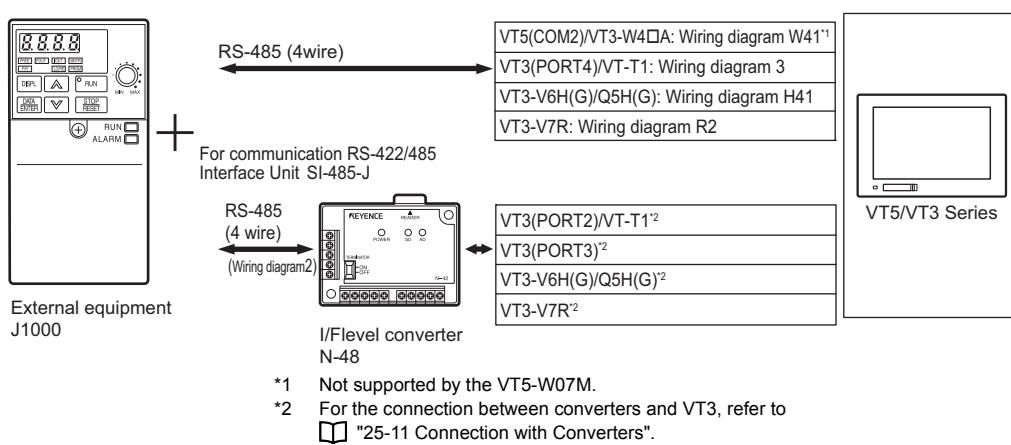
System Configuration

This section describes the system configuration of the VT5/VT3 Series and an inverter from Yaskawa Electric.

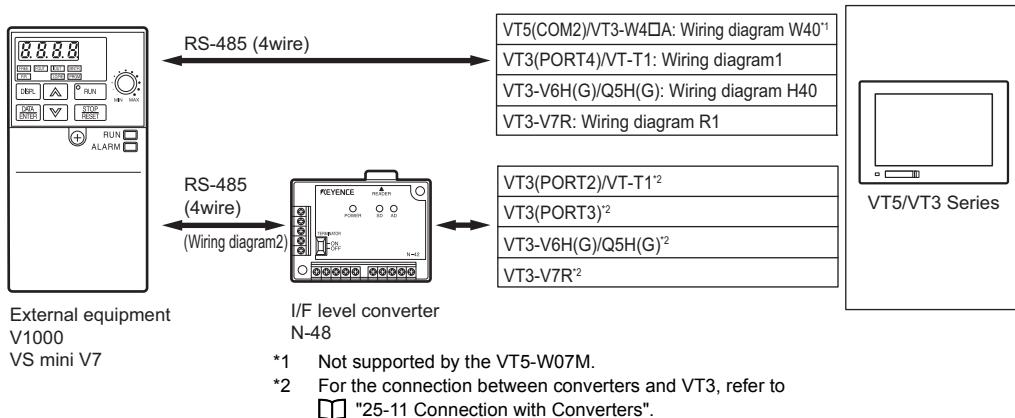
■ A1000



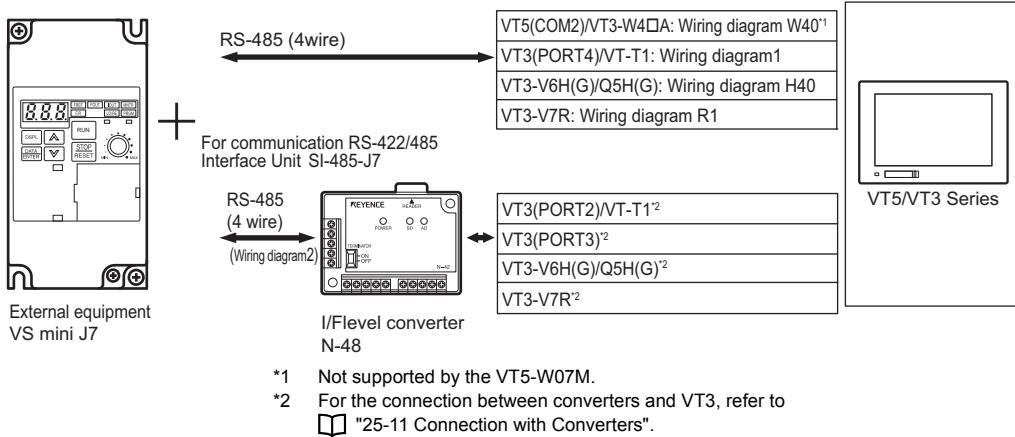
■ J1000



■ V1000, VS mini V7



■ VS mini J7

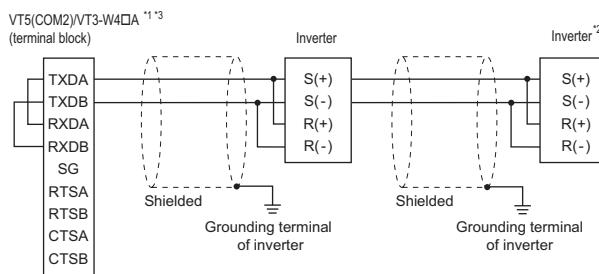


Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

The following describes wiring of connector cables.

The wiring diagram in this manual may be different from that recommended by Yaskawa Electric. But it can still be used for proper operation of the system.

■ Wiring diagram W40 (RS-485: 4-wire)

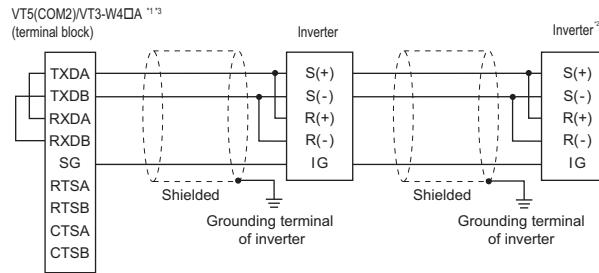


*1 When the VT5/VT3 Series are at the end of the communication line, set the terminator switch (TERM.) to "ON".

*2 Set the terminal resistance switch on the inverter at the end of the communication line to ON.

*3 Not supported by the VT5-W07M.

■ Wiring diagram W41 (RS-485: 4-wire)



*1 When the VT5/VT3 Series are at the end of the communication line, set the terminator switch (TERM.) to "ON".

*2 Set the terminal resistance switch on the inverter at the end of the communication line to ON.

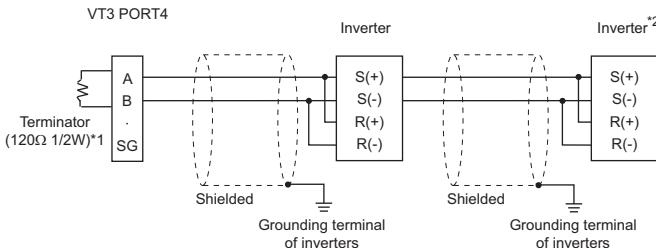
*3 Not supported by the VT5-W07M.

Connection to VT3 Series

The following describes wiring of connector cables.

The wiring diagrams recommended by YASKAWA ELECTRIC may differ from those represented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

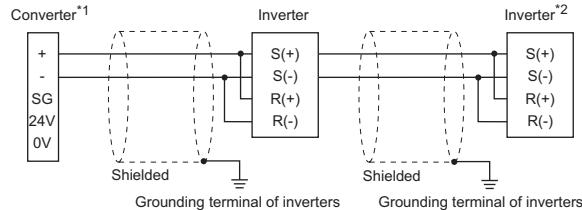
■ Wiring diagram 1 (RS-485: 4-wire)



*1 When VT3 is at one end of communication cable, install termination resistor (120Ω 1/2W) between A and B of PORT4.

*2 For the inverter at one end of communication cable, please set the switch of terminal resistance to ON.

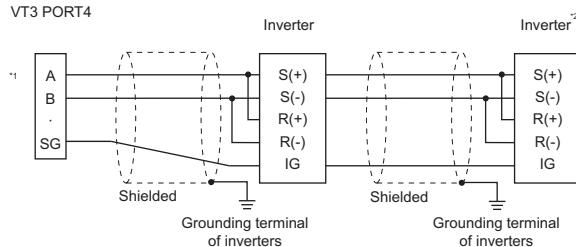
■ Wiring diagram 2 (RS-485: 4-wire)



*1 When the converter is at one end of communication cable, set the terminator switch to ON.

*2 For the inverter at one end of communication cable, please set the switch of terminal resistance to ON.

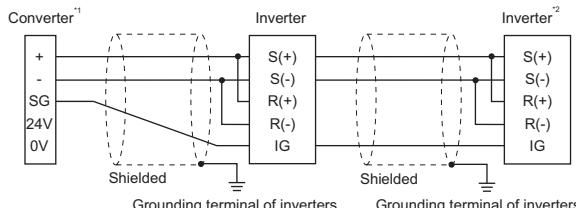
■ Wiring diagram 3 (RS-485: 4-wire)



*1 Connection of terminal resistance is prohibited on VT3 terminal.

*2 Switch of the terminal resistance must be closed for the inverter on communication line terminal.

■ Wiring diagram 4 (RS-485: 4-wire)



*1 Open the terminal switch when the converter is on communication line terminal.

*2 Switch of the terminal resistance must be opened for the inverter on communication line terminal

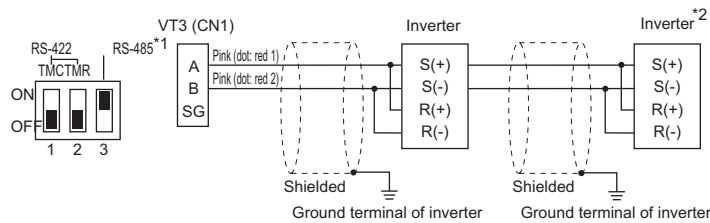
Connection with VT3 Handy Series



For the use of unit connecting cable (OP-87191/87192/87193), please always read "Precautions on Connection", on Page A-8.

■ Wiring diagram H40 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

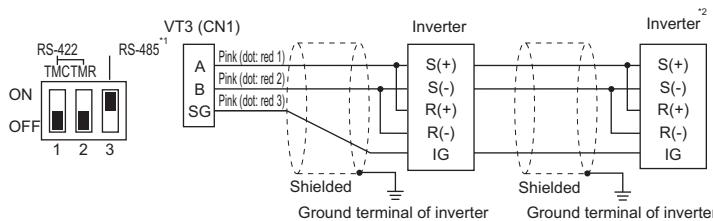


*1 Please set the terminator to ON.

*2 The inverter at communication cable end should be equipped with a terminal resistor ($100\ \Omega$ 1/2W).

■ Wiring diagram H41 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m



*1 Please set the terminator to ON.

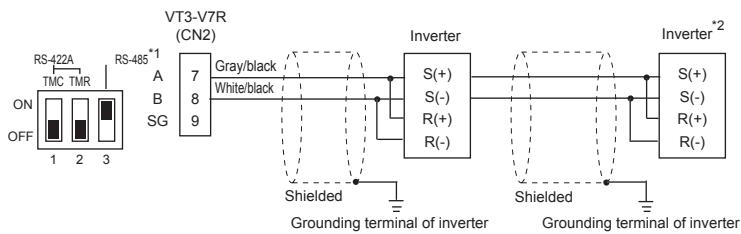
*2 Switch of the terminal resistance must be opened for the inverter on communication line terminal.

Connection to VT3-V7R



When using the connecting cable of the unit (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read "Connection Precautions", page A-13.

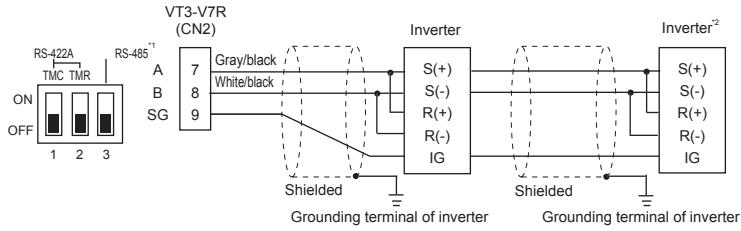
■ Wiring diagram R1 (RS-485: 4-wire)



*1 Set the terminator ON.

*2 Add terminator (100Ω 1/2W) into inverters at one end of communication cable.

■ Wiring diagram R2 (RS-485: 4-wire)



*1 Set the terminator OFF.

*2 Switch of the terminal resistance must be closed for the inverter on communication line terminal.

Unit Settings

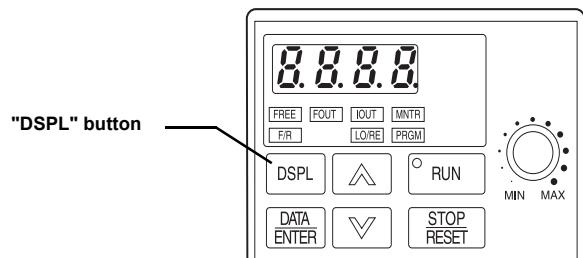
The following describes the settings of the Link Unit matched to the default communications conditions.

■ Communication settings of VS mini V7/VS mini J7

In the following steps, make the inverters in a settable state. Perform communication setting of various items.

1 Set as PRGM mode by pressing "DSPL" button of inverters.

Confirm highlighting of PRGM lamp.



2 Set the value of n001 to "4" for VS mini V7 and the value of n01 to "1" for VS mini J7.

The ex-factory value of n001 and n01 were set to "1" (default value).

Please change the setting items with reference to communication conditions.

For the setting methods, refer to operating instructions of various equipments.

Item	Installation items		Setting Range	Default
	VS mini V7	VS mini J7		
Communication station No.	n153	n70	0 to 32	0 ¹
Baud rate	n154	n71	0 :2400 1 :4800 2 :9600 3 :19200 bit/s	2
Parity	n155	n72	0 :Even 1 :Odd 2 :None	0
Send waiting time	n156	n73	10 to 65ms	10
RTS control	n157	n74	0 :with RTS control 1 :without RTS control	0 ²

*1 No communication is possible in the initial value "0". Be sure to make settings in the range of 1-31.

*2 Be sure to set as "0".

25-5 Connection to Inverters from Yaskawa Electric

● When inverters are controlled from the VT5/VT3

Inverter setting

To control an inverter from the VT5/VT3, first make communication settings. Then check that communications between the VT5/VT3 and the inverter are possible before performing the following settings.

Item	Setting items		Setting Range	Default	Set value
	VS mini V7	VS mini J7			
Optional operating commands	n003	n02	0 :Operator 1 :Control circuit terminal 2 :MEMBUS communication 3 :Communication card(optional)	0	2 ¹
Optional frequency commands	n004	n03	0 :Speech volume 1 :Frequency command 2 :Control circuit terminal(voltage 0 to 10V) 3 :Control circuit terminal(Current 4 to 20mA) 4 :Control circuit terminal(current 0 to 20mA) 5 :Burst 6 :MEMBUS communication 7 :Operator circuit terminal(voltage 0 to 10v) 8 :Operator circuit terminal(current 4 to 20mA) 9 :Communication card(optional)	0	6 ²

*1 When the operating command is set to something other than "2", the inverter cannot be controlled using VT5/VT3 commands.

*2 When the frequency command is set as "6", the value of 0002H stored in the register is changed to setting frequency.

■ Communication Setting of A1000/V1000/J1000

When inverter is set to settable status, the setting items can be changed according to communication conditions.

For more information, please refer to user's manual of specific equipments.

Item	V1000/A1000/J1000 setting items	Setting range	Default
Communication station No.	H5-01	00 to 20(H)	1F(H) ¹
Baud rate	H5-02	0: 1200 1: 2400 2: 4800 3: 9600 4: 19200 5: 38400 6: 57600 ³ 8: 115200bps ³	3
Parity	H5-03	0: None 1: Even 2: Odd	0
Waiting time for sending messages	H5-06	05 to 65ms	5
RTS control	H5-07	0: RTS control disabled (RTS always ON) 1: RTS control enabled (RTS is ON only during sending messages)	1 ²

*1 When a station No. "0" is set, communications between the inverter and the VT5/VT3 Series are disabled. The setting range must be within 1 to 1F(H) (1 to 31: decimal).

*2 Be sure to set to "0". Otherwise, communication is impossible.

*3 57600bps and 115200bps are unavailable for J1000.

● When inverters are controlled from the VT5/VT3

Setting of inverter

To control an inverter from the VT5/VT3, first make communication settings. Then check that communications between the VT5/VT3 and the inverter are possible before performing the following settings.

Item	V1000/A1000/J1000 setting item	Setting range	Default	Set value
Frequency command selection 1	b1-01	0: Operator 1: Control circuit terminal (analog input) 2: MEMOBUS communication 3: Option card ^{*3} 4: Example of pulse ^{*4}	1	2^{*1}
Operation command selection 1	b1-02	0: Operator 1: Control circuit terminal (analog input) 2: MEMOBUS communication 3: Option card ^{*4}	1	2^{*2}
Frequency command selection 2 ^{*5}	b1-15	0: Operator 1: Control circuit terminal (analog input) 2: MEMOBUS communication 3: Option card 4: Example of pulse	0	2^{*1}
Operation command selection 2 ^{*5}	b1-16	0: Operator 1: Control circuit terminal (analog input) 2: MEMOBUS communication 3: Option card	0	2^{*2}

*1 0002H of holding register becomes the set frequency when frequency command selelection 2 is set.

*2 When the operating command is set to something other than "2", the inverter cannot be controlled using VT5/VT3 commands.

*3 For J1000, it is "3: Frequency setting volume unit (option)".

*4 It is displayed only when V1000/A1000 is used.

*5 The parameter that can be set only for V1000/A1000.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● VS mini series

Item	Setting Range	Default
PLC I/F	RS-232C ^{*1} , RS-485 ^{*2}	RS-485
Communication protocols	MEMOBUS RTU	--
Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 bit/s	9600 bit/s
Data bit Length	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	None, Odd, Even	Even
Flow Control	ER control	ER control
CheckSum	--	--
CR	--	--
LF	--	--

*1 • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.
• The VT5 Series does not support connections that use interface level converters (N-48).

*2 The VT5-W07M does not support RS-485 connections.

■ Available devices

The following describes the available devices and range of devices of various converters.

● VS mini series

For the details of devices, see the manuals.

type	Device Name	Device Range
Bit Devices	--	-- ^{*1}
Word Devices	Hold register	0000 to 195C ^{*2}

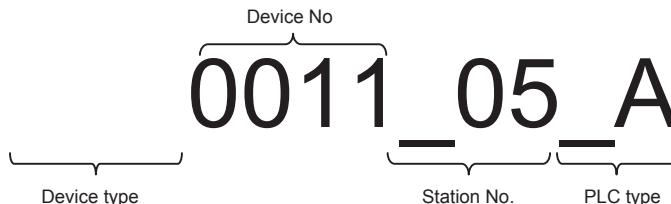
*1 Bit device cannot be used.
(the word device can be used as bit device if it's treated as bit.)

*2 Device No. is expressed by hexadecimal number.



- Do not use the 16 bits (one word unit) containing the trigger bit device on a PLC and the VT5/VT3 when the "Reset trigger bit device" in VT STUDIO is used.
- Available devices are restricted depending on product model. For details, see manual of each model.

Specifying Devices



- Device type : set as blank in the absence of device type.
- Device No. : specify by 4-bit hexadecimal number in the device range.
- Station No. : specify in the range of 1-31.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of Inverter	For the error code["*"], see "Connected Inverter User's Manual".
Time Out Error (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Inverter is OFF.	Turn the Inverter ON.
	The Inverter side is in error or fault status.	Please clear the error or fault on the Inverter side.
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
CRC Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An error occurred in the VT5/VT3 receive buffer.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-6 Connection to Inverters from Fuji Electric

This section describes how to connect an inverter from Fuji Electric Co., Ltd. to the VT5/VT3.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting an inverter from Fuji Electric Co., Ltd. to the VT5/VT3.

- (1) Make sure that the inverter can be connected to the VT5/VT3.
- (2) Make sure if inverter setting is necessary.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the inverter.

Series Name	Inverters	I/F	Unit Setting	Target PLC
FRENIC-Multi Series	FRENIC-Multi (RJ connector direct link) FRENIC-Multi+OPC-E1-RS (RS485 communication card)	RS-485	P.25-59	FVR-E11S series
FRENIC-Mini Series	FRENIC-Mini+OPC-C1-RS (RS485 communication card)	RS-485	P.25-57	
FVR-E11S series	FVR-E11S	RS-485	P.25-58	

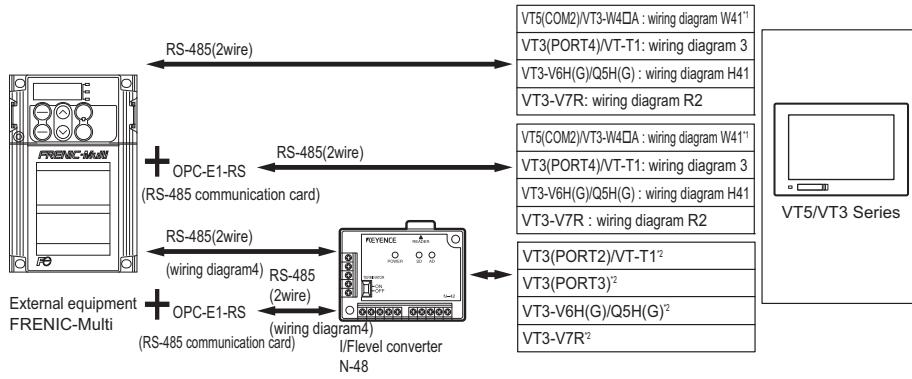


- Not supported by the VT5-W07M.
- Not supported by Soft-VT.

System Configuration

This section describes the system configuration of the VT5/VT3 Series and an inverter from Fuji Electric Co., Ltd.

