KEYENCE

96M17272

96M17272-1

KV-8000/7000 Series Expansion units (X-Unit)

KV-XH04ML
KV-XH16ML
KV-XLE02
KV-XL202
KV-XL402

Instruction manual

Read this manual before using the product in order to achieve maximum performance.
Keep this manual in a safe place after reading it so that it can be used at any time.

Introduction

This instruction manual describes handling, operation and safety information for the KV-8000/7000 Series expansion unit. Read this manual thoroughly in order to take full advantage of KV-8000/7000 Series expansion unit features, and use the product only after fully understanding its contents.
Take care to store this manual in a convenient location so that it is readily accessible for reference whenever needed.
Please take care that the personnel who will actually operate the product have access to this manual.

Safety Precautions

Symbols

The following symbols alert you to important messages. Be sure to read these messages carefully.

DANGER	**Indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
WARNING	**Indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
NOTICE	**Indicates a situation which, if not avoided, could result in product damage as well as property damage.**
Important	**Indicates cautions and limitations that must be followed during operation.**
Point	**Indicates additional information on proper operation.**

General precautions

DANGER	**• Do not use this product to protect human bodies or a part of a human body. • This product is not intended for use as an explosion-proof product. Do not use this product in hazardous locations and/or potentially explosive atmospheres.**
WARNING	**• Provide a safety circuit that does not pass via the programmable controller to enable failsafe operation of the entire system in the event that the programmable controller fails. • Output circuit or internal circuit malfunctions sometimes prevent control from being performed normally. Be sure to provide a safety circuit in control systems where circuit malfunction may lead to fire or other serious accidents.**
CAUTION	**• Verify that this device is operating normally in terms of functionality and performance before the start of work and when operating the device. • If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.**
NOTICE	**• Proceed with care when modifying the product, or when using it in a manner that falls outside of the ranges indicated in its specifications, as KEYENCE is unable to guarantee device functionality or performance in such situations. • Use this product in combination with other devices only after careful consideration, as it may fail to satisfy its functionality and performance capabilities as a result of the conditions and environment in which it is used.**

Precautions on Regulations and Standards

CE Marking

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EU Directive(s), based on the following specifications.
Be sure to consider the following specifications when using this product in the Member States of European Union.

EMC Directive (2004/108/EC)

- Applicable standard EN61131-2
- When installing the KV-8000/7000 Series, it must be installed in an conductive enclosure (e.g. an industrial control panel) with IP54 or higher.
- Be sure to ground the enclosure (e.g. an industrial control panel) to an FG (positive grounding is not possible).
- Use a shielded cable for the signal lines located outside of the conductive enclosure (e.g. an industrial control panel). The shielded cable must be grounded to the enclosure (e.g. industrial control panel). However, do not ground the serial communication cable of the CPU unit and KV-XL202/XL402 or the shielded USB cable.
- Be sure to use the functional earthing terminal on the unit for grounding, if applicable.
- Wrap the CPU unit's USB cable twice around a ferrite core*1.
- Use a Category 5e or higher STP cable with double shields for the KV-XLE02.

*1 The ferrite core used for evaluation by KEYENCE: TDK ZCAT-3035-1330

Remarks:
These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive.

UL Certification

This product complies with the following UL and CSA standards, and has been certified by UL.

- UL File No. E207185
- Category NRAQ, NRAQ7
- Applicable standard UL61010-1
  UL61010-2-201
  CAN/CSA C22.2 No.61010-1
  CAN/CSA C22.2 No.61010-2-201

Be sure to consider the following specifications when using this product as a UL certified product.

- Install this product in an enclosure (e.g. an industrial control panel) with IP54 or higher.
- Use this product under pollution degree 2.
- Indoor use only.
- Install at an altitude of 2000 m or less.
- Use this product with one of the following power supplies.
  - UL/CSA certified power supply that provides Class 2 output as defined in the NFPA70 (NEC: National Electrical Code) and CEC (Canadian Electrical Code).
  - UL/CSA certified power supply that has been evaluated as a Limited Power Source as defined in UL60950-1 and CAN/CSA-C22.2 No. 60950-1.
- Ensure the circuits to be connected to the input/output terminals are SELV circuits.

