This manual describes the part names, dimensions, mounting, cabling and specifications for the product. This manual is extracted from FX3G Series User’s Manual - Hardware Edition. Refer to FX3G Series User’s Manual - Hardware Edition for more details. Before use, read this manual and manuals of relevant products fully to acquire proficiency in the handling and operating the product. Make sure to learn all the product information, safety information, and precautions.

Safety Precaution (Read these precautions before use.)

This manual classifies the safety precautions into two categories:

- **DANGER** 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 medium or slight personal injury or physical damage.

Depending on the circumstances, procedures indicated by **CAUTION** may also cause severe injury. It is important to follow all precautions for personal safety.

**STARTUP AND MAINTENANCE PRECAUTIONS**

- **DANGER**
  - 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 heat excessive generation, burning, ignition, liquid leakage or deformation, and lead to fire, injury or failures and malfunctions of facilities 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.

- **CAUTION**
  - 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 disconnect 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. Failure to do so may cause equipment failures or malfunctions.
  - Peripheral devices, Display module, expansion boards, and FX Series terminal blocks
  - Battery and memory cassette

**DISPOSAL PRECAUTIONS**

- **CAUTION**
  - Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.
  - Do not throw batteries into fire.
  -.Dispose of batteries, separate them from other waste according to local regulations. (For details of the Battery Directive in EU countries, refer to FX3G Series User’s Manual - Hardware Edition.)

**TRANSPORT AND STORAGE PRECAUTIONS**

- **CAUTION**
  - When transporting the FX3G Series PLC incorporating the optional battery, turn on the PLC before shipment, confirm that the battery mode is set using a parameter and the ALM LED is OFF, and check the battery life. If the PLC is transported with the ALM 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 Section 2.1. Failure to do so may cause failures in the PLC.
  - After transportation, verify the operations of the PLC.
  - When transporting lithium batteries, follow required transportation regulations. (For details of the regulated products, refer to FX3G Series User’s Manual - Hardware Edition.)

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 testing (of the identified standards below) and design analysis (through the creation of a technical construction file) to the European Directives for Electromagnetic Compatibility (2004/108/EC) when used as directed by the appropriate documentation.

- **Radiated Emissions**
  - Power frequency magnetic field
  - Conducted RF
  - Voltage drops and interruptions
  - Fast transient burst
  - Electrostatic discharge
  - High-energy surge
  - Radiated electromagnetic field
  - Fast transient burst
  - Electrostatic discharge
  - High-energy surge
  - Voltage drops and interruptions
  - Conducted RF
  - Power frequency magnetic field

<table>
<thead>
<tr>
<th>Standard</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN61131-2:2003</td>
<td>Programmable controllers - Equipment requirements and tests</td>
</tr>
<tr>
<td>Compliance with all relevant aspects of the standard.</td>
<td>Radiated Emissions Conducted Emissions EMS Radiated electromagnetic field Fast transient burst Electrostatic discharge High-energy surge Voltage drops and interruptions Conducted RF Power frequency magnetic field</td>
</tr>
</tbody>
</table>
Models: MELSEC FX2N series manufactured from July 1st, 1997FX2N-**/ES-UL FX2N-**/ET-ESS/UL
Where ** indicates:32,48
FX2N-10EX-ES/UL FX2N-16EYR-ES/UL
FX2N-20EYR-ES/UL FX2N-8EYR-ES/UL
from April 1st, 1998FX2N-8ER-UA1/UL
from August 1st, 2005FX2N-8ER-ES/UL FX2N-8EX-ES/UL
FX2N-8EYR-ES/UL FX2N-8ET-ESS/UL

For the products above, PLCs manufactured before March 31st, 2002 are compliant with EN60588-2-6 (EN6000-6-4) and EN60588-2 from April 1st, 2002 to April 30th, 2006 are compliant with EN60588-2-2 (EN60100-6-4) and EN61131-2-1998+A11:1996+A12:2000 after May 1st, 2006 are compliant with EN61131-2-2:2003