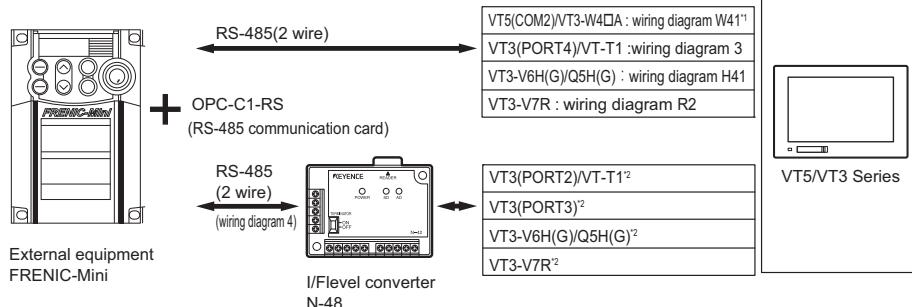
■ FRENIC-Multi



*1 Not supported by the VT5-W07M.

*2 For the connection of converters and VT3, refer to "25-11 Connection with Converters".

■ FRENIC-Mini



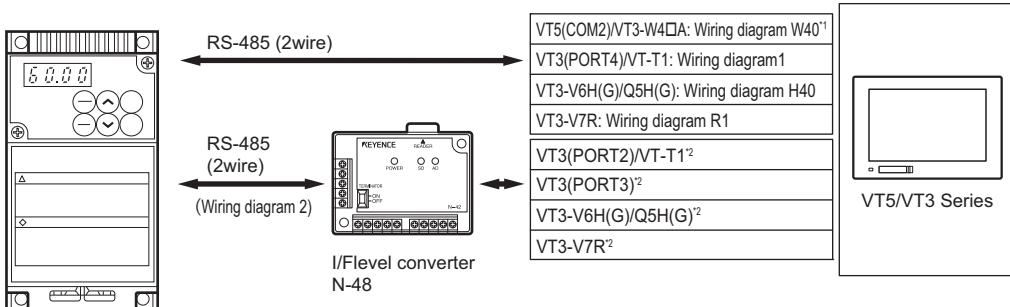
*1 Not supported by the VT5-W07M.

*2 For the connection of converters and VT3, refer to "25-11 Connection with Converters".

- VT5, VT3 Series/Soft-VT/DT Series PLC Connection Manual -

25-6 Connection to Inverters from Fuji Electric

■ FVR-E11S



External equipment
FVR-E11S

*1 Not supported by the VT5-W07M.

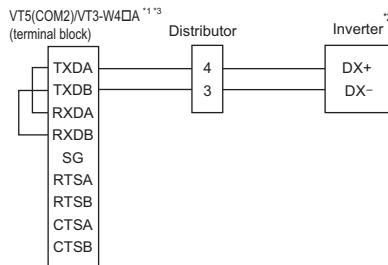
*2 For the connection between converters and VT3, refer to □ "25-11 Connection with Converters".

Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

The following describes wiring of connector cables.

The wiring diagram in this manual may be different from that recommended by Fuji Electric. But it can still be used for proper operation of the system.

■ Wiring diagram W40 (RS-485: 2-wire)



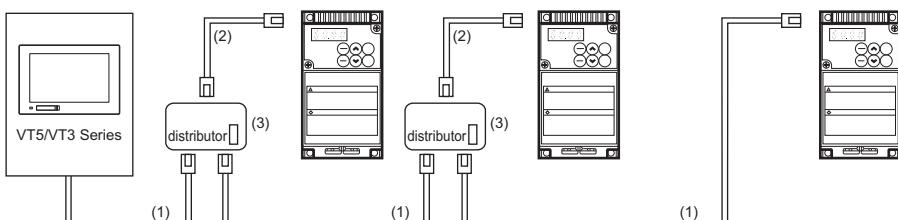
*1 Set terminator switch (TERM.) to ON.

*2 Set the terminator switch to ON in the inverter at one end of communication cable.

*3 Not supported by the VT5-W07M.



Refer to the following diagram to connect the FVR-E11S Series inverter to the VT5/VT3.

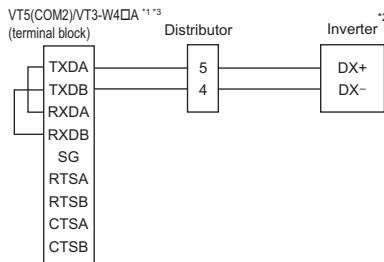


Item	Model	Manufacturer	Remarks
(1)	Cable	-	-
(2)	Cable	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	Distributor	MS8-BA-JJJ SK KOHKI	Cables (10BASE-T cable etc.) compliant with EIA568



- Be sure to place the VT5/VT3 at the terminal.
- Max. branch line length (cable for (2)) is 5m.
- The terminator switch must be set to ON when using terminal inverter.
- Max. trunk line length (total for (1)) is 500m.

■ Wiring diagram W41 (RS-485: 2-wire)



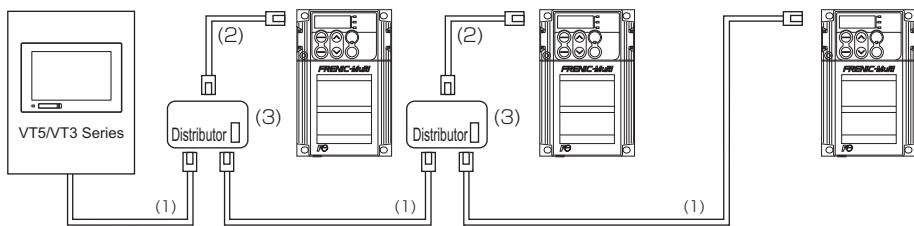
*1 Set terminator switch (TERM.) to ON.

*2 Set the the terminator switch to ON in the inverter at one end of communication cable.

*3 Not supported by the VT5-W07M.



Refer to the following diagram to connect the FRENIC-Multi and FRENIC-Mini to the VT5/VT3.



	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(2)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI	



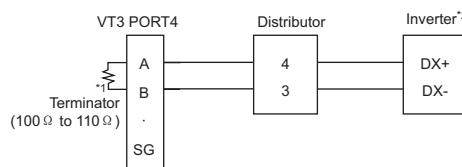
- Be sure to place the VT5/VT3 at the terminal.
- Max. branch line length (cable for (2)) is 1m.
- The terminator switch must be set to ON when using terminal inverter.
- Max. trunk line length (total for (1)) is 500m.

Connection to VT3 Series

The following describes wiring of connector cables.

The wiring diagrams recommended by Fuji Electric may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-485: 2-wire)

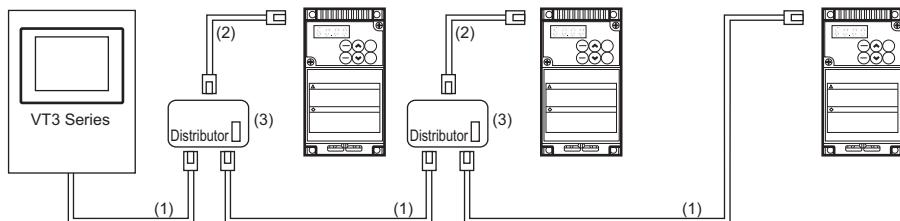


*1 Add terminator (100Ω to 110Ω).

*2 Set terminator switch to ON in the inverter at one end of communication cable.

Reference

The following diagram shall be referenced when FVR-E11S series inverters are connected to VT3.

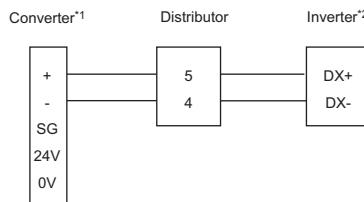


	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI	

Point

- Be sure to configure VT3 at the termination.
- The maximum length of branch line(cable of (2)) is 1m.
- Set terminator switch to ON in the terminal inverters.
- The maximum length of trunk line (total of (1)) is 500m.

■ Wiring diagram 2 (RS-485: 2-wire)

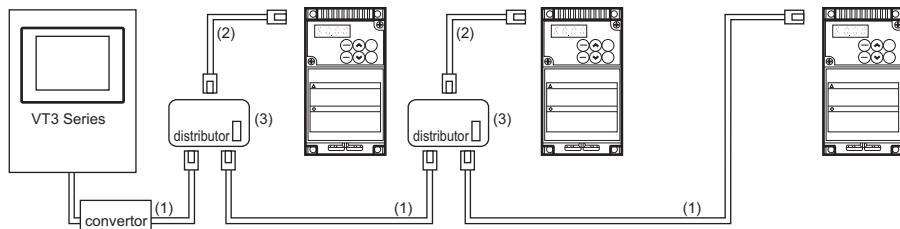


*1 Set the terminator ON.

*2 Set terminator switch to ON in the inverter at one end of communication cable.

Reference

The following diagram shall be referenced when FVR-E11S series inverters are connected to VT3.

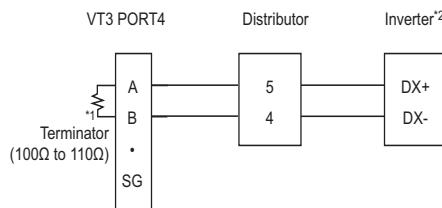


Item	Model	Manufacturer	Remarks
(1)	Cable	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI

Point

- Be sure to configure VT3 at the termination.
- The maximum length of branch line (cable of (2)) is 1m.
- Set terminator switch to ON in the terminal inverters.
- The maximum length of trunk line (total of (1)) is 500m.

■ Wiring diagram 3 (RS-485: 2-wire)

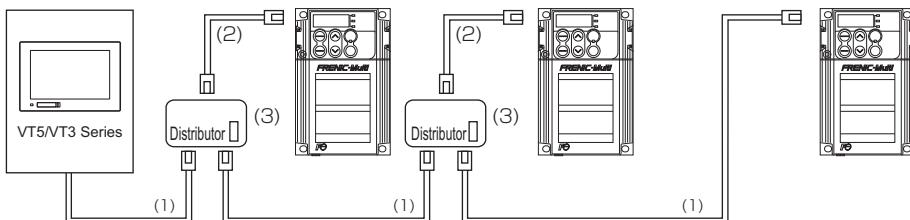


*1 Add a terminator (100Ω to 110Ω).

*2 Set the terminator switch to ON in the inverter at one end of communication cable.

Reference

The following diagram shall be referenced when the inverter FRENIC-Multi or FRENIC-Mini is connected to VT3.

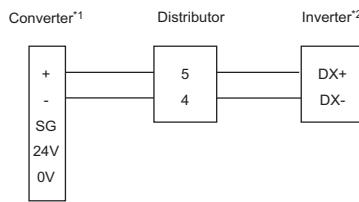


Item	Model	Manufacturer	Remarks
(1)	Cable	-	Cables (10BASE-T cable etc.) compliant with EIA568
(2)	Cable	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI

Point

- Be sure to connect VT3 at the termination.
- Max. branch line length (cable for (2)) is 1m.
- The terminator switch must be set to ON when using terminal inverter.
- Max. trunk line length (total for (1)) is 500m.

■ Wiring diagram 4 (RS-485: 2-wire)

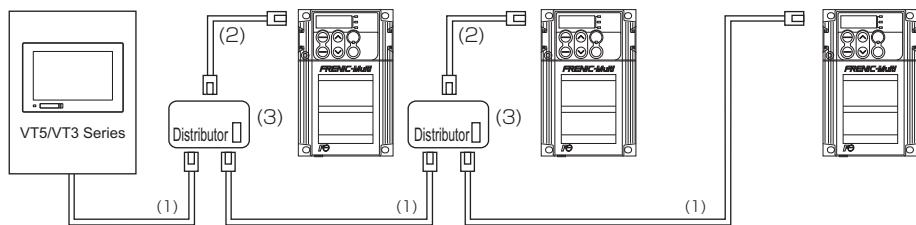


*1 Set the terminator ON.

*2 Set terminator switch to ON in the inverter at one end of communication cable.



The following diagram shall be referenced when the inverter FREMIC-Multi or FRENIC-Mini is connected to VT3.



	Items	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(2)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	distributor	MS8-BA-JJJ	SK KOHKI	



- Be sure to connect VT3 at the termination.
- Max. branch line length (cable for (2)) is 1m.
- The terminator switch must be set to ON when using terminal inverter.
- Max. trunk line length (total for (1)) is 500m.

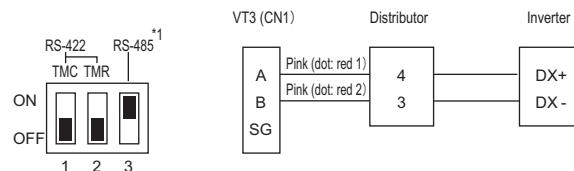
Connection with VT3 Handy Series



Point For the use of unit connecting cable (OP-87191/87192/87193), please always read "Precautions on Connection", on Page A-13.

■ Wiring diagram H40 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

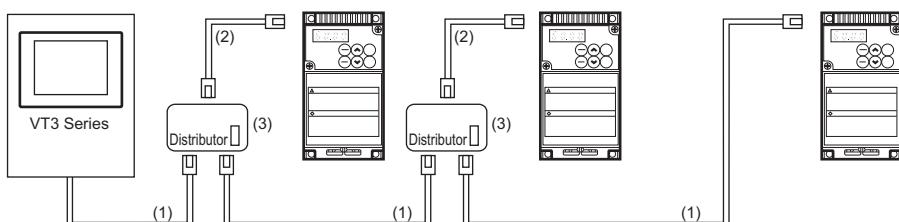


*1 Please set the terminator to ON.

*2 For the inverter on one end of the communication cable, set the terminal resistor switch to ON.



For the connection of VT3 with FVR-E11S Series inverter, please refer to the diagram below.



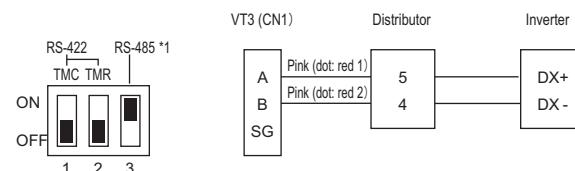
	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables(10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI	



- Be sure to configure VT3 at the termination.
- The maximum length of branch line(cable of (2)) is 1m.
- Set terminator switch to ON in the terminal inverters.
- The maximum length of trunk line (total of (1)) is 500m.

■ Wiring diagram H41 (RS-485: 2-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m



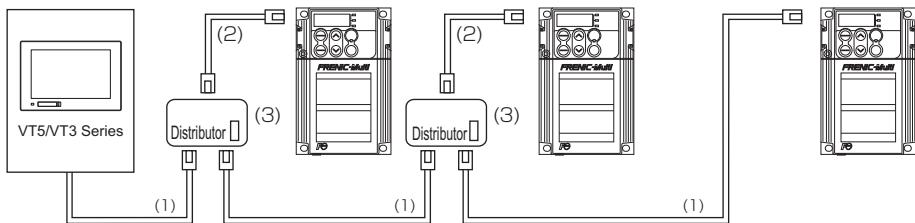
*1 Please set the terminator to ON.

*2 For the inverter on one end of the communication cable, set the terminal resistor switch to ON.



When connecting FREMIC-Multi or FRENIC-Mini inverters to VT3, please refer to the following diagram.

25-6 Connection to Inverters from Fuji Electric



Item	Model	Manufacturer	Remarks
(1)	Cable	-	Cables(10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	SK KOHKI	

Point

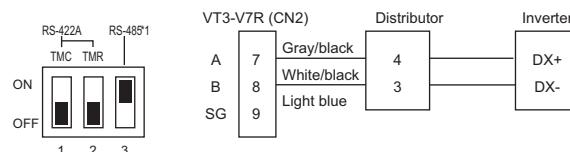
- Be sure to configure VT3 at the termination.
- The maximum length of branch line(cable of (2)) is 1m.
- Set terminator switch to ON in the terminal inverters.
- The maximum length of trunk line (total of (1)) is 500m.

Connection to VT3-V7R

Point

When using the connecting cable of the unit (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read "Connection Precautions", page A-13.

■ Wiring diagram R1 (RS-485: 2-wire)

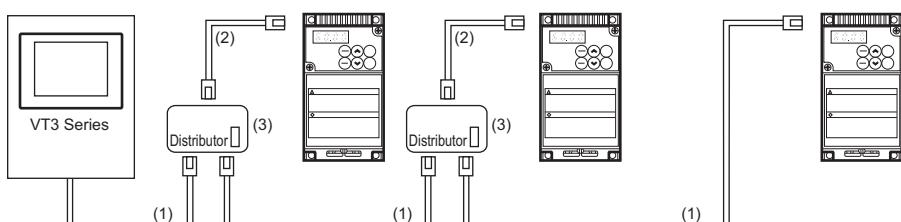


*1 Set the terminator ON.

*2 Set terminator switch to ON in the inverter at one end of communication cable.

Reference

The following diagram shall be referenced when FVR-E11S series inverters are connected to VT3.

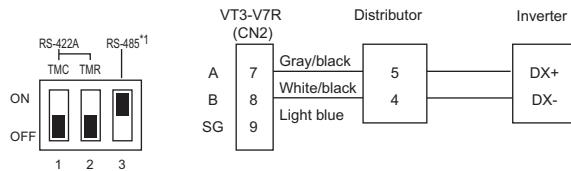


Item	Model	Manufacturer	Remarks
(1)	Cable	-	Cables(10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI

Point

- Be sure to configure VT3 at the termination.
- The maximum length of branch line(cable of (2)) is 1m.
- Set terminator switch to ON in the terminal inverters.
- The maximum length of trunk line (total of (1)) is 500m.

■ Wiring diagram R2 (RS-485: 2-wire)

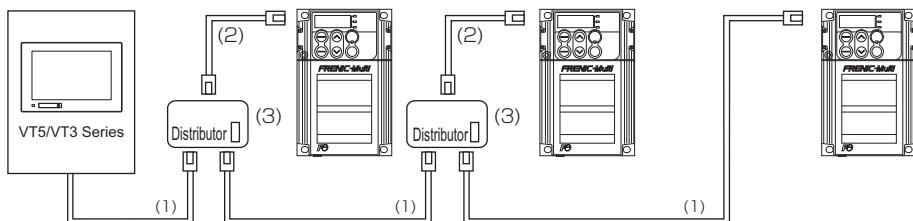


*1 Set the terminal load to ON.

*2 Set the terminator switch to ON in the inverter at one end of communication cable.

Reference

When connecting FREMIC-Multi or FRENIC-Mini inverters to VT3, please refer to the following diagram.



	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(2)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	Distributor	MS8-BA-JJJ	SK KOHKI	

Point

- Be sure to connect VT3 at the termination.
- Max. branch line length (cable for (2)) is 1m.
- The terminator switch must be set to ON when using terminal inverter.
- Max. trunk line length (total for (1)) is 500m.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ Setting of FRENIC-Multi

Perform communication setting for each item after setting inverter to settable status as following steps.
For the setting methods, refer to operating instructions of specific equipment.

Item	Setting device	Setting range	Default
RS-485 setting 1			
		Setting Monitor Frequency setting Operation command	
Linking function	H30	0 O F01/C30 F02 1 O RS-485 communication F02 2 O F01/C30 RS-485 communication 3 O RS-485 communication RS-485 communication 4 O RS-485 communication (option) F02 5 O RS-485 communication (option) RS-485 communication 6 O F01/C30 RS-485 communication (option) 7 O RS-485 communication RS-485 communication (option) 8 O RS-485 communication (option) RS-485 communication (option)	0 ^{*1}
Station No.	y01	1 to 255	1
Operation in the case of error	y02	0 :Instant Er8 tripping 1 :Continuous operation within timer time, Er8 trip after timer time ^{*2} 2 :Continuous operation within timer time and retrying. Er8 trip without communication error after timer time; otherwise, continue to operate. 3 :Continuous operation	0
Instant error handling	y03	0.0 to 60.0s	2.0
Baud rate	y04	0 :2400bps 1 :4800bps 2 :9600bps 3 :19200bps 4 :38400bps	3 ^{*3}
Data length	y05	0 :8bit 1 :7bit	0
Parity bit	y06	0 :None (for RTU, stop bit: 2 bits) 1 :Even parity (for RTU, stop bit: 1 bit) 2 :Odd parity (for RTU, stop bit: 1 bit) 3 :None (for RTU, stop bit: 1 bit)	0
Stop bit	y07	0 :2 bits 1 :1 bit	0
Communication interruption detection time	y08	0 :Not detect 1 to 60s	0
Response time interval	y09	0.00 to 1.00s	0.01
Protocol selection^{*3}	y10	0 :Modbus RTU protocol 1 :SX protocol (loader protocol) 2 :Fuji general inverter protocol	1 ^{*4}
RS-485 setting 2			
		Setting Monitor Frequency setting Operation command	
Operation in the case of error	y12	0 :Instant Er8 tripping 1 :Continuous operation within timer time, Er8 trip after timer time ^{*2} 2 :Continuous operation within timer time and retrying. Er8 trip without communication error after timer time; otherwise, continue to operate. 3 :Continuous operation	0
Instant error handling	y13	0.0 to 60.0s	2.0
Baud rate	y14	0 :2400bps 1 :4800bps 2 :9600bps 3 :19200bps 4 :38400bps	3 ^{*3}
Data length	y15	0 :8 bits 1 :7 bits	0
Parity bit	y16	0 :None (for RTU, stop bit: 2 bits) 1 :Even parity (for RTU, stop bit: 1 bit) 2 :Odd parity (for RTU, stop bit: 1 bit) 3 :None (for RTU, stop bit: 1 bit)	0
Stop bit	y17	0 :2 bits 1 :1 bit	0
Communication interruption detection time	y18	0 :Not detect 1 to 60s	0
Response time interval	y19	0.00 to 1.00s	0.01
Protocol selection^{*4}	y20	0 :Modbus RTU protocol 2 :Fuji general inverter protocol	0 ^{*4}

25-6 Connection to Inverters from Fuji Electric

- *1 Set to "3" to control an inverter from the VT5/VT3 when it is connected using an RJ45 connector. Set to "8" to control an inverter from the VT5/VT3 when connected using an OPC-E1-RS (RS-485 communication card).
- *2 Communication is retried within the timer time. In case the error still remains in communication, Er8 trips after the timer time.
- *3 Select communication speed among "2:9600bps", "3:19200bps (default)", and "4:38400bps".
- *4 Be sure to select "Fuji general inverter protocol".

