FANUC Series 30*i*-MODEL A/B
FANUC Series 31*i*-MODEL A/B
FANUC Series 32*i*-MODEL A/B
FANUC Series 35*i*-MODEL B
FANUC Power Motion *i*-MODEL A
FANUC Series 0*i*-MODEL F

CC-Link Board

CONNECTION MANUAL

B-64463EN/04

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Should you wish to export or re-export these products, please contact FANUC for advice.

In this manual we have tried as much as possible to describe all the various matters.
However, we cannot describe all the matters which must not be done, or which cannot be done, because there are so many possibilities.
Therefore, matters which are not especially described as possible in this manual should be regarded as "impossible".

This manual contains the program names or device names of other companies, some of which are registered trademarks of respective owners. However, these names are not followed by ® or ™ in the main body.

SAFETY PRECAUTIONS

"SAFETY PRECAUTIONS" describes the safety precautions related to the use of CNC units, to ensure safe operation of machines fitted with FANUC CNC units. Read this section carefully before attempting to use any function described in this manual.
Users should also read the relevant descriptions in the Operator's Manual of the CNC to become fully familiar with the functions to be used.

Contents

DEFINITION OF WARNING, CAUTION, AND NOTE

This manual includes safety precautions for protecting the user and preventing damage to the machine. Precautions are classified into Warnings and Cautions according to their bearing on safety. Also, supplementary information is described as Notes. Read the Warnings, Cautions, and Notes thoroughly before attempting to use the machine.

⚠ WARNING
Applied when there is a danger of the user being injured or when there is a danger of both the user being injured and the equipment being damaged if the approved procedure is not observed.

⚠ CAUTION
Applied when there is a danger of the equipment being damaged, if the approved procedure is not observed.

NOTE
The Note is used to indicate supplementary information other than Warning and Caution.

- Read this manual carefully, and store it in a safe place.

GENERAL WARNINGS AND CAUTIONS

⚠ WARNING

1 Before operating the machine, thoroughly check the entered data. Operating the machine with incorrectly specified data may result in the machine behaving unexpectedly, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.

2 Never attempt to machine a workpiece without first checking the programmed value, compensation value, current position, and external signal settings. Also, never attempt to machine a workpiece without first checking the operation of the machine. Before starting a production run, ensure that the machine is operating correctly by performing a trial run using, for example, the single block, feedrate override, or machine lock function, or by operating the machine with neither a tool nor workpiece mounted. Failure to confirm the correct operation of the machine may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

3 Ensure that the specified feedrate is appropriate for the intended operation. Generally, for each machine, there is a maximum allowable feedrate. The appropriate feedrate varies with the intended operation. Refer to the manual provided with the machine to determine the maximum allowable feedrate. If a machine is turn at other than the correct speed, unexpected load may be applied to the machine, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.

4 When using a tool compensation function, thoroughly check the direction and amount of compensation.
Operating the machine with incorrectly specified data may result in the machine behaving unexpectedly, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.

5 The parameters for the CNC and PMC are factory-set. Usually, there is no need to change them. When, however, there is no alternative other than to change a parameter, ensure that you fully understand the function of the parameter before making any change.
A failure to set a parameter correctly may result in the machine behaving unexpectedly, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.

⚠ CAUTION

1 Immediately after switching on the power, do not touch any of the keys on the MDI unit until the position display or alarm screen appears on the CNC unit.
Some of the keys on the MDI panel are dedicated to maintenance or other special operations. Pressing any of these keys may place the CNC unit in other than its normal state. Starting the machine in this state may cause it to behave unexpectedly.

2 The operator's manual for the CNC describes all the basic functions of the CNC, including the optional functions. The selected optional functions vary with the machine. Some functions described in this manual may not, therefore, be supported by your machine. Check the machine specifications before using the optional functions.

⚠ CAUTION

3 Some machine operations and screen functions are implemented by the machine tool builder. For an explanation of their usage and related notes, refer to the manual provided by the machine tool builder.
For example:
- On some machines, executing a tool function causes the tool change unit to operate. When executing a tool function on such a machine, stand well clear of the tool change unit. Otherwise, there is a danger of injury to the operator.
- Many auxiliary functions trigger physical operations, such as rotation of the spindle. Before attempting to use an auxiliary function, therefore, ensure that you are fully aware of the operation to be triggered by that function.

NOTE

Command programs, parameters, and variables are stored in nonvolatile memory in the CNC. Generally, the contents of memory are not lost by a power on/off operation. However, the contents of memory may be erased by mistake, or important data in nonvolatile memory may have to be erased upon recovering from a failure.
To enable the restoration of data as soon as possible if such a situation arises, always make a backup of the data in advance.

GENERAL WARNINGS FOR CNC APPLICATION DEVELOPMENT

⚠ WARNING

Be careful enough for the following warnings when you develop two or more applications or use networks.
If you neglect them, there is a danger of the user being injured or there is a danger of both the user being injured and the equipment being damaged.

1 Be careful enough if you write an identical CNC data, an identical PMC data or a series of related data set by two or more above applications including network functions. Because they are executed based on each individual cycles (in other words, asynchronous cycles), there is a possibility that the data will be written in an unexpected order.
Therefore, do NOT write above data in the following cases.
- Applications and network functions
- Two or more applications
- Two or more network functions

Data, applications and network functions of interest are listed in below.
However, all may not be listed completely because new features will be added in the future.

2 Be careful enough that you must prevent PMC signals in the same byte from being written by the following two or more applications including network functions. While an application reads and writes one byte of PMC signals, other applications may write the same byte.

3 Be careful enough if you process a PMC signal set that is related to a CNC function by using the following two or more applications including network functions. Because they are executed based on each individual cycles (in other words, asynchronous cycles), there is a possibility that the NC may receive the PMC signal set in an unexpected order.

⚠ WARNING

4 Generally, when multi-byte data are read or written at once among the following two or more applications including network functions, the coherency of the read multi-byte data (in other words, reading all latest data at once) is not guaranteed. To ensure the coherency of the multi-byte data, prepare flags to notify the completion of reading or writing process that is separated from the entity of the data and make the handshaking process to access the data by using the flags.

Data List Table

Category	Data
General data for CNC	Parameter, Tool compensation value and related data, Work zero offset value and related data, Workpiece coordinate system shift value and related data, Macro variable, P-CODE variable, Program and related data, Tool management function data, Tool life management data, Error compensation related data , Overtravel check (Interference check) related data , Software operator's panel related data
PMC data	PMC signal, PMC parameter
Data for Laser, Punch press or Wire cut	Tool data for punch press and related data, Safety zone data and related data, Laser cutting condition data and related data, Laser oscillator setting data and related data, Wire consumption compensation data, Guide position compensation data, Workpiece leveling data
Other data	Parameters for Data Server, Parameters for network setting

List Table of Applications and Network Functions

Category	Functions
Applications	PMC Ladder, Macro Executor, C Language Executor, FANUC PICTURE, FOCAS2
Network functions	FL-net, EtherNet/IP, PROFINET, Modbus/TCP, PROFIBUS-DP, DeviceNet, CC-Link

5 CNC has functions that read or write PMC signals in other than the G/F address. Be careful enough if the above mentioned applications and network read or write PMC signals used by these functions. When reading or writing the same PMC signal, applications or CNC functions may work in an unexpected manner.
For the relevant CNC functions, refer to "LIST OF FUNCTIONS USING PMC SIGNALS OTHER THAN G/F ADDRESS " in Appendix in the CONNECTION MANUAL (FUNCTION) of the relevant CNC.

TABLE OF CONTENTS

I. GENERAL

1 GENERAL

This chapter explains the organization of this manual and how to read this manual.

1.1 ORGANIZATION OF THIS MANUAL

This manual consists of the following parts:

SAFETY PRECAUTIONS
Describes the precautions which must be observed when any of the functions explained in this manual is used.

I. GENERAL
Explains the organization of this manual, lists applicable models, and provides an overview of the CC-Link function.

II. SETTING
Describes the settings for CC-Link communication and notes on creating a ladder program.

III. CONNECTION
Describes how to connect devices to enable CC-Link communication, as well as related precautions.

IV. MAINTENANCE
Describes CC-Link board drawing numbers and the meanings of LED indications

1.2 APPLICABLE MODELS

The models covered in this manual are as follows. The abbreviations listed below may be used to refer to the corresponding models.

<table>
<tr><th>Model name</th><th colspan="4">Abbreviation</th></tr>
<tr><td>FANUC Series 30i-MODEL A</td><td>Series 30i-A</td><td colspan="2" rowspan="3">Series 30i/31i/32i-A</td><td rowspan="10">Series 30i/31i/32i-A/B, 35i-B, PMi-A</td></tr>
<tr><td>FANUC Series 31i-MODEL A</td><td rowspan="2">Series 31i-A</td></tr>
<tr><td>FANUC Series 31i-MODEL A5</td></tr>
<tr><td>FANUC Series 32i-MODEL A</td><td>Series 32i-A</td></tr>
<tr><td>FANUC Series 30i-MODEL B</td><td>Series 30i-B</td><td rowspan="4">Series 30i/31i/32i-B</td><td rowspan="5">Series 30i/31i/32i/35i-B</td></tr>
<tr><td>FANUC Series 31i-MODEL B</td><td rowspan="2">Series 31i-B</td></tr>
<tr><td>FANUC Series 31i-MODEL B5</td></tr>
<tr><td>FANUC Series 32i-MODEL B</td><td>Series 32i-B</td></tr>
<tr><td>FANUC Series 35i-MODEL B</td><td>Series 35i-B</td><td>Series 35i-B</td></tr>
<tr><td>FANUC Power Motion i-MODEL A</td><td>Power Motion i-A</td><td>Power Motion i-A</td><td>PMi-A</td></tr>
<tr><td>FANUC Series 0i-MODEL F</td><td>Series 0i-F</td><td>Series 0i-F</td><td>Series 0i-F</td><td>0i-F</td></tr>
</table>

1.3 RELATED MANUALS

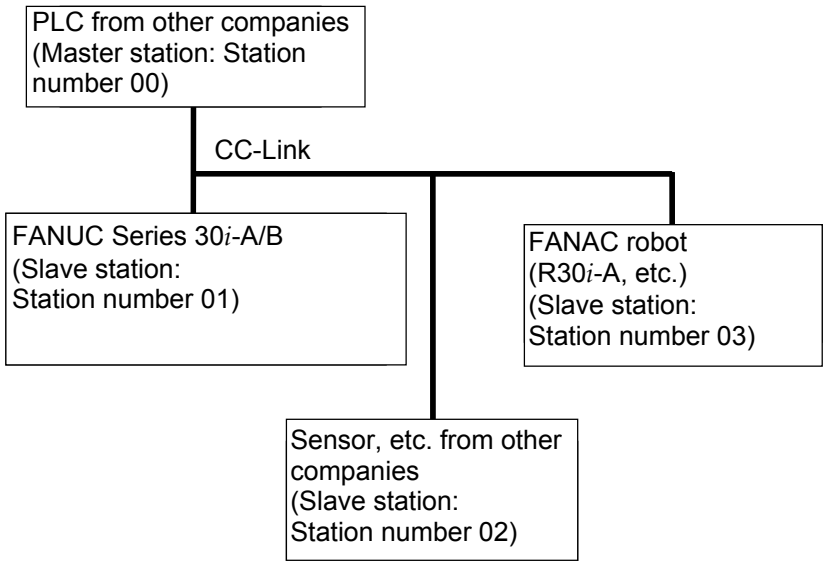
The related manuals are shown below.
See also the following manuals together with this manual. This manual is indicated by an asterisk(*).

