



Programmable Controller

**MELSEC iQ-F**  
series

MELSEC iQ-F  
FX5U User's Manual (Hardware)

---



# SAFETY PRECAUTIONS

---

(Read these precautions before use.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety in order to handle the product correctly.

This manual classifies the safety precautions into two categories: [ WARNING] and [ CAUTION].



## WARNING

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

---



## CAUTION

Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

---

Depending on the circumstances, procedures indicated by [ CAUTION] may also cause severe injury.

It is important to follow all precautions for personal safety.

Store this manual in a safe place so that it can be read whenever necessary. Always forward it to the end user.

## [DESIGN PRECAUTIONS]

---



## WARNING

- Make sure to set up the following safety circuits outside the PLC to ensure safe system operation even during external power supply problems or PLC failure. Otherwise, malfunctions may cause serious accidents.
    - Most importantly, set up the following: an emergency stop circuit, a protection circuit, an interlock circuit for opposite movements (such as normal vs. reverse rotation), and an interlock circuit (to prevent damage to the equipment at the upper and lower positioning limits.)
    - Note that when the CPU module detects an error, such as a watchdog timer error, during self-diagnosis, all outputs are turned off. Also, when an error that cannot be detected by the CPU module occurs in an input/output control block, output control may be disabled. External circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
    - Note that the output current of the 24 V DC service power supply varies depending on the model and the absence/presence of extension modules. If an overload occurs, the voltage automatically drops, inputs in the PLC are disabled, and all outputs are turned off. External circuits and mechanisms should be designed to ensure safe machine operation in such a case.
    - Note that when an error occurs in a relay, transistor or triac of an output circuit, the output might stay on or off. For output signals that may lead to serious accidents, external circuits and mechanisms should be designed to ensure safe machinery operation in such a case.
  - Construct an interlock circuit in the program so that the whole system always operates on the safe side before executing the control (for data change) of the PLC in operation.

Read the manual thoroughly and ensure complete safety before executing other controls (for program change, parameter change, forcible output and operation status change) of the PLC in operation. Otherwise, the machine may be damaged and accidents may occur due to erroneous operations.
  - In an output circuit, when a load current exceeding the current rating or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
  - For the operating status of each station after a communication failure of the network, refer to relevant manuals for the network. Incorrect output or malfunction may result in an accident.
  - To maintain the safety of the programmable controller system against unauthorized access from external devices via the network, take appropriate measures. To maintain the safety against unauthorized access via the Internet, take measures such as installing a firewall.
-

## [DESIGN PRECAUTIONS]

---

### CAUTION

---

- When an inductive load such as a lamp, heater, or solenoid valve is controlled, a large current (approximately ten times greater than normal) may flow when the output is turned from off to on. Take proper measures so that the flowing current does not exceed the value corresponding to the maximum load specification of the resistance load.
  - After the CPU module is powered on or is reset, the time taken to enter the RUN status varies depending on the system configuration, parameter settings, and/or program size.  
Design circuits so that the entire system will always operate safely, regardless of this variation in time.
  - Simultaneously turn on and off the power supplies of the CPU module and extension modules.
  - If a long-time power failure or an abnormal voltage drop occurs, the PLC stops, and output is turned off. When the power supply is restored, it will automatically restart (when the RUN/STOP/RESET switch is on RUN side).
- 

## [INSTALLATION PRECAUTIONS]

---

### WARNING

---

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
  - Use the product within the generic environment specifications described in  Page 20 Generic Specifications of this manual.  
Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl<sub>2</sub>, H<sub>2</sub>S, SO<sub>2</sub> or NO<sub>2</sub>), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind.  
If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.
-

## [INSTALLATION PRECAUTIONS]

---

### CAUTION

---

- Do not touch the conductive parts of the product directly. Doing so may cause device failures or malfunctions.
  - When drilling screw holes or wiring, make sure that cutting and wiring debris do not enter the ventilation slits of the PLC. Failure to do so may cause fire, equipment failures or malfunctions.
  - For product supplied together with a dust proof sheet, the sheet should be affixed to the ventilation slits before the installation and wiring work to prevent foreign objects such as cutting and wiring debris.  
However, when the installation work is completed, make sure to remove the sheet to provide adequate ventilation. Failure to do so may cause fire, equipment failures or malfunctions.
  - Install the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.
  - Install the product securely using a DIN rail or mounting screws.
  - Connect the expansion board and expansion adapter securely to their designated connectors. Loose connections may cause malfunctions.
  - Make sure to affix the expansion board with tapping screws. Tightening torque should follow the specifications in the manual. If the screws are tightened outside of the specified torque range, poor connections may cause malfunctions.
  - Work carefully when using a screwdriver such as installation of the product. Failure to do so may cause damage to the product or accidents.
  - Connect the extension cables, peripheral device cables, input/output cables and battery connecting cable securely to their designated connectors. Loose connections may cause malfunctions.
  - When using an SD memory card, insert it into the SD memory card slot. Check that it is inserted completely. Poor contact may cause malfunction.
  - Turn off the power to the PLC before attaching or detaching the following devices. Failure to do so may cause equipment failures or malfunctions.
    - Peripheral devices, expansion board, expansion adapter, and connector conversion adapter
    - Extension modules, bus conversion module, and connector conversion module
    - Battery
-

## [WIRING PRECAUTIONS]

---

### **WARNING**

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.
  - Make sure to attach the terminal cover, provided as an accessory, before turning on the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock.
  - The temperature rating of the cable should be 80°C or more.  
It may differ depending on the extension devices. For details, refer to the user's manual of the extension devices.
  - Make sure to wire the screw terminal block in accordance with the following precautions. Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
    - The disposal size of the cable end should follow the dimensions described in the manual.
    - Tightening torque should follow the specifications in the manual.
    - Tighten the screws using a Phillips-head screwdriver No. 2 (shaft diameter 6 mm or less). Make sure that the screwdriver does not touch the partition part of the terminal block.
  - Make sure to properly wire to the terminal block (European type) in accordance with the following precautions. Failure to do so may cause electric shock, equipment failures, a short-circuit, wire breakage, malfunctions, or damage to the product.
    - The disposal size of the cable end should follow the dimensions described in the manual.
    - Tightening torque should follow the specifications in the manual.
    - Twist the ends of stranded wires and make sure that there are no loose wires.
    - Do not solder-plate the electric wire ends.
    - Do not connect more than the specified number of wires or electric wires of unspecified size.
    - Affix the electric wires so that neither the terminal block nor the connected parts are directly stressed.
- 

## [WIRING PRECAUTIONS]

---

### **CAUTION**

- Do not supply power to the [24+] and [24V] terminals (24 V DC service power supply) on the CPU module or extension modules. Doing so may cause damage to the product.
  - Perform class D grounding (grounding resistance: 100 Ω or less) of the grounding terminal on the CPU module and extension modules with a wire 2 mm<sup>2</sup> or thicker.  
Do not use common grounding with heavy electrical systems (refer to  Page 100 Grounding).
  - Connect the power supply wiring to the dedicated terminals described in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the PLC will burn out.
  - Do not wire vacant terminals externally. Doing so may damage the product.
  - Install module so that excessive force will not be applied to terminal blocks, power connectors, I/O connectors, communication connectors, or communication cables. Failure to do so may result in wire damage/breakage or PLC failure.
-

---

## CAUTION

- Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to malfunction of the PLC caused by abnormal data written to the PLC due to the effects of noise.
    - Do not bundle the power line, control line and communication cables together with or lay them close to the main circuit, high-voltage line, load line or power line. As a guideline, lay the power line, control line and communication cables at least 100 mm away from the main circuit, high-voltage line, load line or power line.
    - Ground the shield of the shield wire or shielded cable at one point on the PLC. However, do not use common grounding with heavy electrical systems.
    - Ground the shield of the analog input/output cable at one point on the signal receiving side. However, do not use common grounding with heavy electrical systems.
- 

## [STARTUP AND MAINTENANCE PRECAUTIONS]

---

### WARNING

- Do not touch any terminal while the PLC's power is on. Doing so may cause electric shock or malfunctions.
  - Before cleaning or retightening terminals, cut off all phases of the power supply externally. Failure to do so in the power ON status may cause electric shock.
  - Before modifying the program in operation, forcible output, running or stopping the PLC, read through this manual carefully, and ensure complete safety. An operation error may damage the machinery or cause accidents.
  - Do not change the program in the PLC from two or more peripheral equipment devices at the same time. (i.e. from an engineering tool and a GOT) Doing so may cause destruction or malfunction of the PLC program.
  - Use the battery for memory backup in conformance to this manual.
    - Use the battery for the specified purpose only.
    - Connect the battery correctly.
    - Do not charge, disassemble, heat, put in fire, short-circuit, connect reversely, weld, swallow or burn the battery, or apply excessive forces (vibration, impact, drop, etc.) to the battery.
    - Do not store or use the battery at high temperatures or expose to direct sunlight.
    - Do not expose to water, bring near fire or touch liquid leakage or other contents directly.
- Incorrect handling of the battery may cause excessive generation, bursting, ignition, liquid leakage or deformation, and lead to injury, fire or failures and malfunction of facilities and other equipment.
-

## [STARTUP AND MAINTENANCE PRECAUTIONS]

---

### CAUTION

- Do not disassemble or modify the PLC. Doing so may cause fire, equipment failures, or malfunctions. For repair, contact your local Mitsubishi Electric representative.
  - After the first use of the SD memory card, do not insert/remove the memory card more than 500 times. 500 times or more may cause malfunction.
  - Turn off the power to the PLC before connecting or disconnecting any extension cable. Failure to do so may cause equipment failures or malfunctions.
  - Turn off the power to the PLC before attaching or detaching the following devices. Failure to do so may cause equipment failures or malfunctions.
    - Peripheral devices, expansion board, expansion adapter, and connector conversion adapter
    - Extension modules, bus conversion module, and connector conversion module
    - Battery
- 

## [OPERATION PRECAUTIONS]

---

### CAUTION

- Construct an interlock circuit in the program so that the whole system always operates on the safe side before executing the control (for data change) of the PLC in operation. Read the manual thoroughly and ensure complete safety before executing other controls (for program change, parameter change, forcible output and operation status change) of the PLC in operation. Otherwise, the machine may be damaged and accidents may occur by erroneous operations.
- 

## [DISPOSAL PRECAUTIONS]

---

### CAUTION

- Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.
  - When disposing of batteries, separate them from other waste according to local regulations. (For details on the Battery Directive in EU countries, refer to  Page 210 Handling of Batteries and Devices with Built-in Batteries in EU Member States.)
-

## [TRANSPORTATION PRECAUTIONS]

---

### CAUTION

- When transporting the PLC with the optional battery, turn on the PLC before shipment, confirm that the battery mode is set using a parameter and the BAT LED is OFF, and check the battery life. If the PLC is transported with the BAT LED ON or the battery exhausted, the battery-backed data may be unstable during transportation.
  - The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in the general specifications (  Page 20 Generic Specifications) by using dedicated packaging boxes and shock-absorbing pallettes. Failure to do so may cause failures in the PLC. After transportation, verify operation of the PLC and check for damage of the mounting part, etc.
  - When transporting lithium batteries, follow required transportation regulations. (For details on the regulated products, refer to  Page 210 Handling of Batteries and Devices with Built-in Batteries in EU Member States.)
  - When fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine used for disinfecting and protecting wooden packaging from insects, they cause malfunction when entering our products. Please take necessary precautions to ensure that remaining materials from fumigant do not enter our products, or treat packaging with methods other than fumigation (heat method). Additionally, disinfect and protect wood from insects before packing products.
- 

## INTRODUCTION

---

This manual contains text, diagrams and explanations which will guide the reader in the correct installation, safe use and operation of the FX5U Programmable Controllers and should be read and understood before attempting to install or use the module.

Always forward it to the end user.

### Regarding use of this product

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult Mitsubishi Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

### Note

- If in doubt at any stage during the installation of the product, always consult a professional electrical engineer who is qualified and trained in the local and national standards. If in doubt about the operation or use, please consult the nearest Mitsubishi Electric representative.
- Since the examples indicated by this manual, technical bulletin, catalog, etc. are used as a reference, please use it after confirming the function and safety of the equipment and system. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
- This manual content, specification etc. may be changed, without a notice, for improvement.
- The information in this manual has been carefully checked and is believed to be accurate; however, if you notice a doubtful point, an error, etc., please contact the nearest Mitsubishi Electric representative. When doing so, please provide the manual number given at the end of this manual.

# CONTENTS

SAFETY PRECAUTIONS .....	1
INTRODUCTION .....	7
RELEVANT MANUALS .....	14
TERMS .....	15
<b>CHAPTER 1 OUTLINE</b> .....	<b>17</b>
1.1 Part Names .....	17
Front panel .....	17
Side .....	19
<b>CHAPTER 2 SPECIFICATIONS</b> .....	<b>20</b>
2.1 Generic Specifications .....	20
2.2 Power Supply Specifications .....	22
AC power supply type .....	22
DC power supply type .....	23
2.3 Input Specifications .....	24
24 V DC Input (sink/source) .....	24
2.4 Output Specifications .....	26
Relay output .....	26
Transistor output .....	27
2.5 Input/Output Derating Curve .....	27
2.6 Performance Specifications .....	28
2.7 Built-in Analog Specifications .....	30
Analog input .....	30
Analog output .....	30
2.8 Communication Specifications .....	31
Built-in Ethernet communication .....	31
Built-in RS-485 communication .....	32
2.9 External Dimensions .....	33
CPU module .....	33
2.10 Terminal Layout .....	34
<b>CHAPTER 3 PRODUCT LIST</b> .....	<b>37</b>
3.1 Overall Configuration .....	37
3.2 CPU Module .....	38
3.3 Extension Module .....	39
I/O Module .....	40
Intelligent Function Module .....	43
Extension Power Supply Module .....	45
Connector Conversion Module .....	46
Bus Conversion Module .....	46
3.4 Expansion Board .....	47
3.5 Expansion Adapter .....	47
3.6 Extended Extension Cable and Connector Conversion Adapter .....	47
Extended Extension Cable .....	47
Connector Conversion Adapter .....	47
3.7 Terminal Module .....	48
3.8 SD Memory Card .....	48

3.9	<b>Battery</b> .....	48
3.10	<b>Communication Cable</b> .....	48
3.11	<b>Engineering Tool</b> .....	48
<b>CHAPTER 4 SYSTEM CONFIGURATION</b>		<b>49</b>
4.1	<b>Rules of System Configuration</b> .....	50
4.2	<b>Limitations on the Number of Connected Extension Devices</b> .....	52
	Number of connected expansion boards .....	52
	Number of connected expansion adapters .....	52
	Number of connected extension modules (including extended extension cable) .....	53
4.3	<b>Limitation on the Number of Input/Output Points</b> .....	55
	Total number of I/O points and remote I/O points .....	56
	Calculation of number of input/output points .....	56
	Calculation of number of remote I/O points .....	57
4.4	<b>Limitation on Current Consumption</b> .....	59
	Power supply check from the CPU module (current consumption calculation) .....	59
	Power supply check from the powered input/output module (current consumption calculation) .....	62
	Power supply check from extension power supply module (current consumption calculation) .....	65
4.5	<b>Rules of System Configuration and Examples of Reconfiguration</b> .....	69
	System configuration example .....	69
	System reconfiguration example .....	73
4.6	<b>Numbers and Assignment in System</b> .....	78
	Module input/output number .....	78
	Module number of Extension modules .....	78
<b>CHAPTER 5 INSTALLATION</b>		<b>79</b>
5.1	<b>Installation Location</b> .....	79
	Installation location in enclosure .....	79
	Spaces in enclosure .....	79
	Layout in enclosure .....	80
5.2	<b>Examination for Installation Method in Enclosure</b> .....	81
5.3	<b>Procedures for Installing on and Detaching from DIN Rail</b> .....	82
	Preparation for installation .....	82
	Installation of CPU module .....	83
	Installation of extension module (extension cable type) .....	83
	Installation of terminal modules .....	84
	Removal of CPU module .....	84
5.4	<b>Procedures for Installing Directly (with M4 Screws)</b> .....	85
	Hole pitches for direct mounting .....	85
	Hole pitches when extension module connected .....	87
	Installation of CPU module .....	87
	Installation of extension module (extension cable type) .....	88
5.5	<b>Connection Methods for CPU Module and Extension Devices</b> .....	89
	Connection of extension devices .....	89
	Connection method A - connection of an expansion board .....	89
	Connection method B - connection of an expansion adapter .....	90
	Connection method C - connection of an extension module (extension cable type) to the CPU module .....	90
	Connection method D - connection between extension modules (extension cable type) .....	91
	Connecting method E - connection of extended extension cable and connector conversion adapter .....	91
	Connecting method F - connection of an extension module (extension connector type) .....	92

Connection method G - connection of an FX3 extension module to the bus conversion module . . . . .	92
Connection of power cables . . . . .	93
Removal of power cables . . . . .	94
Connection of I/O cables . . . . .	94

---

## **CHAPTER 6 WIRING** **96**

<b>6.1 Wiring Preparations</b> . . . . .	<b>96</b>
Wiring procedure . . . . .	96
Removal and installation of removable terminal block . . . . .	97
<b>6.2 Cable Connecting Procedure</b> . . . . .	<b>97</b>
Screw terminal block . . . . .	97
European-type terminal block . . . . .	99
<b>6.3 Grounding</b> . . . . .	<b>100</b>
<b>6.4 Power Supply Wiring</b> . . . . .	<b>101</b>
Examples of AC power supply wiring . . . . .	101
Examples of DC power supply wiring . . . . .	105
<b>6.5 Input Wiring</b> . . . . .	<b>109</b>
24 V DC input (Sink and source input type) . . . . .	109
Input wiring example . . . . .	115
Input wiring examples of terminal modules . . . . .	119
<b>6.6 Output Wiring</b> . . . . .	<b>121</b>
Relay output . . . . .	121
Transistor output . . . . .	124
Triac output . . . . .	127
Output wiring example . . . . .	129
Output wiring examples of terminal modules . . . . .	132
<b>6.7 Analog Wiring</b> . . . . .	<b>136</b>
<b>6.8 Examples of Wiring for Various Uses</b> . . . . .	<b>137</b>
Positioning function . . . . .	137
Communication function . . . . .	137
High-speed counter . . . . .	138
Interruption . . . . .	142
Digital Switch . . . . .	144
Input Matrix . . . . .	146
Seven Segment with Latch . . . . .	147

---

## **CHAPTER 7 OPERATION ADJUSTMENT** **149**

<b>7.1 Preparation for Operation</b> . . . . .	<b>149</b>
Preliminary inspection . . . . .	149
Procedure until operation . . . . .	150
Connection with a personal computer . . . . .	151
<b>7.2 Operation and Test</b> . . . . .	<b>152</b>
Self-diagnostic function . . . . .	152
Monitoring and debugging . . . . .	152
<b>7.3 Running, Stopping, and Resetting</b> . . . . .	<b>153</b>
Methods of running, stopping, and resetting . . . . .	153

---

## **CHAPTER 8 MAINTENANCE AND INSPECTION** **154**

<b>8.1 Daily Inspection</b> . . . . .	<b>154</b>
<b>8.2 Periodic Inspection</b> . . . . .	<b>154</b>

<b>8.3</b>	<b>Battery</b> .....	<b>155</b>
	Part names .....	155
	Specifications .....	155
	Battery attachment .....	155
	Battery replacement .....	157
	Special relay for low battery voltage .....	158

## **CHAPTER 9 TROUBLESHOOTING** **159**

<b>9.1</b>	<b>Troubleshooting Procedure</b> .....	<b>159</b>
<b>9.2</b>	<b>Checking with LEDs</b> .....	<b>159</b>
	Checking the PWR LED .....	159
	Checking the BAT LED .....	159
	Checking the ERR LED .....	160
	Checking the P.RUN LED .....	160
<b>9.3</b>	<b>Troubleshooting using the engineering tool</b> .....	<b>160</b>
	Module diagnostics (CPU Diagnostics) .....	161
	Event history .....	162
<b>9.4</b>	<b>Error Status and Operations on Occurrence of an Error</b> .....	<b>163</b>
<b>9.5</b>	<b>Backing Up the Data</b> .....	<b>164</b>
<b>9.6</b>	<b>Canceling Errors</b> .....	<b>164</b>
<b>9.7</b>	<b>Troubleshooting for Each Symptom</b> .....	<b>165</b>
	I/O operation (CPU module, I/O module) .....	165
	PLC write, PLC read .....	166
	Boot operation .....	166

## **APPENDIX** **167**

<b>Appendix 1</b>	<b>How to Check the Date of Manufacture</b> .....	<b>167</b>
<b>Appendix 2</b>	<b>Standards</b> .....	<b>168</b>
	Certification of UL, cUL standards .....	168
	Compliance with EC directive (CE Marking) .....	168
	Requirement for compliance with EMC directive .....	168
	Requirement for compliance with LVD directive .....	169
	Caution for compliance with EC Directive .....	170
<b>Appendix 3</b>	<b>How to use analog inputs built in CPU module for current inputs</b> .....	<b>172</b>
<b>Appendix 4</b>	<b>Precautions for operating ambient temperature</b> .....	<b>173</b>
<b>Appendix 5</b>	<b>I/O Module</b> .....	<b>174</b>
	Product configuration .....	174
	Product list .....	174
	Specifications .....	176
	External dimensions and component names .....	184
	Terminal layout .....	190
<b>Appendix 6</b>	<b>Connector conversion module</b> .....	<b>192</b>
	External dimensions and component names .....	192
	Specifications .....	192
<b>Appendix 7</b>	<b>SD Memory Card</b> .....	<b>193</b>
	Part names .....	193
	Specifications .....	193
	Insertion and removal of the SD memory card .....	194
<b>Appendix 8</b>	<b>Terminal Module</b> .....	<b>195</b>
	Product configuration .....	195

Product list . . . . .	195
Specifications . . . . .	196
External dimensions and component names . . . . .	201
Terminal layout . . . . .	202
Internal circuit . . . . .	203
<b>Appendix 9 Precautions for Battery Transportation . . . . .</b>	<b>209</b>
Control-subject product . . . . .	209
Precautions for transportation . . . . .	209
<b>Appendix 10 Handling of Batteries and Devices with Built-in Batteries in EU Member States . . . . .</b>	<b>210</b>
Disposal precautions . . . . .	210
Exportation precautions . . . . .	210
<b>Appendix 11 Added and Changed Functions . . . . .</b>	<b>211</b>
<b>INDEX</b>	<b>212</b>
<hr/>	
REVISIONS . . . . .	214
WARRANTY . . . . .	215
TRADEMARKS . . . . .	216



# RELEVANT MANUALS

Manual name <manual number>	Description
MELSEC iQ-F FX5U CPU Module Hardware Manual <JY997D53401>	Describes the details of input/output specifications, wiring and installation of the FX5U CPU module from MELSEC iQ-F FX5U User's Manual (Hardware).
MELSEC iQ-F FX5 User's Manual (Startup) <JY997D58201>	Performance specifications, procedures before operation, and troubleshooting of the CPU module.
MELSEC iQ-F FX5U User's Manual (Hardware) <JY997D55301> (This manual)	Describes the details of hardware of the FX5U CPU module, including input/output specifications, wiring, installation, and maintenance.
MELSEC iQ-F FX5UC User's Manual (Hardware) <JY997D61401>	Describes the details of hardware of the FX5UC CPU module, including input/output specifications, wiring, installation, and maintenance.
MELSEC iQ-F FX5 User's Manual (Application) <JY997D55401>	Describes basic knowledge required for program design, functions of the CPU module, devices/labels, and parameters.
MELSEC iQ-F FX5 Programming Manual (Program Design) <JY997D55701>	Describes specifications of ladders, ST, FBD/LD, and other programs and labels.
MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks) <JY997D55801>	Describes specifications of instructions and functions that can be used in programs.
MELSEC iQ-F FX5 User's Manual (Serial Communication) <JY997D55901>	Describes N:N network, Parallel link, MELSEC Communication protocol, inverter communication, non-protocol communication, and predefined protocol support.
MELSEC iQ-F FX5 User's Manual (MELSEC Communication Protocol) <JY997D60801>	Explains methods for the device that is communicating with the CPU module by MC protocol to read and write the data of the CPU module.
MELSEC iQ-F FX5 User's Manual (MODBUS Communication) <JY997D56101>	Describes MODBUS serial communication.
MELSEC iQ-F FX5 User's Manual (Ethernet Communication) <JY997D56201>	Describes the functions of the built-in Ethernet port communication function.
MELSEC iQ-F FX5 User's Manual (SLMP) <JY997D56001>	Explains methods for the device that is communicating with the CPU module by SLMP to read and write the data of the CPU module.
MELSEC iQ-F FX5 User's Manual (CC-Link IE) <JY997D64201>	Describes CC-Link IE field network module.
MELSEC iQ-F FX5 User's Manual (CC-Link) <SH-081793ENG>	Describes CC-Link system master/intelligent device module.
MELSEC iQ-F FX5 User's Manual (ASLINK) <SH-081796ENG>	Describes AnyWireASLINK system master module.
MELSEC iQ-F FX5 User's Manual (Positioning Control - CPU module built-in, High-speed pulse input/output module) <JY997D56301>	Describes the positioning function of the CPU module built-in and the high-speed pulse input/output module.
MELSEC iQ-F FX5 User's Manual (Positioning Control - Intelligent function module) <SH-081805ENG>	Describes the positioning module.
MELSEC iQ-F FX5 Simple Motion Module User's Manual (Startup) <IB0300251>	Specifications, procedures before operation, system configuration, wiring, and operation examples of the Simple Motion module.
MELSEC iQ-F FX5 Simple Motion Module User's Manual (Application) <IB0300253>	Functions, input/output signals, buffer memories, parameter settings, programming, and troubleshooting of the Simple Motion module.
MELSEC iQ-F FX5 Simple Motion Module User's Manual (Advanced Synchronous Control) <IB0300255>	Functions and programming for the synchronous control of the Simple Motion module.
MELSEC iQ-F FX5 User's Manual (Analog Control - CPU module built-in, Expansion adapter) <JY997D60501>	Describes the analog function of the CPU module built-in and the analog adapter.
MELSEC iQ-F FX5 User's Manual (Analog Control - Intelligent function module) <SH-081802ENG>	Describes the multiple input module (voltage, current, thermocouple, and resistance temperature detector).
MELSEC iQ-F FX5 User's Manual (Temperature Control) <SH-081799ENG>	Describes the temperature control module.
GX Works3 Operating Manual <SH-081215ENG>	System configuration, parameter settings, and online operations of GX Works3.
Transition from MELSEC FX3U, FX3UC Series to MELSEC iQ-F Series Handbook <JY997D66201>	Describes the transition from MELSEC FX3U/FX3UC series to MELSEC iQ-F series.

# TERMS

Unless otherwise specified, this manual uses the following terms.

- □ indicates a variable part to collectively call multiple models or versions.

(Example) FX5U-32MR/ES, FX5U-32MT/ES ⇒ FX5U-32M□/ES

- For details on the FX3 devices that can be connected with the FX5U CPU module, refer to  Page 37 PRODUCT LIST.

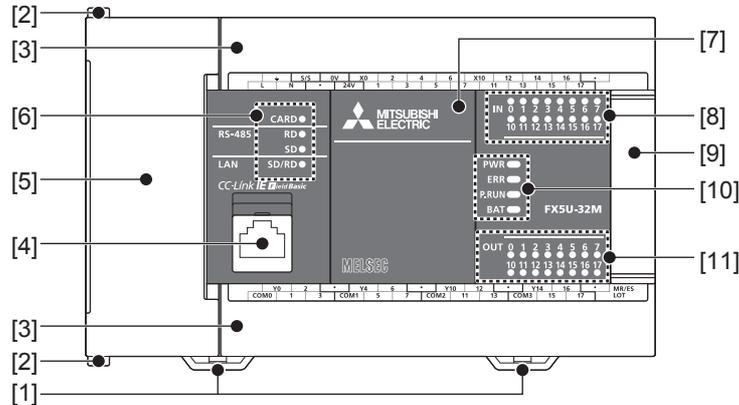
Terms	Description
■Devices	
FX5	Generic term for FX5U and FX5UC PLCs
FX3	Generic term for FX3S, FX3G, FX3GC, FX3U, and FX3UC PLCs
FX5 CPU module	Generic term for FX5U CPU module and FX5UC CPU module
FX5U CPU module	Generic term for FX5U-32MR/ES, FX5U-32MT/ES, FX5U-32MT/ESS, FX5U-64MR/ES, FX5U-64MT/ES, FX5U-64MT/ESS, FX5U-80MR/ES, FX5U-80MT/ES, FX5U-80MT/ESS, FX5U-32MR/DS, FX5U-32MT/DS, FX5U-32MT/DSS, FX5U-64MR/DS, FX5U-64MT/DS, FX5U-64MT/DSS, FX5U-80MR/DS, FX5U-80MT/DS, and FX5U-80MT/DSS
FX5UC CPU module	Generic term for FX5UC-32MT/D, FX5UC-32MT/DSS, FX5UC-64MT/D, FX5UC-64MT/DSS, FX5UC-96MT/D, and FX5UC-96MT/DSS
Extension module	Generic term for FX5 extension modules and FX3 function modules
• FX5 extension module	Generic term for I/O modules, FX5 extension power supply modules, and FX5 intelligent function modules
• FX3 extension module	Generic term for FX3 extension power supply module and FX3 intelligent function module
• Extension module (extension cable type)	Generic term for Input modules (extension cable type), Output modules (extension cable type), Input/output modules (extension cable type), Powered input/output module, High-speed pulse input/output module, Extension power supply module (extension cable type), Connector conversion module (extension cable type), Intelligent function modules, and Bus conversion module (extension cable type)
• Extension module (extension connector type)	Generic term for Input modules (extension connector type), Output modules (extension connector type), Input/output modules (extension connector type), Extension power supply module, and Bus conversion module (extension connector type)
I/O module	Generic term for Input modules, Output modules, Input/output modules, Powered input/output modules, and High-speed pulse input/output modules
Input module	Generic term for Input modules (extension cable type) and Input modules (extension connector type)
• Input module (extension cable type)	Generic term for FX5-8EX/ES and FX5-16EX/ES
• Input module (extension connector type)	Generic term for FX5-C16EX/D, FX5-C16EX/DS, FX5-C32EX/D, and FX5-C32EX/DS
Output module	Generic term for Output modules (extension cable type) and Output modules (extension connector type)
• Output module (extension cable type)	Generic term for FX5-8EYR/ES, FX5-8EYT/ES, FX5-8EYT/ESS, FX5-16EYR/ES, FX5-16EYT/ES, and FX5-16EYT/ESS
• Output module (extension connector type)	Generic term for FX5-C16EYT/D, FX5-C16EYT/DSS, FX5-C32EYT/D, and FX5-C32EYT/DSS
Input/output module	Generic term for Input/output modules (extension cable type) and Input/output modules (extension connector type)
• Input/output module (extension cable type)	Generic term for FX5-16ER/ES, FX5-16ET/ES, and FX5-16ET/ESS
• Input/output module (extension connector type)	Generic term for FX5-C32ET/D and FX5-C32ET/DSS
Powered input/output module	Generic term for FX5-32ER/ES, FX5-32ET/ES, FX5-32ET/ESS, FX5-32ER/DS, FX5-32ET/DS, and FX5-32ET/DSS
High-speed pulse input/output module	Generic term for FX5-16ET/ES-H and FX5-16ET/ESS-H
Extension power supply module	Generic term for FX5 extension power supply module and FX3 extension power supply module
• FX5 extension power supply module	Generic term for FX5 extension power supply module (extension cable type) and FX5 extension power supply module (extension connector type)
• FX5 extension power supply module (extension cable type)	Different name for FX5-1PSU-5V
• FX5 extension power supply module (extension connector type)	Different name for FX5-C1PS-5V
• FX3 extension power supply module	Different name for FX3U-1PSU-5V
Intelligent module	The abbreviation for intelligent function modules
Intelligent function module	Generic term for FX5 intelligent function modules and FX3 intelligent function modules
• FX5 intelligent function module	Generic term for FX5-8AD, FX5-4LC, FX5-20PG-P, FX5-40SSC-S, FX5-80SSC-S, FX5-CCLIEF, FX5-CCL-MS, and FX5-ASL-M

Terms	Description
• FX3 intelligent function module	Generic term for FX3U-4AD, FX3U-4DA, FX3U-4LC, FX3U-1PG, FX3U-2HC, FX3U-16CCL-M, FX3U-64CCL, and FX3U-128ASL-M
Expansion board	Generic term for board for FX5U CPU module
• Communication board	Generic term for FX5-232-BD, FX5-485-BD, and FX5-422-BD-GOT
Expansion adapter	Generic term for adapter for FX5 CPU module
• Communication adapter	Generic term for FX5-232ADP and FX5-485ADP
• Analog adapter	Generic term for FX5-4AD-ADP, FX5-4DA-ADP, FX5-4AD-PT-ADP, and FX5-4AD-TC-ADP
Bus conversion module	Generic term for Bus conversion module (extension cable type) and Bus conversion module (extension connector type)
• Bus conversion module (extension cable type)	Different name for FX5-CNV-BUS
• Bus conversion module (extension connector type)	Different name for FX5-CNV-BUSC
Connector conversion module (extension cable type)	Different name for FX5-CNV-IF
Extended extension cable	Generic term for FX5-30EC and FX5-65EC
Connector conversion adapter	Different name for FX5-CNV-BC
Battery	Different name for FX3U-32BL
SD memory card	Generic term for NZ1MEM-2GBSD, NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD, L1MEM-2GBSD and L1MEM-4GBSD SD memory cards Abbreviation of Secure Digital Memory Card. Device that stores data using flash memory.
Peripheral device	Generic term for engineering tools and GOTs
GOT	Generic term for Mitsubishi Electric Graphic Operation Terminal GOT1000 and GOT2000 series
<b>■Software packages</b>	
Engineering tool	The product name of the software package for the MELSEC programmable controllers
GX Works3	The product name of the software package, SWnDND-GXW3, for the MELSEC programmable controllers (The 'n' represents a version.)

# 1 OUTLINE

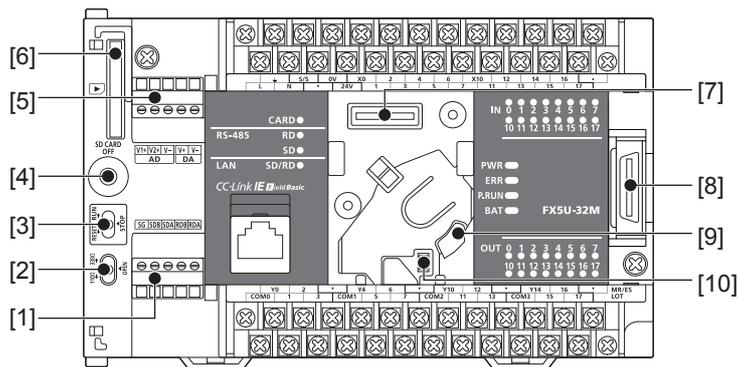
## 1.1 Part Names

### Front panel



No.	Name	Description
[1]	DIN rail mounting hooks	Hook for mounting the CPU module on a DIN rail of DIN46277 (35 mm wide).
[2]	Expansion adapter connecting hooks	When connecting an expansion adapter, secure it with these hooks.
[3]	Terminal block cover	Cover for protecting the terminal block. The cover can be opened for wiring. Keep the covers closed while equipment is running (power is on).
[4]	Built-in Ethernet communication connector	Connector for connection with Ethernet-compatible devices. (with cover) For details, refer to MELSEC iQ-F FX5 User's Manual (Ethernet Communication).
[5]	Top cover	Cover for protecting the SD memory card slot, the RUN/STOP/RESET switch, and others. The built-in RS-485 communication terminal block, built-in analog I/O terminal block, RUN/STOP/RESET switch, SD memory card slot, and others are located under this cover.
[6]	CARD LED	Indicates whether an SD memory card can be used or not. Lit: Can be used or cannot be removed. Flashing: In preparation Off: Not inserted or can be removed.
	RD LED	Lit when the CPU module is receiving data through built-in RS-485 communication.
	SD LED	Lit when the CPU module is sending data through built-in RS-485 communication.
	SD/RD LED	Lit when the CPU module is sending or receiving data through built-in Ethernet communication.
[7]	Expansion board connector cover	Cover for protecting expansion board connectors, battery, or others. Connect the battery under this cover.
[8]	Input display LED	Lit when input is on.
[9]	Extension connector cover	Cover for protecting the extension connector. Connect the extension cable of an extension module to the extension connector under the cover.
[10]	PWR LED	Indicates whether the CPU module is powered or not. Lit: Powered Off: Not powered or hardware error (☞ Page 159 Checking with LEDs)
	ERR LED	Indicates the error status of the CPU module. (☞ Page 159 Checking with LEDs) Lit: Error or hardware error Flashing: Factory default setting, error, hardware error, or resetting Off: Operating normally
	P.RUN LED	Indicates the program running status. Lit: Operating normally Flashing: Paused Off: Stopped or stop error
	BAT LED	Indicates the battery status. Flashing: Battery error Off: Operating normally (☞ Page 159 Checking with LEDs)
[11]	Output display LED	Lit when output is on.

## With cover open

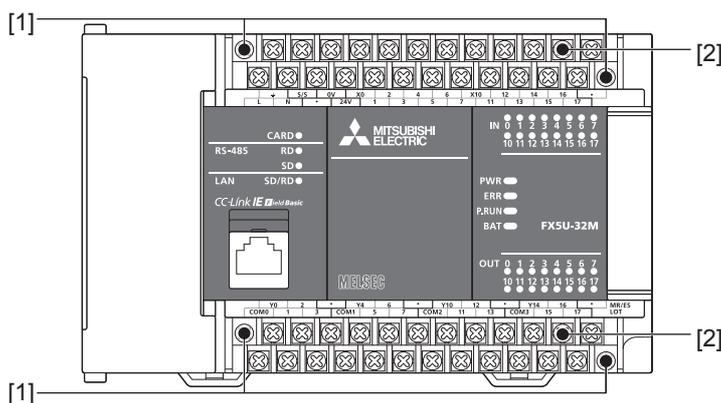


No.	Name	Description
[1]	Built-in RS-485 communication terminal block	Terminal block for connection with RS-485-compatible devices
[2]	RS-485 terminal resistor selector switch	Switch for switching terminal resistance for built-in RS-485 communication.
[3]	RUN/STOP/RESET switch	Switch for operating the CPU module. (☞ Page 153 Methods of running, stopping, and resetting) RUN: Runs the program STOP: Stops the program RESET: Resets the CPU module (hold the switch on the RESET side for approximately 1 second.)
[4]	SD memory card disable switch	Switch for disabling access to the SD memory card when the card is to be removed.
[5]	Built-in analog I/O terminal block	Terminal block for using the built-in analog function.
[6]	SD memory card slot	Slot for inserting an SD memory card.
[7]	Expansion board connector	Connector for connecting an expansion board.
[8]	Extension connector	Connector for connecting the extension cable of an extension module.
[9]	Battery holder	Holder for storing an optional battery.
[10]	Battery connector	Connector for connecting an optional battery.

### Point

Use a tool such as a screwdriver to operate RS-485 terminal resistor selector switch.  
Make sure that the edge of the tool does not damage the switch or the case.

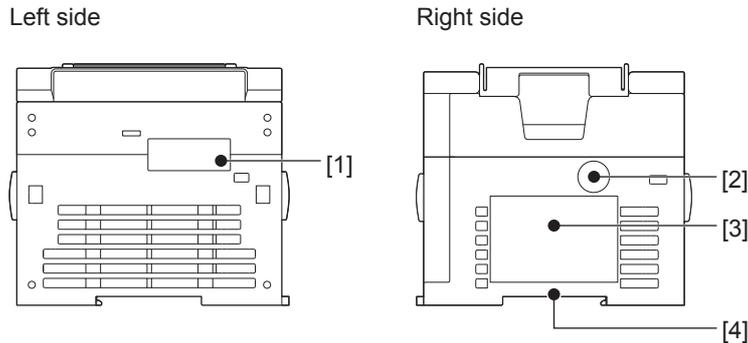
## When the terminal block covers are open



No.	Name	Description
[1]	Terminal block mounting screws	Gradually loosen the left and right screws (alternately), and remove the top of the terminal blocks.
[2]	Terminal	Terminals for power, input, and output. For details on the terminal layout, refer to ☞ Page 34 Terminal Layout.

# Side

## Left side/right side

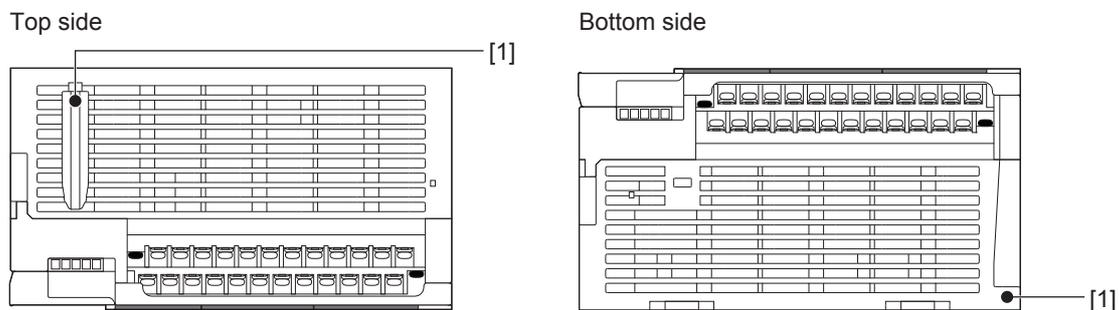


No.	Name	Description
[1]	Expansion adapter connector cover	Cover for protecting the expansion adapter connector. Connect the expansion adapter to the expansion adapter connector under the cover.
[2]	Genuine product certification label	Genuine product certification label to prevent counterfeiting
[3]	Nameplate	The product model name, Manufacturer's serial number, power supply specifications, and MAC address are shown.
[4]	DIN rail mounting groove	The module can be installed on DIN46277 rail (35 mm wide).

**Point**

Products that do not have the genuine product certification label or nameplate are not covered by the warranty.

## Top side/bottom side



No.	Name	Description
[1]	CPU module fixing screw hole	Screw holes for fixing the CPU module to the panel. (In the case of FX5U-64M□/80M□, there are four screw holes.)

# 2 SPECIFICATIONS

The CPU module specifications are explained below.

## 2.1 Generic Specifications

Item	Specifications				
Operating ambient temperature* <sup>1</sup>	-20 to 55°C, non-freezing* <sup>2,3</sup>				
Storage ambient temperature	-25 to 75°C, non-freezing				
Operating ambient humidity	5 to 95%RH, non-condensation* <sup>4</sup>				
Storage ambient humidity	5 to 95%RH, non-condensation				
Vibration resistance* <sup>5,6</sup>	—	Frequency	Acceleration	Half amplitude	Sweep count 10 times each in X, Y, Z directions (80 min in each direction)
	Installed on DIN rail	5 to 8.4 Hz	—	1.75 mm	
		8.4 to 150 Hz	4.9 m/s <sup>2</sup>	—	
	Direct installing	5 to 8.4 Hz	—	3.5 mm	
8.4 to 150 Hz		9.8 m/s <sup>2</sup>	—		
Shock resistance* <sup>5</sup>	147 m/s <sup>2</sup> , Action time: 11 ms, 3 times by half-sine pulse in each direction X, Y, and Z				
Noise durability	By noise simulator at noise voltage of 1000 Vp-p, noise width of 1 μs and period of 30 to 100 Hz				
Grounding	Class D grounding (grounding resistance: 100 Ω or less) <Common grounding with a heavy electrical system is not allowed.>* <sup>7</sup>				
Working atmosphere	Free from corrosive or flammable gas and excessive conductive dust				
Operating altitude* <sup>8</sup>	0 to 2000 m				
Installation location	Inside a control panel				
Overvoltage category* <sup>9</sup>	II or less				
Pollution degree* <sup>10</sup>	2 or less				
Equipment class	Class 2				

\*1 The simultaneous ON ratio of available PLC inputs or outputs changes with respect to the ambient temperature, refer to  Page 27 Input/Output Derating Curve.

\*2 The operating ambient temperature is 0 to 55°C for products manufactured before June 2016. For details on Intelligent function modules, refer to manuals of each product.

\*3 In the case where operating ambient temperature is lower than 0°C, the specifications are different from the above description. For details, refer to  Page 173 Precautions for operating ambient temperature.

\*4 When used in a low-temperature environment, use in an environment with no sudden temperature changes. If there are sudden temperature changes because of opening/closing of the control panel or other reasons, condensation may occur, which may cause a fire, fault, or malfunction. Furthermore, use an air conditioner in dehumidifier mode to prevent condensation.

\*5 The criterion is shown in IEC61131-2.

\*6 When the system has equipment which specification values are lower than above mentioned vibration resistance specification values, the vibration resistance specification of the whole system is corresponding to the lower specification.

\*7 For grounding, refer to  Page 100 Grounding

\*8 The PLC cannot be used at a pressure higher than the atmospheric pressure to avoid damage.

\*9 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

\*10 This index indicates the degree to which conductive material is generated in the environment in which the equipment is used. Pollution level 2 is when only non-conductive pollution occurs. Temporary conductivity caused by condensation must be expected occasionally.

## Dielectric withstand voltage test and insulation resistance test

Perform dielectric withstand voltage test and insulation resistance test at the following voltages between each terminal and the CPU module ground terminal.

### ■ CPU module, I/O module

Between terminals	Dielectric withstand voltage	Insulation resistance	Remarks
Between power supply terminal (AC power supply) and ground terminal	1.5 kV AC for one minute	10 MΩ or higher by 500 V DC insulation resistance tester	—
Between power supply terminal (DC power supply) and ground terminal	500 V AC for one minute		—
Between 24 V DC service power supply connected to input terminal (24 V DC) and ground terminal	500 V AC for one minute		—
Between output terminal (relay) and ground terminal	1.5 kV AC for one minute		—
Between output terminal (transistor) and ground terminal	500 V AC for one minute		—

### ■ Expansion board, expansion adapter

Between terminals	Dielectric withstand voltage	Insulation resistance	Remarks
Between terminal of expansion board and ground terminal	Not allowed	Not allowed	Since the expansion board and CPU module are not insulated, it is not allowed to perform the dielectric withstand voltage test and insulation resistance test between them.
Between terminal of expansion adapter and ground terminal	500 V AC for one minute	10 MΩ or higher by 500 V DC insulation resistance tester	—

For dielectric withstand voltage test and insulation resistance test of each product, refer to manuals of each product.

### ■ Intelligent function module

For information concerning dielectric withstand voltage and insulation resistance of intelligent function modules, refer to manuals of each intelligent function module.

## 2.2 Power Supply Specifications

The CPU module power supply specifications are explained below.

For the consumption current of extension modules, refer to  Page 37 PRODUCT LIST or manuals of each extension module.

### AC power supply type

Item	Specifications	
Rated voltage	100 to 240 V AC	
Allowable supply voltage range	85 to 264 V AC	
Frequency rating	50/60 Hz	
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less. When the supply voltage is 200 V AC, the time can be change to 10 to 100 ms by editing the user program.	
Power fuse	FX5U-32M□/E□	250 V, 3.15 A Time-lag fuse
	FX5U-64M□/E□, FX5U-80M□/E□	250 V, 5 A Time-lag fuse
Rush current	FX5U-32M□/E□	25 A max. 5 ms or less/100 V AC 50 A max. 5 ms or less/200 V AC
	FX5U-64M□/E□, FX5U-80M□/E□	30 A max. 5 ms or less/100 V AC 60 A max. 5 ms or less/200 V AC
Power consumption*1	FX5U-32M□/E□	30 W
	FX5U-64M□/E□	40 W
	FX5U-80M□/E□	45 W
24 V DC service power supply capacity*2	FX5U-32M□/E□	400 mA [300 mA*3] (Supply capacity when 24 V DC service power supply is used for input circuit of the CPU module)
		480 mA [380 mA*3] (Supply capacity when external power supply is used for input circuit of the CPU module)
	FX5U-64M□/E□	600 mA [300 mA*3] (Supply capacity when 24 V DC service power supply is used for input circuit of the CPU module)
		740 mA [440 mA*3] (Supply capacity when external power supply is used for input circuit of the CPU module)
	FX5U-80M□/E□	600 mA [300 mA*3] (Supply capacity when 24 V DC service power supply is used for input circuit of the CPU module)
		770 mA [470 mA*3] (Supply capacity when external power supply is used for input circuit of the CPU module)
5 V DC built-in power supply capacity	FX5U-32M□/E□	900 mA
	FX5U-64M□/E□, FX5U-80M□/E□	1100 mA

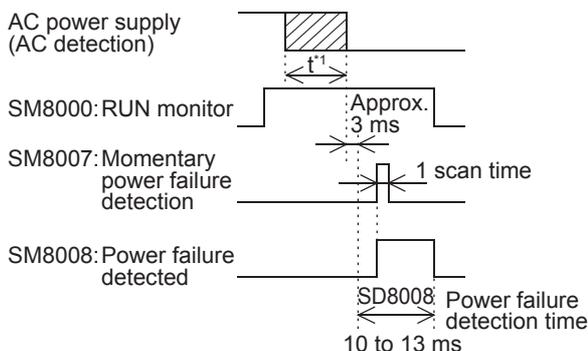
\*1 This item shows value when all 24 V DC service power supplies are used in the maximum configuration connectable to the CPU module. (The current of the input circuit is included.)

\*2 When I/O modules are connected, they consume current from the 24 V DC service power supply.  
For details on the 24 V DC service power supply, refer to  Page 59 Limitation on Current Consumption.

\*3 The value in [] is capacity of 24 V DC service power supply in the case where operating ambient temperature is lower than 0°C.

#### Point

The following shows the power failure detection time of the AC power supply type.



\*1  $t$ : time (as a guideline)  
100 V AC: 0 ms to approximately 60 ms  
200 V AC: 0 ms to approximately 100 ms

## DC power supply type

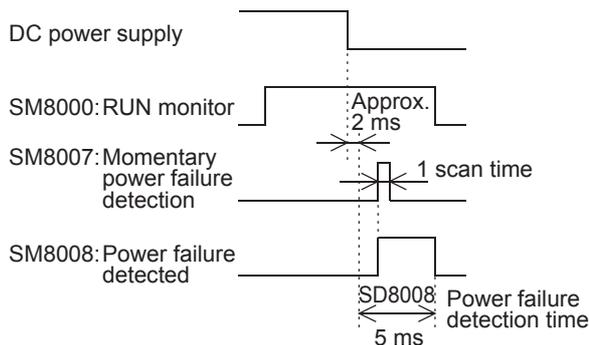
Item	Specifications	
Rated voltage	24 V DC	
Allowable supply voltage range	16.8 to 28.8 V DC	
Allowable instantaneous power failure time	Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.	
Power fuse	FX5U-32M□/D□	250 V, 3.15 A Time-lag fuse
	FX5U-64M□/D□, FX5U-80M□/D□	250 V, 5 A Time-lag fuse
Rush current	FX5U-32M□/D□	50 A max. 0.5 ms or less/24 V DC
	FX5U-64M□/D□, FX5U-80M□/D□	65 A max. 2.0 ms or less/24 V DC
Power consumption*1	FX5U-32M□/D□	30 W
	FX5U-64M□/D□	40 W
	FX5U-80M□/D□	45 W
24 V DC built-in power supply capacity	FX5U-32M□/D□	480 mA (360 mA)*2
	FX5U-64M□/D□	740 mA (530 mA)*2
	FX5U-80M□/D□	770 mA (560 mA)*2
5 V DC built-in power supply capacity	FX5U-32M□/D□	900 mA (775 mA)*2
	FX5U-64M□/D□, FX5U-80M□/D□	1100 mA (975 mA)*2

\*1 Maximum consumption value when using the maximum configuration connectable to the CPU module.

\*2 The value in ( ) is capacity of power supply when the supply voltage is 16.8 to 19.2 V DC.

### Point

The following shows the power failure detection time of the DC power supply type.



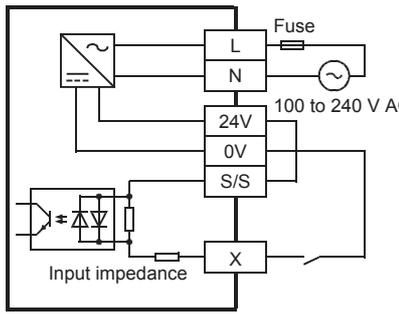
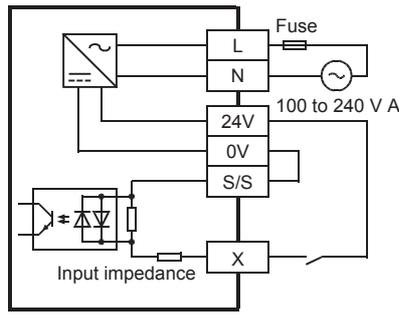
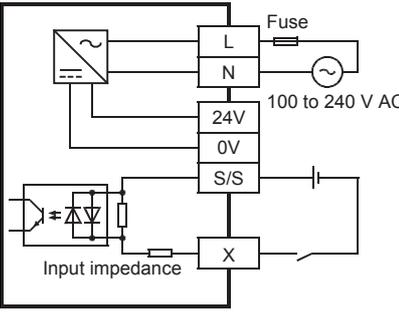
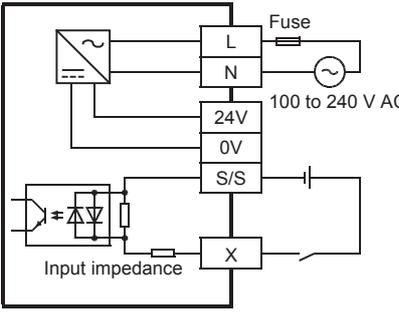
## 2.3 Input Specifications

The CPU module input specifications are explained below.

### 24 V DC Input (sink/source)

The input points in the table below indicate the CPU module terminal points.

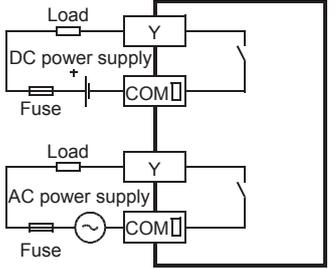
Item		Specifications	
No. of input points	FX5U-32M□	16 points	
	FX5U-64M□	32 points	
	FX5U-80M□	40 points	
Connection type		Removable terminal block (M3 screws)	
Input type		Sink/source	
Input signal voltage		24 V DC +20 %, -15%	
Input signal current	X0 to X17	5.3 mA/24 V DC	
	X20 and subsequent	4.0 mA/24 V DC	
Input impedance	X0 to X17	4.3 kΩ	
	X20 and subsequent	5.6 kΩ	
ON input sensitivity current	X0 to X17	3.5 mA or more	
	X20 and subsequent	3.0 mA or more	
OFF input sensitivity current		1.5 mA or less	
Input response frequency	FX5U-32M□	X0 to X5	200 kHz
	FX5U-64M□, FX5U-80M□	X0 to X7	When capturing pulses of a response frequency of 50 to 200 kHz, refer to  Page 114 In the case of capturing high-speed pulses.
	FX5U-32M□	X6 to X17	10 kHz
	FX5U-64M□, FX5U-80M□	X10 to X17	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	0.1±0.05 kHz
Pulse waveform	Waveform		
			T1 (pulse width)
			T2 (rise/fall time)
	FX5U-32M□	X0 to X5	2.5 μs or more
	FX5U-64M□, FX5U-80M□	X0 to X7	1.25 μs or less
FX5U-32M□	X6 to X17	50 μs or more	
FX5U-64M□, FX5U-80M□	X10 to X17	25 μs or less	
Input response time (H/W filter delay)	FX5U-32M□	X0 to X5	ON: 2.5 μs or less OFF: 2.5 μs or less
	FX5U-64M□, FX5U-80M□	X0 to X7	
	FX5U-32M□	X6 to X17	ON: 30 μs or less OFF: 50 μs or less
	FX5U-64M□, FX5U-80M□	X10 to X17	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	ON: 50 μs or less OFF: 150 μs or less
Input response time (Digital filter setting value)		None, 10 μs, 50 μs, 0.1 ms, 0.2 ms, 0.4 ms, 0.6 ms, 1 ms, 5 ms, 10 ms (initial values), 20 ms, 70 ms When using this product in an environment with much noise, set the digital filter.	
Input signal format		No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor	
Input circuit insulation		Photo-coupler insulation	
Indication of input operation		LED is lit when input is on	

Item	Specifications	
Input circuit configuration	AC power supply type	<ul style="list-style-type: none"> <li>When using 24 V DC service power supply</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div>
	DC power supply type	<ul style="list-style-type: none"> <li>When using external power supply</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div>

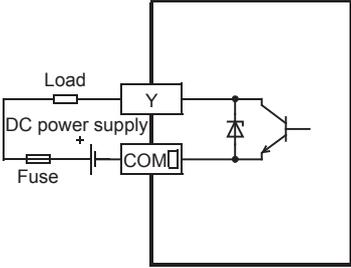
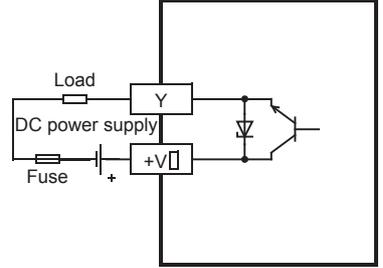
## 2.4 Output Specifications

The CPU module output specifications are explained below.

### Relay output

Item		Output Specifications
No. of output points	FX5U-32MR/□	16 points
	FX5U-64MR/□	32 points
	FX5U-80MR/□	40 points
Connection type		Removable terminal block (M3 screws)
Output type		Relay
External power supply		30 V DC or less 240 V AC or less ("250 V AC or less" if not a CE, UL, cUL compliant item)
Max. load		2 A/point The total load current per common terminal should be the following value. <ul style="list-style-type: none"> <li>• 4 output points/common terminal: 8 A or less</li> <li>• 8 output points/common terminal: 8 A or less</li> </ul> For details on the common, refer to  Page 35 Interpretation of terminal block layout.
Min. load		5 V DC, 2 mA (reference values)
Open circuit leakage current		—
Response time	OFF→ON	Approx. 10 ms
	ON→OFF	Approx. 10 ms
Insulation of circuit		Mechanical insulation
Indication of output operation		LED is lit when output is on
Output circuit configuration		 <p>A number is entered in the □ of [COM □].</p>

## Transistor output

Item		Output specifications
No. of output points	FX5U-32MT/□	16 points
	FX5U-64MT/□	32 points
	FX5U-80MT/□	40 points
Connection type		Removable terminal block (M3 screws)
Output type	FX5U-□MT/□S	Transistor/sink output
	FX5U-□MT/□SS	Transistor/source output
External power supply		5 to 30 V DC
Max. load		0.5 A/point The total load current per common terminal should be the following value. <ul style="list-style-type: none"> <li>• 4 output points/common terminal: 0.8 A or less</li> <li>• 8 output points/common terminal: 1.6 A or less</li> </ul> For details on the common, refer to  Page 35 Interpretation of terminal block layout.
Open circuit leakage current		0.1 mA or less/30 V DC
Voltage drop when ON	Y0 to Y3	1.0 V or less
	Y4 and subsequent	1.5 V or less
Response time	Y0 to Y3	2.5 μs or less/10 mA or more (5 to 24 V DC)
	Y4 and subsequent	0.2 ms or less/200 mA or more (24 V DC)
Insulation of circuit		Photo-coupler insulation
Indication of output operation		LED is lit when output is on
Output circuit configuration		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink output wiring</p>  <p>A number is entered in the □ of [COM].</p> </div> <div style="text-align: center;"> <p>Source output wiring</p>  <p>A number is entered in the □ of [+V].</p> </div> </div>

## 2.5 Input/Output Derating Curve

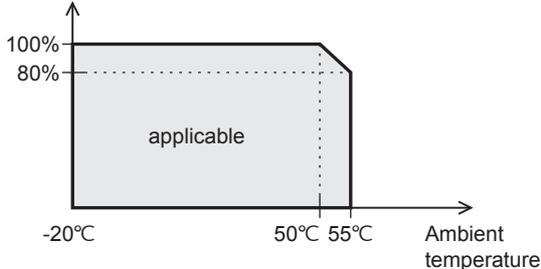
The derating curve below shows the simultaneous ON ratio of available PLC inputs or outputs with respect to the ambient temperature. Use the PLC within the simultaneous input or output ON ratio range shown in the figure.

- AC power supply type

Derating curve

When 24 V DC service power supply or external power supply (24 V DC) is used for input circuits

Simultaneous ON ratio

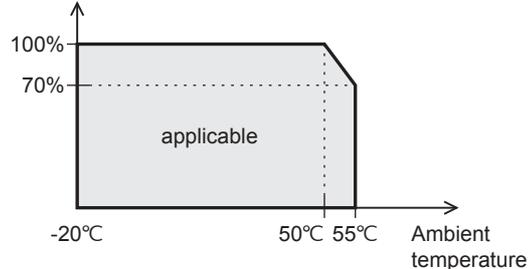


- DC power supply type

Derating curve

When external power supply (24 V DC) is used for input circuits

Simultaneous ON ratio



## 2.6 Performance Specifications

Item	Specification	
Control system	Stored-program repetitive operation	
Input/output control system	Refresh system (Direct access input/output allowed by specification of direct access input/output [DX, DY])	
Programming specifications	Programming language	Ladder diagram (LD), structured text (ST), function block diagram/ladder diagram (FBD/LD)
	Programming extension function	Function block (FB), function (FUN), label programming (local/global)
	Constant scan	0.2 to 2000 ms (can be set in 0.1 ms increments)
	Fixed cycle interrupt	1 to 60000 ms (can be set in 1 ms increments)
	Timer performance specifications	100 ms, 10 ms, 1 ms
	No. of program executions	32
	No. of FB files	16 (Up to 15 for user)
Operation specifications	Execution type	Standby type, initial execution type, scan execution type, event execution type
	Interrupt type	Internal timer interrupt, input interruption, high-speed comparison match interrupt, interrupt by modules <sup>*1</sup>
Command processing time	LD X0	34 ns
	MOV D0 D1	34 ns
Memory capacity	Program capacity	64 k steps (128 kbytes, flash memory)
	SD memory card	Memory card capacity (SD/SDHC memory card: Max. 16 Gbytes)
	Device/label memory	120 kbytes
	Data memory/standard ROM	5 Mbytes
Flash memory (Flash ROM) write count	Maximum 20000 times	
File storage capacity	Device/label memory	1
	Data memory P: No. of program files FB: No. of FB files	P: 32, FB: 16
	SD Memory Card	NZ1MEM-2GBSD: 511 <sup>*2</sup> NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD: 65534 <sup>*2</sup>
Clock function	Display data	Year, month, day, hour, minute, second, day of week (leap year automatic detection)
	Precision	Differences per month $\pm 45$ sec./25°C (TYP)
Power failure retention (clock data <sup>*3</sup> )	Retention method	Large-capacity capacitor
	Retention time	10 days (Ambient temperature: 25°C)
No. of input/output points	(1) No. of input/output points	256 points or less
	(2) No. of remote I/O points	384 points or less
	Total No. of points of (1) and (2)	512 points or less
Power failure retention (device)	Power failure retention capacity	Maximum 12 k word <sup>*4</sup>

\*1 Interrupt from the intelligent function module and high-speed pulse input/output module.

\*2 The value listed above indicates the number of files stored in the root folder.

\*3 Clock data is retained using the power accumulated in a large-capacity capacitor incorporated into the PLC. When voltage of the large-capacity capacitor drops, clock data is no longer accurately retained. The retention period of a fully charged capacitor (electricity is conducted across the PLC for at least 30 minutes) is 10 days (ambient temperature: 25°C). How long the capacitor can hold the data depends on the operating ambient temperature. When the operating ambient temperature is high, the holding period is short.

\*4 It is possible to back up all devices in device (high-speed) area. When a battery is used, it is also possible to back up devices in device (standard) area.

## Number of device points

Item		Base	Max. number of points		
No. of user device points	Input relay (X)	8	1024 points	The total number of X and Y assigned to input/output points is up to 256 points.	
	Output relay (Y)	8	1024 points		
	Internal relay (M)	10	32768 points (can be changed with parameter) <sup>*1</sup>		
	Latch relay (L)	10	32768 points (can be changed with parameter) <sup>*1</sup>		
	Link relay (B)	16	32768 points (can be changed with parameter) <sup>*1</sup>		
	Annunciator (F)	10	32768 points (can be changed with parameter) <sup>*1</sup>		
	Link special relay (SB)	16	32768 points (can be changed with parameter) <sup>*1</sup>		
	Step relay (S)	10	4096 points (fixed)		
	Timer system	Timer (T)	10	1024 points (can be changed with parameter) <sup>*1</sup>	
	Accumulation timer system	Accumulation timer (ST)	10	1024 points (can be changed with parameter) <sup>*1</sup>	
	Counter system	Counter (C)	10	1024 points (can be changed with parameter) <sup>*1</sup>	
		Long counter (LC)	10	1024 points (can be changed with parameter) <sup>*1</sup>	
	Data register (D)		10	8000 points (can be changed with parameter) <sup>*1</sup>	
	Link register (W)		16	32768 points (can be changed with parameter) <sup>*1</sup>	
Link special register (SW)		16	32768 points (can be changed with parameter) <sup>*1</sup>		
No. of system device points	Special relay (SM)	10	10000 points (fixed)		
	Special register (SD)	10	12000 points (fixed)		
Module access device	Intelligent function module device	10	65536 points (designated by U□\G□)		
No. of index register points	Index register (Z) <sup>*2</sup>	10	24 points		
	Long index register (LZ) <sup>*2</sup>	10	12 points		
No. of file register points	File register (R)	10	32768 points (can be changed with parameter) <sup>*1</sup>		
No. of nesting points	Nesting (N)	10	15 points (fixed)		
No. of pointer points	Pointer (P)	10	4096 points		
	Interrupt pointer (I)	10	178 points (fixed)		
Others	Decimal constant (K)	Signed	— 16 bits: -32768 to +32767, 32 bits: -2147483648 to +2147483647		
		Unsigned	— 16 bits: 0 to 65535, 32 bits: 0 to 4294967295		
	Hexadecimal constant (H)	—	16 bits: 0 to FFFF, 32 bits: 0 to FFFFFFFF		
	Real constant (E)	Single precision	— E-3.40282347+38 to E-1.17549435-38, 0, E1.17549435-38 to E3.40282347+38		
	Character string		—	Shift-JIS code max. 255 single-byte characters (256 including NULL)	

\*1 Can be changed with parameters within the capacity range of the CPU built-in memory.

\*2 Total of the index register (Z) and long index register (LZ) is maximum 24 words.

## 2.7 Built-in Analog Specifications

The analog input/output specifications of the built-in analog function are explained below.

For details on the analog built-in function, refer to [MELSEC iQ-F FX5 User's Manual \(Analog Control - CPU module built-in, Expansion adapter\)](#).

### Analog input

Item		Specifications
Analog input points		2 points (2 channels)
Analog input	Voltage	0 to 10 V DC (input resistance 115.7 kΩ)
Digital output		Unsigned 12-bit binary
Device allocation		SD6020 (Input data of ch1) SD6060 (Input data of ch2)
I/O characteristics, Maximum resolution	Digital output value	0 to 4000
	Maximum resolution	2.5 mV
Accuracy (Accuracy for the full scale of the digital output value)	Ambient temperature 25 ±5°C	Within ±0.5% (±20 digit <sup>*2</sup> )
	Ambient temperature 0 to 55°C	Within ±1.0% (±40 digit <sup>*2</sup> )
	Ambient temperature -20 to 0°C <sup>*1</sup>	Within ±1.5% (±60 digit <sup>*2</sup> )
Conversion speed		30 μs /channels (data refreshed every operation cycle)
Absolute maximum input		-0.5 V, +15 V
Insulation method		Inside the CPU module and the analog input circuit are not insulated. Between input terminals (channels) is not insulated.
Occupied points		0 points (does not pertain to the max. No. of input/output points of the CPU module.)
Terminal block used		European-type terminal block

\*1 Products manufactured before June 2016 do not adapt to this specification.

\*2 "Digit" refers to digital values.

### Analog output

Item		Specifications
Analog output points		1 points (1 channels)
Digital input		Unsigned 12-bit binary
Analog output	Voltage	0 to 10 V DC (external load resistance 2 k to 1 MΩ)
Device allocation		SD6180 (Output setting data of ch1)
I/O characteristics, Maximum resolution <sup>*1</sup>	Digital input value	0 to 4000
	Maximum resolution	2.5 mV
Accuracy <sup>*2</sup> (Accuracy for the full scale of the analog output value)	Ambient temperature 25 ±5°C	Within ±0.5% (±20 digit <sup>*4</sup> )
	Ambient temperature 0 to 55°C	Within ±1.0% (±40 digit <sup>*4</sup> )
	Ambient temperature -20 to 0°C <sup>*3</sup>	Within ±1.5% (±60 digit <sup>*4</sup> )
Conversion speed		30 μs (data refreshed every operation cycle)
Insulation method		Inside the CPU module and the analog output circuit are not insulated.
Occupied points		0 points (does not pertain to the max. No. of input/output points of the CPU module.)
Terminal block used		European-type terminal block

\*1 There is a dead band near 0 V output, which is an area where some analog output values do not reflect digital input values.

\*2 External load resistance is set to 2 kΩ when shipped from the factory. Thus, output voltage will increase somewhat if the resistance is set higher than 2 kΩ. When the resistance is 1 MΩ, output voltage increases maximum 2%.

\*3 Products manufactured before June 2016 do not adapt to this specification.

\*4 "Digit" refers to digital values.

## 2.8 Communication Specifications

The built-in Ethernet and built-in RS-485 communication specifications are as explained below.

### Built-in Ethernet communication

For details of built-in Ethernet communication, refer to the following.