■ Setting of FRENIC-Mini

Perform communication setting for each item after setting inverter to settable status as following steps.
For the setting methods, refer to operating instructions of specific equipment.

Item	Setting device	Setting range				Default	
		Setting	Monitor	Frequency setting	Operation command		
Linking function	H30	0	O	x	x	0 ¹	
		1	O	RS-485 communication	x		
		2	O	x	RS-485 communication		
		3	O	RS-485 communication	RS-485 communication		
O: can be set : x: can not be set							
Station No.	y01	1 to 31					
Operation in the case of error	y02	0 :Instant Er8 tripping 1 :Continuous operation within timer time, Er8 trip after timer time ² 2 :Continuous operation within timer time and retrying. Er8 trip without communication error after timer time; otherwise, continue to operate. 3 :Continuous operation					
Instant error handling	y03	0.0 to 60.0s					
Baud rate	y04	0 :2400bps 1 :4800bps 2 :9600bps 3 :19200bps					
Data length	y05	0 :8 bits 1 :7 bits					
Parity bit	y06	0 :None 1 :Even parity 2 :Odd parity 3 :None					
Stop bit	y07	0 :2 bits 1 :1 bit					
Communication interruption detection time	y08	0 :Not detect 1 to 60s					
Response time interval	y09	0.00 to 1.00s					
Protocol selection⁴	y10	0 :Modbus RTU protocol 1 :SX protocol (loader protocol) 2 :Fuji general inverter protocol					

*1 Set to "3" to control an inverter from the VT5/VT3.

*2 Communication is retried within the timer time. In case the error still remains in communication, Er8 trips after the timer time.

*3 Select communication speed among "2:9600bps" and "3:19200bps (default)".

*4 Be sure to select "Fuji general inverter protocol".

■ Communication settings of FVR-E11S

In the following steps, make the inverters in a settable state. Perform communication setting of various items. For the setting methods, refer to operating instructions of various equipment.

Item	Setting Device	Setting Range				Default
		Setting	Monitoring	Frequency command	Operating command	
Linking function	H30	0	○	x	x	0 ^{*1}
		1	○	○	x	
		2	○	x	○	
		3	○	○	○	
○:Settable x: Not settable						
PLC No.	H31	1 to 31				1
Operation in the case of error	H32	0 :instantaneous Er8 trip 1 :Er8 trip after timed operation of timer ^{*2} 2 :Continuous operation				0
Instant error handling	H33	0.0 to 60.0s				2.0
Baud rate	H34	0 :19200 1 :9600 2 :4800 3 :2400				1
Data length	H35	0 :8 1 :7 bits				0
Parity bit	H36	0 :None 1 :Even 2 :Odd				0
Stop bit	H37	0 :1 1 :2 bits				0
Communication interruption detection time	H38	0 to 60s				0
Response time interval	H39	0.00 to 1.00s				0.01

*1 Set to "3" to control an inverter from the VT5/VT3.

*2 Retry communication within timed operation of timer. In the absence of communication feedback, Er8 short-circuit occurs after timed operation of timer.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● FVR-E11S series

Item	Setting Range	Default
PLC serial interface	RS-232C ^{*1} , RS-485 ^{*2}	RS-485
Communication protocols	Polling/option	--
Baud rate	1200,2400,4800,9600,19200,38400 bit/s	9600 bit/s
Data bit	7 bits, 8 bits	8 bits
Stop bit	1 bit, 2 bits	1 bit
Parity	Without, odd, even	None
Flow Control	ER control	ER control
CheckSum	--	--
CR	--	--
LF	--	--

*1 • An interface level converter (N-48) must be used when RS-232C is selected on the VT3 Series.

• The VT5 Series does not support connections that use interface level converters (N-48).

*2 The VT5-W07M does not support RS-485 connections.

■ Available devices

The following describes the available devices and range of devices of various converters.

For the details of devices, see the manuals.

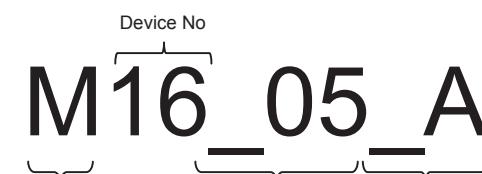
Type	Device Name	Device Range
Bit Devices	Alarm reset	m0 ^{*1}
	Basic Function	F00 to F51 ^{*2}
	Terminal Function	E01 to E99
	Control Function	C01 to C53
	Motor 1	P01 to P99
	High-level function	H01 to H98
Word Devices		A01 to A46
	Motor 2	J01 to J92 y01 to y99 o00 to o29
	Command data	S01 to S14
	Monitoring data	M01 to M73 W01 to W96 X00 to X74 Z00 to Z64

*1 Please write into special devices.

*2 Read special devices.

 The devices are located at inverter side. Data format is defined for every device No. For the details, refer to the operating instruction of inverters.

Specifying Devices



Device type

- Device type : specify in device range.
- Device No. : specify by 4-bit hexadecimal number in the device range.
- Station No. : specify in the range of 1-31.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
COM ERROR [NAK**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of Inverter	For the error code[**], see "Connected Inverter User's Manual".
COM ERROR [Timeout(++)]	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Inverter is OFF.	Turn the Inverter ON.
	The Inverter side is in error or fault status.	Please clear the error or fault on the Inverter side.
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
COM ERROR [SUM(++)]	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An error occurred in the VT5/VT3 receive buffer.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the inverter and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-7 Connection to Inverters from OMRON

This section describes how to connect the inverters from OMRON to VT3.

Checks to Perform before Making Connections

Here, make sure the necessary items used for connecting VT3 to inverters from OMRON.

- (1) Make sure that VT3 can be connected to inverters.
- (2) Make sure if inverter setting is necessary.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the inverter.

Series Name	Inverters	I/F	Unit Setting	Target PLC
SYS DRIVE 3G3MV series	3G3MV-A□	RS-485	P.25-65	SYS DRIVE 3G3MV series *1 *2

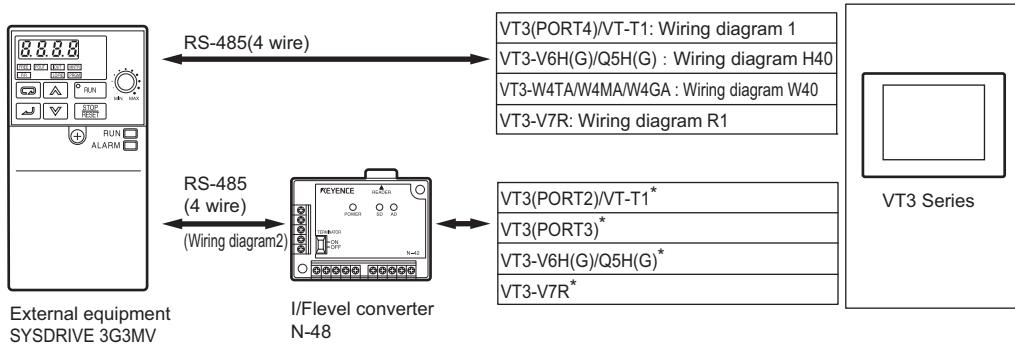
*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

System Configuration

The following describes the system composition of VT3 series and inverters from OMRON.

■ SYSDRIVE 3G3MV Series



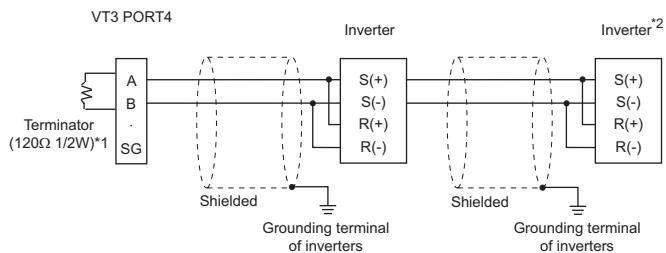
* For the connection between converters and VT3, refer to
 "25-11 Connection with Converters".

Connection to VT3 Series

The following describes wiring of connector cables.

The wiring diagrams recommended by OMRON may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

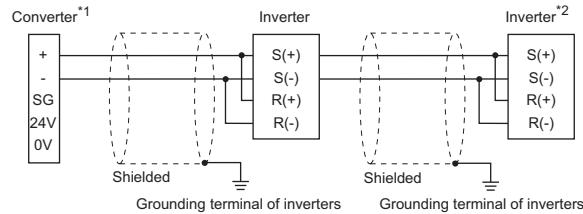
■ Wiring diagram 1 (RS-485: 4-wire)



*1 When VT3 is at one end of communication cable, install termination resistor (120Ω 1/2W) between A and B of PORT4.

*2 For the inverter at one end of communication cable, please set the switch of terminal resistance to ON.

■ Wiring diagram 2 (RS-485: 4-wire)



*1 When the converter is at one end of communication cable, set the terminator switch to ON.

*2 For the inverter at one end of communication cable, please set the switch of terminal resistance to ON.

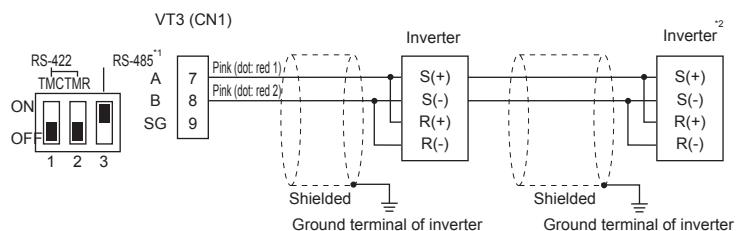
Connection with VT3 Handy Series



When unit connecting cable (OP-87191/87192/87193) is used for connection, please always read "Precautions on Connection", on Page A-8.

■ Wiring diagram H40 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m



*1 Set the terminator to ON.

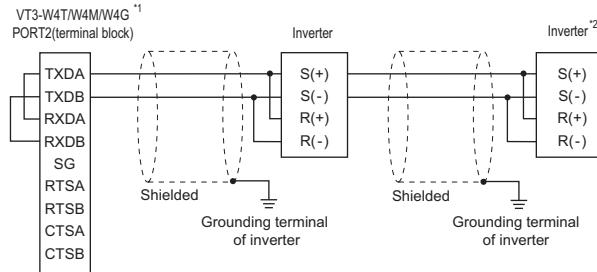
*2 The Inverter at communication cable end should be equipped with a terminal resistor

Connection to VT3-W4TA/W4MA/W4GA

The following describes wiring of connector cables.

The wiring diagram in this manual may be different from that recommended by OMRON. But it can still be used for proper operation of the system.

■ Wiring diagram W40 (RS-485: 4-wire)



*1 Set the terminator switch (TERM.) to ON when VT3 is at the end of communication line.

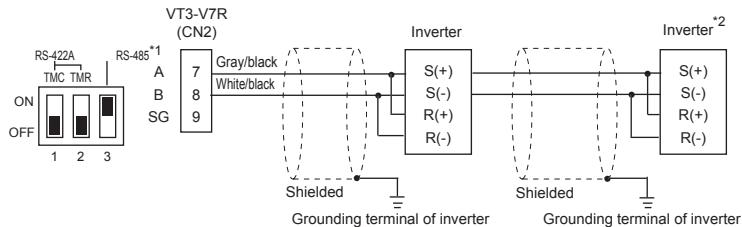
*2 The switch of termination resistor must be set to ON when the inverter at the end of communications line is used.

Connection to VT3-V7R



When using the connecting cable of the unit (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read "Connection Precautions", page A-13.

■ Wiring diagram R1 (RS-485: 4-wire)



*1 Set the terminator ON.

*2 Add terminator (100Ω 1/2W) into inverters at one end of communication cable.

Unit Settings

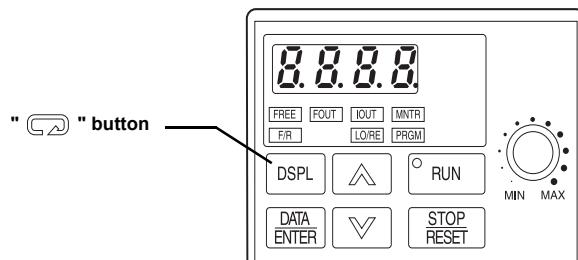
The following describes the settings of the Link Unit matched to the default communications conditions.

■ SYSDRIVE 3G3MV Series

In the following steps, make the inverters in a settable state. Perform communication setting of various items.

1 Set as PRGM mode by pressing " " button of inverters.

Confirm highlighting of PRGM lamp.



2 Set the value of n001 to "4".

The ex-factory value of n001 were set to "1" (default value).

Please change the setting items with reference to communication conditions.

For the setting methods, refer to operating instructions of various equipments.

Item	Installation items	Setting Range	Default
Communication station No.	n153	0 to 32	0 ^{*1}
Baud rate	n154	0 :2400 1 :4800 2 :9600 3 :19200 bit/s	2
Parity	n155	0 :Even 1 :Odd 2 :None	0
Send waiting time	n156	10 to 65ms	10
RTS control	n157	0 :with RTS control 1 :without RTS control	0 ^{*2}

*1 No communication is possible in the initial value "0". Be sure to make settings in the range of 1-31.

*2 Be sure to set as "0".

- When inverters are controlled from VT3

Inverter setting

When inverters are controlled from VT3, communication settings shall be required at first. When VT3 and inverters are in communication state, make the following settings.

Item	Setting items	Setting Range	Default	Set value
Optional operating commands	n003	0 :Operator 1 :Terminal (Multi-function input) 2 :RS-422/485 Communication 3 :Option (DeviceNet Communication)	0	2 ¹
Optional frequency commands	n004	0 :Speech volume 1 :Frequency command 2 :Control terminal(voltage 0 to 10V) 3 :Control terminal(Current 4 to 20mA) 4 :Control terminal(current 0 to 20mA) 5 :Burst 6 :RS-422/485 Communication 7 :Analog voltage input(voltage 0 to 10v) 8 :Analog current input(current 4 to 20mA) 9 :Option (DeviceNet Communication)	0	6 ²

*1 When the operating command is set other than "2", the operating command for inverters cannot be performed from VT3.

*2 When the frequency command is set as "6", the value of 0002H stored in the register is changed to setting frequency.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● SYSDRIVE 3G3MV series

Item	Setting Range	Default
PLC I/F(Port no.)	RS-232C(PORT2, PORT3) [*] , RS-485(PORT4)	RS-485(PORT4)
Communication protocols	MEMOBUS RTU	--
Baud rate	2400,4800,9600,19200 bit/s	9600 bit/s
Data bit Length	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	None, Odd, Even	Even
Flow Control	ER control	ER control
CheckSum	--	--
CR	--	--
LF	--	--

* Be sure to use I/F level converter when RS-232C is selected. Be sure to use I/F level converter when RS-232C is selected.

■ Available devices

The following describes the available devices and range of devices of various converters.

● SYSDRIVE 3G3MV series

For the details of devices, see the manuals.

type	Device Name	Device Range
Bit Devices	--	-- ^{*1}
Word Devices	Hold register	0001 to 01B3 ^{*2}

*1 Bit device cannot be used.

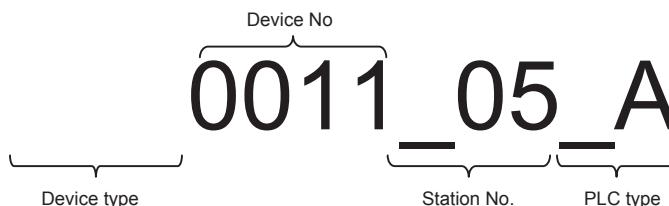
(the word device can be used as bit device if it's treated as bit.)

*2 Device No. is expressed by hexadecimal number.



- Bit16 (in word units) including trigger bit device cannot be used for PLC and VT3 when using "Reset trigger bit device" function set on VT STUDIO.
- Available devices are restricted depending on product model. For details, see manual of each model.

Specifying Devices



- Device type : set as blank in the absence of device type.
- Device No. : specify by 4-bit hexadecimal number in the device range.
- Station No. : specify in the range of 1-31.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
Error [**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of Inverter	For the error code[**], see "Connected Inverter User's Manual".
Time Out Error (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Inverter is OFF.	Turn the Inverter ON.
	The Inverter side is in error or fault status.	Please clear the error or fault on the Inverter side.
	Communication setting error.	Keep the communication settings consistent between Inverter and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
CRC Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between Inverter and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between Inverter and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between Inverter and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Inverter.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between Inverter and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Communication Error	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-8 Connection to Servo Amplifiers from MITSUBISHI ELECTRIC

This section describes how to connect the servo amplifiers from MITSUBISHI ELECTRIC to VT3.

Checks to Perform before Making Connections

Here, make sure the necessary items used for connecting VT3 to inverters from MITSUBISHI ELECTRIC.

- (1) Make sure that VT3 can be connected to servo amplifiers.
- (2) Make sure if servo amplifier setting is necessary.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the target device.

Series Name	Servo amplifiers	I/F	Unit Setting	Target PLC
MR-J3 series	MR-J3-□A	RS-422A ^{*1}	 P.25-76	MELSERVO series ^{*2 *3}
MR-J2S series	MR-J2S-□A			

^{*1} Communication through equivalent RS-485 is made possible by means of wiring.

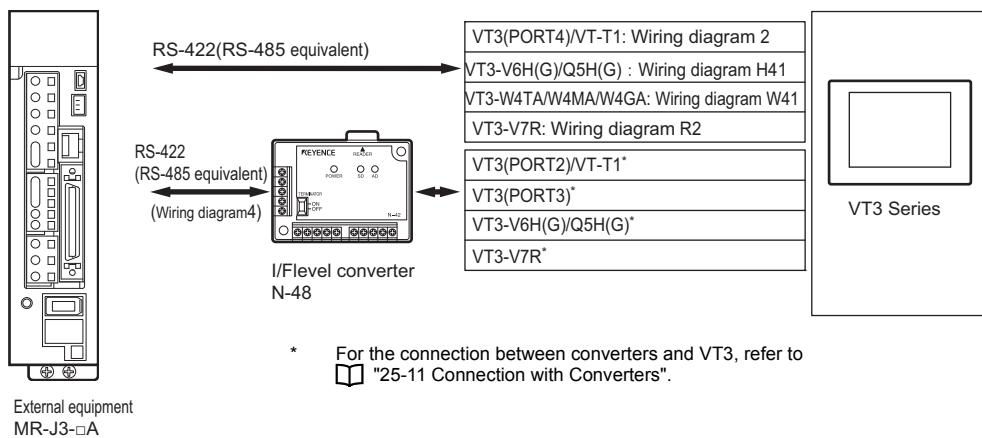
^{*2} Not supported by the VT5 Series.

^{*3} Not supported by Soft-VT.

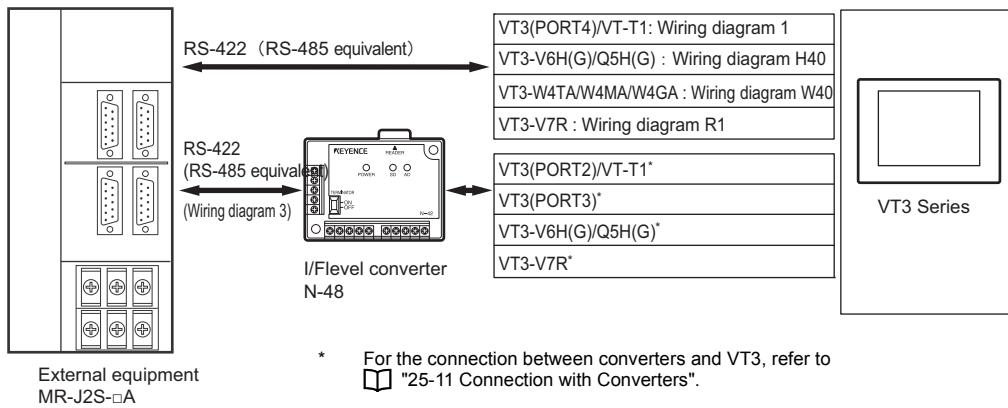
System Configuration

Connection to servo amplifiers from MITSUBISHI ELECTRIC

■ MR-J3 series



■ MR-J2S series



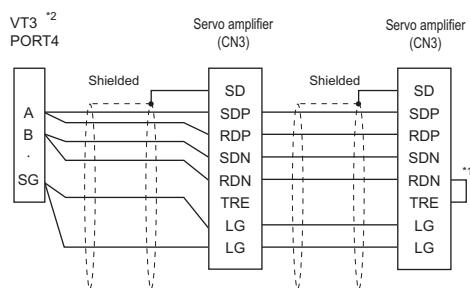
25-8 Connection to Servo Amplifiers from MITSUBISHI ELECTRIC

Connection to VT3 Series

The following describes wiring of connector cables.

The wiring diagrams recommended by MITSUBISHI ELECTRIC may differ from those presented in this manual. There will, however, be no problems if wiring is performed according to the wiring diagrams in this manual.

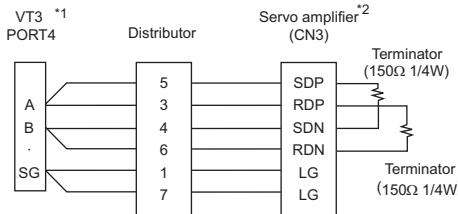
■ Wiring diagram 1 (RS-422A: 4-wire)



*1 Make short-circuit of RDN-TRE for servo amplifier at one end of communication cable.

*2 Terminal resistor not allowed at VT3 side.