KC Certificate (South Korea)

Class A equipment
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

A급 기기 (업무용 방송통신기자재)

이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Inspection and Daily Care

Inspection

Long-term use of the power supply unit and other units results in wear that causes connectors to come loose and other problems. Continued use under such conditions could eventually lead to a malfunction.
It is therefore essential to perform regular inspections of the main unit and cable connections to discover any issues before they come out of hand.
Make the following inspections.

- Check whether locks for connecting units are loose or have become disconnected.
- Check whether connectors are loose or have become disconnected.
- Check screws on the terminal board for looseness.
- Check for damage to units and cables between units.

Daily care

The power supply and other units will become soiled from long-term use.
Use a clean dry cloth to wipe away any dirt that has adhered to the units.
Use cotton buds to remove dust and dirt from connectors and other difficult to clean locations; disconnect connectors before cleaning.

Specifications

General specifications

Item	Specifications	
System configuration	For systems that use KV-5000/3000 Series expansion units	For systems that use KV-8000/7000 Series expansion units only
Power supply voltage	24 V DC (±10%) *3	24 V DC (-15%, +20%) *3
Surrounding air temperature	0 to +50°C (no freezing) *1*2	0 to +55°C (no freezing) *1*2
Relative humidity	10 to 95% RH (no condensation) *1	5 to 95% RH (no condensation) *1
Operating atmosphere	No excessive dust or corrosive gases	
Operating altitude	2,000 m or less	
Pollution degree	2	
Withstand voltage	1,500 V AC for 1 min. between the power terminal and I/O terminals and between all external terminals and cases	
Insulation resistance	50 MΩ or more (500 V DC megger used to perform measurements between the power terminal and I/O terminals and between all external terminals and cases)	

*1 Guaranteed range as a system.
*2 Stipulated by the temperature at the bottom side of the unit, inside the control panel
*3 Supplied via CPU unit or other Expansion unit

KV-XLE02 specifications

Model	KV-XLE02
Internal current consumption	200 mA or less
Weight	Approx. 190 g

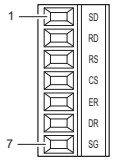
KV-XL202/XL402 specifications

Model	KV-XL202	KV-XL402
Internal current consumption	140 mA or less	150 mA or less
Weight	Approx. 200 g	Approx. 190g

KV-XL202 wiring diagram

(PORT1/PORT2 common)

Pin number	Signal name	Signal direction
1	SD (Send data)	Output
2	RD (Received data)	Input
3	RS (Request to send) *1	Output
4	CS (Clear to send) *2	Input
5	ER (Data terminal ready)	Output
6	DR (Data set ready)	Input
7	SG	-

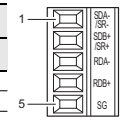


*1 It turns to Low when signals cannot be received. Normally it is High.
*2 Normally set on High. It switches to Low when signals are not to be received.

KV-XL402 wiring diagram

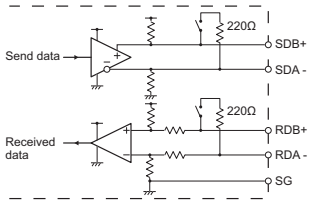
(PORT1/PORT2 common)

Pin number	RS-422A/485 (four-wire)		RS-422A/485 (two-wire)	
	Signal name	Signal direction	Signal name	Signal direction
1	SDA-	Output	SR-	I/O
2	SDB+	Output	SR+	I/O
3	RDA-	Input	-	-
4	RDB-	Input	-	-
5	SG	-	SG	-



RS-422A/485 (four-wire) Interface Feature Block Diagram

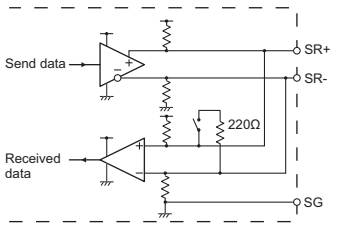
(PORT1/PORT2 common)



* SG is insulated from an internal GND of the CPU unit.