Manual name	Specification number	
Related to Series 30*i*/31*i*/32*i*-A		
DESCRIPTIONS	B-63942EN	
CONNECTION MANUAL (HARDWARE)	B-63943EN	
CONNECTION MANUAL (FUNCTION)	B-63943EN-1	
OPERATOR'S MANUAL (Common to Lathe System/Machining Center System)	B-63944EN	
OPERATOR'S MANUAL (For Lathe System)	B-63944EN-1	
OPERATOR'S MANUAL (For Machining Center System)	B-63944EN-2	
MAINTENANCE MANUAL	B-63945EN	
PARAMETER MANUAL	B-65950EN	
Related to Series 30*i*/31*i*/32*i*-B		
DESCRIPTIONS	B-64482EN	
CONNECTION MANUAL (HARDWARE)	B-64483EN	
CONNECTION MANUAL (FUNCTION)	B-64483EN-1	
OPERATOR'S MANUAL (Common to Lathe System/Machining Center System)	B-64484EN	
OPERATOR'S MANUAL (For Lathe System)	B-64484EN-1	
OPERATOR'S MANUAL (For Machining Center System)	B-64484EN-2	
MAINTENANCE MANUAL	B-64485EN	
PARAMETER MANUAL	B-64490EN	
Related to Series 35*i*-B		
DESCRIPTIONS	B-64522EN	
CONNECTION MANUAL (HARDWARE)	B-64523EN	
CONNECTION MANUAL (FUNCTION)	B-64523EN-1	
OPERATOR'S MANUAL	B-64524EN	
MAINTENANCE MANUAL	B-64525EN	
PARAMETER MANUAL	B-64530EN	
Related to Power Motion *i*-A		
DESCRIPTIONS	B-64572EN	
CONNECTION MANUAL (HARDWARE)	B-64573EN	
CONNECTION MANUAL (FUNCTION)	B-64573EN-1	
OPERATOR'S MANUAL	B-64574EN	
MAINTENANCE MANUAL	B-64575EN	
PARAMETER MANUAL	B-64580EN	
Related to Series 0*i*-F		
DESCRIPTIONS	B-64602EN	
CONNECTION MANUAL (HARDWARE)	B-64603EN	
CONNECTION MANUAL (FUNCTION)	B-64603EN-1	
CONNECTION MANUAL (FUNCTION) (For Series 0*i*-PF)	B-64623EN	
OPERATOR'S MANUAL (Common to Lathe System/Machining Center System)	B-64604EN	
OPERATOR'S MANUAL (For Series 0*i*-PF)	B-64624EN	
OPERATOR'S MANUAL (For Lathe System)	B-64604EN-1	
OPERATOR'S MANUAL (For Machining Center System)	B-64604EN-2	
MAINTENANCE MANUAL	B-64605EN	
PARAMETER MANUAL	B-64610EN	
PARAMETER MANUAL (For Series 0*i*-PF)	B-64630EN	
PMC		
PMC PROGRAMMING MANUAL (For Series 30*i*/31*i*/32*i*-A)	B-63983EN	

Manual name	Specification number	
PMC PROGRAMMING MANUAL (For Series 30*i*/31*i*/32*i*/35*i*-B, Power Motion *i*-A, Series 0*i*-F)	B-64513EN	
Network		
PROFIBUS-DP Board CONNECTION MANUAL	B-63993EN	
Industrial Ethernet CONNECTION MANUAL	B-64013EN	
Fast Ethernet / Fast Data Server OPERATOR'S MANUAL	B-64014EN	
DeviceNet Board CONNECTION MANUAL	B-64043EN	
FL-net Board CONNECTION MANUAL	B-64163EN	
CC-Link Board CONNECTION MANUAL	B-64463EN	*

2 OVERVIEW OF CC-Link FUNCTIONS

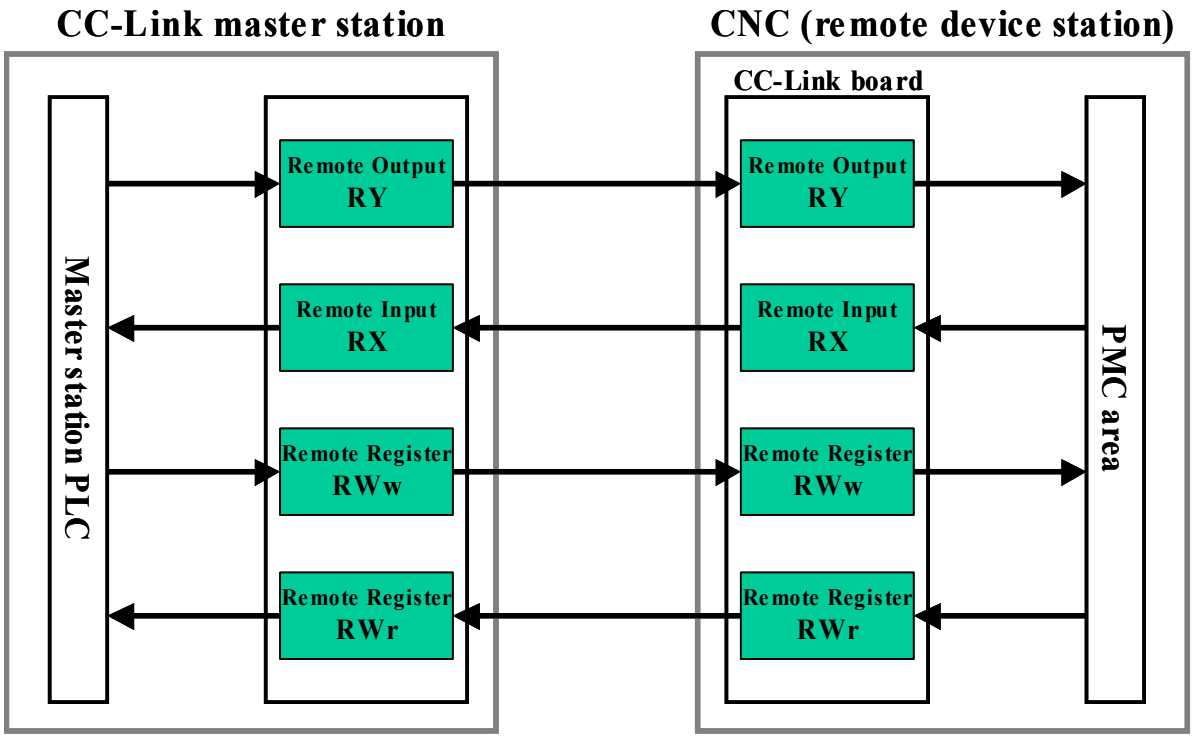
The CC-Link is a field network that can be connected to a variety of control units such as a CNC, PLC, and sensor.



The FANUC CC-Link functions can be operated as remote device stations (slave stations), and can communicate with control units compliant with CC-Link master stations.

2.1 FEATURES OF CC-Link REMOTE DEVICE STATIONS

The CC-Link remote device station enables exchange of bit information (remote output RY and remote input RX) and word information (remote registers RWw and RWr) to and from a CC-Link master station (such as a PLC from other companies).



NOTE
The data of the remote input/output of the CC-Link functions contains both user and system areas. The system area is reserved for the CC-Link functions, and is not for use by the user.

2.2 TERMINOLOGY

This section describes the terms used in this manual.

Term	Description
Master station	A station that manages an entire network. A single network requires a single master station. A master station has a fixed station number of 0.
Slave station	A generic term for stations other than master stations.
Remote device station	A CC-Link slave station. A station that can communicate with a master station in bit units and in word (16-bit) units.
Station number	The ID assigned to a station on the CC-Link. A master station has a fixed station number of 0. A slave station is assigned a number between 1 and 64.
No. of occupied stations	The number of stations on a network that are used by a single slave station. Numbers between 1 and 4 may be set according to the amount of data.
Remote output RY	The bit-unit data that a slave station is to receive from its master station. Or, the area used to store that data.
Remote input RX	The bit-unit data that a slave station is to send to its master station. Or, the area used to store that data.

Term	Description
Remote register RWw	The word-unit data that a slave station is to receive from its master station. Or, the area used to store that data.
Remote register RWr	The word-unit data that a slave station is to send to its master station. Or, the area used to store that data.

NOTE
"Remote input" and "remote output" are input and output as seen from the master station; if seen from the CNC (slave station), they are output and input, respectively. That is, remote input RX stores output signals to the master station, while remote output RY stores input signals from the master station.
Similarly, remote register RWr stores an output signal to the master station, while remote register RWw stores an input signal from the master station.
In the text, "input signal" and "output signal" refer to any input signal (RY or RWw) and any output signal (RX or RWr) as seen from the CNC, respectively.
To refer to an input and an output as seen from the master station, the expressions "input signal from the master station" and "output signal from the master station" are used.

2.3 SPECIFICATION OF FANUC CC-Link FUNCTIONS

The FANUC CC-Link functions operate as a CC-Link remote device station, and their specification is as given in the table below.
These functions are referred to as the "CC-Link remote device functions" in the following description.

Item	Specification
Communication protocol	CC-Link Ver1.10
Type	Remote device station
Transfer rate (Baud rate)	Selectable from 156K/625K/2.5M/5M/10M bps.
Station number	1 to 64
No. of occupied stations	1 to 4
Maximum transfer data size (when 4 stations are occupied)	Remote output RY : 16 bytes (128 bits) User area : 14 bytes System area : 2 bytes (not for use by the user)
	Remote input RX : 16 bytes (128 bits) User area : 14 bytes System area : 2 bytes (not for use by the user)
	Remote register RWw : 16 words (32 bytes)
	Remote register RWr : 16 words (32 bytes)

NOTE
1 The CC-Link functions cannot be used simultaneously as the DeviceNet functions or the PROFIBUS-DP functions.
2 The 2-byte system area in remote input/output is reserved for the CC-Link functions, and are not for use by the user.
3 The user can freely use a remote register.

2.3.1 No. of Occupied Stations and Maximum Transfer Data Size

The amount of data that a single unit can communicate depends on the number of stations that the unit occupies.
Per occupied station, remote input/output can each communicate data of 4 bytes (of which 2 bytes are for the system area) and remote registers can each communicate 4 words (8 bytes). A single unit can occupy up to 4 stations.
If 4 stations are occupied, remote input/output can each communicate data of 16 bytes (of which 2 bytes are for the system area) and remote registers can each communicate 16 words (32 bytes).

No. of occupied stations	RY	RX	RWw	RWr
1	4 bytes User area: 2 bytes System area: 2 bytes	4 bytes User area: 2 bytes System area: 2 bytes	4 words (8 bytes)	4 words (8 bytes)
2	8 bytes User area: 6 bytes System area: 2 bytes	8 bytes User area: 6 bytes System area: 2 bytes	8 words (16 bytes)	8 words (16 bytes)
3	12 bytes User area: 10 bytes System area: 2 bytes	12 bytes User area: 10 bytes System area: 2 bytes	12 words (24 bytes)	12 words (24 bytes)
4	16 bytes User area: 14 bytes System area: 2 bytes	16 bytes User area: 14 bytes System area: 2 bytes	16 words (32 bytes)	16 words (32 bytes)

NOTE
The 2-byte system area in each of remote input/output is reserved for the CC-Link functions, and is not for use by the user.