📖 MELSEC iQ-F FX5 User's Manual (Ethernet Communication)

📖 MELSEC iQ-F FX5 User's Manual (SLMP)

Item	Specifications	
Data transmission speed	100/10 Mbps	
Communication mode	Full-duplex (FDX) / Half-duplex (HDX) <sup>*1</sup>	
Interface	RJ45 connector	
Transmission method	Base band	
Maximum segment length (The distance between hub and node)	100 m	
Cascade connection	100BASE-TX	Max. 2 stages <sup>*2</sup>
	10BASE-T	Max. 4 stages <sup>*2</sup>
Protocol type	CC-Link IE field network Basic	
	MELSOFT connection	
	SLMP (3E frame)	
	Socket communication	
	Predefined protocol support	
	FTP server	
Number of simultaneously open connections allowed	Total of 8 connections <sup>*3*4</sup> (Up to 8 external devices can access one CPU module at the same time.)	
Hub <sup>*1</sup>	Hubs with 100BASE-TX or 10BASE-T ports can be used.	
Insulation method	Pulse transformer insulation	
IP address <sup>*5</sup>	Initial value: 192.168.3.250	
Cable used <sup>*6</sup>	For 100BASE-TX connection	Ethernet standard-compatible cable, category 5 or higher (STP cable)
	For 10BASE-T connection	Ethernet standard-compatible cable, category 3 or higher (STP cable)

\*1 IEEE802.3x flow control is not supported.

\*2 Number of stages that can be connected when a repeater hub is used. When a switching hub is used, check the specifications of the switching hub used.

\*3 The first device for MELSOFT connection is not included in the number of connections. (The second and the following devices are included.)

\*4 The CC-Link IE field network Basic and FTP server are not included in the number of connections.

\*5 If the first octet is 0 or 127, a parameter error (2222H) will occur. (Example: 0.0.0.0, 127.0.0.0, etc.)

\*6 A straight cable can be used. If a personal computer or GOT and CPU module are directly connected a cross cable can be used.

## Built-in RS-485 communication

For details of built-in RS-485 communication, refer to the following.

📖 MELSEC iQ-F FX5 User's Manual (Serial Communication)

📖 MELSEC iQ-F FX5 User's Manual (MELSEC Communication Protocol)

📖 MELSEC iQ-F FX5 User's Manual (MODBUS Communication)

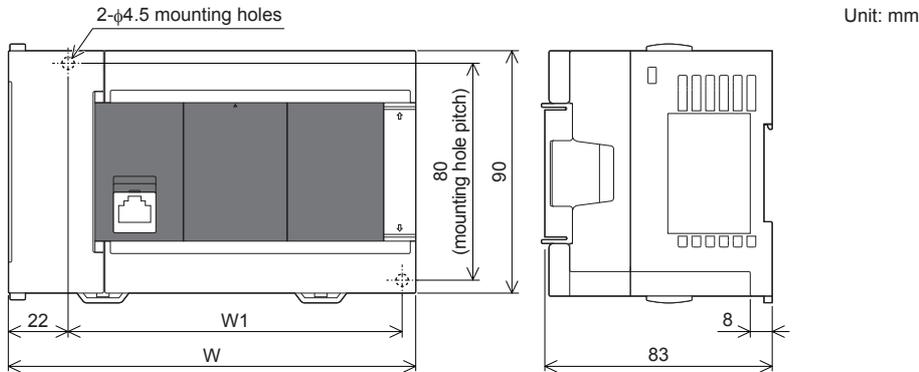
Item	Specifications
Transmission standards	Conforms to RS-485/RS-422 specifications
Data transmission speed	Max. 115.2 kbps
Communication method	Full-duplex (FDX) / Half-duplex (HDX)
Maximum total extension distance	50 m
Protocol type	MELSOFT connection
	Non-protocol communication
	MELSEC Communication protocol (3C/4C frames)
	MODBUS RTU
	Predefined protocol support
	Inverter communication
	N:N network
	Parallel link
Insulation method	Not insulated
Terminal resistors	Built-in (OPEN/110 Ω/330 Ω)
Terminal block used	European-type terminal block

## 2.9 External Dimensions

### CPU module

2

#### FX5U-32M□



Model	W	W1 (mounting hole pitch)	Mass (weight)
FX5U-32M□	150 mm	123 mm	Approx. 0.7 kg

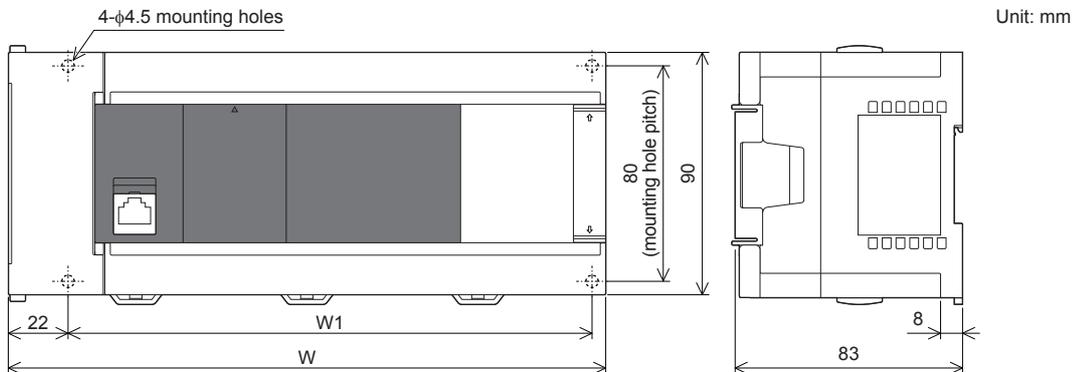
- Exterior color

Main body: Munsell 0.6B7.6/0.2

- Accessories

Dust proof protection sheet  
Manual supplied with product

#### FX5U-64M□, FX5U-80M□



Model	W	W1 (mounting hole pitch)	Mass (weight)
FX5U-64M□	220 mm	193 mm	Approx. 1.0 kg
FX5U-80M□	285 mm	258 mm	Approx. 1.2 kg

- Exterior color

Main body: Munsell 0.6B7.6/0.2

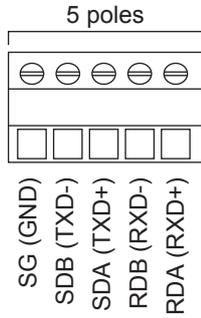
- Accessories

Dust proof protection sheet  
Manual supplied with product

# 2.10 Terminal Layout

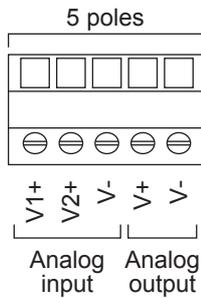
## Built-in RS-485 terminal

European type terminal block

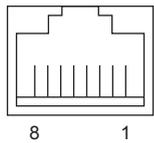


## Built-in analog terminal

European type terminal block



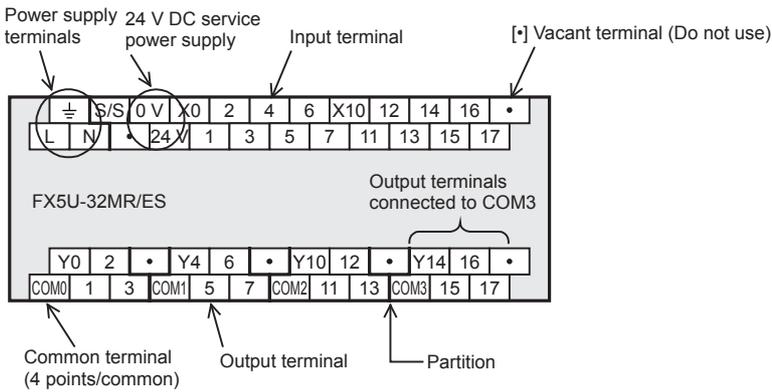
## Built-in Ethernet connector



Pin	Signal name
1	TXD+
2	TXD-
3	RXD+
4	Not used
5	Not used
6	RXD-
7	Not used
8	Not used

## Power, input/output terminal block

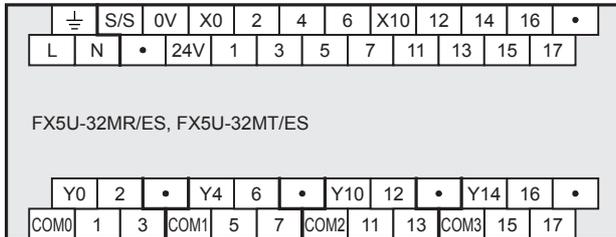
### ■ Interpretation of terminal block layout



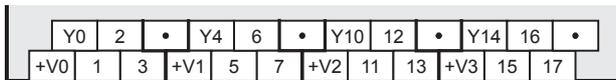
- Indication of power supply terminals  
The AC power supply type has [L] and [N] terminals, whereas the DC power type has [+] and [-] terminals.  
For external wiring, refer to [Page 101 Power Supply Wiring](#).
- Indication of 24 V DC service power supply  
The AC power supply type has [0V] and [24V] terminals.  
The DC power supply type does not have a 24 V DC service power supply. [.] indicates open terminals.  
Do not wire [.] terminals.
- Indication of input terminal  
Both AC and DC power supply type have the same input terminals, however, the external input wiring differs from each other.  
For external wiring, refer to [Page 109 Input Wiring](#).
- Indication of output terminals connected to common (COM□)  
One common terminal covers 4 or 8 output points.  
The output number (Y) connected to common is the range inside the thick "separation line."  
For transistor output (source) type, the "COM□" terminal is the "+V□" terminal.

### ■ FX5U-32M□

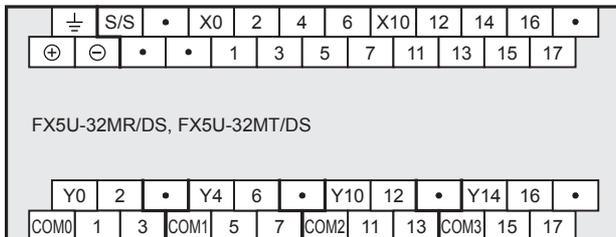
- AC power supply type



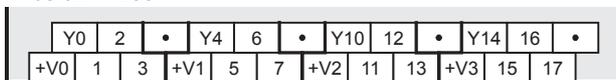
FX5U-32MT/ESS



- DC power supply type



FX5U-32MT/DSS



## ■FX5U-64M□

- AC power supply type

⏏	S/S	0V	0V	X0	2	4	6	X10	12	14	16	X20	22	24	26	X30	32	34	36	•
L	N	•	24V	24V	1	3	5	7	11	13	15	17	21	23	25	27	31	33	35	37

FX5U-64MR/ES, FX5U-64MT/ES

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	Y30	32	34	36	COM5
COM0	1	3	COM1	5	7	COM2	11	13	COM3	15	17	COM4	21	23	25	27	31	33	35	37

FX5U-64MT/ESS

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	Y30	32	34	36	+V5
+V0	1	3	+V1	5	7	+V2	11	13	+V3	15	17	+V4	21	23	25	27	31	33	35	37

- DC power supply type

⏏	S/S	•	•	X0	2	4	6	X10	12	14	16	X20	22	24	26	X30	32	34	36	•
⊕	⊖	•	•	•	1	3	5	7	11	13	15	17	21	23	25	27	31	33	35	37

FX5U-64MR/DS, FX5U-64MT/DS

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	Y30	32	34	36	COM5
COM0	1	3	COM1	5	7	COM2	11	13	COM3	15	17	COM4	21	23	25	27	31	33	35	37

FX5U-64MT/DSS

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	Y30	32	34	36	+V5
+V0	1	3	+V1	5	7	+V2	11	13	+V3	15	17	+V4	21	23	25	27	31	33	35	37

## ■FX5U-80M□

- AC power supply type

⏏	S/S	0V	0V	X0	2	4	6	X10	12	14	16	•	X20	22	24	26	•	X30	32	34	36	•	X40	42	44	46	•
L	N	•	24V	24V	1	3	5	7	11	13	15	17	•	21	23	25	27	•	31	33	35	37	•	41	43	45	47

FX5U-80MR/ES, FX5U-80MT/ES

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	•	•	Y30	32	34	36	•	Y40	42	44	46	•
COM0	1	3	COM1	5	7	COM2	11	13	COM3	15	17	COM4	21	23	25	27	•	COM5	31	33	35	37	COM6	41	43	45	47

FX5U-80MT/ESS

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	•	•	Y30	32	34	36	•	Y40	42	44	46	•
+V0	1	3	+V1	5	7	+V2	11	13	+V3	15	17	+V4	21	23	25	27	•	+V5	31	33	35	37	+V6	41	43	45	47

- DC power supply type

⏏	S/S	•	•	X0	2	4	6	X10	12	14	16	•	X20	22	24	26	•	X30	32	34	36	•	X40	42	44	46	•
⊕	⊖	•	•	•	1	3	5	7	11	13	15	17	•	21	23	25	27	•	31	33	35	37	•	41	43	45	47

FX5U-80MR/DS, FX5U-80MT/DS

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	•	•	Y30	32	34	36	•	Y40	42	44	46	•
COM0	1	3	COM1	5	7	COM2	11	13	COM3	15	17	COM4	21	23	25	27	•	COM5	31	33	35	37	COM6	41	43	45	47

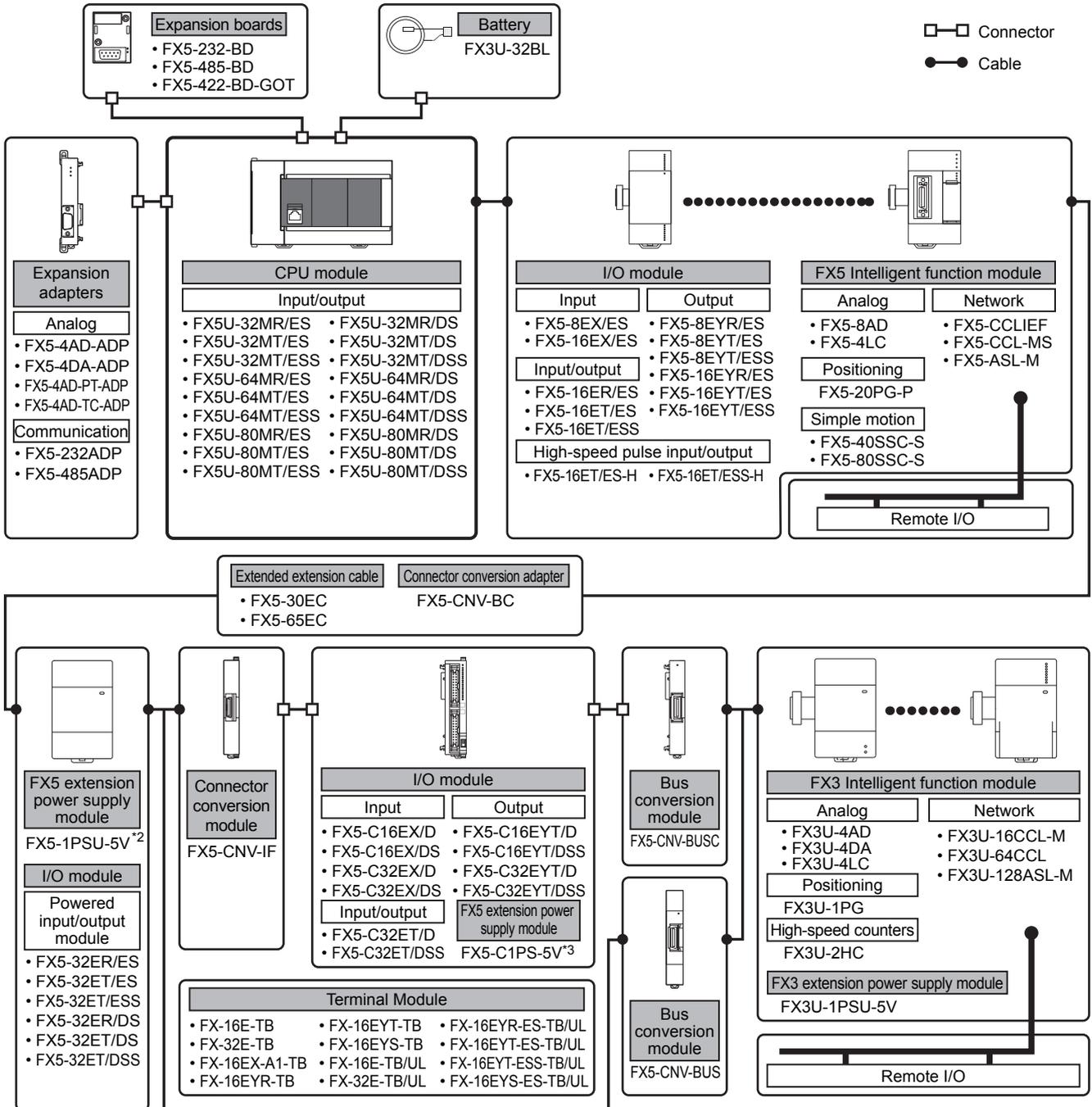
FX5U-80MT/DSS

Y0	2	•	Y4	6	•	Y10	12	•	Y14	16	•	Y20	22	24	26	•	•	Y30	32	34	36	•	Y40	42	44	46	•
+V0	1	3	+V1	5	7	+V2	11	13	+V3	15	17	+V4	21	23	25	27	•	+V5	31	33	35	37	+V6	41	43	45	47

# 3 PRODUCT LIST

The following shows the system configuration equipment of the FX5U.

## 3.1 Overall Configuration



\*1 Use this to connect a module (extension cable type) located distantly or on a second stage. The connector conversion adapter (FX5-CNV-BC) is required when the connection destination is a module of extension cable type (except for FX5-1PSU-5V and extension power supply module). When also using a bus conversion module in the same system, connect the FX5-1PSU-5V or powered input/output module directly after the extended extension cable.

\*2 Can connect to only the AC power supply type system.

\*3 Can connect to only the DC power supply type system.

## 3.2 CPU Module

The CPU module incorporates a CPU, memory, input/output terminals, and power supply.



- Power supply, Input/output type: Connection on terminal block.
- R/ES: AC power supply/24 V DC (sink/source) input/Relay output
- T/ES: AC power supply/24 V DC (sink/source) input/Transistor (sink) output
- T/ESS: AC power supply/24 V DC (sink/source) input/Transistor (source) output
- R/DS: DC power supply/24 V DC (sink/source) input/Relay output
- T/DS: DC power supply/24 V DC (sink/source) input/Transistor (sink) output
- T/DSS: DC power supply/24 V DC (sink/source) input/Transistor (source) output

### AC power supply common to 24 V DC sink and source input

Model	No. of input/output points			Input type	Output type	Connection type	Power supply capacity	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC service power supply
FX5U-32MR/ES	32 points	16 points	16 points	24 V DC (Sink/source)	Relay	Terminal block	900 mA	400 mA (480 mA <sup>*1</sup> )
FX5U-32MT/ES					Transistor (sink)			
FX5U-32MT/ESS					Transistor (source)			
FX5U-64MR/ES	64 points	32 points	32 points	24 V DC (Sink/source)	Relay	Terminal block	1100 mA	600 mA (740 mA <sup>*1</sup> )
FX5U-64MT/ES					Transistor (sink)			
FX5U-64MT/ESS					Transistor (source)			
FX5U-80MR/ES	80 points	40 points	40 points	24 V DC (Sink/source)	Relay	Terminal block	1100 mA	600 mA (770 mA <sup>*1</sup> )
FX5U-80MT/ES					Transistor (sink)			
FX5U-80MT/ESS					Transistor (source)			

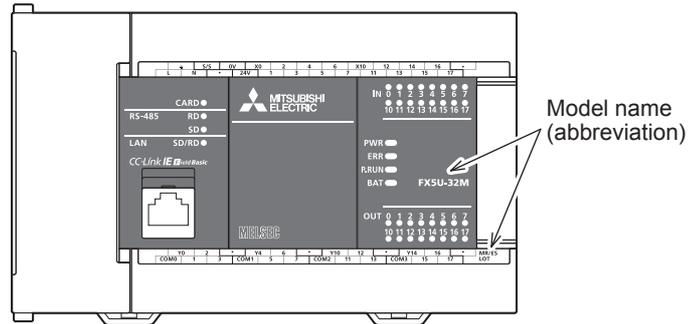
\*1 Power supply capacity when external power supply is used for input circuit

### DC power supply common to 24 V DC sink and source input

Model	No. of input/output points			Input type	Output type	Connection type	Power supply capacity	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5U-32MR/DS	32 points	16 points	16 points	24 V DC (Sink/source)	Relay	Terminal block	900 mA (775 mA <sup>*1</sup> )	480 mA (360 mA <sup>*1</sup> )
FX5U-32MT/DS					Transistor (sink)			
FX5U-32MT/DSS					Transistor (source)			
FX5U-64MR/DS	64 points	32 points	32 points	24 V DC (Sink/source)	Relay	Terminal block	1100 mA (975 mA <sup>*1</sup> )	740 mA (530 mA <sup>*1</sup> )
FX5U-64MT/DS					Transistor (sink)			
FX5U-64MT/DSS					Transistor (source)			
FX5U-80MR/DS	80 points	40 points	40 points	24 V DC (Sink/source)	Relay	Terminal block	1100 mA (975 mA <sup>*1</sup> )	770 mA (560 mA <sup>*1</sup> )
FX5U-80MT/DS					Transistor (sink)			
FX5U-80MT/DSS					Transistor (source)			

\*1 Power supply capacity when the power supply voltage is 16.8 to 19.2 V DC.

The model name of the CPU module can be checked on the nameplate on the right side. However, when extension modules are connected, the nameplate cannot be seen. Check the model name in the following places.

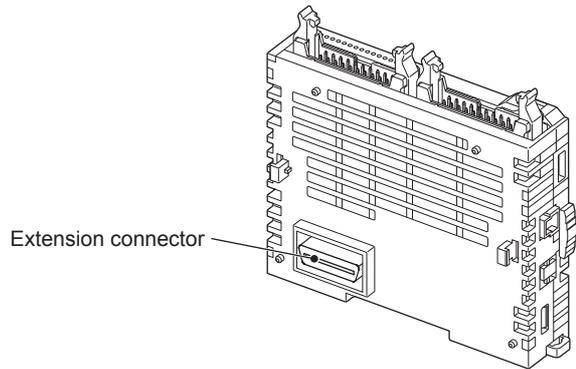
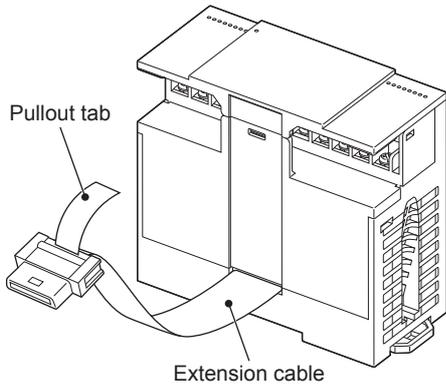


### 3.3 Extension Module

Extension modules are used to expand inputs/outputs, functions, and others.

The two connection types, extension cable type and extension connector type, are provided for extension modules.

- Extension cable type
- Extension connector type



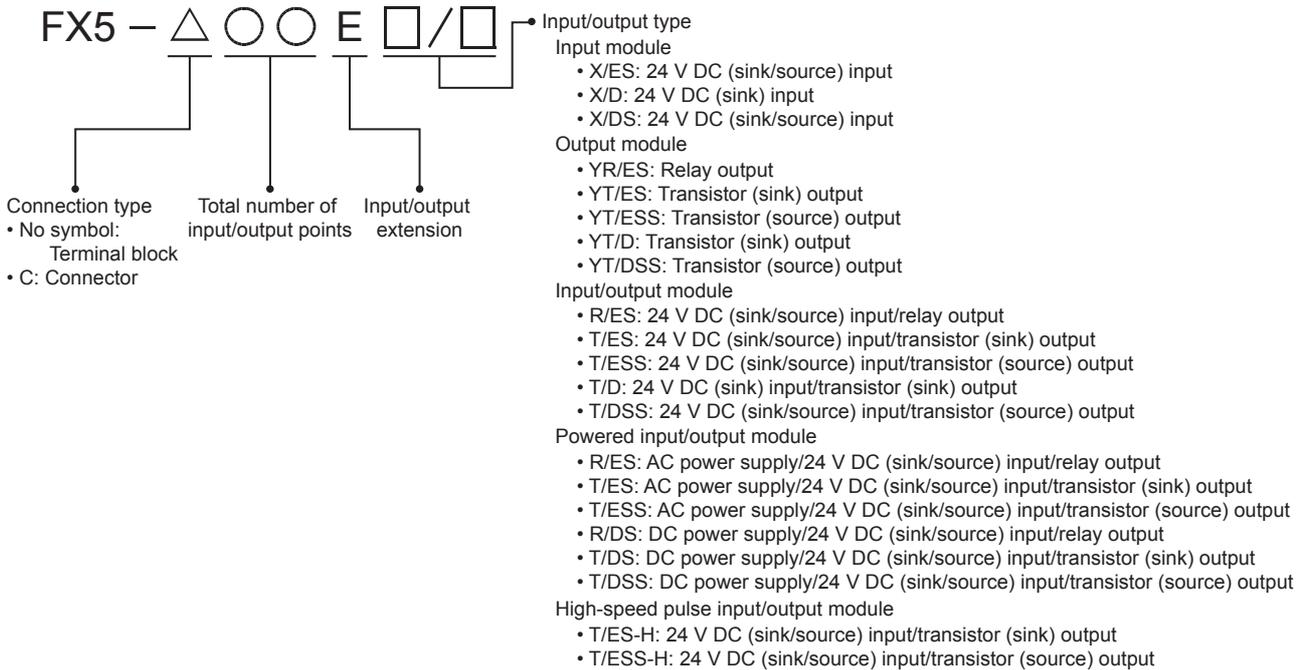
Restriction

FX5-CNV-IF is required to use modules of extension connector type.

# I/O Module

The I/O module is used to expand inputs/outputs.

For details, refer to  Page 174 I/O Module.



## Input module

The input module is used to expand inputs.

### ■ Extension cable type

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5-8EX/ES	8 points	8 points	—	24 V DC (Sink/source)	—	Terminal block	75 mA	50 mA
FX5-16EX/ES	16 points	16 points	—				100 mA	85 mA

### ■ Extension connector type

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption		
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply	External 24 V DC power supply (24 V DC power supply for input circuits) <sup>*1</sup>
FX5-C16EX/D	16 points	16 points	—	24 V DC (sink)	—	Connector	100 mA	—	65 mA
FX5-C16EX/DS				24 V DC (sink/source)					
FX5-C32EX/D	32 points	32 points	—	24 V DC (sink)	—	Connector	120 mA	—	130 mA
FX5-C32EX/DS				24 V DC (sink/source)					

\*1 This is the current consumption when using the 24 V DC service power supply for the input circuit.

## Output module

The output module is used to expand outputs.

### ■Extension cable type

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5-8EYR/ES	8 points	—	8 points	—	Relay	Terminal block	75 mA	75 mA
FX5-8EYT/ES					Transistor (sink)			
FX5-8EYT/ESS					Transistor (source)			
FX5-16EYR/ES	16 points	—	16 points	—	Relay	Terminal block	100 mA	125 mA
FX5-16EYT/ES					Transistor (sink)			
FX5-16EYT/ESS					Transistor (source)			

### ■Extension connector type

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5-C16EYT/D	16 points	—	16 points	—	Transistor (sink)	Connector	100 mA	100 mA
FX5-C16EYT/DSS					Transistor (source)			
FX5-C32EYT/D	32 points	—	32 points	—	Transistor (sink)	Connector	120 mA	200 mA
FX5-C32EYT/DSS					Transistor (source)			

## Input/output module

Input/output modules are used to expand inputs/outputs.

### ■Extension cable type

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5-16ER/ES	16 points	8 points	8 points	24 V DC (sink/source)	Relay	Terminal	100 mA	125 mA
FX5-16ET/ES					Transistor (sink)			
FX5-16ET/ESS					Transistor (source)			

## ■ Extension connector type

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption		
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply	External 24 V DC power supply (24 V DC power supply for input circuits) <sup>*1</sup>
FX5-C32ET/D	32 points	16 points	16 points	24 V DC (sink)	Transistor (sink)	Connector	120 mA	100 mA	65 mA
FX5-C32ET/DSS				24 V DC (sink/source)	Transistor (source)				

\*1 This is the current consumption when using the 24 V DC service power supply for the input circuit.

## Powered input/output module

The powered input/output module includes a power supply and is used to expand input/output.

### ■ AC power supply common to 24 V DC sink and source input

Model	No. of input/output points			Input type	Output type	Connection type	Power supply capacity	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC service power supply
FX5-32ER/ES	32 points	16 points	16 points	24 V DC (Sink/source)	Relay	Terminal block	965 mA	250 mA (310 mA <sup>*1</sup> )
FX5-32ET/ES					Transistor (sink)			
FX5-32ET/ESS					Transistor (source)			

\*1 Power supply capacity when external power supply is used for input circuit

### ■ DC power supply common to 24 V DC sink and source input

Model	No. of input/output points			Input type	Output type	Connection type	Power supply capacity	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5-32ER/DS	32 points	16 points	16 points	24 V DC (Sink/source)	Relay	Terminal block	965 mA	310 mA
FX5-32ET/DS					Transistor (sink)			
FX5-32ET/DSS					Transistor (source)			

## High-speed pulse input/output module

The high-speed pulse input/output module is a product for extending the high-speed input/output.

Model	No. of input/output points			Input type	Output type	Connection type	Current consumption	
	Total No. of points	No. of input points	No. of output points				5 V DC power supply	24 V DC power supply
FX5-16ET/ES-H <sup>*1</sup>	16 points	8 points	8 points	24 V DC (Sink/source)	Transistor (sink)	Terminal block	100 mA	125 mA (82 mA <sup>*2</sup> )
FX5-16ET/ESS-H <sup>*1</sup>					Transistor (source)			

\*1 For supported versions, refer to  Page 211 Added and Changed Functions.

\*2 Current consumption when external power supply is used for the input circuit.

# Intelligent Function Module

Intelligent function modules are modules that have functions other than input/output, such as simple motion modules. For details, refer to manuals of each module.

## FX5 intelligent Function Module

### ■Analog

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX5-8AD <sup>*1</sup>	8-ch voltage input/current input/thermocouple input/resistance thermometer input	8 points	—	40 mA	100 mA
FX5-4LC <sup>*1</sup>	4-ch temperature control (thermocouple/resistance thermometer/micro voltage) 4-point current sensor input 4-point transistor output	8 points	140 mA	—	25 mA

### ■Positioning

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX5-20PG-P <sup>*1</sup>	Pulse output for 2-axis control (transistor)	8 points	—	—	120 mA

### ■Simple motion

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX5-40SSC-S	4-axis control (compatible with SSCNET III/H)	8 points	—	—	250 mA
FX5-80SSC-S <sup>*1</sup>	8-axis control (compatible with SSCNET III/H)	8 points	—	—	250 mA

### ■Network

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX5-CCLIEF <sup>*1</sup>	Intelligent device station for CC-Link IE Field network	8 points	10 mA	—	230 mA
FX5-CCL-MS <sup>*1</sup>	Master station/intelligent device station for CC-Link (Ver. 2.00 and Ver. 1.10 compatible)	8 points <sup>*2</sup>	—	—	100 mA
FX5-ASL-M <sup>*1*4</sup>	Master for AnyWireASLINK	8 points	200 mA	—	100 mA <sup>*3</sup>

\*1 For supported versions, refer to  Page 211 Added and Changed Functions.

\*2 When using with the master station, the number of remote I/O points is added. For details, refer to  Page 57 Calculation of number of remote I/O points.

\*3 This value does not include supply current to slave modules. For details, refer to  MELSEC iQ-F FX5 User's Manual (ASLINK).

\*4 Note that the warranty for this model differs from the ones for other PLCs. For details, refer to  MELSEC iQ-F FX5 User's Manual (ASLINK).

## FX3 intelligent Function Module

The following FX3 intelligent functions modules can be used in FX5U systems by using bus conversion modules.

For the bus conversion modules to be connected, refer to  Page 46 Bus Conversion Module.

To use the modules, refer to  Page 51 Bus conversion module.

### ■Analog

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX3U-4AD	4-ch voltage/current input	8 points	110 mA	—	90 mA
FX3U-4DA	4-ch voltage/current output		120 mA	—	160 mA
FX3U-4LC	4-ch temperature control (thermocouple/ resistance thermometer/micro voltage) 4-point current sensor input 4-point transistor output		160 mA	—	50 mA

### ■Positioning

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX3U-1PG	Pulse output for independent 1-axis control	8 points	150 mA	—	40 mA

### ■High-speed counter

Model	Function	No. of occupied input/output points	Current consumption	
			5 V DC power supply	24 V DC power supply
FX3U-2HC	2-ch high-speed counter	8 points	245 mA	—

### ■Network

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX3U-16CCL-M	Master station for CC-Link (compatible with Ver. 2.00 and Ver. 1.10)	8 points <sup>*1</sup>	—	—	240 mA
FX3U-64CCL	Intelligent device station for CC-Link	8 points	—	—	220 mA
FX3U-128ASL-M <sup>*4</sup>	Master for AnyWireASLINK	8 points <sup>*2</sup>	130 mA	—	100 mA <sup>*3</sup>

\*1 Number of remote I/O points is added. For details, refer to  Page 57 Calculation of number of remote I/O points.

\*2 The number of input/output points set by the rotary switch is added. For details, refer to FX3U-128ASL-M User's Manual.

\*3 This value does not include supply current to slave modules. For details, refer to FX3U-128ASL-M User's Manual.

\*4 Note that the warranty for this model differs from the ones for other PLCs. For details, refer to FX3U-128ASL-M User's Manual.

## Precautions

- Some FX3 intelligent function modules are not supported. For details, refer to the user's manual for each product.
- When using the network module of the FX3 intelligent function module, set the parameter in the program.
- The bus speed for accessing the FX3 intelligent function module is the FX3 speed.

# Extension Power Supply Module

The extension power supply module is an added power supply if the built-in power supply of the CPU module is insufficient. For details on the specifications of the extension power supply module, refer to Manuals of each product.

## FX5 expansion power supply module

### Extension cable type

Model	Function	No. of occupied input/output points	Power supply capacity	
			5 V DC power supply	24 V DC power supply
FX5-1PSU-5V	Extension power supply (for the AC power supply type)	—	1200 mA <sup>*1</sup>	300 mA <sup>*1</sup>

### Extension connector type

Model	Function	No. of occupied input/output points	Power supply capacity	
			5 V DC power supply	24 V DC power supply
FX5-C1PS-5V	Extension power supply (for the DC power supply type)	—	1200 mA <sup>*1</sup>	625 mA <sup>*1</sup>

## FX3 expansion power supply module

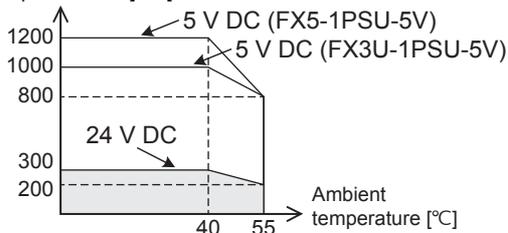
With FX5U systems, the following FX3 extension power supply module can be used. However, a bus conversion module is required to use the intelligent function modules. For details, refer to [Page 51 Bus conversion module](#).

Model	Function	No. of occupied input/output points	Power supply capacity	
			5 V DC power supply	24 V DC power supply
FX3U-1PSU-5V	Extension power supply	—	1000 mA <sup>*1</sup>	300 mA <sup>*1</sup>

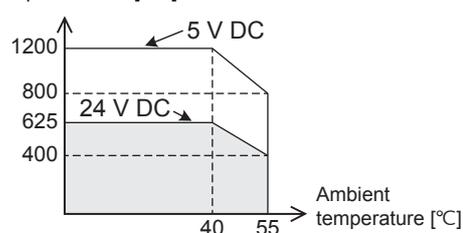
\*1 If the ambient temperature exceeds 40°C, use the extension power supply module at the following current values within the derating range.

Derating curve

■ In the case of FX5-1PSU-5V and FX3U-1PSU-5V  
Output current [mA]



■ In the case of FX5-C1PS-5V  
Output current [mA]



## Connector Conversion Module

The connector conversion module is to connect extension module (extension connector type) with FX5U systems.

Model	Function	No. of occupied input/output points	Current consumption	
			5 V DC power supply	24 V DC power supply
FX5-CNV-IF	Connector conversion from CPU module, extension modules (extension cable type) or intelligent function modules	—	—	—

## Bus Conversion Module

The bus conversion module is to connect FX3 extension modules with FX5U systems. For details on the specifications of the bus conversion module, refer to Hardware Manual of each product.

Model	Function	No. of occupied input/output points	Current consumption	
			5 V DC power supply	24 V DC power supply
FX5-CNV-BUS	Bus conversion from CPU module, extension modules (extension cable type) or FX5 intelligent function modules	8 points	150 mA	—
FX5-CNV-BUSC	Bus conversion from extension module (extension connector type)	8 points	150 mA	—

## 3.4 Expansion Board

The expansion board is to expand functions and is connected to the front face of the CPU module.  
For details on the specifications of the expansion board, refer to Hardware manuals of each product.

Model	Function	No. of occupied input/output points	Current consumption	
			5 V DC power supply	24 V DC power supply
FX5-232-BD	For RS-232C communication	—	20 mA	—
FX5-485-BD	For RS-485 communication	—	20 mA	—
FX5-422-BD-GOT	For RS-422 communication (For GOT connection)	—	20 mA <sup>*1</sup>	—

\*1 When the GOT 5 V type is connected with this product, the current consumption increases.  
For the current consumption, refer to the manual of the model to be connected.

## 3.5 Expansion Adapter

The expansion adapter is to expand functions and is connected on the left side of the CPU module.  
For details on the specifications of the expansion adapter, refer to Hardware manuals of each product.

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX5-4AD-ADP	4-ch voltage input/current input	—	10 mA	20 mA	—
FX5-4DA-ADP	4-ch voltage output/current output	—	10 mA	—	160 mA
FX5-4AD-PT-ADP <sup>*1</sup>	4-ch resistance thermometer sensor input	—	10 mA	20 mA	—
FX5-4AD-TC-ADP <sup>*1</sup>	4-ch thermocouple input	—	10 mA	20 mA	—
FX5-232ADP	For RS-232C communication	—	30 mA	30 mA	—
FX5-485ADP	For RS-485 communication	—	20 mA	30 mA	—

\*1 For supported versions, refer to  Page 211 Added and Changed Functions.

## 3.6 Extended Extension Cable and Connector Conversion Adapter

### Extended Extension Cable

Use this to install the FX5 extension module (extension cable type) at a remote location. When the connection destination is a module of extension cable type (except for FX5-1PSU-5V or extension power supply module), always use the connector conversion adapter (FX5-CNV-BC).

Model	Function
FX5-30EC	Distance between modules (0.30 m)
FX5-65EC	Distance between modules (0.65 m)

### Connector Conversion Adapter

Adapter for connecting extended extension cable and module of extension cable type (except for FX5-1PSU-5V or extension power supply module).

Model	Function
FX5-CNV-BC	Connector conversion adapter for connecting extended extension cable and module of extension cable type (except for FX5-1PSU-5V or extension power supply module).

## 3.7 Terminal Module

For details of the terminal modules, refer to  Page 195 Terminal Module.

Model	Function	No. of occupied input/output points	Current consumption		
			5 V DC power supply	24 V DC power supply	External 24 V DC power supply
FX-16E-TB	Directly connected to the I/O connector of a PLC.	—	—	—	112 mA
FX-32E-TB		—	—	—	112 mA/16 points
FX-16EX-A1-TB	100 V AC input type	—	—	—	48 mA
FX-16EYR-TB	Relay output type	—	—	—	80 mA
FX-16EYT-TB	Transistor output type (sink output)	—	—	—	112 mA
FX-16EYS-TB	Triac output type	—	—	—	112 mA
FX-16E-TB/UL	Directly connected to the I/O connector of a PLC.	—	—	—	112 mA
FX-32E-TB/UL		—	—	—	112 mA/16 points
FX-16EYR-ES-TB/UL	Relay output type	—	—	—	80 mA
FX-16EYT-ES-TB/UL	Transistor output type (sink output)	—	—	—	112 mA
FX-16EYT-ESS-TB/UL	Transistor output type (source output)	—	—	—	112 mA
FX-16EYS-ES-TB/UL	Triac output type	—	—	—	112 mA

## 3.8 SD Memory Card

For details on the SD memory card, refer to  Page 193 SD Memory Card.

Model	Function
NZ1MEM-2GBSD	SD memory card (Mitsubishi product)
NZ1MEM-4GBSD	
NZ1MEM-8GBSD	
NZ1MEM-16GBSD	
L1MEM-2GBSD	
L1MEM-4GBSD	

## 3.9 Battery

For details on the battery, refer to  Page 155 Battery.

Model	Function
FX3U-32BL	Battery

## 3.10 Communication Cable

Use a communication cable to connect a PLC with a personal computer by RS-232C communication.

Model	Function
FX-232CAB-1	FX5-232ADP⇔Personal computer FX5-232-BD⇔Personal computer

## 3.11 Engineering Tool

For design and programming of FX5U systems, use GX Works3.

For the operation method, refer to  GX Works3 Operating Manual.

Model	Function
GX Works3	MELSEC PLC software package

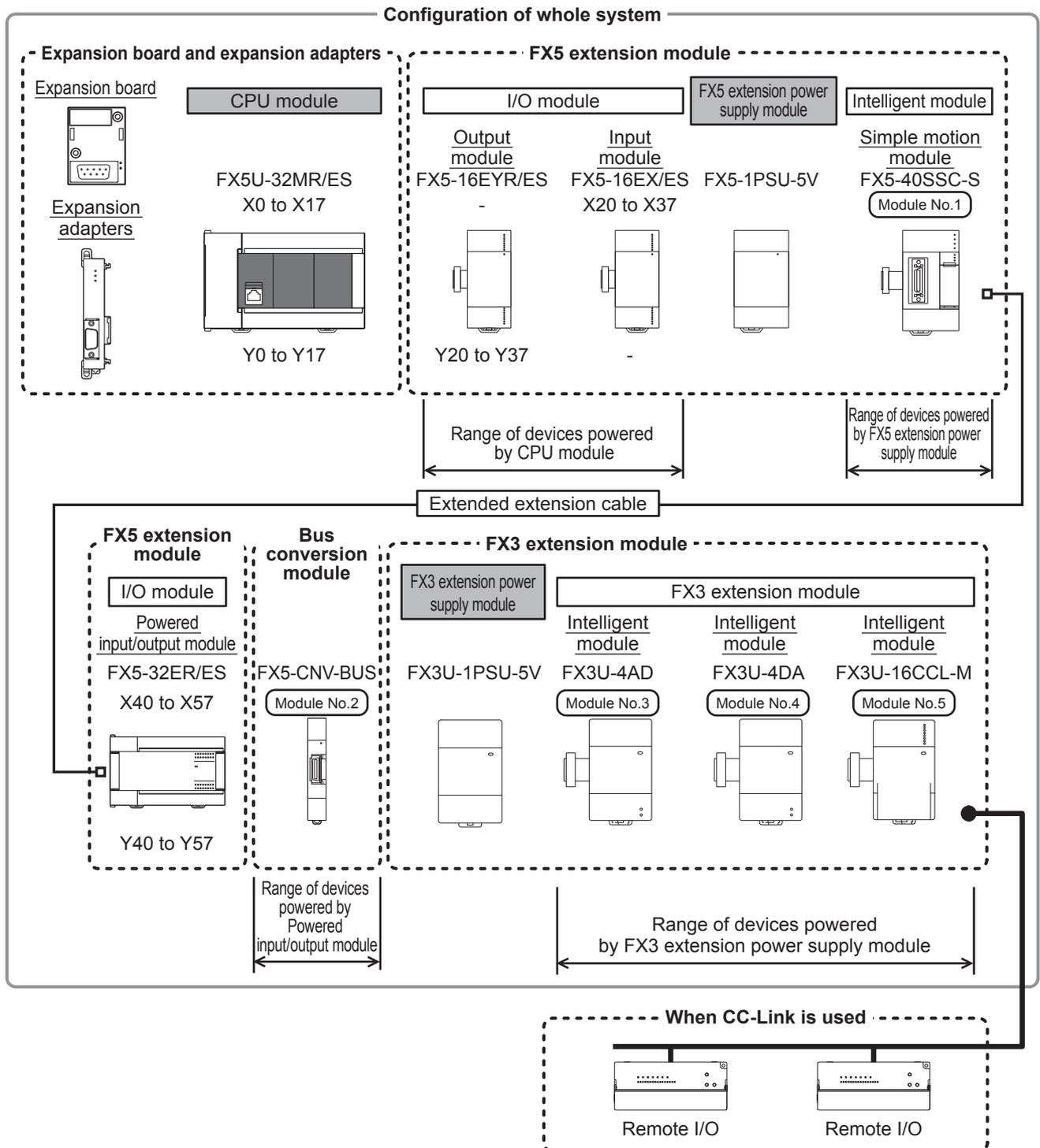
# 4 SYSTEM CONFIGURATION

## Configuration of a whole system

The configuration of an entire system is shown below as an example.

For assignment of the module numbers for extension modules, refer to Page 78 Module number of Extension modules.

Ex.



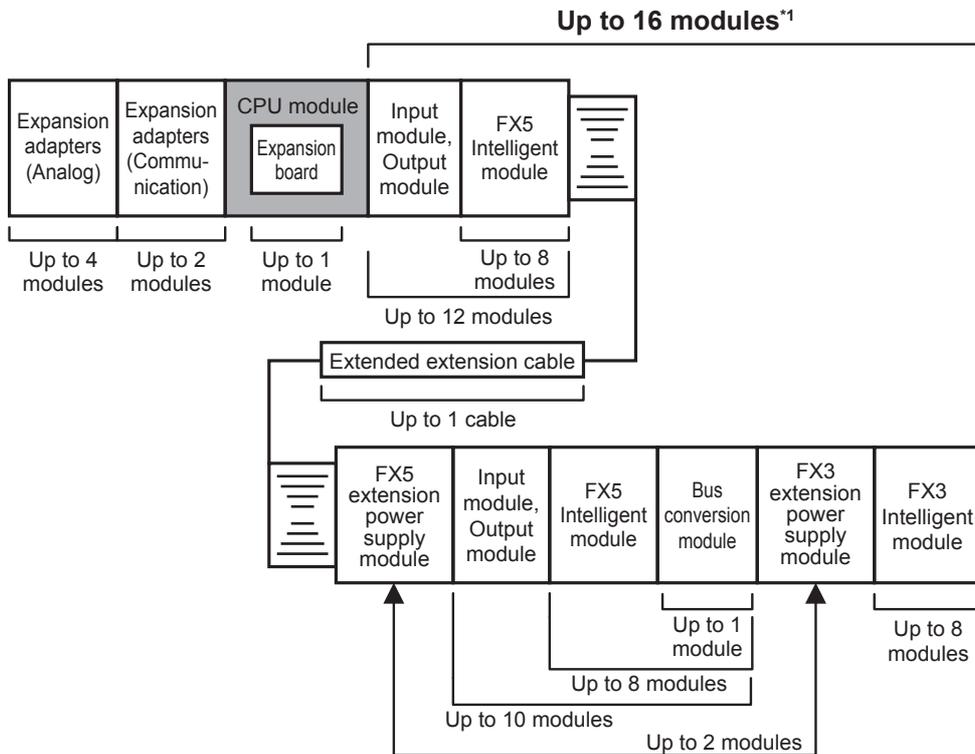
# 4.1 Rules of System Configuration

The system configuration must meet the following four requirements.

## Number of connected extension device

The number of extension devices that can be connected to a single system of FX5U CPU module is limited. For details, refer to [Page 52](#) Limitations on the Number of Connected Extension Devices.

**Ex.**



\*1 Extension power supply modules and connector conversion module are not included in the number of connected devices.

## Number of input/output points

With the FX5U CPU module, a total of 512 points or less including the number of input/output points of extension devices (max. 256 points) and number of remote I/O points (max. 384 points) can be controlled.

For details on the number of input/output points, refer to [Page 55](#) Limitation on the Number of Input/Output Points.

## Current consumption

Power of extension devices is supplied from the CPU module, powered input/output module or extension power supply module.

The number of extension devices that can be connected must be determined from the capacity of the power supply.

For details on the current consumption, refer to  Page 59 Limitation on Current Consumption.

Expansion adapters	CPU module Expansion board	Input module, Output module	FX5 Intelligent module	Powered input/output module	Input module, Output module	FX5 Intelligent module	FX5 extension power supply module	Input module, Output module	FX5 Intelligent module	Bus conversion module	FX3 Intelligent module
Power supply from CPU module*1				Power supply from powered input/output module*1			Power supply from FX5 extension power supply module*1				

\*1 Power is supplied to input circuit of input modules by 24 V DC service power supply or external power supply. However, the DC power type does not have 24 V DC service power supply.

## Limitations when using extension devices

### ■Modules of extension connector type

FX5-CNV-IF is required to use modules of extension connector type.

### ■Limitations on high-speed pulse input/output module

Up to four high-speed pulse input/output modules can be connected in a system.

### ■Bus conversion module

- A bus conversion module is required to use FX3 extension module. FX3 extension module can be connected to the right side of the bus conversion module only.
- For limitation on the number of connectable modules, refer to  Page 55 Connection to the bus conversion module (connection with FX3 extension devices).

### ■Limitations on intelligent function modules

Note that some intelligent function modules have limitations on the number of modules, order and combination in which they are added for each individual module.

Model	Limitations
FX5-CCLIEF	Only one module may be connected per system.
FX5-CCL-MS	One module can be connected to the system for each station type. <ul style="list-style-type: none"> <li>• Master station: 1</li> <li>• Intelligent device station: 1</li> </ul> When using the FX5-CCL-MS as the master station, it cannot be used together with the FX3U-16CCL-M. When using the FX5-CCL-MS as the intelligent device station, it cannot be used together with the FX3U-64CCL.
FX5-ASL-M	Only one module may be connected per system. Use together with the FX3U-128ASL-M is not possible.
FX3U-2HC	Up to two modules connectable per system. When FX3U-1PSU-5V is not used, connect immediately after the bus conversion module.
FX3U-16CCL-M	Only one module may be connected per system. When using the FX5-CCL-MS as the master station, it cannot be used together with the FX5-CCL-MS.
FX3U-64CCL	Only one module may be connected per system. When using the FX5-CCL-MS as the intelligent device station, it cannot be used together with the FX5-CCL-MS.
FX3U-128ASL-M	Only one module may be connected per system. Use together with the FX5-ASL-M is not possible.

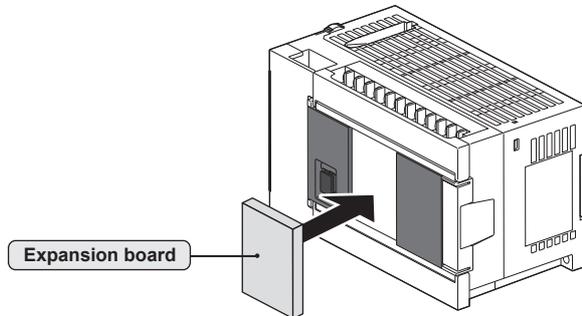
### ■Using the extended extension cable

- The connector conversion adapter is required when the extended extension cable connection destination is a module of extension cable type (except for FX5-1PSU-5V or extension power supply module).
- When connecting a bus conversion module in the same system, connect FX5-1PSU-5V or the powered input/output module directly after the extended extension cable.
- This cannot be used with the FX3 extension module.

## 4.2 Limitations on the Number of Connected Extension Devices

### Number of connected expansion boards

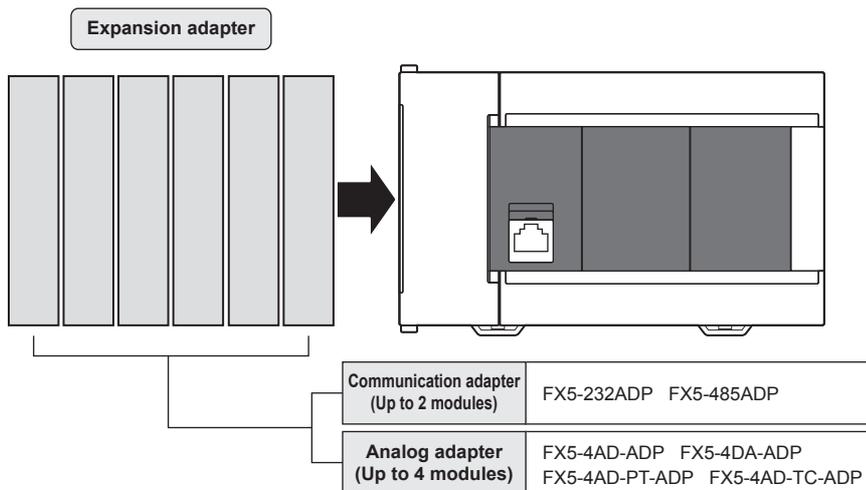
Only 1 expansion board can be connected on the front face of the CPU module.



### Number of connected expansion adapters

There is a limitation on the number of expansion adapter connected to the CPU module as follows.

Type	Limitations
Communication adapter	Up to 2 modules can be connected.
Analog adapter	Up to 4 modules can be connected.



### Precautions

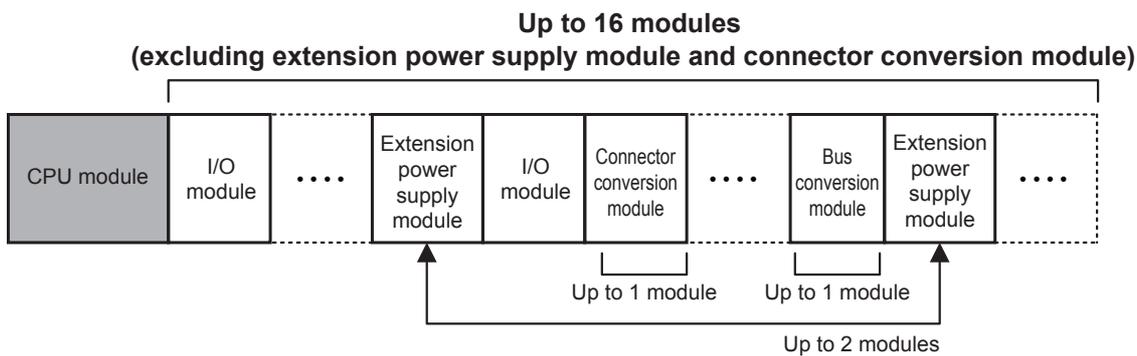
To use two or more FX5-4DA-ADP, connect them to only one side of FX5-4AD-TC-ADP. Do not connect them to both sides.

# Number of connected extension modules (including extended extension cable)

## Overall system limitation

There is a limitation on the number of connected extension modules in a whole system as follows.

Type	Limitations
Extension module	Up to 16 modules can be connected to a system. (Extension power supply modules and connector conversion module are excluded.)
Extension power supply module	Up to 2 modules can be connected to a system.
Connector conversion module	Only 1 module can be connected to a system.
Extended extension cable	Only 1 cable can be connected to a system.
Bus conversion module	Only 1 module can be connected to a system.

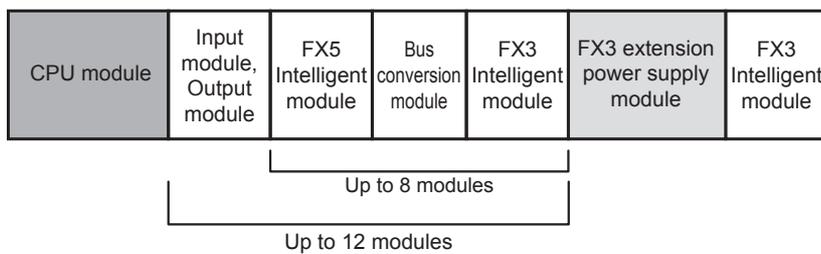
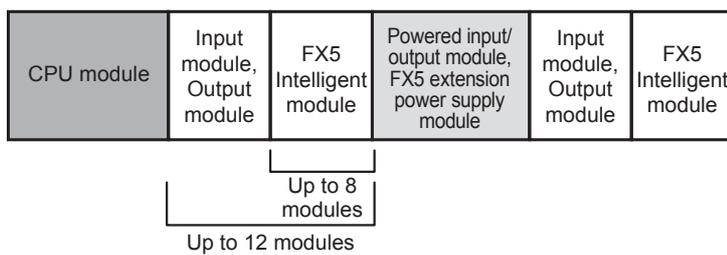


## Connection to the CPU module

There is a limitation on the number of extension modules connected to the CPU module as follows.

The number of extension modules added from the right side of the CPU module to powered input/output module or the extension power supply module must be as follows.

Type	Limitations
Total No. of input modules, output modules, intelligent function modules, and bus conversion modules	Up to 12 modules can be connected.
Total No. of intelligent function module and bus conversion modules	Up to 8 modules can be connected.

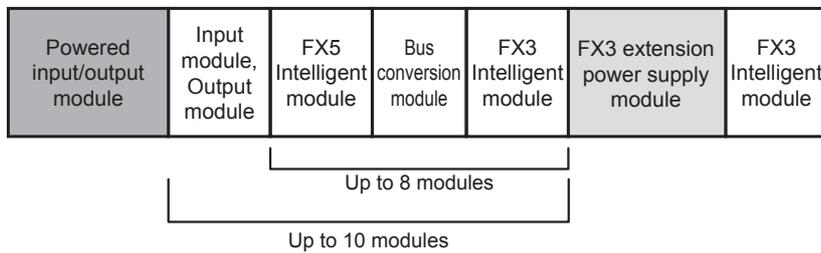
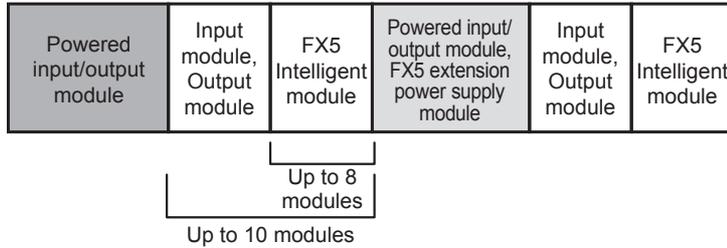


## Connection to the powered input/output module

There is a limitation on the number of extension modules connected to the powered input/output module as follows.

The number of connected modules from the right side of the powered input/output module the next extension power supply module added later must be as follows.

Type	Limitations
Total No. of input module, output module intelligent function modules, and bus conversion modules	<u>Up to 10 modules</u> can be connected.
Total No. of intelligent function module and bus conversion modules	<u>Up to 8 modules</u> can be connected.

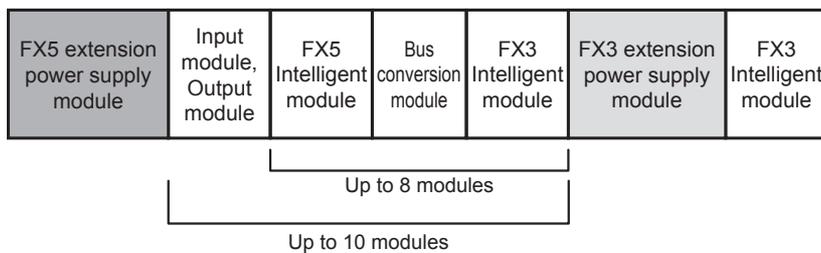
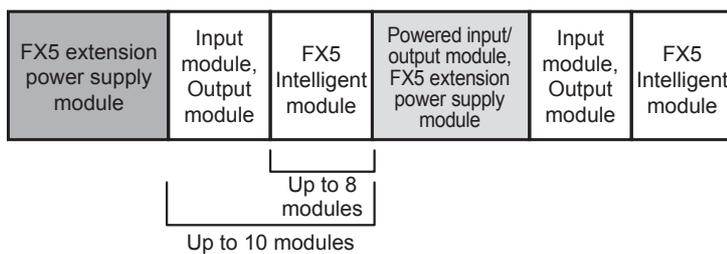


## Connection to the FX5 extension power supply module

There is a limitation on the number of extension modules connected to the FX5 extension power supply module as follows.

The number of connected modules from the right side of the FX5 extension power supply module to powered input/output module or the next extension power supply module added later must be as follows.

Type	Limitations
Total No. of input modules, output modules, intelligent function modules, and bus conversion modules	<u>Up to 10 modules</u> can be connected.
Total No. of intelligent function module and bus conversion modules	<u>Up to 8 modules</u> can be connected.

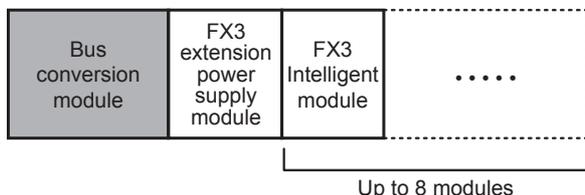


### Connection to the bus conversion module (connection with FX3 extension devices)

There is a limitation on the number of extension modules connected to the bus conversion module as follows. The number of modules connected on the right side of the bus conversion module must be as follows.

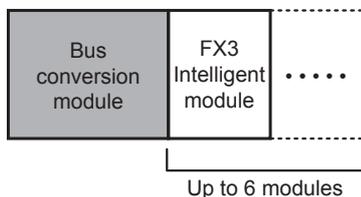
#### ■When using FX3 extension power supply modules

Type	Limitations
Total No. of intelligent function modules	Up to 8 modules can be connected.



#### ■When not using FX3 extension power supply modules

Type	Limitations
Total No. of intelligent function modules	Up to 6 modules can be connected.

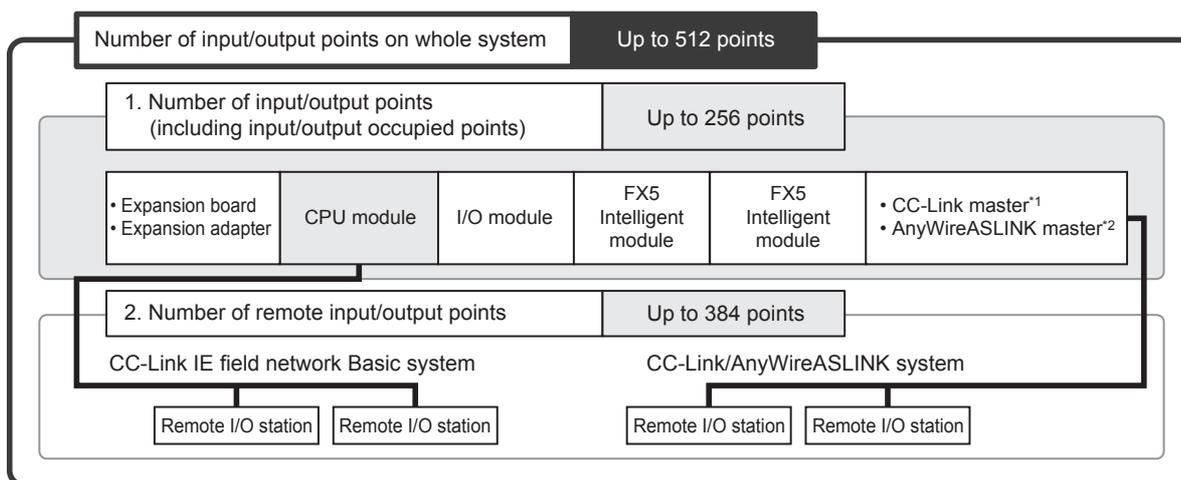


### Precautions

FX5 extension modules cannot be connected on the right side of the bus conversion module.

## 4.3 Limitation on the Number of Input/Output Points

With the FX5U CPU module, a total of 512 points including the number of input/output points of extension devices (max. 256 points) and the number of remote I/O points (max. 384 points) can be controlled.

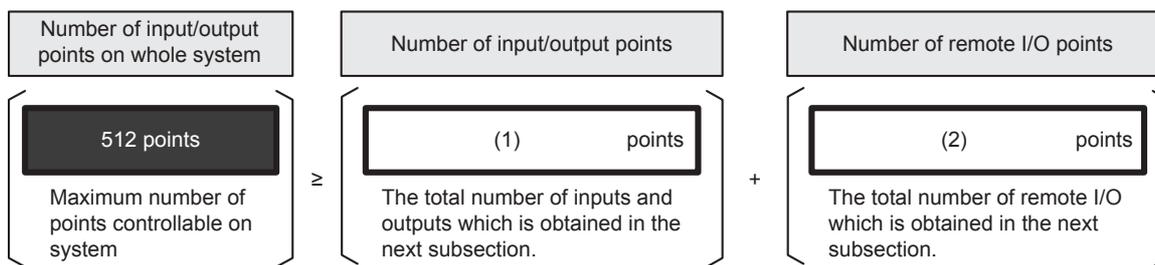


\*1 A bus conversion module is required when using the FX3U-16CCL-M.  
 \*2 A bus conversion module is required when using the FX3U-128ASL-M.

## Total number of I/O points and remote I/O points

With the FX5U CPU module, a total of 512 points or less including the number of input/output points of extension devices and number of remote I/O points can be controlled.

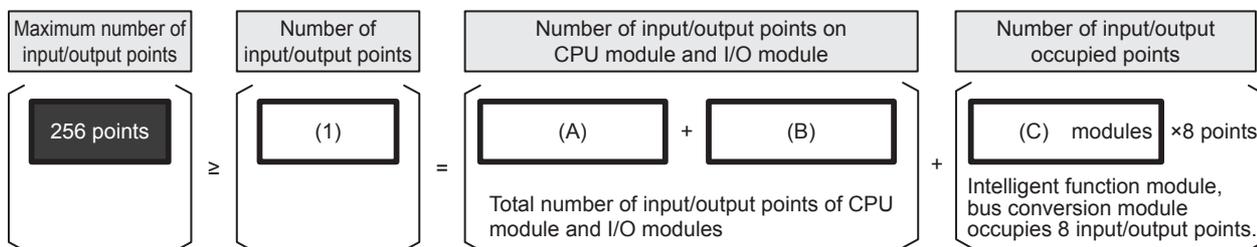
The total number of I/O points and remote I/O points must not exceed 512 points.



## Calculation of number of input/output points

The number of input/output points is the total of the number of input/output points of the CPU module and I/O module, and the number of occupied input/output points of intelligent function modules.

The total number of input/output points must not exceed 256 points.



(A): Number of input/output points of CPU module

(B): Number of input/output points of I/O modules

(C): Number of Intelligent function modules and bus conversion modules

## Total number of input/output points of the CPU module and I/O modules

Count the total number of input/output points of the CPU module and I/O modules.

To obtain the total number of input/output points, count the input points (X0 and more) and output points (Y0 and more) of the CPU module and I/O modules.

For details on the number of input/output points by model, refer to the following.

☞ Page 38 CPU Module

☞ Page 40 I/O Module

## Number of occupied input/output points of intelligent function modules

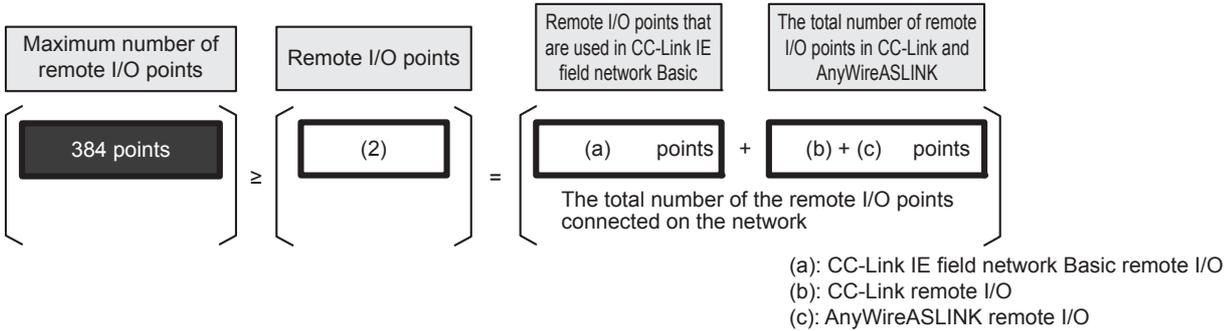
Count the number of occupied input/output points of intelligent function modules.

The number of occupied input/output points per module is 8.

For details on the number of occupied input/output points by model, refer to ☞ Page 43 Intelligent Function Module.

# Calculation of number of remote I/O points

If the master module of the network is used, calculate the number of remote I/O points connected on the network.  
 The total number of remote I/O points must not exceed 384 points.



The maximum number of remote I/O points differs according to type of the network.

## Precautions

- When CC-Link IE field network Basic is used, remote I/O points that are used in CC-Link IE field network Basic are occupied, and then remote I/O points of the intelligent function module are occupied.
- When using CC-Link master (FX3U-16CCL-M) and AnyWireASLINK master (FX3U-128ASL-M) together, connect FX3U-128ASL-M on the left side. In the FX5U CPU module, FX3U-16CCL-M parameters are set up by PLC program and will occupy up to 256 remote I/O points. Therefore, the remote I/O points of FX3U-128ASL-M that is connected to the right side may be less than 128 points when FX3U-16CCL-M is connected to the left side.

**Ex.**

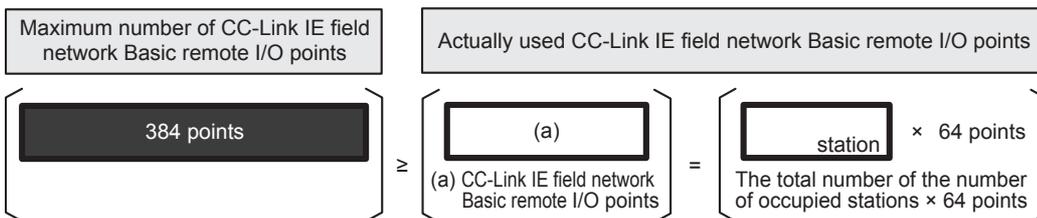
When input/output points are 160 points, FX3U-16CCL-M is connected to the left side of FX3U-128ASL-M, and 256 points of remote I/O points to be used with FX3U-16CCL-M are occupied: 512 points - 160 points - 256 points = 96 points  
 Remote I/O points that can be used with FX3U-128ASL-M are 96 points or less.

