STARTUP AND MAINTENANCE PRECAUTIONS

- Use the battery for memory backup correctly in FX3U Series User - Hardware Edition.
  - Use the battery only for the specified purpose.
  - Disconnect the battery correctly.
  - Do not change, 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.
  - Improper handling of the battery may cause heat excessive generation, burning, ignition, liquid leakage or deformation, and lead to injury, fire or failures of functions and other equipment.

- Before modifying or disrupting the program in operation or running the PLC, carefully read through this manual and the associated manuals and ensure the safety of the operation. An operation error may damage the machinery or cause accidents.

PRECAUTIONS

- Turn off the power to the PLC before attaching or detaching the memory cassette. If the memory cassette is attached or detached while the PLC’s power is on, the data in the memory may be destroyed, or the memory cassette may be damaged.
- Do not disassemble or modify the PLC. Doing so may cause fire, equipment failures, or malfunctions.
- For repair, contact your local Mitsubishi Electric distributor.
- 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.
- Battery and memory cassette

SAFETY PRECAUTIONS

- Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
- Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Safety Precaution (read these precautions before use.)

This manual classifies the safety precautions into two categories:

- Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
- Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

STORAGE PRECAUTIONS

- Do not touch any terminal while the PLC’s power is on.
- Do not apply shock by electric shock or malfunction.
- Before cleaning or tightening terminals externally cut off all phases of the power supply.
- Failure to do so may cause electric shock.

Compliance with EC directive (CE Marking)

This document does not guarantee that a mechanical system including this product will comply with the following standards. Compliance to EMC directive and LVD directive of the entire mechanical system should be checked by the user / manufacturer. For more details please contact the local Mitsubishi Electric sales site.

Requirement for Compliance with EMC directive

The following products have shown compliance through direct tests (the identification standards below) and design analysis (through the creation of a technical construction file) to the European Directive for Electromagnetic Compatibility (2004/108/EC) when used as directed by the appropriate documentation.
### 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 (2006/95/EC) when used as directed by the appropriate documentation.

#### Type: Programmable Controller (Open Type Equipment)

**Models:** MELSEC FX3U series manufactured

- 

#### Standard

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX3U-16M</td>
<td>Power supplies (-A)</td>
</tr>
<tr>
<td>FX3U-22M</td>
<td>Power supply (-A)</td>
</tr>
<tr>
<td>FX3U-23M</td>
<td>Power supply (-A)</td>
</tr>
<tr>
<td>FX3U-32M</td>
<td>Power supplies (-A)</td>
</tr>
<tr>
<td>FX3U-16M</td>
<td>Power supplies (-A)</td>
</tr>
<tr>
<td>FX3U-22M</td>
<td>Power supply (-A)</td>
</tr>
</tbody>
</table>

#### Requirement for EMC compliance

- 

#### Requirement for compliance with EC Directives

1. Outline

1.1 Part names

- Top cover
- Battery cover
- Special adapter connecting hooks (2 places)
- Expansion board dummy cover
- RUREDSTOP switch
- Peripheral device connecting connector
- DIN rail mounting hooks
- Model name (abbreviation)
- Input display LEDs (Red)
- Terminal block covers
- Extension device connecting connector cover
- Operation status display LEDs (Red)
- On while power is on the PLC.
- On while the PLC is running.
- Lights when the battery voltage drops.
- Flashing when a program error occurs.
- Lights when a CPU error occurs.

---

### Incorporated Items

<table>
<thead>
<tr>
<th>Main units</th>
<th>Included Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX3U-16M/22M</td>
<td>Product 1 unit</td>
</tr>
<tr>
<td>FX3U-23M</td>
<td>Dust protection sheet 1 sheet</td>
</tr>
<tr>
<td>FX3U-32M</td>
<td>Manuals [Japanese version, English version] each</td>
</tr>
<tr>
<td>FX3U-12M/22M</td>
<td>Extension cable 1 cable</td>
</tr>
<tr>
<td>FX3U-16/22M</td>
<td>Input/output number label 1 sheet</td>
</tr>
</tbody>
</table>

### Input/output extension blocks

- FX3U-16/22M
- FX3U-22/32M
- FX3U-32/48M

---

### Incorporation of Manual

- Contains the manual included in the package. Review the necessary product manuals or documents, consult with the Mitsubishi Electric dealer from where you purchase your product.