2.3.2 Memory Mapped Profile

The memory mapped profile of FANUC CC-Link Remote device function is as follows.

Remote input/output

<table>
<tr><th rowspan="2"></th><th colspan="2">Slave → Master</th><th colspan="2">Master → Slave</th></tr>
<tr><th>Device No.</th><th>Description</th><th>Device No.</th><th>Signal Name</th></tr>
<tr><td rowspan="6">User area</td><td>RXm0</td><td rowspan="5">User write area</td><td>RYm0</td><td rowspan="5">User read area</td></tr>
<tr><td>RXm1</td><td>RYm1</td></tr>
<tr><td>RXm2</td><td>RYm2</td></tr>
<tr><td>RXm3</td><td>RYm3</td></tr>
<tr><td>:</td><td>:</td></tr>
<tr><td rowspan="7">System area</td><td>RX(m+n)0</td><td rowspan="3">Reserved</td><td>RY(m+n)0</td><td rowspan="7">Reserved</td></tr>
<tr><td>:</td><td rowspan="5">:</td></tr>
<tr><td>RX(m+n)A</td></tr>
<tr><td>RX(m+n)B</td><td>Remote READY</td></tr>
<tr><td>RX(m+n)C</td><td rowspan="3">Reserved</td></tr>
<tr><td>:</td></tr>
<tr><td>RX(m+n)F</td><td>RY(m+n)F</td></tr>
</table>

m : This value is decided by the station number.
n : This value depends on the No. of occupied stations
(in case of 1 then n=1, in case of 2 then n=3, in case of 3 then n=5, in case of 4 then n=7)

NOTE
1 The user can freely use a user area of Remote input/output.
The 2-byte system area in each of remote input/output is reserved for the CC-Link functions, and is not for use by the user.
2 When the CC-Link communication becomes ready, “Remote READY” signal is turned on automatically. It is not necessary for user to turn this signal on.

Remote register

	Slave → Master		Master → Slave	
	Device No.	**Description**	**Device No.**	**Description**
User area	RWrm	User write area	RWwm	User read area
	RWrm+1		RWwm+1	
	RWrm+2	If 1 station is to be occupied:	RWwm+2	If 1 station is to be occupied:
	RWrm+3	(4 words)	RWwm+3	(4 words)
	RWrm+4	If 2 stations are to be occupied:	RWwm+4	If 2 stations are to be occupied:
	RWrm+5	(8 words)	RWwm+5	(8 words)
	RWrm+6		RWwm+6	
	RWrm+7		RWwm+7	
	RWrm+8	If 3 stations are to be occupied:	RWwm+8	If 3 stations are to be occupied:
	RWrm+9	(12 words)	RWwm+9	(12 words)
	RWrm+A		RWwm+A	
	RWrm+B		RWwm+B	
	RWrm+C	If 4 stations are to be occupied:	RWwm+C	If 4 stations are to be occupied:
	RWrm+D	(16 words)	RWwm+D	(16 words)
	RWrm+E		RWwm+E	
	RWrm+F		RWwm+F	

m : This value is decided by the station number.

NOTE
The user can freely use all areas of the remote register.

II. SETTING

1 CC-Link REMOTE DEVICE FUNCTIONS

This chapter describes how to set the CC-Link remote device functions.

> ⚠ **WARNING**
> To use the CC-Link, fully understand the instructions described in this manual before making the setting. If you make the setting without fully understanding them, the machine may behave unexpectedly when started, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.
> After making the communication setting for the first time or changing any communication setting, conduct communication tests thoroughly.

> ⚠ **CAUTION**
> Before starting operation, carefully confirm the following conditions. Otherwise, a serious accident may occur.
> (1) Confirm that the signal functions correctly in a safety status after setting the communication parameters.
> (2) Confirm that the ladder program is designed so that the system operates safely even in the event of a communication failure.
> (3) The time after the power is turned on until communication is actually started may vary depending on the power-on timing, connected device status, and other factors. If it is necessary to strictly determine whether communication starts, use not the time or status, but actual communication data.
> (4) If connecting to communication devices made by other companies, thoroughly read the manuals supplied with the communication devices made by the other companies and sufficiently conduct connection tests beforehand.

> **NOTE**
> In this manual, each screen has described the example of the screen of Series 30*i*/31*i*/32*i*-A. Although detailed layout might be different, the basic contents are the same as for Series 30*i*/31*i*/32*i*/35*i*-B, Power Motion *i*-A and Series 0*i*-F.

1.1 CC-Link REMOTE DEVICE FUNCTION SETTING SCREEN

This section describes the CC-Link remote device function setting screen.

> **NOTE**
> 1 Parameters can be changed only in the MDI mode or emergency stop state.
> 2 If a parameter is changed, “PW0000 POWER MUST BE OFF” appears on the alarm message screen of the CNC. For the changed parameter to take effect, turn off the power to the CNC and back on.

Procedure

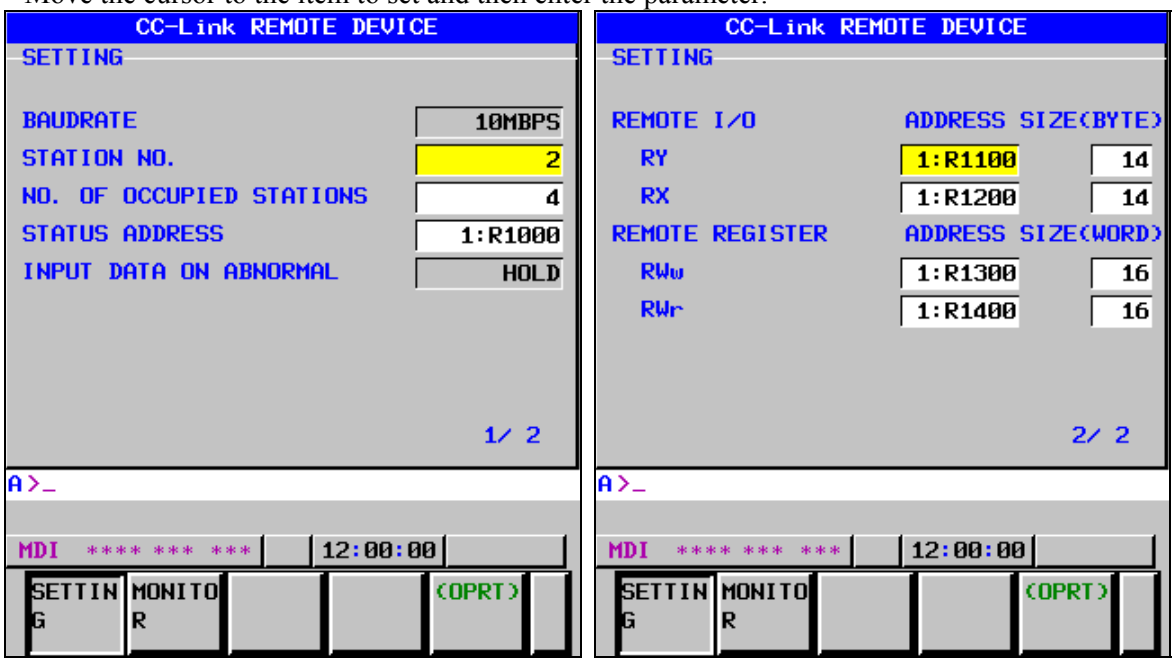
1 Press function key 

.

2 Soft key [CCLink REMOTE] appears. (When soft key [CCLink REMOTE] does not appear, press the continue key located at the right end of soft keys several times.)

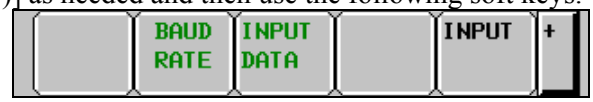
3 If you press soft key [CCLink REMOTE], the SETTING screen or MONITOR screen appears.

4 Press soft key [SETTING] to display the SETTING screen (Screen 1-1).
5 Move the cursor to the item to set and then enter the parameter.

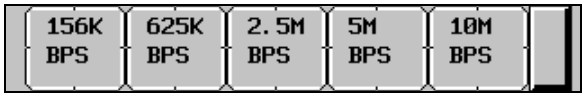


Screen 1 - 1

6 Press soft key [(OPRT)] as needed and then use the following soft keys.



Press soft key [BAUD RATE], and the operations below are enabled, and the communication rate can be set. Set the same communication rate as that to be set on the master station.



Press soft key [INPUT DATA], and the input data on abnormal can be set.

Setting item

Basic setting

Item	Description
BAUDRATE Setting: Selection with a soft key Initial value: 10Mbps	Set a communication rate. The same rate must be set on all units on the CC-Link. The valid setting ranges are: • 10 Mbps • 5 Mbps • 2.5 Mbps • 625 Kbps • 156 Kbps

Item	Description
STATION NO. Valid data range: 1 to 64 Initial value: 1	Set the station No. for use by the CC-Link remote device functions. The number must not be the same as that of any other slave stations on the network. If multiple stations are to be occupied, it is necessary to set the start station No. The station Nos. of the consecutive stations to be occupied must not be the same as those of other slave stations. Example) If 10 is input as a station No. when 4 stations are to be occupied, the CNC will occupy 4 stations, 10, 11, 12, and 13. If the setting is such that 65th and subsequent stations are to be occupied, an error will result. The setting must meet the following condition: (STATION NO.) + (NO. OF OCCUPIED STATIONS) – 1 ≤ 64
NO. OF OCCUPIED STATIONS Valid data range: 1 to 4 Initial value: 1	Set the number of stations to be occupied by the CC-Link remote device functions. Depending on the number of stations to be occupied, the amount of data that can be communicated with the master station varies.
STATUS ADDRESS Valid data range: R area, E area Initial value: Not used	Set the address of the PMC area used to store the status of the CC-Link remote device functions. (CAUTION, NOTE 1) The status is output to the 3 bytes starting at the specified PMC address. For an explanation of the output status, see Section 1.4, "STATUS OF CC-Link REMOTE DEVICE FUNCTION." If not using the status, set a space (SP).
INPUT DATA ON ABNORMAL Input: Setting with a soft key Initial value: HOLD	Decide whether to keep the input signal in the state it was immediately before the abnormal state occurs or clear it to 0 if the CPU stops or a time over error occurs, making it impossible to receive an input signal (RY or RWw) from the master station. • HOLD : Keeps the data received immediately before the abnormal state occurs. • CLEAR : Clear the signal to 0.