■ Wiring diagram 2 (RS-422A: 4-wire)

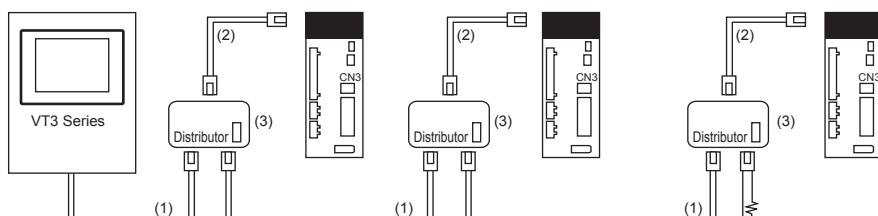


*1 Terminal resistor not allowed at VT3 side.

*2 Add terminal resistance into inverters at one end of communication cable(150Ω 1/4W).



The following diagram shall be referenced when CN3 ports of MR-J3 series servo amplifiers are connected to VT3.

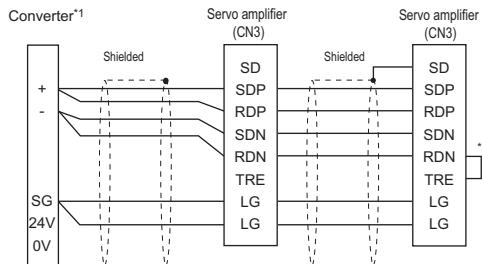


	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	BMJ-8	Hachiko Electric	Without terminator



- Be sure to configure VT3 at the termination.
- Cut down the branch line (cable of (2)) as short as possible.
- Add terminal resistor 150W (1/4W) at the terminal distributor. If communication is unstable, remove the terminal resistor.
- The maximum length of trunk line (total of (1)) is 15m.

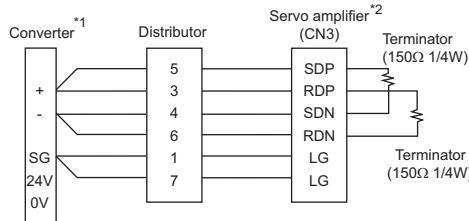
■ Wiring diagram 3 (RS-422A:4-wire)



*1 Set the terminator switch ON even if the converter is at one end of communication cable.

*2 Make short-circuit of RDN-TRE for servo amplifier at one end of communication cable.

■ Wiring diagram 4 (RS-422A:4-wire)

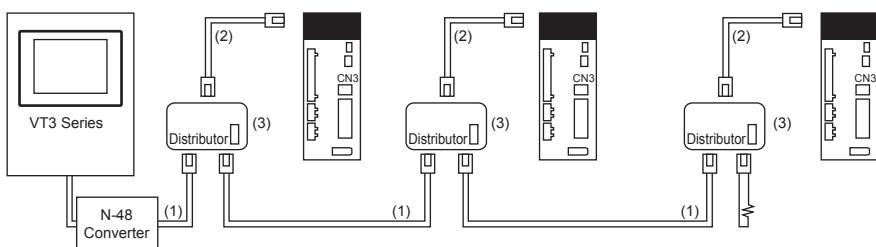


*1 Set the terminator OFF.

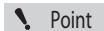
*2 Add terminal resistance into inverters at one end of communication cable.
(150Ω 1/4W)



The following diagram shall be referenced when CN3 ports of MR-J3 series servo amplifiers are connected to VT3.



	Item	Model No.	Manufacturer	Remarks
(1)	Cables	-	-	Reference to EIA 568 cables(10BASE-T cable, etc)
(2)	Cables	-	-	Reference to EIA 568 cables(10BASE-T cable, etc)
(3)	Distributor	BMJ-8	Hachiko Electric	With terminal resistor



- Be sure to configure VT3 into the terminal.
- Please cut down the branch line (cable of (2)) as short as possible.
- Please add terminal resistor 150W (1/4W) at the terminal distributor.
- If the communication is unstable, remove the terminal resistor.
- The maximum length of trunk line (sum of (1)) is 15m.

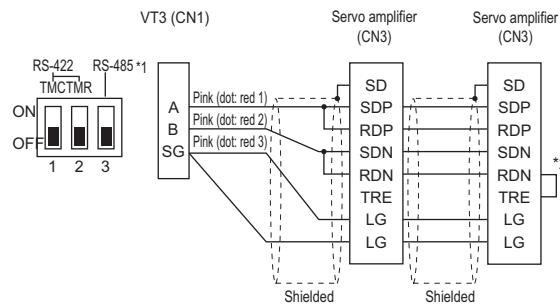
Connection with VT3 Handy Series

Point

For the use of unit connecting cable (OP-87191/87192/87193), please always read "Precautions on Connection", on Page A-13.

■ Wiring diagram H40 (RS-485: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

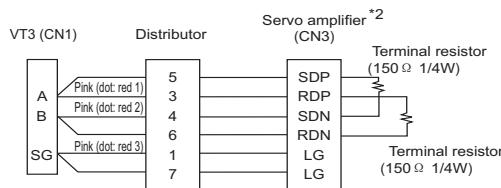


*1 Set the terminator to OFF.

*2 Make short-circuit of RDN-TRE for servo amplifier at one end of communication cable.

■ Wiring diagram H41 (RS-422A: 4-wire)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m

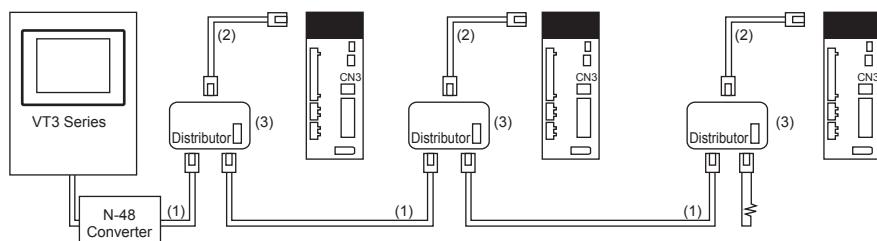


*1 Set the terminator to OFF.

*2 The Inverter at communication cable end should be equipped with a terminal resistor.

Reference

When the CN3 port on MR-J3 Series servo amplifier is connected to VT3, please use the following wiring diagram.



	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(2)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	Distributor	BMJ-8	Hachiko Electric	Without terminator

Point

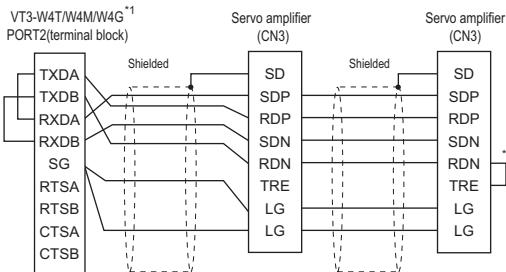
- Be sure to connect VT3 at the termination.
- Cut down the branch line (cable of (2)) as short as possible.
- A terminator 150W (1/4W) needs to be connected for the terminal distributor. If communication is unstable, remove the terminator.
- Max. trunk line length (total for (1)) is 15m.

Connection to VT3-W4TA/W4MA/W4GA

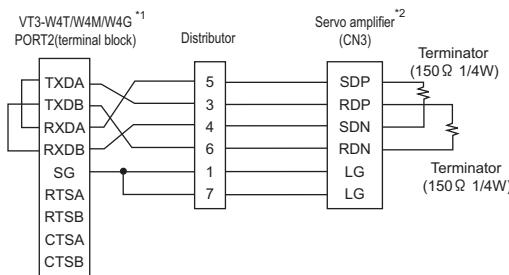
The following describes wiring of connector cables.

The wiring diagram in this manual may be different from that recommended by Yaskawa Electric. But it can still be used for proper operation of the system.

■ Wiring diagram W40 (RS-422A: 4-wire)

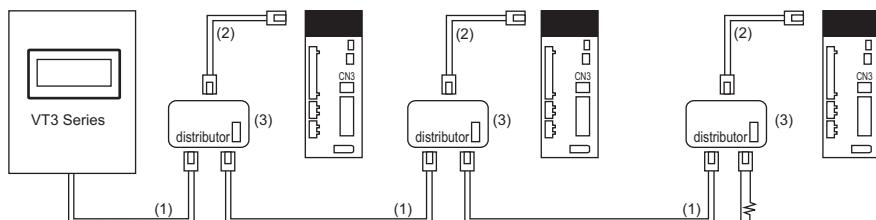


■ Wiring diagram W41 (RS-422A: 4-wire)



Reference

When the CN3 port on MR-J3 Series servo amplifier is connected to VT3, please use the following wiring diagram.



	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(2)	Cable	-	-	Cables (10BASE-T cable etc.) compliant with EIA568
(3)	Distributor	BMJ-8	Hachiko Electric	Without terminator

Point

- Be sure to connect VT3 at the termination.
- Cut down the branch line (cable of (2)) as short as possible.
- A terminator 150W (1/4Ω) needs to be connected for the terminal distributor. If communication is unstable, remove the terminator.
- Max. trunk line length (total for (1)) is 15m.

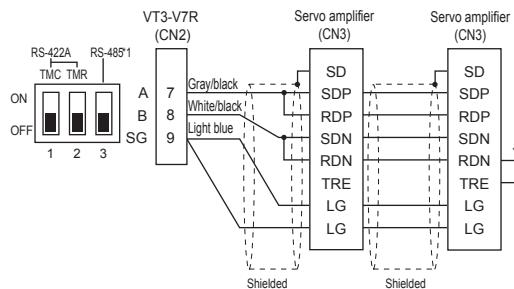
25-8 Connection to Servo Amplifiers from MITSUBISHI ELECTRIC

Connection to VT3-V7R



When using the connecting cable of the unit (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read "Connection Precautions", page A-13.

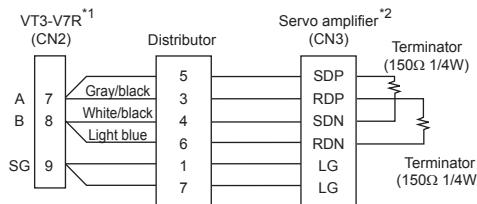
■ Wiring diagram R1 (RS-485: 4-wire)



*1 Set the terminator OFF.

*2 Make short-circuit of RDN-TRE for servo amplifier at one end of communication cable.

■ Wiring diagram R2 (RS-422A: 4-wire)

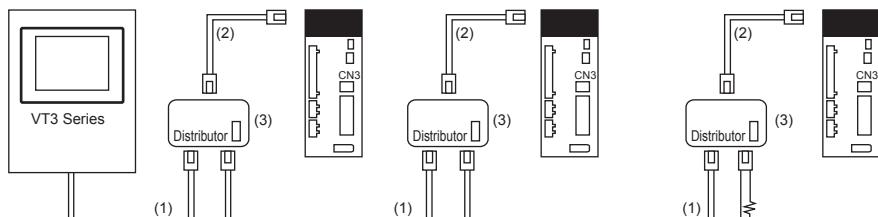


*1 Set the terminator OFF.

*2 Add terminal resistance into inverters at one end of communication cable.
(150Ω 1/4W)



The following diagram shall be referenced when CN3 ports of MR-J3 series servo amplifiers are connected to VT3.



	Item	Model	Manufacturer	Remarks
(1)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(2)	Cable	-	-	Cables (10BASE-T cable, etc) compliant with EIA 568
(3)	Distributor	BMJ-8	Hachiko Electric	Without terminator



- Be sure to configure VT3 at the termination.
- Cut down the branch line (cable of (2)) as short as possible.
- Add terminator 150Ω ($1/4W$) at the terminal distributor. If communication is unstable, remove the terminator.
- The maximum length of trunk line (total of (1)) is 15m.

Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.



Be sure to turn power on again after the settings of parameters. Otherwise, communication is impossible in the case of any change of communication-related parameters.

25

■ Communication settings of MR-J3

For the setting methods, refer to operating instructions of various devices.

Item	Parameter No.	Setting Range	Default
Communication station No.	PC20	0 to 31	0
Baud rate, communication response delay	PC21	0100 :9600bit/s, Enabled 0110 :19200bit/s, Enabled 0120 :38400bit/s, Enabled 0130 :57600bit/s, Enabled 0140 :115200bit/s, Enabled	0000*1

*1 Be sure to set PC21 as either one of 0100, 0110, 0120, 0130 and 0140. Communication with V32 is impossible in the case of settings other than this range.

■ Communication settings of MR-J2S

For the setting methods, refer to operating instructions of various equipment.

Item	Parameter No.	Setting Range	Default
Communication station No.	PRM15	0 to 31	0
Communication speed, communication selection, communication response delay	PRM16	1100 :9600bit/s, RS-422, Enabled 1101 :19200bit/s, RS-422, Enabled 1102 :38400bit/s, RS-422, Enabled 1103 :57600bit/s, RS-422, Enabled	0000*1

*1 Be sure to set PRM16 within the range of 1100 to 1103. Communication with V32 is impossible in the case of settings other than this range.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● MELSERVO series

Item	Setting Range	Default
PLC I/F(Port no.)	RS-232C(PORT2,PORT3) ^{*1} , RS-485(PORT4) ^{*2}	RS-485(PORT4)
Communication protocols	Start/stop synchro-half duplex mode(ASCII format)	--
Baud rate	9600,19200,38400,57600,115200 ^{*3} bit/s	9600 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	Even	Even
Flow Control	ER control	ER control
CheckSum	--	--
CR	--	--
LF	--	--

*1 Be sure to use I/F level converter(N-48) when RS-232C is selected.

*2 Serial I/F of servo amplifier is RS-422A. Communication through equivalent RS-485 is made possible by means of wiring.

*3 Don't select when MR-J2S A series are connected.

■ Available devices

The following describes available devices and device range of various servo amplifiers.

● MR-J3 series

For the details of devices, see the manuals.

Type	Device Name	Device Range
Bit Devices	Special functions ^{*1}	SP0 to SP6
	Status	ST00 to ST16
	Basic setting parameters(RAM)	PA01 to PA19
	Gains filter parameters(RAM)	PB01 to PB45
	Extended setting parameters(RAM)	PC01 to PC50
	I/O setting parameters(RAM)	PD01 to PD30
	Basic setting parameters(EEP-ROM)	PA01 to PA19
	Gains filter parameters(EEP-ROM)	PB01 to PB45
	Extended setting parameters(EEP-ROM)	PC01 to PC50
	I/O setting parameters(EEP-ROM)	PD01 to PD30
Word Devices	Alarm	AL000 to AL235 ^{*2}
	Input Status	DI0 to DI2
	Output Status	DO0 to DO1

*1 Write special devices.

*2 Please use alarms in the following device ranges. Some errors may occur in VT3 if devices other than this range are used.

Device No.	Function
AL000	Current alarm No.
AL001	Current detailed alarm data
AL011 to AL025	Details in the case of occurrence of alarm
AL200 to AL205	Log alarm No.
AL210 to AL215	Time of occurrence of log alarm
AL230 to AL235	Detailed data of log alarm

● MR-J2S series

For the details of devices, refer to operating instructions of various equipment.

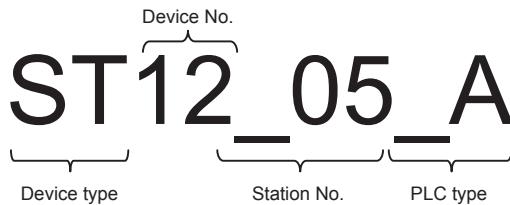
Type	Device Name	Device Range
Bit Devices	Special functions ^{*1}	SP0 to SP6
	Status	ST00 to ST16
	Parameter(RAM)	PRM00 to PRM90
	Parameter(EEP-ROM)	PRM00 to PRM90
	Alarm	AL000 to AL235 ^{*2}
	Input Status	D10 to D12
	Output Status	DO0 to DO1

*1 Write special devices.

*2 Please use alarms in the following device ranges. Some errors may occur in VT3 if devices other than this range are used.

Device No.	Function
AL000	Current alarm No.
AL001	Current detailed alarm data
AL011 to AL025	Details in the case of occurrence of alarm
AL200 to AL205	Log alarm No.
AL210 to AL215	Time of occurrence of log alarm
AL230 to AL235	Detailed data of log alarm

Specifying Devices



- Device type : specify in device range.
- Device No. : specify in device range.
- Station No. : specify in the range of 0-31.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
COM ERROR [ERR ^{*(++)}]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[*]: Error code of Servo amplifier	For the error code[*], see "Connected Servo amplifier User's Manual".
COM ERROR [Timeout ⁽⁺⁺⁾]	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Servo amplifier is OFF.	Turn the Servo amplifier ON.
	The Servo amplifier side is in error or fault status.	Please clear the error or fault on the Servo amplifier side.
	Communication setting error.	Keep the communication settings consistent between Servo amplifier and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
COM ERROR [SUM ⁽⁺⁺⁾]	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between Servo amplifier and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Servo amplifier.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between Servo amplifier and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	The receive buffer of VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between Servo amplifier and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Servo amplifier.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between Servo amplifier and VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
COM ERROR [RecvData ⁽⁺⁺⁾]	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-9 Connection to Robots from IAI

This section describes how to connect a robot from IAI to the VT5/VT3.

Checks to Perform before Making Connections

The following describes how to check the items required for connecting a robot from IAI to the VT5/VT3.

- (1) Make sure that VT5/VT3 can be connected to the robot.
- (2) Make sure if robot setting is necessary.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the target device.

Series Name	Robot	I/F	Unit Setting	Target PLC
ROBO CYLINDER Series	PCON series ACON series SCON series	RS-485 ^{*1}	P.25-88	ROBO CYLINDER Series(1:N) ^{*2}
ROBONET Series	RACON series RPCON series			
X-SEL Control Series	X-SEL, P-SEL, A-SEL, S-SEL	RS-232C	P.25-89	X-SEL series ^{*2}

^{*1} PORT4 of VT3 cannot be used when "ROBO CYLINDER series" are connected. Please connect to PORT2 or PORT3 using RS-485-RS-232C converters from "A".

^{*2} Not supported by Soft-VT.



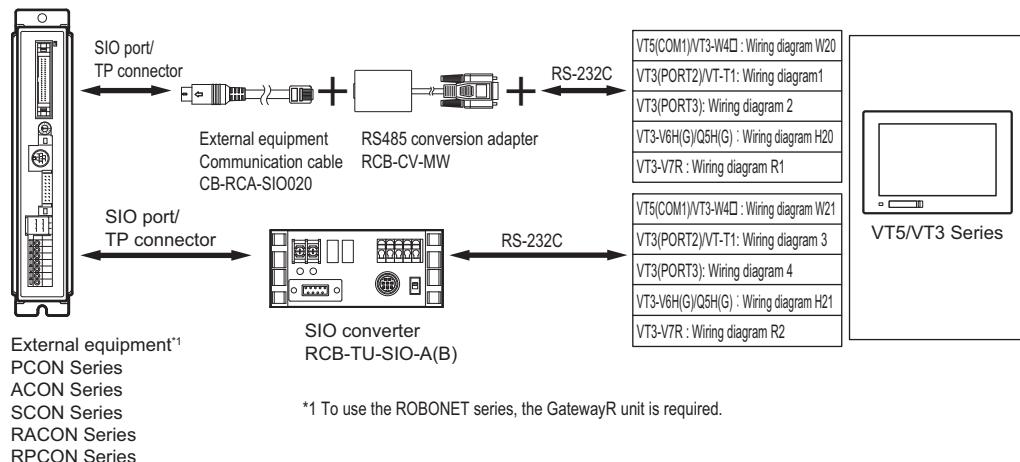
I/F level converter from Keyence cannot be used when connecting to "ROBO CYLINDER series" or "ROBONET series".

"RCB-CV-MW" or "RCB-TU-SIO" converter from IAI must be used.

System Configuration

This section describes the configuration of the VT5/VT3 Series and a robot system from IAI.

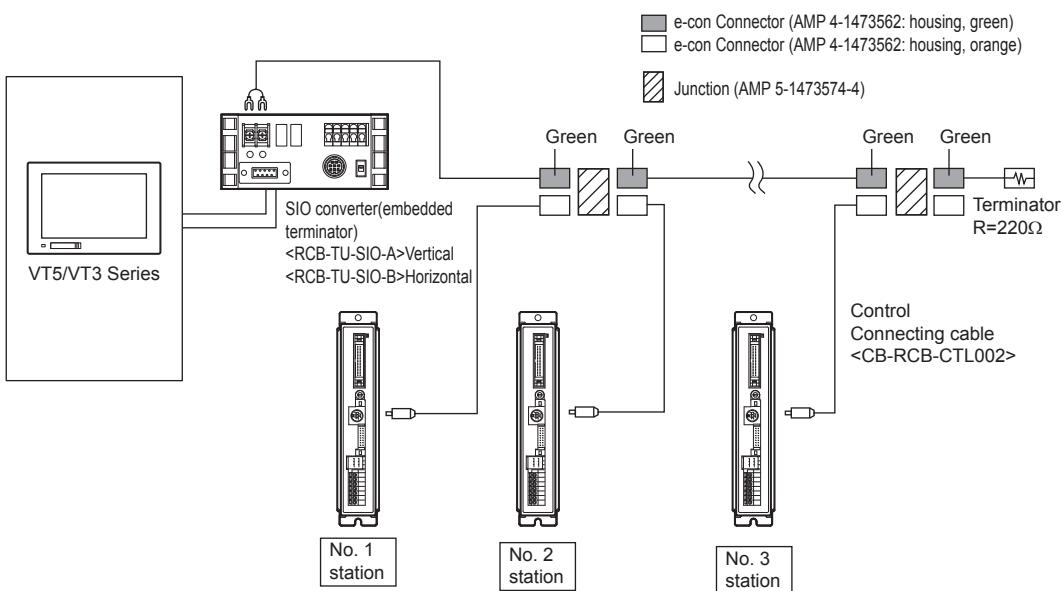
■ ROBO CYLINDER series, ROBONET series



*1 To use the ROBONET series, the GatewayR unit is required.