#### Manual

- FX3U Series PLC (main unit) comes with this document (hardware manual).

#### Description

- For a detailed explanation of the FX3U Series hardware manual and information on instructions for PLC programming and special extension unit/block, refer to the relevant documents.


#### Manual Code

- FX3U-16MS: 09R156 |
- FX3U-22MS: 09R255 |
- FX3U-32MS: 09R354 |
- FX3U-12MS: 09R453 |
- FX3U-16/22M: 09R619 |
- FX3U-22/32M: 09R620 |
- FX3U-32/48M: 09R621 |

#### Main components

- FX3U-16M/22M: 1 unit |
- FX3U-23M: 1 unit |
- FX3U-32M: 1 unit |
- FX3U-12M/22M: 1 unit |

#### Input/output extension blocks

- FX3U-16/22M: 1 unit |
- FX3U-22/32M: 1 unit |
- FX3U-32/48M: 1 unit |

---

### How to obtain manuals

- For the necessary product manuals or documents, consult with the Mitsubishi Electric dealer from where you purchase your product.
2. Installation (general specifications)


INSTALLATION PRECAUTIONS

- Use the product within the generic environment specifications described in section 2.1 of this manual. Never use the product in areas with excessive dust, oily smoke, conductive dust, corrosive gas (salt air, Cl₂, H₂S, SO₂ or NO₂), flammable gas, vibration or impacts, or exposed 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.
- Do not touch the conductive parts of the product directly to avoid failure or malfunctions.
- Install the product securely using a DIN rail or mounting screws.
- Instal the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.
- When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits.
- Failure to do so may cause fire, equipment failures or malfunctions.
- Be sure to remove the dust proof sheet from the PLC's ventilation port when installation work is completed. Failure to do so may cause fire, equipment failures or malfunctions.
- Connect the extension cables, peripheral device cables, input/output cables and battery connecting cable securely to their designated connectors.
- Unsecured connection may cause malfunctions.
- Turn off the power before attaching or detaching the following devices. Failure to do so may cause device failures or malfunctions.
- Peripheral devices, display modules, expansion boards and special adapters
- Extension units/blocks and the FX Series terminal block
- Battery and memory cassette

1. External dimensions and weight

- FX3U-32MR/UA1 uses 4-4.5 mounting holes.
- Except FX3U-32MR/UA1

<table>
<thead>
<tr>
<th>Model name</th>
<th>W: mm (inches)</th>
<th>W1: mm (inches)</th>
<th>W2: mm (inches)</th>
<th>MASS (Weight): kg (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX3U-16M</td>
<td>130 (5.12&quot;)</td>
<td>103 (4.06&quot;)</td>
<td>61 (2.36&quot;)</td>
<td>0.6 (1.32lbs)</td>
</tr>
<tr>
<td>FX3U-32M</td>
<td>150 (5.91&quot;)</td>
<td>123 (4.85&quot;)</td>
<td>61 (2.36&quot;)</td>
<td>0.65 (1.43lbs)</td>
</tr>
<tr>
<td>FX3U-48M</td>
<td>182 (7.17&quot;)</td>
<td>155 (6.11&quot;)</td>
<td>61 (2.36&quot;)</td>
<td>0.85 (1.87lbs)</td>
</tr>
<tr>
<td>FX3U-64M</td>
<td>220 (8.67&quot;)</td>
<td>193 (7.6&quot;)</td>
<td>61 (2.36&quot;)</td>
<td>1.00 (2.2lbs)</td>
</tr>
<tr>
<td>FX3U-80M</td>
<td>285 (11.23&quot;)</td>
<td>258 (10.16&quot;)</td>
<td>61 (2.36&quot;)</td>
<td>1.20 (2.64lbs)</td>
</tr>
<tr>
<td>FX3U-128M</td>
<td>350 (13.78&quot;)</td>
<td>323 (12.72&quot;)</td>
<td>61 (2.36&quot;)</td>
<td>1.80 (3.96lbs)</td>
</tr>
</tbody>
</table>