REMOTE I/O

Item	Description
RY	
ADDRESS Valid data range: R area, E area Initial value: Not used	Set the address of the PMC area used to store RY. (CAUTION, NOTE 1) If not using RY, set a space (SP).
SIZE(BYTE) Valid data range: If 1 station is to be occupied: 0 to 2 If 2 stations are to be occupied: 0 to 6 If 3 stations are to be occupied: 0 to 10 If 4 stations are to be occupied: 0 to 14 Initial value: 0	Set the size of the PMC area used to store RY. The size must be set in units of bytes. If not using RY, set a 0. If the specified size of the PMC area is less than the size of RY, the part of RY that exceeds the size of the PMC area will not be stored in the PMC area.
RX	
ADDRESS Valid data range: R area, E area Initial value: Not used	Set the address of the PMC area used to store RX. (CAUTION, NOTE 1) If not using RX, set a space (SP). If so, RX will be sent to the master station as all 0s.
SIZE(BYTE) Valid data range: If 1 station is to be occupied: 0 to 2 If 2 stations are to be occupied: 0 to 6 If 3 stations are to be occupied: 0 to 10 If 4 stations are to be occupied: 0 to 14 Initial value: 0	Set the size of the PMC area used to store RX. The size must be set in units of bytes. If not using RX, set a 0. If the specified size of the PMC area is less than the size of RY, the part of RX that exceeds the size of the PMC area will be sent to the master station as 0s.

REMOTE REGISTER

Item	Description
RWw	
ADDRESS Valid data range: R area, E area Initial value: Not used	Set the address of the PMC area used to store RWw. (CAUTION, NOTE 1) If not using RWw, set a space (SP).
SIZE(WORD) Valid data range: If 1 station is to be occupied: 0 to 4 If 2 stations are to be occupied: 0 to 8 If 3 stations are to be occupied: 0 to 12 If 4 stations are to be occupied: 0 to 16 Initial value: 0	Set the size of the PMC area used to store RWw. The size must be set in units of words (2 bytes). If not using RWw, set a 0. If the specified size of the PMC area is less than the size of RWw, the part of RWw that exceeds the size of the PMC area will not be stored in the PMC area.
RWr	
ADDRESS Valid data range: R area, E area Initial value: Not used	Set the address of the PMC area used to store RWr. (CAUTION, NOTE 1) If not using RWr, set a space (SP). If so, RWr will be sent to the master station as all 0s.
SIZE(WORD) Valid data range: If 1 station is to be occupied: 0 to 4 If 2 stations are to be occupied: 0 to 8 If 3 stations are to be occupied: 0 to 12 If 4 stations are to be occupied: 0 to 16 Initial value: 0	Set the size of the PMC area used to store RWr. The size must be set in units of words (2 bytes). If not using RWr, set a 0. If the specified size of the PMC area is less than the size of RY, the part of RWr that exceeds the size of the PMC area will be sent to the master station as 0s.

⚠ WARNING

Before allocating the status address, remote I/O, and remote register to the PMC area, fully understand the instructions in "GENERAL WARNINGS FOR CNC APPLICATION DEVELOPMENT" in "SAFETY PRECAUTIONS" at the beginning of this manual, and in this section.
Allocate the PMC area so that multiple communication functions do not write it.
Immediately after setting all communication parameters including those for allocation to the PMC area, make sure that DI/DO data and status data operate correctly in the status in which safety is ensured before starting operation.
If operation is started without checking the above, the machine may behave unexpectedly, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.

⚠ CAUTION

1 In the PMC area, the R area, and the E area in volatile memory are all set to 0 immediately after power-on.
2 The E area in the PMC area is normally allocated to volatile memory. However, it can also be used as nonvolatile memory by setting the option.
When the area is used as nonvolatile memory, the contents of the area are retained even after the power is turned off. So, special attention should be paid not to cause an unpredictable operation when the power is turned on next time.

NOTE

1 A PMC address can be set as an R or E address.
For multipath PMC, the PMC address has the following format.
<path-number>:<PMC-address>
For example, for the second path of PMC with a PMC address of R0500, input "2:R500." If only the PMC address is input, "R500" is assumed as the address of the first path (1:R0500).
When the <:> key is not present, use the </> or <EOB> key instead.
2 If wishing to delete an input PMC address, input a space (SP).
3 Only the user area can be allocated to the PMC with REMOTE I/O. The system area cannot be allocated to the PMC.
For details of the system area, see Chapter 2, "OVERVIEW OF CC-Link FUNCTIONS," in GENERAL.
4 The PMC address that can be allocated to a REMOTE REGISTER is limited to an even-numbered address only.
5 The station number, the number of occupied stations, the size of remote I/O, and the size of a remote register check the range of the input respectively.
For example, the number of occupied stations cannot be changed to 3 stations or less because 4 stations are indispensable to the number of occupied stations when set to the size of remote I/O as 14.
In this case, change the number of occupied stations after changing the size of remote I/O.

Examples of data exchange when four stations are occupied

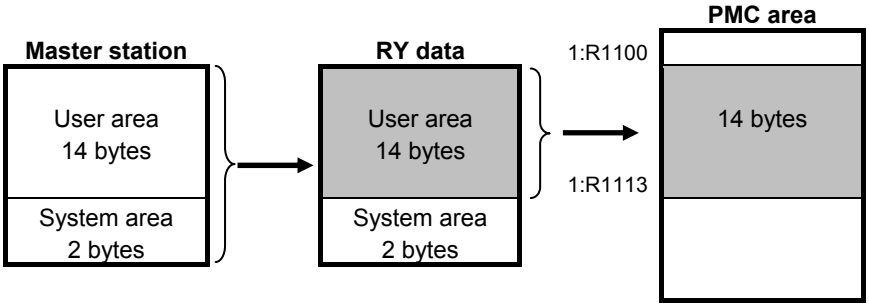
The following describes examples of REMOTE I/O and REMOTE REGISTER data exchange when 4 stations are occupied, in accordance with the setting examples below.

Item	Setting value
ADDRESS RY	1:R1100
SIZE RY	14
ADDRESS RX	1:R1150
SIZE RX	10
ADDRESS RWw	1:R1200
SIZE RWw	12
ADDRESS RWr	1:R1250
SIZE RWr	16

When 4 stations are occupied, the REMOTE I/O and REMOTE REGISTER data sizes are as follows respectively: RY/RX = 16/16 bytes (of which 2 bytes are for the system area) and RWw/RWr = 16/16 words.

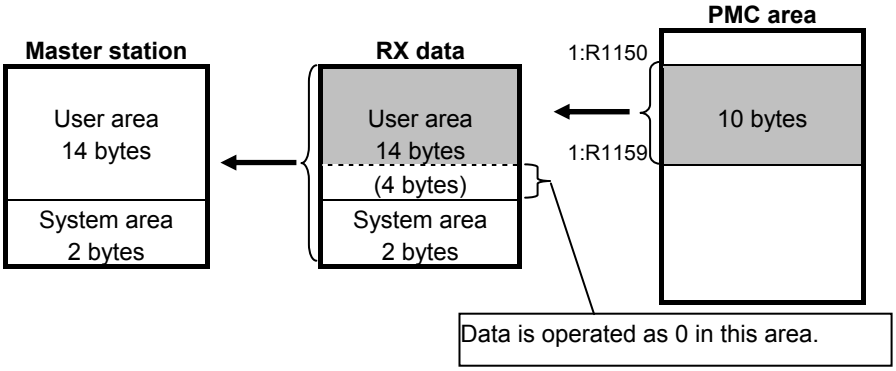
Data exchange for RY data

For input signal RY, the RY size is set to 14. Thus, all data (14 bytes) in the user area that is received from the master station is transferred to the PMC area.



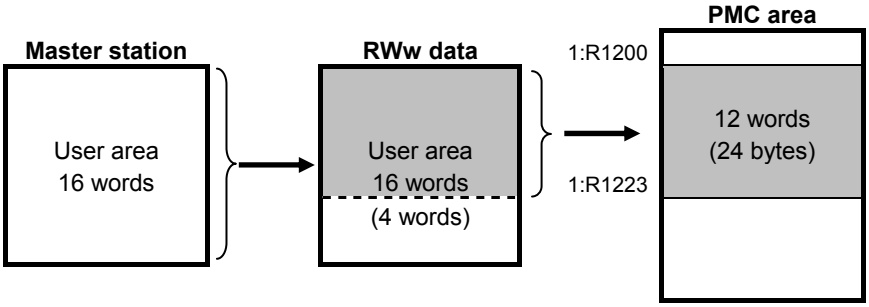
Data exchange for RX data

For output signal RX, the RX size is set to 10. Thus, only 10 bytes are transferred from the PMC area to the RX data area.
To the master station, the RX data is sent with the remaining part of it being set to 0s.



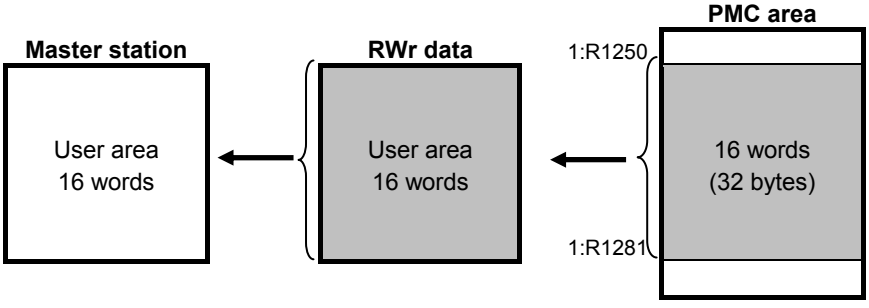
Data exchange for RWw data

For input signal RWw, the RWw size is set to 12. Thus, of the 16 words in the user area that are received from the master station, the first 12 words are transferred to the PMC area.



Data exchange for RWr data

For output signal RWr, the RWr size is set to 16. Thus, 16-word data is transferred from the PMC area to the RWr data area.
To the master station, the RWr data is sent.



1.2 BACKING UP AND RESTORING COMMUNICATION PARAMETERS

After the completion of communication parameter setting, communication parameters can be backed up as a batch, and previously backed up communication parameters can be restored as a batch.
As the input/output device to which to backup communication parameters and from which to restore them, the memory card or USB memory can be used. To select an input/output device, use parameter No.20. For details of this parameter, see "Related NC parameters" in this section.

⚠ WARNING
When [RESTORE] is executed for communication parameters, the communication parameters including the allocation of a PMC area to CC-Link function are all restored. When [ALL RESTORE] is executed for communication parameters, the communication parameters valid for embedded, Ethernet, Fast Ethernet/Fast Data Server, PROFIBUS-DP master/slave, DeviceNet master/slave, FL-net, CC-Link remote device, EtherNet/IP Scanner/Adapter, Modbus/TCP Server, and PROFINET IO Controller/IO Device are all restored. When the unsolicited messaging function is enabled, the allocation of macro variables is also restored.
For this reason, immediately after executing [RESTORE] or [ALL RESTORE] for communication parameters, fully understand instructions written in "GENERAL WARNINGS FOR CNC APPLICATION DEVELOPMENT" in "SAFETY PRECAUTIONS" at the beginning of this manual and carefully check the setting of the communication parameters of the relevant communication functions before starting operation.
For any communication function for which any PMC area or macro variable is allocated, make sure that DI/DO data, status data, and macro variable operate correctly before starting operation.
If operation is started without checking the above, the machine may behave unexpectedly, possibly causing damage to the tool, machine, and/or workpiece, or injury to the user.

⚠ CAUTION
While an external input/output device such as the memory card or USB memory is being accessed, do not turn the power to the CNC off or remove the external input/output device. Doing so may damage the external input/output device.