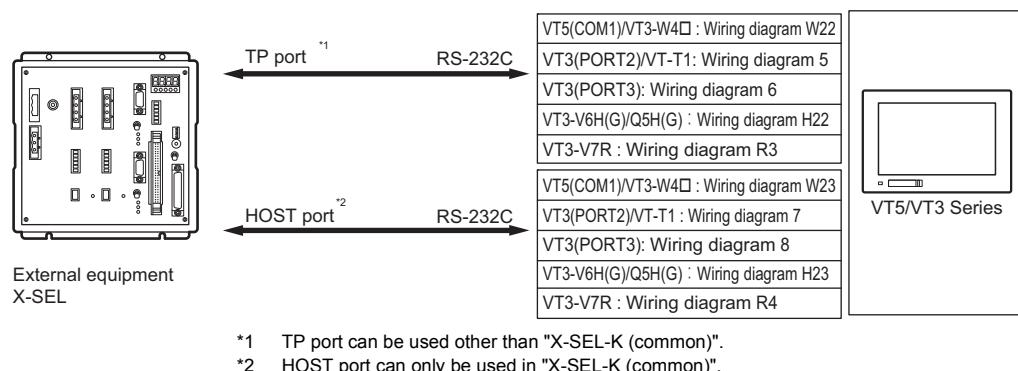
The following diagram shall be referenced when SIO converters RCB-TU-SIO-A(B) are connected to ROBO CYLINDER series or ROBONET series.



- Be sure to use the IAI RCB-CV-MW or RCB-TU-SIO RS-485↔RS-232C converter to connect the ROBO CYLINDER Series or the ROBONET Series to the VT5/VT3 Series. Don't use I/F level converter "N-48" from KEYENCE.
- Use an SIO converter to connect the ROBO CYLINDER Series and ROBONET Series to the VT5/VT3 Series in an 1:N configuration.
- The SIO converter cannot be connected when the VT5/VT3 Series is connected to a teaching box.
- Cannot be connected to VT3-W4TA/W4MA/W4GA.

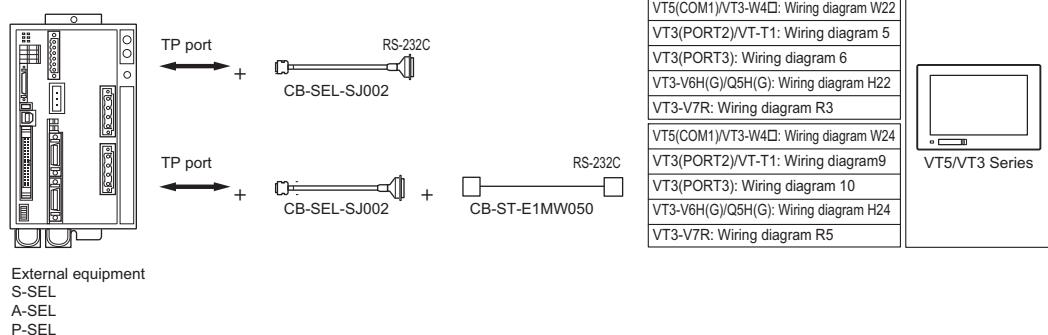
25-9 Connection to Robots from IAI

■ X-SEL controller series



Cannot be connected to VT3-W4TA/W4MA/W4GA.

■ P-SEL, A-SEL, S-SEL controller series



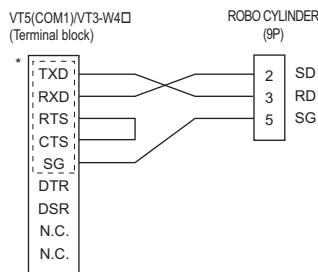
Cannot be connected to VT3-W4TA/W4MA/W4GA.

Connection to VT5 Series (COM1) and VT3-W4□ (RS-232C)

The following describes wiring of connector cables.

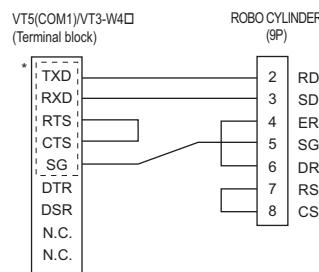
The wiring diagrams recommended by "IAI" may differ from those presented in this manual. There will, however, be no problems for wiring according to the wiring diagrams in this manual.

■ Wiring diagram W20(RS-232C)



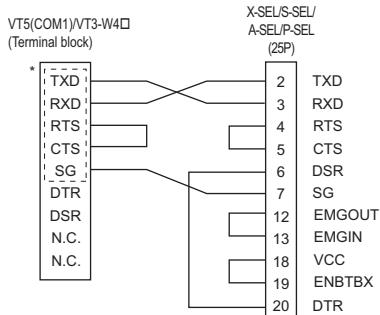
* [] indicates a terminal diagram for the VT5.

■ Wiring diagram W21(RS-232C)



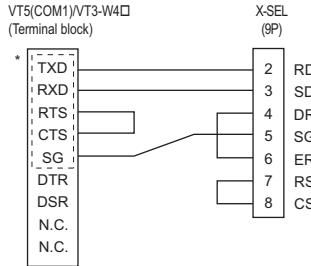
* [] indicates a terminal diagram for the VT5.

■ Wiring diagram W22 (RS-232C)



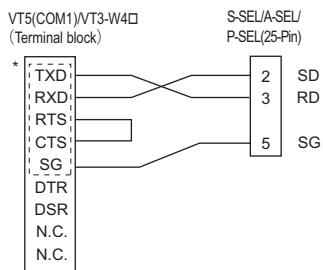
* [] indicates a terminal diagram for the VT5.

■ Wiring diagram W23 (RS-232C)



* [] indicates a terminal diagram for the VT5.

■ Wiring diagram W24 (RS-232C)



* [] indicates a terminal diagram for the VT5.

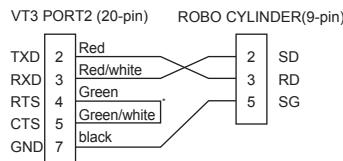
25-9 Connection to Robots from IAI

Connection to VT3 Series

The following describes wiring of connector cables.

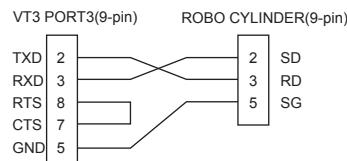
The wiring diagrams recommended by "IAI" may differ from those presented in this manual. There will, however, be no problems for wiring according to the wiring diagrams in this manual.

■ Wiring diagram 1 (RS-232C: OP-24027)

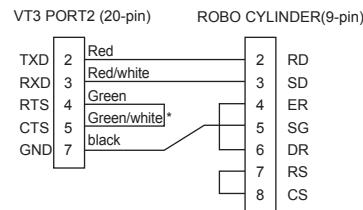


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 2 (RS-232C)

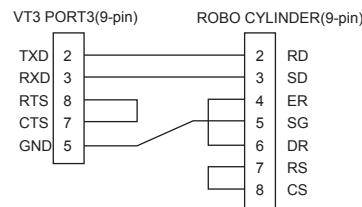


■ Wiring diagram 3 (RS-232C: OP-24027)

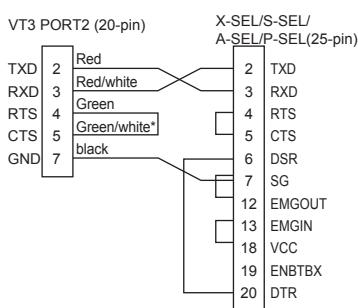


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 4 (RS-232C)

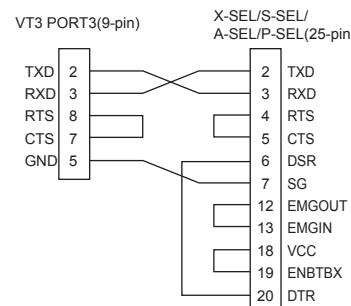


■ Wiring diagram 5 (RS-232C:OP-24027)

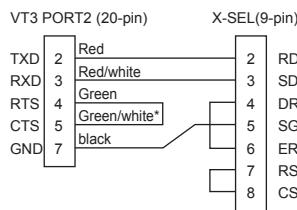


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 6 (RS-232C)

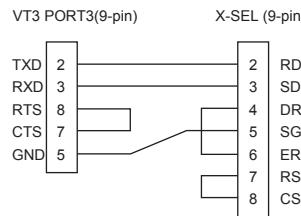


■ Wiring diagram: 7 (RS-232C: OP-24027)

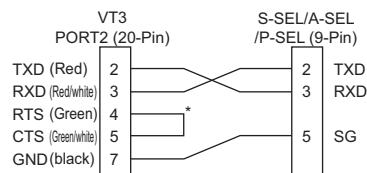


* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 8 (RS-232C)

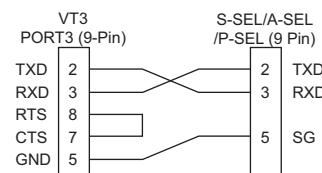


■ Wiring diagram 9 (RS-232C: OP-24027)



* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram 10 (RS-232C)



Connection with VT3 Handy Series

This section describes the cable wiring.

The wiring diagram in this manual might be different from the wiring diagram recommended by IAI. However, even if connection is made according to the wiring diagram in this manual, no problem will occur during operation.



- When unit connecting cable (OP-87185/87186/87187/87191/87192/87193) is used for connection, please always read "Precautions on Connection", on Page A-8.
- FG2 must be grounded.

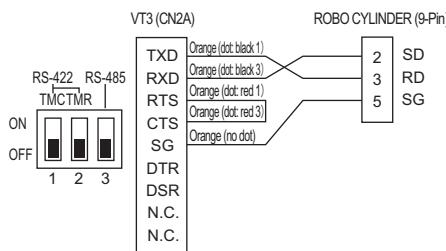
■ Wiring diagram H20 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



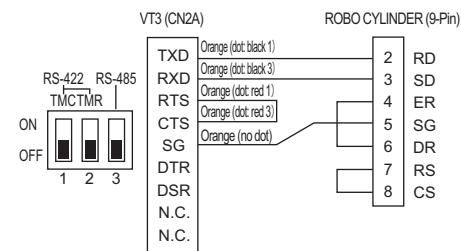
■ Wiring diagram H21 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



25-9 Connection to Robots from IAI

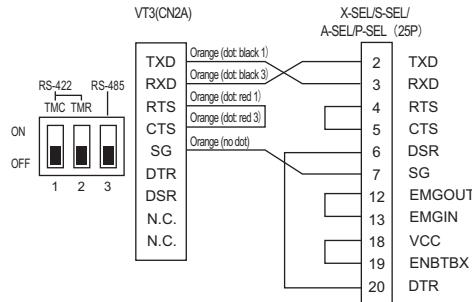
■ Wiring diagram H22 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



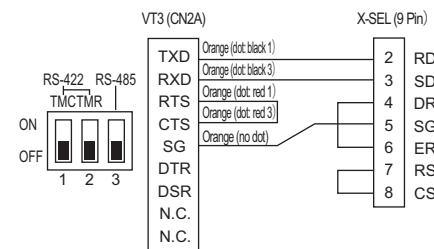
■ Wiring diagram H23 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m



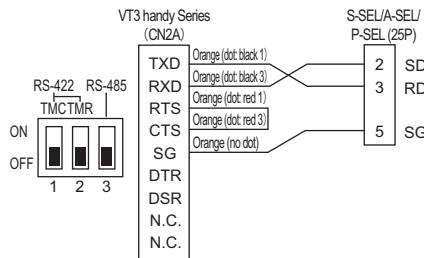
■ Wiring diagram H24 (RS-232C)

OP-87185: 3m, OP-87186: 5m,

OP-87187: 10m

OP-87191: 3m, OP-87192: 5m,

OP-87193: 10m

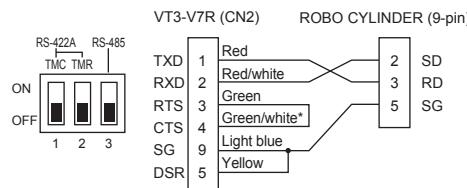


Connection to VT3-V7R



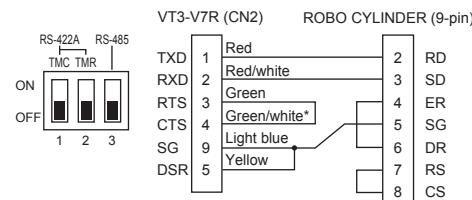
Point Before connecting the host cables (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039), be sure to read the "Connection Precautions", page A-13.

■ Wiring diagram R1 (RS-232C: VT-C5R1)



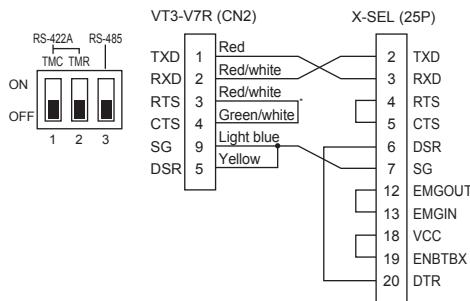
* Not wired for loopback test inside the connector.
Solder the signal lead.

■ Wiring diagram R2 (RS-232C: VT-C5R1)

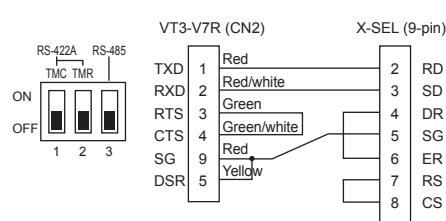


* Not wired for loopback test inside the connector.
Solder the signal lead.

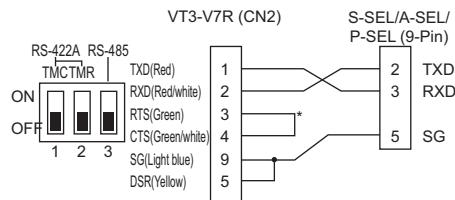
■ Wiring diagram R3 (RS-232C: VT-C5R1)



■ Wiring diagram R4 (RS-232C: VT-C5R1)



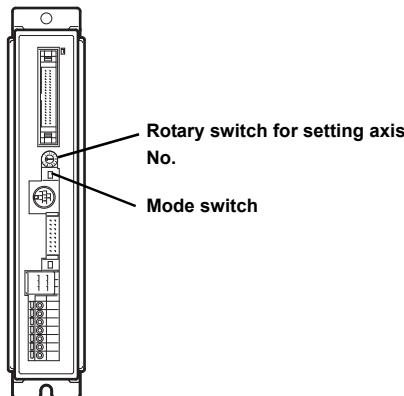
■ Wiring diagram R5 (RS-232C: VT-C5R1)



Unit Settings

The following describes the settings of the Link Unit matched to the default communications conditions.

■ Communication Settings of ROBO CYLINDER Series or ROBONET series



Rotary switch for setting axis No.

Set axis No. of controllers when ROBO CYLINDER series or ROBONET series controllers are linked and installed.

Mode switch

When the operating command is used on the VT5/VT3, set "MANU" (manual mode). (The ROBO CYLINDER Series can also read devices in "AUTO" (auto mode).)

● Communication parameters

For the setting methods, refer to operating instructions of various devices.

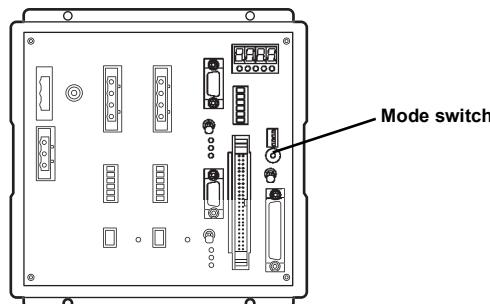
Item	Parameter	Setting Range	Default
Baud rate	No.16 (SIO Communication speed)	9600,19200,38400,57600,115200 bit/s ^{*1}	38400 bit/s

*1 To use the ROBONET series, always set to 115200 bit/s.



Be sure to turn the power on again after the ROBO CYLINDER series or the ROBONET series and the computer software for RC are connected.

■ Communication settings of X-SEL/S-SEL/ASEL/P-SEL series



Mode switch

The switches with interlocking functions are used for indicating controllers in the operating mode. It's required to operate them manually, if necessary during operation. MANU is at upper side, and AUTO at lower side.

Set to AUTO to communicate with the VT5/VT3 Series. (Communications are disabled in MANU mode.)

● Communication parameters

For the setting methods, refer to operating instructions of various devices.

Item	Parameter	Setting Range	Default
Protocols	I/O parameters	0 :SEL open program ^{*1} 1 :SEL open program ^{*1} 2 :IAI protocol B (secondary)	0 ^{*1}
PLC No.	I/O parameters No. 91	0 to 255 ^{*2}	153 ^{*2}
Baud rate	I/O parameters No.92	0 :9600 1 :19200 2 :38400 3 :57600 4 :76800 5 :115200 bit/s	2
Data length	I/O parameters No.93	7 :7 bits 8 :8 bits	8
Stop bit	I/O parameters No.94	1 :1 bit 2 :2 bits	1
Parity	I/O parameters No.95	0 :None 1 :Odd 2 :Even	0
Minimum response delay time	I/O parameters No.97	0 to 999	0
Bit mode	Other parameters	0H to FFFFFFFFH ^{*3}	1 ^{*3}

^{*1} Be sure to set to 2 since no communication is possible other than 2.

^{*2} Please set within the range of 0 to 31.

^{*3} Be sure to set to 1.

Communication Conditions and Available Devices

■ Communication Conditions Setting Ranges and Defaults

● ROBO CYLINDER series, ROBONET series

Item	Setting Range	Default
PLC serial interface	RS-232C ¹	RS-232C
Communication protocols	MODBUS RTU	MODBUS RTU
Baud rate	9600,19200,38400,57600,115200 bit/s ²	38400 bit/s
Data bit	8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	None	None
Flow Control	ER control	ER control
CheckSum	-	-
CR	-	-
LF	-	-

*1 Be sure to use the IAI RCB-CV-MW or RCB-TU-SIO RS-485↔RS-232C converter to connect the ROBO CYLINDER Series or the ROBONET Series to the VT5/VT3 Series. Don't use I/F level converter "N-48" from KEYENCE.

In addition, it's not allowed to connect to PORT3 of VT3 series.

*2 To use the ROBONET series, always set to 115200 bit/s.

● X-SEL /S-SEL/ASEL/P-SELseries

Item	Setting Range	Default
PLC serial interface	RS-232C	RS-232C
Communication protocols	IAI protocol B	IAI protocol B
Baud rate	9600,19200,38400,57600,115200 bit/s	38400 bit/s
Data bit	7, 8 bits	8 bits
Stop bit	1, 2 bits	1 bit
Parity	None, Odd, Even	None
Flow Control	ER control	ER control
CheckSum	-	-
CR	-	-
LF	-	-

■ Available devices

The following describes available devices and device range of various robots.

● ROBO CYLINDER series, ROBONET series

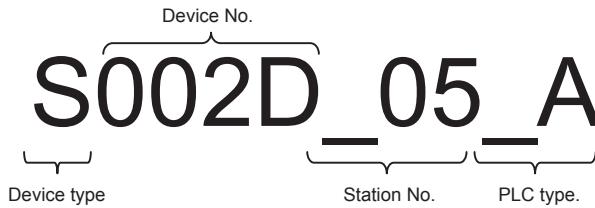
For the details of devices, see the manuals.

type	Device Name	Device Range
Bit Devices	Status	S 0000 to S FFFF ¹
Word Device	Register	R 0000 to R FFFF ¹
	Register (2 words)	DR 0000 to DR FFFE ²

*1 Specify by hexadecimal number.

*2 32-bit devices. Be sure to specify even number to devices.

Specifying Devices



- Device type : specify in device range.
- Device No. : specify in device range.
- Station No. : specify in the range of 0 to 15.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

25-9 Connection to Robots from IAI

● X-SEL /S-SEL/ASEL/P-SELseries

For the details of devices, see the manuals.

type	Device Name	Read ^{*1}	Write ^{*2}	2 word	Device type	Device Range
Bit Devices	Program execution ^{*3}	-	○	-	253	0 to 64
	Program stop ^{*3}	-	○	-	254	0 to 64
	Temporary program suspension ^{*3}	-	○	-	255	0 to 64
	Program 1-step execution ^{*3}	-	○	-	256	0 to 64
	Restart program execution ^{*3}	-	○	-	257	0 to 64
	Server ON/OFF ^{*4}	-	○	-	232	0 to 5
	Alarm reset	-	○	-	252	0
	Reset request of drive source	-	○	-	25C	0
	Input port	○	-	-	20B	0 to 299
	out put port	○	○	-	20C	300 to 599
	Mark ^{*5}	○	○	-	20D	000600 to 640999
	Software reset	-	○	-	25B	0 to 5
	Request to cancel the pause	-	○	-	25E	0 to 5
Word Devices	System state	○	-	-	215	0 to 6
	Axis state ^{*6}	○	-	○	212	00 to 34
	Program state ^{*7}	○	-	-	213	0000 to 6403
	Scalar axis state ^{*8}	○	-	○	2AE	000 to 358
	Valid dot data size	○	-	-	208	0
	Integral variable ^{*9}	○	○	○	20E	000001 to 641299
	String ^{*10}	○	○	-	210	000001 to 640999
	System error information ^{*11}	○	-	-	2160	00000 to 10145
	Error information of each axis ^{*12}	○	-	-	2161	00000 to 50145
	Error information of each program ^{*13}	○	-	-	2162	000000 to 1280145
	Error information in the error list ^{*14}	○	-	-	2163	000000 to 2550145

*1 The devices to be read only shall be neglected during writing(without error).

*2 The devices to be written only shall be always read as "0".

*3 Program No is displayed in the device range of device type 253 to 257.