RS-422A/485 (two-wire) Interface Feature Block Diagram

(PORT1/PORT2 common)

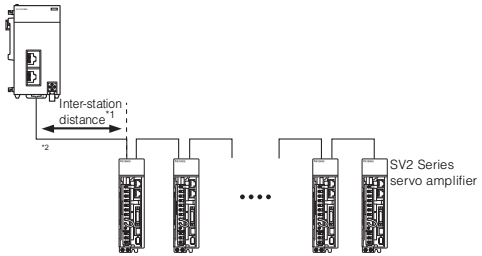


* SG is insulated from an internal GND of the CPU unit.

KV-XH16ML/XH04ML specifications

Model	KV-XH16ML	KV-XH04ML
Internal current consumption	400 mA or less	160 mA or less
Weight	Approx. 280 g	Approx. 190 g

*1 When the distance is greater than 30 m, pass the cable through a ferrite core (OP-84409) twice at each end.



*1 Adjust the space between stations according to the equipment you are connecting.
*2 Use the following type of MECHATROLINK-III cable.

SV2-LA2	0.2 m	SV2-LA5	0.5 m
SV2-L1	1 m	SV2-L3	3 m
SV2-L5	5 m	SV2-L10	10 m
SV2-L20	20 m		

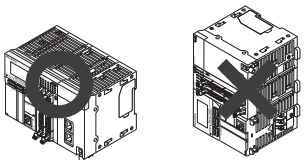
Installation cautions

■ Installation environment

Do not install KV-8000/7000 Series devices in the following locations:
- exposed to direct sunlight
- where a temperature range between 0 to +55°C is exceeded
- where a humidity range between 5 to +95% RH is exceeded
- subject to condensation due to rapid temperature changes
- exposed to corrosive gases or flammable gases
- exposed to excessive dust, salt, iron powder or smoke
- where the device will be directly exposed to vibrations or impact
- exposed to spray of water, oil, chemical agents, etc.
- exposed to strong magnetic fields or electric fields
- where the altitude exceeds 2,000 m

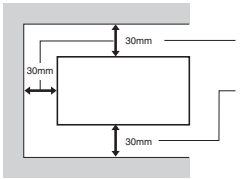
■ Installation orientation

When installing the KV-8000/7000 Series CPU unit in a control panel, always orient the CPU unit so that its front panel is accessible from the front.



■ Surrounding space

Allow a space of at least 30 mm between the device and any walls or other equipment surrounding it.



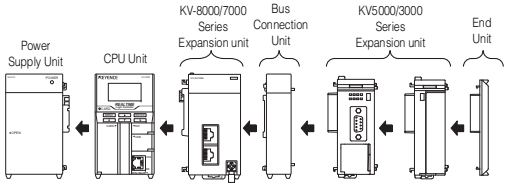
Space above and to left of device
Allow 30 mm of space for heat dissipation.

Below
Allow 30 mm of space so that you can insert your finger and remove the lock lever.

Point **When the temperature inside the control panel (temperature at the bottom of the unit) exceeds the ambient operating temperature, lower the temperature, for example, by installing forced air cooling or providing more space around the unit to improve ventilation.**
When an extension unit is used, allow at least 60 mm of space between the units on the upper and lower racks to compensate the effect of heat.

Connecting units

Be sure to follow these guidelines when connecting units.
- Always connect <Power Supply Units> to the left of the <CPU Unit>.
- When using a Bus Connection Unit or KV-5000/3000 Series Expansion Unit, be sure to connect an <End unit> to the right of the last unit connected.



NOTICE **Make sure to turn the power OFF for connection.**

■ Maximum connectable units

A maximum of 16 expansion units for KV-8000/7000 can be connected to a single CPU Unit (excluding Power Supply Units and Bus Connection Units). When using a Bus Connection Unit, up to 16 expansion units for KV-8000/7000/5000/3000 can be connected to 1 CPU unit (excluding Power Supply Units and Bus Connection Units). When using an extension unit, up to 48 expansion units for the KV-5000/3000 Series can be connected.
Some expansion units do not support 48 connections.
For more information, see each unit's instruction manual.