NOTE
1 A backup or restore operation for communication parameters can only be performed in the MDI mode, EDIT mode, or emergency stop state.
2 It is not possible to backup or restore the communication parameters by using any device other than the memory card or the USB memory.
With Series 30*i*/31*i*/32*i*-A, the USB memory cannot be used.

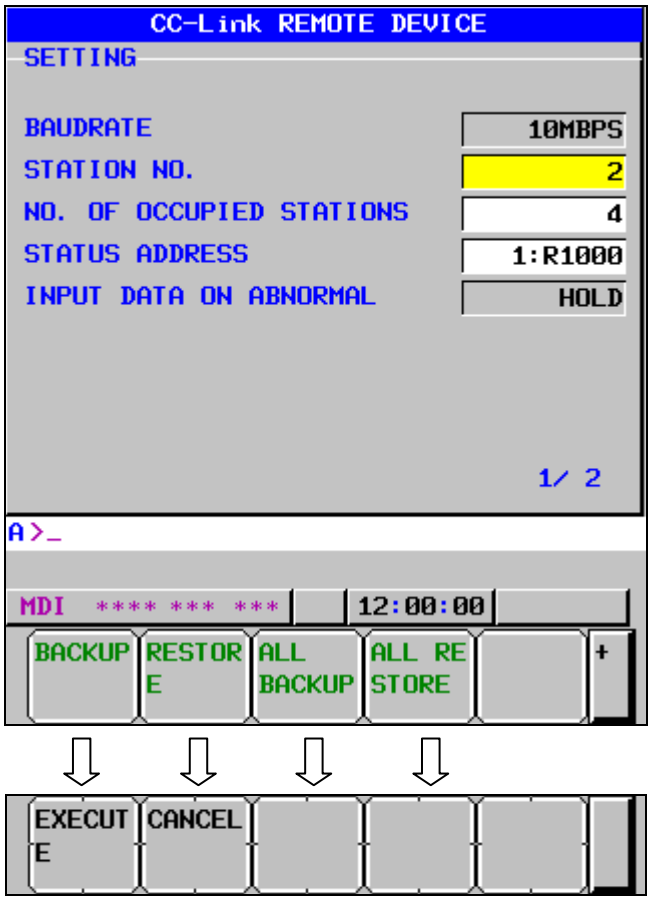
Procedure

1 Press function key 

.

2 Soft key [CCLink REMOTE] appears. (When soft key [CCLink REMOTE] does not appear, press the continue key located at the right end of soft keys several times.)

3 If you press soft key [CCLink REMOTE], the SETTING screen or MONITOR screen appears.
4 When you press soft keys [SETTING] - [(OPRT)], and then press soft key [+], soft keys [BACKUP], [RESTORE], [ALL BACKUP], and [ALL RESTORE] for backing up and restoring communication parameters appear as shown below.
5 When you press any of soft keys [BACKUP], [RESTORE], [ALL BACKUP], and [ALL RESTORE], soft keys [EXECUTE] and [CANCEL] appear.
6 Enter in the key-in buffer the name of a file to which the parameters are backed up or from which the parameters are restored, and then press soft key [EXECUTE] to perform a backup or restore operation.
During the operation, "EXECUTING" blinks.



Operation

BACKUP

This soft key is used to save to the input/output device the communication parameters for the CC-Link remote device function stored in the SRAM of the CNC.
When a file name is specified in the key-in buffer, the parameters are saved to a file with the specified name in the input/output device. Otherwise, a file called "CCLRMT.MEM" is used.

RESTORE

This soft key is used to read the communication parameters for the CC-Link remote device function from the input/output device and save them to the SRAM of the CNC.
When a file name is specified in the key-in buffer, the file with the specified name is read from the input/output device. Otherwise, a file called "CCLRMT.MEM" is used.

ALL BACKUP

This soft key is used to save to the input/output device all of the valid communication parameters for the embedded Ethernet, Fast Ethernet/Fast Data Server, PROFIBUS-DP master/slave, DeviceNet master/slave, FL-net, CC-Link remote device, EtherNet/IP Scanner/Adapter, Modbus/TCP Server, and PROFINET IO Controller/IO Device stored in the SRAM of the CNC.
When a file name is specified in the key-in buffer, the parameters are saved to a file with the specified name in the input/output device. Otherwise, a file called "NETWORK.MEM" is used.

ALL RESTORE

This soft key is used to read all of the valid communication parameters for the embedded Ethernet, Fast Ethernet/Fast Data Server, PROFIBUS-DP master/slave, DeviceNet master/slave, FL-net, CC-Link remote device, EtherNet/IP Scanner/Adapter, Modbus/TCP Server, and PROFINET IO Controller/IO Device from the input/output device and save them to the SRAM of the CNC.
If a communication function associated with some of the valid parameters is disabled in the CNC, however, the communication parameters for that function are not saved to the SRAM.
When a file name is specified in the key-in buffer, the file with the specified name is read from the input/output device. Otherwise, a file called "NETWORK.MEM" is used.

NOTE
When communication parameters are restored, an alarm condition occurs that requires power-off.

Related NC parameters

0020	I/O CHANNEL: Input/output device selection, or interface number for a foreground input/output device

[Input type] Setting input
[Data type] Byte
[Valid data range] 4: Selects the memory card as the input/output device.
17: Selects the USB memory as the input/output device.
It is not possible to backup and restore the communication parameters by using other devices.

NOTE
In case of Series 30*i*/31*i*/32*i*-A, the memory card is used regardless for this NC parameter.

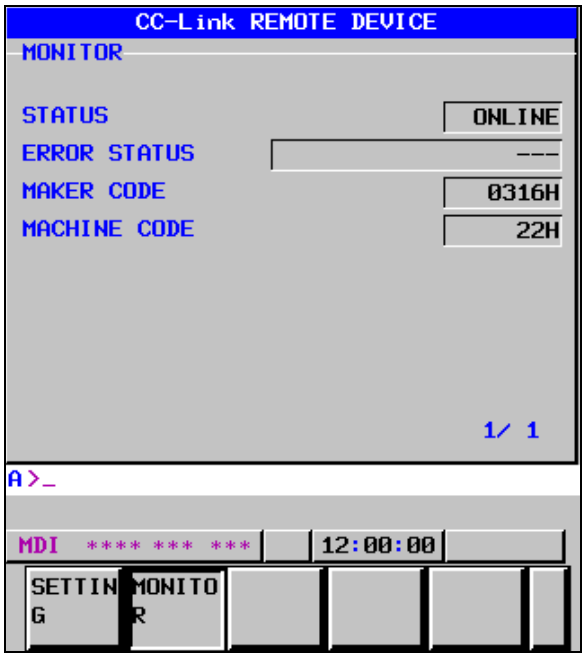
1.3 CC-Link REMOTE DEVICE FUNCTION MAINTENANCE SCREEN

This section describes the maintenance screen of the CC-Link remote device function.

Procedure

1 Press function key 

.
2 Soft key [CCLink REMOTE] appears. (When soft key [CCLink REMOTE] does not appear, press the continue key located at the right end of soft keys several times.)
3 If you press soft key [CCLink REMOTE], the SETTING screen or MONITOR screen appears.
4 Press soft key [MONITOR] to display the MONITOR screen (Screen 1-2).



Screen 1 - 2

Display item

Item	Display	Description and action
STATUS	ONLINE OFFLINE	The status of communication with the master station is indicated. ONLINE: Communicating with the master station. OFFLINE: Not communicating with the master station.
ERROR STATUS (Note 2)	---	No error has occurred.
	PARAMETER ERROR	The setting of a communication parameter is invalid.
	CH CARRIER ERROR	Detection of a channel carrier failed.
	CRC ERROR	A CRC error occurred.
	MASTER CPU ERR	An error occurred in the CPU of the master station.
	MASTER STOP	The user application on the master station stopped.
MAKER CODE	0316H	The maker code of FANUC is indicated.
MACHINE CODE	22H	The machine code (Remote device type) of the CNC is indicated.

NOTE
1 The error conditions are listed in the order of priority. If multiple errors occur at the same time, the highest-priority error is indicated.
2 For details of error conditions, see Subsection 1.3.1, "Error Conditions and Actions."

1.3.1 Error Conditions and Actions

If an error is indicated as an error condition on the maintenance screen, confirm the error and take the appropriate action, by referring to the table below.

Display	Description	Action
---	No error has occurred.	
PARAMETER ERROR	The setting of a communication parameter is invalid.	Confirm the following: • The communication parameters set on the CC-Link setting screen are correct.

Display	Description	Action
CH CARRIER ERROR	Detection of a channel carrier failed.	Confirm the following: • The master station is turned on. • The cable is not disconnected. • The cable is not bent forcibly. • The terminating resistor is mounted correctly.
CRC ERROR	A CRC error occurred.	Confirm the following: • The cable is not disconnected. • The terminating resistor is mounted correctly. • The same baud rate is set. • The measures against noise are appropriate.
MASTER CPU ERROR	An error occurred in the CPU of the master station.	Confirm the following: • The CPU on the master station is operating normally.
MASTER STOP	The user application on the master station stopped.	Confirm the following: • The sequence program on the master station is operating normally.

1.4 STATUS OF CC-Link REMOTE DEVICE FUNCTION

Using an appropriate common setting, it is possible to decide where to output the status of the CC-Link remote device function. The information described below is output to the PMC, starting at the address (m) specified with the common setting.

	#7	#6	#5	#4	#3	#2	#1	#0
m							MOUT	LINK

#0 LINK Indicates the state of the line to the master station.
When data is received from the master station, the status is judged online, and the bit becomes 1. When a time over error occurs, the status is judged offline, and the bit becomes 0.
0: Offline: Not communicating with the master station.
1: Online: Communicating with the master station.

#1 MOUT Indicates the state of the input signal.
Becomes 1 if the input signal (RY or RWw) cannot be received normally from the master station and is changed according to the value set with "INPUT DATA ON ABNORMAL" (HOLD or CLEAR). It becomes 0 if the input signal can be received normally from the master station again. It is 0 if the state has never been online (no valid data has ever been received from the master station).
0: The input signal is normal.
1: The input signal conforms to the setting of "INPUT DATA ON ABNORMAL."

NOTE
This signal does not necessarily indicate whether the state is offline. Even if the state is not offline but online, MOUT becomes 1 if the user application running on the master station stops or an error occurs in the CPU on the master station because the input signal cannot be received normally.

	#7	#6	#5	#4	#3	#2	#1	#0
m+1						CHERR	TIMER	CRCER

#0 CRCER Indicates whether a CRC error occurred.
Becomes 1 if a CRC error occurred in the data received from the master station. It becomes 0 if the data is received normally because of, for example, retransmission from the master station.
0: Normal
1: An error occurred.

#1 TIMER Indicates whether a time over error occurred.
Becomes 1 if no data is received from the master station for a fixed period of time. It becomes 0 if the data is received from the master station.
Note that if the data has never been received from the master station since the power is turned on, the bit is 0.
0: Normal
1: An error occurred.

Remarks
The time after which the time over error occurs is decided according to the baud rate setting, as follows:

Baud rate	156Kbps	625Kbps	2.5Mbps	5Mbps	10Mbps
Time	1678ms	839ms	210ms	105ms	105ms

#2 CHERR Indicates whether a channel carrier detection error occurred.
Becomes 1 if no channel carrier can be detected. It becomes 0 if a channel carrier is detected.
0: Normal
1: An error occurred.