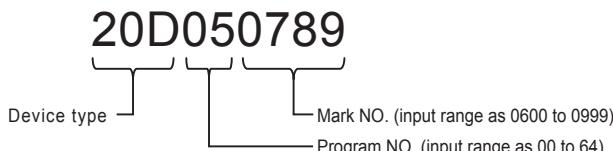
When bit device "25305" is set ON, perform program No. 05.

*4 Axis No is displayed in the device range of device type 232 (server ON/OFF).
Axis No is configured as follows.

Device No.	Axis No
23200	Axis No.1
23201	Axis No.2
23202	Axis No.3
23203	Axis No.4
23204	Axis No.5
23205	Axis No.6

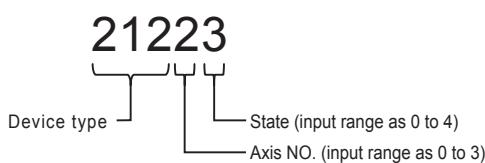
*5 In the device range of device type 20D(mark), program No is displayed at superior 2 bits, and mark No displayed at inferior 2 bits.

Example) in the case of "20D 050789"



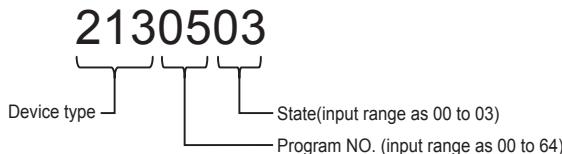
- *6 In the device range of device type 212 (axis state), axis No is displayed at superior 1 bit, and the state displayed at inferior 1 bit.

Example) in the case of "21223"



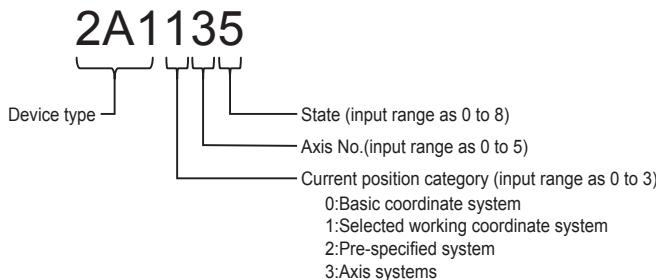
- *7 In the device range of device type 213(program state), program NO is displayed at superior 2 bits, and the state displayed at inferior 2 bits.

Example) in the case of "2130503"



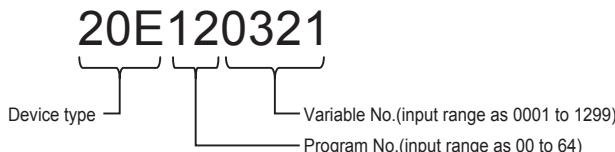
- *8 In the device range of device type 2A1(scalar axis state), current position type is displayed at superior 1st bit, and axis NO displayed at 2nd bit, while the state is displayed at inferior 1 bit.

Example) in the case of "2A1135"



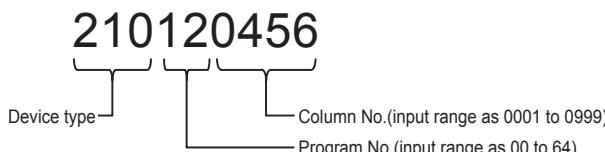
- *9 In the device range of device type 20E(integral variable), program NO is displayed at superior 2 bits, and the state NO displayed at inferior 4 bits.

Example) in the case of "20E12032"

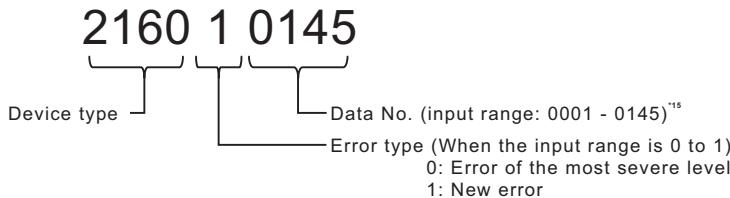


- *10 In the device range of device type 210(string), program NO is displayed at superior 2 bits, and column NO displayed at inferior 4 bits.

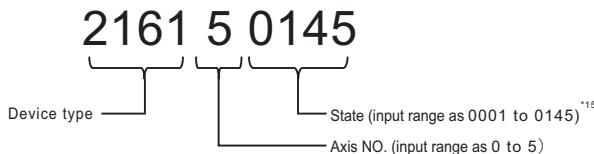
Example) in the case of "210120456"



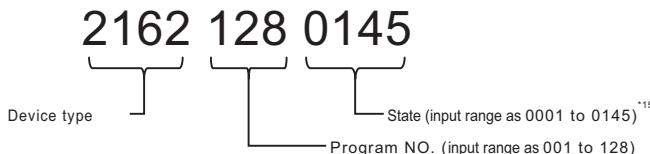
- *11 For device specifying of 2160 (system error information), low 4 bits represent data No., and high 1 bit represents error type.
Example) in the case of "216010145"



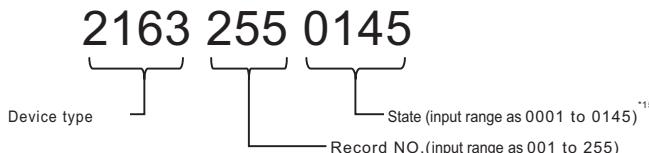
- *12 For device specifying method of 2161 (error information of each axis), low 4 bits represent data No., and high 1 bit represents axis No..
Example) in the case of "216150145"



- *13 For device specifying of 2162 (error information of each program), low 4 bits represent data No., and high 3 bits represent program No..
Example) in the case of "2162128014"

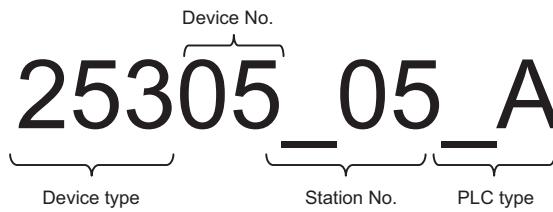


- *14 For device specifying of 2163 (error information in the error list), low 4 bits represent data No., and high 3 bits represent record No..
Example) in the case of "21632550145"



- *15 Data No. details
- Error No. (data No. 0)
 - Details (data No.1: low word/data No.2: high word)
 - Details (data No.3: low word/data No.4: high word)
 - Details (data No.5: low word/data No.6: high word)
 - Details (data No.7: low word/data No.8: high word)
 - Details (data No.9: low word/data No.10: high word)
 - Details (data No.11: low word/data No.12: high word)
 - Details (data No.13: low word/data No.14: high word)
 - Details (data No.15: low word/data No.16: high word)
 - Number of message bytes (data No. 17)
 - Message character string (data No. 18 to 145)

Specifying Devices



- Device type : specify with 3-bit English number.
- Device No. : specify in device range.
- Station No. : specify in the range of 0-31.
- PLC type : specify PLC-A/PLC-B when MultiTalk function is used. Not described when MultiTalk function isn't used.

Commands executable in extended command communication.

Extended Instructions	Send	Receive	Counts range
Version code Query	Unit type		Main CPU application Main CPU core Driver CPU/Mounted SIO
	Device number		0 to 15
		Unit type	0 to 3
		Device number	0 to 15
		Model code	0 to 255
		Unit code	0 to 255
		Version number	0 to 65535
		Year	0 to 65535
		Month	0 to 12
		Day	0 to 31
Effective Point Data Query [†]	Query head point number		1 to 4095
	Number of query records		1 to 12
		Number of effective records	1 to 12
		Point number	1 to 4095
		Axis pattern [‡]	axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
		Acceleration (0.01G)	0 to 65535
		Deceleration (0.01G)	0 to 65535
		Speed (mm/sec)	0 to 65535
		Position data (0.001mm)	-99999999 to 99999999
Real number variable verification [†]	Program number		0 to 128
	Query start variable number		0 to 4095
	Number of query variable data		1 to 60
		Program number	0 to 128
		Response start variable number	0 to 4095
		Number of response variable data	1 to 60
		Real variable data	-3.402823466E+38 to 3.402823466E+38

Extended Instructions	Send	Receive	Counts range
Effective Point Data Query ²⁺¹	Query head point number		1 to 20000
	Number of query records		1 to 12
		Number of effective records	1 to 12
		Point number	1 to 20000
		Axis pattern ²	axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
		Acceleration (0.01G)	0 to 65535
		Deceleration (0.01G)	0 to 65535
		Speed (mm/sec)	0 to 65535
Servo ON/OFF	Position data (0.001mm)		-99999999 to 99999999
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
Home Return	Servo ON/OFF		ON/OFF
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	End search speed at home return ³		0 to 4095
Absolute-Coordinate Specification Movement	Creep speed at home return (mm/sec) ³⁺³		0 to 4095
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (0.01G) ³		0 to 65535
	Deceleration (0.01G) ³		0 to 65535
	Speed (mm/sec) ³⁺⁴		0 to 65535
Relative-Coordinate Specification Movement	Absolute coordinate data (0.001mm)		-99999999 to 99999999
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (0.01G) ³		0 to 65535
	Deceleration (0.01G) ³		0 to 65535
	Speed (mm/sec) ³⁺⁴		0 to 65535
Jog/Inching	Relative coordinate data (0.001mm)		-99999999 to 99999999
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (0.01G) ³		0 to 65535
	Deceleration (0.01G) ³		0 to 65535
	Speed (mm/sec) ³⁺⁴		0 to 65535
	Inching distance (0.001mm) ⁶		0 to 4294967295
	JOG/inching direction		+ Dest/- Dest
Point-Number Specification Movement	Job/inching coordinate system (SCALA only)		Basic/work/Tool/Each
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (0.01G) ⁷		0 to 65535
	Deceleration (0.01G) ⁷		0 to 65535
	Speed (mm/sec) ⁴⁺⁷		0 to 65535
Operation Stop & Cancel	Point No.		1 to 4095
	Stop axis pattern		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Specification of output cancellation during interlock on-hold (Out port)		Not canceled/Canceled tentatively

Extended Instructions	Send	Receive	Counts range
Point Data Range-Specification Continuous Write ¹	Change start point data number		1 to 4095
	Number of change point data		1 to 12
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/axis 6/axis 7/axis 8
	Acceleration (0.01G)		0 to 65535
	Deceleration (0.01G)		0 to 65535
	Speed (mm/sec)		0 to 65535
	Position data (0.001mm)		-99999999 to 99999999
		Change start point data No.	1 to 4095
		Changed point data quantity	1 to 12
Change start point data number ¹	Number of change point data		1 to 12
	Change point data number		1 to 4095
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/axis 6/axis 7/axis 8
	Acceleration (0.01G)		0 to 65535
	Deceleration (0.01G)		0 to 65535
	Speed (mm/sec)		0 to 65535
	Position data (0.001mm)		-99999999 to 99999999
Point Data Clear	Clear start point data number		1 to 12
	Number of clear point data		1 to 4095
Real Variable Change ¹	Program number ⁸		0 to 128
	Change start variable number		0 to 4095
	Number of change variable data		1 to 61
	Real variable data		-3.402823466E+38 to 3.402823466E+38
		Program number	0 to 128
		Change start variable number	0 to 4095
		Number of changed data	1 to 61
Point-Number Specification Movement 2	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/axis 6/axis 7/axis 8
	Acceleration (0.01G) ⁷		0 to 65535
	Deceleration (0.01G) ⁷		0 to 65535
	Speed (mm/sec) ⁴⁷		0 to 65535
	Point number		1 to 20000
Point Data Range-Specification Continuous Write 2 ¹	Change start point data number		1 to 20000
	Number of change point data		1 to 12
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/axis 6/axis 7/axis 8
	Acceleration (0.01G)		0 to 65535
	Deceleration (0.01G)		0 to 65535
	Speed (mm/sec)		0 to 65535
	Position data (0.001mm)		-99999999 to 99999999
		Change start point data number	1 to 20000
		Number of changed point data	1 to 12
Change Point Data Continuous Write 2 ¹	Number of change point data		1 to 12
	Change point data number		1 to 20000
	Axis pattern ²		axis 1/axis 2/axis 3/axis 4/axis 5/axis 6/axis 7/axis 8
	Acceleration (0.01G)		0 to 65535
	Deceleration (0.01G)		0 to 65535
	Speed (mm/sec)		0 to 65535
	Position data (0.001mm)		-99999999 to 99999999
		Number of changed point data	1 to 12
Point data Clear 2	Clear start point data number		1 to 20000
	Number of clear point data		1 to 20000

Extended Instructions	Send	Receive	Counts range
Controller function specification 2	Controller function specification word 9		Extended data accessible/ Extended data access invalidity
	Controller function specification word 10		0 (fixed)
	Controller function specification word 11		0 (fixed)
	Controller function specification word 12		0 (fixed)
	Controller function specification word 13		0 (fixed)
	Controller function specification word 14		0 (fixed)
	Controller function specification word 15		0 (fixed)
	Controller function specification word 16		0 (fixed)
Coordinate System Definition Data Range-Specification Continuous Query ¹	Type		Work coordinate system definition data/Tool coordinate system definition data
	Query-target head coordination system definition data number		0 to 255
	Number of query records		1 to 30
	Type	Type	0 to 1
		Response start coordinate system definition data number	0 to 255
		Number of response records	1 to 30
		Coordinate offset (X) (0.001mm)	-99999999 to 99999999
		Coordinate offset (Y) (0.001mm)	-99999999 to 99999999
		Coordinate offset (Z) (0.001mm)	-99999999 to 99999999
		Coordinate offset (R) (0.001deg)	-99999999 to 99999999
Simple-Interference-Check-Zone Definition Data Range-Specification Continuous Query ¹	Query-target simple-interference-check-zone definition data number		1 to 255
	Number of query records		1 to 12
	Simple-interference-check-zone definition data number	Simple-interference-check-zone definition data number	1 to 255
		Number of response records	1 to 12
		Simple-interference-check-zone definition coordinate effective axis pattern	X axis/Y axis/Z axis/R axis
		X axis: simple interference check zone definition coordinate 1 (0.001mm, R axis: 0.001deg)	-99999999 to 99999999
		X axis: simple interference check zone definition coordinate 2 (0.001mm, R axis: 0.001deg)	-99999999 to 99999999
		Physical output port number or global flag number for output upon entry	0 to 65535
		Entry error type specification	0 to 2
		Reserved for system use	0 (fixed)
		Reserved for system use	0 (fixed)
		Reserved for system use	0 (fixed)

Extended Instructions	Send	Receive	Counts range
SCARA Absolute-Coordinate Specification Movement	Axis pattern ^{*2}		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (PTP: %, CP: 0.01G) ^{*3}		0 to 65535
	Deceleration (PTP: %, CP: 0.01G) ^{*3}		0 to 65535
	Speed (PTP: %, CP: mm/sec) ^{*3}		0 to 65535
	Movement control		PTP/CP
	Movement coordinate system		Selected work coordinate system
	PTP target arm system specification type (Always move current arm system if CP)		Current arm system (Movement of opposite arm system prohibited if unfeasible)/Current arm system (Movement of opposite arm system permitted if unfeasible)/Right arm system (Movement of opposite arm system prohibited if unfeasible)/Left arm system (Movement of opposite arm system permitted if unfeasible)
	Absolute coordinate data (0.001mm, R axis: 0.001deg)		-99999999 to 99999999
	Axis pattern ^{*2}		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (PTP: %, CP: 0.01G) ^{*3}		0 to 65535
SCARA Relative-Coordinate Specification Movement	Deceleration (PTP: %, CP: 0.01G) ^{*3}		0 to 65535
	Speed (PTP: %, CP: mm/sec) ^{*3}		0 to 65535
	Movement control		PTP/CP
	Movement coordinate system		Selected work coordinate system
	PTP target arm system specification type (Always move current arm system if CP)		Current arm system (Movement of opposite arm system prohibited if unfeasible)/Current arm system (Movement of opposite arm system permitted if unfeasible)/Right arm system (Movement of opposite arm system prohibited if unfeasible)/Left arm system (Movement of opposite arm system permitted if unfeasible)
	Relative coordinate data (0.001mm, R axis: 0.001deg)		-99999999 to 99999999

Extended Instructions	Send	Receive	Counts range
SCARA Point-Number Specification Movement	Axis pattern ^{*2}		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (PTP: %, CP: 0.01G) ^{*7}		0 to 65535
	Deceleration (PTP: %, CP: 0.01G) ^{*7}		0 to 65535
	Speed (PTP: %, CP: mm/sec) ^{*7}		0 to 65535
	Movement control		PTP/CP
	Movement coordinate system		Selected work coordinate system
	PTP target arm system specification type (Always move current arm system if CP)		Current arm system (Movement of opposite arm system prohibited if unfeasible)/Current arm system (Movement of opposite arm system permitted if unfeasible)/Right arm system (Movement of opposite arm system prohibited if unfeasible)/Left arm system (Movement of opposite arm system permitted if unfeasible)
	Point number		1 to 4095
SCARA Point-Number Specification Movement 2	Axis pattern ^{*2}		axis 1/axis 2/axis 3/axis 4/axis 5/ axis 6/axis 7/axis 8
	Acceleration (PTP: %, CP: 0.01G) ^{*7}		0 to 65535
	Deceleration (PTP: %, CP: 0.01G) ^{*7}		0 to 65535
	Speed (PTP: %, CP: mm/sec) ^{*7}		0 to 65535
	Movement control		PTP/CP
	Movement coordinate system		Selected work coordinate system
	PTP target arm system specification type (Always move current arm system if CP)		Current arm system (Movement of opposite arm system prohibited if unfeasible)/Current arm system (Movement of opposite arm system permitted if unfeasible)/Right arm system (Movement of opposite arm system prohibited if unfeasible)/Left arm system (Movement of opposite arm system permitted if unfeasible)
	Point No.		1 to 20000

*1 The setting items might be added depending on set values.

*2 It is used according to the AND condition of axis pattern for the point No..

*3 Parameter value is valid for 0.

*4 Different safety restrictions exist for different modes.

*5 The unit is % for each axis.

*6 Distance (JOG) is not specified for 0, the unit is 0.001deg for each axis.

*7 The set value of position data is valid for 0 When the set value of position data is also 0 parameter value is valid.

*8 0 for global variable.

List of Communication Errors

Error messages are displayed at the bottom left of the VT5/VT3 unit screen when a communication error occurs. The error messages are shown as follows.

Display message	Causes	How to handle
X-SEL : Error[**(++)] ROBO CYLINDER : Error[**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**](HEX): Error code of Robot	For the error code["*"], see "Connected Robot User's Manual".
X-SEL: TimeOut Error ROBO CYLINDER: COM ERROR [Timeout(++)]	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Robot is OFF.	Turn the Robot ON.
	The Robot side is in error or fault status.	Please clear the error or fault on the Robot side.
	Communication setting error.	Keep the communication settings consistent between the robot and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
X-SEL: SUM Check Error ROBO CYLINDER: CRC Error (++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between the robot and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Parity Error	A parity error occurred during communicating with Robot.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between the robot and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Over Run Error	An overrun occurred in the VT5/VT3 receive buffer.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between the robot and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
Framing Error	The stop bit cannot be detected during communicating with Robot.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between the robot and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
X-SEL: DataError	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * • "(++)" indicates the station No. for which an error has occurred.(Only ROBO CYLINDER)
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - "Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - "Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-10 Connection to Eco-Power Meters from Panasonic

This section describes how to connect Eco-Power Meters from Panasonic to the VT5/VT3

Acknowledgement before Connection

The following describes how to check the items required for connecting Eco-Power Meters from Panasonic to the VT5/VT3.

- (1) Check whether VT5/VT3 may be connected with simple wattmeter.
- (2) Check whether simple wattmeter needs to be set.
- (3) Confirm the name of the model to set as the target PLC.

Be sure to check the above three points before connecting the target device.

Series name	Eco Power Meter	I/F	Unit setting	Object PLC
KW1M series	AKW1110, AKW1111, AKW1121, AKW1000, AKW1131			
KW4M series	AKW5111, AKW5211 ^{*1}	RS-485	P.25-103	KW Series ^{*2}
KW7M series	AKW7111			
KW8M series	AKW8111, AKW8111H AKW8115			

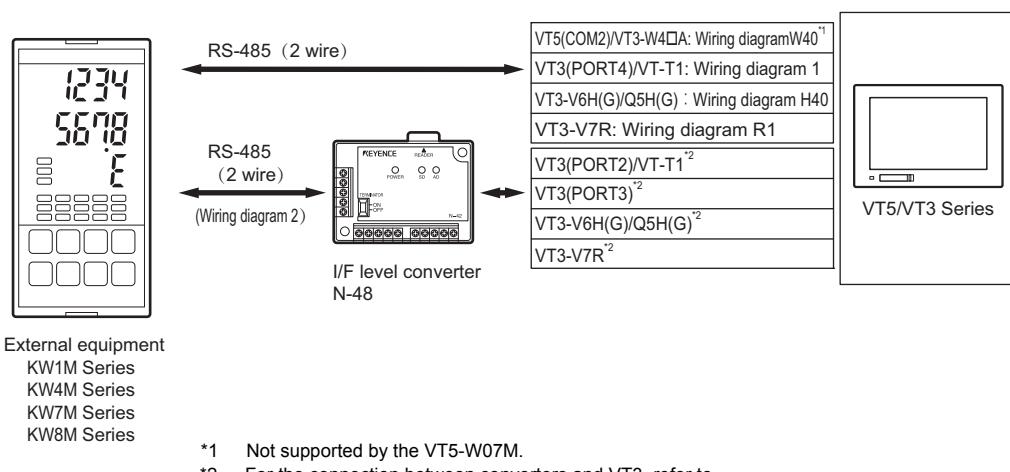
*1 Not supported by the VT5 Series.

*2 Not supported by Soft-VT.