**Ex.**

When input/output points are 160 points, FX3U-16CCL-M is connected to the right side of FX3U-128ASL-M, and the total number of remote I/O points to be used with FX3U-128ASL-M is 128 points: 512 points - 160 points - 128 points = 224 points  
 Remote I/O points that can be used with FX3U-16CCL-M are 224 points or less.

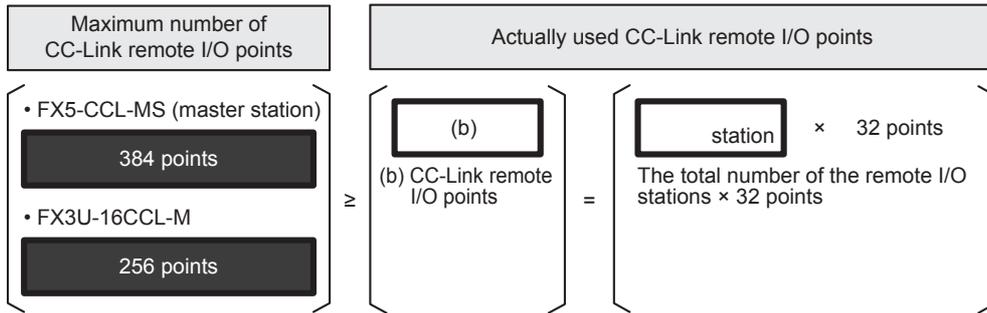
## CC-Link IE field network Basic remote I/O

Remote I/O points that are used in CC-Link IE field network Basic are calculated as "number of occupied stations × 64 points".



## CC-Link remote I/O

The number of remote I/O points to be used in CC-Link are calculated as "number of remote I/O stations × 32 points". Even if using less than 32 remote I/O points, calculate as "number of remote I/O stations × 32 points."



## AnyWireASLINK remote I/O

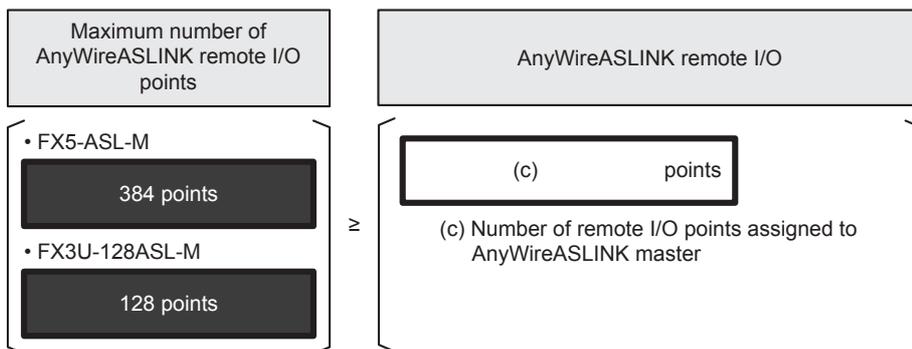
The number of I/O points set below is assigned to the remote I/O to be used with AnyWireASLINK.

- FX5-ASL-M: Set with the engineering tool parameters.
- FX3U-128ASL-M: Set with the rotary switch on the FX3U-128ASL-M main body.

For details, refer to the following manuals.

📖 MELSEC iQ-F FX5 User's Manual (ASLINK)

FX3U-128ASL-M User's Manual

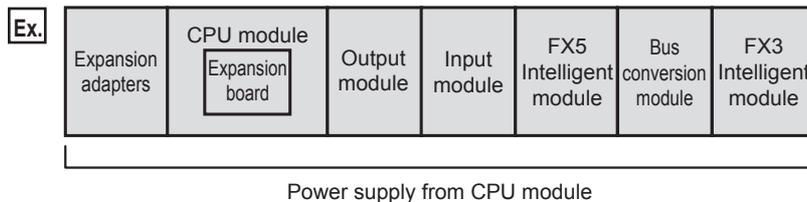


## 4.4 Limitation on Current Consumption

Power required for expansion adapters, expansion boards, and extension modules is supplied from the CPU module, powered input/output module or extension power supply module. The number of extension devices that can be connected must be determined from the capacity of the power supply.

### Power supply check from the CPU module (current consumption calculation)

Check if power can be supplied to extension devices with the power supply capacity of the CPU module.



#### In the case of AC power supply type

Calculate following the procedure below.

1. Check the power supply capacity of the CPU module used. (☞ Page 38 CPU Module)

**Ex.**

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC service power supply
CPU module	FX5U-32MT/ES	900 mA	400 mA <sup>*1</sup>

\*1 Value when 24 V DC service power supply is used for input circuits. The power supply capacity differs when external power supply is used for input circuit.

2. Check the current consumption of extension devices.

(☞ Page 40 I/O Module)

(☞ Page 43 Intelligent Function Module)

**Ex.**

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Expansion board	FX5-232-BD	20 mA	—
Expansion adapter	FX5-232ADP	30 mA	30 mA
Output module	FX5-16EYT/ES	100 mA	125 mA
Input module	FX5-16EX/ES	100 mA	85 mA <sup>*1</sup>
Simple motion module	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Analog input	FX3U-4AD	110 mA	—

\*1 If using external power supply for input circuit, calculate current consumption of 24 V DC power supply as 0 mA.

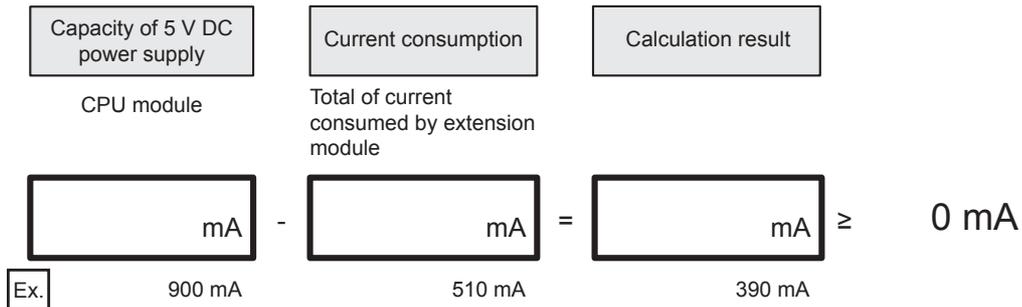
3. Calculate the total current consumption of each power supply.

**Ex.**

Power supply type	Total current consumption
5 V DC power supply	510 mA
24 V DC power supply	240 mA

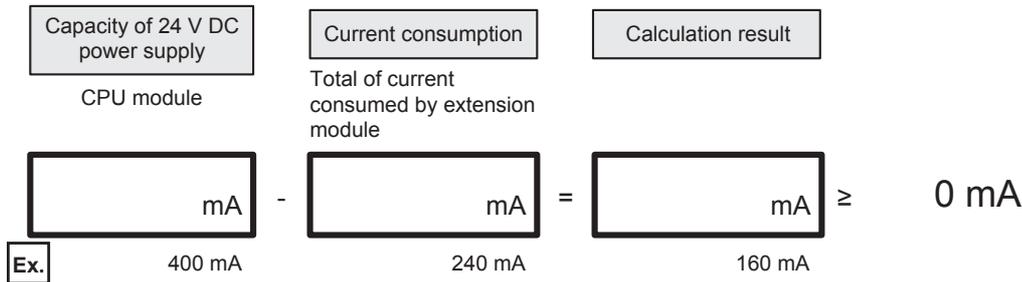
**4.** Check if expansion to the CPU module is permitted.

- 5 V DC power supply



- 24 V DC power supply

The value obtained by this calculation (when the value is positive) indicates the remaining capacity of 24 V DC service power supply, and the capacity can be used for external loads.



If the calculation result is a negative value, the current consumption exceeds the power supply capacity of the CPU module. Reconfigure the system, adding powered input/output module or extension power supply modules.

## In the case of DC power supply type

Calculate following the procedure below.

1. Check the power supply capacity of the CPU module used. (☞ Page 38 CPU Module)

Ex.

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC power supply
CPU module	FX5U-32MT/DS	900 mA	480 mA

2. Check the current consumption of extension devices.

(☞ Page 40 I/O Module)

(☞ Page 43 Intelligent Function Module)

Ex.

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Expansion board	FX5-232-BD	20 mA	—
Expansion adapter	FX5-232ADP	30 mA	30 mA
Output module	FX5-16EYT/ES	100 mA	125 mA
Input module	FX5-16EX/ES	100 mA	—
Simple motion module	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Analog input	FX3U-4AD	110 mA	—

3. Calculate the total current consumption of each power supply.

Ex.

Power supply type	Total current consumption
5 V DC power supply	510 mA
24 V DC power supply	155 mA

4. Check if expansion to the CPU module is permitted.

- 5 V DC power supply

Capacity of 5 V DC power supply	Current consumption	Calculation result	
CPU module	Total of current consumed by extension module		
<input type="text" value="900"/> mA	<input type="text" value="510"/> mA	<input type="text" value="390"/> mA	$\geq 0 \text{ mA}$

Ex.

- 24 V DC power supply

Capacity of 24 V DC power supply	Current consumption	Calculation result	
CPU module	Total of current consumed by extension module		
<input type="text" value="480"/> mA	<input type="text" value="155"/> mA	<input type="text" value="325"/> mA	$\geq 0 \text{ mA}$

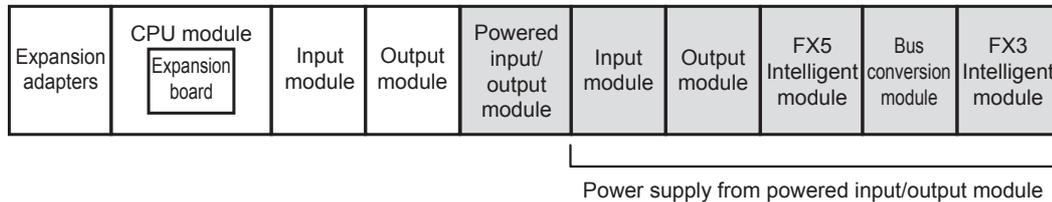
Ex.

If the calculation result is a negative value, the current consumption exceeds the power supply capacity of the CPU module. Reconfigure the system, adding powered input/output module or extension power supply module.

# Power supply check from the powered input/output module (current consumption calculation)

If 5 V DC and 24 V DC power supplies of the CPU module are insufficient and system cannot be extended, add a powered input/output module.

Check if power can be supplied to extension modules with the power supply capacity of the powered input/output module.



## In the case of AC power supply type

Calculate following the procedure below.

**1.** Check the power supply capacity of the powered input/output module.

(☞ Page 42 Powered input/output module)

Ex.

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC service power supply
Powered input/output module	FX5-32ER/ES	965 mA	250 mA <sup>*1</sup>

\*1 Value when 24 V DC service power supply is used for input circuits. The power supply capacity differs when external power supply is used for input circuit.

**2.** Check the current consumption of the extension module.

(☞ Page 40 I/O Module)

(☞ Page 43 Intelligent Function Module)

Ex.

Type	Model	Current consumption	
		5 V DC power supply	24 V DC service power supply
Input module	FX5-16EX/ES	100 mA	85 mA
Output module	FX5-16EYR/ES	100 mA	125 mA
Simple motion modules	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Analog input	FX3U-4AD	110 mA	—

**3.** Calculate the total current consumption of each power supply.

Ex.

Power supply type	Total current consumption
5 V DC power supply	460 mA
24 V DC power supply	210 mA

#### 4. Check if expansion to the extension power supply module is permitted.

- 5 V DC power supply

Capacity of 5 V DC power supply	Current consumption	Calculation result
Powered input/output module	Total of current consumed by extension module	
mA	mA	mA
Ex. 965 mA	460 mA	505 mA

$$965 \text{ mA} - 460 \text{ mA} = 505 \text{ mA} \geq 0 \text{ mA}$$

- 24 V DC power supply

The value obtained by this calculation (when the value is positive) indicates the remaining capacity of 24 V DC service power supply, and the capacity can be used for external loads.

Capacity of 24 V DC service power supply	Current consumption	Calculation result
Powered input/output module	Total of current consumed by extension module	
mA	mA	mA
Ex. 250 mA	210 mA	40 mA

$$250 \text{ mA} - 210 \text{ mA} = 40 \text{ mA} \geq 0 \text{ mA}$$

If the calculation result is a negative value, the current consumption exceeds the power supply capacity of the CPU module. Reconfigure the system, adding powered input/output module.

### In the case of DC power supply type

Calculate following the procedure below.

1. Check the power supply capacity of the powered input/output module.

(☞ Page 42 Powered input/output module)

Ex.

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC power supply
Powered input/output module	FX5-32ER/DS	965 mA	310 mA

2. Check the current consumption of the extension module.

(☞ Page 40 I/O Module)

(☞ Page 43 Intelligent Function Module)

Ex.

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Input module	FX5-16EX/ES	100 mA	85 mA
Output module	FX5-16EYR/ES	100 mA	125 mA
Simple motion modules	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Analog input	FX3U-4AD	110 mA	—

3. Calculate the total current consumption of each power supply.

Ex.

Power supply type	Total current consumption
5 V DC power supply	460 mA
24 V DC power supply	210 mA

**4.** Check if expansion to the extension power supply module is permitted.

• 5 V DC power supply

Capacity of 5 V DC power supply	Current consumption	Calculation result
Powered input/output module	Total of current consumed by extension module	
<input type="text" value="965 mA"/>	<input type="text" value="460 mA"/>	<input type="text" value="505 mA"/>
Ex.		

$965 \text{ mA} - 460 \text{ mA} = 505 \text{ mA} \geq 0 \text{ mA}$

• 24 V DC power supply

Capacity of 24 V DC power supply	Current consumption	Calculation result
Powered input/output module	Total of current consumed by extension module	
<input type="text" value="310 mA"/>	<input type="text" value="210 mA"/>	<input type="text" value="100 mA"/>
Ex.		

$310 \text{ mA} - 210 \text{ mA} = 100 \text{ mA} \geq 0 \text{ mA}$

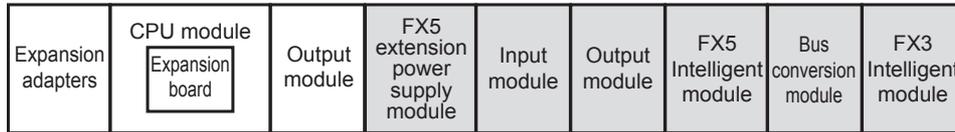
If the calculation result is a negative value, the current consumption exceeds the power supply capacity of the CPU module. Reconfigure the system, adding powered input/output module.

# Power supply check from extension power supply module (current consumption calculation)

If 5 V DC power supply of the CPU module is insufficient and cannot be extended, add an extension power supply module. Check if power can be supplied to extension modules with the power supply capacity of the extension power supply module.

## In the case of AC power supply type

Ex.



Power supply from FX5 extension power supply module  
(Only the 5 V DC power supply for the input module is supplied by the extension power supply module.)

Calculate following the procedure below.

1. Check the power supply capacity of the extension power supply module used.

(☞ Page 45 Extension Power Supply Module)

Ex.

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC power supply
FX5 extension power supply module	FX5-1PSU-5V	1200 mA	300 mA

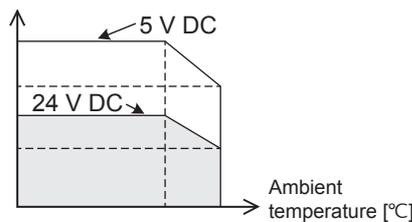
### Point

If the ambient temperature exceeds 40°C, use the extension power supply module at the following current values within the derating range.

Derating curve

■FX5-C1PS-5V

Output current [mA]



2. Check the current consumption of the extension module.

(☞ Page 40 I/O Module)

(☞ Page 43 Intelligent Function Module)

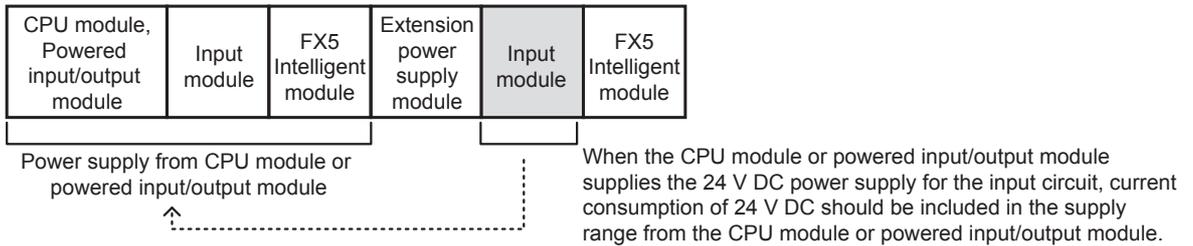
Ex.

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Input module	FX5-16EX/ES	100 mA	—*1
Output module	FX5-16EYR/ES	100 mA	125 mA
Simple motion module	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Analog input	FX3U-4AD	110 mA	—

\*1 24 V DC power supply is supplied from the CPU module or powered input/output module.

**Point**

When connecting an input module after (on the right side of) the extension power supply module  
 When using 24 V DC service power supply of the CPU module or powered input/output module for input circuit of an input module, include the input module in the 24 V DC current consumption calculation.  
 5 V DC power supply of the input module is supplied from the extension power supply module.



**3.** Calculate the total current consumption of each power supply.

**Ex.**

Power supply type	Total current consumption
5 V DC power supply	460 mA
24 V DC power supply	125 mA

**4.** Check if expansion to the extension power supply module is permitted.

- 5 V DC power supply

Capacity of 5 V DC power supply	Current consumption	Calculation result
Extension power supply module	Total of current consumed by extension module	
<input type="text" value="1200"/> mA	<input type="text" value="460"/> mA	<input type="text" value="740"/> mA $\geq$ 0 mA

**Ex.**

- 24 V DC power supply

Capacity of 24 V DC power supply	Current consumption	Calculation result
Extension power supply module	Total of current consumed by extension module	
<input type="text" value="300"/> mA	<input type="text" value="125"/> mA	<input type="text" value="175"/> mA $\geq$ 0 mA

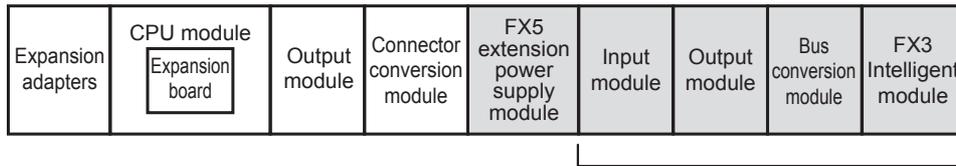
**Ex.**

If the calculation result is a negative value, the current consumption exceeds the power supply capacity of the extension power supply module.

Reconfigure the system, adding powered input/output module or extension power supply modules.

## In the case of DC power supply type

Ex.



Power supply from FX5 extension power supply module  
(Only the 5 V DC power supply for the input module is supplied by the extension power supply module.)

Calculate following the procedure below.

1. Check the power supply capacity of the extension power supply module used.

(☞ Page 45 Extension Power Supply Module)

Ex.

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC power supply
FX5 extension power supply module	FX5-C1PS-5V	1200 mA	625 mA

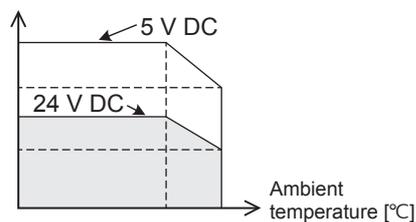
### Point

If the ambient temperature exceeds 40°C, use the extension power supply module at the following current values within the derating range.

Derating curve

■FX5-C1PS-5V

Output current [mA]



2. Check the current consumption of the extension module.

(☞ Page 40 I/O Module)

(☞ Page 43 Intelligent Function Module)

Ex.

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Input module	FX5-C16EX/D	100 mA	—
Output module	FX5-C16EYT/D	100 mA	100 mA
Bus conversion module	FX5-CNV-BUSC	150 mA	—
Analog input	FX3U-4AD	110 mA	—

3. Calculate the total current consumption of each power supply.

Ex.

Power supply type	Total current consumption
5 V DC power supply	460 mA
24 V DC power supply	100 mA

**4.** Check if expansion to the extension power supply module is permitted.

- 5 V DC power supply

Capacity of 5 V DC power supply	Current consumption	Calculation result
Extension power supply module	Total of current consumed by extension module	
<input type="text" value="1200"/> mA	<input type="text" value="460"/> mA	<input type="text" value="740"/> mA
<b>Ex.</b>		

$1200 \text{ mA} - 460 \text{ mA} = 740 \text{ mA} \geq 0 \text{ mA}$

- 24 V DC power supply

Capacity of 24 V DC power supply	Current consumption	Calculation result
Extension power supply module	Total of current consumed by extension module	
<input type="text" value="625"/> mA	<input type="text" value="100"/> mA	<input type="text" value="525"/> mA
<b>Ex.</b>		

$625 \text{ mA} - 100 \text{ mA} = 525 \text{ mA} \geq 0 \text{ mA}$

If the calculation result is a negative value, the current consumption exceeds the power supply capacity of the extension power supply module.

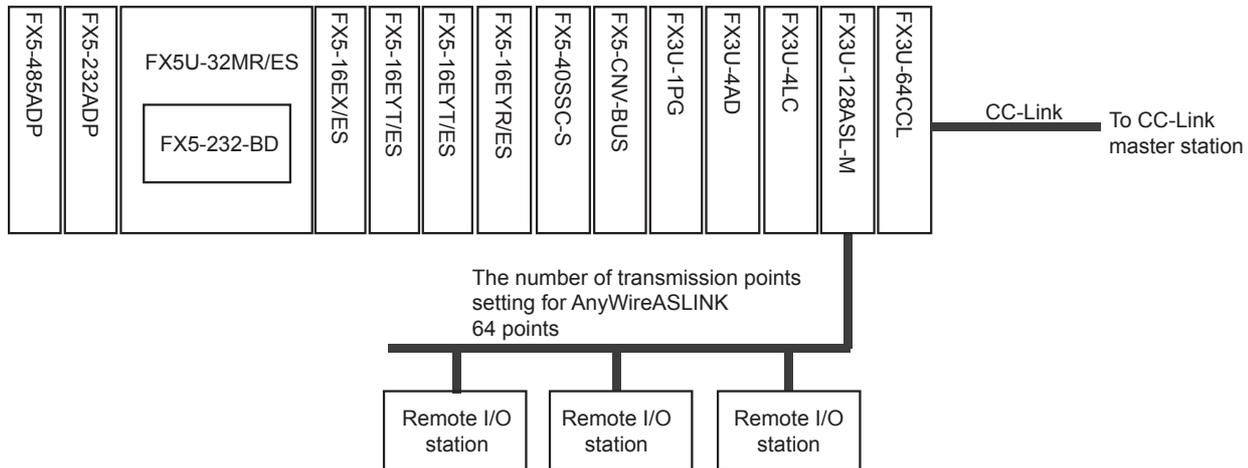
Reconfigure the system, adding powered input/output module or extension power supply modules.

# 4.5 Rules of System Configuration and Examples of Reconfiguration

The rules of system configuration are explained below referring to a sample system configuration using an expansion board, expansion adapter, I/O module, and intelligent function module.

## System configuration example

The following system configuration is under consideration.



### Check of limitation on the number of modules

Check if the sample system configuration is within the connectable-module range.

#### ■Number of connected expansion boards

(☞ Page 52 Number of connected expansion boards)

Type	No. of modules used	Limitations	Judgment
Expansion board	1	Only 1	OK

#### ■Number of connected expansion adapters

(☞ Page 52 Number of connected expansion adapters)

Type	No. of modules used	Limitations	Judgment
Expansion adapter (Communication)	2	Up to 2	OK

#### ■Number of connected extension modules

- Number of modules connected on whole system

(☞ Page 53 Overall system limitation)

Type	No. of modules used	Limitations	Judgment
Extension module	11	Up to 16 (Extension power supply modules and connector conversion module are excluded.)	OK
Bus conversion module	1	Only 1	OK

- Number of modules connected to the CPU module

(☞ Page 53 Connection to the CPU module)

Type	No. of modules used	Limitations	Judgment
Total No. of I/O modules, intelligent function modules, and bus conversion modules	11	Up to 12	OK
Total No. of intelligent function module and bus conversion modules	7	Up to 8	OK

- Number of modules connected to the bus conversion module

(☞ Page 55 Connection to the bus conversion module (connection with FX3 extension devices))

Type	No. of modules used	Limitations	Judgment
Total No. of intelligent function modules	5	Up to 6 (When not using extension power supply modules)	OK

## Check on limitations when using extension devices

Check on limitations when using the extension devices.

### ■Use of the bus conversion module

(☞ Page 51 Bus conversion module)

Limitations	Judgment
FX3 extension modules are connected on the right side of the bus conversion module.	OK
FX5 extension modules are connected on the left side of the bus conversion module.	OK

### ■Connection of intelligent function modules

(☞ Page 51 Limitations on intelligent function modules)

Model	Limitations	Judgment
FX3U-128ASL-M	Only one module may be connected to the system. Use together with the FX5-ASL-M is not possible.	OK
FX3U-64CCL	Only one module may be connected to the system. When using the FX5-CCL-MS as the intelligent device station, it cannot be used together with the FX5-CCL-MS.	OK

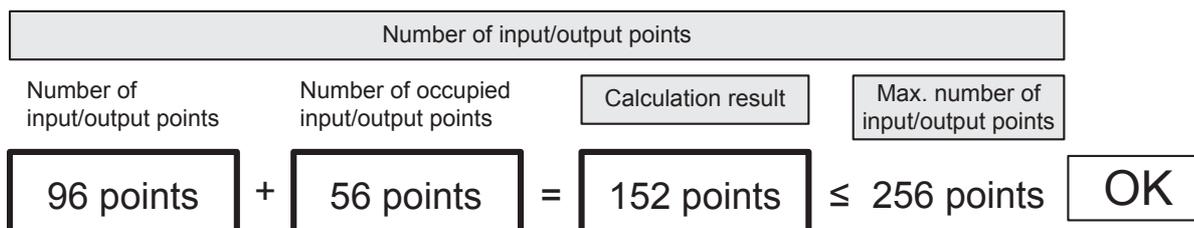
## Check of limitation on the number of input/output points

Check if the number of input/output points of the sample system configuration is within the limit range.

### ■Number of input/output points

(☞ Page 56 Calculation of number of input/output points)

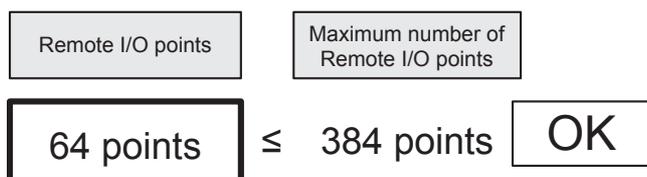
Type	Model	No. of input/output points	No. of occupied input/output points
CPU module	FX5U-32MR/ES	32 points	—
Expansion board	FX5-232-BD	—	—
Expansion adapter	FX5-232ADP	—	—
Expansion adapter	FX5-485ADP	—	—
Input module	FX5-16EX/ES	16 points	—
Output module	FX5-16EYT/ES	16 points	—
Output module	FX5-16EYT/ES	16 points	—
Output module	FX5-16EYR/ES	16 points	—
Simple motion module	FX5-40SSC-S	—	8 points
Bus conversion module	FX5-CNV-BUS	—	8 points
Pulse output module	FX3U-1PG	—	8 points
Analog input module	FX3U-4AD	—	8 points
Temperature controller module	FX3U-4LC	—	8 points
AnyWireASLINK master module	FX3U-128ASL-M	—	8 points
CC-Link intelligent device module	FX3U-64CCL	—	8 points



### ■Number of remote I/O points

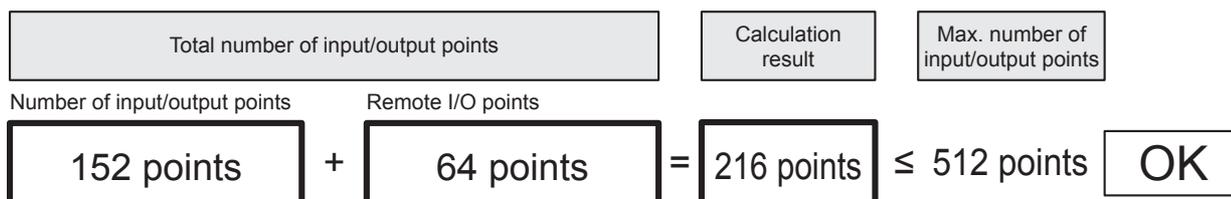
(☞ Page 57 Calculation of number of remote I/O points)

Network	No. of remote I/O points
AnyWireASLINK	64 points



### ■Total number of I/O points and remote I/O points

(☞ Page 55 Limitation on the Number of Input/Output Points)



## Check of limitation on current consumption

Check if power required for extension devices can be supplied from the CPU module and extension power supply module. A case using 24 V DC service power supply for input circuit is explained as an example.

### ■ Check of power supply from the CPU module

(☞ Page 59 Power supply check from the CPU module (current consumption calculation))

- Power supply capacity of the CPU module

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC service power supply
CPU module	FX5U-32MR/ES	900 mA	400 mA (24 V DC service power supply is used for input circuit)

- Current consumption of extension devices

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Expansion board	FX5-232-BD	20 mA	—
Expansion adapter	FX5-232ADP	30 mA	30 mA
Expansion adapter	FX5-485ADP	20 mA	30 mA
Input module	FX5-16EX/ES	100 mA	85 mA
Output module	FX5-16EYT/ES	100 mA	125 mA
Output module	FX5-16EYT/ES	100 mA	125 mA
Output module	FX5-16EYR/ES	100 mA	125 mA
Simple motion module	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Pulse output module	FX3U-1PG	150 mA	—
Analog input module	FX3U-4AD	110 mA	—
Temperature controller module	FX3U-4LC	160 mA	—
AnyWireASLINK master module	FX3U-128ASL-M	130 mA	—
CC-Link intelligent device module	FX3U-64CCL	—	—

Capacity of 5 V DC power supply CPU module	Current consumption Total of current consumed by extension module	Calculation result	
900 mA	1170 mA	= -270 mA	NG
Capacity of 24 V DC power supply CPU module	Current consumption Total of current consumed by extension module	Calculation result	
400 mA	520 mA	= -120 mA	NG

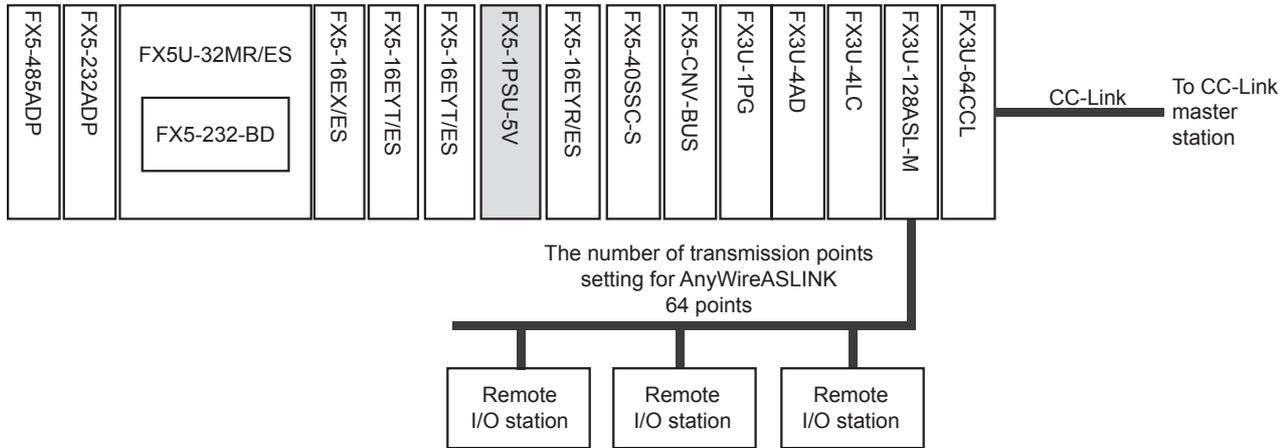
## Result check

Because calculation results for 5 V DC or 24 V DC current consumption are negative, reconfiguration is necessary. The judgment procedure after reconfiguration is explained on the following pages.

# System reconfiguration example

If current consumption of the 5 V DC or 24 V DC power supply is insufficient with the CPU module only, powered input/output module or use an extension power supply module.

Reconfigure the example system configuration using an extension power supply module.



## Check of limitation on the number of modules

Check if the example system configuration is within the connectable-module range.

### ■Number of connected expansion boards

(☞ Page 52 Number of connected expansion boards)

Type	No. of modules used	Limitations	Judgment
Expansion board	1	Only 1	OK

### ■Number of connected expansion adapters

(☞ Page 52 Number of connected expansion adapters)

Type	No. of modules used	Limitations	Judgment
Expansion adapter (Communication)	2	Up to 2	OK

### ■Number of connected extension modules

- Number of modules connected on whole system

(☞ Page 53 Overall system limitation)

Type	No. of modules used	Limitations	Judgment
Extension module	11	Up to 16 (Extension power supply modules and connector conversion module are excluded.)	OK
Extension power supply module	1	Up to 2	OK
Bus conversion module	1	Only 1	OK

- Number of modules connected to the CPU module

(☞ Page 53 Connection to the CPU module)

Type	No. of modules used	Limitations	Judgment
Total No. of I/O modules, intelligent function modules, and bus conversion modules	3	Up to 12	OK
Total No. of intelligent function module and bus conversion modules	0	Up to 8	OK

- Number of modules connected to extension power supply module

(☞ Page 54 Connection to the FX5 extension power supply module)

Type	No. of modules used	Limitations	Judgment
Total No. of I/O modules, intelligent function modules, and bus conversion modules	8	Up to 10	OK
Total No. of intelligent function module and bus conversion modules	7	Up to 8	OK

- Number of modules connected to the bus conversion module

(☞ Page 55 Connection to the bus conversion module (connection with FX3 extension devices))

Type	No. of modules used	Limitations	Judgment
Total No. of intelligent function modules	5	Up to 6 (When not using extension power supply modules)	OK

## Check on limitations when using extension devices

Check on limitations when using the extension devices.

### ■Use of the bus conversion module

(☞ Page 51 Bus conversion module)

Limitations	Judgment
FX3 extension modules are connected on the right side of the bus conversion module.	OK
FX5 extension modules are connected on the left side of the bus conversion module.	OK

### ■Connection of intelligent function modules

(☞ Page 51 Limitations on intelligent function modules)

Model	Limitations	Judgment
FX3U-128ASL-M	Only one module may be connected to the system. Use together with the FX5-ASL-M is not possible.	OK
FX3U-64CCL	Only one module may be connected to the system. When using the FX5-CCL-MS as the intelligent device station, it cannot be used together with the FX5-CCL-MS.	OK

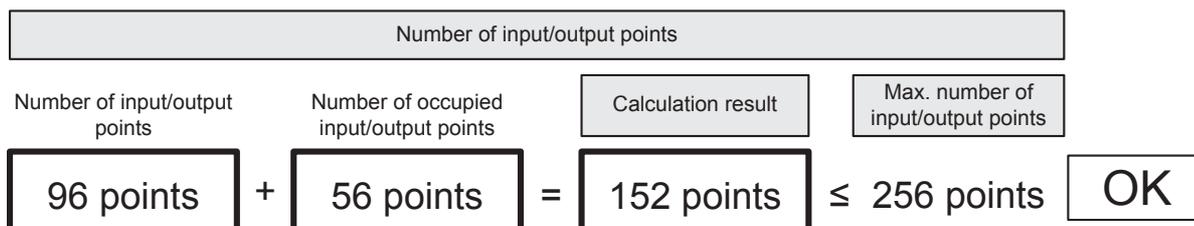
## Check of limitation on the number of input/output points

Check if the number of input/output points of the sample system configuration is within the limit range.

### ■Number of input/output points

(☞ Page 56 Calculation of number of input/output points)

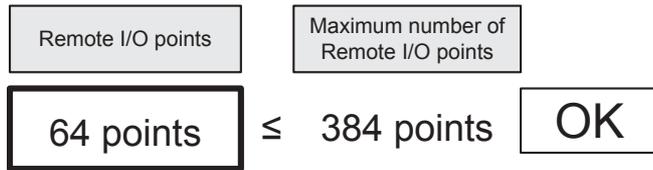
Type	Model	No. of input/output points	No. of occupied input/output points
CPU module	FX5U-32MR/ES	32 points	
Input module	FX5-16EX/ES	16 points	—
Output module	FX5-16EYT/ES	16 points	—
Output module	FX5-16EYT/ES	16 points	—
FX5 extension power supply module	FX5-1PSU-5V	—	—
Output module	FX5-16EYR/ES	16 points	—
Simple motion module	FX5-40SSC-S	—	8 points
Bus conversion module	FX5-CNV-BUS	—	8 points
Pulse output module	FX3U-1PG	—	8 points
Analog input module	FX3U-4AD	—	8 points
Temperature controller module	FX3U-4LC	—	8 points
AnyWireASLINK master module	FX3U-128ASL-M	—	8 points
CC-Link intelligent device module	FX3U-64CCL	—	8 points



### ■Number of remote I/O points

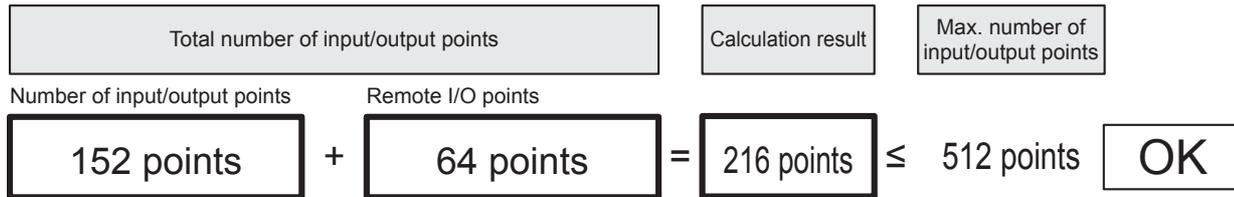
(☞ Page 57 Calculation of number of remote I/O points)

Network	No. of remote I/O points
AnyWireASLINK	64 points



### ■Total number of I/O points and remote I/O points

(☞ Page 55 Limitation on the Number of Input/Output Points)



## Check of limitation on current consumption

Check if power required for extension devices can be supplied from the CPU module and extension power supply module. A case using 24 V DC service power supply for input circuit is explained as an example.

### ■ Check of power supply from the CPU module

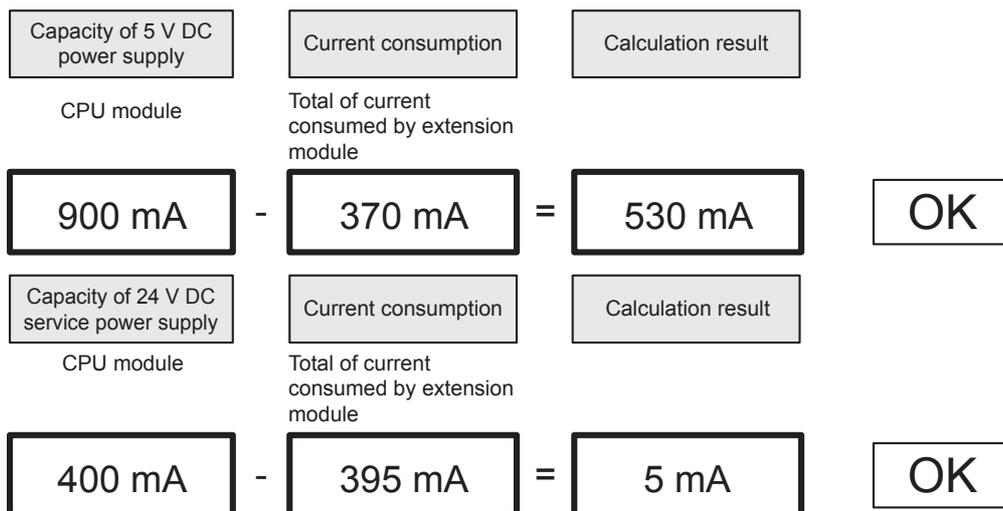
(☞ Page 59 Power supply check from the CPU module (current consumption calculation))

Power supply capacity of the CPU module

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC service power supply
CPU module	FX5U-32MR/ES	900 mA	400 mA (24 V DC service power supply is used for input circuit)

Current consumption of extension devices

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Expansion board	FX5-232-BD	20 mA	—
Expansion adapter	FX5-232ADP	30 mA	30 mA
Expansion adapter	FX5-485ADP	20 mA	30 mA
Input module	FX5-16EX/ES	100 mA	85 mA
Output module	FX5-16EYT/ES	100 mA	125 mA
Output module	FX5-16EYT/ES	100 mA	125 mA



## ■ Check of power supply from the extension power supply module

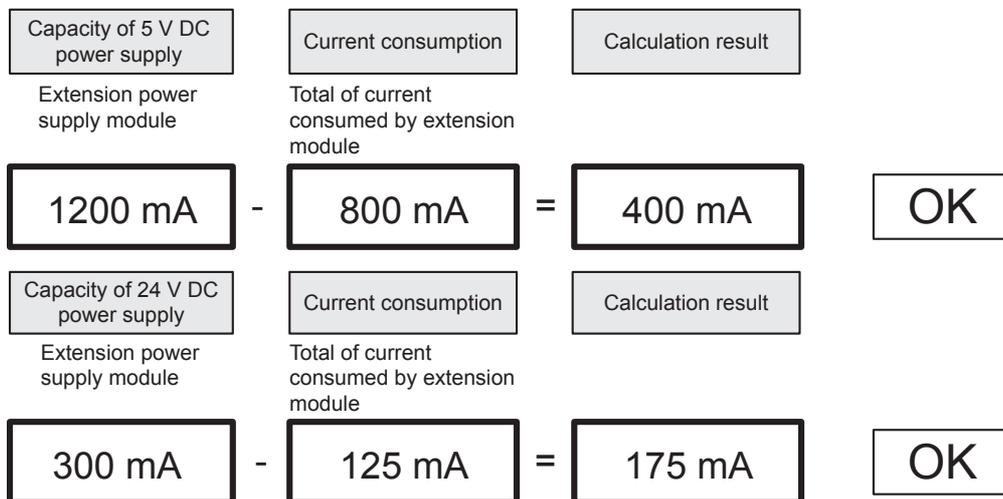
(☞ Page 65 Power supply check from extension power supply module (current consumption calculation))

Power supply capacity of the extension power supply module

Type	Model	Power supply capacity	
		5 V DC power supply	24 V DC power supply
FX5 extension power supply module	FX5-1PSU-5V	1200 mA	300 mA

Current consumption of extension devices

Type	Model	Current consumption	
		5 V DC power supply	24 V DC power supply
Output module	FX5-16EYR/ES	100 mA	125 mA
Simple motion module	FX5-40SSC-S	—	—
Bus conversion module	FX5-CNV-BUS	150 mA	—
Pulse output module	FX3U-1PG	150 mA	—
Analog input module	FX3U-4AD	110 mA	—
Temperature controller module	FX3U-4LC	160 mA	—
AnyWireASLINK master module	FX3U-128ASL-M	130 mA	—
CC-Link intelligent device module	FX3U-64CCL	—	—



### Result check

The reconfigured system is acceptable because the number of extension devices, consumption capacity of 5 V DC and 24 V DC power supply, and number of input/output points are all within the limit range.

# 4.6 Numbers and Assignment in System

Input/output numbers and module numbers in an FX5U CPU module system are explained.

## Module input/output number

The input/output numbers are octal numbers. Input is assigned to "X" and output to "Y."

Input/output numbers are used for communication of ON/OFF data between I/O modules and the CPU module.

- Input/output numbers (X/Y) are octal.

Input/output numbers (X/Y) are automatically assigned as shown below.

X0 to X7, X10 to X17, X20 to X27, ... X70 to X77, X100 to X107, ...

Y0 to Y7, Y10 to Y17, Y20 to Y27, ... Y70 to Y77, Y100 to Y107, ...

- Numbers for added I/O module

To an added I/O module, input numbers and output numbers following the input numbers and output numbers given to the preceding device are assigned. The last digit of the assigned numbers must begin with 0.

## Module number of Extension modules

The CPU module automatically assigns numbers (1 to 16) to intelligent function modules or bus conversion module as module numbers in order of distance from the CPU module.

- Intelligent function modules or bus conversion module connected to the CPU module

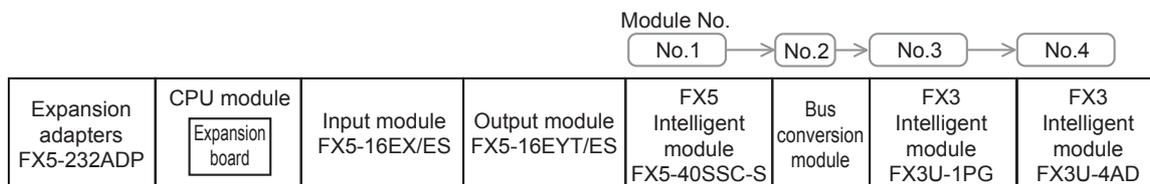
Module numbers are assigned to intelligent function modules in order of distance from the CPU module: No. 1 to No. 16.

- Products to which module numbers are not assigned

Module numbers are not assigned to the following extension devices.

- I/O module FX5-16EX/ES, FX5-16EYT/ES, etc.
- Expansion board FX5-232-BD, FX5-485-BD, etc.
- Expansion adapter FX5-232ADP, FX5-485ADP, etc.
- Connector conversion module FX5-CNV-IF
- Connector conversion adapter FX5-CNV-BC
- Extension power supply module FX5-1PSU-5V, FX5-C1PS-5V, FX3U-1PSU-5V

**Ex.**



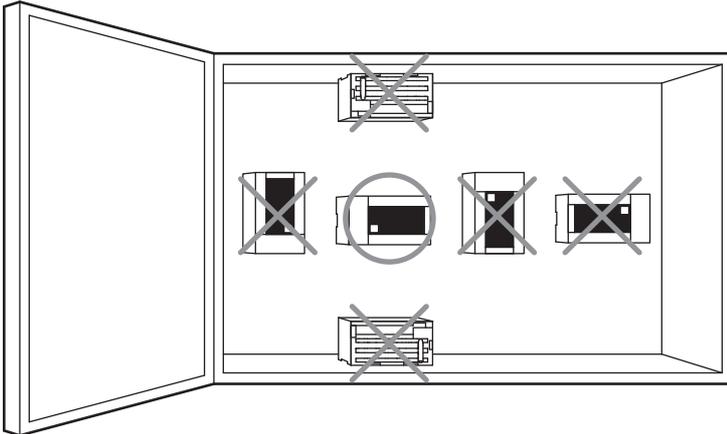
# 5 INSTALLATION

## 5.1 Installation Location

Use the PLC under the environmental conditions complying with the generic specifications (Page 20 Generic Specifications).

### Installation location in enclosure

To prevent temperature rise, do not mount the PLC on the floor or ceiling, or in the vertical direction. Always mount the PLC horizontally on the wall as shown in the following figure.



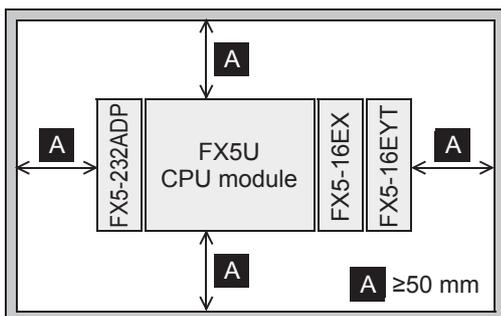
5

### Spaces in enclosure

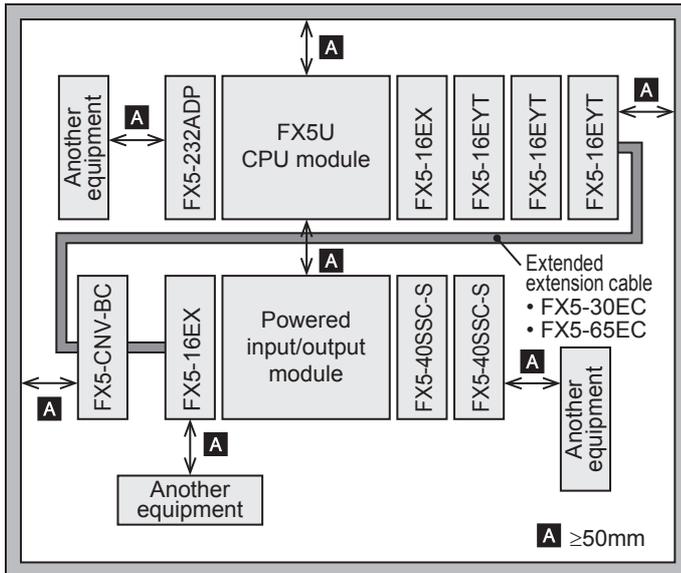
Extension devices can be connected on the left and right sides of the CPU module of the PLC. Keep a space of at least 50 mm between the module main body and other devices and structure.

If you intend to add extension devices, keep necessary spaces on the left and right sides.

### Configuration without extended extension cable



## Configuration in 2 stages with extended extension cable



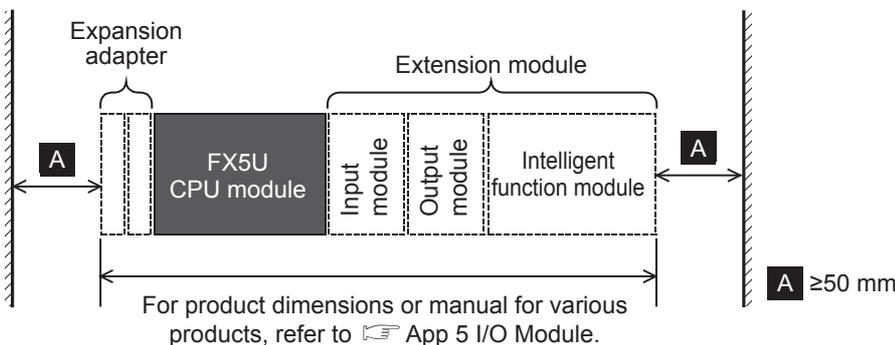
## Layout in enclosure

The PLC components can be laid out in one stage or in two stages, upper and lower.

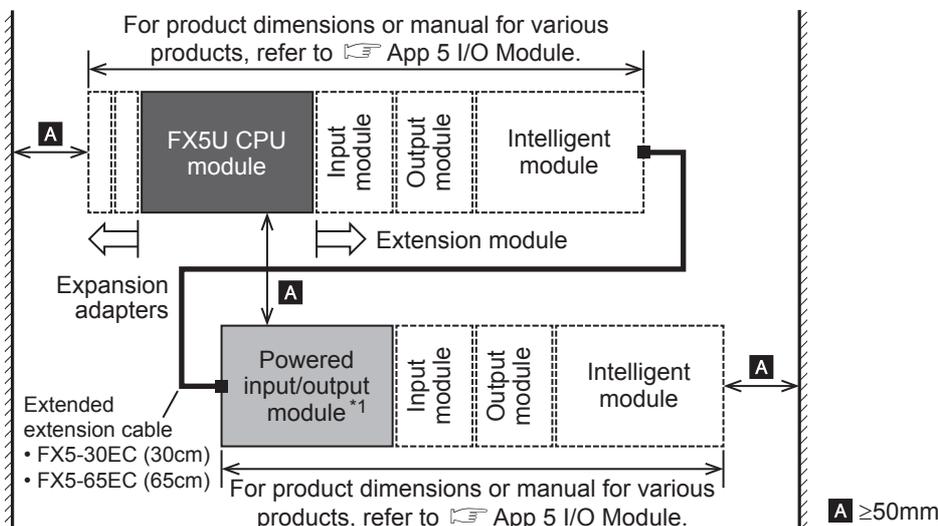
The connecting procedures in each case are explained below.

Keep a space of at least 50 mm between the module main body or other devices and structure.

## Configuration in 1-stage layout



## Configuration in 2-stage layout



\*1 Including FX5-1PSU-5V

# 5.2 Examination for Installation Method in Enclosure

Examine the installation location of PLC considering the environmental conditions (☞ Page 20 Generic Specifications). The PLC can be installed by the following methods.

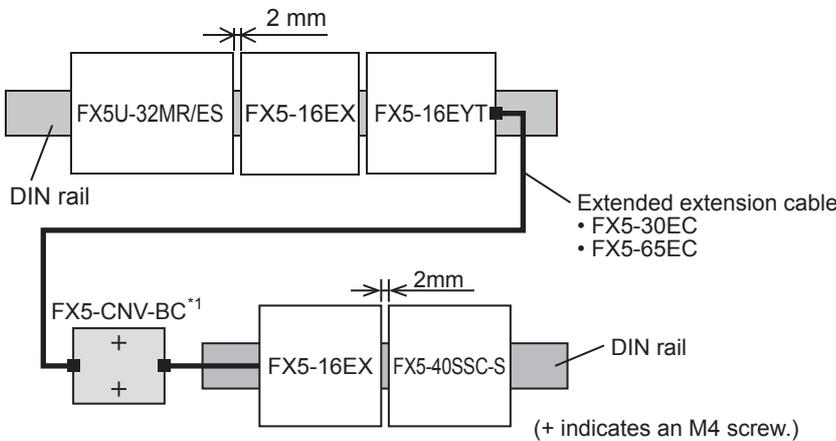
**Point**  Keep a space of about 2 mm between the products.

## Installing on DIN rail

- The PLC can be installed on a DIN46277 rail (35 mm wide).
- The PLC can be easily moved and removed.
- The PLC installation height is the same as the DIN rail.

For details on the procedures for installing on and detaching from DIN rail, refer to ☞ Page 82 Procedures for Installing on and Detaching from DIN Rail.

### Example of installation



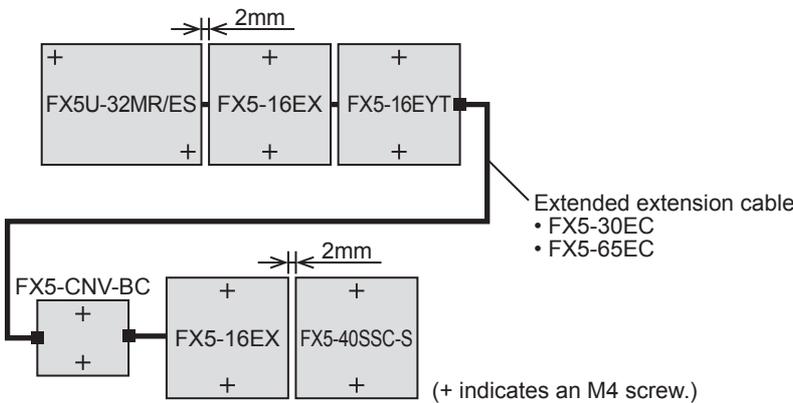
\*1 FX5-CNV-BC can only be installed directly.

## Installing directly

- The PLC can be installed directly in the enclosure with M4 screws.

For mounting hole pitch, refer to ☞ Page 85 Hole pitches for direct mounting.

### Example of installation

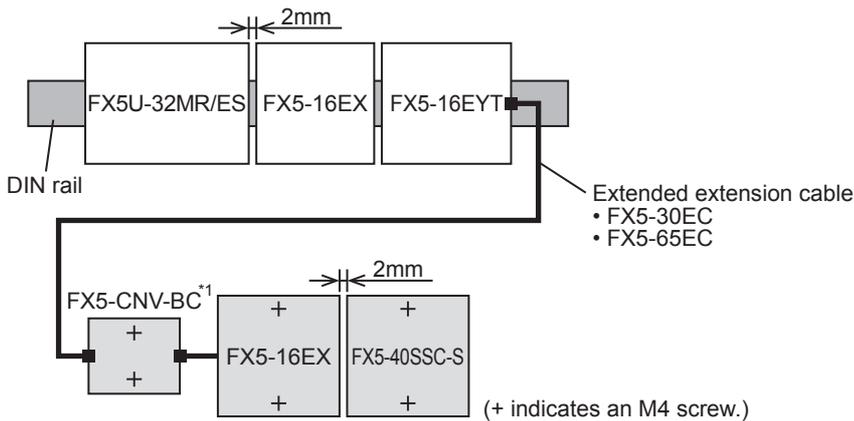


## Example of combination of installation on DIN rail and direct installation

- The CPU module side can be installed on the DIN rail, and the extension modules extended by the extended extension cable can be directly installed.
- The PLC can be installed on a 35 mm wide DIN46277 rail.
- The PLC can be easily moved and removed.
- The PLC installation height is the same as the DIN rail.
- The PLC can be installed directly in the enclosure with M4 screws.

For details on the procedures for installing on and detaching from DIN rail, refer to  Page 82 Procedures for Installing on and Detaching from DIN Rail. For mounting hole pitch, refer to  Page 85 Hole pitches for direct mounting.

### Example of installation



\*1 FX5-CNV-BC can only be installed directly.

## 5.3 Procedures for Installing on and Detaching from DIN Rail

The CPU module can be installed on a DIN46277 rail (35 mm wide).

### Preparation for installation

#### Connecting extension devices

Some extension devices must be mounted on the CPU module before the module is installed in the enclosure.

- Connect expansion adapters to the CPU module before mounting the PLC in the enclosure.
- Mount extension modules (extension cable type) and terminal module in the enclosure after mounting the CPU module in the enclosure.
- Connect the extension module (extension connector type) to the connector conversion module before mounting the extension module in the enclosure.
- Expansion boards can be mounted on the CPU module after it is installed in the enclosure.
- Batteries can be replaced without dismounting the CPU module from the enclosure. However, if an expansion board is used, the CPU module must be removed.

#### Affixing the dust proof sheet

The dust proof sheet should be affixed to the ventilation slits before beginning the installation and wiring work.

For the affixing procedure, refer to the instructions on the dust proof sheet.

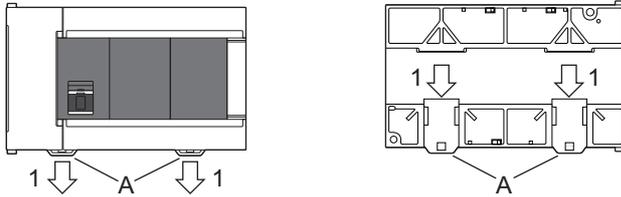
Always remove the dust proof sheet when the installation and wiring work is completed.

## Installation of CPU module

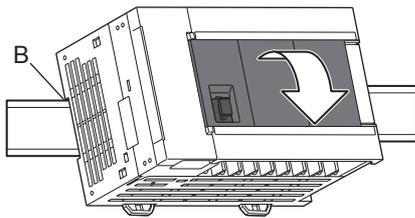
Connect the expansion adapter to the CPU module before mounting the PLC in the enclosure.

For the connection method of the expansion adapter, refer to  Page 90 Connection method B - connection of an expansion adapter.

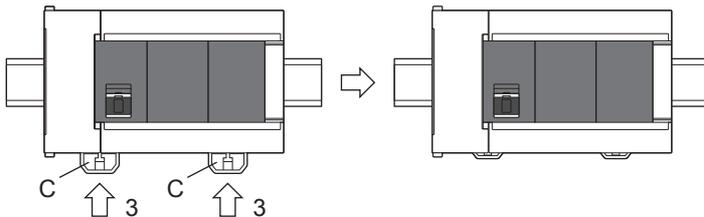
1. Push out all DIN rail mounting hooks (A in the following figure).



2. Fit the upper edge of the DIN rail mounting groove (B in the following figure) onto the DIN rail.

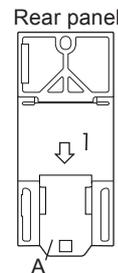


3. Lock the DIN rail mounting hooks (C in the following figure) while pressing the PLC against the DIN rail.

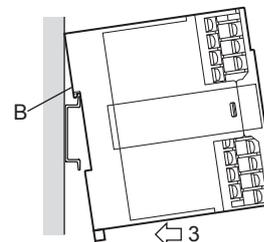


## Installation of extension module (extension cable type)

1. Push out the DIN rail mounting hook (A in the right figure) of the extension module.



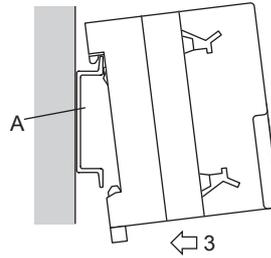
2. Fit the upper edge of the DIN rail mounting groove (B in the right figure) onto the DIN rail.
3. Push the product against the DIN rail.
4. Lock the DIN rail mounting hook while pressing the product against the DIN rail.



5. Connect the extension cable. For the connecting procedure of the extension cable, refer to  Page 89 Connection Methods for CPU Module and Extension Devices.

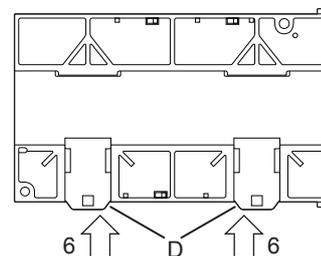
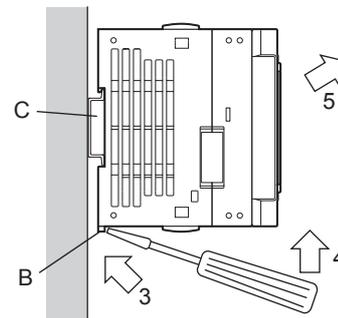
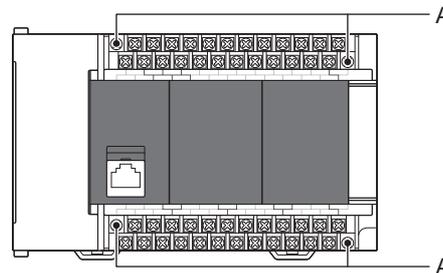
## Installation of terminal modules

1. Turn off all the power supplies connected to the CPU module, extension modules, or terminal modules.
2. Fit the upper edge of the DIN rail mounting groove (A in the right figure) onto the DIN rail.
3. Push the product against the DIN rail.



## Removal of CPU module

1. Open the terminal block cover, gradually loosen the left and right terminal block mounting screws (A in the right figure), and remove the terminal blocks. For the mounting procedure of the terminal block, refer to [Page 97 Removal and installation of removable terminal block](#).
2. Disconnect the extension cables and the connecting cables. When removing the extension cable, pull the pullout tab of the extension cable straight up.
3. Insert the tip of a flathead screwdriver into the hole of the DIN rail mounting hook (B in the right figure). This step also applies for the DIN rail mounting hooks of the expansion adapters.
4. Move the flathead screwdriver as shown in the right figure to draw out the DIN rail mounting hooks of all devices.
5. Remove the product from the DIN rail (C in the right figure).
6. Push in the DIN rail mounting hooks (D in the right figure).



# 5.4 Procedures for Installing Directly (with M4 Screws)

The product can be installed directly in the enclosure (with screws).



Position the holes so that there is a gap of about 2 mm between the products.

## Hole pitches for direct mounting

The product mounting hole pitches are shown below.  
For pitch that varies depending on the product, refer to the table.

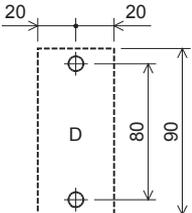
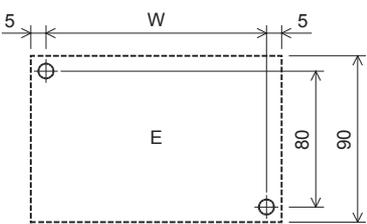
### CPU module

Dimensions	Model name	Mounting hole pitch W Unit: mm
	FX5U-32MR/ES FX5U-32MT/ES FX5U-32MT/ESS FX5U-32MR/DS FX5U-32MT/DS FX5U-32MT/DSS	123
	FX5U-64MR/ES FX5U-64MT/ES FX5U-64MT/ESS FX5U-64MR/DS FX5U-64MT/DS FX5U-64MT/DSS	193
	FX5U-80MR/ES FX5U-80MT/ES FX5U-80MT/ESS FX5U-80MR/DS FX5U-80MT/DS FX5U-80MT/DSS	258

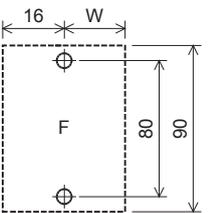
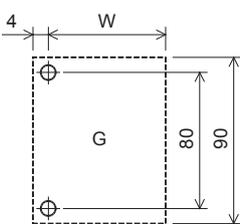
### Expansion adapter

Dimensions	Model name	Mounting hole pitch W Unit: mm
	FX5-232ADP FX5-485ADP FX5-4AD-ADP FX5-4DA-ADP FX5-4AD-PT-ADP FX5-4AD-TC-ADP	15.1

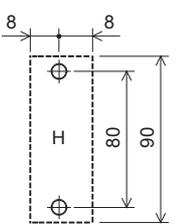
## I/O module

Dimensions	Model name	Mounting hole pitch W Unit: mm
 <p>D</p>	FX5-8EX/ES FX5-8EYR/ES FX5-8EYT/ES FX5-8EYT/ESS FX5-16EX/ES FX5-16EYR/ES FX5-16EYT/ES FX5-16EYT/ESS FX5-16ER/ES FX5-16ET/ES FX5-16ET/ESS FX5-16ET/ES-H FX5-16ET/ESS-H	Refer to the figure shown to the left.
 <p>E</p>	FX5-32ER/ES FX5-32ET/ES FX5-32ET/ESS FX5-32ER/DS FX5-32ET/DS FX5-32ET/DSS	140

## Extension power supply module

Dimensions	Model name	Mounting hole pitch W Unit: mm
 <p>F</p>	FX5-1PSU-5V	34
 <p>G</p>	FX3U-1PSU-5V	51

## Bus conversion module

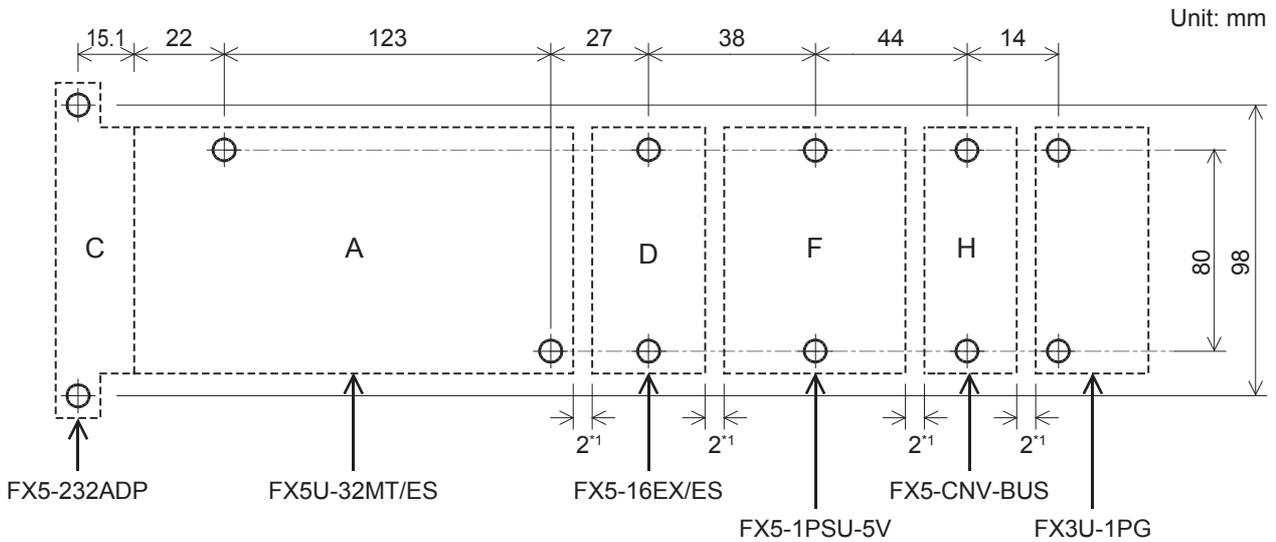
Dimensions	Model name	Mounting hole pitch W Unit: mm
 <p>H</p>	FX5-CNV-BUS	Refer to the figure shown to the left.

## Intelligent function module

For the mounting hole dimensions of intelligent function modules, refer to user's manuals of each product.

## Hole pitches when extension module connected

Ex.



\*1 The gap between products is 2 mm.

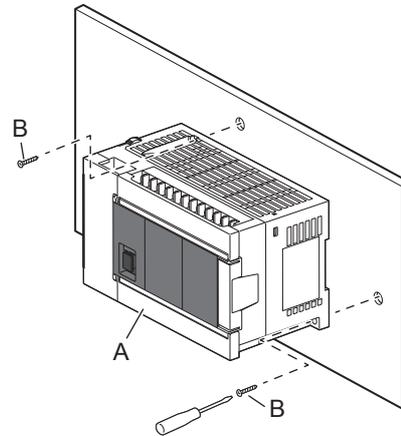
## Installation of CPU module

Connect the expansion adapter to the CPU module before mounting the PLC in the enclosure.

For the connection method of the expansion adapter, refer to [Page 90 Connection method B - connection of an expansion adapter](#).

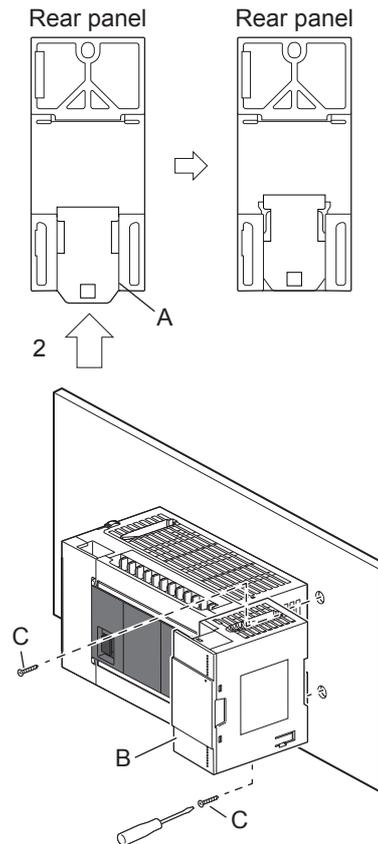
The FX5U-32M□ is used as the CPU module in this example.