	#7	#6	#5	#4	#3	#2	#1	#0
m+2							MCPU	MAPP

#0 MAPP Indicates the operating state of the user application that performs signal processing on the master station.
The bit is 0 if the application is stopped. It is 1 if the application is running.
Note that this signal is displayed normally only if the communication with the master station is performed normally (LINK = 1).
0: STOP
1: RUN

#1 MCPU Indicates the state of the CPU that controls the user application on the master station.
The bit becomes 1 if an error occurs in the CPU. It becomes 0 if the CPU returns to normal.
Note that this signal is displayed normally only if the communication with the master station is performed normally (LINK = 1).
0: Normal
1: Error

NOTE
Refer to "Actions upon detection of an error " of the next subsection for the method of observing status information by the ladder program.

1.5 NOTES ON CREATING A LADDER PROGRAM

The following provides notes on creating a ladder program required to construct a safety system in a system that uses CC-Link.

Input signal and output signal

Output signals of the master station (input signals of the CNC), RY and RWw, are written from the CC-Link network to PMC registers through the refreshing of the CC-Link remote device functions.
For input signals of the master station (output signals of the CNC), RX and RWr, the signals that are stored in PMC registers through ladder program processing are sent to the CC-Link network through the refreshing of the CC-Link remote device functions.

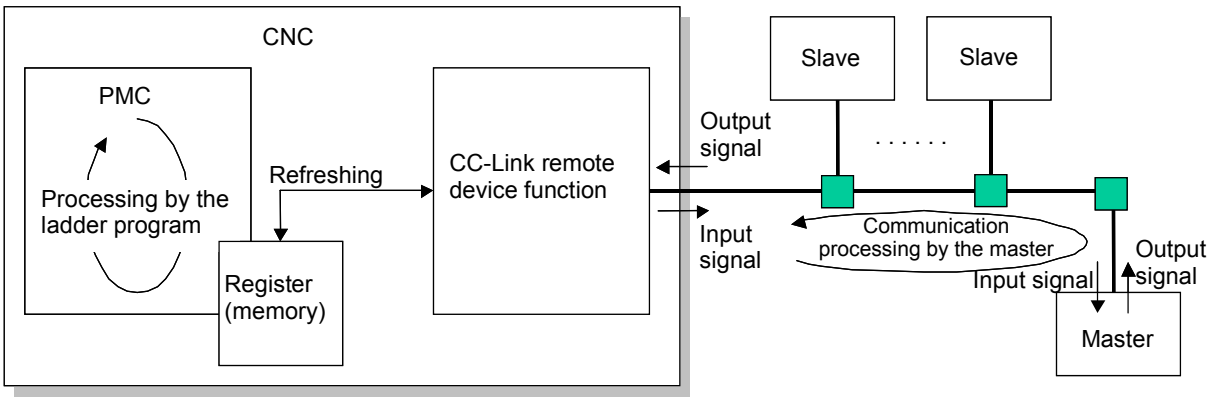


Fig. 1 – 1 Input signal and output signal viewed from the CNC

Input/output response time viewed from the master

Suppose that input/output signals are processed by the ladder program in the master, as shown in the figure below.
In this case, the input/output response time in terms of the master is the time from when the output signal is set by the master ladder program through when the slave ladder program performs input/output processing to when the master ladder program recognizes it as the input program.
Input/output response time viewed from the master = $T_{in1} + T_{in2} + T_{in3} + T_{in-out} + T_{out1} + T_{out2} + T_{out3}$

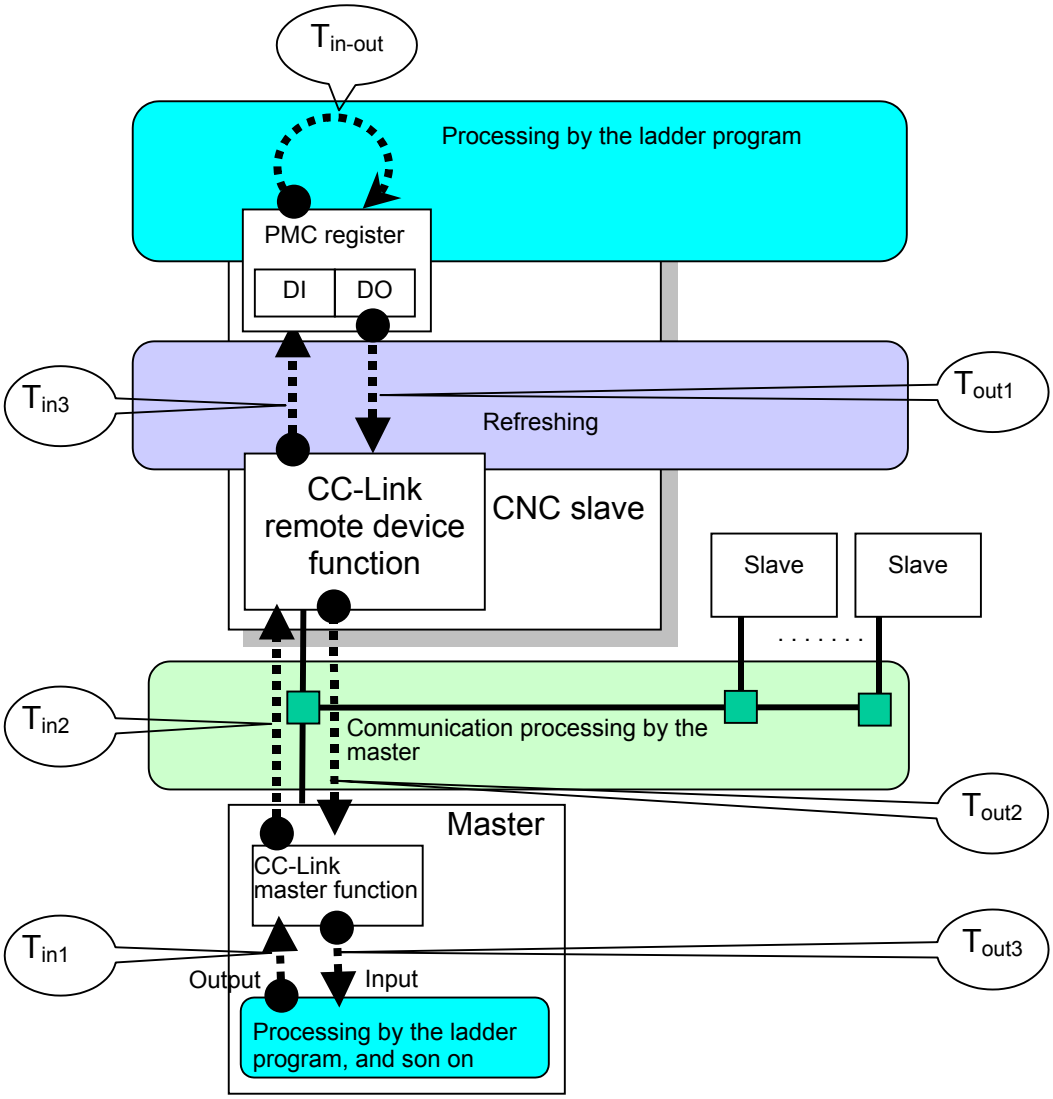


Fig. 1 – 2 Input/output response time viewed from the master

Ladder program processing time (CNC slave)

Operates in a cycle that is a multiple of 4 ms or 8 ms depending on the size of the ladder program. The actual time can be measured with SCAN TIME on the PMC STATUS screen.
This value is the maximum value of T_{in-out}.

Refreshing time

This is the time from when the CC-Link remote device function updates all CC-Link-related DI/DO data assigned to PMC registers until DI/DO data is updated again.
This value is the maximum value of T_{in3} and T_{out1}.

NOTE
For this CC-Link remote device function, the refresh time is 4 ms.

Communication processing time by the master

This is the time in terms of the master from when I/O data communication to the slave with a certain node number is processed to when I/O data communication to the slave with the same node number is processed again. This time depends on the settings of the master unit, etc. For details, refer to the manual supplied with the master unit.
This value is the maximum value of T_{in2} and T_{out2}.

Master processing time

This is the time in terms of the master from when the output signal is set by input/output processing (by the ladder program etc.) to when the signal is sent to a network or the time until input/output processing (by the ladder program etc.) recognizes the input signal received from a network. For details, refer to the manual of the master device.
This value is the maximum value of T_{in1} and T_{out3}.

Maximum input/output response time viewed from the master

The maximum input/output response time (T_{max}) viewed from the master is calculated as shown below.
T_{max} = ladder-program-processing-time (CNC slave) +
(refreshing-time + communication-processing-time-by-the-master + master-processing-time) × 2

Ladder program processing and refreshing by the CC-Link remote device function

Processing by the ladder program and refreshing by the CC-Link remote device function operate asynchronously with one another. Processing by the ladder program can operate independently of refreshing by the CC-Link remote device function, so the ladder program can be repeatedly executed at high-speed.

Fig. 1-3 shows a time chart of the internal operation of the CNC with signals output from the ladder program.

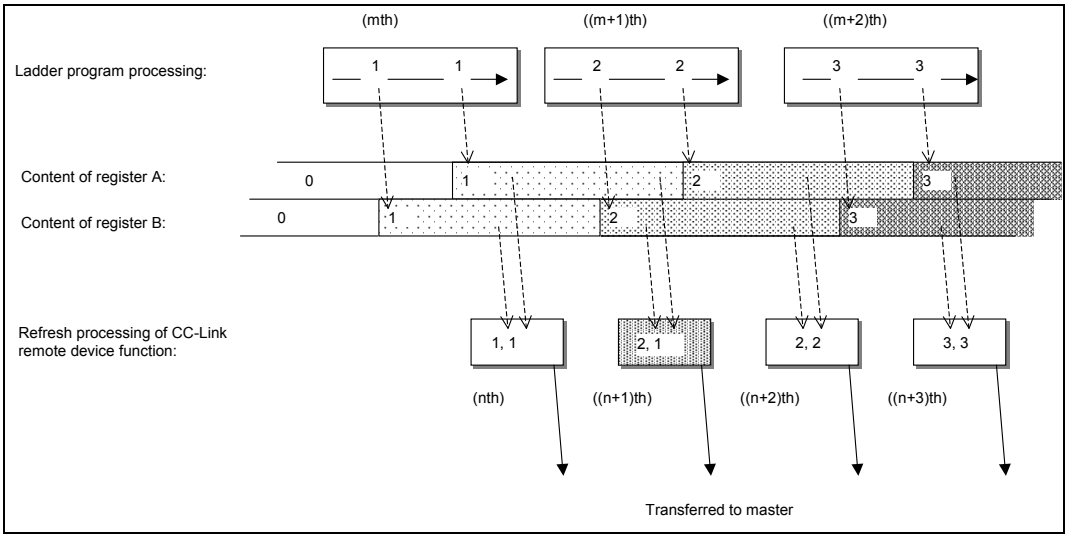


Fig. 1 – 3 Time chart

The upper part of the figure indicates that processing by the ladder program is performed periodically and writing to register A or register B in the PMC is performed in the ladder program.

The middle part indicates that how register A and register B are updated in this case. There are differences in the timing in which data is written to register A or register B even in the same execution cycle of the ladder program, so register A and register B are not updated at the same time.