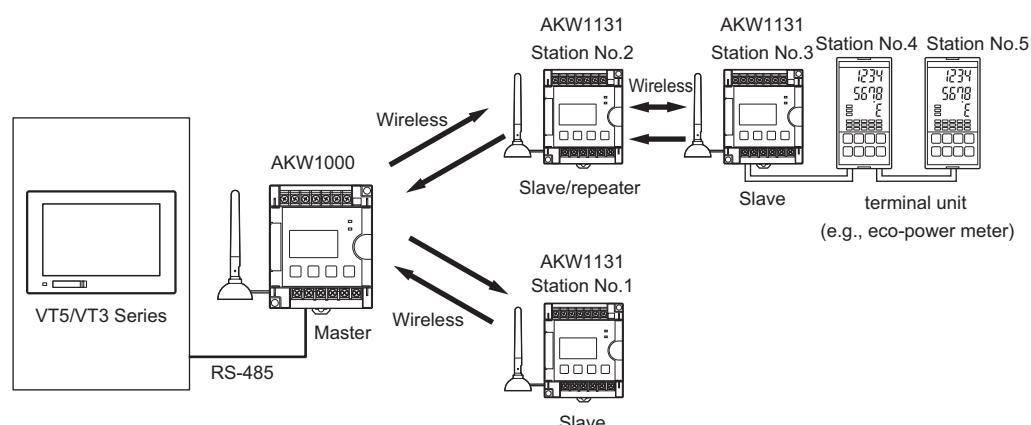
System Structure

System structure of VT5/VT3 series and simple wattmeter produced by Panasonic Corporation is described.

KW series



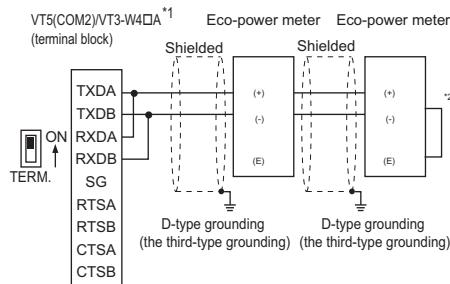
When AKW1131 is used for radio link, please refer to the diagram below.



* Device does not exist in the host. Please set station No. Of each sub-computer, read write the device of each station No..

Connection to the VT5 Series (COM2) and VT3-W4□A (RS-485)

■ Wiring diagram W40 (RS-485: 2-wire)



- *1 When VT5/VT3-W4 series is on one side of the communication line, terminal will be open.
- *2 In the simple wattmeter on one end of the communication line, short the (-) terminal and (E) terminal. When equipment without (E) terminal is used, please set the lateral slide switch of the unit to "Terminal station".
- *3 For the connection with different equipments, terminal No. Will also be different.

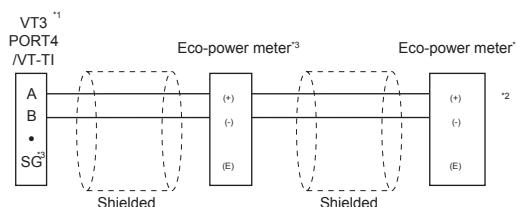
Connect equipment	Terminal No.		
	(+)	(-)	(E)
AKW1110, AKW1121, AKW8111, AKW8111H, AKW8115	8	9	10
AKW1111, AKW1000, AKW7111	7	8	9
AKW5111	11	1	N/A
AKW5211	4	5	N/A

Connection with VT3 Series

Wiring method of the connecting wire is described.

Wiring diagram in these data sometimes might be different from the wiring diagram recommended by Panasonic Corporation, but normal operation is also available when connection is made according to the wiring diagram in these data.

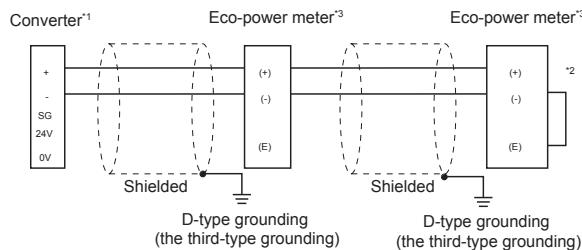
■ Wiring diagram 1 (RS-485: 2-wire)



- *1 Do not install termination resistor at VT3 end.
- *2 Do not short between (-) and (E) terminals. When unit without (E) terminal is used, please set the lateral slide switch of the unit to "General station".
- *3 For the connection with different equipments, terminal No. Will also be different.

Connect equipment	Terminal No.		
	(+)	(-)	(E)
AKW1110, AKW1121, AKW8111, AKW8111H, AKW8115	8	9	10
AKW1111, AKW1000, AKW7111	7	8	9
AKW5111	11	1	N/A
AKW5211	4	5	N/A

■ Wiring diagram 2 (RS-485: 2-wire)



*1 When the converter is on one side of the communication line, terminal will be open.

*2 In the simple wattmeter on one end of the communication line, short the (-) terminal and (E) terminal. When equipment without (E) terminal is used, please set the lateral slide switch of the unit to "Terminal station".

*3 For the connection with different equipments, terminal No. Will also be different.

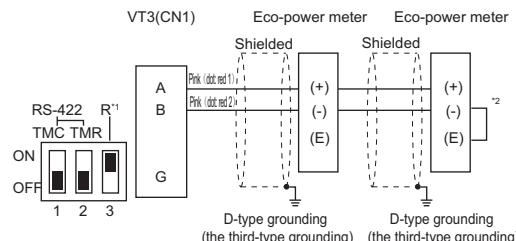
Connect equipment	Terminal No.		
	(+)	(-)	(E)
AKW1110, AKW1121, AKW8111, AKW8111H, AKW8115	8	9	10
AKW1111, AKW1000, AKW7111	7	8	9
AKW5111	11	1	N/A
AKW5211	4	5	N/A

Connection with VT3 Handy Series



FG2 must be grounded.

■ Wiring diagram H40 (RS-485: 2-wire)



*1 Terminal will be open.

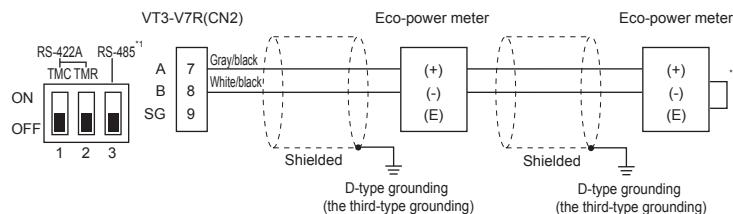
*2 In the simple wattmeter on one end of the communication line, short the (-) terminal and (E) terminal. When equipment without (E) terminal is used, please set the lateral slide switch of the unit to "Terminal station".

*3 For the connection with different equipments, terminal No. Will also be different.

Connect equipment	Terminal No.		
	(+)	(-)	(E)
AKW1110, AKW1121, AKW8111, AKW8111H, AKW8115	8	9	10
AKW1111, AKW1000, AKW7111	7	8	9
AKW5111	11	1	N/A
AKW5211	4	5	N/A

Connection to VT3-V7R

■ Wiring diagram R1 (RS-485: 2-wire)



*1 Terminal will be OFF.

*2 Do not short between (-) and (E) terminals. When unit without (E) terminal is used, please set the lateral slide switch of the unit to "General station".

*3 For the connection with different equipments, terminal No. Will also be different.

Connect equipment	Terminal No.		
	(+)	(-)	(E)
AKW1110, AKW1121, AKW8111, AKW8111H, AKW8115	8	9	10
AKW1111, AKW1000, AKW7111	7	8	9
AKW5111	11	1	N/A
AKW5211	4	5	N/A

Unit Setting

Unit setting corresponding to the initial value of communication conditions is described.

■ Communication setting of KW series

With respect to the setting method, please refer to operating instructions of the equipment.

Item	Setting range	Initial value	Set value
Protocol	MEWTOCOL, MODBUS	MEWTOCOL	MEWTOCOL ^{*1}
Station No.	1 to 99	1	1 to 31 ^{*2}
Communication speed	2400, 4800, 9600, 19200, 38400 bit/s ^{*3}	19200 bit/s	19200 bit/s
Data length	7 bits, 8 bits	8 bits	8 bits
Parity	None, even number, odd number	Odd number	Odd number

*1 Always set to "MEWTOCOL".

*2 Always set within the scope of 1 - 31.

*3 According to different product types, some do not support 38400 bit/s. For specific content, please refer to the manual of connected equipments.

Communication conditions and available devices

■ Setting range of the communication conditions and the initial value

● KW series

Item	Setting range	Initial value
PLC SERIAL PORT I/F (PORT NO.)	RS-232C(PORT2,PORT3) ^{*1} , RS-485(PORT4)	RS-485(PORT4)
Communication protocol	MEWTOCOL-COM	MEWTOCOL-COM
Communication speed	9600, 19200, 38400 bit/s ^{*2}	19200 bit/s
Data bit length	7 bits, 8 bits	8 bits
Stop bit	1 bit	1 bit
Parity	None, odd number, even number	Odd number
Control mode	ER CONTROL	ER CONTROL
Check sum	-	-
CR	-	-
LF	-	-

*1 I/F level converter (N-48) must be used for the selection of RS-232C.

*2 According to different product types, some do not support 38400 bit/s. For specific content, please refer to the manual of connected equipments.

■ Available devices

The device that may be used in each drive and device scope are described.

● KW series

Item	Initial value
Bit device	-
Words device	DT00000 to DT63199 ^{*2*3*4}
	SR0 to SR5 ^{*5}

*1 Bit device could not be used.

*2 Read-only device is included. For specific content, please refer to the manual of connected equipments.

*3 For the connection with different equipments, device scope will also be different. For specific content, please refer to the manual of connected equipments.

*4 2-word device must be written in the unit of 2 words. For specific content, please refer to the manual of connected equipments.

*5 Read only.

25-10 Connection to Eco-Power Meters from Panasonic

List of Communication Errors

When a communication error occurs, it will be displayed on the left bottom on the screen of the VT5/VT3 main unit. The error messages are shown as follows.

Display message	Causes	How to handle
Error[**(++)]	The device that is set is outside the range of the device setting range.	Please set it again within the device setting range.
	A nonexistent device has been set.	
	[**]: Error code of Energy efficient instruments	For the error code[**], see "Connected Energy efficient instruments User's Manual".
TimeOutError (++)	Cable is not connected correctly.	Please check again whether the cable is connected correctly.
	Power of the Energy efficient instruments is OFF.	Turn the Energy efficient instruments ON.
	The Energy efficient instruments side is in error or fault status.	Please clear the error or fault on the Energy efficient instruments side.
	Communication setting error.	Keep the communication settings consistent between Energy efficient instruments and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
BCC Error(++)	Checksum is not correct. The calculation method for checksum is wrong.	Please check the checksum calculation method.
	Connection status of the connection cables is not good.	Verify whether there is wire break or bad contact.
	Communication setting error.	Keep the communication settings consistent between Energy efficient instruments and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
ParityError	A parity error occurred during communicating with Energy efficient instruments.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication setting error.	Keep the communication settings consistent between Energy efficient instruments and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
OverRunError	The receive buffer of VT5/VT3 overrun.	Please decrease the communication speed (baud rate).
	Connection status of the connection cables is not good. Communication setting error.	Verify whether there is wire break or bad contact. Keep the communication settings consistent between Energy efficient instruments and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
FramingError	The stop bit cannot be detected during communicating with Energy efficient instruments.	Verify whether there is wire break or bad contact.
	Connection status of the connection cables is not good.	
	Communication protocol setting error.	Keep the communication protocol consistent between Energy efficient instruments and VT5/VT3.
	Affected by noise.	Verify whether there is a noise source. If there is a noise source, then it must be separated from the main unit.
DataError[(++)]	Multiple communication errors occurred.	Please refer to the handling methods mentioned above.

- * "(++)" indicates the station No. for which an error has occurred.
- When MultiTalk function is used, in order to determine the connected equipment on which an error occurs, "A:" or "B:" will be added in front of the above error messages.
- For details on error messages other than communication errors, refer to the following manuals.
 - Appendix-1 Error Messages and Troubleshooting", VT5 Series Hardware Manual
 - Appendix-1 Error Messages and Troubleshooting", VT3 Series Hardware Manual

25-11 Connection with Converters

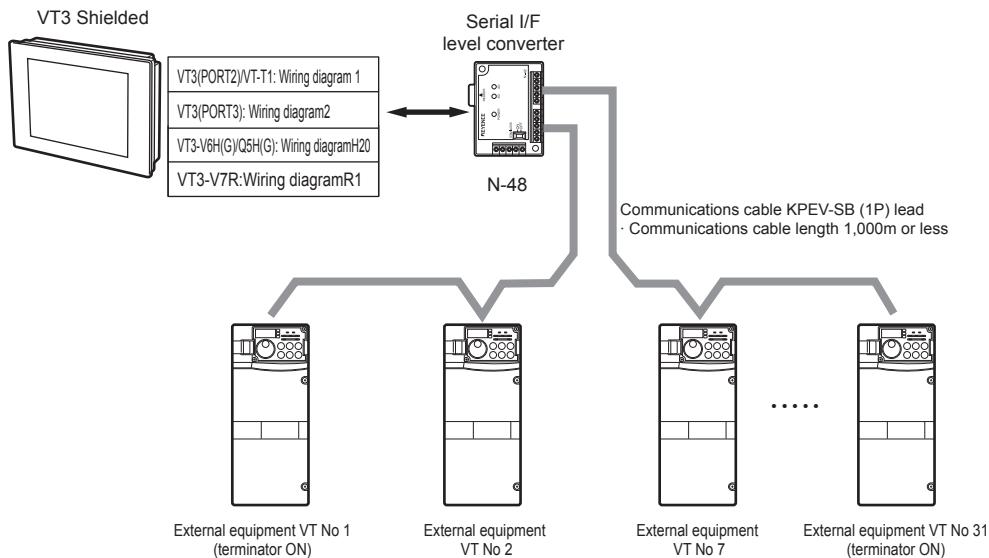
When external equipments are connected to VT3 by 1:N in the RS-485, they're generally connected to PORT4. But, when PORT4 is used for Megabyte link or KL communication, serial I/F level converters are used to connect external equipments to PORT2/PORT3 by 1:N.



- Not supported by the VT5 Series/Soft-VT.
- The VT3-W4T(A)/W4M(A)/W4G(A) cannot be connected.

Connection Methods

■ When external equipments are connected to VT3 series (by 1:N)

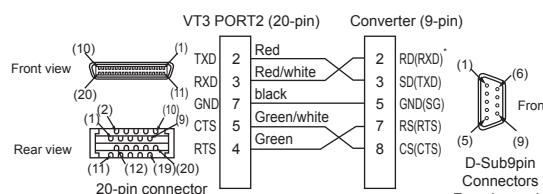


Connection of VT3 to Converters



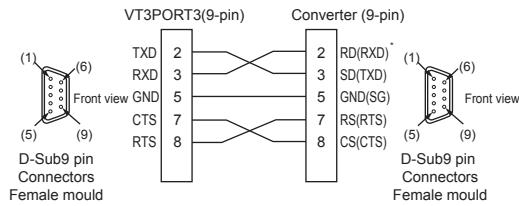
- When the connection cable of the unit (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039) is used for connection, please read "Connection Precautions", page A-13

■ Wiring diagram 1 (OP-24027)



* The signal name at converter side is the signal name of output target.

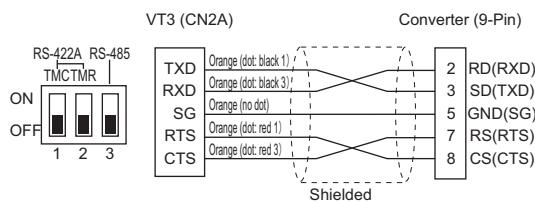
■ Wiring diagram 2 (OP-26486+OP-24025(5m), OP-24045(1m))



* The signal name at converter side is the signal name of output target.

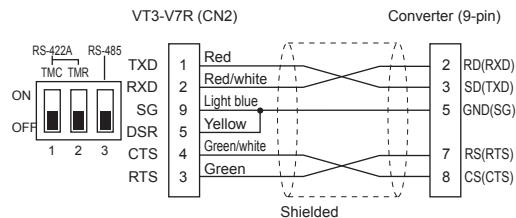
■ Wiring diagram H20 (RS-232C)

OP-87191: 3m, OP-87192: 5m, OP-87193: 10m



* Signal name of the inverter is changed to signal name of the output destination.

■ Wiring diagram R1 (RS-232C:VT-C5R1)



For the pin No. of connectors at one side of VT3/DT series, refer to the chapters in the Appendix.

APPENDIX

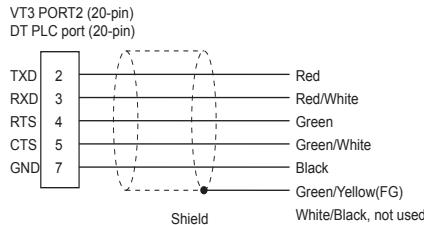
This appendix describes how to connect the VT3/DT and a PLC using an optional cable.

1	VT3 Series/DT Series Cables	A-2
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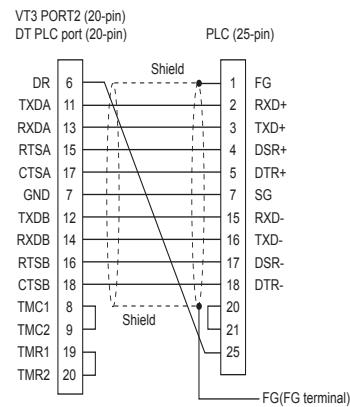
This section provides the wiring diagrams for VT3/DT Series optional cables and describes precautions when wiring cables.

Wiring diagram

■ RS-232C Link Cable (OP-24027:5m)

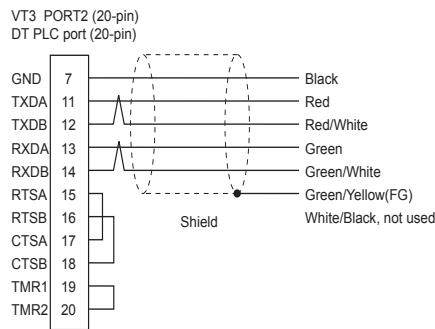


■ MITSUBISHI ELECTRIC A, FX Series PLC Port Direct Link Cable (MT-C5:5m / MT-C10:10m / MT-C20:20m)

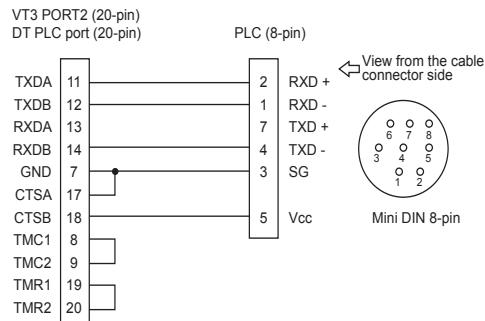


Point
Connect FG to FG on the terminal block on the PLC side.

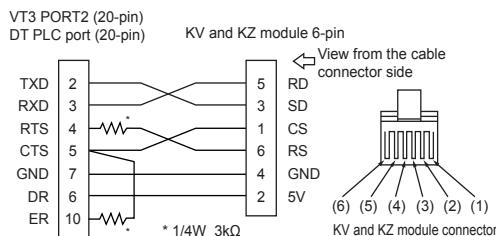
■ RS-422A Link Cable (OP-24028: 5m)



■ MITSUBISHI ELECTRIC FXN Series PLC Port Direct Link Cable (OP-31096: 5 m)



■ KZ, KV Series PLC Port Direct Link Cable (OP-26484: 5 m, OP-35403: 1 m)



For more information about the pin assignment of the connector on the VT3 series/DT series side, please see page A-10.

Assembling the Cable

Use twisted pair shielded cable.

Use a 20-pin serial I/F connector (OP-26275) for the connector on the VT3/DT sides.



- The maximum transmission length on the RS-232C communications cable is 15 m.
- The maximum transmission length on the RS-422A communications cable is 500 m.
- The maximum transmission length on the RS-485 communications cable is 500 1200 m.

19200bit/s : Up to 1200m

115200bit/s : Up to 1200m

0.5Mbit/s : Up to 500m

1Mbit/s : Up to 200m

2Mbit/s : Up to 100m

A

■ Stripping cables

1 Cut the cable to the required length.

2 Strip back the cable covering using a knife taking care not to damage the shield lead.

Strip back the cable by about 40 mm from the cable end.



3 Cut the shield lead with nippers.

Strip back the covering of each lead by about 5 mm using wire strippers.



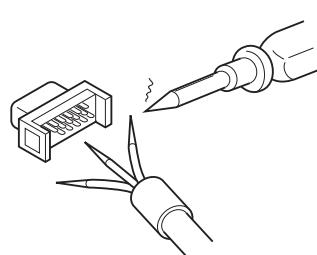
4 Wrap insulating tape at the cut section of the shield lead.

■ Soldering lead ends

1 Pass heat-shrink onto each lead.

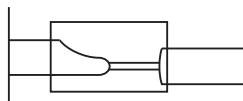
2 Pre-solder the end of each lead and the 20-pin serial I/F connector terminals.

3 Solder each lead to the 20-pin serial I/F connector terminals.



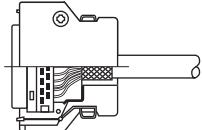
4 Move the heat-shrink tubes up to the soldered section, and heat the heatshrink tube with forced hot air.

This shrinks the heat-shrink tube.

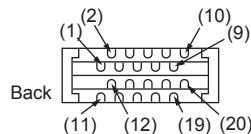
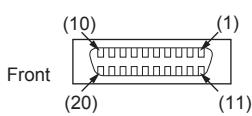


■ Assembling the 20-pin serial I/F connector (cable cover)

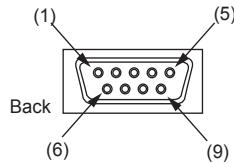
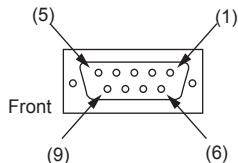
Assemble the cable cover.