- FX3U-32MR/UA1 is equivalent to FX3U-48M.
- FX3U-64MR/UA1 is equivalent to FX3U-80M.

Installation

- 35-mm-wide DIN rail or Direct (screw) mounting (M4)

INSTALLATION PRECAUTIONS

- Connect the extension cables, peripheral device cables, input/output cables and battery connecting cable securely to their designated connectors.
- Unsecured connection may cause malfunctions.
- Turn off the power before attaching or detaching the following devices. Failure to do so may cause device failures or malfunctions.
- Peripheral devices, display modules, expansion boards and special adapters
- Extension units/blocks and the FX Series terminal block
- Battery and memory cassette

Notes

- When a dust proof sheet is supplied with an extension unit/block, keep the sheet applied to the ventilation slits during installation and wiring work.
- To prevent temperature rise, do not install the PLC on a floor, a ceiling or a vertical surface.
- Install it horizontally on a wall as shown in section 2.2.
- Keep a space of 50 mm (1.97") or more between the unit main body and another device or structure (part A). Install the unit as far away as possible from high-voltage lines, high-voltage devices and power equipment.
2.2 Installation location

Install the PLC in an environment conforming to the generic specifications (section 2.1), installation precautions and notes. For more details, refer to FX3U Series User's Manual - Hardware Edition.

Installation location in enclosure

2.3 Procedures for installing to and detaching from DIN rail

The products can be installed on a DIN46277 rail [35mm (1.38") wide). This section explains the installations of the main units. For the input/output extension units/blocks and special adapters, refer to the following manual.


2.3.1 Installation

1) Connect the expansion boards and special adapters to the main unit.

2) Push out all DIN rail mounting hooks (below fig.A) onto the DIN rail.

3) Fit the upper edge of the DIN rail mounting groove (right fig.C) based on the holes, and secure it with M4 screws (B in the right figure). The mounting hole pitches and number of screws depend on the product. Refer to the external dimensions diagram.

4) Lock the DIN rail mounting hooks (below fig.D) while pressing the PLC against the DIN rail. The product can be installed directly on the panel (with screws).

The section explains the installation of the main units. As for the details of the installation/detaching for input extension units/blocks and special adapters, refer to the following manual.


2.4 Procedures for installing directly (with M4 screws)

The product can be installed directly on the panel (with screws). This section explains the installation of the main units. As for the details of the installation/detaching for input extension units/blocks and special adapters, refer to the following manual.


2.4.1 Mounting hole pitches

Refer to the External Dimensions (section 1.2) for the product's mounting hole pitch information. As for the details of the mounting hole pitches for extension units/block and special adapters, refer to the following manual.


3. Power supply/input/output specifications and examples of external wiring


Design Precautions

- Make sure to have the following safety circuits outside of the PLC to ensure safe system operation even during external power supply problems or PLC failure. Otherwise, malfunctions may cause serious accidents.

1) Most importantly, have 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).

2) Note that when the PLC CPU 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 PLC CPU 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.

3) Note that when an error occurs in a relay, timer or transistor output device, the output could be held either 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.

Wiring Precautions

- Connect the AC power supply to the dedicated terminals specified 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 use vacuum terminals externally. Do not make any damage to the product.

- Use class D grounding (grounding resistance of 100Ω or less) with a wire of 2mm² or thicker on the grounding terminal of the FX3U Series main unit. However, do not connect the ground terminal at the same point as a heavy electrical system.