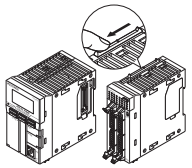
Installation

■ Assembling the units (for KV-8000/7000 Series Expansion Units)

1 **Release the lock levers on the top and bottom of the right unit.**

2 **Connect the units by inserting the right unit's lock lever into the left unit's lock lever slot.**

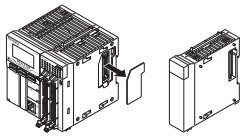
3 **Lock the lock levers on the top and bottom of the right unit.**



■ Assembling the units (when using KV-5000/3000 Series Expansion Units)

1 **Remove the expansion unit connector cover of the last KV-8000/7000 Series expansion unit installed on the right.**

2 **Install a Bus Connection Unit.**
- Refer to the procedure for installing a KV-8000/7000 Series expansion unit.



3 **Release the lock lever on the KV-5000/3000 Series expansion unit.**

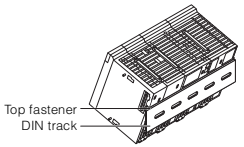
4 **Connect the units by inserting the KV-5000/3000 Series expansion unit's lock lever into the Bus Connection Unit's lock lever slot.**

5 **Lock the lock levers on the top and bottom of the right unit.**

6 **Attach an end unit to the far right unit.**

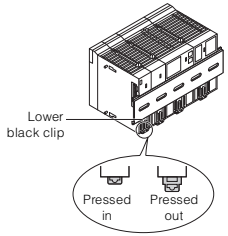
Mounting the units on a DIN track

1 **Latch the DIN track mount fastener on the top of each unit onto the groove on the top of the DIN track.**



2 **Insert the bottom of the DIN track into the DIN mount fastener on the bottom of each unit.**

3 **Check whether the bottom DIN track mount fastener is pushed in (locked).**



To remove the DIN rail, pull the lower black clip out.

Wiring

■ Precautions when wiring units

● Precautions when wiring input/output devices

Pay attention to the following when wiring input/output devices.
- Separate the input and output lines when wiring.
- Positioning input/output signal lines close to power lines may result in abnormal device operation due to the influence of high-voltage and large currents. Separate input/output signal lines and power lines by at least 100 mm.
- Separate 24 VDC input/output lines from 100 VAC and 200 VAC lines.
- When using a duct to hold wires, verify that the duct is properly grounded.

■ Wiring procedure

Use wire (copper wire / stranded wire) with a temperature rating of 105°C or higher as the lead for wiring to terminal blocks.
The marking ⚠ beside the terminal block intends to warn these instructions.

When using an MIL connector

■ Connector assembly and wire connections

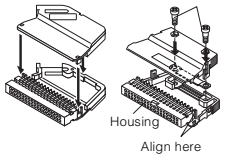
● Precautions when connecting wires

(OP-22184 (40 pin connector), OP-51404 (40 pin slim connector)
Pay attention to the following when connecting wires.
- Always use wires compatible with the following:
  Wire size: AWG24 to 22 (stranded wire)
  Cross-sectional area: 0.2 to 0.3 mm^2
  Insulation outside diameter: ø1.5 to ø1.1
- Cut the tips of wires straight across so that they are flat.
- Once connections have been made, verify that clamps completely surround wires and that the wires are inserted as far as possible.
- Cut wires so that no strands remain (it is not necessary to strip the insulation from the wire).
- A connector (OP-30594) is available from Keyence for AWG28 to 26 wiring. (Use in combination with OP-22184, OP-51404, etc.)
  Wire size: AWG28 to 26
  Cross-sectional area: 0.08 to 0.14 mm^2
  Insulation outside diameter: ø1.3 to ø1.1

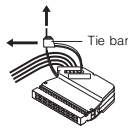
NOTICE **Unit bodies are made from composite resins and may suffer deformation when exposed to powerful solvents such as acetone, trichlene, and benzene. Exposure to excessive force after making pressure contacts may result in device damage. Take appropriate cautions.**

● Connecting wires to connectors

1 **Attach the connector to the housing with its inserted contacts and attach the cover.**



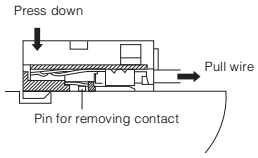
2 **Secure the wires with the tie band as shown in the diagram.**



To remove the contact
Use the following 2 steps to remove a contact from the connector.

1 **Align the terminal to be removed with the arrow on the pressure connection tool's frame.**

2 **Pull out the wire while pressing gown on the contact.**



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