The lower part indicates that refreshing by the CC-Link remote device function is cyclically made to read data in register A and register B. Since register A and register B are not updated at the same time, for example, in the case of (n +1)-th refreshing, the data written by one execution of the ladder program cannot be read as one set.

Conversely, when input signals from a master are processed in the ladder program, the data written by one execution of refreshing may not be read by one execution of the ladder program.

> ⚠ **CAUTION**
> Refreshing by the CC-Link remote device function is made asynchronously with the execution of the ladder program. Therefore, keep the following in mind when creating a ladder program.
> (1) When an input signal (RY or RWw) set in the specified PMC address is read from two points in the ladder program, even if the ladder program can be executed in one cycle, there is no guarantee that the same value can be read.
> (2) When the ladder program writes an output signal (RX or RWr) in the specified PMC address, the signal may be transferred to a master station before the ladder program is completely executed.

Concurrency of data

When remote registers (RWw and RWr) is handled with the ladder program, the concurrency of long data (4-byte data) and word data (2-byte data) is guaranteed (there are no data segmentation) under the corresponding constraints.

> ⚠ **CAUTION**
> If the following constraints are not satisfied, the concurrency of long data or word data is not guaranteed.

Concurrency of long data (4-byte data)

To guarantee the concurrency of data, satisfy the following two conditions.

<1> In the ladder program, the following commands are used in units of four bytes.
Commands :
MOVD, MOVN, XMOVB, SETND, XCHGD, DSCHB, TBLRD, TBLWD, DSEQD, DSNED, DSGTD, DSLTD, DSGED, DSLED, DMAXD, DMIND, EQD, NED, GTD, LTD, GED, LED, RNGD, COMPB, EOR, AND, OR, NOT, EORD, ANDD, ORD, NOTD, SHLD, SHRD, ROLD, RORD, BSETD, BRSTD, BTSTD, BPOSD, BCNTD, CODB, DCNVB, DECB, TBCDD, FBCDD, ADDB, SUBB, MULB, DIVB, NUMEB, ADDSD, SUBSD, MULSD, DIVSD, MODSD, INCSD, DECSD, ABSSD, NEGSD

<2> When RWw data or RWr data is assigned to the R address or E address of PMC, the R address or E address is aligned with 4-byte boundaries.
Example) 1:R0000, 2:R0004, 3:R0008, 1:E0000

Concurrency of word data (2-byte data)

To guarantee the concurrency of data, satisfy the following two conditions.

<1> In the ladder program, the following commands are used in units of two bytes.
Commands :
MOVW, MOVN, XMOVB, SETNW, XCHGW, DSCHB, TBLRW, TBLWW, DSEQW, DSNEW, DSGTW, DSLTW, DSGEW, DSLEW, DMAXW, DMINW, EQW, NEW, GTW, LTW, GEW, LEW, RNGW, COMPB, EOR, AND, OR, NOT, EORW, ANDW, ORW, NOTW, SHLW, SHRW, ROLW, RORW, BSETW, BRSTW, BTSTW, BPOSW, BCNTW, CODB, DCNVB, DECB, TBCDW, FBCDW, ADDB, SUBB, MULB, DIVB, NUMEB, ADDSW, SUBSW, MULSW, DIVSW, MODSW, INCSW, DECSW, ABSSW, NEGSW

<2> When RWw data or RWr data is assigned to the R address or E address of PMC, the R address or E address is aligned with 2-byte boundaries.
Example) 1:R0000, 1:R0002, 2:R0004

Concurrency of byte data

There are no special constraints. The concurrency is always guaranteed in 1-byte data.

Actions upon detection of an error

Whether CC-Link communication is normal can be determined by monitoring the first byte of the status information with the ladder program.
For details on the status information, see Section 1.4, "STATUS OF CC-Link REMOTE DEVICE FUNCTION."
Fig. 1-4 shows a flowchart for detecting a failure by using the first byte of the status information.

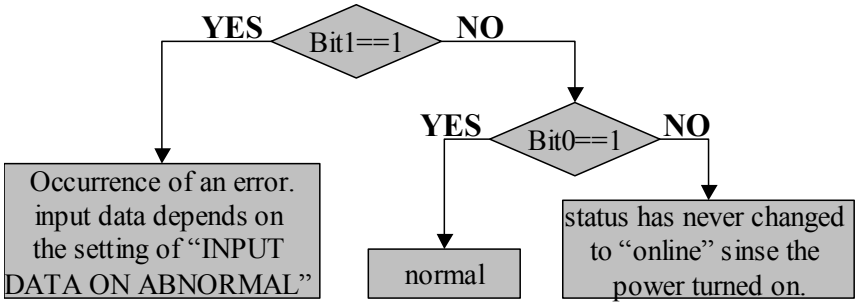


Fig. 1 – 4 flowchart

> ⚠ **CAUTION**
> The time after the power is turned on until communication is actually started may vary depending on the connected device status and other factors. For this reason, to perform I/O communication depending on the communication start timing, it is necessary not to wait for the specified time, but to check each signal received from the communication destination.
> Before the input signals (RY and RWw) of the CC-Link can be referred to with the ladder program, it must be judged whether communication is normal by monitoring the "status information" with the ladder program.
> How RY and RWw are to be processed if the input signals cannot be received normally depends on the setting of "INPUT DATA ON ABNORMAL." When creating a ladder program, give thorough consideration of this setting so that the system can run safely even in the event of a communication error.

III. CONNECTION

1 CONNECTING THE CC-Link

This chapter provides an explanation of how to connect the CC-Link.

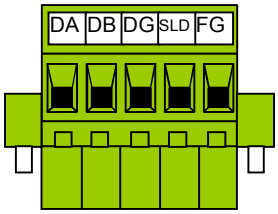
> ⚠ **CAUTION**
> The following provides descriptions of the CC-Link connection devices below, which are not supplied by FANUC. Please purchase these connection devices complying with the CC-Link standard as needed from other companies.
> - Communication cable
> - Terminator

1.1 CONNECTORS

Connector

CC-Link interface connector

1 2 3 4 5



Terminal number	Signal name
1	DA
2	DB
3	DG
4	SLD
5	FG

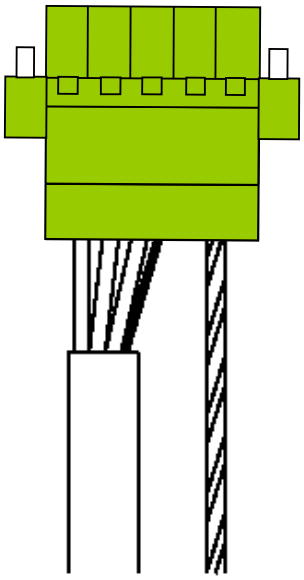
Cable side connector:

Phoenix Contact

MVSTBW2.5/5-STF-5.08AU (This is supplied with the product.)

Applicable wire: AWG24-12

Connection of a communication cable



Connect a communication cable to the CC-Link interface connector, as described below.

(1) Strip off the sheath of the cable and remove the unnecessary shield.
(2) Strip off the covering of the wire according to the length of the crimp terminal. (CAUTION)
(3) Loosen the cable fixing screw of the connector so a wire can easily be inserted.
(4) Insert the individual signal lines into the holes of the terminal block of the connector.
(5) Fix the lines by tighten the cable fixing screws of the connector.
(6) Insert the cable-attched connector to the connector on the board.
(7) Fasten it by tightening the detachable screws of the connector.

The FG signal with the terminal number 5 must be grounded to the grounding plate with a stranded wire of 2 mm^2 or greater and with a length of about 100 to 300 mm.

> ⚠ **CAUTION**
> A crimp terminal may also be used. Twist a wire with covering removed, and mount a crimp terminal. The following crimp terminal is recommended:
>
> AI Series made by Phoenix Contact (dedicated tool: ZA3)

1.2 CABLE LAYING

For an explanation of how to lay cables, refer to the "Cable Wiring Manual," issued by the CC-Link Partner Association.
CC-Link cables and terminating resistors must be supplied by the customer. When laying a CC-Link cable, be sure to strip off the sheath of the CC-Link cable CC-Link to expose the shielded external covering and fasten it to the grounding plate in the cabinet, using a cable clamp, as described in Section 1.3, "CABLE CLAMP."

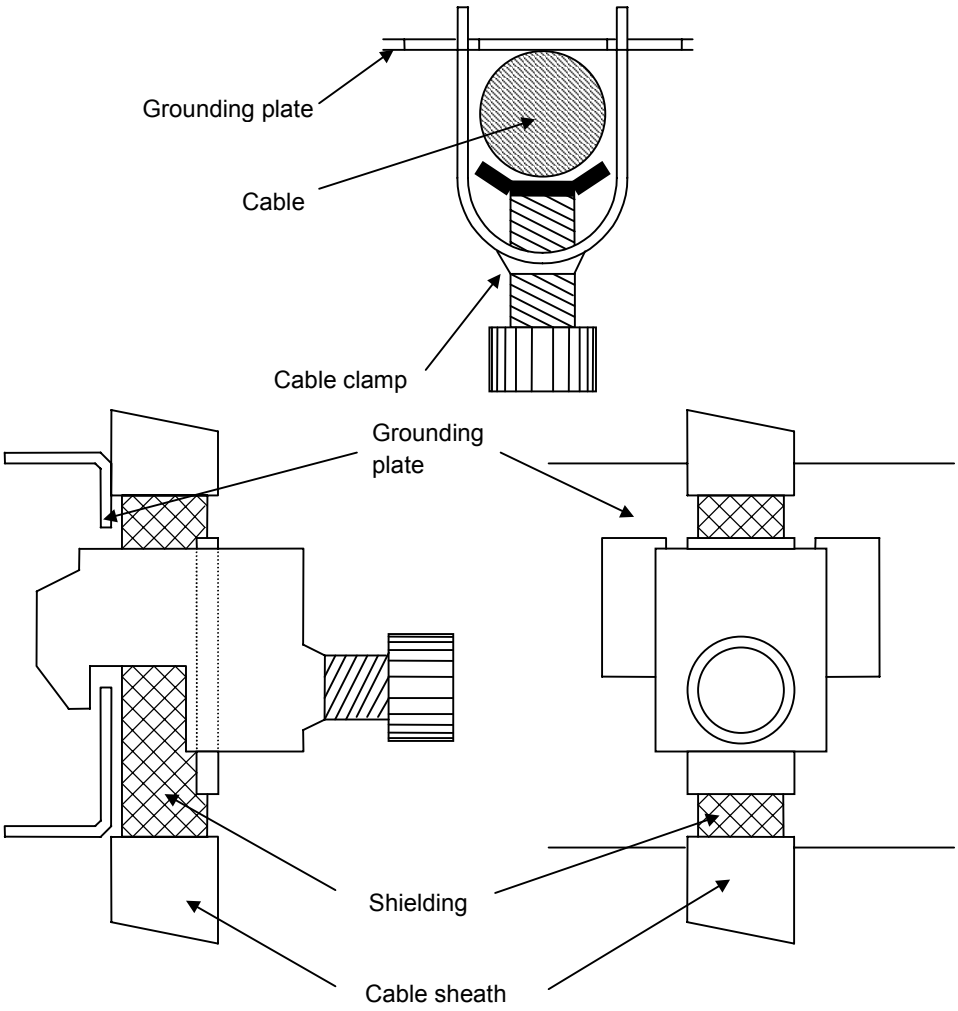
To reduce signal reflection and stablize communication, the trunk line must have terminating resistors mounted at both ends. Mount terminating resistors conforming to the cable used.