- When drilling screw holes or wiring, make sure cutting or wire faults does not enter the ventilation slits. Failure to do so may cause fire, equipment failures or malfunctions.

- Make sure to properly wire to the terminal 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.

Notes

- Output/input wiring 50 to 100 m (164'1" to 328'1") long will cause almost no problems of noise, but, generally, the wiring length should be less than 20 m (65') to ensure the safety.

- Extension cables are easily affected by noise. Lay the cables at a distance of at least 30 to 50 mm (1.19' to 1.97") away from the PLC output and other power lines.
3.1 Wiring

3.1.1 Cable end treatment and tightening torque

For the terminals of FX2U series PLC, M3 screws are used.

The electric wire ends should be treated as shown below. Tighten the screws to a torque of 0.5 to 0.8 Nm. Do not tighten terminal screws exceeding the specified torque. Failure to do so may cause equipment failures or malfunctions.

- When one wire is connected to one terminal

- When two wires are connected to one terminal

3.2 Power supply specifications and example of external wiring

As for the details of the power supply specifications and example of external wiring, refer to the following manual.


3.2.1 Power supply specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC power type</td>
<td>DC power type*6</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24V DC</td>
</tr>
<tr>
<td>Allowed supply voltage range</td>
<td>85 to 264V AC</td>
</tr>
<tr>
<td>Main unit</td>
<td>FX2N-32E, FX2N-48E</td>
</tr>
<tr>
<td>Allowable instantaneous power failure time</td>
<td>16.8 to 28.8V DC*3</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50/60Hz</td>
</tr>
</tbody>
</table>

3.2.2 Example of external wiring (DC power type)

100 to 240V AC power is supplied to the main unit and input/output extension units. For the details of wiring work, refer to section 3.1.

3.3 Grounding

Ground the PLC as stated below.

- Perform class D grounding. (Grounding resistance: 100 Ω or less)
- Ground the PLC independently if possible.
- Use ground wires thicker than AWG14 (2 mm²).
- Position the grounding point as close to the PLC as possible to decrease the length of the ground wire.

3.4 Input specifications and external wiring

As for the details of the input specifications and external wiring, refer to the following manual.


3.4.1 Input specifications (24V DC input type)

- FX2N-8ER
- FX2N-16ER
- FX2N-32ER
- FX2N-64ER
- FX3U-16ER
- FX3U-32ER
- FX3U-64ER
- FX3U-128ER

* Class D grounding See section 3.3 for details.
### 3.4.2 Examples of 24V DC input wiring [AC power type]

#### 1. Sink input type

- **Fuse**: 100 to 240V AC
- **L**: 100 to 240V AC

#### 2. Source input type

- **Fuse**: 100 to 240V AC
- **L**: 100 to 240V AC

### 3.4.3 Examples of 24V DC input wiring [DC power type]

#### 1. Sink input type

- **Fuse**: 4.3kΩ 24V

#### 2. Source input type

- **Fuse**: 4.3kΩ 24V

### 3.4.4 Instructions for connecting input devices

1. In the case of no-voltage contact:
   - The input current of this PLC is 5 to 7 mA/24V DC.
   - Use input devices applicable to this minute current.
   - If no-voltage contacts (switches) for large current are used, contact failure may occur.

2. In the case of input device with built-in series diode:
   - The voltage drop of the series diode should be approx. 4 V or less.
   - When lead switches with a series LED are used, up to two switches can be connected in series.
   - Also make sure that the input current is over the input-sensing level while the switches are ON.

3. In the case of device with built-in parallel resistance:
   - Use a device having a parallel resistance, Rp, of 15 kΩ or more.