■ 20-pin serial I/F connector pin Nos.



■ D-SUB 9 PIN The pin assignment of the serial I/F connector male



Note:

- For wiring diagrams in the PLC, refer to the page on which each manufacturer's wiring diagrams are presented.
- When performing loopback processing, solder a lead for the loopback, and wind insulating tape around the lead to insulate.
- When cables are cut to shorten the cable, use FG leads soldered to the shielded lead of the cable. Also, insulate cables with heat-shrink tube, for example, to prevent contact between the shielded lead and other pins in the connector.
- When the metal hood cover is used, connect FG to the hood cover.
- Operations when cables are cut or extended are not assured.

Connecting Cable for VT3 Handy Series

Wiring table

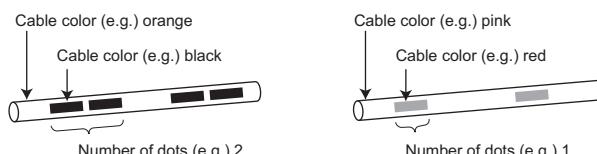
■ Cable color

● General

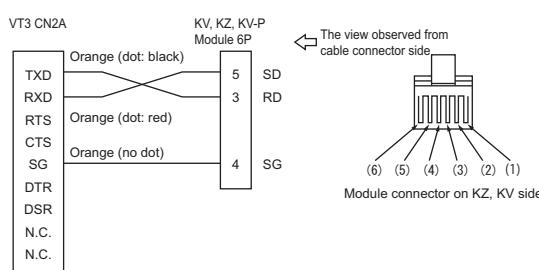
Connector name	Signal name	Description	I/O	Cable		
				Wire diameter	Color	Dot
CN1	PB1A	Button switch 1A (N.C. contact)	Output	AWG26	Red	Black 1
	PB1B	Button switch 1B (N.C. contact)				Black 2
	PB2A	Button switch 2A (N.C. contact)				Black 3
	PB2B	Button switch 2B (N.C. contact)				Black 4
	PBAM/TPAM	Button switch monitor A (N.O. contact)	Output	AWG26	Pink	Black 1
	PBBM/TPBM	Button switch monitor B (N.O. contact)				Black 2
	EN1A	Enable switch 1A (N.O. contact)	Output	AWG26	Purple	Black 1
	EN1B	Enable switch 1B (N.O. contact)				Black 2
	EN2A	Enable switch 2A (N.O. contact)				Black 3
	EN2B	Enable switch 2B (N.O. contact)				Black 4
CN3	KSW1	Key switch 1 (left)	Output	AWG26	Yellow	Red 1
	KSW2	Key switch 2 (right)				Red 2
	KSWC	Key switch common				Red 3
	FSWC	Function switch common	Output	AWG28	Yellow	Ç»Çµ
	FSW1	Function switch 1				Black 1
	FSW2	Function switch 2				Black 2
	FSW5	Function switch 5				Black 3
	FSW6	Function switch 6				Black 4
	+24V	Power supply (24V)	Input	AWG24	Brown	Black 4
	0V	Power supply (0V)				Black 4
	FG*	Frame ground	-	AWG24	Green	None

* FG terminal is divided into FG1 (power supply shielding) and FG2 (RS-232C/422 shielding) on the cable end.
FG2 is available only on the cable with CN2.

<color and dot of cable>

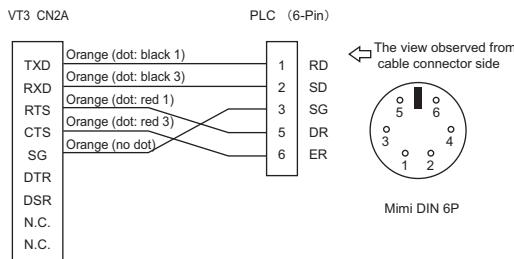


● PLC from KEYENCE Serial port connection (OP-87180/87181)

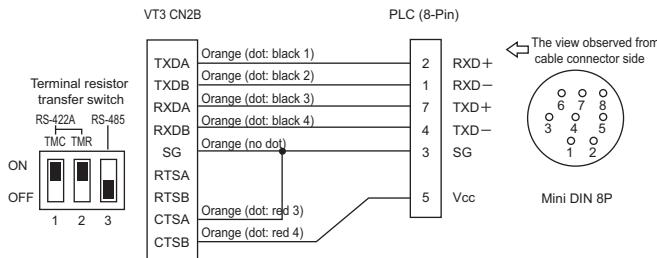


* FG2 must be grounded.

- PLC from Mitsubishi Q Series Serial port connection (OP-87182/87183)



- PLC from Mitsubishi FX Series Serial port connection (OP-87184)



- RS-232C/422A connecting cable (OP-87185/87186/87187)

Connector	Signal name	Description	I/O	Cable				
name				Wire diameter	Color	Dot		
CN2A/CN2B	TXD/TXDA	Serial (RS-232C/422) communication signal	Output	AWG28	Black	Black 1		
	NC/TXDB	Serial (RS-232C/422) communication signal				Black 2		
	RXD/RXDA	Serial (RS-232C/422) communication signal	Input			Black 3		
	NC/RXDB	Serial (RS-232C/422) communication signal				Black 4		
	RTS/RTSA	Serial (RS-232C/422) communication signal	Output		Orange	Red 1		
	DTR/RTSB	Serial (RS-232C/422) communication signal				Red 2		
	CTS/CTSA	Serial (RS-232C/422) communication signal	Input			Red 3		
	DSR/CTSB	Serial (RS-232C/422) communication signal				Red 4		
	SG	Serial (RS-232C/422) communication ground cable	A		None			

- * FG2 must be grounded.

- Ethernet connecting cable (OP-87188/87189/87190)

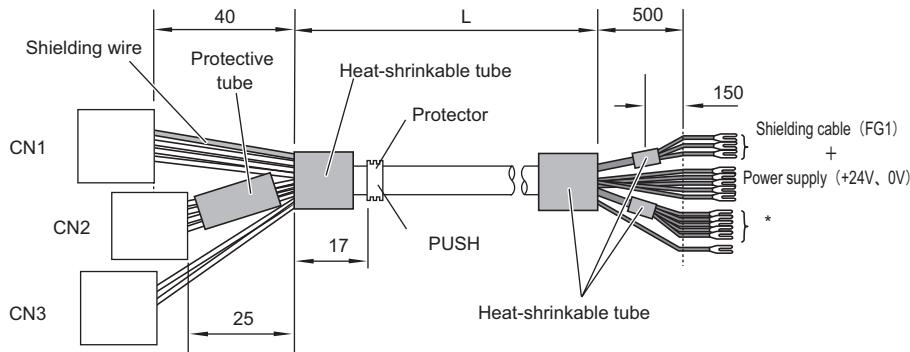
Connector	Signal name	Description	I/O	Cable			
				Wire diameter	Color	Dot	
CN1	TX-	Ethernet communication signal	Output	AWG26	White	None	
	TX+	Ethernet communication signal			Blue	None	
	RX-	Ethernet communication signal	Input		Grey	None	
	RX+	Ethernet communication signal			Brown	None	

● RS-232C/422A/485/Ethernet connecting cable (OP-87191/87192/87193)

Connector	Signal name	Description	I/O	Cable			
				Wire diameter	Color	Dot	
CN3	TX-	Ethernet communication signal	Output	AWG26	White	None	
	TX+	Ethernet communication signal			Blue	None	
	RX-	Ethernet communication signal	Input		Grey	None	
	RX+	Ethernet communication signal			Brown	None	
	A	RS-485 communication signal A	I/O		Red 1		
	B	RS-485 communication signal B			Pink	Red 2	
	G	RS-485 communication signal G	-			Red 3	
CN2A/CN2B	TXD/TXDA	Serial (RS-232C/422) communication signal	Output	AWG28	Black 1		
	NC/TXDB	Serial (RS-232C/422) communication signal			Black 2		
	RXD/RXDA	Serial (RS-232C/422) communication signal	Input		Black 3		
	NC/RXDB	Serial (RS-232C/422) communication signal			Black 4		
	RTS/RTSA	Serial (RS-232C/422) communication signal	Output		Orange	Red 1	
	DTR/RTSB	Serial (RS-232C/422) communication signal				Red 2	
	CTS/CTSA	Serial (RS-232C/422) communication signal	Input			Red 3	
	DSR/CTSB	Serial (RS-232C/422) communication signal				Red 4	
	SG	Serial (RS-232C/422) communication ground cable	—			None	

* FG2 must be grounded.

■ Dimension



* Shape varies with the interface on PLC side.

Note:

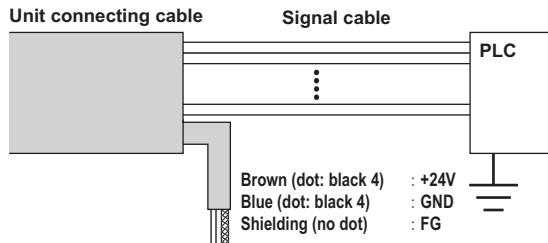
- See appropriate page for the wiring diagram of PLC from various companies.
- For loopback treatment, the cable to be treated should be soldered and insulated with insulating tape.
- The operation cannot be guaranteed in case cable is cut off/extended.

A

■ Precautions on wiring

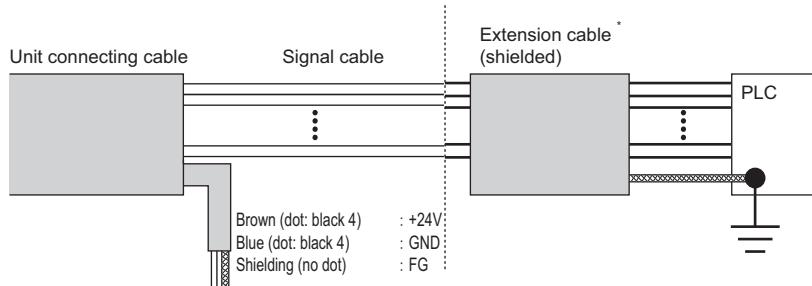
Always pay attention to the following points when using unit connecting cable (OP-87180/87181/87182/87183/87184/87185/87186/87187/87188/87189/87190/87191/87192/87193) to connect with VT3 handy Series.

In case the signal cable is not extended



Power ON (connected with power supply)

In case the signal cable is extended



Power ON (connected with power supply)

- * The extension cable should be provided by the user.
The shielding in wiring diagram R□ refers to the shielding of extension cable.
Shielding of the extension cable must be grounded on PLC side.

● Connection location and extension of the ground cable

The shielding cable (FG) of the unit connecting cable must be grounded using the FG terminal of the power supply (D-type grounding (the third type grounding)). In addition, 2-core shielded cable must be used for the extension of power cable. See "3-3 Power Supply Connection" and "3-4 Precautions on Grounding" in the VT3 Series Hardware Manual for more information.

● Cable not connected

Unused cable must be insulated with heat shrinking tube, so as to avoid contact with other cables.
Wound cables must be welded, and insulated with insulating tape.

Note:

- See appropriate page for the wiring diagram of PLC from various companies.
- For loopback treatment, the cable to be treated should be soldered and insulated with insulating tape.
- When cutting the cable for shortening purpose, see "Shielding Cable Treatment" on Page A-12 for shielding treatment.
- The operation cannot be guaranteed in case cable is cut off/extended.

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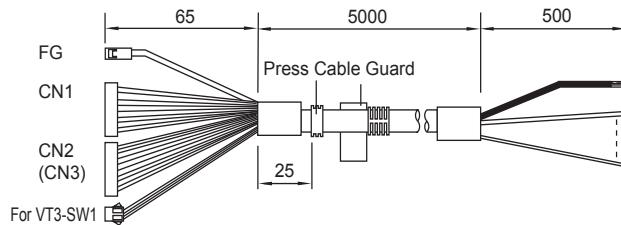
VT3-V7R link cable

Wiring Table

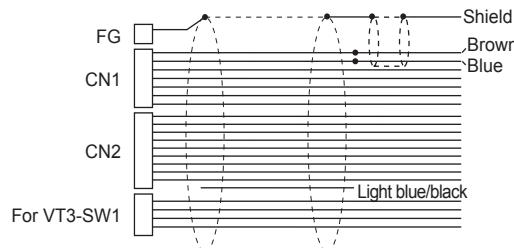
Connector		Signal Name	Name	Wire Color	AWG Size
Connector No.	Pin				
FG	1	FG	FG	(Shielded Wire)	-
	2	NC	No Connection	Brown	-
CN1	1	24V	Power Supply (DC24V)	-	AWG24
	2	NC	No Connection	Blue	-
	3	GND	Ground	-	AWG24
	4	NC	No Connection	Black	-
	5	KEY1	Cross Button: Up	White	AWG24
	6	KEY2	Cross Button: Right	Grey	
	7	KEY3	Cross Button: Down	Orange	
	8	KEY4	Cross Button: Left	Orange/Black	
	9	KEYCOM	Cross Button: Common Output	Red	
CN2 ^{*1}	1	TXD(SD)	RS-232C:Send Data	Red/White	AWG28
	2	RXD(RD)	RS-232C:Receive Data	Green	
	3	RTS(RS)	RS-232C: Request to Send	Green/White	
	4	CTS(CS)	RS-232C:Clear to Send	Yellow	
	5	DSR(DR)	RS-232C:Data Set Ready	Yellow/black	
	6	DTR(ER)	RS-232C:Data Terminal Ready	Grey/black	
	7	A	RS-485:Signal A	White/black	AWG24
	8	B	RS-485:Signal B	Light blue	
	9	SG	Signal Ground	-	
CN3 ^{*2}	10	NC	No Connection	Red	AWG28
	1	TXDA	RS-422A:Send Data A	Red/White	
	2	TXDB	RS-422A:Send Data B	Yellow	
	3	RTSA	RS-422A:Request to Send A	Yellow/black	
	4	RTSB	RS-422A:Request to Send B	Green	
	5	RXDA	RS-422A:Receive Data A	Green/White	
	6	RXDB	RS-422A:Receive Data B	Grey/black	
	7	CTSA	RS-422A:Clear to Send A	White/black	AWG24
	8	CTSB	RS-422A:Clear to Send B	Light blue	
	9	SG	Signal Ground	-	
	10	NC	No Connection	Light blue/black	-
VT3-SW1	11	DSR(DR)	RS-232C:Data Set Ready	Pink/black	AWG28
	1	-	Emergency Stop Switch Unit (SW1)	Pink	AWG24
	2	-	Emergency Stop Switch Unit (SW1)	Purple/ white	
	3	-	Emergency Stop Switch Unit (SW2)	Purple	
	4	-	Emergency Stop Switch Unit (SW2)		

*1 Not included in the VT-C5R2/C15R2 (RS-422A link cable).

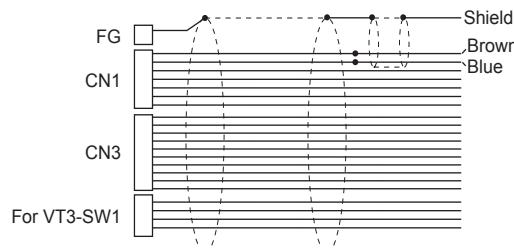
*2 Not included in the VT-C5R1 (RS-232C/485 link cable).



■ RS-232C or 485 cable (5m:VT-C5R1)



■ RS-422A cable (5m:VT-C5R2, 15m:VT-C15R2)



Note:

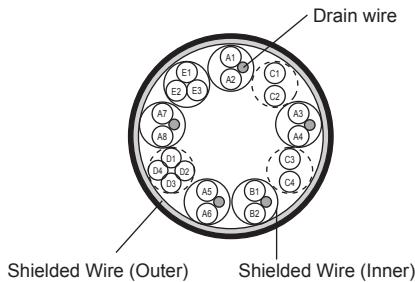
- For wiring diagrams in the PLC, refer to the page on which each manufacturer's wiring diagrams are presented.
- When performing loopback processing, solder a lead for the loopback, and wind insulating tape around the lead to insulate.
- For the handling of the shielded wire when cutting the cable, please see the "Handling of Shielded Wire", page A-12.
- Operations when cables are cut or extended are not assured.

The Shielded Cable

Describe how to deal with the shielded cable when the cable is cut short.

● Cable Cross-section (VT-C5R1/VT-C5R2/VT-C15R2)

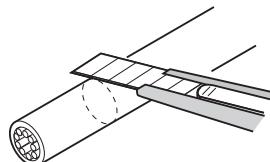
Cross-section



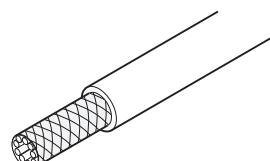
Cable	Color	Cable	Color	Cable	Color
A1	Red	A8	Light blue/black	D1	Pink/black
A2	Red/White	B1	Grey/black	D2	Pink
A3	Green	B2	White/black	D3	Purple/white
A4	Green/White	C1	Brown	D4	Purple
A5	Yellow	C2	Blue	E1	Grey
A6	Yellow/black	C3	Black	E2	Orange
A7	Light blue	C4	White	E3	Orange/Black

■ Prepare the Cable

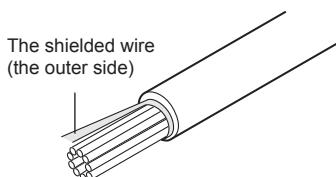
- 1** Cut the cable to the required length.



- 2** Remove the cable coat with a knife. Do not damage the shielded wire (the outer side).

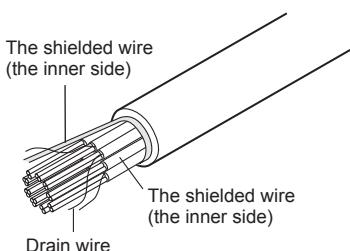


- 3** Keep a proper length of the shielded wire (the outer side), and cut off the rest with pliers.

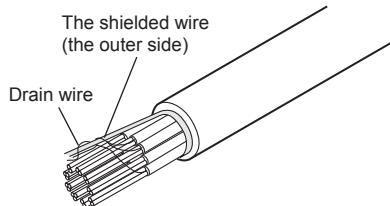


- 4** Cut off the rest shielded wire with pliers (5 wires on the inner side)

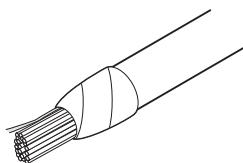
Ensure to keep the drain wire (5 wires)



5 Cut off the rest shielded wire with pliers (5 wires on the inner side)



6 Wrap the rest shielded wire (the outer side) with an insulating tape or shrinkable insulating cable sleeve to ensure a good insulation.



NOTICE

Power supply (color: brown), GND (color: blue), Shield (FG), please use a shielded pair to connect to the power.

- For more information, please refer to the "3-3 Power Connection" in the VT3 Series Hardware Manual and "3-4Grounding Precautions" in the VT3 Series Hardware Manual.

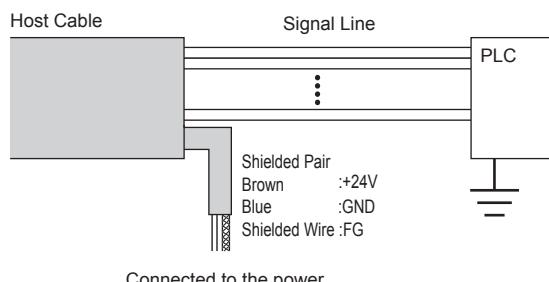
■ Connection Precautions

The following precautions should be observed when using the host cable (VT-C5K1/C5K2/C5R1/C5R2/C15R2/C5A/C5F/OP-75039) to connect VT3-V7R.

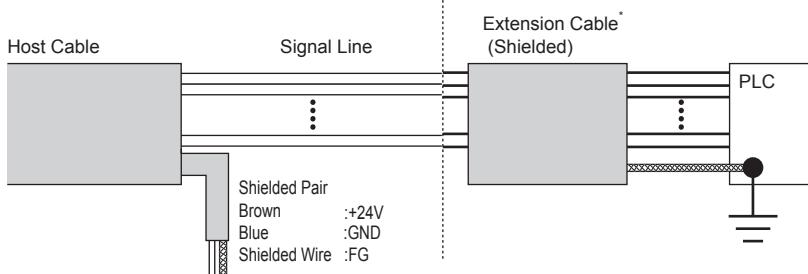
- The connection and extension of the ground wire.

To ground the shielded wire (FG) of the host cable, ensure to connect it to the FG terminal "Class-D grounding (third-type grounding)". In addition, to use the power cable, please use a shielded pair. For more information, please refer to the  "3-3 Power Connection" in the VT3 Series Hardware Manual and  "3-4 Grounding Precautions" in the VT3 Series Hardware Manual.

When the signal line of VT-C5R1/C5R2/C15R2 is extended



When the signal line of VT-C5R1/C5R2/C15R2 is extended



* Customers should prepare the extension cable by themselves.
The shielded wire in Wiring Diagram is the shielded wire of the extension cable.
The shielded wire of the extension cable should be connected on the PLC side.

● For the wires not to be used

For the wires not to be used, please insulate them with shrinkable insulating sleeves to prevent them from touching other wires.
The feedback wire should be soldered and insulated with an insulating tape.

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Revision History

Printing Date	Version	Details of Revision
Jan 2009	Initial version	
Apr 2009	2nd version	
Aug 2009	3rd version	
Dec 2010	19th version	
Apr 2011	22nd version	
Nov 2011	23rd version	
Jan 2013	24th version	
Jun 2013	26th version	
Feb 2014	28th version	
May 2014	29th version	
May 2015	31st version	VT5 Series
Oct 2015	33rd version	Supports Soft-VT
Nov 2015	34th version	
Mar 2016	35th version	
Jun 2016	36th version	
Nov 2016	37th version	
Sep 2017	39th version	
Dec 2017	1st revision 1st edition	

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