Specifications of terminating resistors

Cable used	Terminating resistor
CC-Link dedicated cable for Ver.1.10	110Ω ±5% 1/2W
CC-Link dedicated cable for Ver.1.00	110Ω ±5% 1/2W
CC-Link dedicated, high-performance cable for Ver.1.00	130Ω ±5% 1/2W

1.3 CABLE CLAMP

A cable clamp has a shielding effect in addition to supporting a cable.
As shown below, remove part of the cable sheath to expose the shielding conductor, and clamp the exposed shielding portion against the grounding plate with the clamping fixture.



2 CC-Link REMOTE DEVICE STATION BOARD

This chapter describes the specification of the CC-Link remote device station board. as well as its installation and mounting.

2.1 SPECIFICATION

CC-Link remote device station board (common to stand alone type CNC/LCD-mounted type CNC)

Item	Specification	
Specification drawing number	A02B-0303-J320	Series 30*i*/31*i*/32*i*-A
	A02B-0323-J320	Series 30*i*/31*i*/32*i*/35*i*-B Power Motion *i*-A
	A02B-0338-J320	Series 0*i*-F
Hardware drawing number	A20B-8101-0551	
Power supply for CNC	Power consumption: Max. 0.1 A (24VDC ±10%)	
Calorific value	3W	
Weight	150g or less	

2.2 INSTALLATION

2.2.1 Environmental Conditions

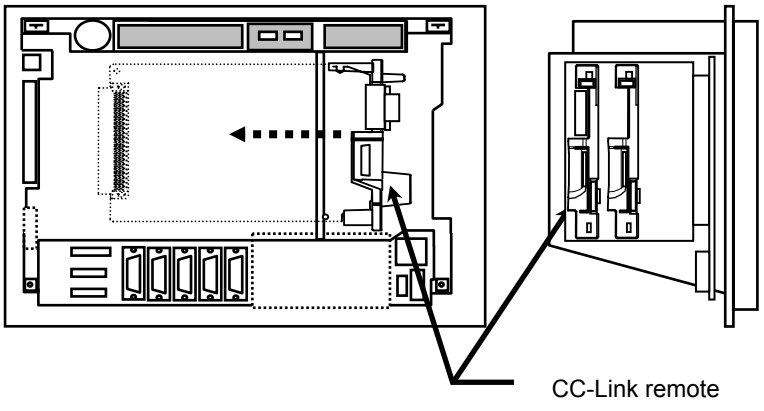
In using the CC-Link remote device station board, the installation conditions for the CNC control unit into which it is to be mounted (environmental conditions for the cabinet) must be satisfied.

2.3 MOUNTING

Only a single CC-Link remote device station board can be mounted into the CNC control unit.

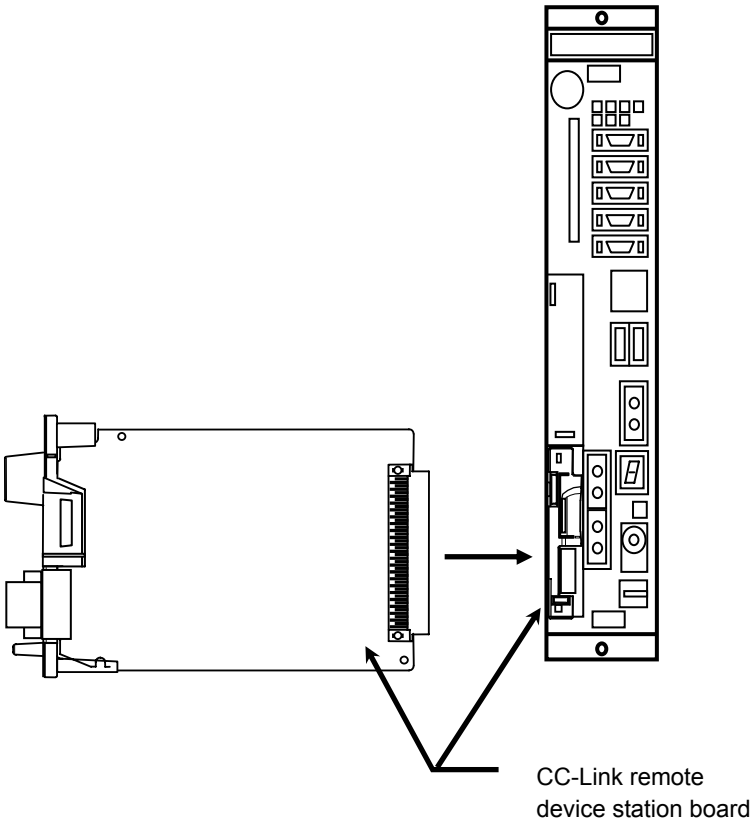
2.3.1 Mounting into the LCD-mounted Type Unit

The optional board is mounted into an optional slot of the control unit. CC-Link remote device station board occupies one slot. The optional slot does not have mounting limitations.



2.3.2 Mounting into the Stand-alone Type Unit

The optional board is mounted into an optional slot of the control unit. CC-Link remote device station board occupies one slot. The optional slot does not have mounting limitations.

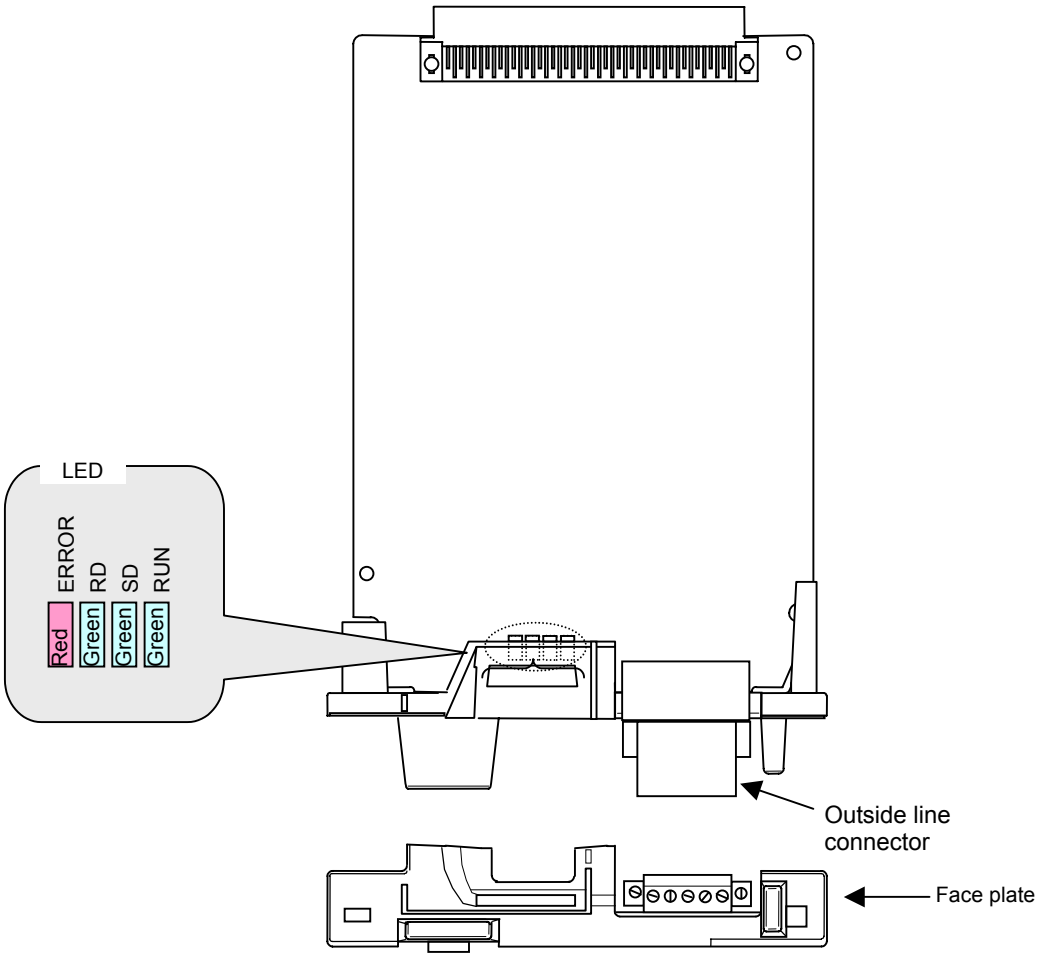


IV. MAINTENANCE

1 HARDWARE

This chapter describes maintenance information about the CC-Link remote device station board.

1.1 COMPONENT LAYOUT



Ordering information

Name	Specification	Remarks
CC-Link remote device station board	A20B-8101-0551	

1.2 LED INDICATORS AND THEIR MEANINGS

This board provides three green LEDs and one red LED for status indication.
The meanings of the LEDs are as follows:

Name	Color	On	Off
RUN	Green	Online	Offline
SD	Green	Sending data.	Not sending data.
RD	Green	Channel carrier detected.	Channel carrier error.
ERROR	Red	CRC error detected.	Communicating normally.

In the usual, normal communication state, the on/off states of the LEDs are as follows:

Name	On/off state
RUN	On
SD	Blinking
RD	On
ERROR	Off

NOTE
If the number of units on the network is small, SD blinks at high speed, and it may appear on not insteading of blinking to the human eye.

LED indicators in the event of an error

If the LEDs indicates a state other than the normal communication state, check the settings according to the table below.

■On □Off ☆Blinking ◇Not applicable

LED				Meaning of the state	Check item
RUN	SD	RD	ERR		
◇	◇	◇	☆	- A CRC error occurred.	Cable connection Terminating resistors Measures against noise Baud rate
■	□	■	□	- Data destined to the local station cannot be received from the master station.	Settings of the master station
□	☆	■	□	- The master station is not link-started.	Settings of the master station
□	□	■	□	- Data cannot be received.	Cable connection Measures against noise Settings of the master station
□	□	□	□	- The cable is disconnected. - The master station is not turned on. - System alarm(Note)	Cable connection Settings of the master station
Other				- Another error	Contact your FANUC service representative.

Check item	What to check
Cable connection	- The cable is not connected. - The cable and the connector are connected together correctly. - The cable is not bend forcibly. - The inter-slave station distance is correct.
Terminating resistors	- Terminating resistors are connected to both ends of the cable. - The terminating resistors match the cable type.
Measures against noise	- Each unit is grounded.
Baud rate	- The same baud rate is set for the master and slave stations.
Settings of the master station	- The master station is turned on. - The master station is operating normally. - The settings of the master station are made correctly.

NOTE
If the CNC enters a system alarm state, the CC-Link remote device functions enter the communication reset state, stopping communication.

INDEX

REVISION RECORD

Edition	Date	Contents
04	Sep., 2015	• Applied to Series 0*i*-F • Correction of errors
03	Mar., 2014	• Applied to Power Motion *i*-A • Addition of warnings to "Safety Precautions" • Correction of errors
02	Oct., 2010	• Applied to Series 30*i*/31*i*/32*i*/35*i*-B • Correction of errors
01	Oct., 2008	