### 3.4.5 Input specifications (100V AC input type)

- **Number of input points**: FX3N-BEX-UA1/UL 8 points
- **Input current**: 5mA/24V DC
- **Input response time**: Approx. 10ms
- **Input signal form**: Sink input: No-voltage contact input
  - Source input: No-voltage contact input
  - NPN open collector transistor
  - PNP open collector transistor

- **Input circuit insulation**: Photocoupler insulation

- **Input operation display**: LED on panel lights when photocoupler is driven.

---

*1 Each value inside ( ) indicates the number of occupied points.

**4.3kΩ**

(Rb)

**15-Rp**

(kΩ)

**6.2mA/110V AC 60Hz**

(70% or less when turned on simultaneously)

**3.8mA or more**

ON input sensitivity current 3.8mA or more

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-16M)

**5mA/24V DC**

(FX2N-48ER-UA1/UL 24 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-32MR/UA1 16 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX2N-8EX-UA1/UL 8 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX2N-16ER-UA1/UL 12 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX2N-32ER-UA1/UL 24 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-64MR/UA1 32 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-64MR/UA1 32 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-64MR/UA1 32 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-64MR/UA1 32 points)

**4.7mA/100V AC 50Hz**

(0V)

24V

**6mA/24V DC**

(FX3U-64MR/UA1 32 points)
3.4.6 Examples of 100V AC input wiring

![Diagram]

*1 Each value inside ( ) indicates the number of occupied points.

3.5.3 Example of relay output wiring

![Diagram]

*2 The total load current of resistance loads per common terminal should be the following value or less.
- 1 output points/common terminal : 2A
- 4 output points/common terminal : 8A
- 8 output points/common terminal : 8A

As for the number of outputs per common terminal, refer to “Chapter 4 interpretation of partition” and the following manual.


3.5.2 Life of relay output contact

The product life of relay contacts considerably varies depending on the load type used. Take care that loads generating reverse electromotive force or rush current may cause poor contact or deposition of contacts which may lead to considerable reduction of the contact product life.

1) Inductive load

Inductive loads generate large reverse electromotive force between contacts at shutdown which may cause arcing. At a fixed current consumption, as the power factor (phase between current and voltage) gets smaller, the arc energy gets larger.

The standard life of the contact used for Inductive loads, such as contactors and solenoid valves, is 500 thousand operations at 20VA.

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

<table>
<thead>
<tr>
<th>Load capacity</th>
<th>Contact life</th>
</tr>
</thead>
<tbody>
<tr>
<td>20VA</td>
<td>0.2A/100V AC</td>
</tr>
<tr>
<td></td>
<td>0.1A/200V AC</td>
</tr>
<tr>
<td>35VA</td>
<td>0.35A/100V AC</td>
</tr>
<tr>
<td></td>
<td>0.17A/200V AC</td>
</tr>
<tr>
<td>80VA</td>
<td>0.8A/100V AC</td>
</tr>
<tr>
<td></td>
<td>0.4A/200V AC</td>
</tr>
</tbody>
</table>

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

→ For countermeasures while using inductive loads, refer to Subsection 3.5.4.

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.

2) 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.

3) 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.

→ For the maximum specified resistance load, refer to Subsection 3.5.1.

3.5.4 Cautions in external wiring

For cautions in external wiring, refer to the following manual.


Protection circuit for load short-circuiting

When a load connected to the external terminal short-circuits, the printed circuit board may be burnt out. Fit a protective fuse on the output circuit.

Protection circuit of contact when inductive load is used

An internal protection circuit for the relays is not provided for the relay output circuit. 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 the product life.

1) DC circuit

Connect a diode in parallel with the load. Use a diode for commutation having the following specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>5 to 10 times the load voltage</td>
</tr>
<tr>
<td>Current</td>
<td>Load current or more</td>
</tr>
</tbody>
</table>

2) AC circuit

Connect the surge absorber (combined CR components such as a surge killer and spark killer, etc.) parallel to the load. Select the rated voltage of the surge absorber suitable to the output used. Refer to the table below for other specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic capacity</td>
<td>Approx. 0.1μF</td>
</tr>
<tr>
<td>Resistance value</td>
<td>Approx. 100 to 200Ω</td>
</tr>
</tbody>
</table>

Interlock

Loads, such as contactors for normal and reverse rotations, that must not be turned on simultaneously should have an interlock in the PLC program and an external interlock.