1. Make mounting holes on the mounting surface according to the external dimensions diagram.
2. Fit the CPU module (A in the right figure) to holes, and secure it with M4 screws (B in the right figure). (In the case of FX5U-64M□/80M□, there are four screw holes.)



## Installation of extension module (extension cable type)

1. Make mounting holes on the mounting surface according to the external dimensions diagram.
2. Push in the DIN rail mounting hook (A in the right figure) of the extension module (extension cable type). If the DIN rail mounting hook is not pushed in, the screw hole is covered, and the extension module cannot be mounted. (This procedure may not be required, depending on the model.)
3. Fit the extension module (extension cable type) (B in the right figure) to the holes, and secure it with M4 screws (C in the right figure).



# 5.5 Connection Methods for CPU Module and Extension Devices

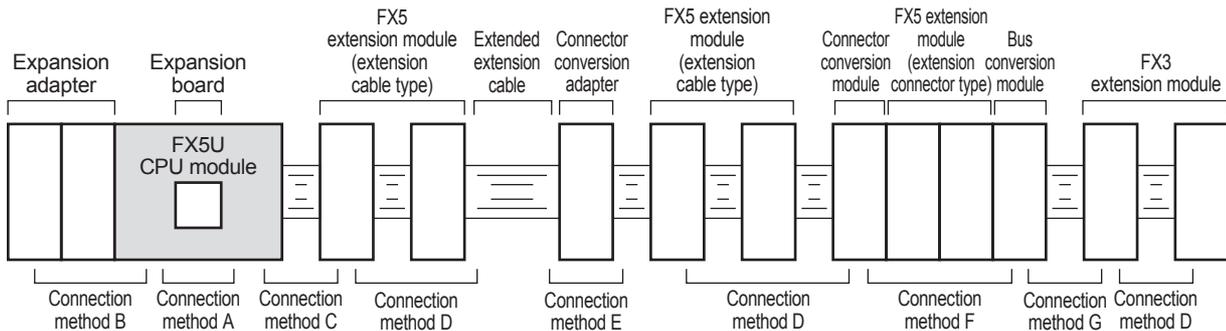
This section explains the connection methods for extension devices.

## Connection of extension devices

The connection method varies depending on the combination of products, i.e., the CPU module, expansion board, expansion adapters, and extension modules.

The connection methods are explained with the following configuration example.

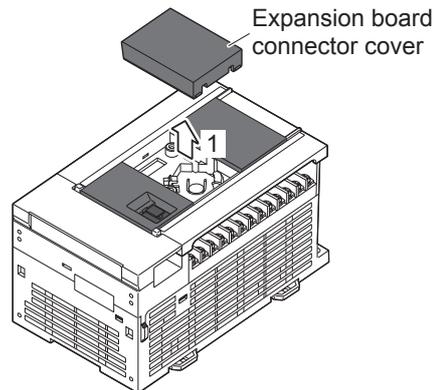
For connection method for FX5-1PSU-5V, refer to MELSEC iQ-F FX5-1PSU-5V HARDWARE MANUAL.



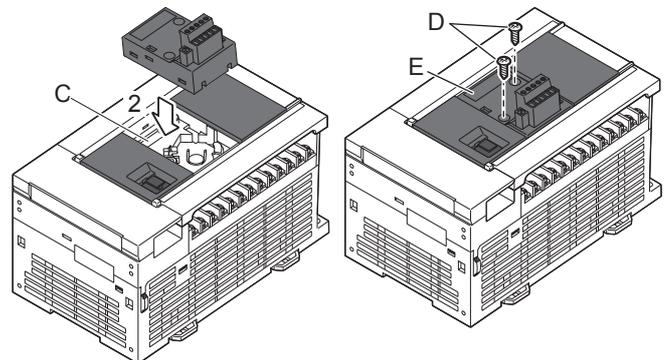
## Connection method A - connection of an expansion board

This subsection explains how to connect the expansion board to the CPU module.

1. Remove the expansion board connector cover from the front face of the CPU module.



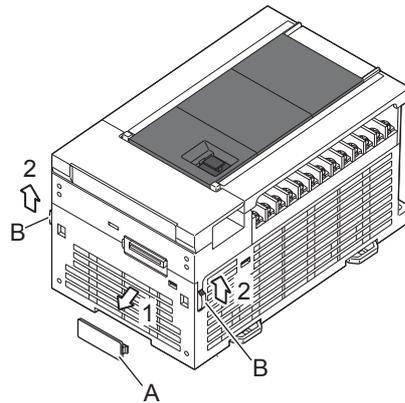
2. Connect the expansion board to the expansion board connector (C in the right figure).
3. Fix the expansion board (E in the right figure) with provided M3 tapping screws (D in the right figure) to the CPU module.
  - Tightening torque: 0.3 to 0.6N·m



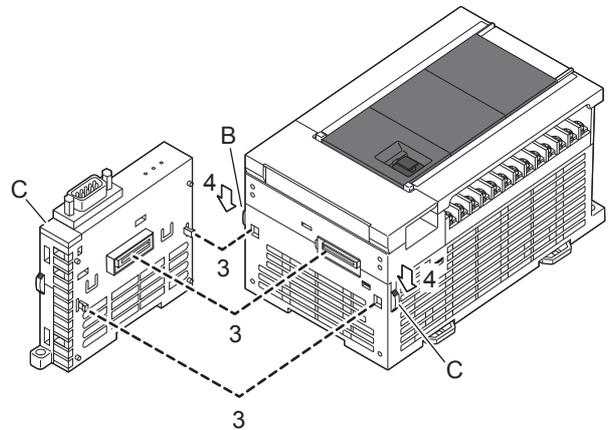
## Connection method B - connection of an expansion adapter

This subsection explains how to connect the expansion adapter to the CPU module.

1. Remove expansion adapter connector cover (A in the right figure).
2. Slide the hook for coupling the expansion adapter of the CPU module (B in the right figure).



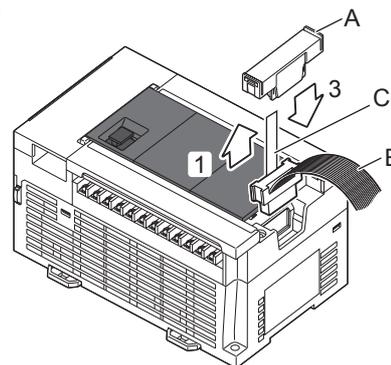
3. Connect the expansion adapter to the CPU module as shown in the right figure.
4. Slide the hook for coupling the expansion adapter of the CPU module (B in the right figure) to fix the expansion adapter (C in the right figure).



## Connection method C - connection of an extension module (extension cable type) to the CPU module

The procedure for connecting the extension module (extension cable type) to the CPU module or powered input/output module is explained below.

1. Remove the extension connector cover (A in the right figure) on the right side of the surface of the CPU module or powered input/output module.
2. Connect the extension cable (B in the right figure) from the extension module (extension cable type) to the extension connector of the CPU module or powered input/output module. Put the pullout tab (C in the right figure) of the extension cable inside the extension connector cover.
3. Fit the extension connector cover (A in the right figure).

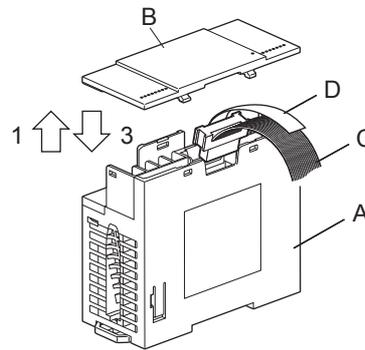


CPU module

## Connection method D - connection between extension modules (extension cable type)

The procedure for connecting the extension modules (extension cable type) is explained below. (Powered input/output module are excluded.)

1. Remove the top cover (B in the right figure) of the existing module (left side) (A in the right figure).
2. Connect the extension cable (C in the right figure) of the module to be connected (right side) to the existing module (left side) (A in the right figure).
3. Fit the top cover (B in the right figure).
4. Pull out the pullout tab (D in the right figure) of the extension cable on the right side of the cover.



5

### Point

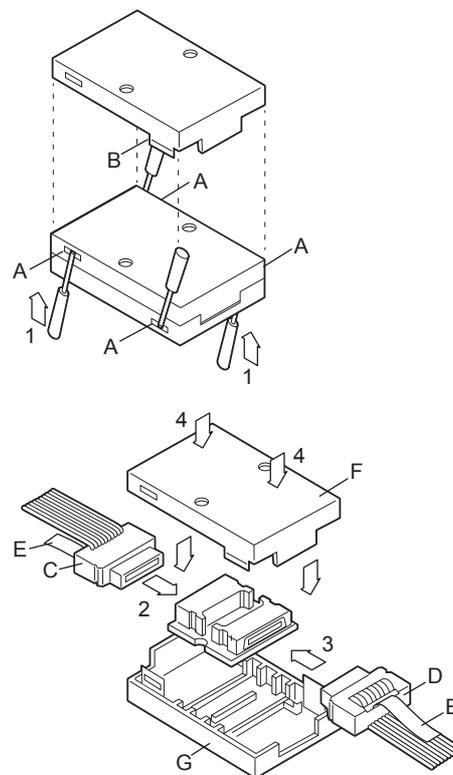
Cautions on mounting and removing extension cables

- Make sure that the pullout tab of extension cables do not touch the conductive parts of the module.
- When removing the extension cable, pull the pullout tab of the extension cable straight up.

## Connecting method E - connection of extended extension cable and connector conversion adapter

This subsection explains the procedures for connecting an extended extension cable and FX5-CNV-BC to the extension cable of the FX5 extension module.

1. Separate the case of FX5-CNV-BC into two pairs as shown right figure. To separate the case, use a precision flathead screwdriver. Slightly insert the tip of the screwdriver into part A shown in the right figure, and the hook (B in the right figure) will come off (4 places).
2. Connect the extended extension cable on the upstream side (C in the right figure).
3. Connect the extension cable on the downstream side (D in the right figure).
4. Pull the tab (E in the right figure) outside, fit the upper cover (F in the right figure) and the lower cover (G in the right figure), and press down the upper cover until it is hooked.

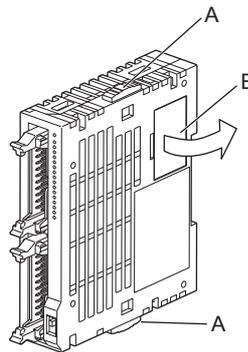


## Connecting method F - connection of an extension module (extension connector type)

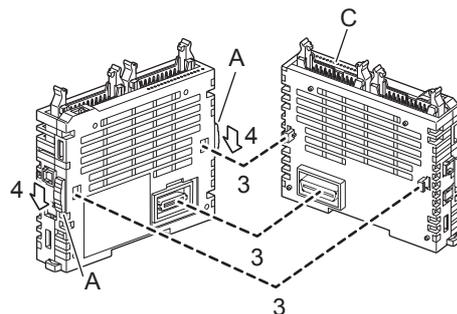
---

This subsection explains how to connect the extension module (extension connector type).

1. Slide the hook for coupling the extension module (A in the right figure) of the existing module (left side).
2. Remove the subsequent extension connector cover (B in the right figure).



3. Connect an extension module as shown in the right figure.
4. Slide the hook for coupling the extension module (A in the right figure) of the existing module to fix the extension module (C in the right figure).



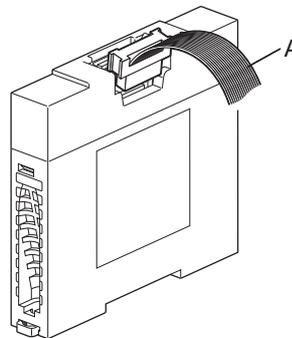
## Connection method G - connection of an FX3 extension module to the bus conversion module

---

The procedure for connecting the FX3 extension module to the bus conversion module is explained below.

1. Connect the FX3 extension cable (A in the right figure) from the extension module to the extension connector of the bus conversion module.

This illustration is FX5-CNV-BUS. When FX5-CNV-BUSC is used, connect the extension cable to the bus conversion module in the same way.



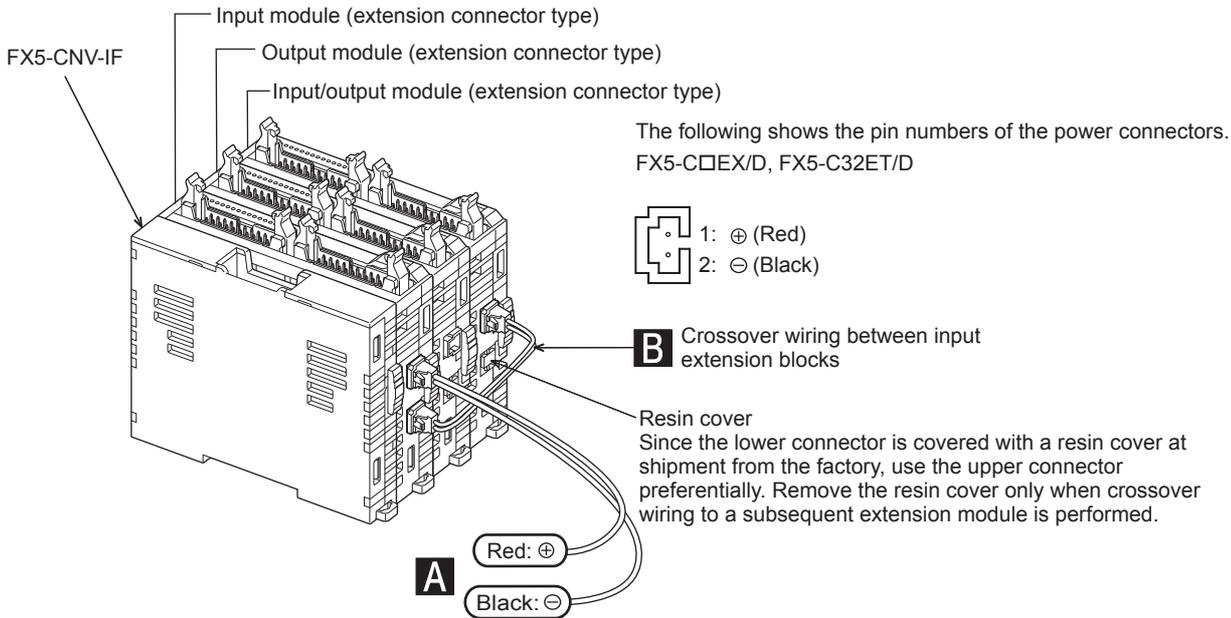
# Connection of power cables

## Power cable connection of the I/O modules

The power must be supplied to the FX5-C□EX/D, and FX5-C32ET/D.

To supply the power to FX5-C□EX/D and FX5-C32ET/D, use two power connectors (upper and lower) on each module for crossover wiring.

FX5-C□EX/DS and FX5-C32ET/DSS do not have power connectors. Supply the power to them using input connectors.



Use the following power cables.

Classification	Application	Model	Length
A	Power cable for FX5-C□EX/D and FX5-C32ET/D	FX2NC-100BPCB	1 m
B	Power crossover cable for FX5-C□EX/D and FX5-C32ET/D	FX2NC-10BPCB1	0.1 m

### • Wiring FX5-C□EX/D or FX5-C32ET/D to a subsequent stage

Since the two power connectors on each module of FX5-C□EX/D and FX5-C32ET/D are connected in parallel inside the module, they have no difference and can be either an inlet port or outlet port for supplying the power. Thus, cables can be connected to either of the connectors.

However, since the lower connector is covered with a resin cover at shipment from the factory, use the upper connector preferentially. Remove the resin cover only when crossover wiring to a subsequent module is performed.

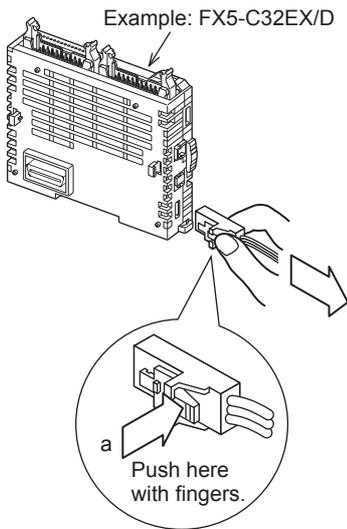
(FX5-C□EX/DS and FX5-C32ET/DSS do not have power connectors and the power is supplied from using input connectors. Thus, removing the resin cover is not required.)

## Precautions

To perform crossover wiring, supply the power from the preceding module to the subsequent module. The power cannot be supplied from the subsequent module to the preceding module.

## Removal of power cables

Hold part "a" on the connector of the power cable with your fingers, and remove the cable in the direction of the arrow.



### Precautions

If the power cable is removed by force, the cable may break.

## Connection of I/O cables

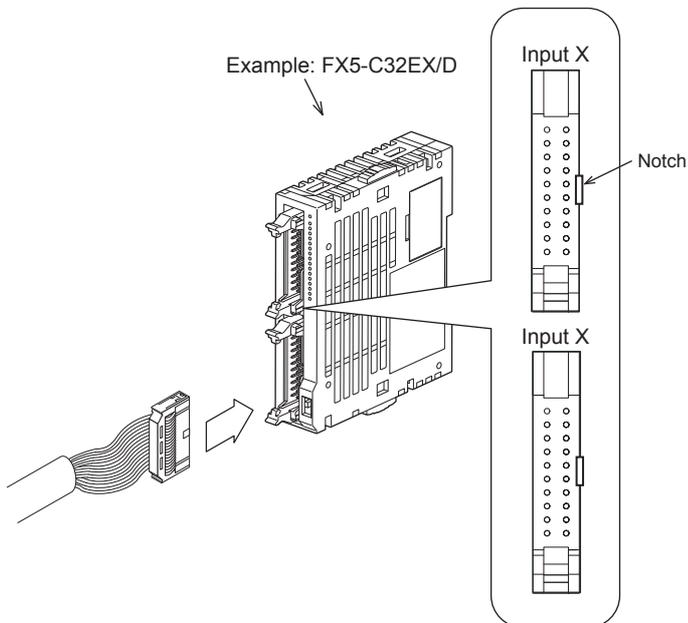
### I/O connectors

#### ■ Cable connection to I/O connectors

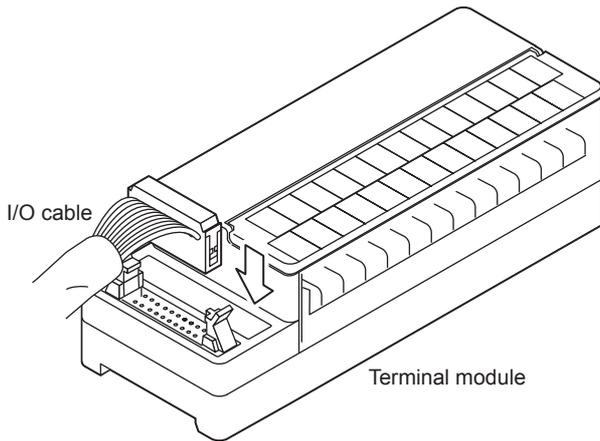
I/O connectors conform to MIL-C-83503.

For I/O cables, refer to Page 95 Preparation of I/O connectors and prepare them.

- I/O modules (extension connector type)



- Terminal module



## ■Preparation of I/O connectors

- Suitable connector (commercial item)

Use 20-pin (1-key) sockets conforming to MIL-C-83503.

Check that the sockets do not interfere with peripheral parts including connector covers in advance.

- I/O cables (Mitsubishi option)

I/O cables on which connectors are attached are prepared.

Model	Length	Description	Type
FX-16E-500CAB-S	5 m	General-purpose I/O cable	<ul style="list-style-type: none"> <li>• Single wire (Wire color: Red)</li> <li>• CPU module side: 20-pin connector is attached.</li> </ul>
FX-16E-150CAB	1.5 m	Cables for connection of the terminal module and I/O connectors For the connection with the terminal module, refer to  Page 96 WIRING.	<ul style="list-style-type: none"> <li>• Flat cables (with tube)</li> <li>• On both ends, 20-pin connectors are attached.</li> </ul>
FX-16E-300CAB	3 m		
FX-16E-500CAB	5 m		<ul style="list-style-type: none"> <li>• Round multicore cables</li> <li>• On both ends, 20-pin connectors are attached.</li> </ul>
FX-16E-150CAB-R	1.5 m		
FX-16E-300CAB-R	3 m		
FX-16E-500CAB-R	5 m		

- Connectors for self-making I/O cables (Mitsubishi option)

Prepare wires and crimp tools by users.

Model and configuration of I/O connectors			Suitable wiring (UL-1061-compliant products are recommended) and tool	
Mitsubishi model		Part description (Manufactured by DDK Ltd.)	Wire size	Crimp tool (Manufactured by DDK Ltd.)
FX2C-I/O-CON for flat cables	10 sets	Crimp connector FRC2-A020-30S	AWG 28 (0.1 mm <sup>2</sup> ) 1.27-pitch 20 cores	357J-4674D main body 357J-4664N attachment
FX2C-I/O-CON-S for single wires	5 sets	Housing HU-200S2-001 Crimp contact HU-411S	AWG 22 (0.3 mm <sup>2</sup> )	357J-5538
FX2C-I/O-CON-SA for single wires	5 sets	Housing HU-200S2-001 Crimp contact HU-411SA	AWG 20 (0.5 mm <sup>2</sup> )	357J-13963

Contact for crimp tools: Fujikura Ltd.

- Certified connectors (commercially available connectors)

Connectors made by DDK Ltd. shown above

# 6 WIRING

## 6.1 Wiring Preparations

### Wiring procedure

Before wiring, make sure that the source power supply is off.

**1.** Prepare the parts for wiring.

Prepare crimp terminals and cables needed for wiring. (☞ Page 97 Cable Connecting Procedure)

**2.** Wire the power supply terminals.

For AC power supply type, connect the cables to the power [L] and [N] terminals.

For DC power supply type, connect the cables to the power [+] and [-] terminals.

Provide the protection circuit described in this chapter for the power supply circuit. (☞ Page 101 Power Supply Wiring)

**3.** Perform class D grounding (grounding resistance: 100 Ω or less) for the ground [  ] terminal.

Connect the grounded wire to the terminal. (☞ Page 100 Grounding)

**4.** Wire the input [X] terminal.

Select sink or source in the following wiring.

In the case of AC power supply type

- For sink input, connect [24V]—[S/S] terminal
- For source input, connect [0V]—[S/S] terminal

In the case of DC power supply type

- For sink input, connect [+]—[S/S] terminal
- For source input, connect [-]—[S/S] terminal

Connect sensors and switches to the terminals. (☞ Page 109 Input Wiring)

**5.** Wire the output [Y] terminal.

Connect the load to terminals. (☞ Page 121 Output Wiring)

**6.** Wire built-in analog I/O terminal blocks.

Connect analog I/Os to terminals. (☞ Page 136 Analog Wiring)

**7.** Wire the built-in RS-485 communication terminal blocks and Ethernet communication connectors.

☞ MELSEC iQ-F FX5 User's Manual (Ethernet Communication)

☞ MELSEC iQ-F FX5 User's Manual (Serial Communication)

☞ MELSEC iQ-F FX5 User's Manual (MODBUS Communication)

**8.** Wire intelligent function modules, expansion boards, and expansion adapters.

☞ MELSEC iQ-F FX5 User's Manual (Serial Communication)

☞ MELSEC iQ-F FX5 User's Manual (MODBUS Communication)

☞ MELSEC iQ-F FX5 User's Manual (Analog Control - CPU module built-in, Expansion adapter)

User's manual for each intelligent function module

# Removal and installation of removable terminal block

## Removal

Loosen terminal block mounting screws on the left and right sides uniformly and remove the terminal block.

## Installation

Place the terminal block at its predetermined position and tighten the terminal block mounting screws on the left and right sides uniformly.

Tightening torque: 0.4 to 0.5 N·m

## Precautions

Do not tighten the terminal block mounting screws with torque exceeding the specified range.

Failure to do so may cause equipment failures or malfunctions.

### Point

Make sure that there is no gap between the terminal block and mount position.

## 6.2 Cable Connecting Procedure

The cable connecting procedure is explained below.

### Screw terminal block

Wire the screw terminal block in accordance with the following specifications.

For information concerning screw terminal blocks for intelligent function modules, refer to User's manual for each intelligent function module.

### Terminal block screw size and tightening torque

Model	Terminal screw size	Tightening torque
CPU module	M3	0.5 to 0.8 N·m
I/O module		
Extension power supply module		
Terminal module	M3.5	
Intelligent function module	Refer to manuals for each product.	

## Precautions

Do not tighten terminal screws with torque beyond the specified range. Otherwise it may cause equipment failure or malfunction.

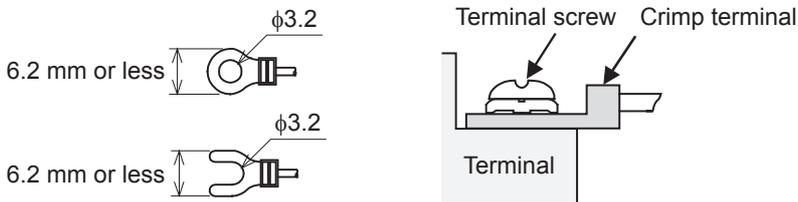
## Wire end treatment

Crimp terminal size differs depending on terminal screw size and wiring methods used.

- Use crimp terminals of the following sizes.

### ■M3 terminal screw

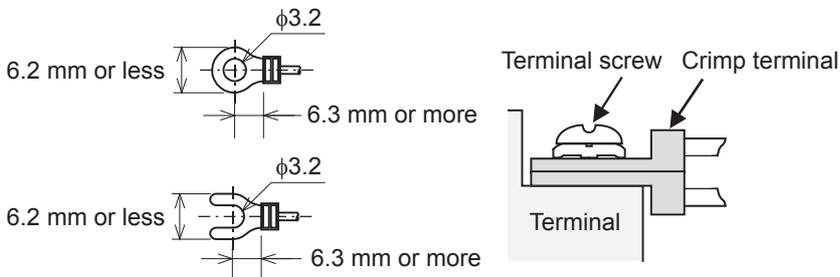
- When a single wire is connected to a single terminal



<Reference>

Manufacturer	Model	Supported standards	Crimp tool
JST Mfg. Co., Ltd.	FV1.25-B3A	UL Listed	YA-1 (JST Mfg. Co., Ltd.)
	FV2-MS3		

- When two wire are connected to a single terminal

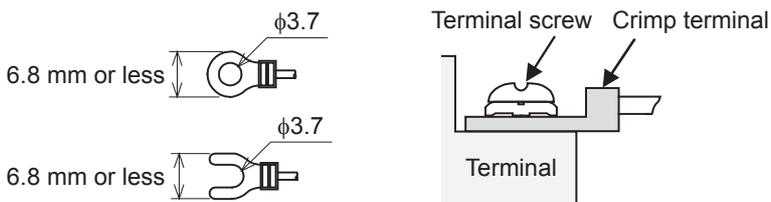


<Reference>

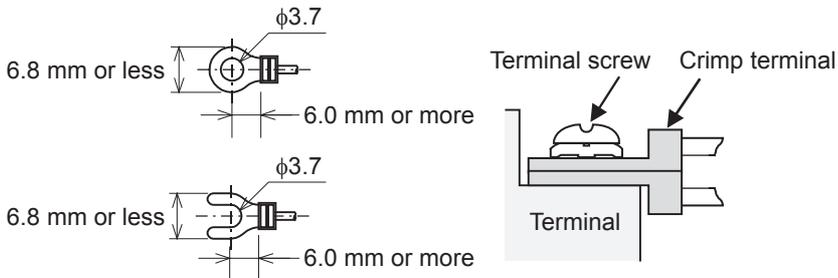
Manufacturer	Model	Supported standards	Crimp tool
JST Mfg. Co., Ltd.	FV1.25-B3A	UL Listed	YA-1 (JST Mfg. Co., Ltd.)

### ■M3.5 terminal screw

- When a single wire is connected to a single terminal



- When two wires are connected to a single terminal



# European-type terminal block

Wire the European-type terminal block in accordance with the following specifications.

## Suitable wiring

	Number of wires connected per terminal	Wire size		Tightening torque
		Solid wire, Stranded wire	Wire ferrule with insulation sleeve	
Built-in analog I/O terminal block Terminal block for built-in RS-485 communication	One wire	0.2 to 0.5 mm <sup>2</sup> (AWG24 to 20)	0.2 to 0.5 mm <sup>2</sup> (AWG24 to 20)	0.22 to 0.25 N·m
	Two wires	0.2 mm <sup>2</sup> (AWG24)	—	
Expansion board, expansion adapter	One wire	0.3 to 0.5 mm <sup>2</sup> (AWG22 to 20)	0.3 to 0.5 mm <sup>2</sup> (AWG22 to 20)	0.20 N·m
	Two wires	0.3 mm <sup>2</sup> (AWG22)	—	
Analog adapter	One wire	0.3 to 0.5 mm <sup>2</sup> (AWG22 to 20)	0.3 to 0.5 mm <sup>2</sup> (AWG22 to 20)	0.20 N·m
	Two wires	0.3 mm <sup>2</sup> (AWG22)	—	

## Precautions

Do not tighten terminal screws with torque beyond the specified range. Otherwise it may cause equipment failure or malfunction.

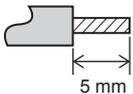
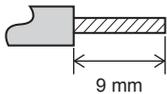
## Wire end treatment

Treat stranded and solid wires as they are or use wire ferrules with insulation sleeves for wiring terminals.

### ■When stranded and solid wires are treated as they are

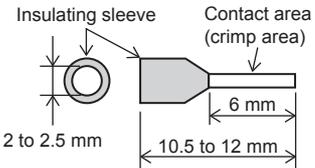
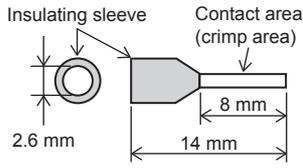
- Twist the end of stranded wires and make sure that there are no loose wires.
- Do not solder-plate the electric wire ends.

### Stripping dimensions of electric wire ends

Built-in analog I/O terminal block, built-in RS-485 communication terminal block	Expansion board, expansion adapter
	

### ■When wire ferrules with insulation sleeves are used

Depending on the thickness of a wiring sheath used, it may be difficult to insert the sheath into an insulation sleeve. Refer to the external dimensions as a reference to select wires.

Built-in analog I/O terminal block, built-in RS-485 communication terminal block	Expansion board, expansion adapter
	

<Reference>

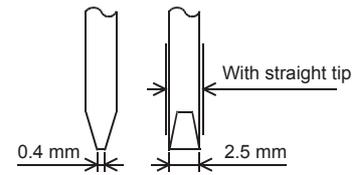
	Manufacturer	Model	Crimp tool
Built-in analog I/O terminal block Terminal block for built-in RS-485 communication	Phoenix Contact GmbH & Co. KG	AI 0.5-6 WH	CRIMPFOX 6 CRIMPFOX 6T-F
Expansion board, expansion adapter		AI 0.5-8 WH	

## ■ Tool

For tightening terminals, use a small, commercially-available screwdriver with a straight tip. The recommended shape is shown in the figure on the right.

### ■ Precautions

When a precision screwdriver with a small grip is used, the specified tightening torque cannot be obtained. Use the following screwdriver or equivalent product (grip diameter: 25 mm) to obtain the tightening torque specified above.



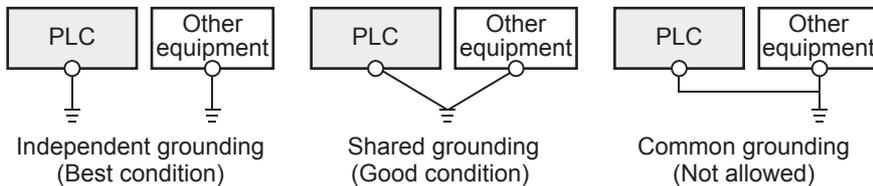
<Reference>

Manufacturer	Model
Phoenix Contact GmbH & Co. KG	SZS 0.4×2.5

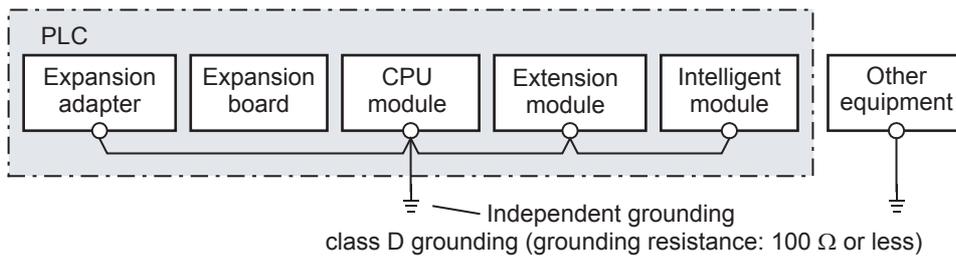
## 6.3 Grounding

Perform the following.

- Perform class D grounding (Grounding resistance: 100 Ω or less).
- Ground the PLC independently when possible.
- If the PLC cannot be grounded independently, perform the "Shared grounding" shown below.



PLC extension devices (excluding expansion boards and communication adapters)

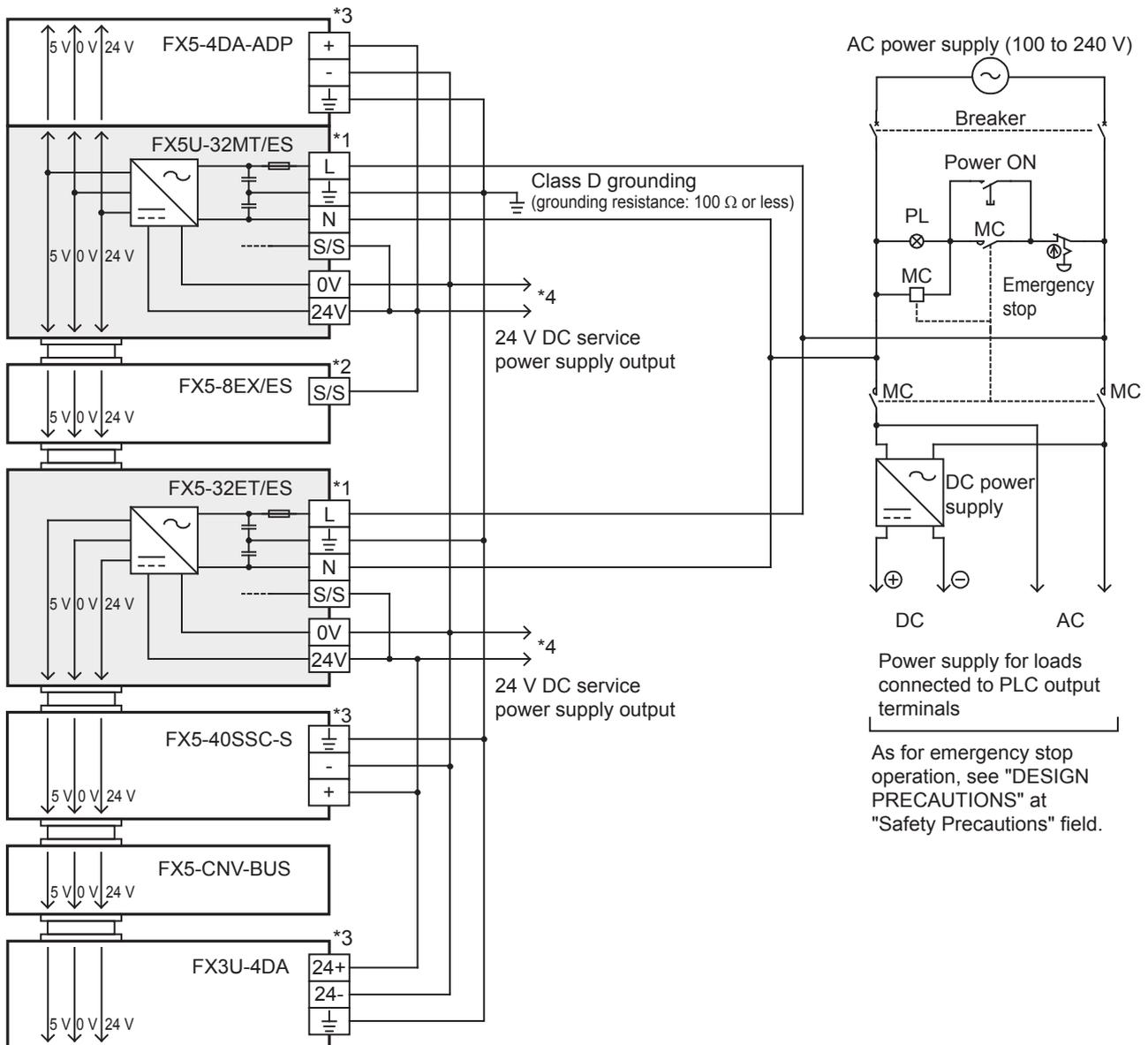


- Use a grounding wire with thickness of AWG 14 (2 mm<sup>2</sup>) or thicker.
- Bring the grounding point close to the PLC as much as possible so that the ground cable can be shortened.

# 6.4 Power Supply Wiring

## Examples of AC power supply wiring

### Power supply example for sink input [-common]

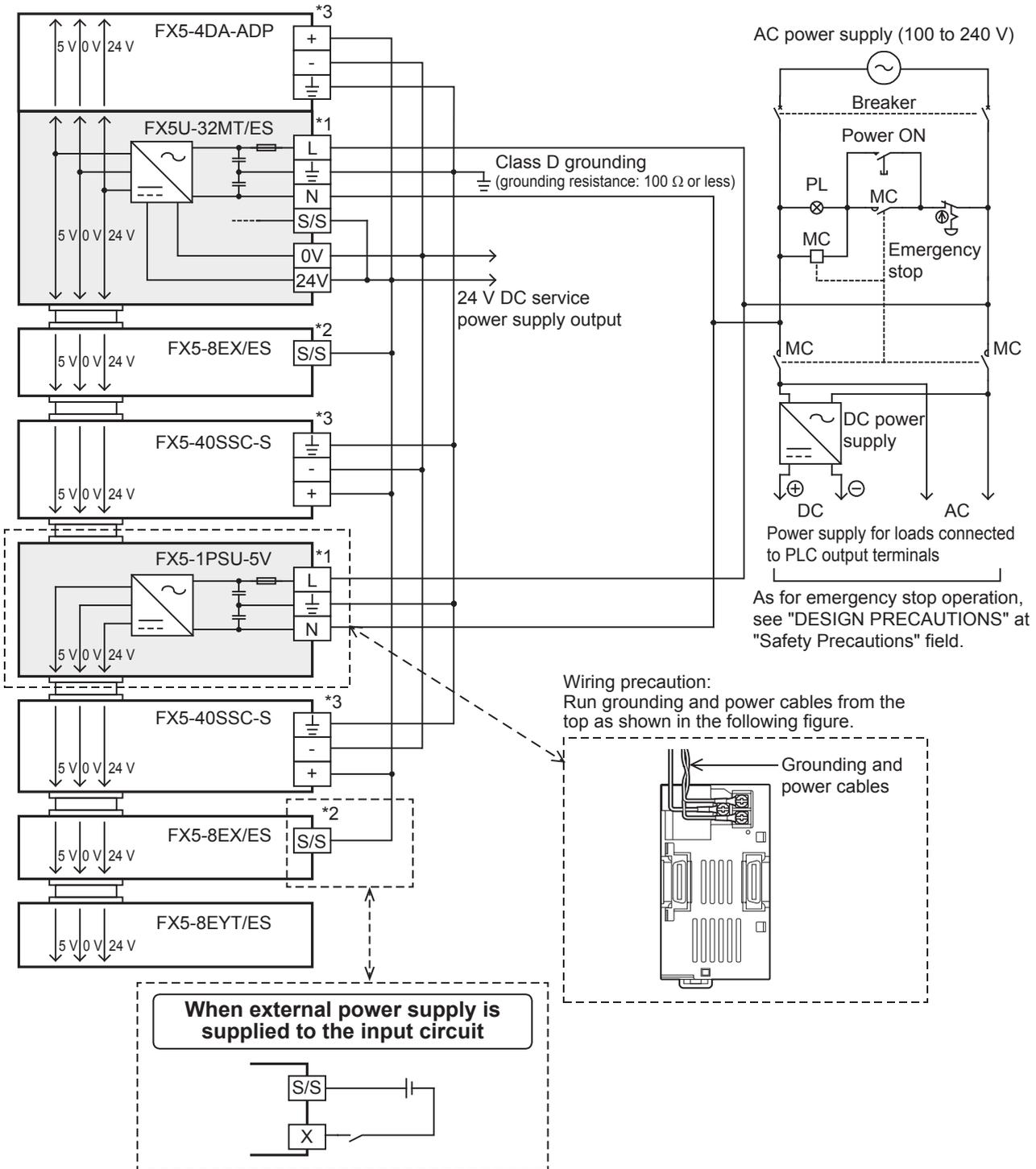


- \*1 Connect the AC power supply to the [L] and [N] terminals (common for 100 V AC system and 200 V AC system).  
Make sure that the powered input/output module is turned on at the same time as the CPU module or earlier than the CPU module.
- \*2 Connect the [24V] terminal of the CPU module to the [S/S] terminal of the input module.
- \*3 Some expansion adapters and intelligent function modules may not have power supply terminals.  
When using an external power supply, turn on the power supply at the same time as the CPU module or earlier than the CPU module.  
When turning off the power, confirm the safety of the system and turn off the power of the PLC (including extension devices) at the same time.
- \*4 Do not connect the [24V] terminals (24 V DC service power supply) of the CPU module and the powered input/output module with each other. Connect the [0V] terminal.



## Wiring example for an FX5-1PSU-5V (sink input [-common])

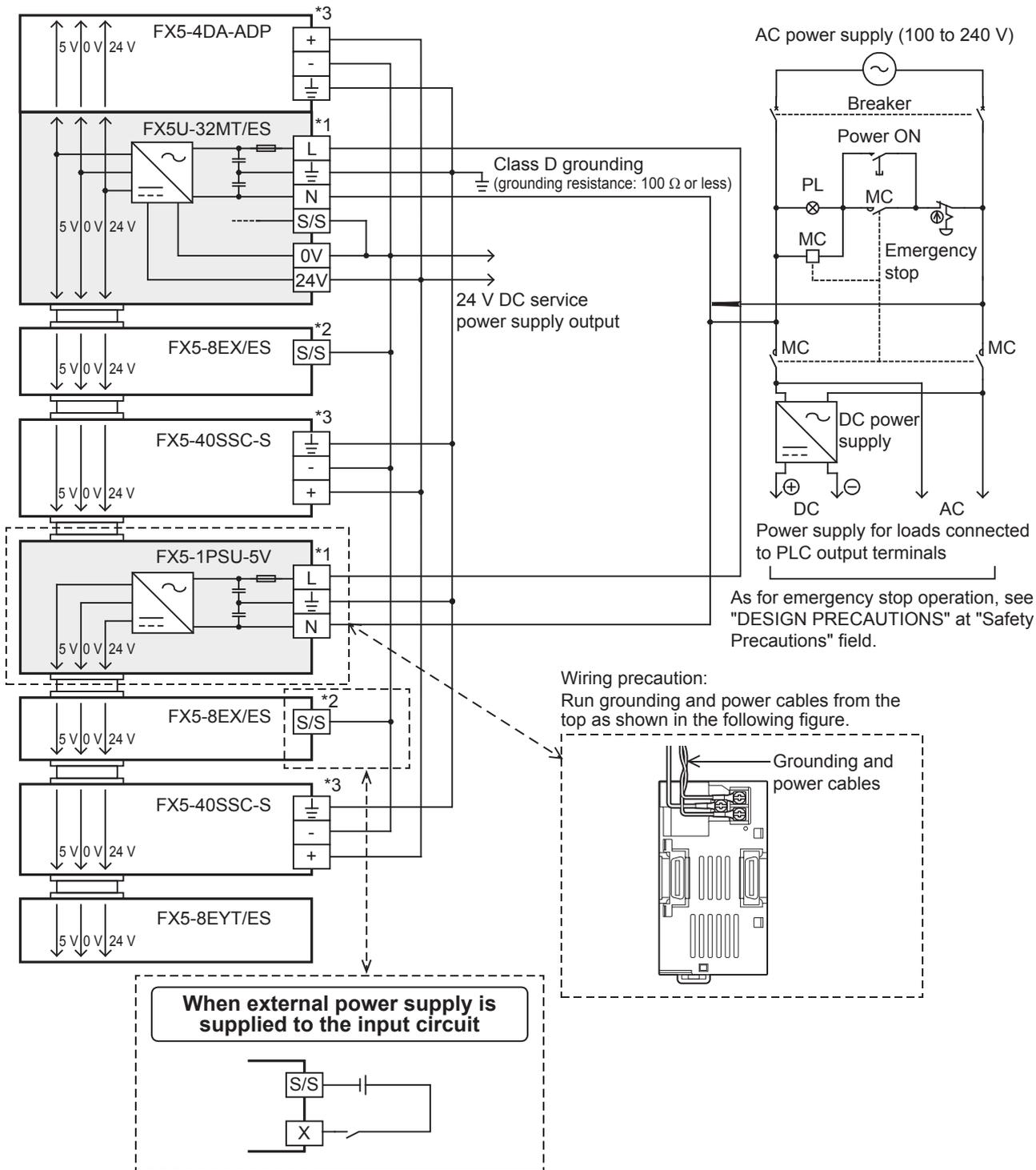
The following example shows wiring for an FX5-1PSU-5V when sink input [-common] is used.



- \*1 Connect the AC power supply to the [L] and [N] terminals (common for 100 V AC system and 200 V AC system). Make sure that the power of the FX5-1PSU-5V is turned on at the same time as the CPU module or earlier than the CPU module.
- \*2 Connect the [24V] terminal of the CPU module to the [S/S] terminal of the input module.
- \*3 Some expansion adapters and intelligent function modules may not have power supply terminals. When using an external power supply, turn on the power supply at the same time as the CPU module or earlier than the CPU module. When turning off the power, confirm the safety of the system and turn off the power of the PLC (including extension devices) at the same time.

## Wiring example for an FX5-1PSU-5V (source input [+common])

The following example shows wiring for an FX5-1PSU-5V when source input [+common] is used.



\*1 Connect the AC power supply to the [L] and [N] terminals (common for 100 V AC system and 200 V AC system). Make sure that the power of the FX5-1PSU-5V is turned on at the same time as the CPU module or earlier than the CPU module.

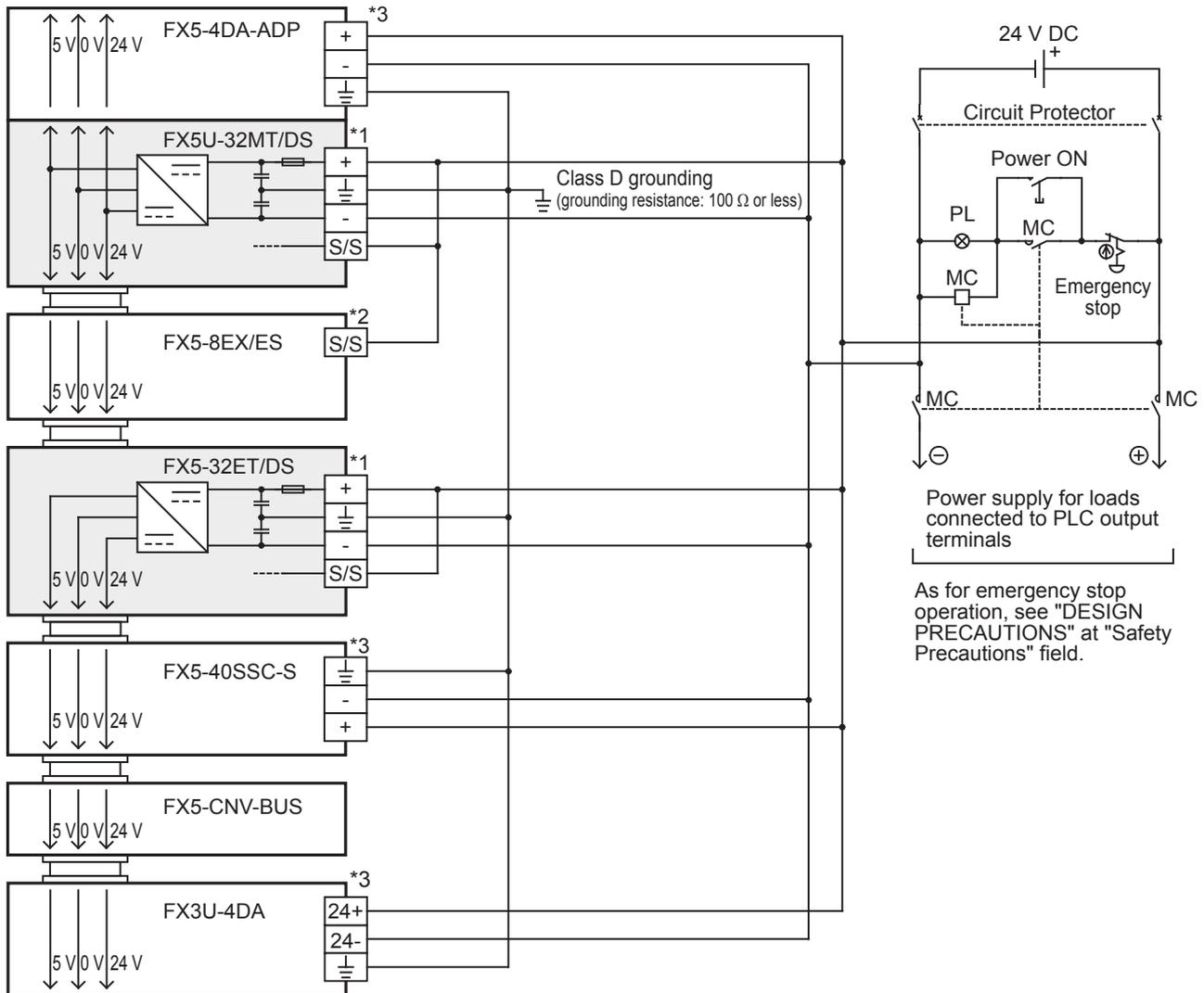
\*2 Connect the [0V] terminal of the CPU module to the [S/S] terminal of the input module.

\*3 Some expansion adapters and intelligent function modules may not have power supply terminals.

When using an external power supply, turn on the power supply at the same time as the CPU module or earlier than the CPU module. When turning off the power, confirm the safety of the system and turn off the power of the PLC (including extension devices) at the same time.

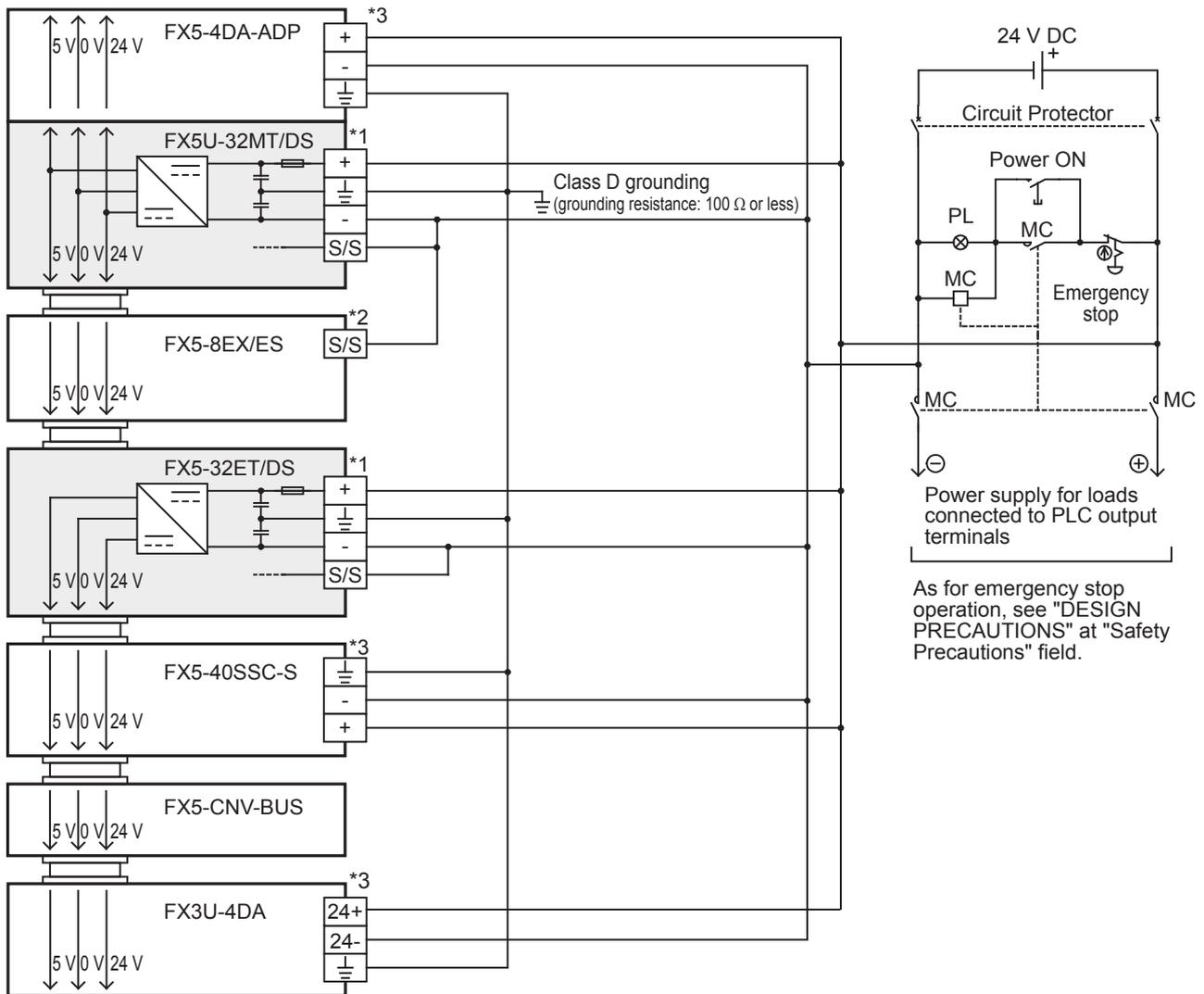
# Examples of DC power supply wiring

## Example of sink input [-common] power supply wiring



- \*1 Connect the DC power supply to the [+] and [-] terminals. Make sure that the power of the powered input/output module is turned on at the same time as the CPU module or earlier than the CPU module.
- \*2 Connect the [+] terminal of the CPU module to the [S/S] terminal of the input module.
- \*3 Some expansion adapter and intelligent function modules may not have power supply terminals.  
When using an external power supply, turn on the power supply at the same time as the CPU module or earlier than the CPU module.  
When turning off the power, confirm the safety of the system and turn off the power of the PLC (including extension devices) at the same time.

## Example of source input [+common] power supply wiring



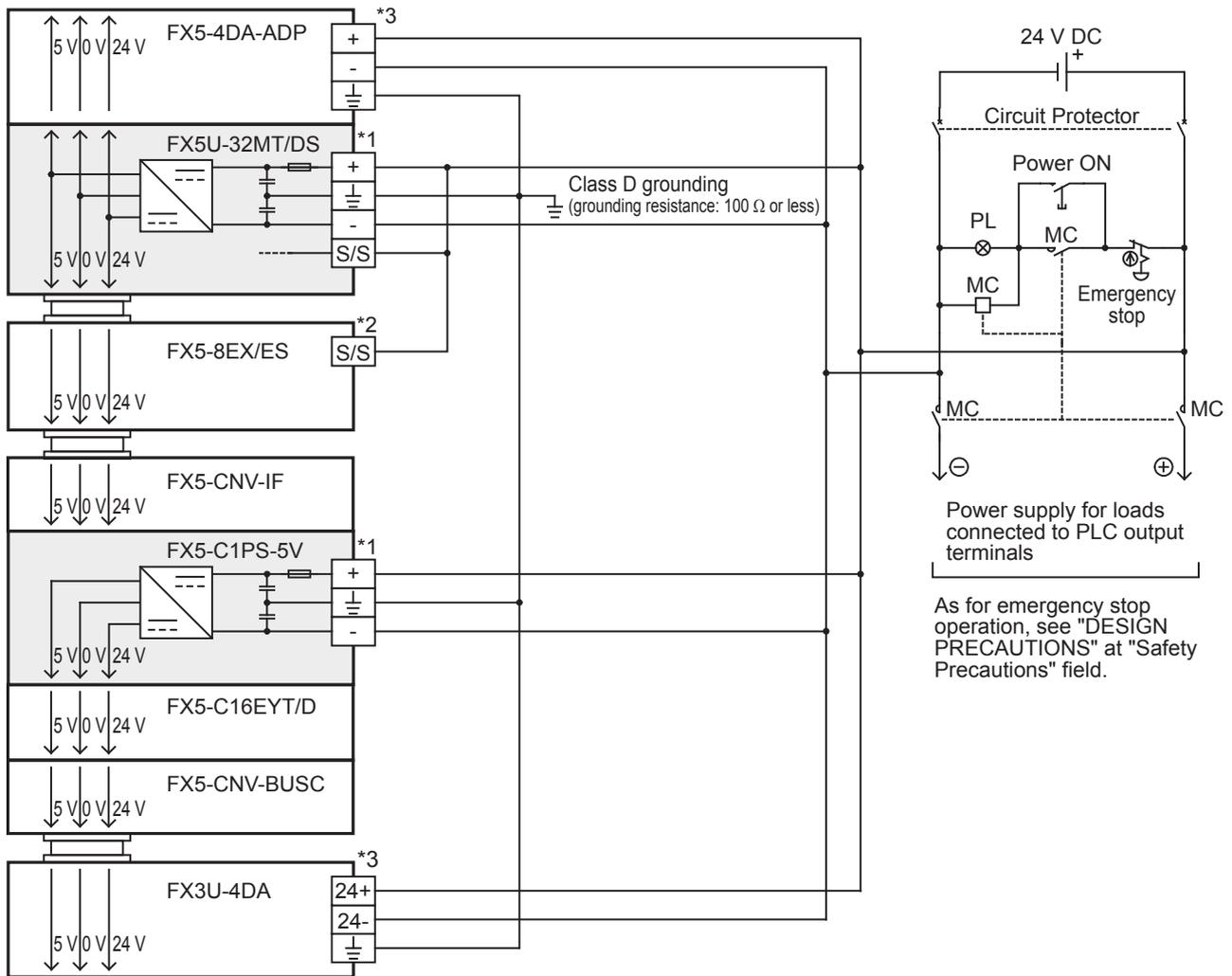
\*1 Connect the DC power supply to the [+] and [-] terminals. Make sure that the power of the powered input/output module is turned on at the same time as the CPU module or earlier than the CPU module.

\*2 Connect the [-] terminal of the CPU module to the [S/S] terminal of the input module.

\*3 Some expansion adapter and intelligent function modules may not have power supply terminals.

When using an external power supply, turn on the power supply at the same time as the CPU module or earlier than the CPU module. When turning off the power, confirm the safety of the system and turn off the power of the PLC (including extension devices) at the same time.

## Wiring example for an FX5-C1PS-5V (sink input [-common])



- \*1 Connect the DC power supply to the [+] and [-] terminals. Make sure that the FX5-C1PS-5V is turned on at the same time as the CPU module or earlier than the CPU module.
- \*2 Connect the [+] terminal of the CPU module to the [S/S] terminal of the input module.
- \*3 Some expansion adapter and intelligent function modules may not have power supply terminals.  
When using an external power supply, turn on the power supply at the same time as the CPU module or earlier than the CPU module.  
When turning off the power, confirm the safety of the system and turn off the power of the PLC (including extension devices) at the same time.



## 6.5 Input Wiring

The input wiring of the CPU module, I/O modules, and terminal modules is explained below.

### 24 V DC input (Sink and source input type)

For input specifications of the CPU module, refer to [Page 24 Input Specifications](#).

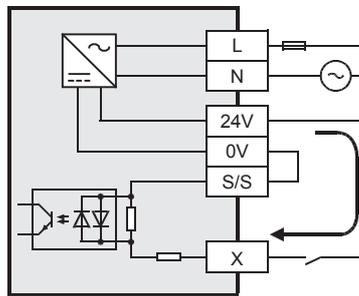
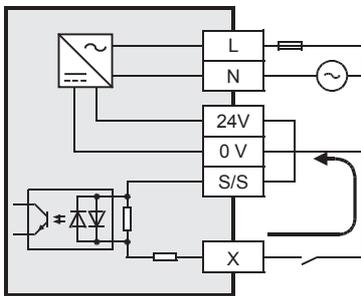
For input specifications of the I/O modules, refer to [Page 179 Input specifications](#).

For input specifications of the terminal modules, refer to [Page 196 Input specifications](#).

#### Sink and source input

##### ■ Differences between the sink input circuit and the source input circuit

- Sink input [-common]  
Sink input means a DC input signal with current-flow from the input (X) terminal.  
When a device such as a transistor output type sensor is connected, NPN open collector transistor output can be used.
- Source input [+common]  
Source input means a DC input signal with current-flow into the input (X) terminal.  
When a device such as a transistor output type sensor is connected, PNP open collector transistor output can be used.



##### ■ Switching between sink/source inputs

To switch the input type to sink or source input, wire the [S/S] terminal to the [0V], [-] or [24V], [+] terminal.

In the case of AC power supply type

- Sink input: Connect the [24V] terminal and [S/S] terminal. ([Page 115 Sink input \[AC power supply type\]](#))
- Source input: Connect the [0V] terminal and [S/S] terminal. ([Page 116 Source input \[AC power supply type\]](#))

In the case of DC power supply type

- Sink input: Connect the [+] terminal and [S/S] terminal. ([Page 117 Sink input \[DC power supply type\]](#))
- Source input: Connect the [-] terminal and [S/S] terminal. ([Page 118 Source input \[DC power supply type\]](#))

#### Point

All inputs (X) of the CPU module can be set to either sink input or source input by selection.

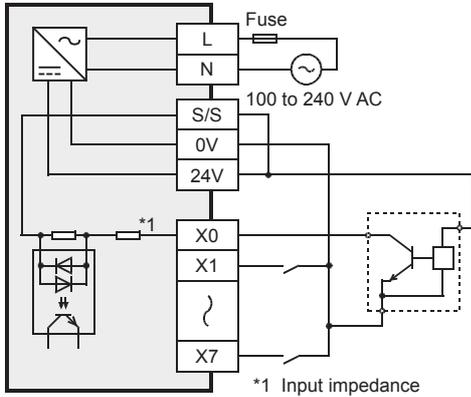
## Handling of 24 V DC input

### Input terminal

For FX5U CPU module, input module (extension cable type), input/output module (extension cable type), powered input/output module and high-speed pulse input/output module

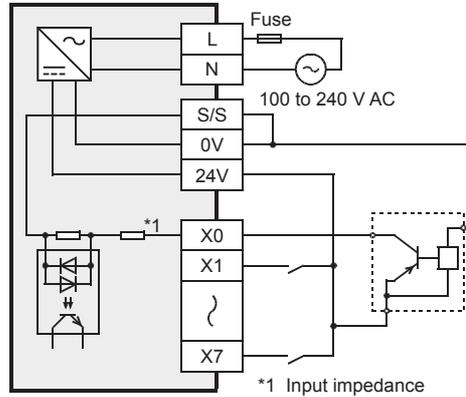
- Sink input

When a no-voltage contact or NPN open collector transistor output is connected between an input (X) terminal and the [0V] terminal and the circuit is closed, the input (X) turns on. The input display LED turns on.



- Source input

When a no-voltage contact or PNP open collector transistor output is connected between an input (X) terminal and the [24V] terminal and the circuit is closed, the input (X) turns on. The input display LED turns on.



- RUN terminal setting

X0 to X17 of the CPU module can be used as RUN input terminals by setting parameters.

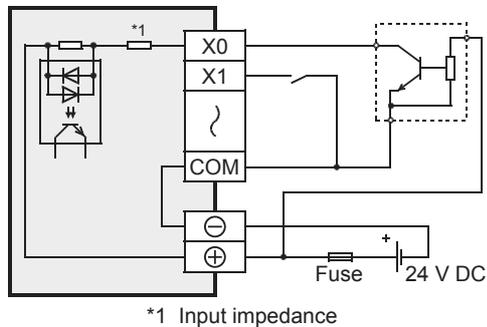
□ MELSEC iQ-F FX5 User's Manual (Application)

For input module (extension connector type) and input/output module (extension connector type)

- FX5-C□EX/D, FX5-C32ET/D

When a no-voltage contact or NPN open collector transistor output is connected between an input (X) terminal and the [COM] terminal and the circuit is closed, the input (X) turns on.

At this time, the LED corresponding to the DISP switch lights up. (FX5-C16EX/D does not have the DISP switch.)

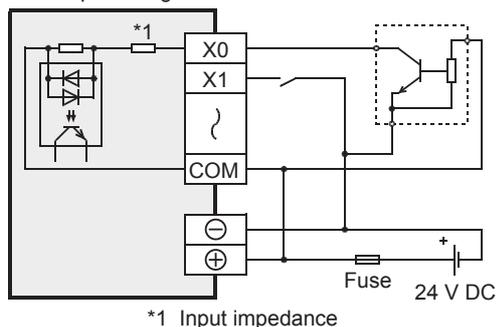


- FX5-C□EX/DS, FX5-C32ET/DSS

In the sink input, the input (X) is turned on by connecting 24 V DC [+] with the [COM] terminal, and connecting a no-voltage contact or NPN open collector transistor output between the input terminal and 24 V DC to close the circuit.

At this time, the LED corresponding to the DISP switch lights up. (FX5-C16EX/DS does not have the DISP switch.)

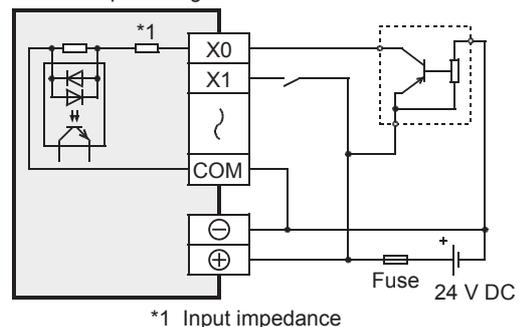
- Sink input wiring



In the source input, the input (X) is turned on by connecting 24 V DC [-] with the [COM] terminal, and connecting a no-voltage contact or PNP open collector transistor output between the input terminal and 24 V DC to close the circuit.

At this time, the LED corresponding to the DISP switch lights up. (FX5-C16EX/DS does not have the DISP switch.)

- Source input wiring



## Input circuit

- Function of input circuit

The primary and secondary circuits for input are insulated with a photocoupler, and the second circuit is provided with a C-R filter.

The C-R filter is designed to prevent malfunctions caused by chattering of the input contact and noise from the input line.

Input has a response delay switching from ON to OFF and OFF to ON, shown in the following table.

Item			Specifications
Input response time (H/W filter delay)	FX5U-32M□	X0 to X5	ON: 2.5 μs or less OFF: 2.5 μs or less
	FX5U-64M□, FX5U-80M□	X0 to X7	
	High-speed pulse input/output module	X0 to X5	
	FX5U-32M□	X6 to X17	ON: 30 μs or less OFF: 50 μs or less
	FX5U-64M□, FX5U-80M□	X10 to X17	
	High-speed pulse input/output module	X6, X7	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	
Input module, Input/output modules, Powered input/output module			ON: 50 μs or less OFF: 150 μs or less

- Change of filter time

All input circuits have digital filters, and the input response time shown in the following table can be added by setting parameters.

When using this product in an environment with much noise, set the digital filter.

Item	Specifications
Input response time (Digital filter setting value)	None, 10 μs, 50 μs, 0.1 ms, 0.2 ms, 0.4 ms, 0.6 ms, 1 ms, 5 ms, 10 ms (initial values), 20 ms, 70 ms

## Input sensitivity

For input signal current and Input sensitivity current of the CPU module, refer to  Page 24 Input Specifications.

For input signal current and Input sensitivity current of the I/O modules, refer to  Page 179 Input specifications.

## Display of operation

The LED turns ON when the photocoupler is driven.

With FX5-C32EX/□ or FX5-C32ET/□, the LED target is switched with the DISP switch.

- FX5-C32EX/□: Smaller number (F)/Larger number (L)
- FX5-C32ET/□: Input (IN)/Output (OUT)

## Precautions for connecting input devices

### ■In the case of no-voltage contact

Use input devices appropriate for low electric current.

If no-voltage contacts for high current (switches) are used, contact failure may occur.

### ■In the case of input device with built-in series diode

The voltage drop of the series diode should be the following value or less.

Also make sure that the input current is over the input-sensing level while the switches are on.

Item			Specifications
Voltage drop	FX5U-32M□	X0 to X5	3.9 V
	FX5U-64M□, FX5U-80M□	X0 to X7	
	High-speed pulse input/output module	X0 to X5	
	FX5U-32M□	X6 to X17	4.1 V
	FX5U-64M□, FX5U-80M□	X10 to X17	
	High-speed pulse input/output module	X6, X7	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	2.4 V
	Input module, Input/output modules, Powered input/output module		

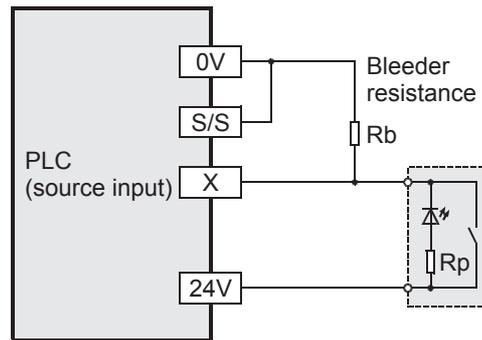
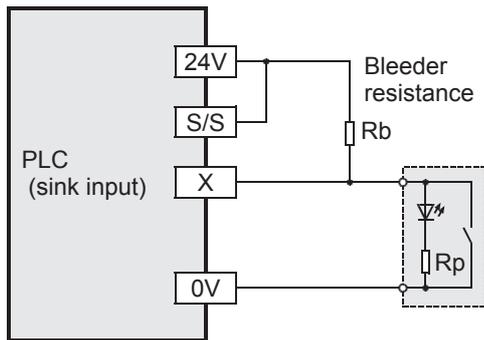
### ■In the case of input device with built-in parallel resistance

Use a device having a parallel resistance  $R_p$  (k $\Omega$ ) of the following value or more.

Item			Specifications
Parallel resistance $R_p$ (k $\Omega$ )	FX5U-32M□	X0 to X5	14
	FX5U-64M□, FX5U-80M□	X0 to X7	
	High-speed pulse input/output module	X0 to X5	
	FX5U-32M□	X6 to X17	15
	FX5U-64M□, FX5U-80M□	X10 to X17	
	High-speed pulse input/output module	X6, X7	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	13
	Input module, Input/output modules, Powered input/output module		

If the resistance is less than the above parallel resistance  $R_p$  ( $k\Omega$ ), connect a bleeder resistance  $R_b$  ( $k\Omega$ ) obtained by the following formula as shown in the following figure.

Item			Specifications
Bleeder resistance $R_b$ ( $k\Omega$ )	FX5U-32M□	X0 to X5	5 $R_p$ / (14- $R_p$ ) or less
	FX5U-64M□, FX5U-80M□	X0 to X7	
	High-speed pulse input/output module	X0 to X5	
	FX5U-32M□	X6 to X17	4 $R_p$ / (15- $R_p$ ) or less
	FX5U-64M□, FX5U-80M□	X10 to X17	
	High-speed pulse input/output module	X6, X7	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	6 $R_p$ / (13- $R_p$ ) or less
Input module, Input/output modules, Powered input/output module			

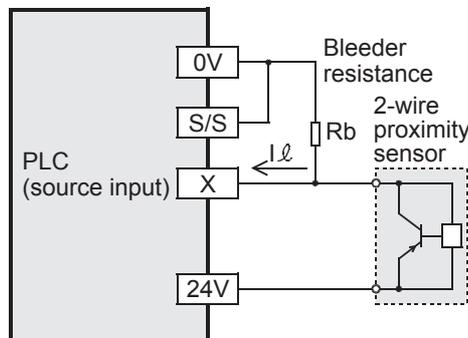
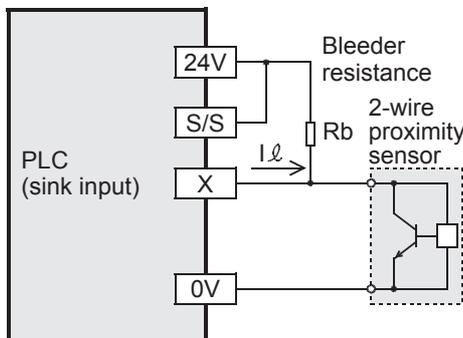


### ■ In the case of 2-wire proximity switch

Use a two-wire proximity switch whose leakage current,  $I_l$  is 1.5 mA or less when the switch is off.

If the resistance is larger than leakage current,  $I_l$  of 1.5 mA, connect a bleeder resistance  $R_b$  ( $k\Omega$ ), obtained by the following formula as shown in the following figure.

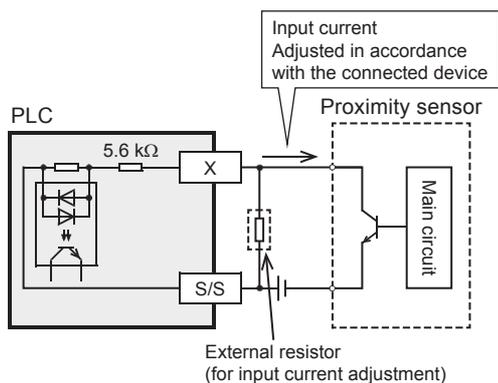
Item			Specifications
Bleeder resistance $R_b$ ( $k\Omega$ )	FX5U-32M□	X0 to X5	7 / ( $I_l$ -1.5) or less
	FX5U-64M□, FX5U-80M□	X0 to X7	
	High-speed pulse input/output module	X0 to X5	
	FX5U-32M□	X6 to X17	7 / ( $I_l$ -1.5) or less
	FX5U-64M□, FX5U-80M□	X10 to X17	
	High-speed pulse input/output module	X6, X7	
	FX5U-64M□, FX5U-80M□	X20 and subsequent	9 / ( $I_l$ -1.5) or less
Input module, Input/output modules, Powered input/output module			



## ■When the input signal cannot be received because the current is insufficient

The current rating for the CPU module in X20 or more and the I/O module is 4 mA.

In some cases, depending on extension devices used, it may not be possible to receive the input signal, due to the insufficient current. Take the following action in such case.



## In the case of capturing high-speed pulses

When capturing pulses of a response frequency of 50 to 200 kHz on input X0 to X7 (FX5U-32M□ and high-speed pulse input/output module is X0 to X5.), wire the terminals as stated below.

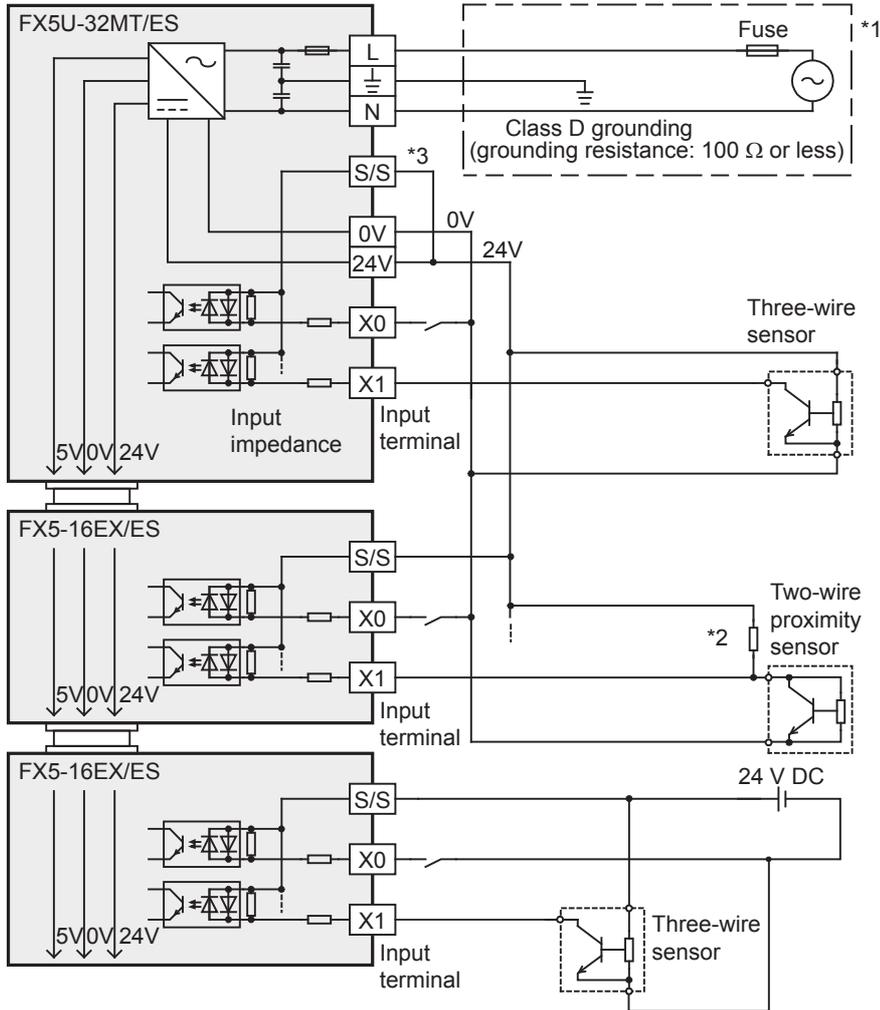
- The wiring length should be 5 m or less.
- Use shielded twisted-pair cables for connecting cables. Ground the shield of each shielded cable only on the CPU module side.
- Connect a 1.5 kΩ (1 W or more) bleeder resistance to the input terminal, so that the sum of the load current of the open collector transistor output on the mating device and the input current of the CPU module is 20 mA or more.

The above-mentioned restrictions are due to specifications of connecting device (encoder etc.).

Please adjust the cable length and load, for connecting device.

# Input wiring example

## Sink input [AC power supply type]



\*1 Handle the power supply circuit properly in accordance with "Power Supply Wiring."

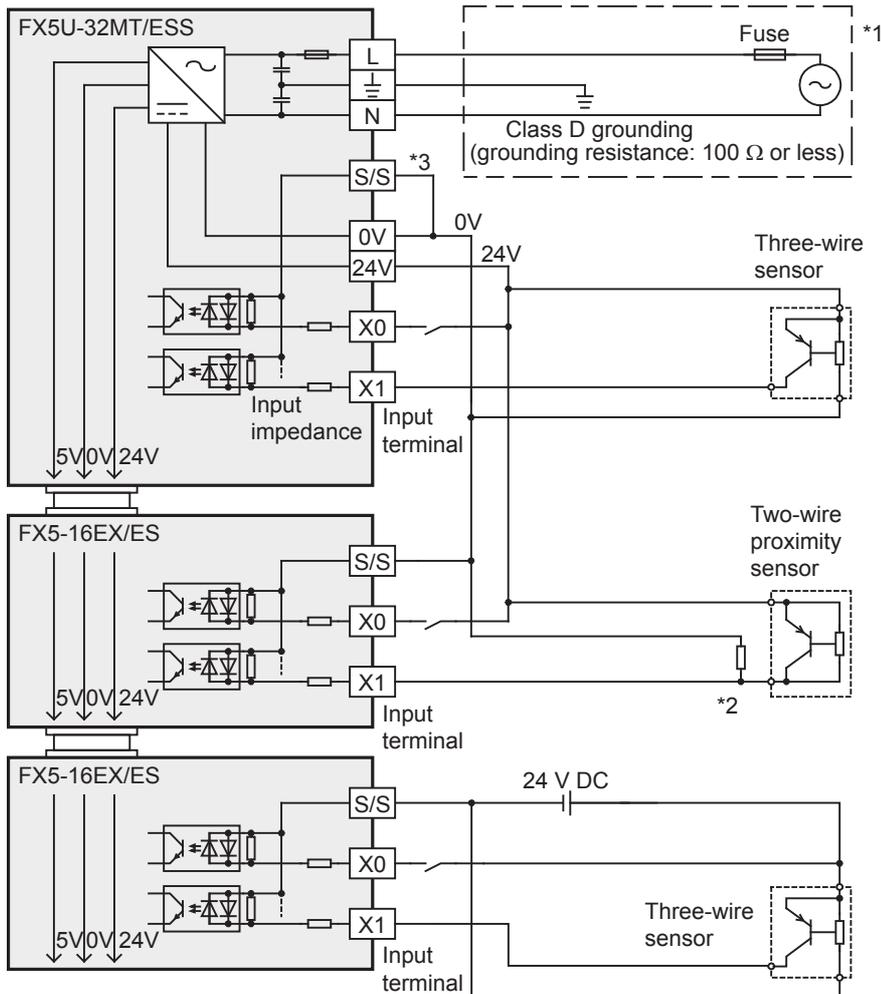
\*2 For an input device having a parallel resistance or a two-wire proximity switch, a bleeder resistance may be required.

\*3 In the case of sink input wiring, short-circuit the [S/S] and [24V] terminals of the CPU module.

### Point

The 24 V DC service power supply or external power supply can be used for all inputs (X) of the CPU module. However you need to select either one for each CPU module or I/O module. Both power supplies cannot be used together in the same module.

## Source input [AC power supply type]



\*1 Handle the power supply circuit properly in accordance with "Power Supply Wiring."

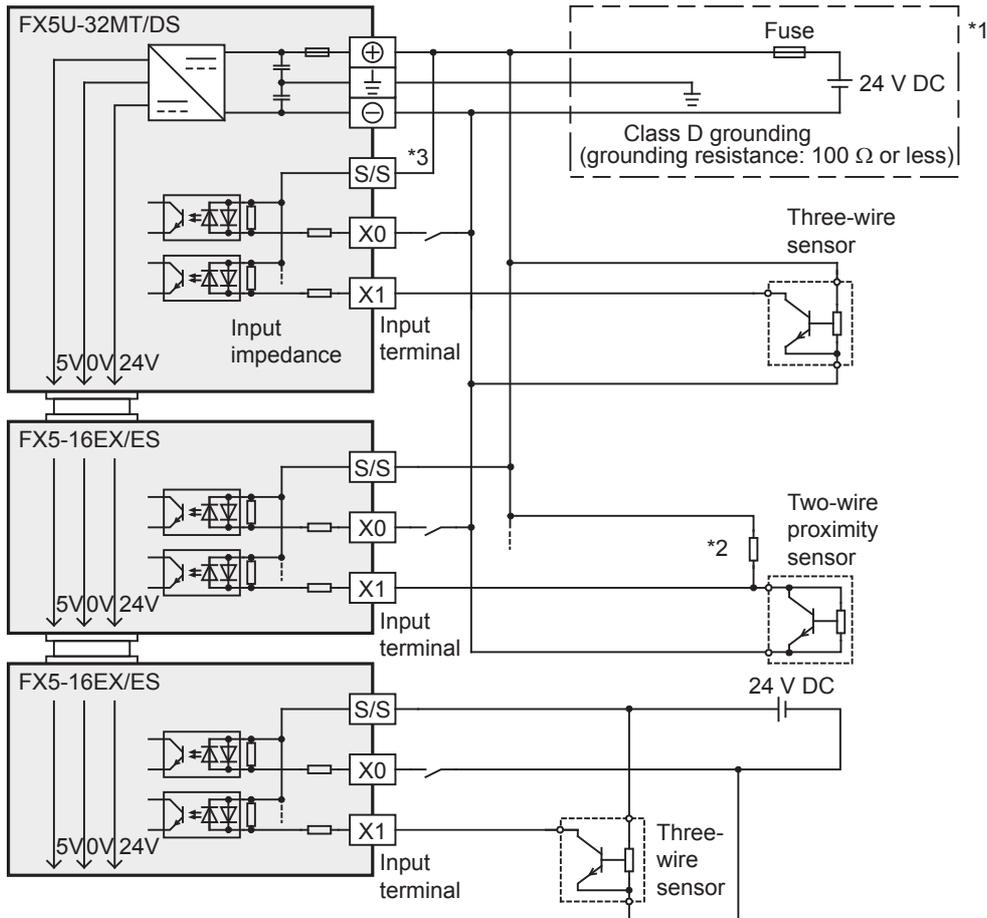
\*2 For an input device having a parallel resistance or a two-wire proximity switch, a bleeder resistance may be required.

\*3 In the case of source input wiring, short-circuit the [S/S] and [0V] terminals of the CPU module.

### Point

The 24 V DC service power supply or external power supply can be used for all inputs (X) of the CPU module. However you need to select either one for each CPU module or I/O module. Both power supplies cannot be used together in the same module.

## Sink input [DC power supply type]

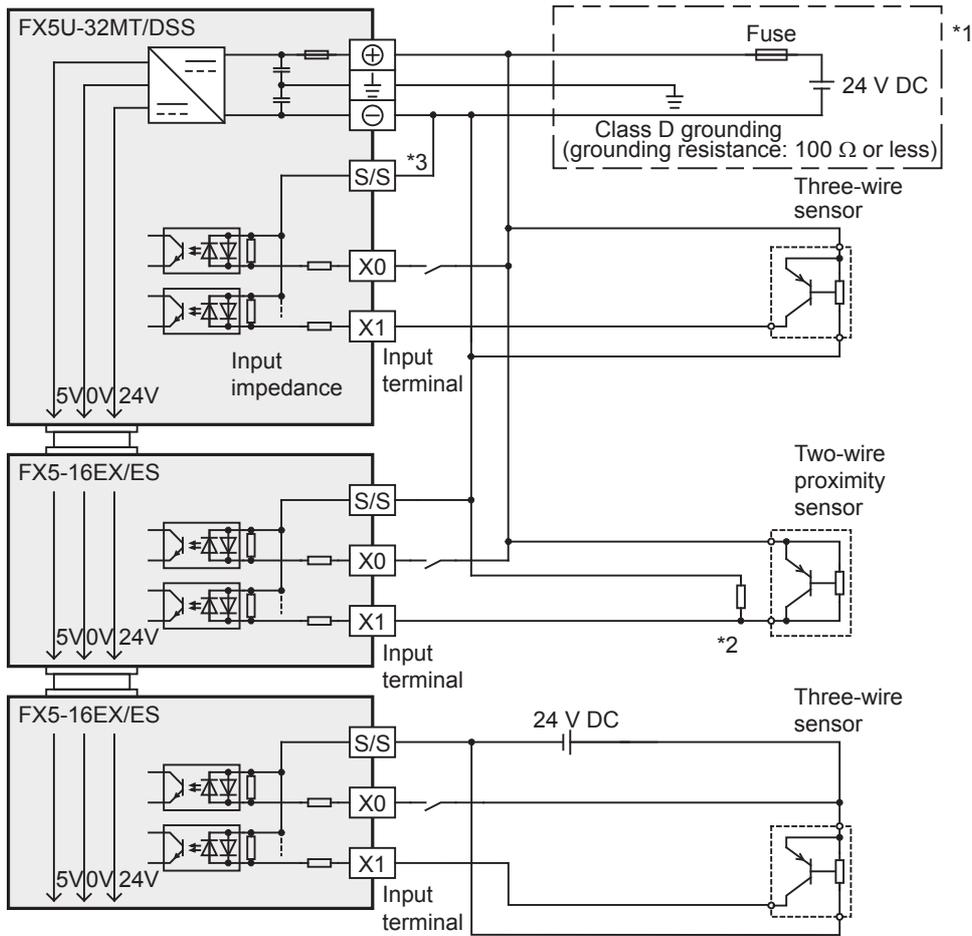


\*1 Handle the power supply circuit properly in accordance with "Power Supply Wiring."

\*2 For an input device having a parallel resistance or a two-wire proximity switch, a bleeder resistance may be required.

\*3 In the case of sink input wiring, short-circuit the [S/S] and [+] terminals of the CPU module.

## Source input [DC power supply type]



\*1 Handle the power supply circuit properly in accordance with "Power Supply Wiring."

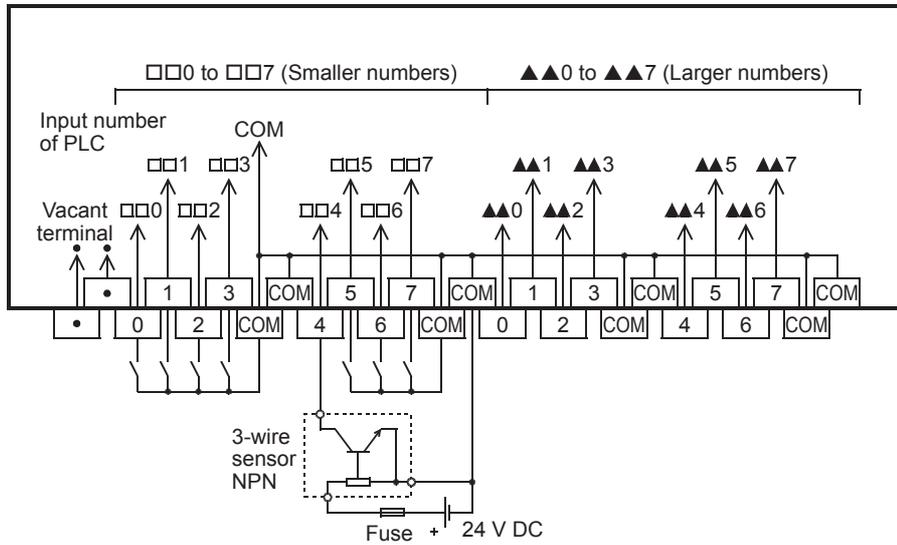
\*2 For an input device having a parallel resistance or a two-wire proximity switch, a bleeder resistance may be required.

\*3 In the case of source input wiring, short-circuit the [S/S] and [-] terminals of the CPU module.

# Input wiring examples of terminal modules

## FX-16E-TB, FX-32E-TB

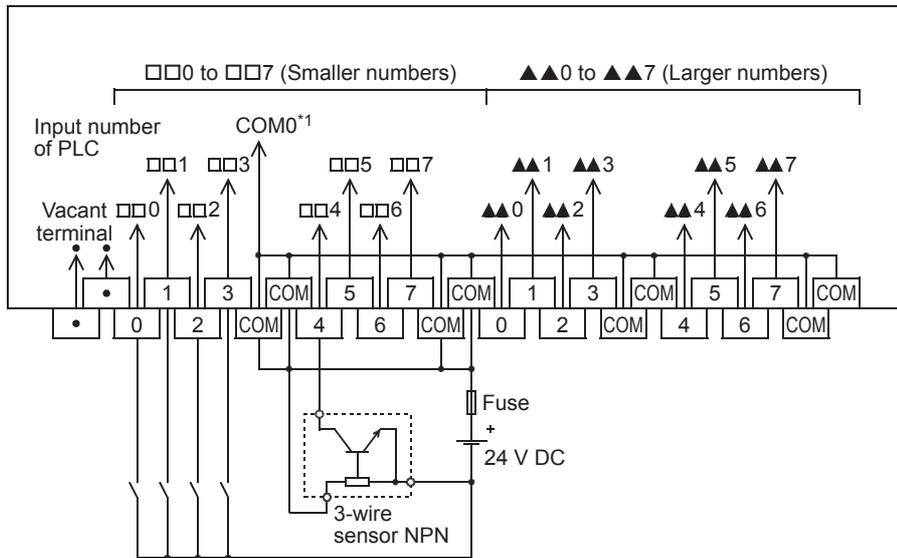
Connectable models: FX5-C□EX/D, FX5-C32ET/D



## FX-16E-TB/UL, FX-32E-TB/UL

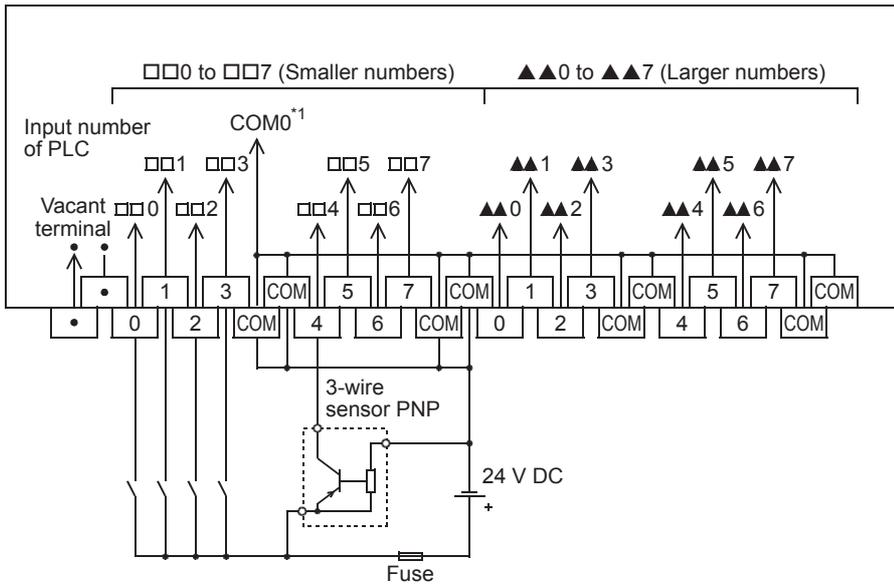
Connectable models: FX5-C□EX/DS, FX5-C32ET/DSS

- In the case of sink wiring



\*1 Replace this number with the one of the connected connector.

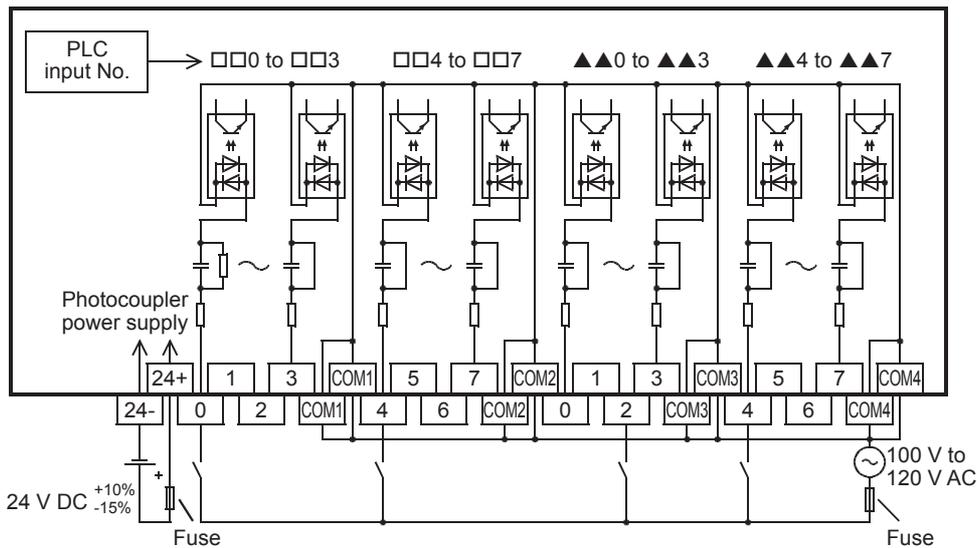
- In the case of source wiring



\*1 Replace this number with the one of the connected connector.

## FX-16EX-A1-TB

Connectable models: FX5-C□EX/D, FX5-C32ET/D



# 6.6 Output Wiring

The output wiring of the CPU module, I/O modules, and terminal modules is explained below.

## Relay output

For output specifications of the CPU module, refer to [Page 26 Output Specifications](#).

For output specifications of the I/O modules, refer to [Page 181 Output specifications](#).

For output specifications of the terminal modules, refer to [Page 197 Output specifications](#).

### Product life of relay output contacts

The product life of relay output contacts varies considerably depending on the load type used.

Note that loads generating reverse electromotive force or rush current may cause poor contact or welding of contacts which may lead to considerable reduction of the contact product life.

#### ■Inductive load

Inductive loads generate large reverse electromotive force between contacts at shutdown, which may cause arc discharge. At a fixed current consumption, as the power factor (phase between current and voltage) gets smaller, the arc energy gets larger. The following table shows the standard life of contacts used for inductive loads, such as contactors and solenoid valves.

Model	Inductive load	Standard life
CPU module, FX5-□EYR/ES, FX5-32ER/□S, FX5-16ER/ES	20 VA	500,000 times
Terminal module	35 VA	

The following table shows the approximate life of a relay based on the results of an operation life test.

- Test condition: 1 sec. ON/1 sec. OFF

Load capacity	Contact life	
■CPU module, FX5-□EYR/ES, FX5-32ER/□S, FX5-16ER/ES		
20 VA	0.2 A/100 V AC	3,000,000 times
	0.1 A/200 V AC	
35 VA	0.35 A/100 V AC	1,000,000 times
	0.17 A/200 V AC	
80 VA	0.8 A/100 V AC	200,000 times
	0.4 A/200 V AC	
■Terminal module		
35 VA	0.35 A/100 V AC	3,000,000 times
	0.17 A/200 V AC	
80 VA	0.8 A/100 V AC	1,000,000 times
	0.4 A/200 V AC	
120 VA	1.2 A/100 V AC	200,000 times
	0.6 A/200 V AC	

The product life of relay contacts becomes considerably shorter than the above conditions when the rush overcurrent is shut down.

Please refer to the following measures regarding the inductive load.

[Page 123 Contact protection circuit for inductive loads](#)

Some types of inductive loads generate rush current 5 to 15 times the stationary current at activation. Make sure that the rush current does not exceed the current corresponding to the maximum specified resistance load.

#### ■Lamp load

Lamp loads generally generate rush current 10 to 15 times the stationary current. Make sure that the rush current does not exceed the current corresponding to the maximum specified resistance load.

## ■Capacitive load

Capacitive loads can generate rush current 20 to 40 times the stationary current. Make sure that the rush current does not exceed the current corresponding to the maximum specified resistance load.

Capacitive loads such as capacitors may be present in electronic circuit loads including inverters.

## ■Resistance load

For maximum load specifications of resistance load, refer to the following.

For output specifications of the CPU module, refer to [Page 26 Output Specifications](#).

For output specifications of the I/O modules, refer to [Page 181 Output specifications](#).

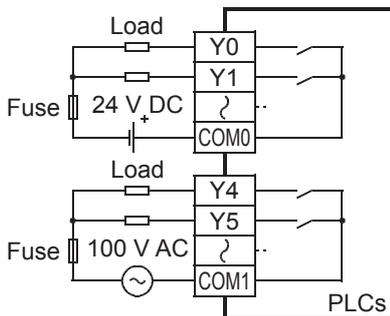
For output specifications of the terminal modules, refer to [Page 197 Output specifications](#).

## Handling of relay output

### ■Output terminal

One common terminal is used for 4 or 8 relay output points.

The common terminal blocks can drive loads of different circuit voltage systems (for example, 100 V AC and 24 V DC).



### ■External power supply

Use an external power supply of 30 V DC or less or 240 V AC or less (250 V AC or less when the module does not comply with CE, UL, cUL standards) for loads.

### ■Insulation of circuit

The PLC internal circuit and external load circuits are electrically insulated between the output relay coil and contact.

The common terminal blocks are separated from one another.

### ■Display of operation

When power is applied to the output relay coil, the LED is lit, and the output contact is turned on.

### ■Response time

The response time of the output relay from when the power is applied to the coil until the output contact is turned on and from when the coil is shut off until the output contact is turned off is approx. 10 ms.

### ■Output current

At a circuit voltage of 240 V AC or less (250 V AC or less when the module does not comply with CE, UL, cUL standards), a resistance load of 2 A per point or an inductive load of 80 VA or less (100 V AC or 200 V AC) can be driven.

For the life of the contact for switching an inductive load, refer to [Page 121 Inductive load](#).

When an inductive load is switched, connect a diode (for commutation) or a surge absorber in parallel with this load.

DC circuit	AC circuit
Diode (for commutation)	Surge absorber

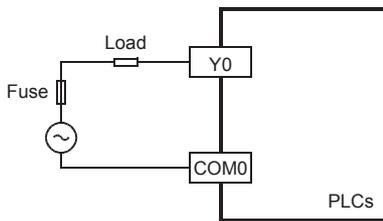
### ■Open circuit leakage current

There is no leakage current when the outputs are OFF.

## Wiring precautions

### ■ Protection circuit for load short-circuiting

A short-circuit at a load connected to an output terminal could cause burnout at the output element or the PCB. To prevent this, a protection fuse should be inserted at the output.



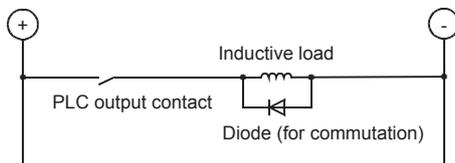
### ■ Contact protection circuit for inductive loads

An internal protection circuit for the relays is not provided for the relay output circuit in this product. It is recommended to use inductive loads with built-in protection circuits.

When using loads without built-in protection circuits, insert an external contact protection circuit, etc. to reduce noise and extend product life.

- DC circuit

Connect a diode in parallel with the load.

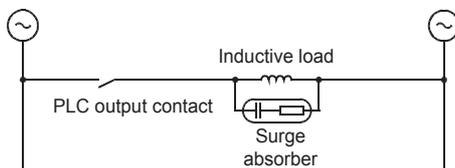


The diode (for commutation) must comply with the following specifications.

- Reverse voltage: 5 to 10 times the load voltage
- Forward current: Load current or more

- AC circuit

Connect a surge absorber (CR composite parts like surge killer, spark killer, etc.) parallel to the load.

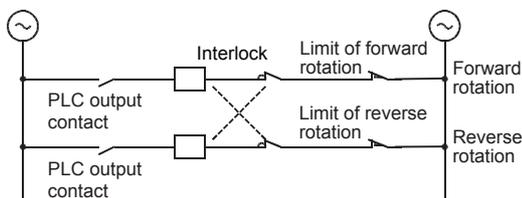


Select a surge absorber with voltage rating that is suitable for the output used.

- Electrostatic capacity: Approx. 0.1  $\mu\text{F}$
- Resistance: Approx. 100 to 200  $\Omega$

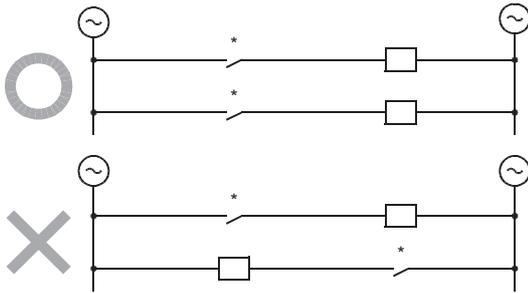
### ■ Interlock

For loads such as forward/reverse contactors, etc., where a hazardous condition could result if switched ON simultaneously, an external interlock should be provided for interlocking along with an interlock in the PLC program, as shown below.



## ■ In-phase

PLC output contacts (\*) should be used in an "in-phase" manner.



## Transistor output

For output specifications of the CPU module, refer to [Page 26 Output Specifications](#).

For output specifications of the I/O modules, refer to [Page 181 Output specifications](#).

For output specifications of the terminal modules, refer to [Page 197 Output specifications](#).

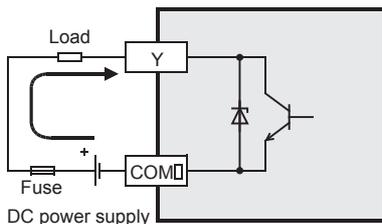
## Sink and source output

Sink output and source output products are available for transistor outputs of the CPU module, I/O modules, and terminal modules.

### ■ Differences in circuit

- Sink output [-common]

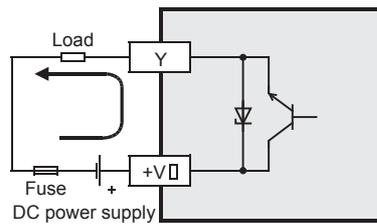
Output to make load current flow into the output (Y) terminal is called sink output.



DC power supply  
A number is entered in the □ of [COM□].

- Source output [+common]

Output to make load current flow out of the output (Y) terminal is called source output.



DC power supply  
A number is entered in the □ of [+V□].

## Handling of transistor output

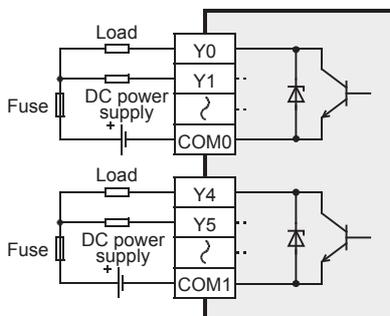
### ■ Output terminal

For the CPU module, output module (extension cable type), input/output module (extension cable type), powered input/output module and high-speed pulse input/output module, the transistor output type is a 4-point or 8-point common output type.

- Sink output

Connect each COM□ (number) terminal to the minus side of the load power supply.

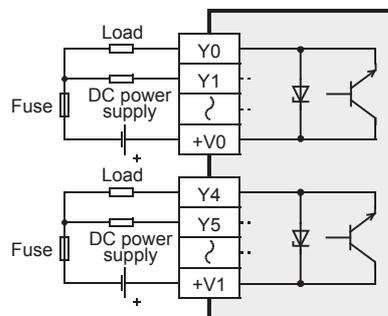
The COM□ terminals are not connected internally.



- Source output

Connect +V□ (number) terminal to the plus side of the load power supply.

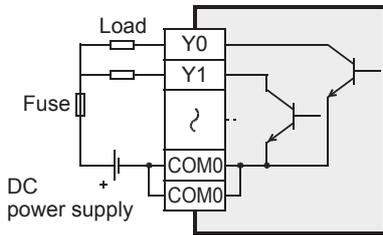
The +V□ terminals are not connected internally.



For the output module (extension connector type) and input/output module (extension connector type), the transistor output type is an 8-point common output type.

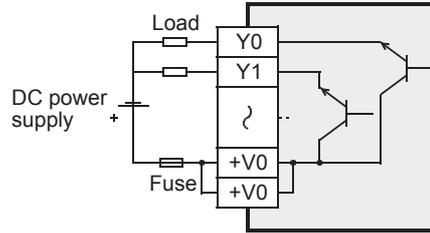
• Sink output

The COM□ (number) terminals that are connected each other inside the PLC are prepared. For external wiring, connect the COM□ (number) terminals outside the PLC to reduce the load per one COM□ terminal.



• Source output

The +V□ (number) terminals that are connected each other inside the PLC are prepared. For external wiring, connect the +V□ (number) terminals outside the PLC to reduce the load per one +V□ terminal.



■ External power supply

For driving the load, use a smoothing power supply of 5 to 30 V DC that can output current two or more times the current rating of the fuse connected to the load circuit.

■ Insulation of circuit

The internal circuit of the PLC and the output transistor are insulated with a photocoupler. The common blocks are separated from one another.

■ Display of operation

Operation indicator LEDs are built into the CPU module and output modules, and turn ON when photocouplers are activated, and the transistors are switched on.

With FX5-C32EYT/□ or FX5-C32ET/□, the LED target is switched with the DISP switch.

- FX5-C32EYT/□: Smaller number (F)/Larger number (L)
- FX5-C32ET/□: Input (IN)/Output (OUT)

■ Response time

Time taken from when the photocoupler of the module is driven (or shut off) to when the transistor is turned on (or off) differs depending on the output terminal used. For specifications of each module, refer to the following.

For output specifications of the CPU module, refer to [Page 26 Output Specifications](#).

For output specifications of the I/O modules, refer to [Page 181 Output specifications](#).

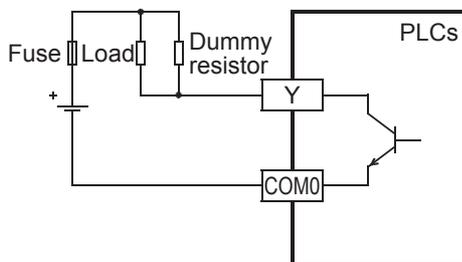
For output specifications of the terminal modules, refer to [Page 197 Output specifications](#).

**Point**

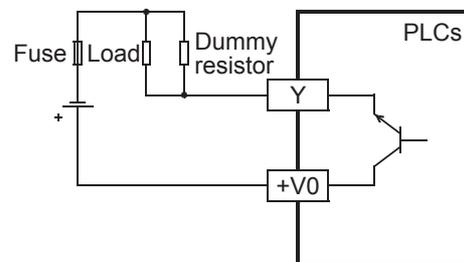
The transistor OFF time is longer under lighter loads. For example, under a load of 24 V DC 40 mA, the response time is approx. 0.3 ms.

When response performance is required under light loads, provide a dummy resistor as shown below to increase the load current.

• Sink output type



• Source output type



## ■Output current

Maximum load differs for each module. For specifications of each module, refer to the following.

For output specifications of the CPU module, refer to  Page 26 Output Specifications.

For output specifications of the I/O modules, refer to  Page 181 Output specifications.

For output specifications of the terminal modules, refer to  Page 197 Output specifications.

When driving a semiconductor device, carefully check the input voltage characteristics of the device.

## ■Open circuit leakage current

0.1 mA or less

## Wiring precautions

### ■Protection circuit for load short-circuiting

A short-circuit at a load connected to an output terminal could cause burnout at the output device or the PCB.

To prevent this, a protection fuse should be inserted at the output. Use a load power supply capacity that is at least 2 times larger than the load current.



### ■Contact protection circuit for inductive loads

When an inductive load is connected, connect a diode (for commutation) in parallel with the load as necessary.

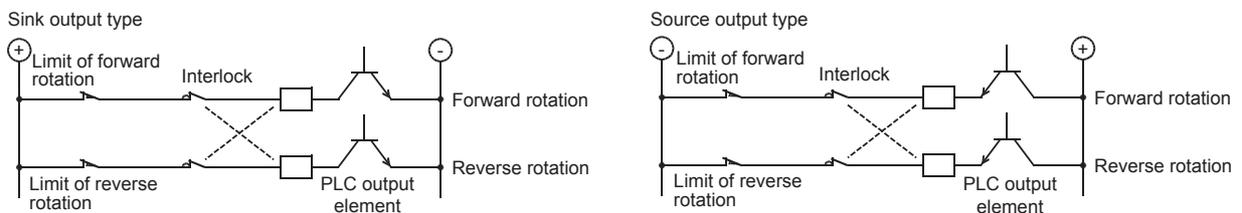
The diode (for commutation) must comply with the following specifications.

Standard	
Reverse voltage	5 to 10 times as high as the load voltage
Forward current	Load current or larger



### ■Interlock

For loads such as forward/reverse contactors, etc., where a hazardous condition could result if switched ON simultaneously, an external interlock should be provided for interlocking along with an interlock in the PLC program, as shown below.



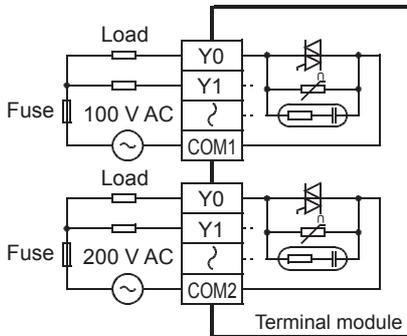
# Triac output

For output specifications of the terminal modules, refer to  Page 197 Output specifications.

## Handling of triac output

### Output terminal

Four triac output points are covered by one common terminal. The common terminal blocks can drive loads of different circuit voltage systems (Example: 100 V AC and 24 V DC).



### Insulation of circuit

The internal circuit and the output element (triac) are insulated with photothyristors. The common blocks are separated from one another.

### Display of operation

The LED turns on and the output triac is turned on when photothyristors are actuated.

### Response time

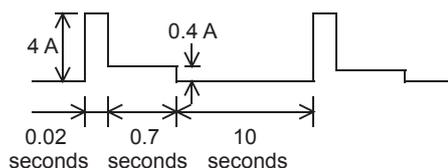
The response time until the output triac is turned on after the photothyristors are actuated (or shut off) is 1 ms or less, and the response time until the output triac is turned off is 10 ms or less.

### Output current

Current of 0.3 A can flow per one output point. However, current of four output points should be 0.8 A (average of 0.2 A per one point) to suppress temperature rise. When a load with a high rush current is frequently turned on or off, the mean-square current should be 0.2 A or less.

<Example>

$$\sqrt{\frac{4^2 \times 0.02 + 0.4^2 \times 0.7}{0.02 + 0.7 + 10}} = 0.2 \text{ A}$$



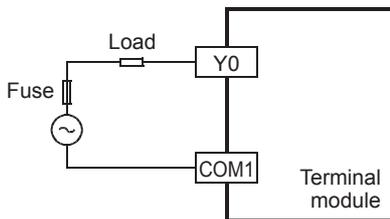
### Open circuit leakage current

C-R absorbers are connected in parallel at the triac output terminal for turning off the triac. Thus, open circuit leakage currents of 1 mA/100 V AC or 2 mA/200 V AC occurs. Since the triac output type has open circuit leakage currents, even after the triac output is turned off, a small relay and a minute current load with low rated operation currents may continuously operate. Therefore, the load should be equal to or more than 0.4 VA/100 V AC or 1.6 VA/200 V AC. For loads lower than these values, connect the surge absorbers described later in parallel.

## Wiring precautions

### ■Protection circuit for load short-circuiting

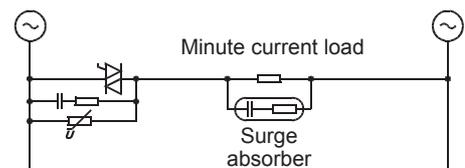
A short-circuit at a load connected to an output terminal could cause burnout at the output element or the PCB. To prevent this, a protection fuse should be inserted at the output.



### ■Minute current load

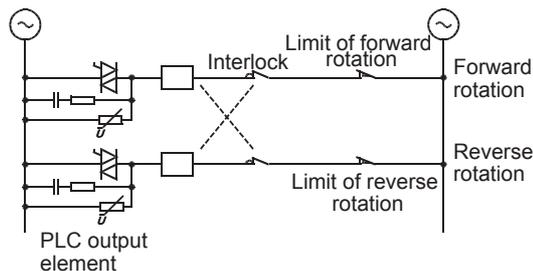
C-R absorbers are connected in parallel at the triac output circuit for turning off the triac. When a minute current load of 0.4 VA or less/100 V AC or 1.6 VA or less/200 V AC is connected, a surge absorber must be connected in parallel with the load. Select a surge absorber with the rated voltage that is suitable for the output used. For other specifications, refer to the following.

Standard  
Electrostatic capacity: Approx. 0.1  $\mu$ F  
Resistance: Approx. 100 to 200  $\Omega$



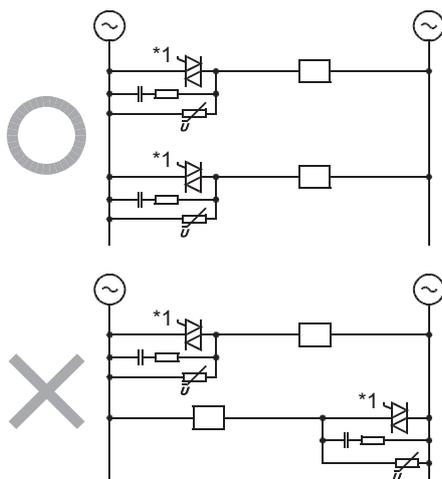
### ■Interlock

For loads such as forward/reverse contactors, etc., where a hazardous condition could result if switched ON simultaneously, an external interlock should be provided for interlocking along with an interlock in the PLC program as shown below.



### ■In-phase

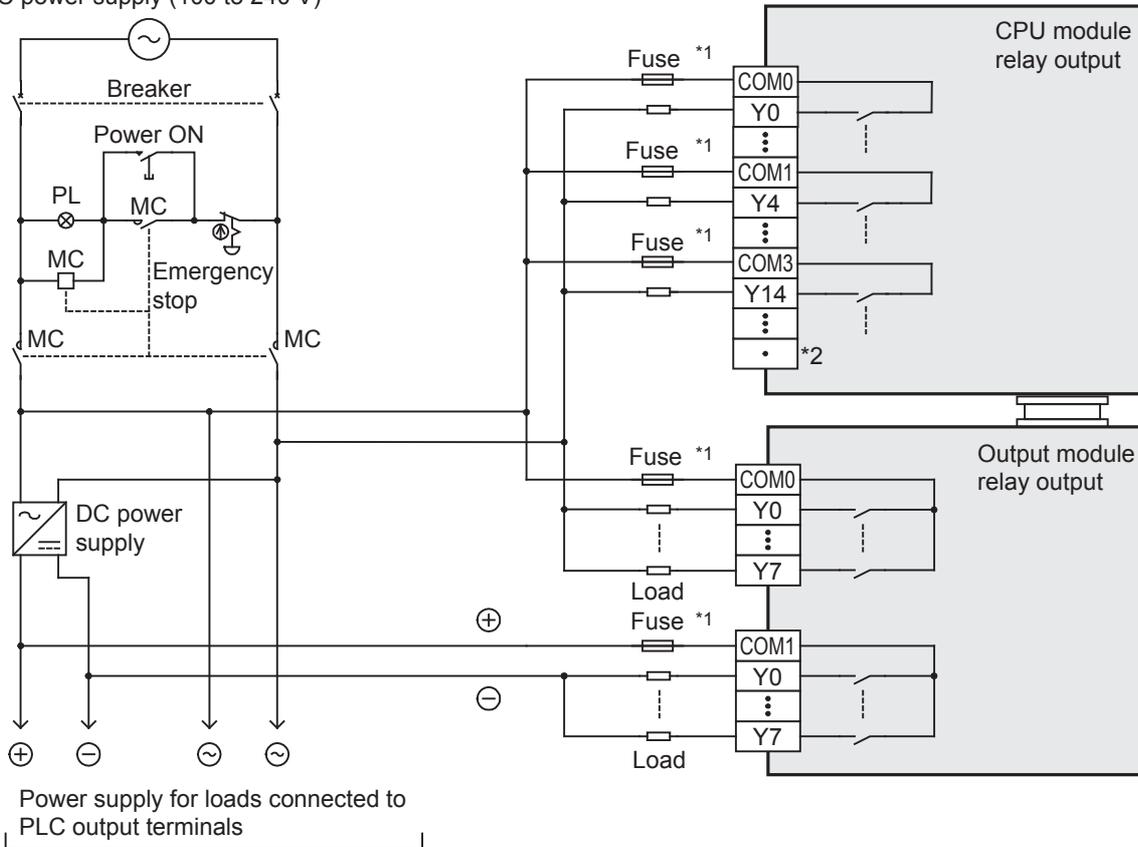
PLC output contacts (\*1) should be used in an "in-phase" manner.



# Output wiring example

## Relay output

AC power supply (100 to 240 V)



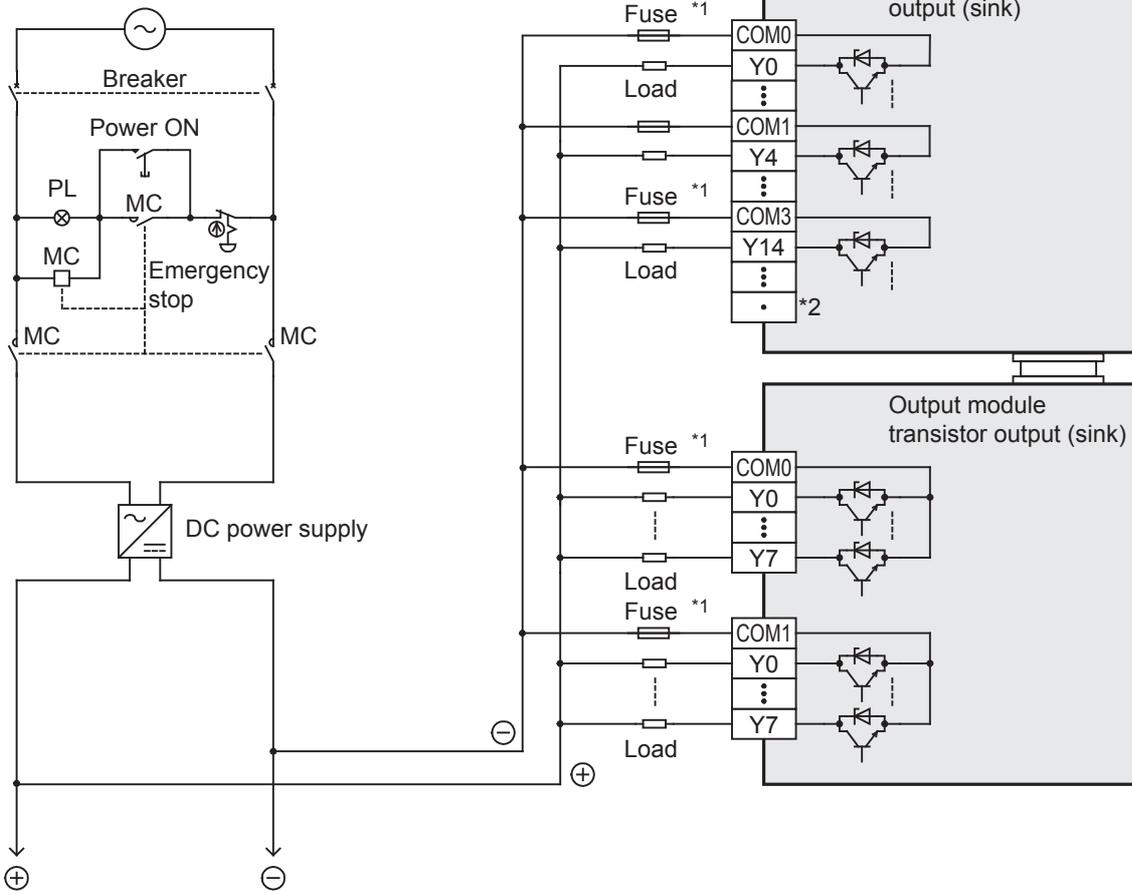
As for emergency stop operation, see "DESIGN PRECAUTIONS" at "Safety Precautions" field.

- \*1 The output circuit of the PLC does not have a built-in fuse.  
Provide a fuse suitable for each load to prevent melting of the wires on the circuit board caused by output device breakdown due to load short-circuiting.
- \*2 "." represents vacant terminals.

## Transistor output

### ■ Sink output type

AC power supply (100 to 240 V)



Power supply for loads connected to PLC output terminals

As for emergency stop operation, see "DESIGN PRECAUTIONS" at "Safety Precautions" field.

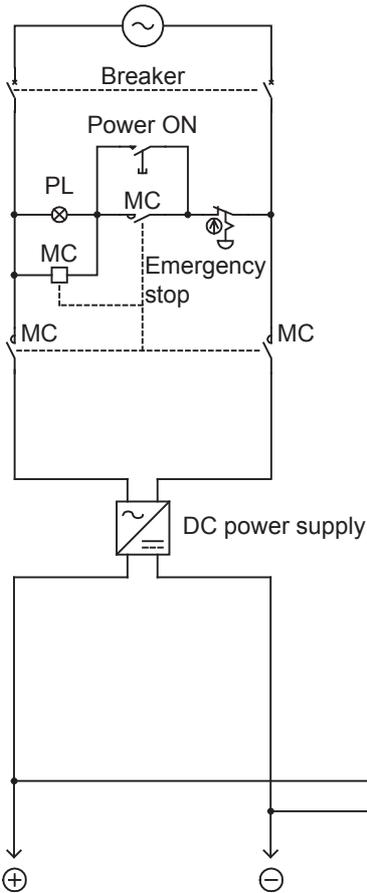
\*1 The output circuit of the PLC does not have a built-in fuse.

Provide a fuse suitable for each load to prevent melting of the wires on the circuit board caused by output device breakdown due to load short-circuiting.

\*2 "." represents vacant terminals.

## ■ Source output type

AC power supply (100 to 240 V)



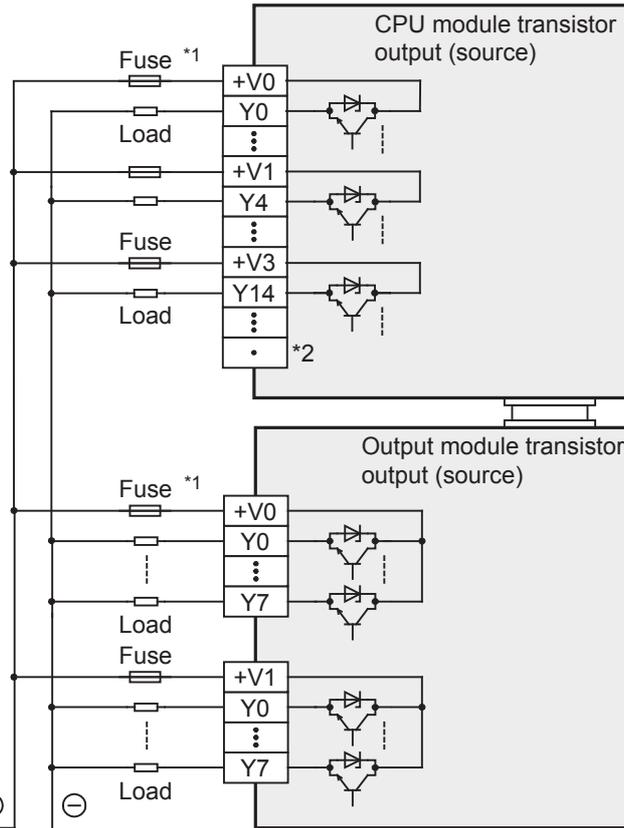
Power supply for loads connected to PLC output terminals

As for emergency stop operation, see "DESIGN PRECAUTIONS" at "Safety Precautions" field.

\*1 The output circuit of the PLC does not have a built-in fuse.

Provide a fuse suitable for each load to prevent melting of the wires on the circuit board caused by output device breakdown due to load short-circuiting.

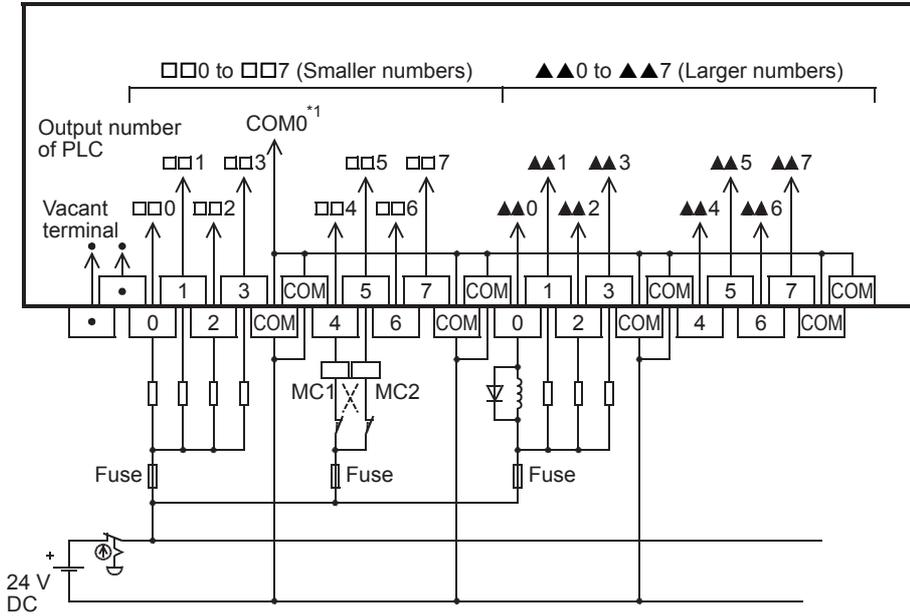
\*2 "." represents vacant terminals.



# Output wiring examples of terminal modules

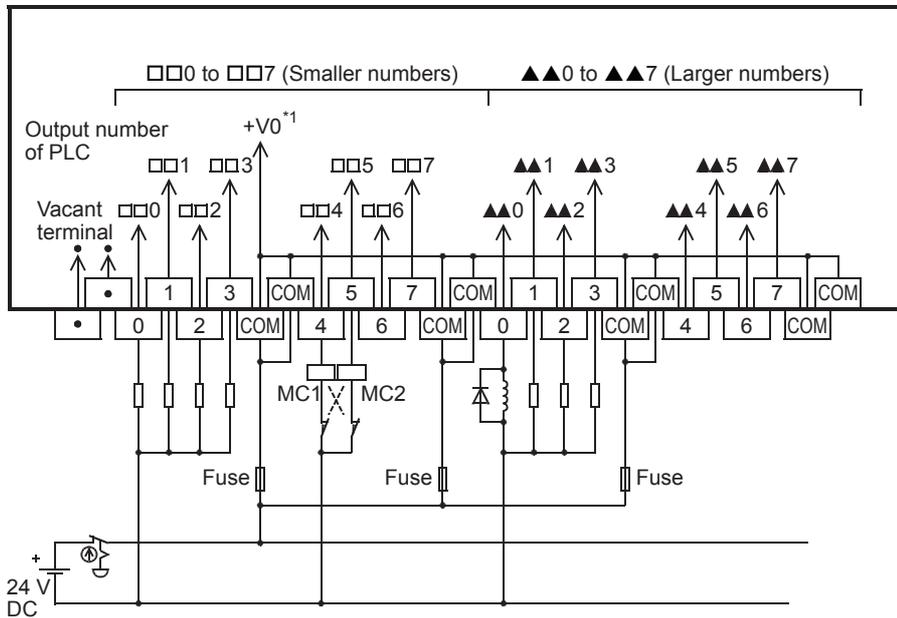
## FX-16E-TB, FX-32E-TB

Connectable models: FX5-C□EYT/D, FX5-C32ET/D



## FX-16E-TB/UL, FX-32E-TB/UL

Connectable models: FX5-C□EYT/DSS, FX5-C32ET/DSS

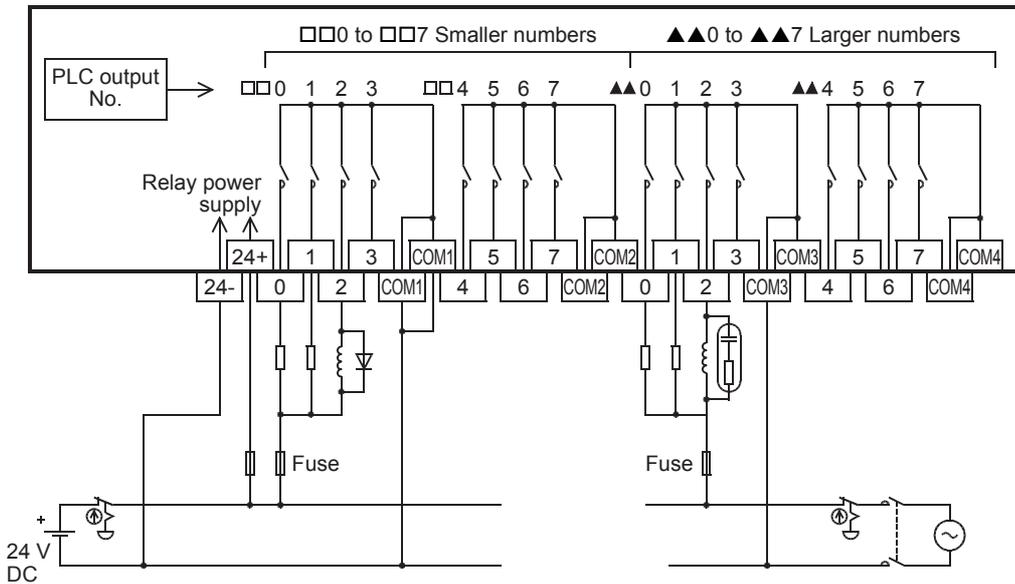


## FX-16EYR-TB, FX-16EYR-ES-TB/UL

Connectable models

FX-16EYR-TB: FX5-C□EYT/D, FX5-C32ET/D

FX-16EYR-ES-TB/UL: FX5-C□EYT/DSS, FX5-C32ET/DSS

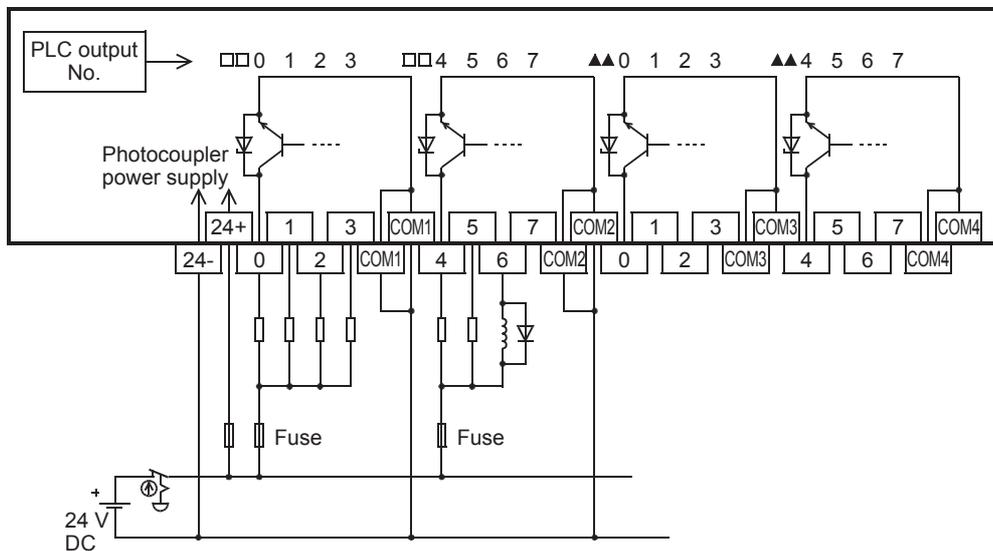


For external wiring precautions, refer to [Page 126 Wiring precautions](#).

For the life of a relay output contact, refer to [Page 121 Product life of relay output contacts](#).

## FX-16EYT-TB

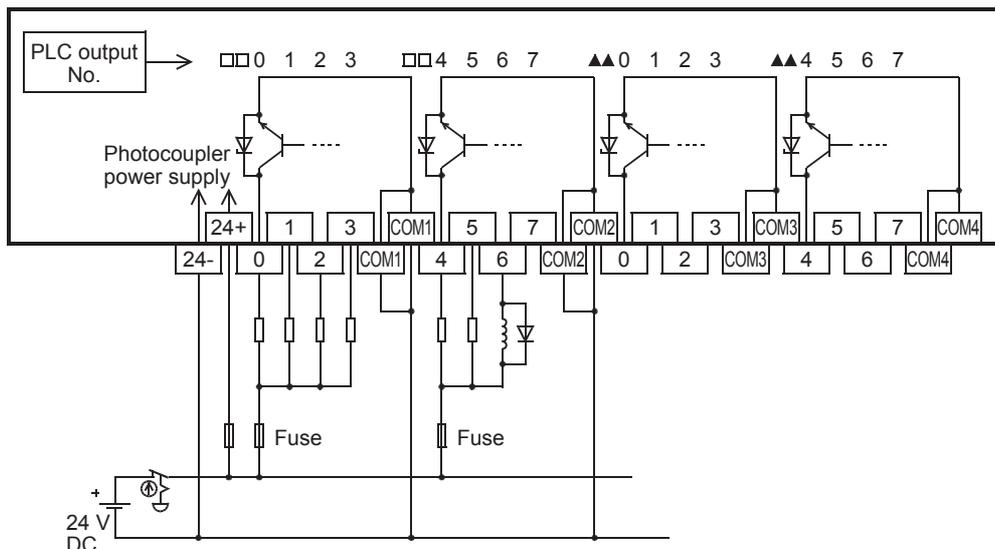
Connectable models: FX5-C□EYT/D, FX5-C32ET/D



For external wiring precautions, refer to [Page 123 Wiring precautions](#).

## FX-16EYT-ES-TB/UL

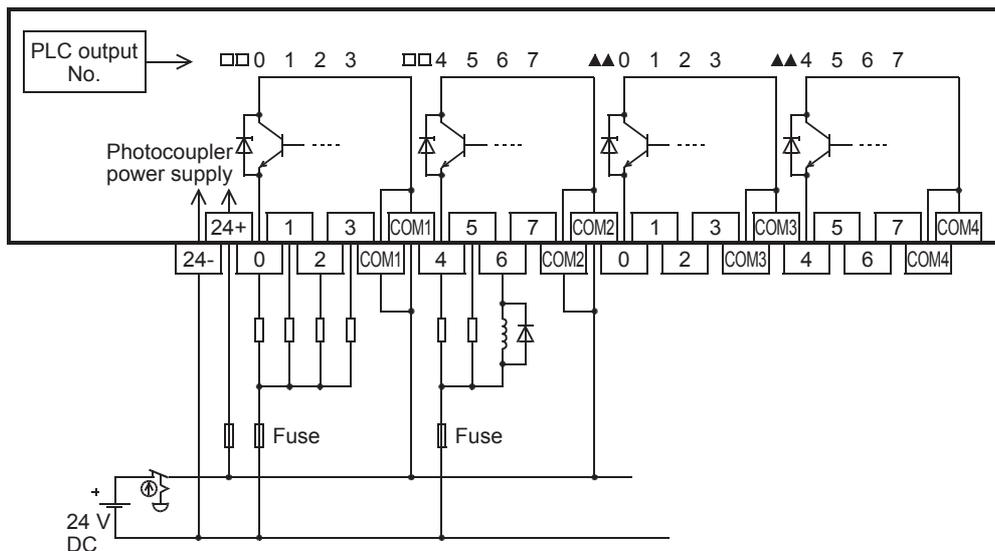
Connectable models: FX5-C□EYT/D, FX5-C32ET/D



For external wiring precautions, refer to [Page 123 Wiring precautions](#).

## FX-16EYT-ESS-TB/UL

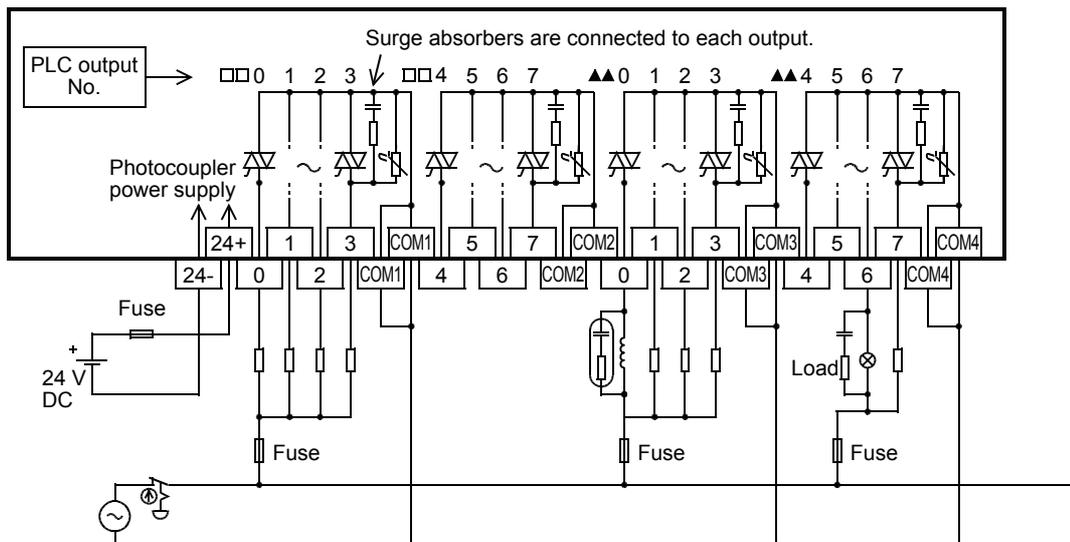
Connectable models: FX5-C□EYT/DSS, FX5-C32ET/DSS



For external wiring precautions, refer to [Page 123 Wiring precautions](#).