Common mode

Use output contacts of the PLC in the common mode.

3.6 Transistor output specifications and example of external wiring

As for the details of the transistor output specifications and external wiring, refer to the following manual.


3.6.1 Transistor output specifications

<table>
<thead>
<tr>
<th>Number of output points</th>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>FXU-16MT/16MR/16MRM</td>
<td>8 points</td>
<td>3 million times</td>
</tr>
<tr>
<td>FXU-32MT/32MTM</td>
<td>16 points</td>
<td>2 hundred thousand times</td>
</tr>
<tr>
<td>FXU-48MT/48MTM</td>
<td>40 points</td>
<td>2 hundred thousand times</td>
</tr>
<tr>
<td>FXU-80MT/80MTM</td>
<td>64 points</td>
<td>2 hundred thousand times</td>
</tr>
</tbody>
</table>

Output form


External power supply

5 to 30V DC

Max. load

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance load</td>
<td>0.5A/point</td>
</tr>
<tr>
<td>Inductive load</td>
<td>1A/point</td>
</tr>
<tr>
<td>Interlock load</td>
<td>0.3A/point</td>
</tr>
<tr>
<td>Interlock load</td>
<td>12W/24V DC</td>
</tr>
<tr>
<td>Interlock load</td>
<td>24W/24V DC</td>
</tr>
<tr>
<td>Interlock load</td>
<td>7.2W/24V DC</td>
</tr>
</tbody>
</table>

Min. load

- Open circuit leakage current 0.1mA or less/30V DC
- ON voltage 1.5V or less
3.6.2 External Wiring of Transistor Output

1. External Wiring of Sink Output Type

![Diagram of Transistor Output Wiring]

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main unit</td>
<td>Y000 to Y002 5μs or less/10mA or more (5 to 24V DC)</td>
</tr>
<tr>
<td>Input/output extension units/blocks</td>
<td>Y003 or more 0.2μs or less/200mA or more (at 24V DC)</td>
</tr>
</tbody>
</table>

Circuit insulation: Photocoupler insulation

Display of output operation: LED on panel lights when photocoupler is driven.

*1 The total load current of resistance loads per common terminal should be the following value or less.
- 1 output point/common terminal: 5mA
- 4 output points/common terminal: 20mA

As for the number of outputs per common terminal, refer to "Chapter 4 Interpretation of partition" and the following manual.

*2 The total load current of resistance loads per common terminal should be the following value or less.
- 1 output point/common terminal: 1.6A
- 4 output points/common terminal: 2A

As for the number of outputs per common terminal, refer to the following manual.

*3 The total load current of resistance loads per common terminal should be the following value or less.
- 16 output point/common terminal: 1.6A

As for the number of outputs per common terminal, refer to the following manual.

*4 The total of inductive loads per common terminal should be the following value or less.
- 1 output point/common terminal: 12W/24V DC
- 4 output points/common terminal: 19W/24V DC
- 8 output points/common terminal: 38.4W/24V DC

As for the number of outputs per common terminal, refer to "Chapter 4 Interpretation of partition" and the following manual.

*5 The total of inductive loads per common terminal should be the following value or less.
- 4 output points/common terminal: 48W/24V DC

As for the number of outputs per common terminal, refer to the following manual.

*6 The total of inductive loads per common terminal should be the following value or less.
- 16 output points/common terminal: 38.4W

As for the number of outputs per common terminal, refer to the following manual.