## FX-16EYS-TB

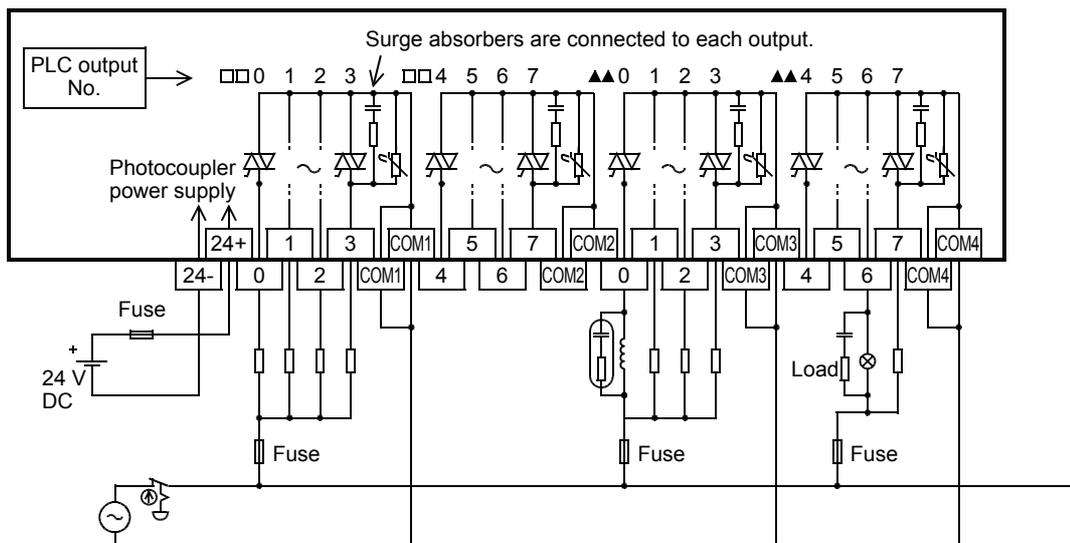
Connectable models: FX5-C□EYT/D, FX5-C32ET/D



For external wiring precautions, refer to [Page 126 Wiring precautions](#).

## FX-16EYS-ES-TB/UL

Connectable models: FX5-C□EYT/DSS, FX5-C32ET/DSS



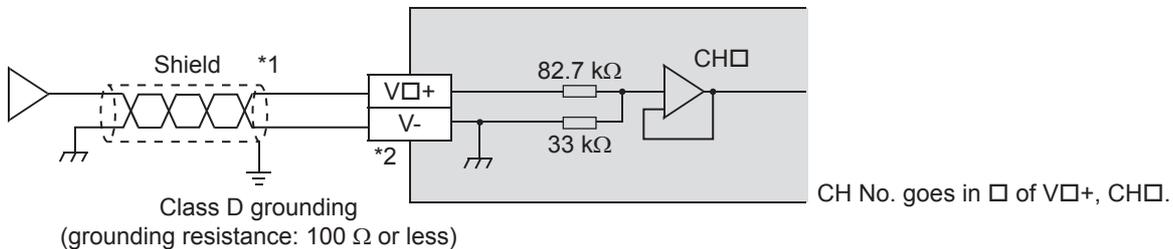
For external wiring precautions, refer to [Page 126 Wiring precautions](#).

## 6.7 Analog Wiring

Wiring to the built-in analog I/O terminals of the CPU module is explained below.

For specifications of the built-in analog I/O terminals of the CPU module, refer to  Page 30 Built-in Analog Specifications.

### Analog input wiring

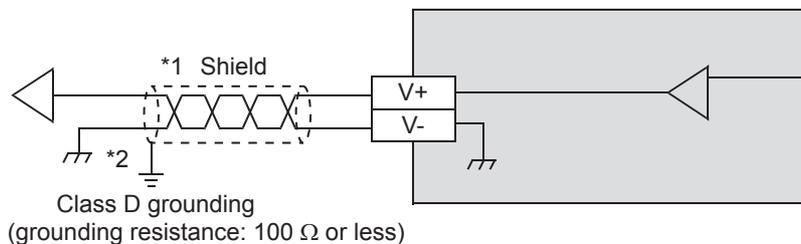


\*1 For analog input wiring, use shielded twisted-pair cables (double-core type). Separate them from other power lines or lines which can be induced by others.

\*2 For unused channels, short-circuit the "V□+" and "V-" terminals.

When used as a current input, refer to  Page 172 How to use analog inputs built in CPU module for current inputs.

### Analog output wiring



\*1 For analog output wiring, use shielded twisted-pair cables (double-core type). Separate them from other power lines or lines which can be induced by others.

\*2 Ground a shielded cable at one point on the signal receiving side.

## 6.8 Examples of Wiring for Various Uses

---

### Notes about examples of wiring

---

The examples of wiring are given under the following conditions.

#### ■Input/output number

The input/output numbers are the actual numbers on the program (They may differ from the numbers shown on the product terminals).

#### ■Input/output specifications of products

Check the input/output specifications of products and examples of wiring.

- There are products for sink output and for source output.

#### ■Examples of program

The examples of programming (instructions) are given based on the allocation of the input/output numbers for wiring.

For the instructions, refer to  MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks)

### Positioning function

---

For wiring examples for the positioning function, refer to  MELSEC iQ-F FX5 User's Manual (Positioning Control - CPU module built-in, High-speed pulse input/output module).

### Communication function

---

For wiring of the built-in RS-485 communication terminal block, communication boards and communication adapters, refer to the following.

 MELSEC iQ-F FX5 User's Manual (Serial Communication)

 MELSEC iQ-F FX5 User's Manual (MODBUS Communication)

For wiring of the built-in Ethernet, refer to the following.

 MELSEC iQ-F FX5 User's Manual (Ethernet Communication)

# High-speed counter

Examples of wiring for high-speed counters are shown below.

When capturing pulses of a response frequency of 50 to 200 kHz, refer to Page 114 In the case of capturing high-speed pulses.

For details on the high-speed counters, refer to MELSEC iQ-F FX5 User's Manual (Application).

For the programs, refer to MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks).

## 1-phase 1-input (S/W)

The wiring examples in this section use the following settings. When settings other than those in the table are used, use the examples shown in the following figures as references for wiring.

CH to be used	Pulse input mode	External preset input	External enable input	Operation mode
CH1 (CPU module) or CH9 (high-speed pulse input/output module)	1-phase 1-input (S/W)	Invalid	Invalid	Normal mode

The settings of the high-speed counters are set by using the parameter settings of the engineering tool.

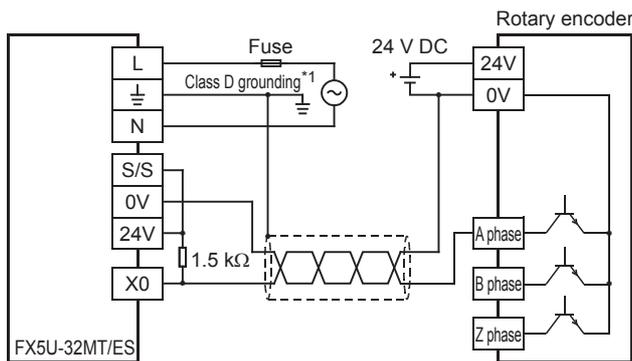
For details, refer to MELSEC iQ-F FX5 User's Manual (Application).

### ■ Example of wiring

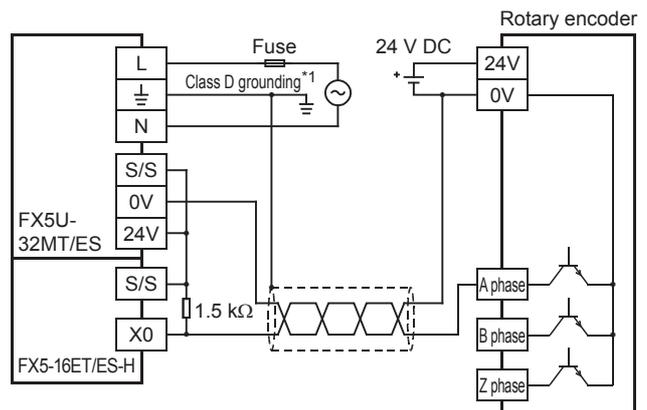
#### • NPN open collector transistor output rotary encoder

In the case of sink wiring

• When the input terminals of the FX5U-32MT/ES are used



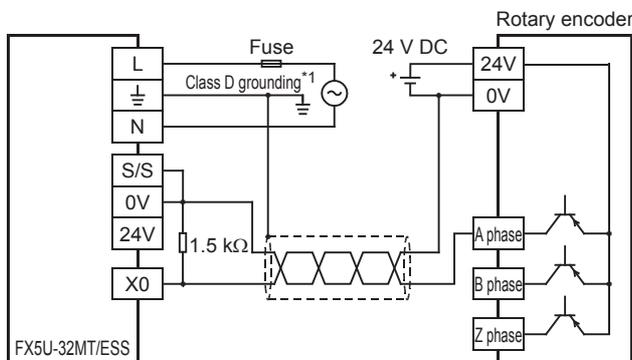
• When the input terminals of the FX5-16ET/ES-H are used



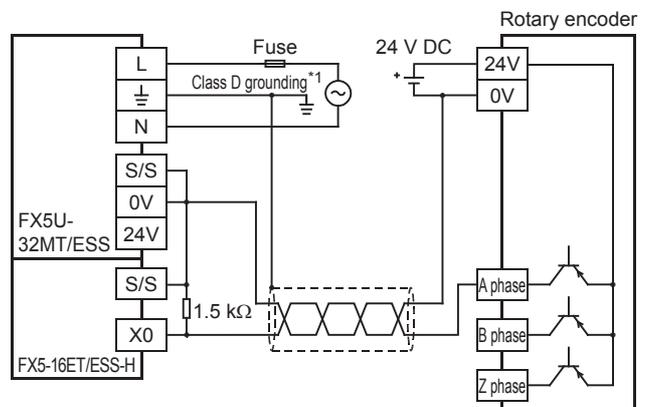
#### • PNP open collector transistor output rotary encoder

In the case of source wiring

• When the input terminals of the FX5U-32MT/ESS are used



• When the input terminals of the FX5-16ET/ESS-H are used



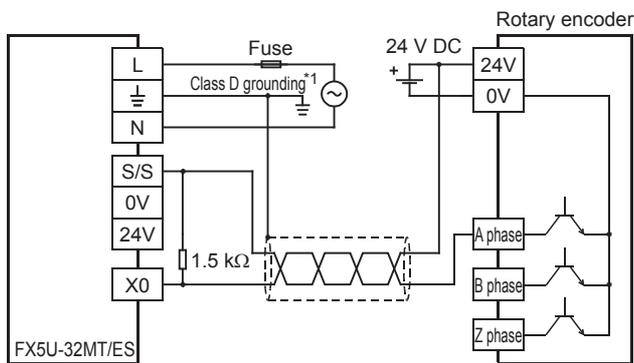
\*1 The grounding resistance should be 100 Ω or less.

■ Example of wiring (When 24 V DC external power supply is used)

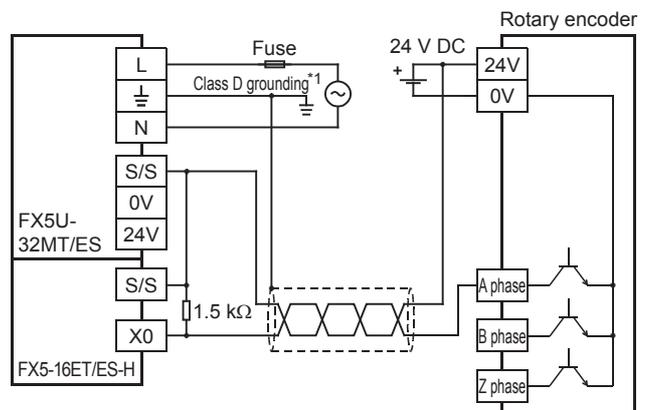
• NPN open collector transistor output rotary encoder

In the case of sink wiring

• When the input terminals of the FX5U-32MT/ES are used



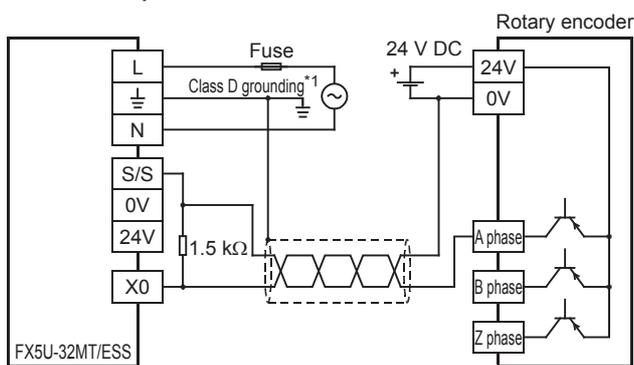
• When the input terminals of the FX5-16ET/ES-H are used



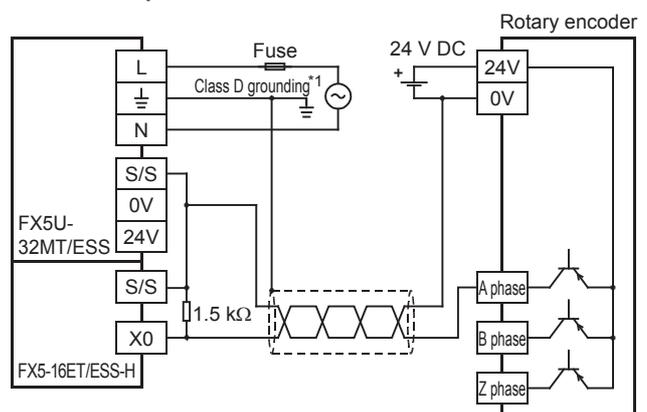
• PNP open collector transistor output rotary encoder

In the case of source wiring

• When the input terminals of the FX5U-32MT/ESS are used



• When the input terminals of the FX5-16ET/ESS-H are used



\*1 The grounding resistance should be 100 Ω or less.

## 2-phase 2-input

The wiring examples in this section use the following settings. When settings other than those in the table are used, use the examples shown in the following figures as references for wiring.

CH to be used	Pulse input mode	External preset input	External enable input	Operation mode
CH2 (CPU module) or CH10 (high-speed pulse input/output module)	2-phase 2-input	Invalid	Invalid	Normal mode

The settings of the high-speed counters are set by using the parameter settings of the engineering tool.

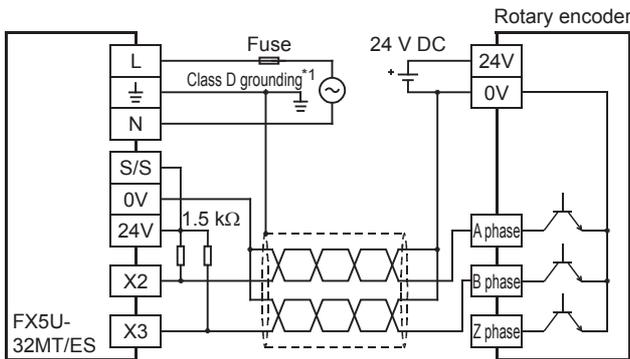
For details, refer to [GX Works3 Operating Manual](#).

### ■ Example of wiring

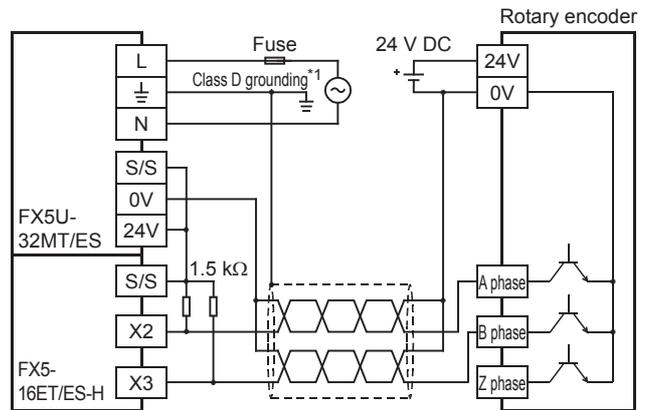
#### • NPN open collector transistor output rotary encoder

In the case of sink wiring

##### • When the input terminals of the FX5U-32MT/ES are used



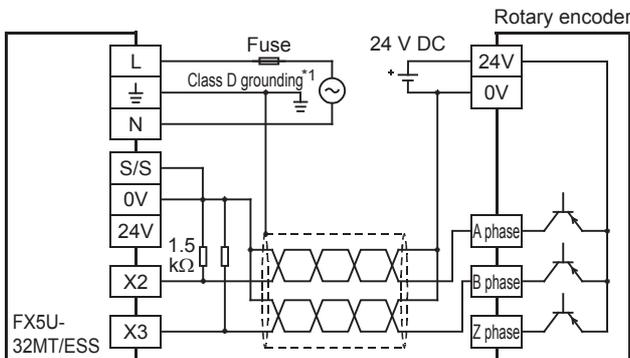
##### • When the input terminals of the FX5-16ET/ES-H are used



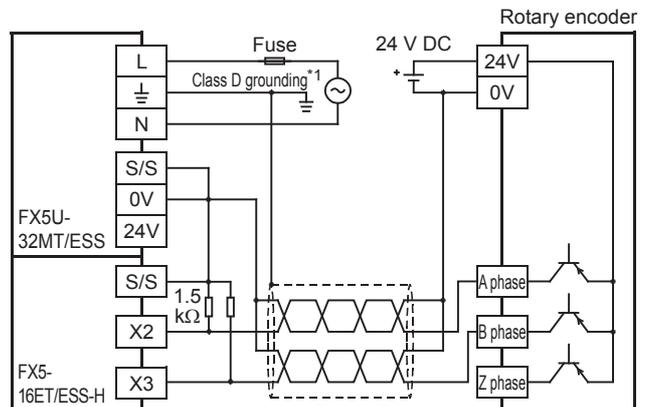
#### • PNP open collector transistor output rotary encoder

In the case of source wiring

##### • When the input terminals of the FX5U-32MT/ESS are used



##### • When the input terminals of the FX5-16ET/ESS-H are used



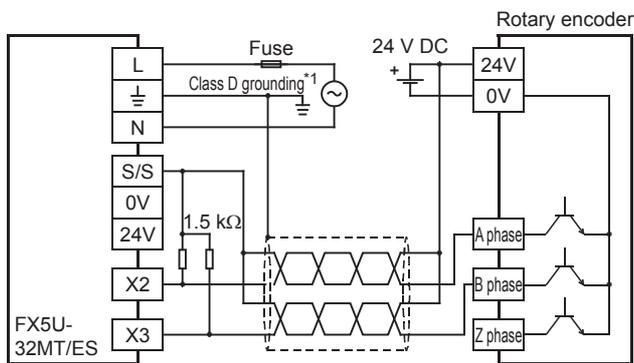
\*1 The grounding resistance should be 100 Ω or less.

■ Example of wiring (When 24 V DC external power supply is used)

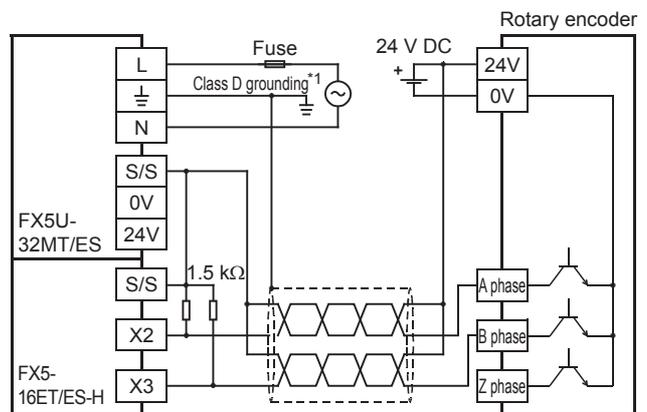
• NPN open collector transistor output rotary encoder

In the case of sink wiring

• When the input terminals of the FX5U-32MT/ES are used



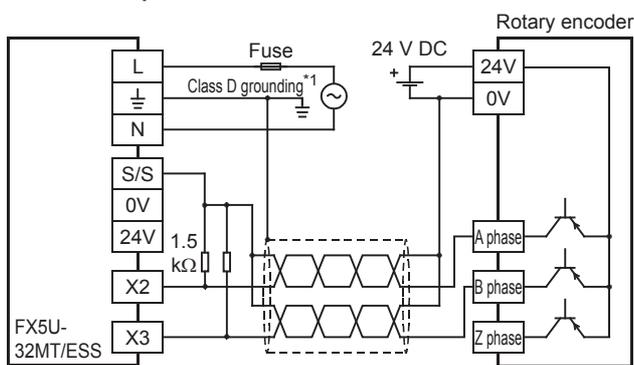
• When the input terminals of the FX5-16ET/ES-H are used



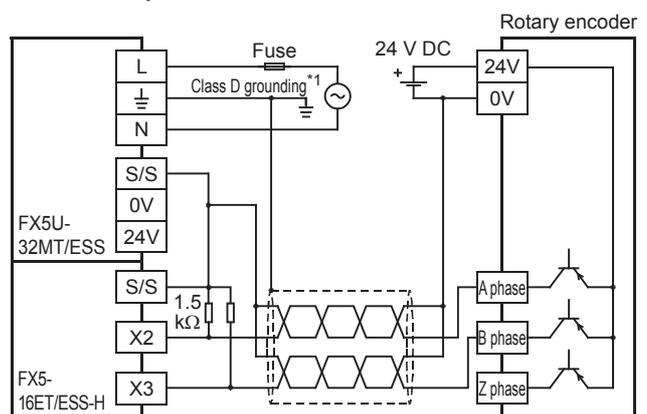
• PNP open collector transistor output rotary encoder

In the case of source wiring

• When the input terminals of the FX5U-32MT/ESS are used



• When the input terminals of the FX5-16ET/ESS-H are used



\*1 The grounding resistance should be 100 Ω or less.

# Interruption

Examples of wiring for when the input interruption function is used are shown below.

The same wiring is used for the pulse catch and pulse width measurement functions.

When capturing pulses of a response frequency of 50 to 200 kHz, refer to Page 114 In the case of capturing high-speed pulses.

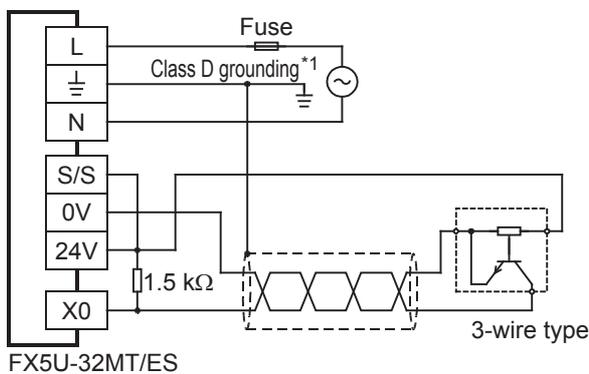
For details on the input interruption function, pulse catch function and pulse width measurement function, refer to MELSEC iQ-F FX5 User's Manual (Application).

## Example of wiring

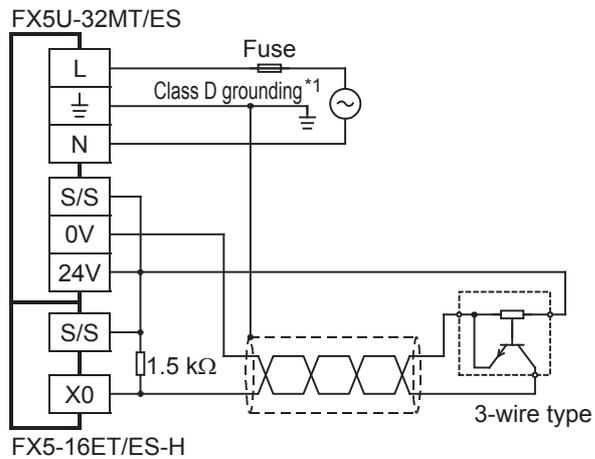
### ■When 24 V DC service power supply is used

In the case of sink wiring

#### • Example of wiring of FX5U-32MT/ES

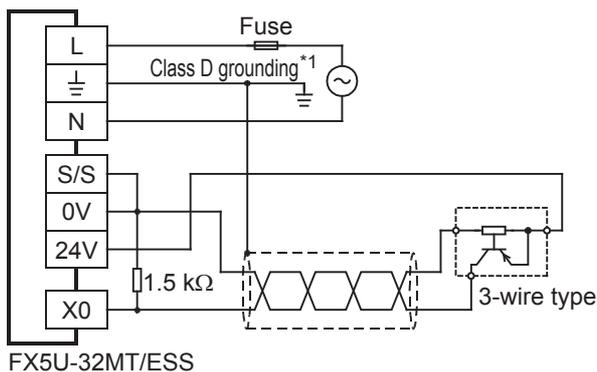


#### • Example of wiring of FX5-16ET/ES-H

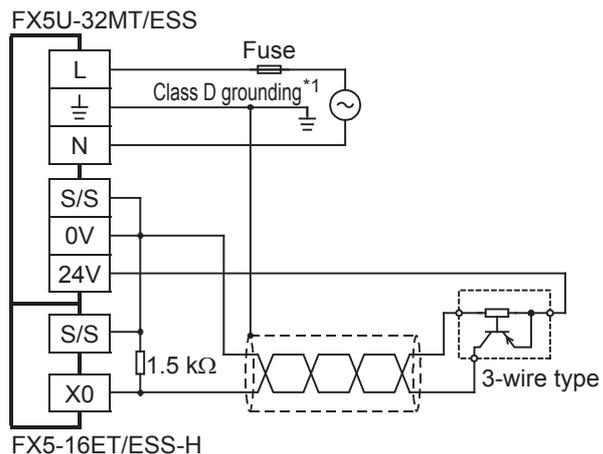


In the case of source wiring

#### • Example of wiring of FX5U-32MT/ESS



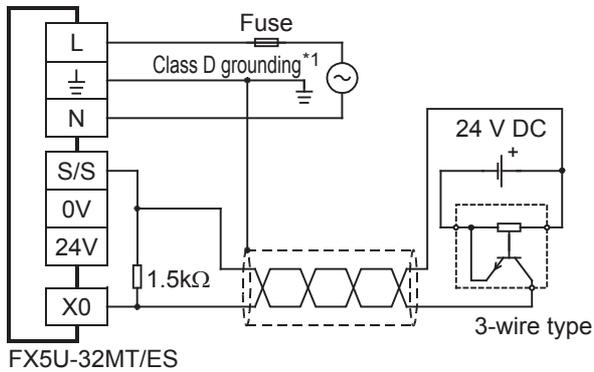
#### • Example of wiring of FX5-16ET/ESS-H



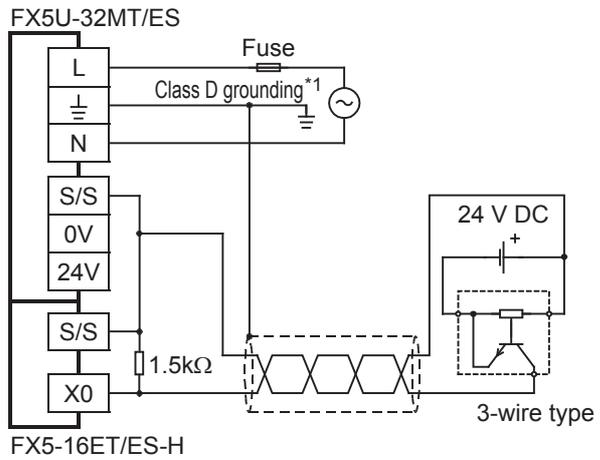
■ When 24 V DC external power supply is used

In the case of sink wiring

• Example of wiring of FX5U-32MT/ES

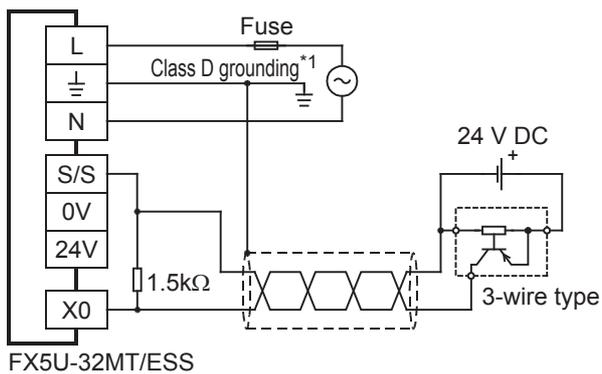


• Example of wiring of FX5-16ET/ES-H

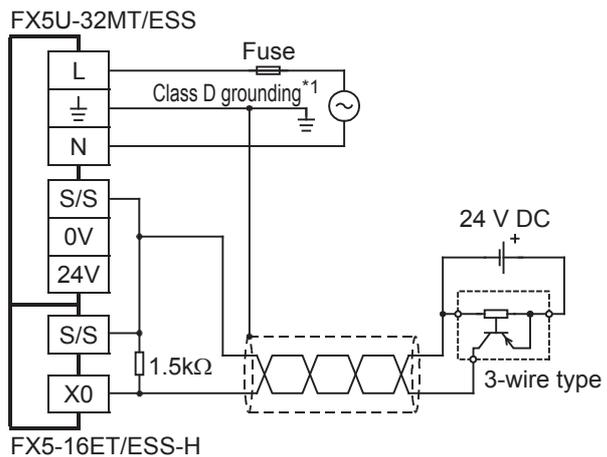


In the case of source wiring

• Example of wiring of FX5U-32MT/ESS



• Example of wiring of FX5-16ET/ESS-H



\*1 The grounding resistance should be 100 Ω or less.

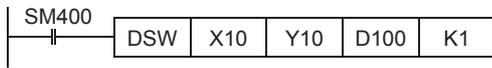
# Digital Switch

## When DSW instructions are used

Examples of wiring for capturing values from a 4-digit digital switch to the data register D100 are given below.

For the instructions, refer to MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks).

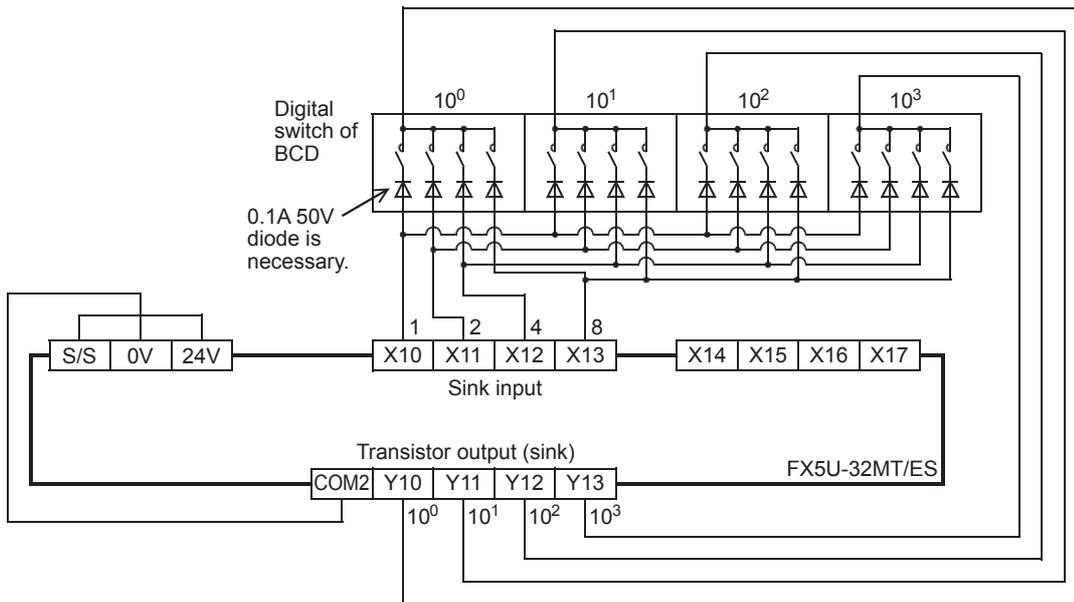
### Example of program



### Example of wiring

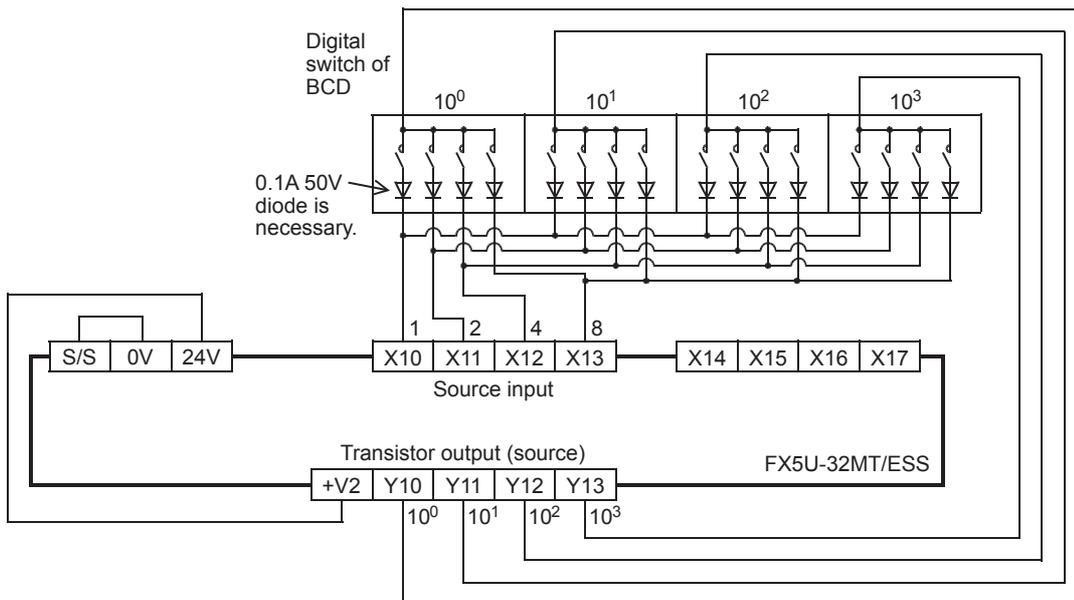
- Sink wiring

The example is the wiring for the input/output of the FX5U-32MT/ES.



- Source wiring

The example is the wiring for the input/output of the FX5U-32MT/ESS.



## When BIN instructions are used

Examples of wiring for capturing values from a 2-digit digital switch to the data register D102 are given below.

For the instructions, refer to MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks).

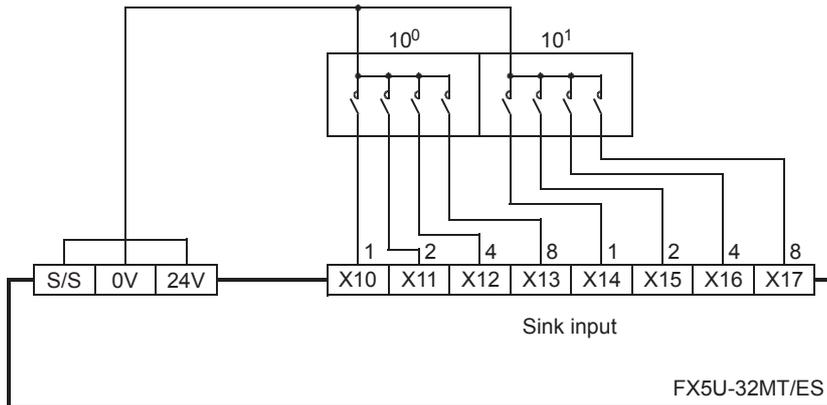
### ■ Example of program



### ■ Example of wiring

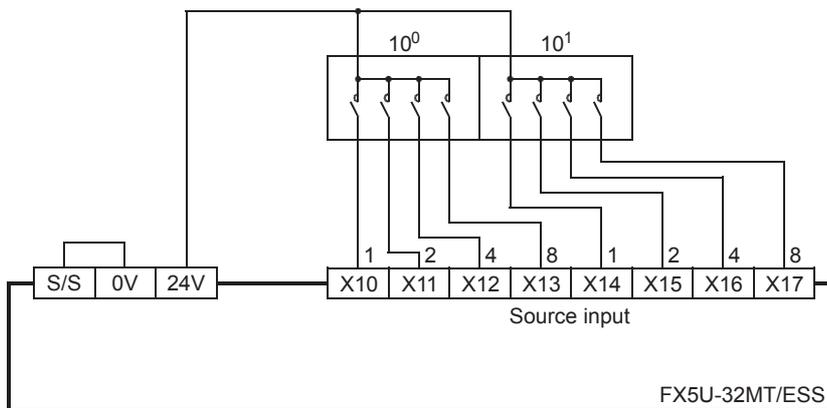
- Sink wiring

The example is the wiring for the input/output of the FX5U-32MT/ES.



- Source wiring

The example is the wiring for the input/output of the FX5U-32MT/ESS.

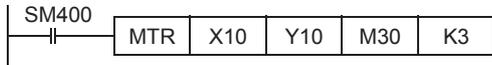


# Input Matrix

Examples of wiring to take ON/OFF status of 24 switches by using MTR instructions are given below.

For the instructions, refer to MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks).

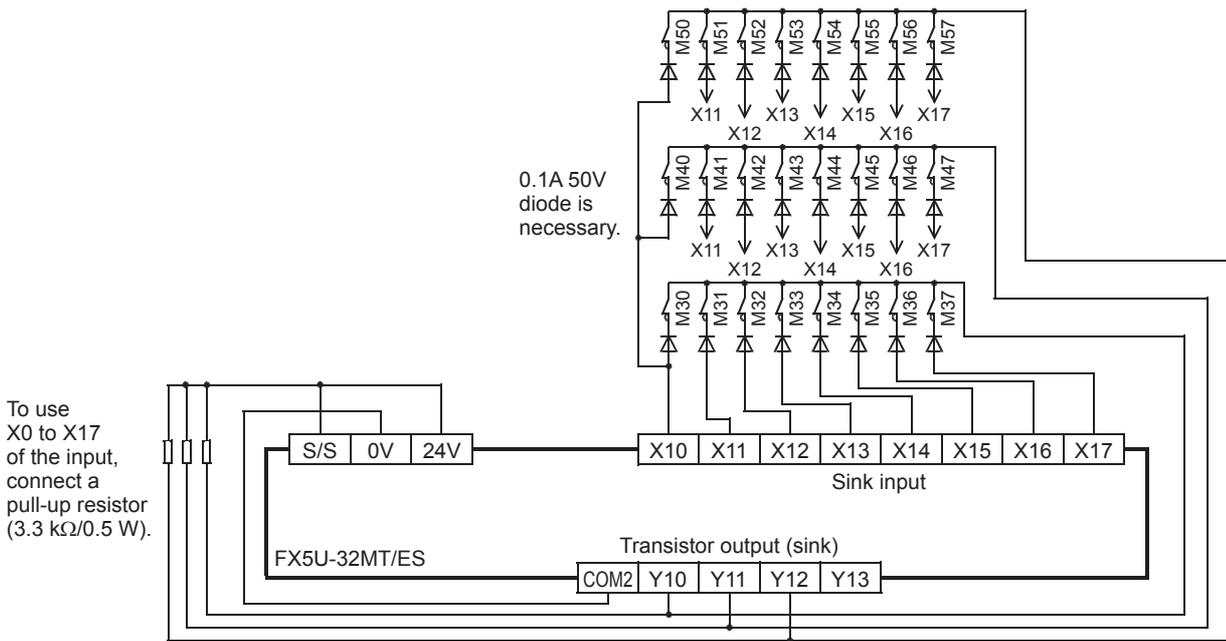
## Example of program



## Example of wiring

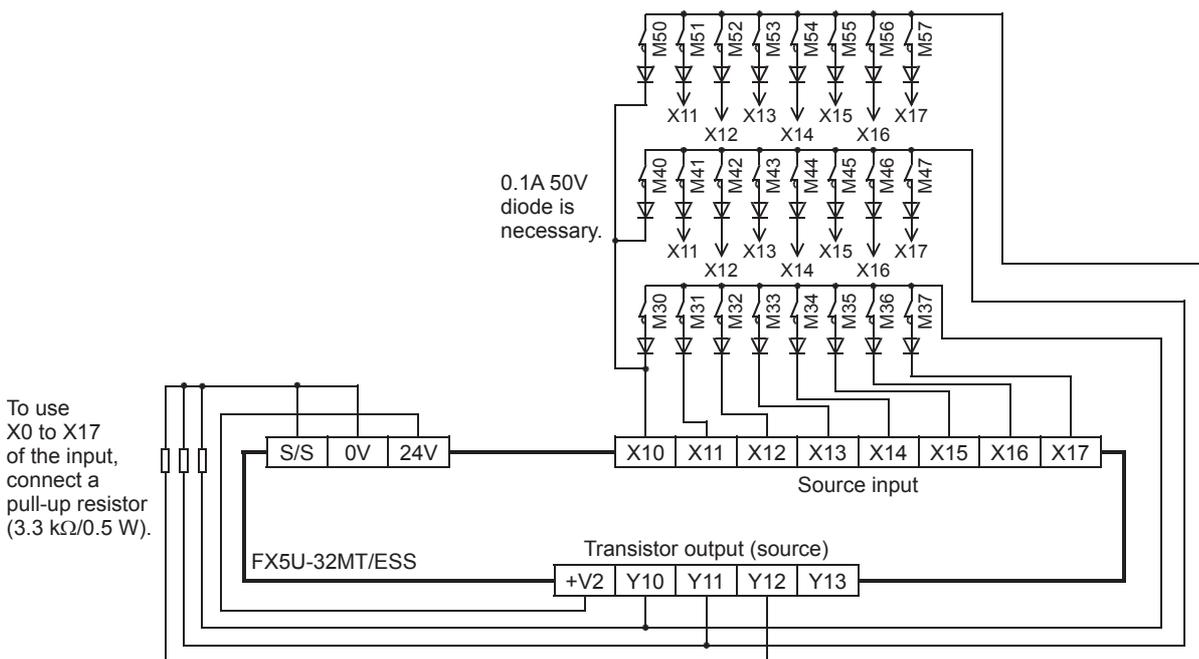
- Sink wiring

The example is the wiring for the input/output of the FX5U-32MT/ES.



- Source wiring

The example is the wiring for the input/output of the FX5U-32MT/ESS.



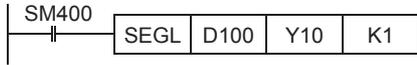
# Seven Segment with Latch

For the instructions, refer to MELSEC iQ-F FX5 Programming Manual (Instructions, Standard Functions/Function Blocks).

## When SEGL instructions are used

Examples of wiring for displaying the current value of D100 on the 4-digit 7-segment display are given below.

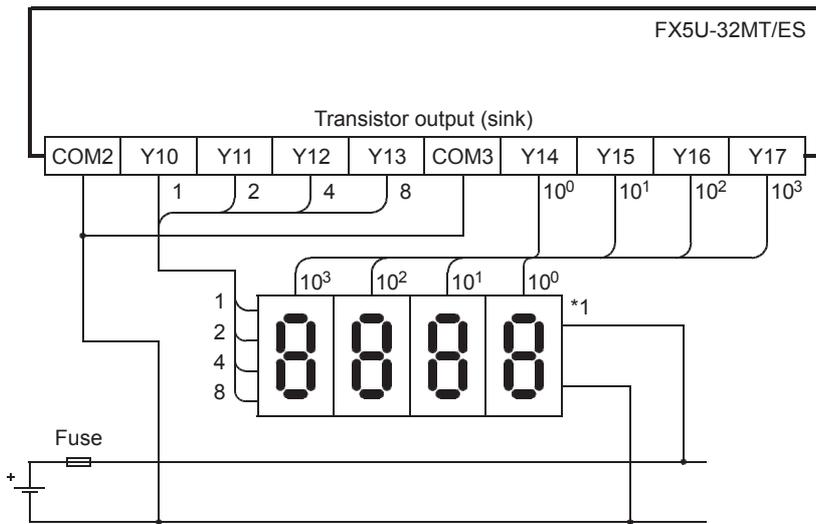
### Example of program



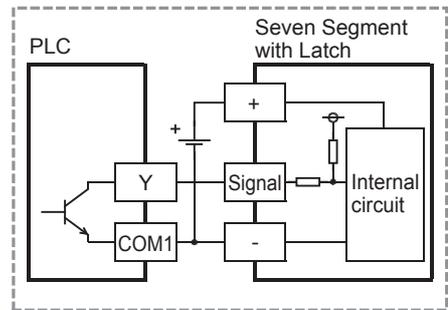
### Example of wiring

- Sink wiring

The example is the wiring for the input/output of the FX5U-32MT/ES.

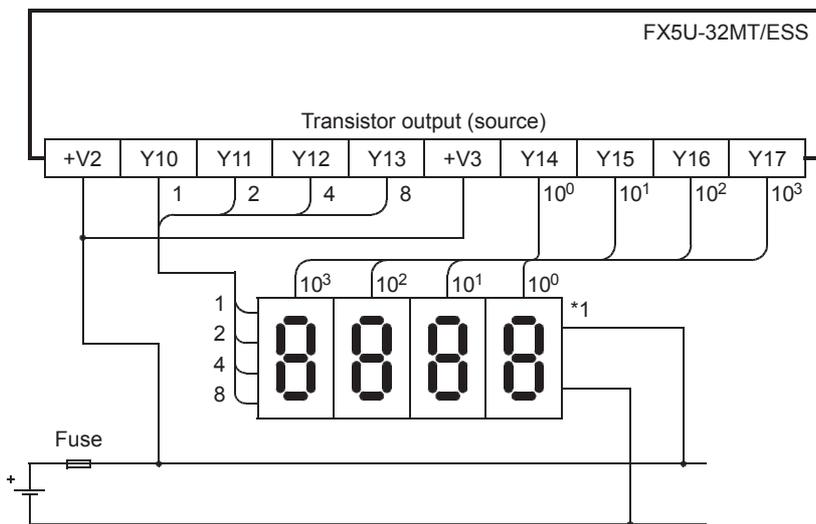


7-segment display to be used for sink wiring (in the case of transistor output)

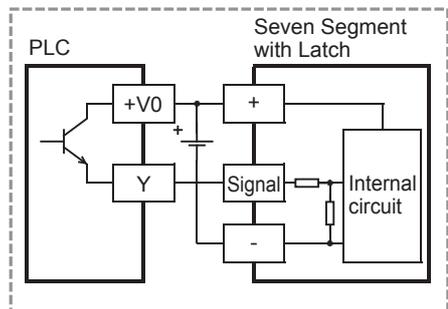


- Source wiring

The example is the wiring for the input/output of the FX5U-32MT/ESS.



7-segment display to be used for source wiring (in the case of transistor output)

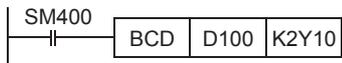


\*1 Use a 7-segment display with a latch and a built-in BCD decoder.

## When BCD instructions are used

Examples of wiring for displaying the current value of D100 on the 2-digit 7-segment display are given below.

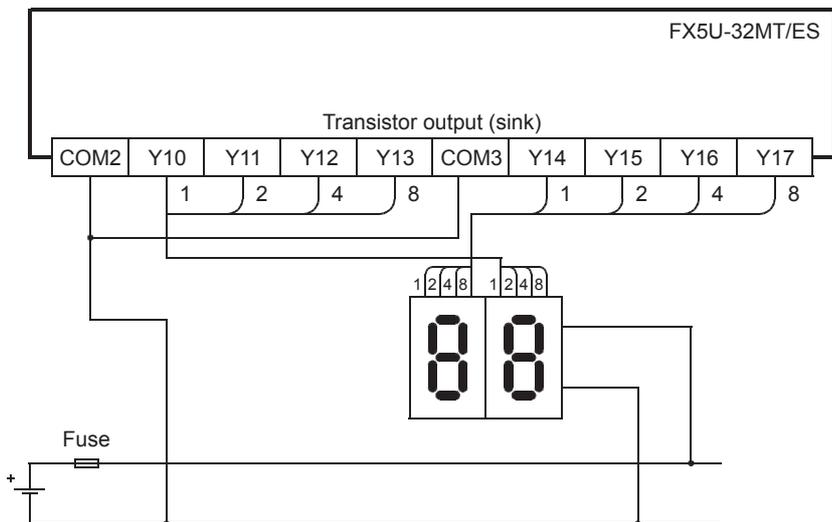
### Example of program



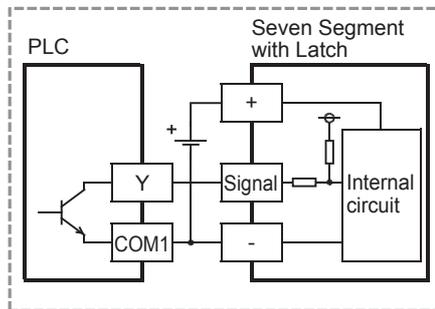
### Example of wiring

- Sink wiring

The example is the wiring for the input/output of the FX5U-32MT/ES.

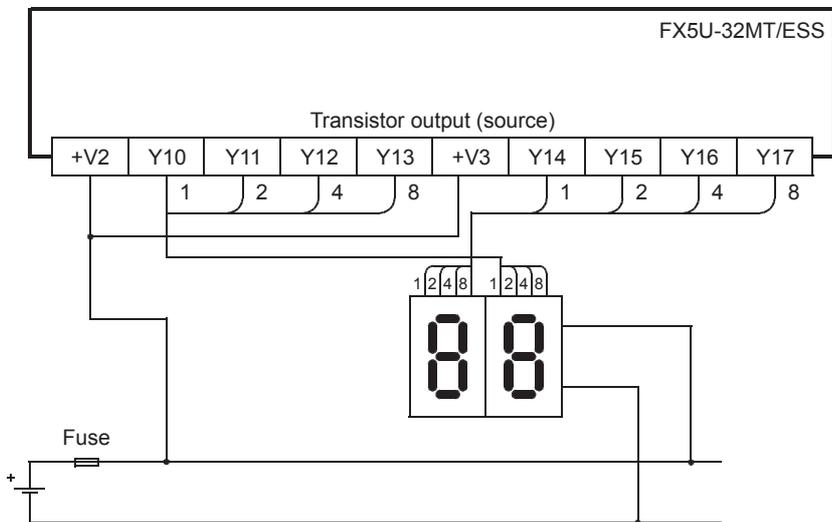


7-segment display to be used for sink wiring (in the case of transistor output)

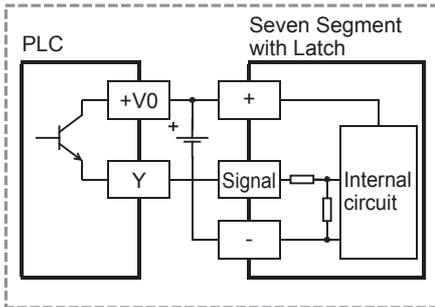


- Source wiring

The example is the wiring for the input/output of the FX5U-32MT/ESS.



7-segment display to be used for source wiring (in the case of transistor output)



# 7 OPERATION ADJUSTMENT

## 7.1 Preparation for Operation

### Preliminary inspection

Incorrect connection of the power supply terminal, contact of the DC input wire and power supply wire, or short-circuiting of output wires may result in serious damage.

Before applying power, check that the power supply and ground terminals are connected correctly and input/output devices are wired properly.

### Dielectric withstand voltage test and insulation resistance test

The dielectric withstand voltage and insulation resistance test of the PLC should be measured in accordance with the following procedure.

1. Remove all input/output wires and power supply wires from the PLC.
2. Connect a crossing wire to each of the PLC terminals (power supply terminal, input terminals and output terminals) except the ground terminal. For the dielectric withstand voltage test of each terminal, refer to the generic specifications for the product (refer to  Page 20 Generic Specifications).
3. Measure the dielectric withstand voltage and insulation resistance between each terminal and the ground terminal.
  - Dielectric withstand voltage 1.5 kV AC or 500 V AC for 1 min (The terminals vary in dielectric withstand voltage.)
  - Insulation resistance 10 MΩ or higher by 500 V DC insulation resistance tester

## Procedure until operation

---

The procedure until operation is explained below.

### 1. Turn on the power of the system.

Check the following items before turning on the power of the system. When the CPU module with the factory default setting is powered on, the ERR LED flashes because the module has no programs.

- The power supply is wired properly.
- The power supply voltage is within the specified range.
- The CPU module is in the stopped status.

### 2. Connection with a personal computer

Connect the CPU module with a personal computer on which an engineering tool has been installed.

( Page 151 Connection with a personal computer)

### 3. Format CPU built-in memory.

Format the CPU built-in memory using the engineering tool.

( GX Works3 Operating Manual)

### 4. Parameter setting

Set the parameters needed for startup.

( GX Works3 Operating Manual)

- System parameters
- CPU parameters
- Unit parameters

### 5. Programming

Create a program using the engineering tool. ( MELSEC iQ-F FX5 User's Manual (Application))

### 6. Write the parameters and the program.

Write the parameters and the program set with the engineering tool into the CPU module.

( GX Works3 Operating Manual)

### 7. Reboot the system.

Reboot the system by any of the following methods.

- Turning off and on the power
- Resetting the CPU module ( Page 153 Resetting method)

### 8. Check errors.

Check the ERR LED of the CPU module. If an error has occurred, check the contents of the error with Module Diagnostics (CPU Diagnostics) of the engineering tool and eliminate its cause.

### 9. Run the program.

Set the CPU module to the RUN status and make sure that the P.RUN LED of the CPU module lights up.

# Connection with a personal computer

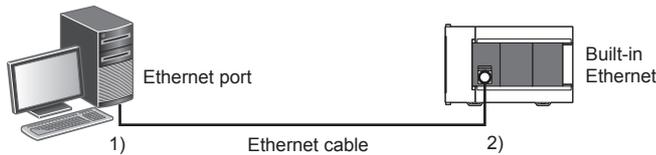
Connect the CPU module with a personal computer on which an engineering tool has been installed.  
 The system configuration examples and GX Works3 settings are described below.  
 For details, refer to GX Works3 Operating Manual.

## Direct connection

Setting examples for accessing the CPU module that is directly connected with a personal computer are shown below.

### ■Ethernet connection

- CPU Module Direct Coupled Setting



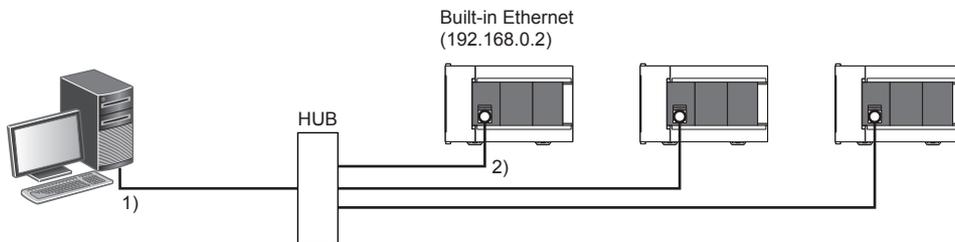
GX Works3 settings

No.	Item	Selection item	Internal setting	Input value
1)	PC side I/F	Ethernet Board	—	—
2)	PLC side I/F	PLC Module		Ethernet Port Direct Connection
	Other Station Setting	No Specification	Check at Communication Time	30 seconds
			Retry Times	0 times

### Point

For the FX5 CPU module, the Ethernet adapter on the personal computer side used for the Ethernet port direct connection can be specified.  
 Click the [CPU Module Direct Coupled Setting] button on the "Specify Connection Destination Connection" window to display the "CPU Module Direct Coupled Setting" window. Select the adapter on the window.

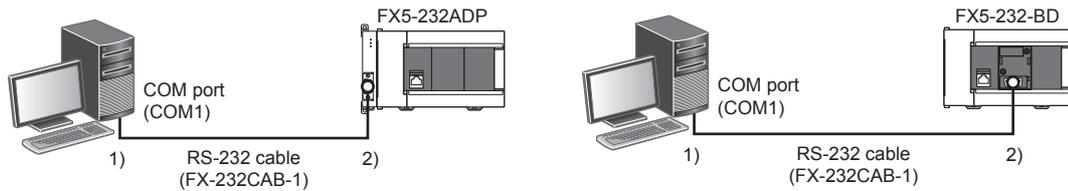
- Connection via HUB



GX Works3 settings

No.	Item	Selection item	Internal setting	Input value	
1)	PC side I/F	Ethernet Board	—	—	
2)	PLC side I/F	PLC Module	Connection via HUB	IP Address	192.168.0.2
				Response Wait Time	2 seconds
	Other Station Setting	No Specification	Check at Communication Time	30 seconds	
			Retry Times	0 times	

## Serial connection



### GX Works3 settings

No.	Item	Selection item	Internal setting	Input value
1)	PC side I/F	Serial/USB	RS-232C	—
			COM Port	COM1
			Transmission Speed	115.2Kbps
2)	PLC side I/F	PLC Module	PLC Mode	FX5CPU
	Other Station Setting	No Specification	Check at Communication Time	30 seconds
			Retry Times	0 times

## 7.2 Operation and Test

### Self-diagnostic function

When the power of the CPU module is turned on, the self-diagnostic function to check for errors starts in the module. The CPU module boots when there is no error with the hardware, parameters and program.

When there are no errors, the module enters the RUN status (the P.RUN LED turns on) in response to the RUN instruction (☞ Page 153 Running, Stopping, and Resetting). If any error is detected, the "ERR" LED flashes or lights up.

### Monitoring and debugging

The ON/OFF status of PLC's devices, current values or set values can be monitored or changed by using engineering tools. For details, refer to [GX Works3 Operating Manual](#).

# 7.3 Running, Stopping, and Resetting

## Methods of running, stopping, and resetting

The following two methods of running, stopping, and resetting the FX5U CPU modules are provided.

### Using the RUN/STOP/RESET switch

The operation status of the CPU module can be changed with the RUN/STOP/RESET switch.

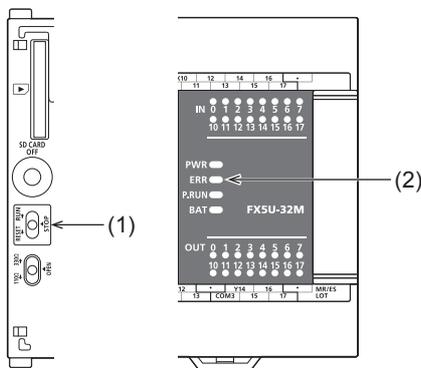
Setting the RUN/STOP/RESET switch to the RUN position runs the program. Setting the switch to the STOP position stops the program.

#### Resetting method

Resetting can be performed with the RUN/STOP/RESET switch. Resetting is not performed immediately after the RUN/STOP/RESET switch is set to the RESET position.

Perform the following procedure to reset with the RUN/STOP/RESET switch.

1. Set the RUN/STOP/RESET switch (1) to the RESET position for at least one second.
2. Make sure that the ERR LED (2) flashes several times.
3. Return the RUN/STOP/RESET switch to the STOP position.



### Remote operation

The operation status of the CPU module can be changed externally with the RUN/STOP/RESET switch set to the RUN position. The operation status of the CPU module can be set to the PAUSE status.

Remote operation can be performed by either of the following methods.

- Using contacts (MELSEC iQ-F FX5 User's Manual (Application))
- Using engineering tools (GX Works3 Operating Manual)
- Using external devices using SLMP (MELSEC iQ-F FX5 User's Manual (SLMP))

### Use of several running/stopping methods

#### When the RUN/STOP/RESET switch and RUN contact are used

- The RUN/STOP status of the PLC is determined by the conditions shown in the following table.

RUN/STOP/RESET switch status	Condition of the input specified as the RUN terminal by parameters	CPU module status
RUN	RUN	RUN
	STOP	STOP
STOP	RUN	STOP
	STOP	STOP

# 8 MAINTENANCE AND INSPECTION

To keep using the PLC in the optimal condition, perform the following inspections daily or periodically.

## 8.1 Daily Inspection

Perform the following inspections on a daily basis.

Item	Inspection item	Description	
1	Installation status of the module	Looseness of mounting screws	Retighten the mounting screws.
		Mounting status of the module	The module should be securely mounted.
		Looseness of cover	The cover should not be off.
2	Connection status	Looseness of terminal screws	Retighten the terminal screws.
		Proximity of crimp terminals	Check the proximity between crimp terminals and correct the clearance.
		Looseness of connectors	Connect cable connectors securely.
3	LED status	Check that the LED status is normal.  Page 159 Checking with LEDs User's manuals for each module	

## 8.2 Periodic Inspection

Perform the following inspections once or twice every 6 months to a year.

Also perform the inspections when facilities have been relocated or modified or when wiring has been changed.

Item	Inspection item	Description	
1	Ambient environment	Operating ambient temperature	The temperature in the panel should be $-20$ to $55^{\circ}\text{C}^{*1}$ .
		Operating ambient humidity	The humidity in the panel should be 5 to 95%RH.
		Working atmosphere	Free from corrosive or flammable gas and excessive conductive dust
2	Power supply voltage	Voltage within the specified range should be supplied.	
3	Installation status	Looseness, rattling	Retighten mounting screws.
		Dirt, foreign matter	Wipe away any dirt or foreign matter. Clean the module.
4	Connection status	Looseness of terminal screws	Retighten the terminal screws.
		Proximity of crimp terminals	Check the proximity between crimp terminals and correct the clearance.
		Looseness of connectors	Connect cable connectors securely.
5	Battery	BAT LED	The BAT LED should be turned off. If flashing, replace the battery with new one.
		Period following the battery purchase	Replace the battery with new one if 5 years or more have passed since the battery was purchased.
		OFF status of SM51 (SM8005), SM52 (SM8006)	SM51 (SM8005) and SM52 (SM8006) should be off. If SM51 (SM8005) and SM52 (SM8006) are on, replace the battery with new one.
6	Module Diagnostics (CPU Diagnostics)	The normal status of the system should be checked with the Module Diagnostics (CPU Diagnostics).  Page 161 Module diagnostics (CPU Diagnostics)	
7	Relay contacts	Check the product life of relay outputs.  Page 121 Product life of relay output contacts	

\*1 The operating ambient temperature is 0 to 55°C for products manufactured in June 2016 or earlier.

### Point

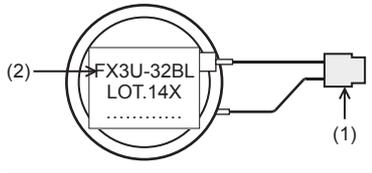
The product life of relay contacts varies considerably depending on the load type used. Note that loads generating reverse electromotive force or rush current may cause poor contact or welding of contacts which may lead to considerable reduction of the contact product life.

 Page 121 Product life of relay output contacts

# 8.3 Battery

## Part names

The Latch device memory and clock data upon power interruption. The battery is not incorporated in the CPU module during shipment from the factory. Order it if necessary. Parameter setting is required to back up the device memory and clock data. (☞ Page 156 Setting an optional battery using the engineering tool)

External appearance	No.	Name	Description
	(1)	Connector	Connected to the battery connector of the CPU module.
	(2)	Nameplate	Displays the model name and lot number.

## Specifications

The following shows functional specifications of the battery.

Item	FX3U-32BL
Battery type	Lithium manganese dioxide battery
Nominal voltage	3.0 V
Life	Standard life: 5 years (at ambient temperature of 25°C)**1

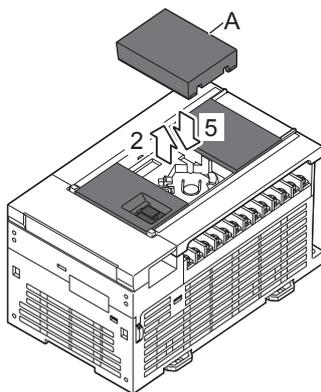
\*1 The life of the battery changes with respect to ambient temperature. (☞ Page 157 Battery life and replacement guidelines)

## Battery attachment

The battery is not incorporated in the CPU module during shipment from the factory. To use the battery, attach it following the procedure below. Parameter setting is required to back up the device memory and clock data using the battery. (☞ Page 156 Setting an optional battery using the engineering tool)

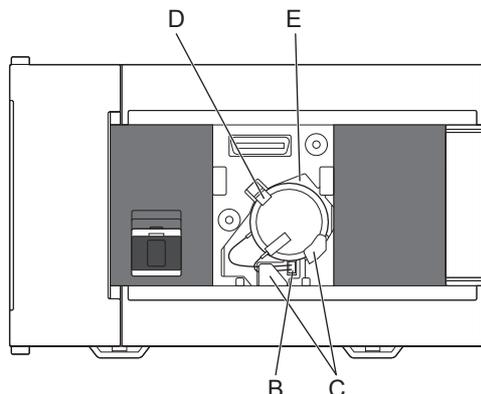
### Attachment procedure

1. Turn the power supply off.
2. Remove the expansion board connector cover (A in figure below). If an expansion board is installed, remove it.



3. Insert the battery connector (B in the figure below) of the battery.
4. Set the battery inside the lower hook (C in the following figure), push up the upper hook (D in the following figure), and then fit the battery in the battery holder (E in the following figure).

The following figure shows the position of the battery.

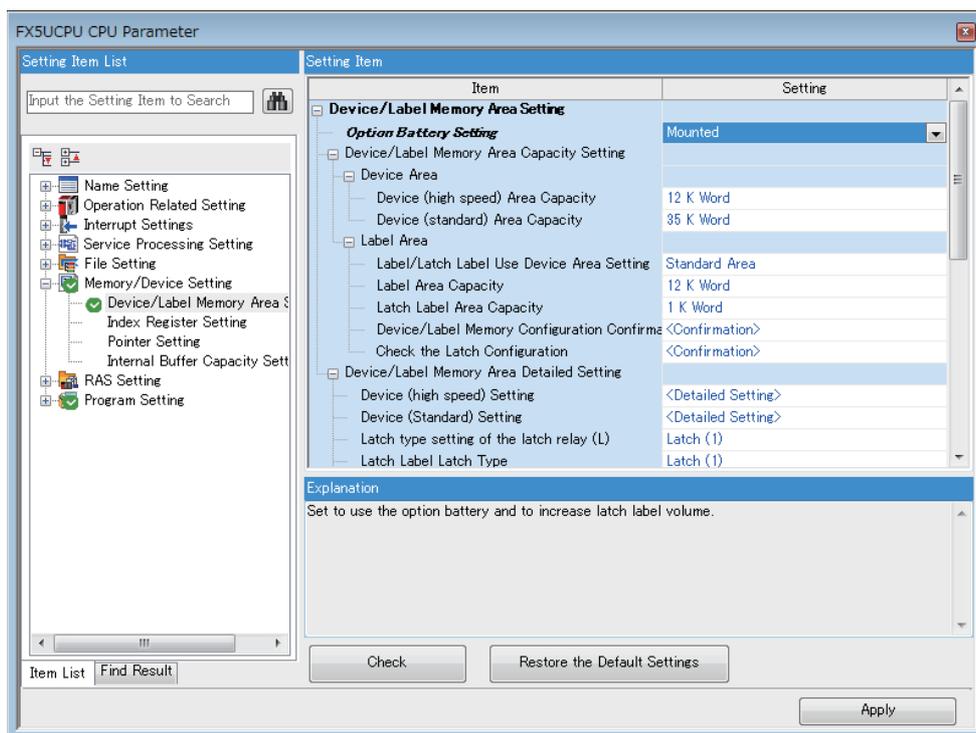


5. Attach the expansion board connector cover. If an expansion board was removed in step 2, reinstall it.

## Setting an optional battery using the engineering tool

The following setting is required when the capacity of the latch device/latch label is increased using the optional battery. Note that the battery does not back up the data if the following setting is not provided.

- Select the Navigation window ⇒ [Parameter] ⇒ [FX5UCPU] ⇒ [CPU Parameter] ⇒ [Memory/Device Setting] ⇒ [Device/Label Memory Area Setting] ⇒ [Option Battery Setting] ⇒ [Mounted]



# Battery replacement

## Battery life and replacement guidelines

When the battery voltage is low, the BAT LED on the panel flashes red while the power is on, and SM51 (SM8005) and SM52 (SM8006) turn ON. The memory can be retained for about one month after the LED is turned on. However, the drop in battery voltage may not be detected immediately. Prepare a new battery and replace the battery with the new one promptly.

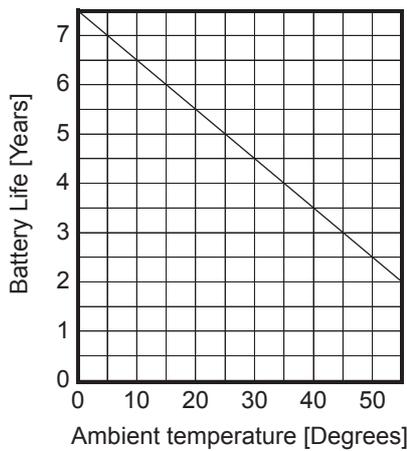
### Point

Standard life of FX3U-32BL: 5 years (at ambient temperature of 25°C)

The life of the battery changes with respect to ambient temperature.

When planning for battery replacement, please estimate the battery life according to the graph below and order replacement batteries in advance.

Battery life vs. temperature

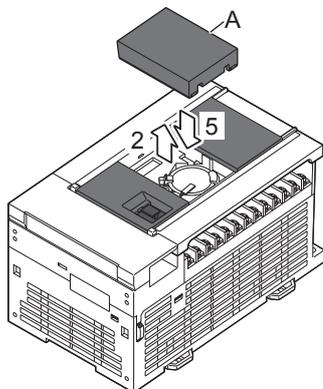


## Replacement procedure

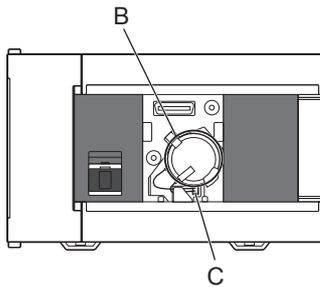
If the battery voltage is reduced, replace it following the procedure below.

Even with the battery removed, the built-in capacitor holds the data of the memory for the power interruption time (20 sec.). Battery replacement steps 3 and 4 must be completed within 20 seconds. If the time taken for battery replacement is longer than the power interruption time, the data of the memory may be lost.

1. Turn the power supply off.
2. Remove the expansion board connector cover (A in figure below). If an expansion board is installed, remove it.



3. Extract the old battery from the battery holder ("B" in figure below), and disconnect the battery connector ("C" in figure below).



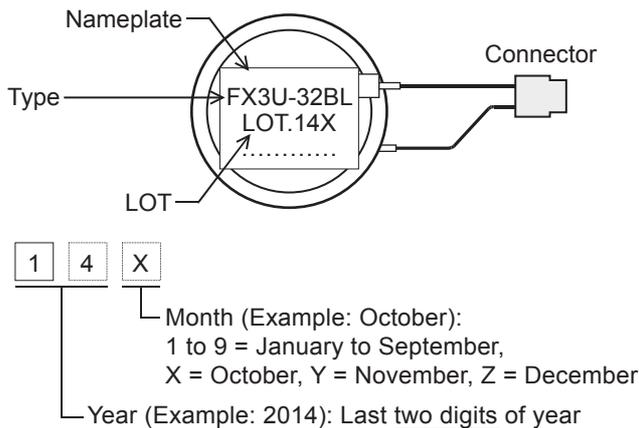
4. Install the new battery. (☞ Page 155 Battery attachment)
5. Attach the expansion board connector cover. If an expansion board was removed in step 2, reinstall it.

### Point

- After replacing the battery, check whether the devices set by the latch and clock data are backed up correctly, confirm safety, and then run the PLC.
- If the devices set by the latch are not backed up correctly, clear them, and set their initial values and clock data again if necessary.

## Reading the date of manufacture

How to read the battery lot number



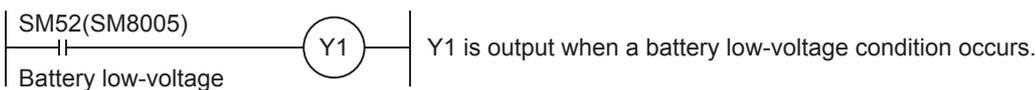
## Special relay for low battery voltage

Prepare a system which allows constant external monitoring of the battery status, using a GOT, etc.

- SM52 (SM8005)

The special relay turns ON when the battery voltage is the specified value or less.

The special relay turns OFF when the battery voltage is normal.



- SM51 (SM8006)

The special relay turns ON when the battery voltage is the specified value or less.

The special relay stays ON even when the battery voltage is normal.

- SD8005

Battery voltage can be monitored.

# 9 TROUBLESHOOTING

Details on errors occurring in the system, their causes, and corrective actions are explained below.  
For details on troubleshooting for each module, refer to the manuals for the module.

## Point

Saving the programs and devices used at the occurrence of an error helps in identifying the cause of the error.  
([↩ Page 164 Backing Up the Data](#))

## 9.1 Troubleshooting Procedure

If an error occurs, perform troubleshooting in the following order.

1. Check that each module is properly mounted and wired.
2. Check the LEDs of the CPU module. ([↩ Page 159 Checking with LEDs](#))
3. Check the LEDs of each intelligent function module. (Manuals for each module)
4. Connect the engineering tool and execute the Module Diagnostics (CPU Diagnostics). The error cause and the action to be taken can be displayed. ([↩ Page 161 Module diagnostics \(CPU Diagnostics\)](#))
5. If the cause could not be specified by Module diagnostics (CPU Diagnostics), check the error history from the event history of the engineering tool to identify the cause. ([↩ Page 162 Event history](#))
6. Check the cause of the error and take corrective actions.

## 9.2 Checking with LEDs

Check the module status with LEDs as a means to perform the primary diagnosis.

### Checking the PWR LED

If the PWR LED is turned off, check the following items.

Item to check	Cause and action
Measure the voltage supply to the CPU module.	If the power source is not supplying the proper voltage, provide a power source that does.
Remove extension modules and all wiring other than the one for the power supply, and turn on the power supply.	If the PWR LED turns on in this condition, the 24 V DC service power supply may be shorted or overloaded. Reconnect the modules and wire one by one to identify the cause.

If the PWR LED still does not turn on even after the items shown above are checked, there may be a hardware issue.  
Consult your local Mitsubishi Electric representative.

### Checking the BAT LED

If the BAT LED is flashing, check the following items.

The LED is valid when the optional battery is installed and the LED is set to "display" for battery errors by using the parameter.

Item to check	Cause and action
Check the installation of the battery.	Install the battery properly.
Check the battery voltage.	If the battery voltage is reduced, replace the battery with a new one. Battery voltage can be monitored with PLC data register SD8005. ( <a href="#">↩ Page 155 Battery</a> )

## Checking the ERR LED

### If the ERR LED flashes

If the ERR LED is turned on, check the following items.

Item to check	Cause and action
Write system parameters, CPU parameters, and program files. Then power on the CPU module again.	Programs or parameters are not written or damaged. Since a CPU module with the factory default setting has no programs, the ERR LED flashes.
Set the CPU module to the STOP status and turn on the power supply again.	When the ERR LED turns off, a watchdog timer error has probably occurred. Take any of the following measures. <ul style="list-style-type: none"><li>• Review the program and avoid the maximum value (SD524, SD525) of the scan time exceeding the scan time monitoring time setting value set by the parameter.</li><li>• Check that the input used for input interruption or pulse catch is not being abnormally turned on and off in one scan.</li><li>• Check that the frequency of the pulse input to the high-speed counter is within the specified range.</li><li>• Add some WDT instructions to the program and reset the watchdog timer several times in one scan.</li></ul>

### If the ERR LED is turned on

If the ERR LED is turned on, check the following items.

Item to check	Cause and action
Provide a different power supply to the CPU module.	If the ERR LED turns off, noise may have affected the module. Consider taking the following measures. <ul style="list-style-type: none"><li>• Check the ground wiring, and reexamine the wiring route and installation location.</li><li>• Fit a noise filter onto the power supply line.</li></ul>

If the ERR LED still does not turn off even after the items shown above are checked, there may be a hardware issue. Consult your local Mitsubishi Electric representative.

## Checking the P.RUN LED

If the P.RUN LED is turned off, check the status of the ERR LED and take corrective actions. (☞ Page 160 Checking the ERR LED)

## 9.3 Troubleshooting using the engineering tool

Check the error or history using the engineering tool, and identify the error cause. More detailed information on the error as well as the error cause and action to be taken can be checked by using the engineering tool.

The engineering tool has the following functions for troubleshooting.

Function	Description
Module diagnostics (CPU Diagnostics)	This function diagnoses the module. (The current error and its details can be checked.) (☞ Page 161 Module diagnostics (CPU Diagnostics))
Event history	This function displays event information including errors that occurred in the CPU module, expansion board, expansion adapter and errors on the network. (☞ Page 162 Event history)

For details on each function, refer to the following.

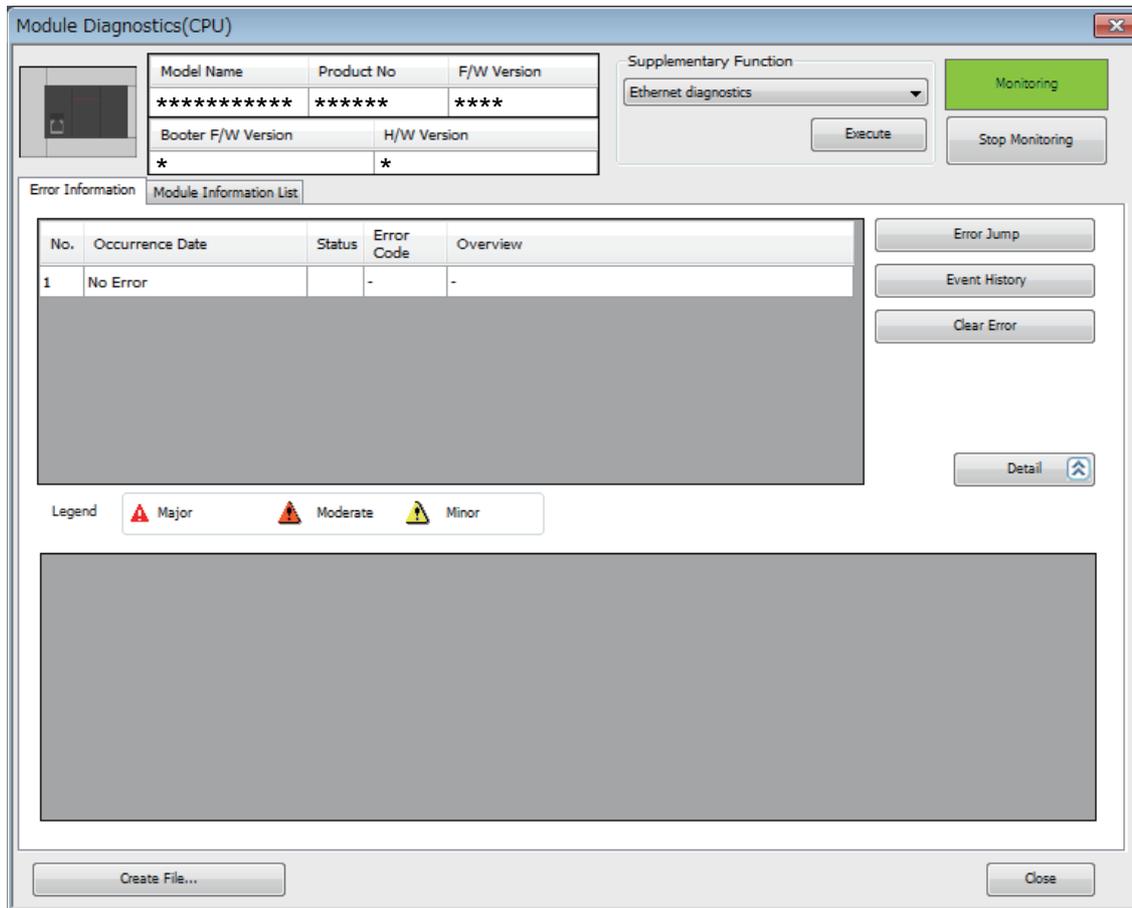
📖 GX Works3 Operating Manual

## Module diagnostics (CPU Diagnostics)

This function diagnoses CPU module, expansion adapter, and expansion board. (The current error and its details can be checked.)

Information required for troubleshooting, such as the current error, details and cause of the error, and action to be taken, are displayed. The incorrect parameter setting and program error location can also be identified by selecting the error and clicking the [Error Jump] button. On the [Module Information List] tab, the LED status and the switch status of the target module can be checked.

 [Diagnostics]⇒[Module diagnostics(CPU Diagnostics)]



Module Diagnostics(CPU)

Model Name	Product No	F/W Version
*****	*****	****
Booter F/W Version	H/W Version	
*	*	

Supplementary Function: Ethernet diagnostics

Buttons: Execute, Stop Monitoring, Monitoring

Error Information | Module Information List

No.	Occurrence Date	Status	Error Code	Overview
1	No Error		-	-

Buttons: Error Jump, Event History, Clear Error, Detail

Legend: Major (Red Triangle), Moderate (Orange Triangle), Minor (Yellow Triangle)

Buttons: Create File..., Close

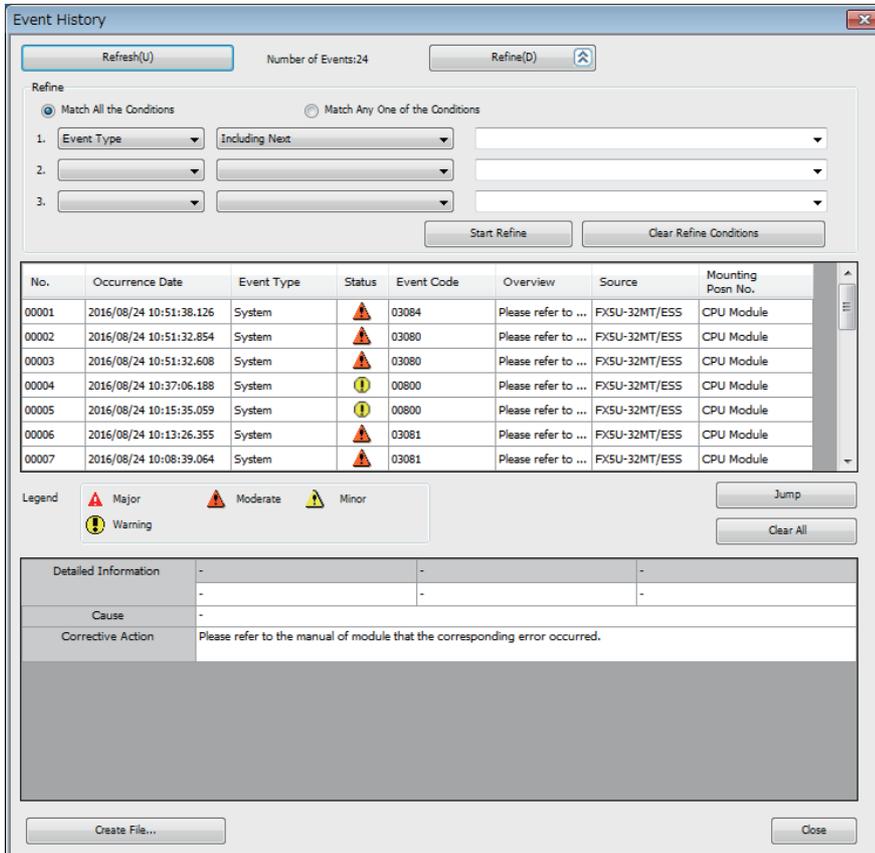
# Event history

This function displays the event information, such as errors that occurred in the CPU module, expansion board, expansion adapter and network errors.

Since information collected before the CPU module is powered off or reset can also be displayed, the error cause can be identified based on the errors.

The displayed information can also be saved in CSV file format.

 [Diagnostics] ⇒ [Module diagnostics(CPU Diagnostics)] ⇒ [Event History] button



No.	Occurrence Date	Event Type	Status	Event Code	Overview	Source	Mounting Postn No.
00001	2016/08/24 10:51:38.126	System		03084	Please refer to ...	FX5U-32MT/ESS	CPU Module
00002	2016/08/24 10:51:32.854	System		03080	Please refer to ...	FX5U-32MT/ESS	CPU Module
00003	2016/08/24 10:51:32.608	System		03080	Please refer to ...	FX5U-32MT/ESS	CPU Module
00004	2016/08/24 10:37:06.188	System		00800	Please refer to ...	FX5U-32MT/ESS	CPU Module
00005	2016/08/24 10:15:35.059	System		00800	Please refer to ...	FX5U-32MT/ESS	CPU Module
00006	2016/08/24 10:13:26.355	System		03081	Please refer to ...	FX5U-32MT/ESS	CPU Module
00007	2016/08/24 10:08:39.064	System		03081	Please refer to ...	FX5U-32MT/ESS	CPU Module

Legend: Major Moderate Minor Warning

Detailed Information: - - -  
 Cause: -  
 Corrective Action: Please refer to the manual of module that the corresponding error occurred.



Use the event history function to identify the cause of failure that occurred in facilities or devices.

For details on this function and collected information, refer to the following.

 MELSEC iQ-F FX5 User's Manual (Application)

For supported versions of the event history, refer to  Page 211 Added and Changed Functions.

## 9.4 Error Status and Operations on Occurrence of an Error

When an error occurs, the CPU module performs preconfigured actions depending on the status of the error.

### Error status

Errors are classified into the following three types according to the urgency of the errors.

Error status	Program execution status	Description	Required action
Major error	Stop	The module is unable to continue its operation due to a hardware issue.	Perform troubleshooting. If the error still persists, consult your local Mitsubishi Electric representative.
Moderate error	Stop	The module is unable to carry out programs or continue the data communication with stations on the network due to improper program or parameter settings and temporary noise.	To resume the execution of the program or the data communication with the stations on the network, use the engineering tool to identify the cause of the error and take corrective actions.
Minor error	Continue	The module has detected a minor error or alarm. However, the execution of the program and the data communication with the stations on the network continues.	Check the details on the error with the engineering tool. If necessary, take corrective actions for the error.

### Operation at the occurrence of an error

Errors are classified into stop errors and continuable errors.

#### ■Stop error

When a stop error occurs, the CPU module stops operation and enters the STOP status. External outputs of the module follow the "STOP→RUN output mode" settings of parameters.

For details on parameters, refer to [MELSEC iQ-F FX5 User's Manual \(Application\)](#).

#### ■Continuable error

When a continuable error occurs, the CPU module will keep the operation status and carry out operations.

Only continuable errors can be canceled. When a continuable error is canceled and the CPU module is restored, the CPU module returns to the status before the occurrence of the error. Continuable errors can be canceled by either of the following methods.

- Using engineering tools
- Using special relay (SM) ([Page 164 Canceling Errors](#))

### Operation settings of the CPU module on occurrence of an intelligent function module error

The operation of the CPU module on occurrence of an intelligent function module error can be set with the engineering tool. Configure the settings with [I/O Assignment Settings] in the system parameters.

## 9.5 Backing Up the Data

---

Saving the following information immediately after the occurrence of an error helps in analyzing the cause of the error.

- Parameters, programs, and device memory
- Error histories

### Backing up parameters, programs, and device memory

The procedure for backing up parameters, programs, and device memory using the engineering tool is explained below.

 [Online]⇒[Read from PLC]

1. Check the parameters, programs, and device memory to back up.
2. Click the [Execute] button to read the data.

### Backing up devices and buffer memory

The procedure for backing up devices and buffer memory using the engineering tool is explained below.

 [Online]⇒[Read from PLC]

1. Click the "Device Memory" check box.
2. Click [Detail].
3. Input character strings in "Device Data Name" and select the devices to back up.
4. Select the "Buffer Memory Intelligent Module No.", and input module number.
5. Click [OK] and then click [Execute] to read the data from the PLC.

## 9.6 Canceling Errors

---

Only continuable errors can be canceled.

If an error is canceled and the CPU module is restored, the status of SM, SD, or LEDs returns to the status before the occurrence of the error. After an error is canceled and when the same error occurs again, this error is recorded again in the error history.

Continuable errors can be canceled by the following method.

### Using special relays (SM)

Turning on and off SM50, all errors will be canceled.

## 9.7 Troubleshooting for Each Symptom

When the CPU module does not operate properly, check the appropriate item from the following and perform troubleshooting.

### I/O operation (CPU module, I/O module)

#### Output does not turn on

Item to check	Action
Check for errors with external wiring.	Connect the external wiring properly.
Stop the PLC, and forcibly turn on or off the inoperable output with a peripheral device or the engineering tool.	<p>■When the output operates The output may be turned off unintentionally in the program. Review user program (Duplicate coils or RST instructions).</p> <p>■When the output does not operate Check the configuration of the connected devices and the connection of the extension cables. If the configuration of the external wiring and connected devices and the connection of the extension cables are acceptable, there may be a hardware issue. Consult your local Mitsubishi Electric representative.</p>

#### Output does not turn off

Item to check	Action
Check for errors with external wiring.	Connect the external wiring properly.
Stop the PLC and check that the output turns off.	<p>■When the output turns off The output may be turned off unintentionally in the program. Review user program (Duplicate coils or RST instructions).</p> <p>■When the output does not turn off There may be a hardware fault. Consult your local Mitsubishi Electric representative.</p>

#### Input does not turn on

Item to check	Action
Disconnect the external wiring and connect the [S/S] terminal and the [0V] terminal or the [24V] terminal. Short-circuit the [0V] terminal or [24V] terminal not connected to the [S/S] terminal and the input terminal, and check the LED or a peripheral device to check that the input turns on.	<p>■When the input turns on Check that the input device does not have a built-in diode or parallel resistance. If so, refer to  Page 112 Precautions for connecting input devices.</p> <p>■When the input does not turn on Measure the voltage between the [0V] terminal or [24] V terminal not connected to the [S/S] terminal and the input terminal with a tester to check that the voltage is 24 V DC. Check the configuration of the external wiring and connected devices and the connection of the extension cables.</p>

#### Input does not turn off

Item to check	Action
Check that there is no leakage current from input devices.	If the leakage current is 1.5 mA or more, connect a bleeder resistance. (  Page 112 Precautions for connecting input devices)

## PLC write, PLC read

### PLC write cannot be performed

If data cannot be written to the CPU module from the engineering tool, check the following items.

Item to check	Action
Check if a password is not registered.	When a password has been registered, authenticate the password with the engineering tool.
When a SD memory card is the write destination, check that the write protection is not applied to the card.	Remove the write protection from the SD memory card.  Page 193 SD Memory Card
When a SD memory card is the write destination, check that the card is formatted.	Format the SD memory card.
Check that the size of the write data does not exceed the memory capacity.	<ul style="list-style-type: none"><li>• Ensure sufficient empty capacity.</li><li>• Clear the memory to which the data is to be written.</li></ul>

If writing still cannot be performed even after the items shown above are checked, there may be a hardware issue. Consult your local Mitsubishi Electric representative.

### PLC read cannot be performed

If data cannot be read from the CPU module to the engineering tool, check the specification of the target memory to be read. Check the memory and reset the CPU module again. Then try PLC read again.

If reading still cannot be performed, there may be a hardware issue. Consult your local Mitsubishi Electric representative.

### The program is unintentionally overwritten

The boot operation may be being performed. Read the parameters and review the boot file settings with the engineering tool. If the boot operation is not being performed, there may be a hardware issue. Consult your local Mitsubishi Electric representative.

For details on the boot operation, refer to  MELSEC iQ-F FX5 User's Manual (Application).

## Boot operation

### Boot operation cannot be performed from the SD memory card

Checking item	Action
Check for errors in the CPU module.	Remove the cause of the error.
Check that the file is set in the boot file settings of the parameters.	Set the file in the parameters.
Check that the file is set in the program file settings of the parameters.	
Check that the file to run is stored in the SD memory card.	Store the file to run.

If the boot operation cannot be performed even after the items shown above are checked, there may be a hardware issue. Consult your local Mitsubishi Electric representative.

# APPENDIX

## Appendix 1 How to Check the Date of Manufacture

Check the date of manufacture of the product (except the expansion board) as follows.

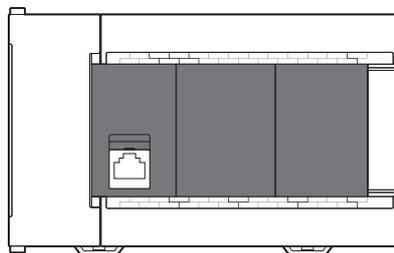
- Nameplate
- Module front surface (CPU module only)

### Checking the nameplate

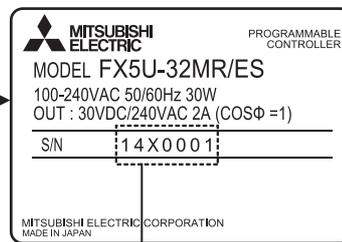
The date of manufacture of the product can be checked from the manufacturer's serial number "S/N" indicated on the nameplate of the product. (For details of the battery, refer to  Page 158 Reading the date of manufacture)

Ex.

CPU module



Example nameplate  
(manufacturer's serial number: 1490001)



\* Actual product nameplate differs from the example shown above.

1 4 X 0 0 0 1

Control number

Month (Example: October):

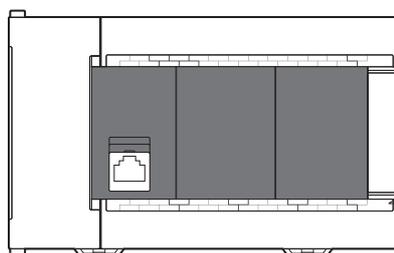
1 to 9 = January to September,

X = October, Y = November, Z = December

Year (Example: 2014): Last two digits of year

### Check on the module front surface

The year and month of production of the product can be checked from the manufacturer's serial number LOT on the front (at the bottom) of the CPU module.



1 4 X

Month (Example: October):

1 to 9 = January to September,

X = October, Y = November, Z = December

Year (Example: 2014): Last two digits of year

A

# Appendix 2 Standards

---

## Certification of UL, cUL standards

---

FX5 supports UL(UL, cUL) standards.

For models that support UL standards, refer to the following.

UL, cUL file number: E95239

## Compliance with EC directive (CE Marking)

---

This note does not guarantee that an entire machine produced in accordance with the contents of this note will comply with the following standards.

Compliance to EMC directive and LVD directive of the entire mechanical module should be checked by the user/ manufacturer. For more details please contact to the local Mitsubishi Electric sales site.

## Requirement for compliance with EMC directive

---

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Electromagnetic Compatibility (2014/30/EU) when used as directed by the appropriate documentation.

### Attention

---

This product is designed for use in industrial applications.

## Product compatibility

Type: Programmable controller (open type equipment)

Models: FX5 manufactured

from October 1st, 2014	FX5U-32MR/ES	FX5U-32MT/ES	FX5U-32MT/ESS			
	FX5U-64MR/ES	FX5U-64MT/ES	FX5U-64MT/ESS			
	FX5U-80MR/ES	FX5U-80MT/ES	FX5U-80MT/ESS			
	FX5-8EX/ES	FX5-8EYR/ES	FX5-8EYT/ES	FX5-8EYT/ESS		
	FX5-16EX/ES	FX5-16EYR/ES	FX5-16EYT/ES	FX5-16EYT/ESS		
	FX5-32ER/ES	FX5-32ET/ES	FX5-32ET/ESS			
	FX5-232ADP	FX5-485ADP	FX5-232-BD	FX5-485-BD	FX5-422-BD-GOT	
	FX5-1PSU-5V	FX5-CNV-BUS				
	from January 1st, 2015	FX5-C32EX/D	FX5-C32EYT/D	FX5-C32ET/D		
		FX5-C32EX/DS	FX5-C32EYT/DSS	FX5-C32ET/DSS		
FX5-4AD-ADP		FX5-4DA-ADP	FX5-CNV-BUSC			
from October 1st, 2015	FX5-C16EX/D	FX5-C16EYT/D	FX5-C16EX/DS	FX5-C16EYT/DSS		
	FX5-C1PS-5V					
from May 1st, 2016	FX5U-32MR/DS	FX5U-32MT/DS	FX5U-32MT/DSS			
	FX5-32ER/DS	FX5-32ET/DS	FX5-32ET/DSS			
	FX5-16ET/ES-H	FX5-16ET/ESS-H	FX5-CNV-IF			
	FX5-30EC	FX5-65EC	FX5-CNV-BC			
from October 1st, 2016	FX5U-64MR/DS	FX5U-64MT/DS	FX5U-64MT/DSS			
	FX5U-80MR/DS	FX5U-80MT/DS	FX5U-80MT/DSS			
	FX5-16ER/ES	FX5-16ET/ES	FX5-16ET/ESS			
	FX5-4AD-PT-ADP	FX5-4AD-TC-ADP				

Electromagnetic compatibility (EMC) directive	Remarks
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	<p>Compliance with all relevant aspects of the standard.</p> <p>EMI</p> <ul style="list-style-type: none"> <li>• Radiated emission</li> <li>• Conducted emission</li> </ul> <p>EMS</p> <ul style="list-style-type: none"> <li>• Radiated electromagnetic field</li> <li>• Fast transient burst</li> <li>• Electrostatic discharge</li> <li>• High-energy surge</li> <li>• Voltage drops and interruptions</li> <li>• Conducted RF</li> <li>• Power frequency magnetic field</li> </ul>

## Requirement for compliance with LVD directive

The following products have shown compliance through direct testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Low Voltage (2014/35/EU) when used as directed by the appropriate documentation.

Type: Programmable controller (open type equipment)

Models: FX5 manufactured

from October 1st, 2014	FX5U-32MR/ES	FX5U-32MT/ES	FX5U-32MT/ESS
	FX5U-64MR/ES	FX5U-64MT/ES	FX5U-64MT/ESS
	FX5U-80MR/ES	FX5U-80MT/ES	FX5U-80MT/ESS
	FX5-8EYR/ES	FX5-16EYR/ES	
	FX5-32ER/ES	FX5-32ET/ES	FX5-32ET/ESS
	FX5-1PSU-5V		
from May 1st, 2016	FX5U-32MR/DS		
	FX5-32ER/DS		
from October 1st, 2016	FX5U-64MR/DS	FX5U-80MR/DS	
	FX5-16ER/ES		

Compliance with LVD directive	Remarks
EN61131-2:2007 Programmable controllers - Equipment requirements and tests	The equipment has been assessed as a component for fitting in a suitable enclosure which meets the requirements of EN61131-2:2007.

# Caution for compliance with EC Directive

## Installation in enclosure

FX5U CPU modules are open-type devices that must be installed and used within shielded conductive control boxes.

Please use the PLCs while installed in conductive shielded control boxes. Please secure the control box lid to the control box (for conduction). Installation within a control box greatly improves the safety of the system and aids in shielding noise from the PLC.

## Caution for when analog products are used

It is recommended to perform the following when precision of measuring and control is required.

As analog devices are sensitive by nature, their use should be considered carefully. For users of proprietary cables (dedicated for sensors or actuators), these users should follow those manufacturers' installation requirements.

Mitsubishi Electric recommends that shielded cables be used. If no other EMC protection is provided, users may experience temporary loss of accuracy between +10%/-10% in very heavy industrial areas.

However, Mitsubishi Electric suggests that if adequate EMC precautions are followed with general good EMC practice for the user's complete control system, users should expect normal errors as specified in this manual.

- Sensitive analog cables should not be laid in the same trunking or cable conduit as high voltage cabling. Where possible, users should run analog cables separately.
- Good cable shielding should be used. When terminating the shield at Earth - ensure that no earth loops are accidentally created.
- When reading analog values, EMC induced errors can be smoothed out by averaging the readings. This can be achieved either through functions on the analog devices or through a user's program in the FX5U CPU module.

Perform the following when using the analog expansion adapter:

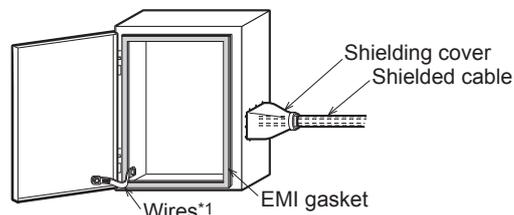
### • Installation in Enclosure

Programmable controllers are open-type devices that must be installed and used within conductive control cabinets.

Please use the programmable controller while installed within a conductive shielded control cabinet. Installation within a control cabinet greatly affects the safety of the system and aids in shielding noise from the programmable controller.

### • Control cabinet

- The control cabinet must be conductive.
- Ground the control cabinet with the thickest possible grounding cable.
- To ensure that there is electric contact between the control cabinet and its door, connect the cabinet and its doors with thick wires.
- In order to suppress the leakage of radio waves, the control cabinet structure must have minimal openings. Also, wrap the cable holes with a shielding cover or other shielding devices.
- The gap between the control cabinet and its door must be as small as possible by attaching EMI gaskets between them.



\*1 These wires are used to improve the conductivity between the door and control cabinet.

### • Cables

- Make sure to use shielded cables as cables pulled out of the control cabinet.
- Connect the shield such as shielded cables and shielding covers to the grounded control cabinet.

• It is possible that the accuracy temporarily fluctuates within  $\pm 10\%$ .

Perform the following when using the FX5-4AD-ADP:

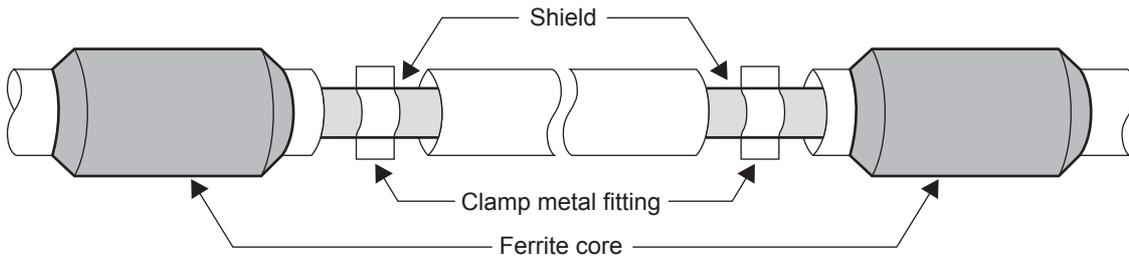
- Set the number of times of winding to "2 turns" within approximately 200 mm from terminal block of the analog cable on the FX5-4AD-ADP side, and attach a ferrite core. (Ferrite core used in our test: E04SR401938 manufactured by SEIWA ELECTRIC MFG. CO., LTD.)

Perform the following when using the FX5-4DA-ADP:

- Set the number of times of winding to “2 turns” within approximately 200 mm from the connectors of the power cable on the FX5-4DA-ADP side, and attach a ferrite core. (Ferrite core used in our test: E04SR401938 manufactured by SEIWA ELECTRIC MFG. CO., LTD.)
- The FX5-4DA-ADP requires that the cable used for power supply is 30 m or less.

### Caution for when the built-in Ethernet port is used

- Use a shielded twisted pair cable for the 10BASE-T or 100BASE-TX cable. Strip a part of the jacket of the shielded twisted pair cable as shown below and ground as much of the exposed shield as possible to both sides of the cable.
- Connect a ferrite core to both ends of the cable. (Ferrite core used in tests by Mitsubishi: ZCAT2035-0930A manufactured by TDK Co.)



# Appendix 3 How to use analog inputs built in CPU module for current inputs

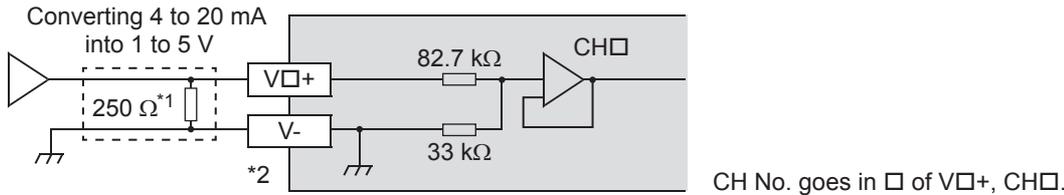
The analog input of the built-in analog can be used as current input (4 to 20 mA DC) for the FX5U CPU module.

## Method of using the FX5U CPU module for current inputs (4 to 20 mA DC)

The FX5U CPU module is designed to handle only voltage inputs.

However, the FX5U CPU module can be used for current inputs by connecting a 250 Ω resistor (tolerance: 0.5%) between the V $\square$ + terminal and the V- terminal.

### Example of wiring



\*1 Instead of a 250 Ω resistor, a 500 Ω resistor can be connected in parallel. When selecting a resistor, consider the maximum input current.

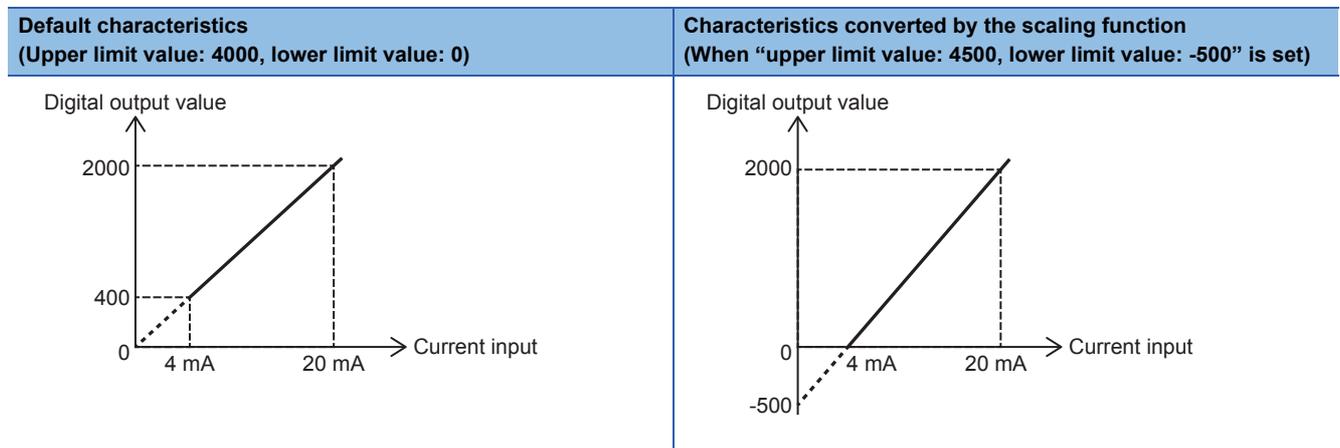
\*2 For unused channels, short-circuit the "V $\square$ +" and "V-" terminals.

### Specifications

Item	Specifications
Analog input	4 to 20 mA DC
Digital output	400 to 2000 <sup>*1</sup>
Resolution	10 μA
Absolute maximum input	-2 mA, +60 mA

\*1 The digital output value can be changed using the scaling function.

### Example of using the scaling signal



For details of the scaling function, refer to MELSEC iQ-F FX5 User's Manual (Analog Control - CPU module built-in, Expansion adapter).

# Appendix 4 Precautions for operating ambient temperature

This section describes precautions when the device is used at an operating ambient temperature below 0°C.

## Precaution when used at an operating ambient temperature below 0°C

- With some exceptions, the operating ambient temperature is -20 to 55°C for the FX5 PLCs manufactured in June 2016 onwards.
- The operating ambient temperature is 0 to 55°C for the FX5 PLCs manufactured before June 2016.
- When the device is used in a low-temperature environment, use care not to let the product freeze or condensation to occur.
- When used in a low-temperature environment, use in an environment with no sudden temperature changes. If there are sudden temperature changes because of opening/closing of the control panel or other reasons, condensation may occur, which may cause a fire, fault, or malfunction. Furthermore, use an air conditioner in dehumidifier mode to prevent condensation.

## Related devices which cannot be used at an operating ambient temperature below 0°C

The following devices cannot be used at an operating ambient temperature below 0°C.

Device name
FX5-40SSC-S
FX5-80SSC-S
FX5-CNV-BUS
FX5-CNV-BUSC
Battery (FX3U-32BL)
SD memory card (NZ1MEM-2GBSD, NZ1MEM-4GBSD, NZ1MEM-8GBSD, NZ1MEM-16GBSD, L1MEM-2GBSD, L1MEM-4GBSD)
FX3 expansion module
Terminal module
Input/output cable (FX-16E-500CAB-S, FX-16E-□CAB, FX-16E-□CAB-R)

A

## Specifications when used at an operating ambient temperature below 0°C

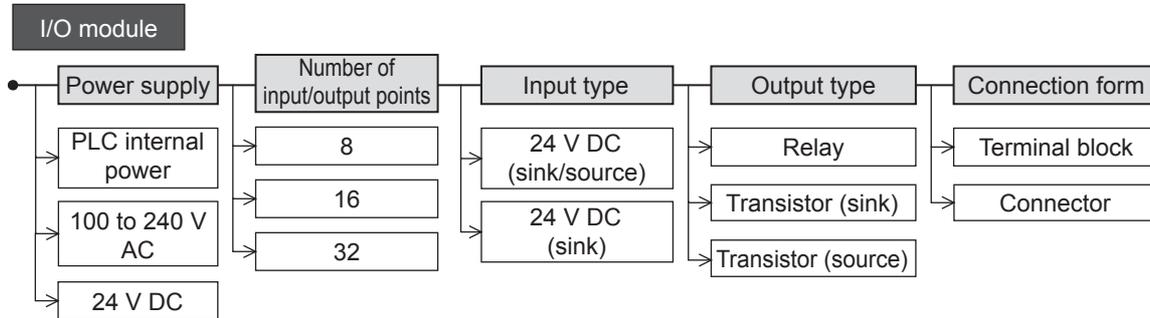
For using the device at an operating ambient temperature below 0°C, specifications are different from when used at an operating ambient temperature of 0 to 55°C.

Item			When used at 0 to 55°C	When used at below 0°C
Capacity of 24 V DC service power supply of the CPU module (AC power supply type)	FX5U-32M□/E□	Supply capacity when 24 V DC service power supply is used for the input circuit of the CPU module	400 mA	300 mA
		Supply capacity when external power supply is used for the input circuit of the CPU module	480 mA	380 mA
	FX5U-64M□/E□	Supply capacity when 24 V DC service power supply is used for the input circuit of the CPU module	600 mA	300 mA
		Supply capacity when external power supply is used for the input circuit of the CPU module	740 mA	440 mA
	FX5U-80M□/E□	Supply capacity when 24 V DC service power supply is used for the input circuit of the CPU module	600 mA	300 mA
		Supply capacity when external power supply is used for the input circuit of the CPU module	770 mA	470 mA
Built-in analog accuracy of the CPU module	Analog input		Within ±1.0% (±40 digit)	Within ±1.5% (±60 digit)
	Analog output		Within ±1.0% (±40 digit)	Within ±1.5% (±60 digit)
Analog accuracy of FX5-4AD-ADP	Analog input		Within ±0.2% (±32 digit)	Within ±0.3% (±48 digit)

# Appendix 5 I/O Module

## Product configuration

There are various types of I/O module. They differ in supply voltage, number of input/output points, input form, output form and connection type.



## Product list

### Input modules

Sink : Sink,  Source : Source

#### ■ Extension cable type

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Input extension/sink and source input type							
FX5-8EX/ES	24 V DC	8	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	—	—	—	Terminal block
FX5-16EX/ES	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	—	—	—	Terminal block

#### ■ Extension connector type

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Input extension/sink input only							
FX5-C16EX/D	24 V DC	16	<input type="checkbox"/> Sink	—	—	—	Connector
FX5-C32EX/D	24 V DC	32	<input type="checkbox"/> Sink	—	—	—	Connector
■ Input extension/sink and source input type							
FX5-C16EX/DS	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	—	—	—	Connector
FX5-C32EX/DS	24 V DC	32	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	—	—	—	Connector

## Output module

Sink : Sink,  Source : Source

### ■ Extension cable type

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Output extension/relay output type							
FX5-8EYR/ES	—	—	—	Relay	8	—	Terminal block
FX5-16EYR/ES	—	—	—	Relay	16	—	Terminal block
■ Output extension/sink output only							
FX5-8EYT/ES	—	—	—	Transistor	8	<input type="checkbox"/> Sink	Terminal block
FX5-16EYT/ES	—	—	—	Transistor	16	<input type="checkbox"/> Sink	Terminal block
■ Output extension/source output only							
FX5-8EYT/ESS	—	—	—	Transistor	8	<input checked="" type="checkbox"/> Source	Terminal block
FX5-16EYT/ESS	—	—	—	Transistor	16	<input checked="" type="checkbox"/> Source	Terminal block

### ■ Extension connector type

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Output extension/sink output only							
FX5-C16EYT/D	—	—	—	Transistor	16	<input type="checkbox"/> Sink	Connector
FX5-C32EYT/D	—	—	—	Transistor	32	<input type="checkbox"/> Sink	Connector
■ Output extension/source output only							
FX5-C16EYT/DSS	—	—	—	Transistor	16	<input checked="" type="checkbox"/> Source	Connector
FX5-C32EYT/DSS	—	—	—	Transistor	32	<input checked="" type="checkbox"/> Source	Connector

## Input/output module

Sink : Sink,  Source : Source

### ■ Extension cable type

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Input/output extension/sink and source input/relay output only							
FX5-16ER/ES	24 V DC	8	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Relay	8	—	Terminal block
■ Input/output extension/sink and source input/sink output only							
FX5-16ET/ES	24 V DC	8	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	8	<input type="checkbox"/> Sink	Terminal block
■ Input/output extension/sink and source input/source output only							
FX5-16ET/ESS	24 V DC	8	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	8	<input checked="" type="checkbox"/> Source	Terminal block

### ■ Extension connector type

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Input/output extension/sink input/output only							
FX5-C32ET/D	24 V DC	16	<input type="checkbox"/> Sink	Transistor	16	<input type="checkbox"/> Sink	Connector
■ Input/output extension/sink and source input/source output only							
FX5-C32ET/DSS	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	16	<input checked="" type="checkbox"/> Source	Connector

A

## Powered input/output module

Sink : Sink,  Source : Source

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Input/output extension/sink and source input/relay output type (AC power supply/DC input type)							
FX5-32ER/ES	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Relay	16	—	Terminal block
■ Input/output extension/sink and source input/sink output only (AC power supply/DC input type)							
FX5-32ET/ES	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	16	<input type="checkbox"/> Sink	Terminal block
■ Input/output extension/sink and source input/source output only (AC power supply/DC input type)							
FX5-32ET/ESS	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	16	<input checked="" type="checkbox"/> Source	Terminal block
■ Input/output extension/sink and source input/relay output type (DC power supply/DC input type)							
FX5-32ER/DS	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Relay	16	—	Terminal block
■ Input/output extension/sink and source input/sink output only (DC power supply/DC input type)							
FX5-32ET/DS	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	16	<input type="checkbox"/> Sink	Terminal block
■ Input/output extension/sink and source input/source output only (DC power supply/DC input type)							
FX5-32ET/DSS	24 V DC	16	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	16	<input checked="" type="checkbox"/> Source	Terminal block

## High-speed pulse input/output module

Sink : Sink,  Source : Source

Model	Input			Output			Connection type
	Type	No. of points	Common wiring system	Type	No. of points	Common wiring system	
■ Input/output extension/sink and source input/sink output only							
FX5-16ET/ES-H	24 V DC	8	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	8	<input type="checkbox"/> Sink	Terminal block
■ Input/output extension/sink and source input/source output only							
FX5-16ET/ESS-H	24 V DC	8	<input type="checkbox"/> Sink <input checked="" type="checkbox"/> Source	Transistor	8	<input checked="" type="checkbox"/> Source	Terminal block

## Specifications

The generic specifications are the same as those for the CPU module. (☞ Page 20 Generic Specifications)

### Power supply specifications

#### ■ Input modules

Item	Specifications	
Voltage rating	24 V DC (supplied from 24 V DC service power supply or external power supply) 5 V DC (supplied from PLC)	
Current consumption (5 V DC)	FX5-8EX/ES	75 mA
	FX5-16EX/ES	100 mA
	FX5-C16EX/□	100 mA
	FX5-C32EX/□	120 mA
Current consumption (24 V DC)	FX5-8EX/ES	50 mA
	FX5-16EX/ES	85 mA
	FX5-C16EX/□	(65 mA)**1
	FX5-C32EX/□	(130 mA)**1

\*1 The value in parentheses indicates the current consumption when the 24 V DC service power supply is used.

## ■ Output modules

Item		Specifications
Voltage rating		24 V DC (supplied from PLC) 5 V DC (supplied from PLC)
Current consumption (5 V DC)	FX5-8EY□	75 mA
	FX5-16EY□	100 mA
	FX5-C16EYT/□	100 mA
	FX5-C32EYT/□	120 mA
Current consumption (24 V DC)	FX5-8EY□	75 mA
	FX5-16EY□	125 mA
	FX5-C16EYT/□	100 mA
	FX5-C32EYT/□	200 mA

## ■ Input/output module

Item		Specifications
Voltage rating	Input	24 V DC (supplied from 24 V DC service power supply or external power supply) 5 V DC (supplied from PLC)
	Output	24 V DC (supplied from PLC) 5 V DC (supplied from PLC)
Current consumption (5 V DC)	FX5-16E□/E□	100 mA
	FX5-C32ET/□	120 mA
Current consumption (24 V DC)	FX5-16E□/E□	125 mA (82 mA <sup>*1</sup> )
	FX5-C32ET/□	Input (65 mA) <sup>*2</sup>
		Output

\*1 Current consumption when external power supply is used for the input circuit.

\*2 The value in parentheses indicates the current consumption when the 24 V DC service power supply is used.

## ■ Powered input/output module

Item		Specifications
Voltage rating	FX5-32E□/E□	100 to 240 V AC
	FX5-32E□/D□	24 V DC
Allowable supply voltage range	FX5-32E□/E□	85 to 264 V AC
	FX5-32E□/D□	16.8 to 28.8 V DC
Rated frequency	FX5-32E□/E□	50/60 Hz
Allowable instantaneous power failure time	FX5-32E□/E□	Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less.
	FX5-32E□/D□	Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.
Power fuse		250 V, 3.15 A time-lag fuse
Rush current	FX5-32E□/E□	30 A max. 5 ms or less/100 V AC 65 A max. 5 ms or less/200 V AC
	FX5-32E□/D□	50 A max. 0.5 ms or less/24 V DC
Power consumption <sup>*1</sup>		25 W
24 V DC service power supply <sup>*2</sup>	FX5-32E□/E□	250 mA (Supply capacity when 24 V DC service power supply is used for input circuit of the powered input/output module)
		310 mA (Supply capacity when external power supply is used for input circuit of the powered input/output module)
24 V DC built-in power supply <sup>*2</sup>	FX5-32E□/D□	310 mA
5 V DC built-in power supply		965 mA

\*1 This item shows value when all 24 V DC service power supplies are used in the maximum configuration connectable to the CPU module. (The current of the input circuit is included.)

\*2 When I/O modules are connected, they consume current from the 24 V DC service power supply and 24 V DC built-in power supply. For details on the 24 V DC service power supply and built-in power supply, refer to  Page 59 Limitation on Current Consumption.

## ■High-speed pulse input/output module

Item	Specifications
Voltage rating	24 V DC (supplied from 24 V DC service power supply or external power supply) 5 V DC (supplied from PLC)
Current consumption (5 V DC)	100 mA
Current consumption (24 V DC)	125 mA (82 mA <sup>*1</sup> )

\*1 Current consumption when external power supply is used for the input circuit.

## External color, weight, accessories

### ■Input module/output module

Item	Specifications	
External color	Munsell 0.6B7.6/0.2	
Mass (weight)	FX5-8E□	Approx. 0.2 kg
	FX5-16E□	Approx. 0.25 kg
	FX5-C16EX/□, FX5-C16EYT/□	Approx. 0.1 kg
	FX5-C32EX/□, FX5-C32EYT/□	Approx. 0.15 kg
Accessories	FX5-8E□, FX5-16E□	Dust proof protection sheet
	FX5-C32EX/□	FX2NC-10BPCB1

### ■Input/output module

Item	Specifications	
Exterior color	Munsell 0.6B7.6/0.2	
Mass (weight)	FX5-16E□/E□	Approx. 0.25 kg
	FX5-C32ET/□	Approx. 0.15 kg
Accessories	FX5-C32ET/D	FX2NC-10BPCB1

### ■Powered input/output module

Item	Specifications
External color	Munsell 0.6B7.6/0.2
Mass (weight)	Approx. 0.65 kg
Accessories	Extension cable, dust proof protection sheet

### ■High-speed pulse input/output module

Item	Specifications
Exterior color	Munsell 0.6B7.6/0.2
Mass (weight)	Approx. 0.25 kg
Accessories	Manual supplied with product, dust proof protection sheet

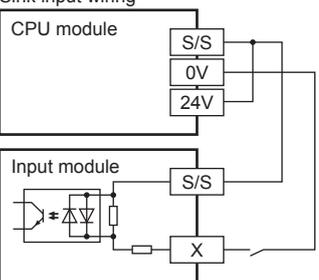
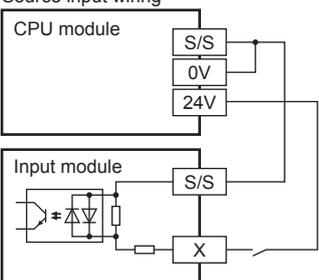
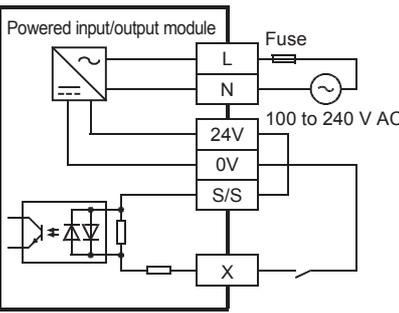
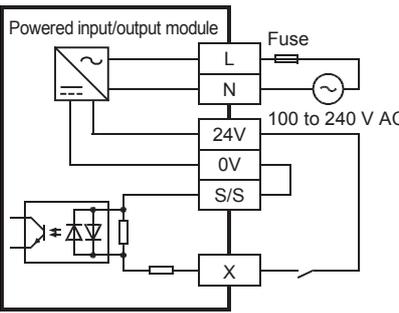
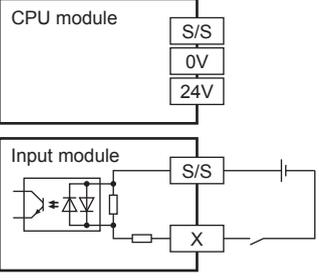
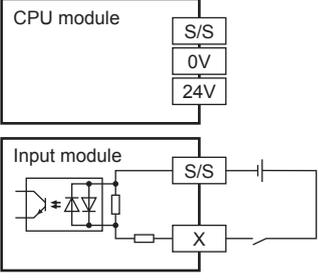
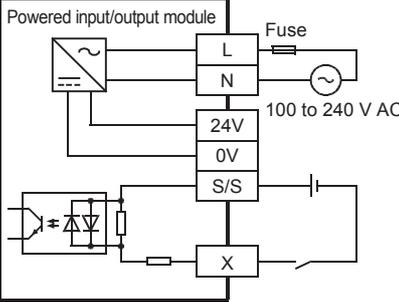
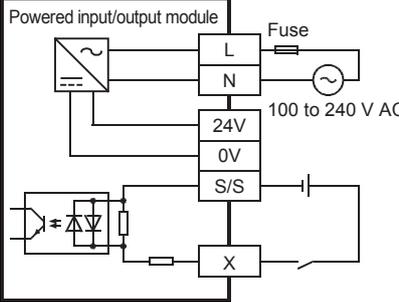
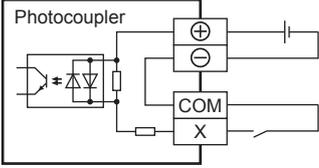
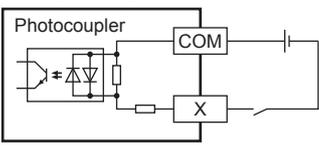
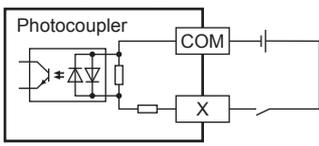
## Input specifications

There is the simultaneous ON ratio of available PLC inputs or outputs with respect to the ambient temperature.

For details, refer to  Page 27 Input/Output Derating Curve

Item		Specifications	
No. of input points	FX5-8EX/ES	8 points	
	FX5-16EX/ES	16 points	
	FX5-32E□	16 points	
	FX5-16ER/ES	8 points	
	FX5-16ET/E□	8 points	
	FX5-C16EX/□	16 points	
	FX5-C32EX/□	32 points	
	FX5-C32ET/□	16 points	
Connection type	FX5-□EX/ES, FX5-32E□, FX5-16ER/ES, FX5-16ET/E□	Terminal block (M3 screws)	
	FX5-C□EX/□, FX5-C32ET/□	Connector	
Input type	FX5-□EX/ES, FX5-32E□, FX5-16ER/ES, FX5-16ET/E□, FX5-C□EX/DS, FX5-C32ET/DSS	Sink/source	
	FX5-C□EX/D, FX5-C32ET/D	Sink	
Input signal voltage		24 V DC +20%, -15%	
Input signal current	Other than FX5-16ET/E□-H	4.0 mA/24 V DC	
	FX5-16ET/E□-H	5.3 mA/24 V DC	
Input impedance	Other than FX5-16ET/E□-H	5.6 kΩ	
	FX5-16ET/E□-H	4.3 kΩ	
Input sensitivity current	ON	Other than FX5-16ET/E□-H	3.0 mA or more
		FX5-16ET/E□-H	3.5 mA or more
	OFF		1.5 mA or less
Input response frequency	FX5-16ET/E□-H	X0 to 5: 200 kHz X6, X7: 10 kHz	
Input response time	Other than FX5-16ET/E□-H	ON: 50 μs or less OFF: 150 μs or less	
	FX5-16ET/E□-H	X0 to X5: ON: 2.5 μs or less, OFF: 2.5 μs or less X6, X7: ON: 30 μs or less, OFF: 50 μs or less	
Input signal format	FX5-□EX/ES, FX5-32E□, FX5-16ER/ES, FX5-16ET/E□, FX5-C□EX/DS, FX5-C32ET/DSS	No-voltage contact input Sink: NPN open collector transistor Source: PNP open collector transistor	
	FX5-C□EX/D, FX5-C32ET/D	No-voltage contact input Sink: NPN open collector transistor	
Input circuit insulation		Photo-coupler insulation	
Indication of input operation		LED is lit when input is on <ul style="list-style-type: none"> <li>• With FX5-C32EX/□, the lower number/higher number order is switched with the DISP switch F/L.</li> <li>• With FX5-C32ET/□, the input/output is switched with the DISP switch IN/OUT.</li> </ul>	

A

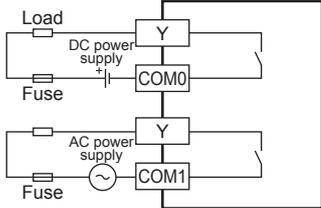
Item	Specifications
Input circuit configuration FX5-□EX/ES, FX5-32E□, FX5-16ER/ES, FX5-16ET/E□	<ul style="list-style-type: none"> <li>When using 24 V DC service power supply for input module and high-speed pulse input/output module</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div> <ul style="list-style-type: none"> <li>When using 24 V DC service power supply for powered input/output module</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div> <ul style="list-style-type: none"> <li>When using external power supply for input module and high-speed pulse input/output module</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div> <ul style="list-style-type: none"> <li>When using external power supply for powered input/output module</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div>
FX5-□EX/D, FX5-C32ET/D	<div style="text-align: center;">  </div>
FX5-□EX/DS, FX5-C32ET/DSS	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Sink input wiring</p>  </div> <div style="text-align: center;"> <p>Source input wiring</p>  </div> </div>

## Output specifications

There is the simultaneous ON ratio of available PLC inputs or outputs with respect to the ambient temperature.

For details, refer to  Page 27 Input/Output Derating Curve

### ■Relay output

Item		Specifications
No. of output points	FX5-8EYR/ES	8 points
	FX5-16EYR/ES	16 points
	FX5-16ER/ES	8 points
	FX5-32ER/□S	16 points
Connection type		Terminal block (M3 screws)
Output type		Relay
External power supply		30 V DC or less 240 V AC or less (250 V AC or less when the module does not comply with CE UL, cUL standards)
Output circuit insulation		Mechanical insulation
Indication of output operation		LED is lit when output is on
Max. load		2 A/point The total load current of resistance loads per common terminal should be the following value. • 4 output points/common terminal: 8 A or less • 8 output points/common terminal: 8 A or less
Open circuit leakage current		—
Min. load		5 V DC, 2 mA (reference values)
Response time	OFF→ON	Approx. 10 ms
	ON→OFF	Approx. 10 ms
Output circuit configuration		

### ■Transistor output (sink output)

Item		Specifications
No. of output points	FX5-8EYT/ES	8 points
	FX5-16EYT/ES	16 points
	FX5-16ET/ES	8 points
	FX5-32ET/□S	16 points
	FX5-16ET/ES-H	8 points
	FX5-C16EYT/D	16 points
	FX5-C32EYT/D	32 points
	FX5-C32ET/D	16 points
Connection type	FX5-□EYT/ES, FX5-16ET/ES, FX5-32ET/□S, FX5-16ET/ES-H	Terminal block (M3 screws)
	FX5-C□EYT/D, FX5-C32ET/D	Connector
Output type		Transistor/sink output
External power supply		5 to 30 V DC
Output circuit insulation		Photo-coupler insulation
Indication of output operation		LED is lit when output is on • With FX5-C32EYT/□, the lower number/higher number order is switched with the DISP switch F/L. • With FX5-C32ET/□, the input/output is switched with the DISP switch IN/OUT.

Item		Specifications	
Max. load	FX5-□EYT/ES, FX5-16ET/ES, FX5-32ET/□S, FX5-16ET/ES-H	0.5 A/point The total load current of resistance loads per common terminal should be the following value. • 4 output points/common terminal: 0.8 A or less • 8 output points/common terminal: 1.6 A or less	
	FX5-C□EYT/D, FX5-C32ET/D	0.1 A/point The total load current of resistance loads per common terminal should be the following value. • 8 output points/common terminal: 0.8 A or less	
Open circuit leakage current		0.1 mA/30 V DC	
Min. load		—	
Response time	OFF→ON	FX5-□EYT/ES, FX5-16ET/ES, FX5-32ET/□S	0.2 ms or less/200 mA (at 24 V DC)
		FX5-C□EYT/D, FX5-C32ET/D	0.2 ms or less/100 mA (at 24 V DC)
		FX5-16ET/ES-H	Y0, Y1, Y4, Y5: 2.5 μs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less/200 mA (at 24 V DC)
	ON→OFF	FX5-□EYT/ES, FX5-16ET/ES, FX5-32ET/□S	0.2 ms or less/200 mA (at 24 V DC)
		FX5-C□EYT/D, FX5-C32ET/D	0.2 ms or less/100 mA (at 24 V DC)
		FX5-16ET/ES-H	Y0, Y1, Y4, Y5: 2.5 μs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less/200 mA (at 24 V DC)
Maximum frequency		FX5-16ET/ES-H Y0, Y1, Y4, Y5: 200 kpps	
Voltage drop when ON		1.5 V or less(Y0, Y1, Y4, and Y5 of FX5-16ET/ES-H is 1.0 V or less)	
Output circuit configuration		<div style="display: flex; flex-direction: column;"> <div style="margin-bottom: 10px;"> <p>FX5-□EYT/ES, FX5-16ET/ES, FX5-32ET/□S, FX5-16ET/ES-H</p> </div> <div> <p>FX5-C□EYT/D, FX5-C32ET/D</p> </div> </div>	

## ■ Transistor output (source output)

Item		Specifications
No. of output points	FX5-8EYT/ESS	8 points
	FX5-16EYT/ESS	16 points
	FX5-16ET/ESS	8 points
	FX5-32ET/□SS	16 points
	FX5-16ET/ESS-H	8 points
	FX5-C16EYT/DSS	16 points
	FX5-C32EYT/DSS	32 points
	FX5-C32ET/DSS	16 points
Connection type	FX5-□EYT/ESS, FX5-16ET/ESS, FX5-32ET/□SS, FX5-16ET/ESS-H	Terminal block (M3 screws)
	FX5-C□EYT/DSS, FX5-C32ET/DSS	Connector
Output type		Transistor/source output

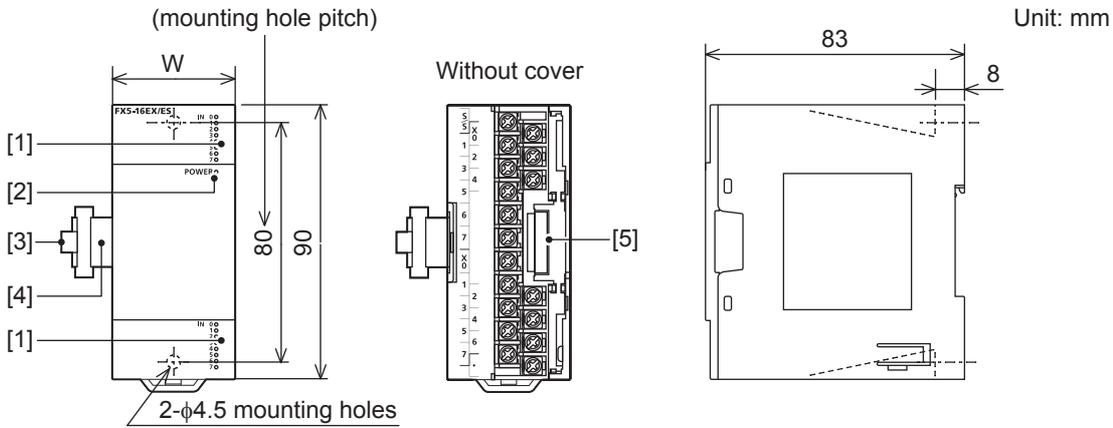
Item		Specifications	
External power supply		5 to 30 V DC	
Output circuit insulation		Photo-coupler insulation	
Indication of output operation		LED is lit when output is on <ul style="list-style-type: none"> <li>• With FX5-C32EYT/□, the lower number/higher number order is switched with the DISP switch F/L.</li> <li>• With FX5-C32ET/□, the input/output is switched with the DISP switch IN/OUT.</li> </ul>	
Max. load	FX5-□EYT/ESS, FX5-16ET/ESS, FX5-32ET/□SS, FX5-16ET/ESS-H	0.5 A/point The total load current of resistance loads per common terminal should be the following value. <ul style="list-style-type: none"> <li>• 4 output points/common terminal: 0.8 A or less</li> <li>• 8 output points/common terminal: 1.6 A or less</li> </ul>	
	FX5-□EYT/DSS, FX5-C32ET/DSS	0.1 A/point The total load current of resistance loads per common terminal should be the following value. <ul style="list-style-type: none"> <li>• 8 output points/common terminal: 0.8 A or less</li> </ul>	
Open circuit leakage current		0.1 mA/30 V DC	
Min. load		—	
Response time	OFF→ON	FX5-□EYT/ESS, FX5-16ET/ESS, FX5-32ET/□SS	0.2 ms or less/200 mA (at 24 V DC)
		FX5-□EYT/DSS, FX5-C32ET/DSS	0.2 ms or less/100 mA (at 24 V DC)
		FX5-16ET/ESS-H	Y0, Y1, Y4, Y5: 2.5 μs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less/200 mA (at 24 V DC)
	ON→OFF	FX5-□EYT/ESS, FX5-16ET/ESS, FX5-32ET/□SS	0.2 ms or less/200 mA (at 24 V DC)
		FX5-□EYT/DSS, FX5-C32ET/DSS	0.2 ms or less/100 mA (at 24 V DC)
		FX5-16ET/ESS-H	Y0, Y1, Y4, Y5: 2.5 μs or less/10 mA (at 5 to 24 V DC) Y2, Y3, Y6, Y7: 0.2 ms or less/200 mA (at 24 V DC)
Maximum frequency		FX5-16ET/ESS-H	Y0, Y1, Y4, Y5: 200 kpps
Voltage drop when ON		1.5 V or less (Y0, Y1, Y4, and Y5 of FX5-16ET/ESS-H is 1.0 V or less)	
Output circuit configuration		FX5-□EYT/ESS, FX5-16ET/ESS, FX5-32ET/□SS, FX5-16ET/ESS-H	
		FX5-□EYT/DSS, FX5-C32ET/DSS	



# External dimensions and component names

## Input module/output module

### ■ Extension cable type



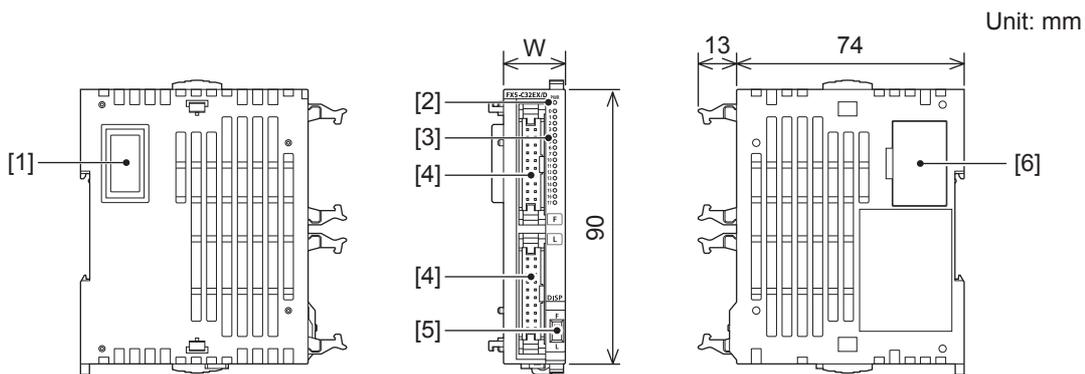
External dimensions

Model	W: mm
FX5-8EX/ES	40
FX5-8EYR/ES, FX5-8EYT/ES, FX5-8EYT/ESS	
FX5-16EX/ES	
FX5-16EYR/ES, FX5-16EYT/ES, FX5-16EYT/ESS	

Part names

No.	Name	Description
[1]	Input display LED, output display LED	Lit when input or output is on.
[2]	POWER LED	Indicates whether the input modules/output modules is powered or not. Lit: Powered Off: Not powered or hardware error
[3]	Pullout tab	They are used when drawing out an extension cable.
[4]	Extension cable	Cable used to connect the extension module
[5]	Extension connector	Connector for connecting the extension cable of an extension module.