*7 The response time is as follows in the FX3N-24YDT-H.
- OFF→ON: 0.2ms or less/1A
- ON→OFF: 0.4ms or less/1A

2. External Wiring of Source Output Type

![Diagram of Source Output Wiring]

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main unit</td>
<td>Y000 to Y002 5μs or less/10mA or more (5 to 24V DC)</td>
</tr>
<tr>
<td>Input/output extension units/blocks</td>
<td>Y003 or more 0.2μs or less/200mA or more (at 24V DC)</td>
</tr>
</tbody>
</table>

Circuit insulation: Photocoupler insulation

Display of output operation: LED on panel lights when photocoupler is driven.

*1 The total load current of resistance loads per common terminal should be the following value or less.
- 4 output points/common terminal: 0.8A
- 8 output points/common terminal: 0.8A

As for the number of outputs per common terminal, refer to "Chapter 4 Interpretation of partition" and the following manual.

*2 The response time is as follows in the FX2N-32EYT-H.
- OFF→ON: 3μs
- ON→OFF: 7μs

*3 For interlock, loads, such as contactors for normal and reverse rotations, that must not be turned on simultaneously should have an interlock in the PLC program and an external interlock.

*4 The total load current of inductive loads per common terminal should be the following value or less.
- 4 output points/terminals: 0.8A
- 8 output points/terminals: 0.8A

*5 The total of inductive loads per common terminal should be the following value or less.
- 16 output points/terminals: 1.6A

3.6.3 Cautions in external wiring

For cautions in external wiring, refer to the following manual.


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. Use a load power supply capacity that is at least twice larger than the total rated fuse capacity.

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 specifications as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>5 to 10 times of the load voltage</td>
</tr>
<tr>
<td>Forward current</td>
<td>Load current or more</td>
</tr>
</tbody>
</table>

Interlock

Loads, such as contactors for normal and reverse rotations, that must not be turned on simultaneously should have an interlock in the PLC program and an external interlock.

3.6.4 Triac output specifications and examples of external wiring

As for details of the triac output specifications and external wiring, refer to the following manual.


3.7 Triac output specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output points</td>
<td>FX3U-32MS/ES, FX2N-16EY, FX2N-32ES</td>
</tr>
<tr>
<td>Output connecting type</td>
<td>Refer to FX3U Series User’s Manual - Hardware Edition</td>
</tr>
<tr>
<td>Output form</td>
<td>Triac (SSR)</td>
</tr>
<tr>
<td>External power supply</td>
<td>85 to 24V AC</td>
</tr>
</tbody>
</table>
| Max. load | Resistance load 0.3A/point
| Inductive load | 15V/100V AC, 30V/200V AC |
| Min. load | 0.4V/100V AC, 1.6V/200V AC |
| Open circuit leakage current | 1mA/100V AC, 2mA/200V AC |
| Response time | OFF→ON 1ms or less
| NN→OFF 10ms or less |
| Circuit insulation | Photocoupler insulation |
| Display of output operation | LED on panel lights when photocoupler is driven. |

*1 The total load current of resistance outputs per common terminal should be the following value or less.
- 1 output point/common terminal: 12W/24V DC
- 4 output points/common terminal: 38.4W/24V DC

As for the number of outputs per common terminal, refer to "Chapter 4 Interpretation of partition" and the following manual.

*2 The total load current of inductive loads per common terminal should be the following value or less.
- 4 output points/common terminal: 1.6A
- 8 output points/common terminal: 3.2A

*3 The total load current of inductive loads per common terminal should be the following value or less.
- 16 output points/common terminal: 3.2A

*4 The total load current of inductive loads per common terminal should be the following value or less.
- 32 output points/common terminal: 4.0A

*5 The total load current of inductive loads per common terminal should be the following value or less.
- 64 output points/common terminal: 8.0A

*6 The total load current of inductive loads per common terminal should be the following value or less.
- 128 output points/common terminal: 16.0A

*7 The total load current of inductive loads per common terminal should be the following value or less.
- 256 output points/common terminal: 32.0A

3.7.3 Cautions in external wiring

For cautions in external wiring, refer to the following manual.


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.