## ■ Extension connector type



### External dimensions

Model	W: mm
FX5-C16EX/D, FX5-C16EX/DS	14.6
FX5-C16EYT/D, FX5-C16EYT/DSS	
FX5-C32EX/D, FX5-C32EX/DS	20.1
FX5-C32EYT/D, FX5-C32EYT/DSS	

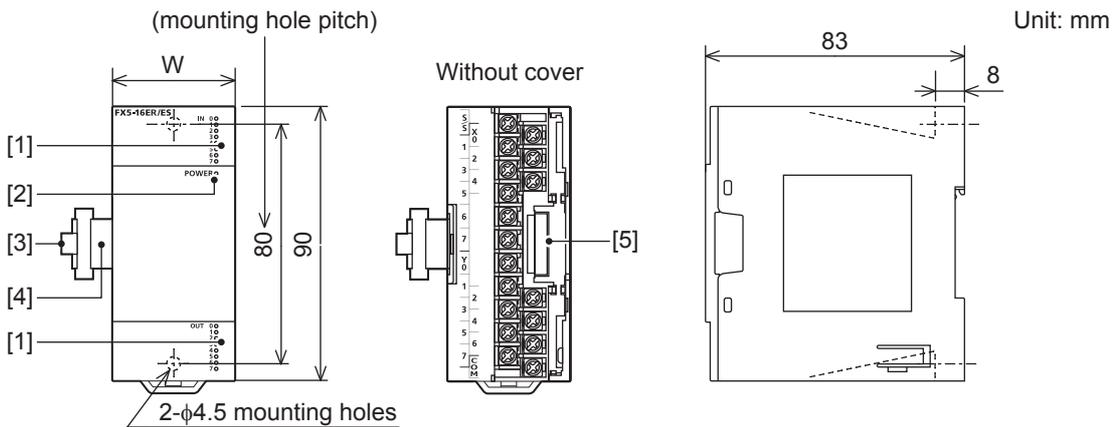
### Part names

No.	Name	Description
[1]	Extension connector	Connector connected to extend modules
[2]	PWR LED	Indicates whether the input modules/output modules is powered or not. Lit: Powered Off: Not powered or hardware error
[3]	I/O display LED	Lit when input or output is on.
[4]	I/O connectors	Connector for connecting input signal cables or output signal cables
[5]	DISP switch	Switches the display of smaller and larger numbers of the input display LED or output display LED. Smaller number: F Larger number: L
[6]	Extension connector	Connector for connecting the extension connector of an extension module

A

## Input/output module

### ■ Extension cable type



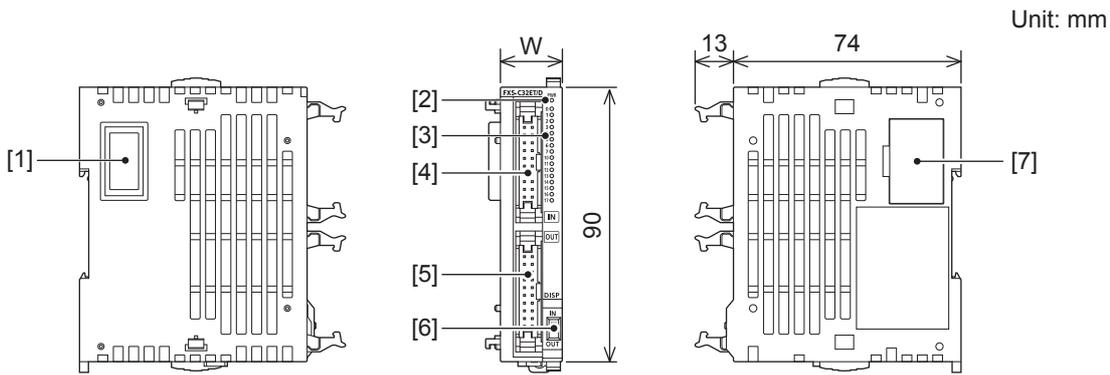
#### External dimensions

Model	W: mm
FX5-16ER/ES, FX5-16ET/ES, FX5-16ET/ESS	40

#### Part names

No.	Name	Description
[1]	Input display LED, output display LED	Lit when input or output is on.
[2]	POWER LED	Indicates whether the input modules/output modules is powered or not. Lit: Powered Off: Not powered or hardware error
[3]	Pullout tab	They are used when drawing out an extension cable.
[4]	Extension cable	Cable used to connect the extension module
[5]	Extension connector	Connector for connecting the extension cable of an extension module.

## ■ Extension connector type



External dimensions

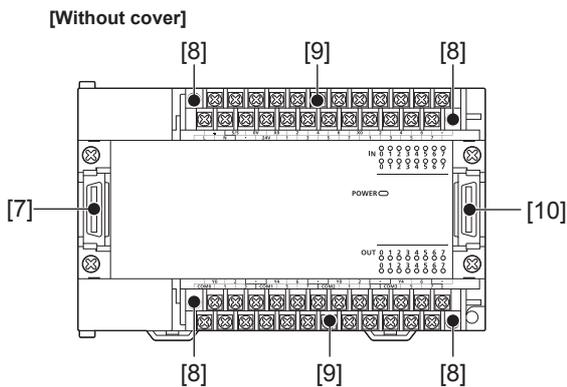
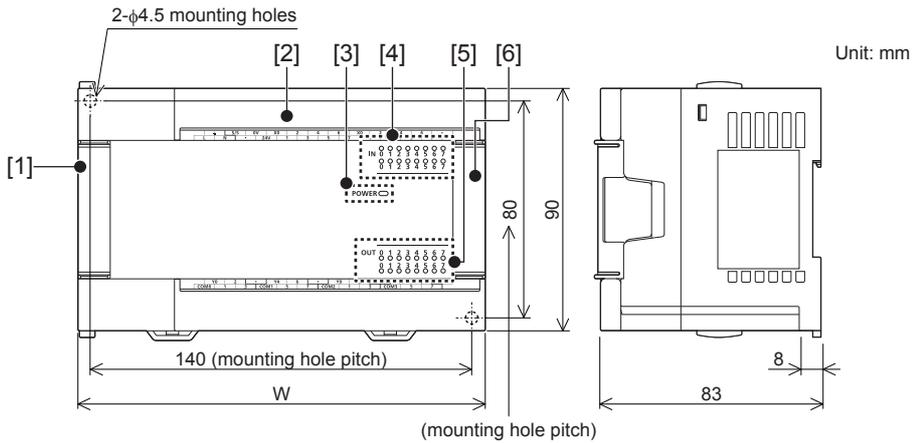
Model	W: mm
FX5-C32ET/D, FX5-C32ET/DSS	20.1

Part names

No.	Name	Description
[1]	Extension connector	Connector connected to extend modules
[2]	PWR LED	Indicates whether the input/output modules are powered or not. Lit: Powered Off: Not powered or hardware error
[3]	I/O display LED	Lit when input or output is on.
[4]	Input connector	Connector for connecting input signal cables.
[5]	Output connector	Connector for connecting output signal cables.
[6]	DISP switch	Switches input/output of the I/O display LED. Input: IN Output: OUT
[7]	Extension connector	Connector for connecting the extension connector of an extension module

A

## Powered input/output module



### External dimensions

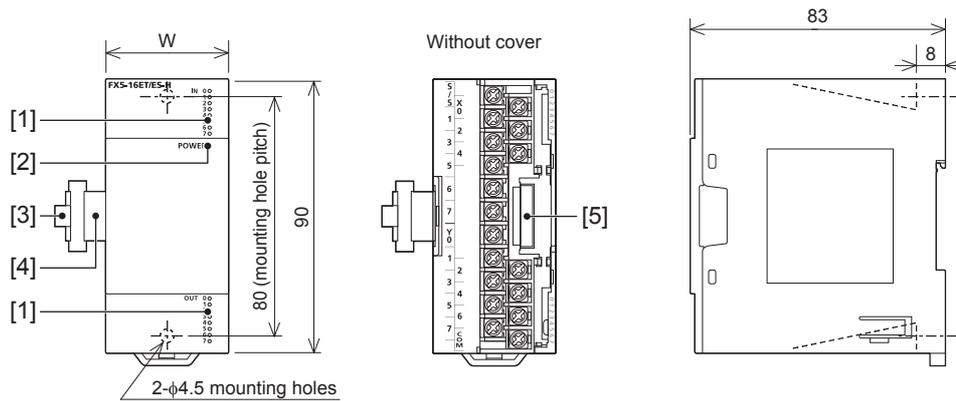
Model	W: mm
FX5-32ER/ES, FX5-32ET/ES, FX5-32ET/ESS FX5-32ER/DS, FX5-32ET/DS, FX5-32ET/DSS	150

### Part names

No.	Name	Description
[1]	Extension connector cover (for preceding module)	Cover for protecting the extension connector cover (for preceding module).
[2]	Terminal block cover	Cover for protecting the terminal block. The cover can be opened for wiring. Keep the covers closed while equipment is running (power is on).
[3]	POWER LED	Indicates whether the powered input/output module is powered or not. Lit: Powered Off: Not powered or hardware error
[4]	Input display LED	Lit when input is on.
[5]	Output display LED	Lit when output is on.
[6]	Extension connector cover (for next module)	Cover for protecting the extension connector cover (for next module).
[7]	Extension connector (for preceding module)	Connector for connecting the supplied extension cable that connects to the preceding module (the CPU module side).
[8]	Terminal block mounting screws	Gradually loosen the left and right screws (alternatingly) to remove the upper part of the terminal block.
[9]	Terminal	Terminals for power, input, and output. For details on the terminal layout, refer to  Page 190 Terminal layout.
[10]	Extension connector (for next module)	Connector for connecting the extension cable of an extension module.

## High-speed pulse input/output module

Unit: mm



### External dimensions

Model	W: mm
FX5-16ET/ES-H, FX5-16ET/ESS-H	40

### Part names

No.	Name	Description
[1]	Input display LED, Output display LED	Lit when input or output is on.
[2]	POWER LED	Indicates whether the input modules/output modules is powered or not. Lit: Powered Off: Not powered or hardware error
[3]	Pullout tab	They are used when drawing out an extension cable.
[4]	Extension cable	Cable connected to extend modules
[5]	Extension connector	Connector for connecting the extension cable of an extension module.

A

# Terminal layout

## Extension cable type

FX5-8EX/ES



FX5-16EX/ES

FX5-8EYR/ES  
FX5-8EYT/ES



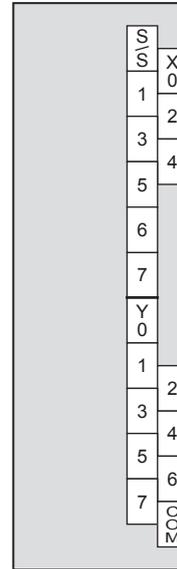
FX5-16EYR/ES  
FX5-16EYT/ES

FX5-8EYT/ESS

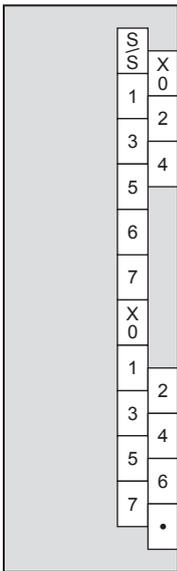


FX5-16EYT/ESS

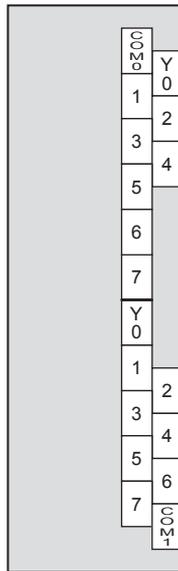
FX5-16ER/ES  
FX5-16ET/ES  
FX5-16ET/ES-H



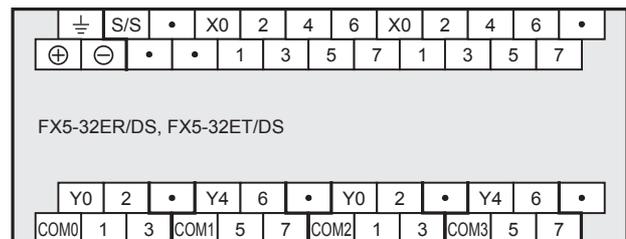
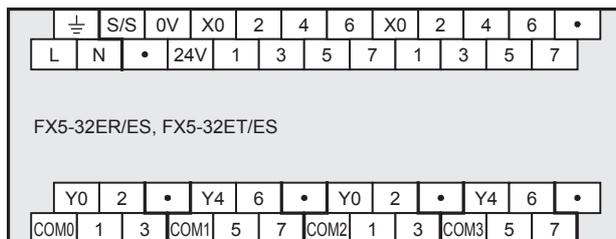
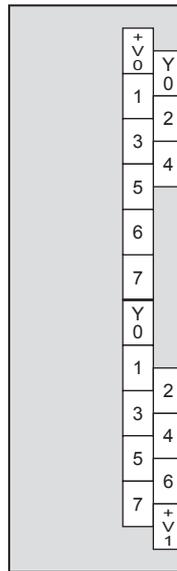
FX5-16ET/ES  
FX5-16ET/ES-H



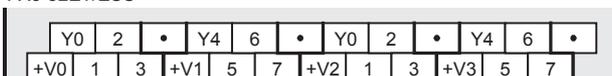
FX5-32E□/E□



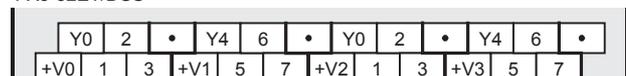
FX5-32E□/D□



FX5-32ET/ESS



FX5-32ET/DSS



# Extension connector type

**FX5-C16EX/D**

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM	COM
•	•

**FX5-C32EX/D**

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM	COM
•	•

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM	COM
•	•

**FX5-C16EYT/D**

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
COM0	COM0
•	•

**FX5-C32EYT/D**

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
COM0	COM0
•	•

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
COM1	COM1
•	•

**FX5-C32ET/D**

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM	COM
•	•

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
COM0	COM0
•	•

**FX5-C16EX/DS**

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM0	COM0
•	•

**FX5-C32EX/DS**

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM0	COM0
•	•

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM1	COM1
•	•

**FX5-C16EYT/DSS**

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
+V0	+V0
•	•

**FX5-C32EYT/DSS**

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
+V0	+V0
•	•

Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
+V1	+V1
•	•

**FX5-C32ET/DSS**

Input	
X0	X0
X1	X1
X2	X2
X3	X3
X4	X4
X5	X5
X6	X6
X7	X7
COM0	COM0
•	•

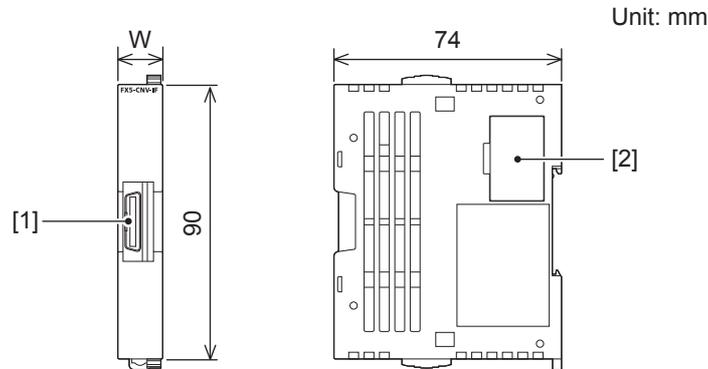
Output	
Y0	Y0
Y1	Y1
Y2	Y2
Y3	Y3
Y4	Y4
Y5	Y5
Y6	Y6
Y7	Y7
+V0	+V0
•	•



# Appendix 6 Connector conversion module

Connector conversion modules are used to connect FX5 I/O modules (extension connector type) in FX5U systems.

## External dimensions and component names



### External dimensions

Model	W: mm
FX5-CNV-IF	14.6

### Part names

No.	Name	Description
[1]	Extension connector (for preceding module)	Connector for connecting the supplied extension cable that connects to the preceding module (the CPU module side).
[2]	Extension connector (for next module)	Connector for connecting the extension connector of an extension module (extension connector type).

## Specifications

The generic specifications are the same as those for the CPU module. (☞ Page 20 Generic Specifications)

### External color, weight, accessories

Item	Specifications
External color	Munsell 0.6B7.6/0.2
Mass (weight)	Approx. 60 g
Accessories	Extension cable

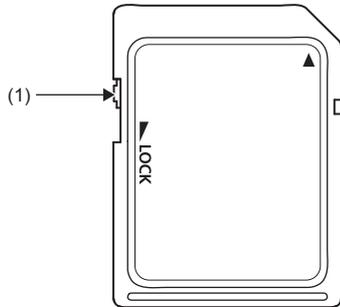
# Appendix 7 SD Memory Card

An SD memory card is installed in the CPU module to perform the following operation.

- Operate using the project data in the SD memory card.
- Storing data that is collected by the data logging function to the SD memory card.

## Part names

This section describes the part names of the SD memory card.



No.	Name	Description
(1)	Write protect switch	Setting the switch in the lock position prevents the data in the SD memory card from being deleted and overwritten.

## Specifications

The following shows functional specifications of the SD memory card.

Item		NZ1MEM-2GBSD	NZ1MEM-4GBSD	NZ1MEM-8GBSD	NZ1MEM-16GBSD
Type		SD memory card	SDHC memory card		
Capacity		2 Gbytes	4 Gbytes	8 Gbytes	16 Gbytes
Number of writes		60,000 times	100,000 times		
External dimensions	Height	32 mm			
	Width	24 mm			
	Depth	2.1 mm			
Mass (weight)		2 g			

A



For L1MEM-2GBSD and L1MEM-4GBSD, refer to the following.  
 (📖 QCPU User's Manual(Hardware Design, Maintenance and Inspection))

## Handling of the SD memory card

- Operational compatibility of the SD memory cards manufactured by Mitsubishi (NZ1MEM-□GBSD) with MELSEC iQ-F series CPU modules has been checked. Use of SD memory card other than a Mitsubishi SD memory card may result in loss of the data stored in the SD memory card, or problems such as system stop.
- When mounted in the CPU module, SD memory cards manufactured by Mitsubishi are compliant with IEC61131-2.
- The SDHC memory card can be used only with devices with an SDHC logo or whose user's manual lists an SDHC logo. Note that SDHC cards cannot be used with devices that support only "SD" specifications.
- Turning off or resetting the CPU module or removing the SD memory card while the card is being accessed may corrupt the data in the SD memory card. Always turn off or reset the CPU module or remove the SD memory card after disabling access to the SD memory card. With SM606 (SD memory card forced disable instruction) and SM607 (SD memory card forced disable status flag), the SD memory card can be disabled and its usage status can be checked.
- It is recommended that important data be periodically backed up to CD, DVD, or other media.

## Formatting

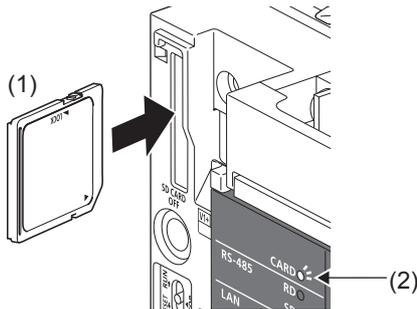
To use any SD memory card in the CPU module, the card must be formatted. In the initial state after purchase, the SD memory card is not formatted. Insert the SD memory card to a CPU module and format the SD memory card using the engineering tool before use. Do not format the SD memory card using the personal computer. (GX Works3 Operating Manual)

## Insertion and removal of the SD memory card

The following explains insertion and removal of the SD memory card.

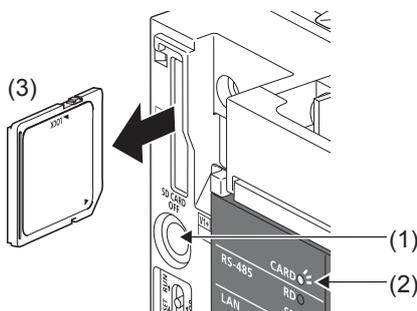
### Insertion procedure

Mount the SD memory card. Pay attention to the direction of the card and follow the procedure below.



1. Insert the SD memory card (1) straight into the SD memory card slot. Make sure that the notch of the card is directed downward. After mounting, check that the card is mounted completely. If the card is mounted incompletely, malfunctions may occur because of poor contact.
2. The CARD LED (2) blinks until the SD memory card becomes available.
3. The CARD LED turns on when the SD memory card is available.
4. If the CARD LED does not turn on even though the SD memory card is mounted, make sure that SM606 (forcibly stop using SD memory card instruction) and SM607 (forcibly stop using SD memory card flag) are OFF by using engineering tools.

### Removal procedure



1. Press the SD memory card stop switch (1) for one second or more to stop access to the card. The CARD READY LED (2) blinks during the access stop operation, and then the LED is turned OFF when the operation is completed.
2. Insert the SD memory card (3) once, and then pull it straight.

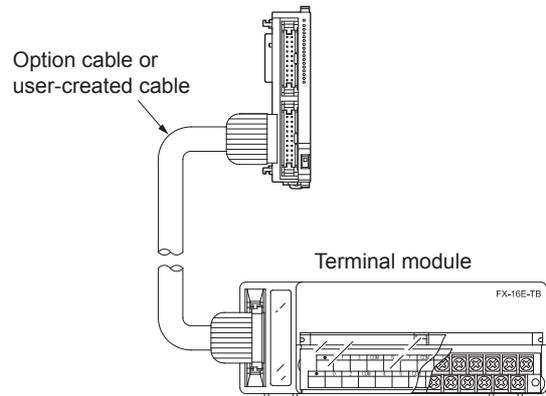
### Precautions

- When mounting or removing the SD memory card while the power is ON, follow the above-mentioned procedure. Otherwise, the data in the card may be broken.
- When removing the SD memory card which is being accessed by any function, the CARD LED is turned OFF after the access is completed. When the CARD LED is turned OFF depends on the accessing function.
- When SM605 (mount and remove memory card disabling flag) is ON, the CARD LED is not turned OFF even if the SD memory card stop switch is pressed. If the CARD LED is not turned OFF, turn ON SM606 (instruction of forcibly stop using SD memory card) so that the SD memory card cannot be used.

# Appendix 8 Terminal Module

## Product configuration

Terminal modules are used to convert connector-type I/O terminals into terminal blocks. By using terminal blocks (built-in element type) dedicated to input or output, capturing of AC input signals and format conversion into the relay/transistor/triac output can be performed.



## Product list

### Sink input/sink output (transistor output)

Model	No. of input points	No. of output points	Function	Connection destination	Driving current
■Sink input/sink output (transistor output)					
FX-16E-TB	16 input points or 16 output points	—	Directly connected to I/O terminals of a PLC.	FX5-C□EX/D, FX5-C□EYT/D, FX5-C32ET/D	Refer to the following table.
FX-32E-TB	32 input points, 32 output points, or 16 input points and 16 output points				
FX-16EX-A1-TB	16	—	100 V AC input type	FX5-C□EX/D, FX5-C32ET/D	24 V DC 48 mA
FX-16EYR-TB	—	16	Relay output type	FX5-C□EYT/D, FX5-C32ET/D	24 V DC 80 mA
FX-16EYT-TB	—	16	Transistor output type (sink)		24 V DC 112 mA
FX-16EYS-TB	—	16	Triac output type		
■Sink and source common input/source output (transistor output)					
FX-16E-TB/UL	16 input points or 16 output points	—	Directly connected to I/O terminals of a PLC.	FX5-C□EX/DS, FX5-C□EYT/DSS, FX5-C32ET/DSS	Refer to the following table.
FX-32E-TB/UL	32 input points, 32 output points, or 16 input points and 16 output points				
FX-16EYR-ES-TB/UL	—	16	Relay output type	FX5-C□EYT/DSS, FX5-C32ET/DSS	24 V DC 80 mA
FX-16EYT-ES-TB/UL	—	16	Transistor output type (sink)		24 V DC 112 mA
FX-16EYT-ESS-TB/UL	—	16	Transistor output type (source)		
FX-16EYS-ES-TB/UL	—	16	Triac output type		

- The following table shows driving current of FX-16E-TB(/UL) and FX-32E-TB(/UL) that depends on the connection destination.

Connection destination	Power supply voltage	Current consumption
■Input connector		
FX5-C□EX/D, FX5-C32ET/D	Not required	
FX5-C□EX/DS, FX5-C32ET/DSS	24 V DC	112 mA/16 points
■Output connector		
FX5-C□EYT/D, FX5-C□EYT/DSS, FX5-C32ET/D, FX5-C32ET/DSS	The power supply appropriate to the connected load is required.	

A

# Specifications

## Exterior color, accessories

Item	Specifications
Exterior color	Munsell 0.08GY/7.64/0.81
Accessories	Input/output number label, terminal block layout card

## Input specifications

### ■FX-16EX-A1-TB

Item	Specifications	
Input type	AC input	
Input signal voltage	100 to 120 V AC +10% -15% 50/60 Hz	
Input signal current	4.7 mA/100 V AC 50 Hz 6.2 mA/110 V AC 60 Hz	
Input impedance	Approx. 21 k $\Omega$ /50 Hz Approx. 18 k $\Omega$ /60 Hz	
Input sensitivity	ON	3.8 mA/80 V AC or more
	OFF	1.7 mA/30 V AC or less
Input response time <sup>*1</sup>	25 to 30 ms	
Input signal format	Voltage contact	
Input circuit insulation	Photo-coupler insulation	
Indication of input operation	No input LED (However, the 24 V power LED display exists.)	
Power consumption	1.2 W (48 mA 24 V DC)	
Input/output configuration circuit		
Unsupported applications	High-speed counter, input interruption, pulse catch, Speed Detection ((D)SPD) instruction, Input Matrix (MTR) instruction, Digital Switch (DSW) instruction, ABS Current Value Read (DBS) instruction, high-speed I/O function start/stop ((D)HIOEN) instruction	

\*1 The response delay time of the CPU module is not included.

## Output specifications

### ■ Relay output (FX-16EYR-TB, FX-16EYR-ES-TB/UL)

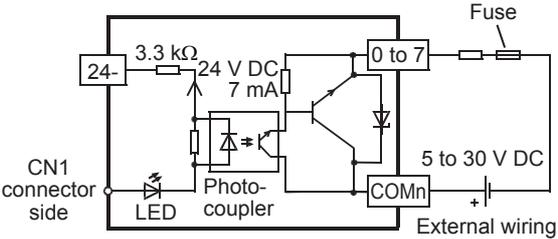
Item		Specifications	
Output type		Relay	
External voltage		250 V AC or less, 30 V DC or less	
Max. load	Resistance load	2 A/point	The total load current per common terminals (four points) should be 8 A or less.
	Inductive load	80 VA	
Min. load		5 V DC, 2 mA (reference values)	
Open circuit leakage current		—	
Response time		Approx. 10 ms	
ON voltage of output element		1.5 V	
Insulation of circuit		Mechanical insulation	
Indication of output operation		LED is lit when the power is supplied to relay coils.	
Power consumption		1.92 W (80 mA 24 V DC)	
Input/output configuration circuit	FX-16EYR-TB		
	FX-16EYR-ES-TB/UL		
Unsupported applications		Positioning, Pulse Y Output ((D)PLSY) instruction, Pulse Width Modulation ((D)PWM) instruction, ABS Current Value Read (DABS) instruction, Start/stop of high-speed I/O function ((D)HIOEN) instruction, Input Matrix (MTR) instruction, Digital Switch (DSW) instruction, Seven Segment With Latch (SEGL) instruction	

A

## ■ Transistor/sink output (FX-16EYT-TB, FX-16EYT-ES-TB/UL)

Item		Specifications	
Output type		Transistor/sink output	
External voltage		5 to 30 V DC	
Max. load	Resistance load	0.5 A/point	The total load current per common terminals (four points) should be 0.8 A or less.
	Inductive load	12 W/24 V DC	
Min. load		—	
Open circuit leakage current		0.1 mA/30 V DC	
Response time		OFF→ON	0.2 ms or less/24 V DC
		ON→OFF	1.5 ms or less/24 V DC
ON voltage of output element		1.5 V	
Insulation of circuit		Photo-coupler insulation	
Indication of output operation		LED is lit when the power is supplied to photo-couplers.	
Power consumption		2.7 W (112 mA 24 V DC)	
Input/output configuration circuit	FX-16EYT-TB		
	FX-16EYT-ES-TB/UL		
Unsupported applications		Positioning, Pulse Y Output ((D)PLSY) instruction, Pulse Width Modulation ((D)PWM) instruction, ABS Current Value Read (DABS) instruction, Start/stop of high-speed I/O function ((D)HIOEN) instruction, Input Matrix (MTR) instruction, Digital Switch (DSW) instruction, Seven Segment With Latch (SEGL) instruction	

## ■ Transistor/source output (FX-16EYT-ESS-TB/UL)

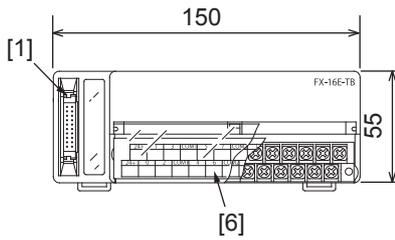
Item		Specifications	
Output type		Transistor/source output	
External voltage		5 to 30 V DC	
Max. load	Resistance load	0.5 A/point	The total load current per common terminals (four points) should be 0.8 A or less.
	Inductive load	12 W/24 V DC	
Min. load		—	
Open circuit leakage current		0.1 mA/30 V DC	
Response time	OFF→ON	0.2 ms or less/24 V DC	
	ON→OFF	1.5 ms or less/24 V DC	
ON voltage of output element		1.5 V	
Insulation of circuit		Photo-coupler insulation	
Indication of output operation		LED is lit when the power is supplied to photo-couplers.	
Power consumption		2.7 W (112 mA 24 V DC)	
Input/output configuration circuit			
Unsupported applications		Positioning, Pulse Y Output ((D)PLSY) instruction, Pulse Width Modulation ((D)PWM) instruction, ABS Current Value Read (DABS) instruction, Start/stop of high-speed I/O function ((D)HIOEN) instruction, Input Matrix (MTR) instruction, Digital Switch (DSW) instruction, Seven Segment With Latch (SEGL) instruction	

## ■ Triac output (FX-16EYS-TB, FX-16EYS-ES-TB/UL)

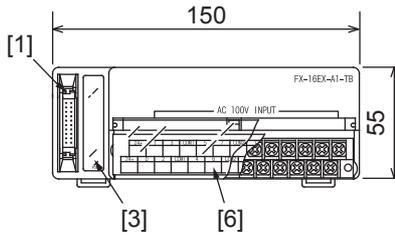
Item		Specifications	
Output type		Triac (SSR)	
External voltage		85 to 242 V AC	
Max. load	Resistance load	0.3 A/point	The total load current per common terminals (four points) should be 0.8 A or less.
	Inductive load	15 VA/100 V AC 36 VA/200 V AC	
Min. load		0.4 VA/100 V AC 1.6 VA/200 V AC	
Open circuit leakage current		1 mA/100 V AC 2 mA/200 V AC	
Response time		2 ms or less	
ON voltage of output element		—	
Insulation of circuit		Photo-coupler insulation	
Indication of output operation		LED is lit when the power is supplied to photo-thyristors.	
Power consumption		2.7 W (112 mA 24 V DC)	
Input/output configuration circuit	FX-16EYS-TB		
	FX-16EYS-ES-TB/UL		
Unsupported applications		Positioning, Pulse Y Output ((D)PLSY) instruction, Pulse Width Modulation ((D)PWM) instruction, ABS Current Value Read (DABS) instruction, Start/stop of high-speed I/O function ((D)HIOEN) instruction, Input Matrix (MTR) instruction, Digital Switch (DSW) instruction, Seven Segment With Latch (SEGL) instruction	

# External dimensions and component names

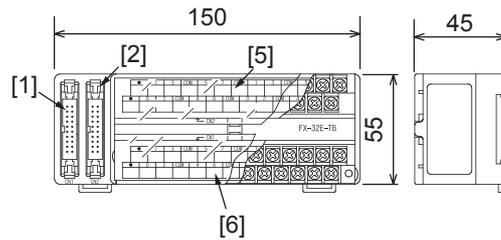
• FX-16E-TB, FX-16E-TB/UL



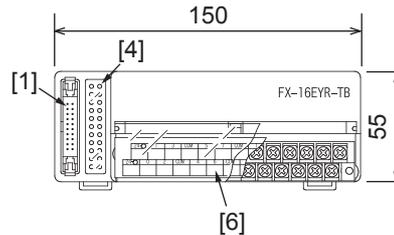
• FX-16EX-A1-TB



• FX-32E-TB, FX-32E-TB/UL



• FX-16EYR-TB, FX-16EYR-ES-TB/UL, FX-16EYT-TB, FX-16EYT-ES-TB/UL, FX-16EYT-ESS-TB/UL, FX-16EYS-TB, FX-16EYS-ES-TB/UL



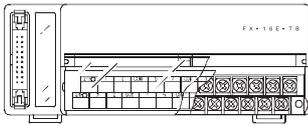
Unit: mm (inches)

No.	Name	Description
[1]	CN1 connector	Connector for connecting input signal cables or output signal cables for CN1
[2]	CN2 connector	Connector for connecting input signal cables or output signal cables for CN2 (FX-32E-TB and FX-32E-TB/UL only)
[3]	POWER LED	Indicates the conduction status. (FX-16EX-A1-TB only) Lit: Powered Off: Not powered or hardware error
[4]	Operation display LED	Turns on when the output is on. (FX-16EYR-TB, FX-16EYR-ES-TB/UL, FX-16EYT-TB, FX-16EYT-ES-TB/UL, FX-16EYT-ESS-TB/UL, FX-16EYS-TB, and FX-16EYS-ES-TB/UL only)
[5]	Terminal block for CN2 (M3.5 screws)	Input/output terminals for CN2 (FX-32E-TB and FX-32E-TB/UL only)
[6]	Terminal block for CN1 (M3.5 screws)	Input/output terminals for CN1



# Terminal layout

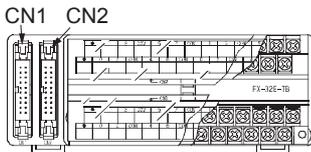
- FX-16E-TB, FX-16E-TB/UL



Smaller numbers							Larger numbers						
•	1	3	COM	5	7	COM	1	3	COM	5	7	COM	
•	0	2	COM	4	6	COM	0	2	COM	4	6	COM	

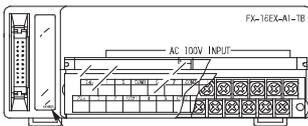
- FX-32E-TB, FX-32E-TB/UL

Smaller numbers							Larger numbers						
CN2	•	1	3	COM	5	7	COM	1	3	COM	5	7	COM
	•	0	2	COM	4	6	COM	0	2	COM	4	6	COM



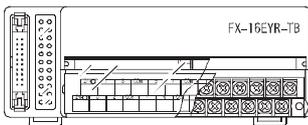
Smaller numbers							Larger numbers						
CN1	•	1	3	COM	5	7	COM	1	3	COM	5	7	COM
	•	0	2	COM	4	6	COM	0	2	COM	4	6	COM

- FX-16EX-A1-TB



Smaller numbers							Larger numbers						
24+	1	3	COM1	5	7	COM2	1	3	COM3	5	7	COM4	
24-	0	2	COM1	4	6	COM2	0	2	COM3	4	6	COM4	

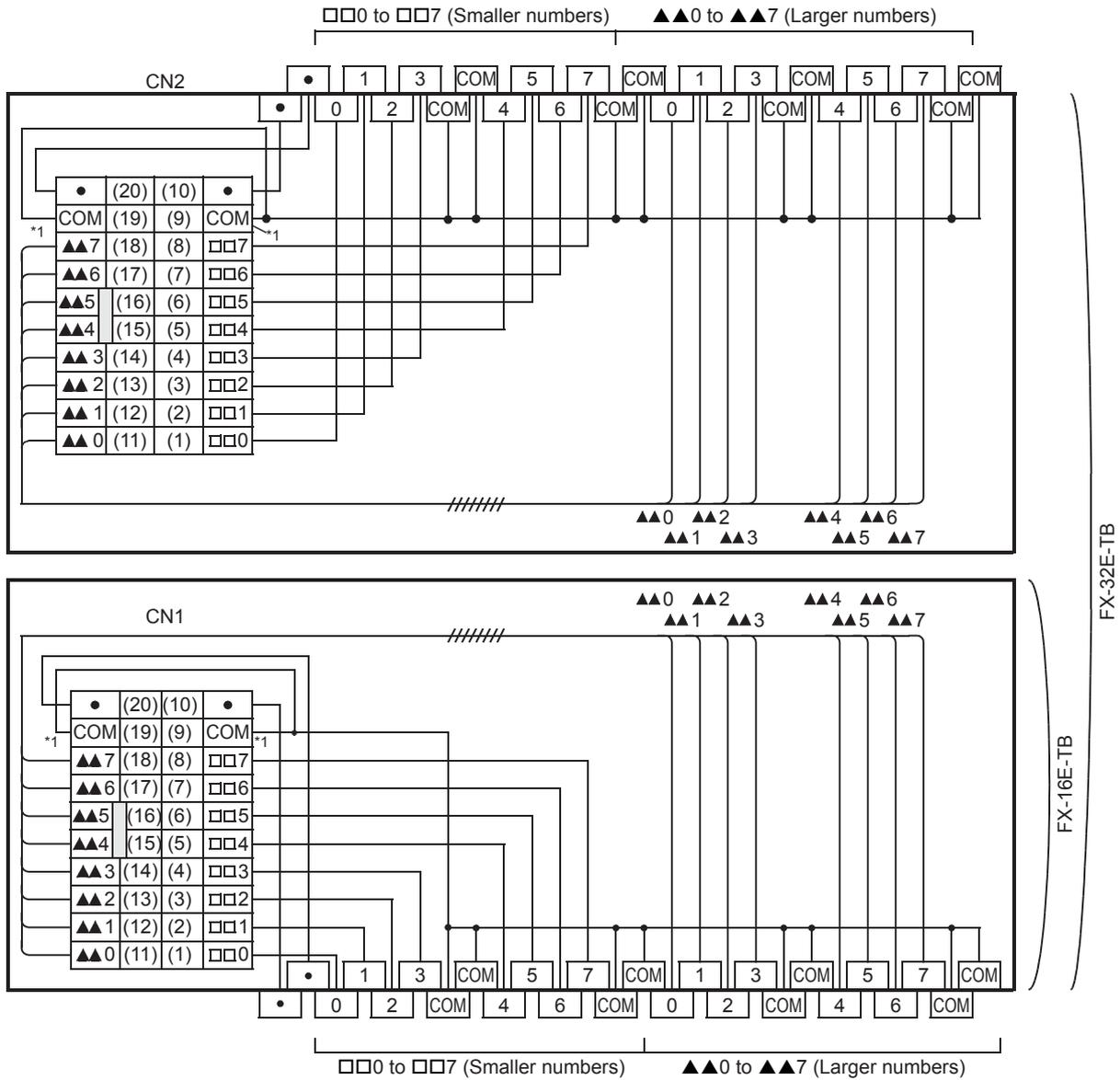
- FX-16EYR-TB, FX-16EYR-ES-TB/UL, FX-16EYT-TB, FX-16EYT-ES-TB/UL, FX-16EYT-ESS-TB/UL, FX-16EYS-TB, FX-16EYS-ES-TB/UL



Smaller numbers							Larger numbers						
24+	1	3	COM1	5	7	COM2	1	3	COM3	5	7	COM4	
24-	0	2	COM1	4	6	COM2	0	2	COM3	4	6	COM4	

# Internal circuit

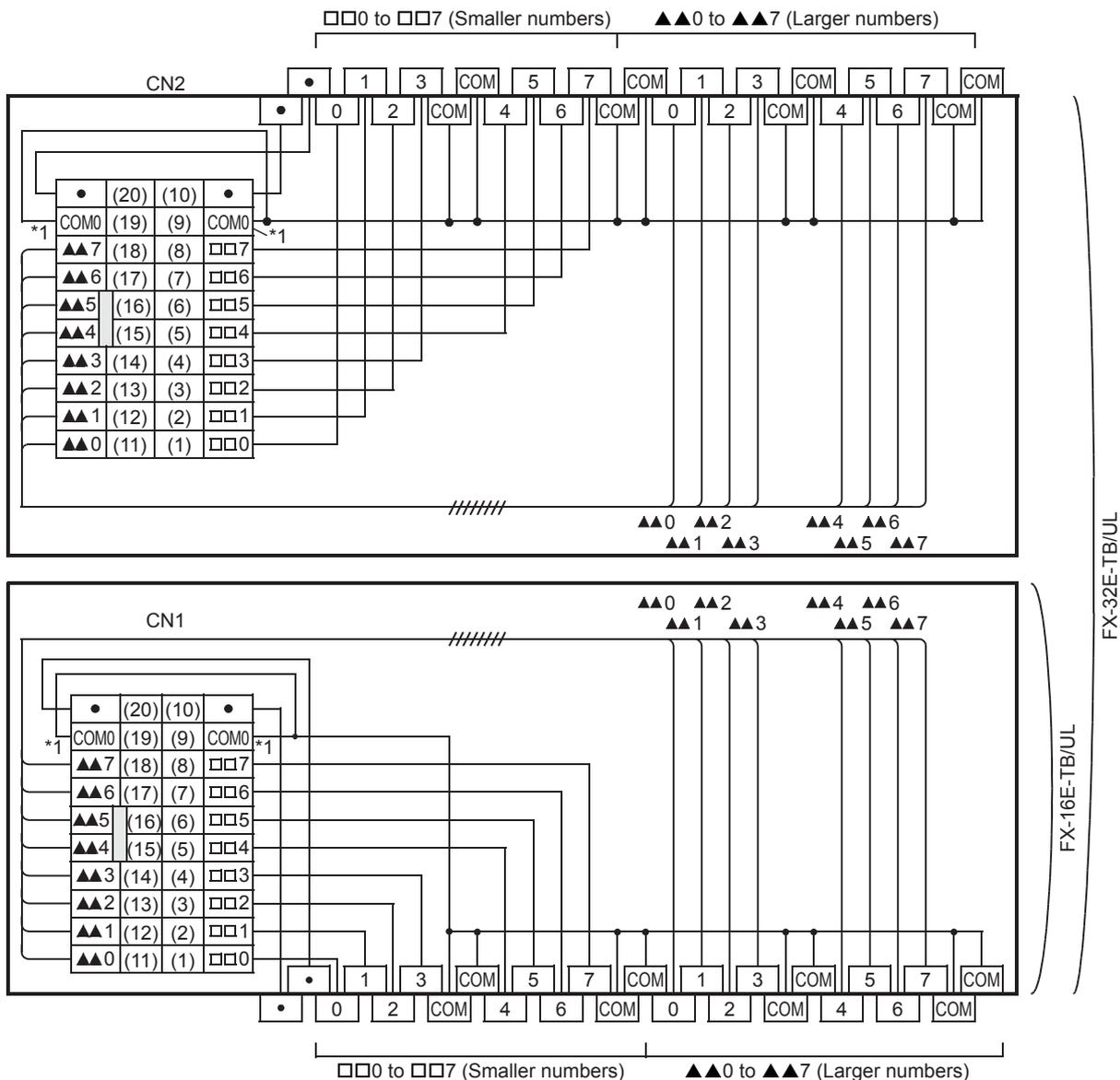
## FX-16E-TB, FX-32E-TB



\*1 Replace this number with the one of the connected connector.

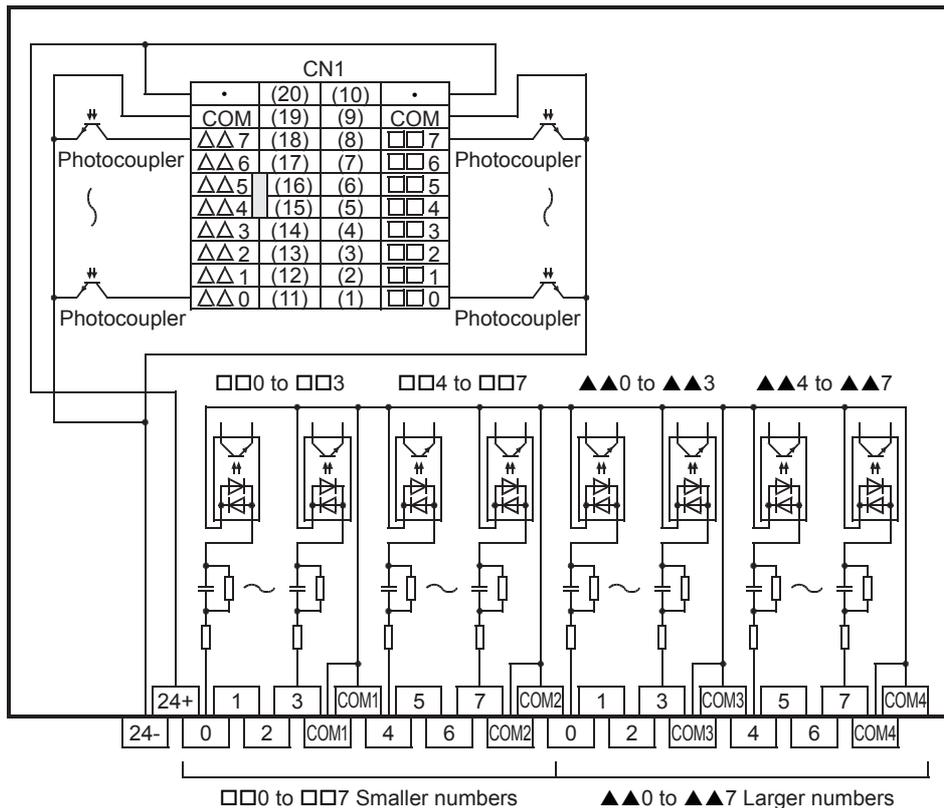
A

# FX-16E-TB/UL, FX-32E-TB/UL

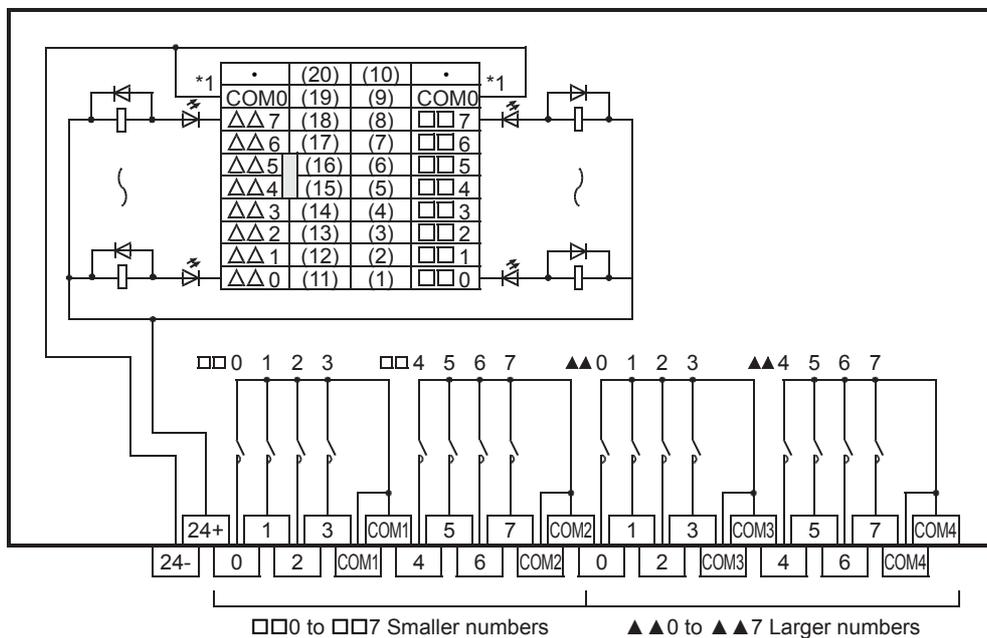


\*1 Replace this number with the one of the connected connector.

## FX-16EX-A1-TB



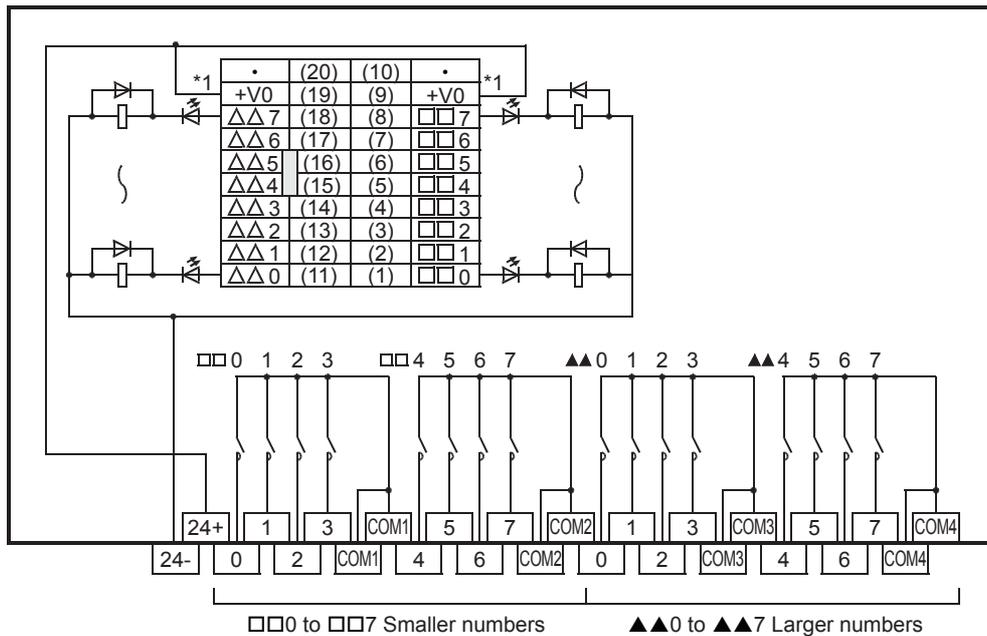
## FX-16EYR-TB



\*1 Replace this number with the one of the connected connector.

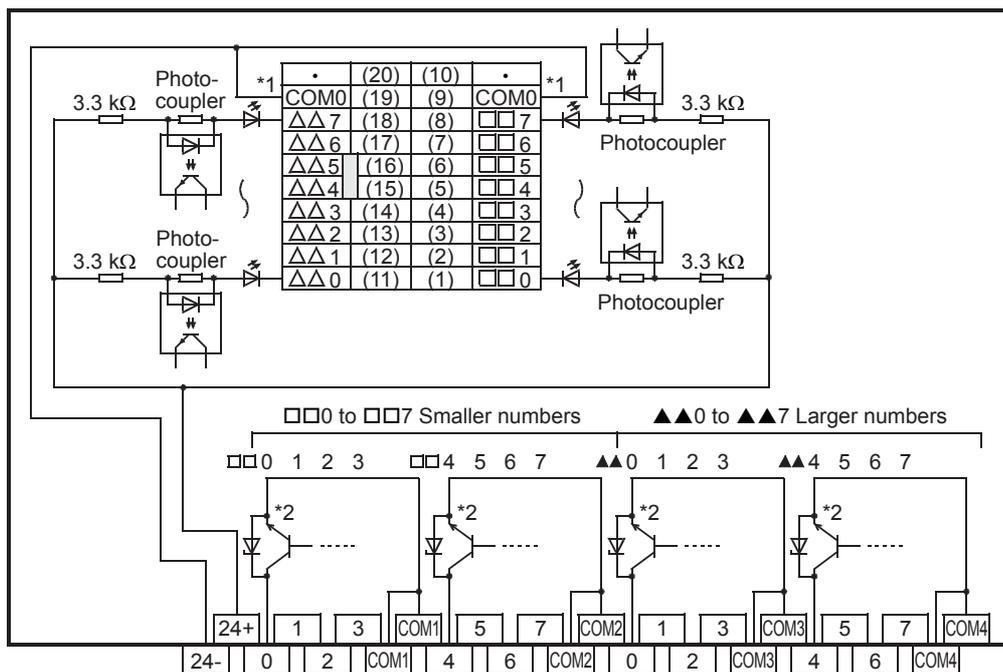
A

# FX-16EYR-ES-TB/UL



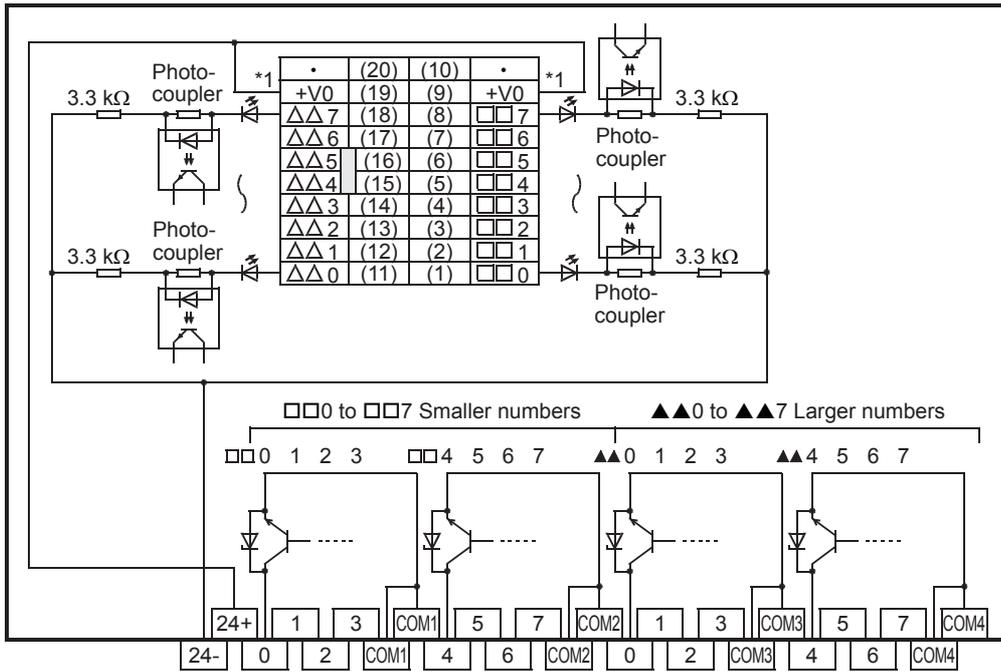
\*1 Replace this number with the one of the connected connector.

# FX-16EYT-TB



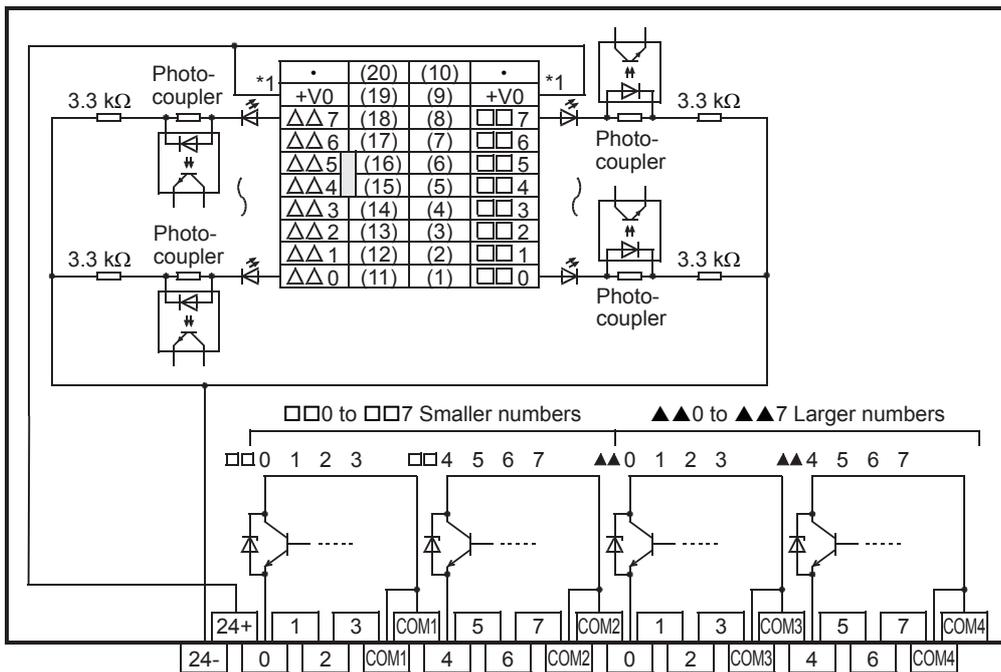
\*1 Replace this number with the one of the connected connector.

## FX-16EYT-ES-TB/UL



\*1 Replace this number with the one of the connected connector.

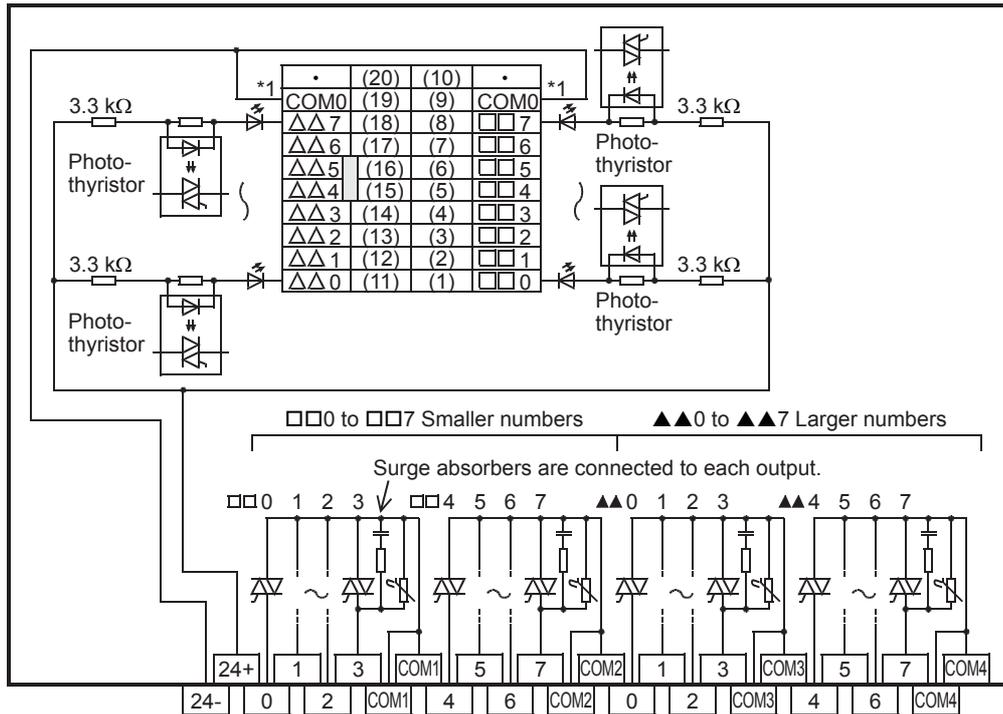
## FX-16EYT-ESS-TB/UL



\*1 Replace this number with the one of the connected connector.

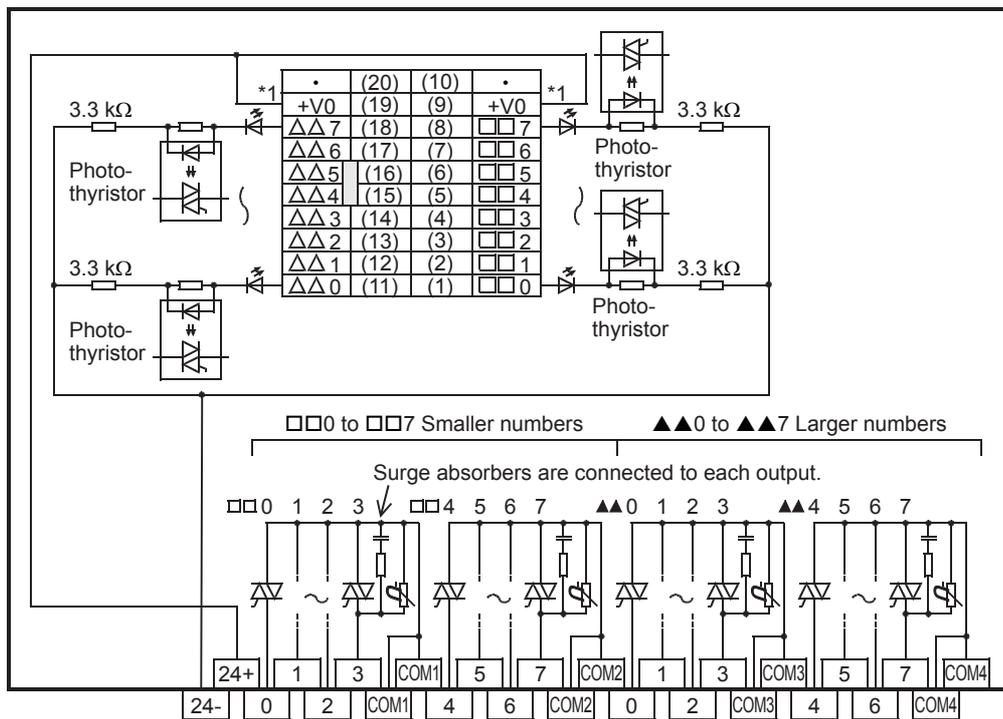
A

## FX-16EYS-TB



\*1 Replace this number with the one of the connected connector.

## FX-16EYS-ES-TB/UL



\*1 Replace this number with the one of the connected connector.

# Appendix 9 Precautions for Battery Transportation

When transporting lithium batteries, follow required transportation regulations.

Batteries used in the FX5U CPU module are classified as follows.

## Control-subject product

### Built-in

None (FX5U CPU modules do not include batteries when shipped from the factory.)

### Battery only (spare parts and optional parts)

Model	Battery type	Product form	Lithium contained (g/battery)	Weight <sup>*1</sup> (g/battery)
FX3U-32BL	Lithium-metal battery	Cell	0.15	30

\*1 Weight in packaging.

## Precautions for transportation

When transporting the product above, follow IATA Dangerous Goods Regulations, IMDG Code (International Maritime Dangerous Goods Code), and domestic transportation regulations in each country. For details, contact the transportation company to be used.

# Appendix 10 Handling of Batteries and Devices with Built-in Batteries in EU Member States

This section describes the precautions for disposing of waste batteries in EU member states and exporting batteries and/or devices with built-in batteries to EU member states.

## Disposal precautions

In EU member states, there is a separate collection system for waste batteries.

Dispose of batteries properly at the local community waste collection/recycling center.

The symbol shown in the following figure is printed on the batteries and packaging of batteries and devices with built-in batteries. This symbol indicates that batteries need to be disposed of separately from other wastes.



### Restriction

This symbol is for EU member states only.

The symbol is specified in the new EU Battery Directive (2006/66/EC) Article 20 "Information for end-users" and Annex II.

## Exportation precautions

The new EU Battery Directive (2006/66/EC) requires the following when marketing or exporting batteries and/or devices with built-in batteries to EU member states.

- To print the symbol on batteries, devices, or their packaging
- To explain the symbol in the manuals of the products

### Labeling

To market or export batteries and/or devices with built-in batteries, which have no symbol, to EU member states, print the symbol shown in the figure above on the batteries, devices, or their packaging.

### Explaining the symbol in the manuals

To export devices incorporating Mitsubishi programmable controller to EU member states, provide the latest manuals that include the explanation of the symbol. If no Mitsubishi manuals are provided, separately attach an explanatory note regarding the symbol to each manual of the devices.

### Point

The requirements apply to batteries and/or devices with built-in batteries manufactured before the enforcement date of the new EU Battery Directive (2006/66/EC).

# Appendix 11 Added and Changed Functions

The functions added or changed with the CPU module and engineering tool, and the supported CPU modules' firmware version and engineering tool software version are given below.

- The firmware version can be confirmed with module diagnostics (CPU diagnostics). Refer to  Page 161 Module diagnostics (CPU Diagnostics) for details on the module diagnostics (CPU diagnostics).
- Refer to the  GX Works3 Operating Manual for details on the software version.

Add/Change Function	Supported CPU module firmware version	Supported engineering tool software version	Reference
High speed input/output module is supported.	"1.030" and above	"1.025B" and above	Page 42
FX5-CCLIEF is supported.	"1.030" and above	"1.025B" and above	Page 43
Event history is supported.	"1.040" and above	"1.030G" and above	Page 162
FX5-80SSC-S is supported.	"1.014" and above	"1.030G" and above	Page 43
The following modules are supported. • FX5-4AD-TC-ADP • FX5-4AD-PT-ADP	"1.040" and above	"1.030G" and above	Page 47
The following modules are supported. • FX5-8AD • FX5-4LC • FX5-20PG-P • FX5-CCL-MS • FX5-ASL-M	"1.050" and above	"1.035M" and above	Page 43

# INDEX

---

## B

---

BAT LED . . . . .	17
Battery connector . . . . .	18
Battery holder . . . . .	18
Built-in analog I/O terminal block. . . . .	18
Built-in Ethernet communication connector . . . . .	17
Built-in RS-485 communication terminal block . . . . .	18

## C

---

CARD LED . . . . .	17
CPU module fixing screw hole . . . . .	19

## D

---

DIN rail mounting groove . . . . .	19
DIN rail mounting hooks. . . . .	17

## E

---

ERR LED . . . . .	17
Expansion adapter connecting hooks . . . . .	17
Expansion adapter connector cover . . . . .	19
Expansion board connector . . . . .	18
Expansion board connector cover . . . . .	17
Extension connector . . . . .	18
Extension connector cover . . . . .	17

## G

---

Genuine product certification label . . . . .	19
---	----

## I

---

Input display LED . . . . .	17
Installing directly . . . . .	81,85
Installing on DIN rail . . . . .	81

## M

---

Memory capacity. . . . .	28
--------------------------	----

## N

---

Nameplate . . . . .	19
Number of input/output points. . . . .	50
Number of remote I/O points . . . . .	57

## O

---

Output display LED . . . . .	17
------------------------------	----

## P

---

P.RUN LED . . . . .	17
PWR LED . . . . .	17

## R

---

RD LED . . . . .	17
RS-485 terminal resistor selector switch . . . . .	18
RUN/STOP/RESET switch . . . . .	18,153

## S

---

SD LED . . . . .	17
SD memory card disable switch . . . . .	18
SD memory card slot. . . . .	18
SD/RD LED . . . . .	17
Sink input. . . . .	109
Sink output. . . . .	124
Source input. . . . .	109
Source output. . . . .	124

## T

---

Terminal . . . . .	18
Terminal block cover. . . . .	17
Terminal block mounting screws. . . . .	18
Top cover . . . . .	17

# MEMO

---

# REVISIONS

Revision date	Revision	Description
October 2014	A	First Edition
January 2015	B	<p>■Added or modified parts RELEVANT MANUALS, TERMS, Section 1.1, 2.1, 2.2, 2.6, 2.7, 2.8, 3.1, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.12, Chapter 4, Section 5.4, 5.5, 6.1, 6.6, 7.1, 7.3, 8.2, 8.3, 9.1, 9.2, 9.3, 9.7, Appendix 2, 4</p>
April 2015	C	A part of the cover design is changed.
May 2016	D	<p>■Added models FX5U-32MR/DS, FX5U-32MT/DS, FX5U-32MT/DSS, FX5-32ER/DS, FX5-32ET/DS, FX5-32ET/DSS, FX5-16ET/ES-H, FX5-16ET/ESS-H, FX5-CCLIEF, FX5-CNV-IF, FX5-30EC, FX5-65EC, FX5-CNV-BC</p> <p>■Applicable models FX5-C16EX/D, FX5-C16EYT/D, FX5-C16EX/DS, FX5-C16EYT/DSS, FX5-C32EX/D, FX5-C32EYT/D, FX5-C32ET/D, FX5-C32EX/DS, FX5-C32EYT/DSS, FX5-C32ET/DSS, FX5-CNV-BUSC, FX-16E-TB, FX-32E-TB, FX-16EX-A1-TB, FX-16EYR-TB, FX-16EYT-TB, FX-16EYS-TB, FX-16E-TB/UL, FX-32E-TB/UL, FX-16EYR-ES-TB/UL, FX-16EYT-ES-TB/UL, FX-16EYT-ESS-TB/UL, FX-16EYS-ES-TB/UL</p> <p>■Added or modified parts RELEVANT MANUALS, TERMS, Section 2.1, 2.2, 2.3, 2.8, 2.10, 3.1, 3.2, 3.3, 3.4, 3.9, Chapter 4, Section 5.1, 5.2, 5.4, 5.5, 6.1, 6.2, 6.4, 6.5, 6.8, 9.7, Appendix 2, 3, 6</p>
October 2016	E	<p>■Added models FX5U-64MR/DS, FX5U-64MT/DS, FX5U-64MT/DSS, FX5U-80MR/DS, FX5U-80MT/DS, FX5U-80MT/DSS, FX5-16ER/ES, FX5-16ET/ES, FX5-16ET/ESS, FX5-80SSC-S, FX5-4AD-PT-ADP, FX5-4AD-TC-ADP</p> <p>■Applicable model FX5-C1PS-5V</p> <p>■Added or modified parts RELEVANT MANUALS, TERMS, Section 2.2, 2.4, 2.6, 2.9, 2.10, 3.1, 3.2, 3.3, 3.5, 3.6, 4.1, 4.2, 4.3, 4.4, 4.6, 5.4, 5.5, 6.4, 6.5, 6.6, 6.8, 9.3, Appendix 2, 5, 7, 11</p>
April 2017	F	<p>■Added models FX5-8AD, FX5-4LC, FX5-20PG-P, FX5-CCL-MS, FX5-ASL-M</p> <p>■Added or modified parts SAFETY PRECAUTIONS, RELEVANT MANUALS, TERMS, Section 3.1, 3.3, 4.1, 4.3, 4.5, Appendix 11</p>

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

© 2014 MITSUBISHI ELECTRIC CORPORATION

# WARRANTY

Please confirm the following product warranty details before using this product.

## 1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company. However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

### [Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

### [Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
  1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
  2. Failure caused by unapproved modifications, etc., to the product by the user.
  3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
  4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
  5. Relay failure or output contact failure caused by usage beyond the specified life of contact (cycles).
  6. Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by force majeure such as earthquakes, lightning, wind and water damage.
  7. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
  8. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

## 2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.  
Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not available after production is discontinued.

## 3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

## 4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
- (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
- (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

## 6. Product application

- (1) In using the Mitsubishi MELSEC programmable controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
- (2) The Mitsubishi programmable controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for railway companies or public service purposes shall be excluded from the programmable controller applications.  
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.  
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the user's discretion.

# TRADEMARKS

---

Microsoft® and Windows® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Ethernet is a trademark of Xerox Corporation.

Anywire and ANYWIREASLINK is a registered trademark of the Anywire Corporation.

MODBUS® is a registered trademark of Schneider Electric SA.

Phillips is a registered trademark of Phillips Screw Company.

SD logo and SDHC logo are trademarks or registered trademarks of SD-3C, LLC.



The company name and the product name to be described in this manual are the registered trademarks or trademarks of each company.



Manual number: JY997D55301F

Model: FX5U-U-HW-E

Model code: 09R536

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

**MITSUBISHI ELECTRIC CORPORATION**

HEAD OFFICE: TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

Specifications are subject to change without notice.