### 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 FX2N series manufactured from November 1st, 2008 FX2N-**/MTE/S(A)
Where ** indicates:14,24,40,60
from December 1st, 2008 FX2N-**/MR/S(A)
Where ** indicates:14,24,40,60
from March 1st, 2009 FX2N-**/MTE/ES
Where ** indicates:14,24,40,60
from December 1st, 2009 FX2N-**/MR/ES
Where ** indicates:14,24,40,60

<table>
<thead>
<tr>
<th>Standard</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN61131-2-2003</td>
<td>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 EN61131-2-2:2003</td>
</tr>
</tbody>
</table>

Models: MELSEC FX2N series manufactured from July 1st, 1997 FX2N-**/ER-ES/UL FX2N-**/ET-ESS/UL
Where ** indicates:32,48
from April 1st, 1998 FX2N-8ER-DSS
from August 1st, 1998 FX2N-48ER-UA1/UL
from August 1st, 2005 FX2N-8ER-ES/UL FX2N-8EX-ES/UL
FX2N-8EYR-ES/UL FX2N-8ET-ESS/UL


### Caution for compliance with EC Directive
Programmable logic controllers are open-type devices that must be installed and used within conduits or control boxes. Please use the FX3G Series programmable logic controllers while installed in conduits while shielded control boxes. Please secure the control box lid to the control box (for conduction). Installation within a control box greatly affects the safety of the system and aids in shielding noise from the programmable logic controller.

**Associated manuals**
FX3G Series PLC (main unit) comes with this document (hardware manual).
For a detailed explanation of the FX3G Series software and information on instructions for PLC programming and special unit/extension, refer to the relevant documents.

<table>
<thead>
<tr>
<th>Manual name</th>
<th>Manual No.</th>
<th>Description</th>
</tr>
</thead>
</table>

For the necessary product manuals or documents, consult with the Mitsubishi Electric dealer from where you purchase your product.

1. Outline
For the input/output units/extension units, refer to the following manual.

1.1 Parts names

**Incorporated Items**
Check if the following product and items are included in the package:

<table>
<thead>
<tr>
<th>Main units</th>
<th>Included Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>1 unit</td>
</tr>
<tr>
<td>Dust proof protection sheet</td>
<td>1 sheet</td>
</tr>
<tr>
<td>Manuals [Japanese version†1, English version]</td>
<td>1 manual each</td>
</tr>
</tbody>
</table>

**Input/output units**

<table>
<thead>
<tr>
<th>Product</th>
<th>Included Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX2N-32E</td>
<td>1 unit</td>
</tr>
<tr>
<td>FX2N-48E</td>
<td>Extension cable 1 cable</td>
</tr>
<tr>
<td>FX3G-60E</td>
<td>Input/output number label 1 sheet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product</th>
<th>Included Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX2N-16E</td>
<td>Input/output number label 1 sheet</td>
</tr>
</tbody>
</table>

†1 The FX3G-□□□□□□ES-A becomes Chinese version.
### 2. Installation (general specifications)

As for installation of the input/output extension units/blocks, refer to the following manual.

**Caution:**
- 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, oil smoke, conductive dusts, corrosive gas (salt air), C2H2, SO2 or NO2, flammable gas, vibration or impacts, or exposed to high temperature, condensation, or rain and wind.
- 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.
- Do not install the product on a floor, a wall or a vertical surface.
- Install it horizontally on a wall as shown in section 2.2.

### 2.1 Generic specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0 to 65°C (32 to 131°F) when operating and -25 to 70°C (-13 to 167°F) when stored</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>5 to 95%RH (no condensation) when operating</td>
</tr>
</tbody>
</table>

### INSTALLATION PRECAUTIONS

**1.** Use the product within the generic environment specifications described in section 2.1 of this manual.

**2.** Never use the product in areas with excessive dust, oil smoke, conductive dusts, corrosive gas (salt air), C2H2, SO2 or NO2, flammable gas, vibration or impacts, or exposed to high temperature, condensation, or rain and wind.

**3.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**4.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**5.** Install the product securely using a DIN rail or mounting screws.

**6.** Do not install the product on a floor, a wall or a vertical surface.

**7.** Install it horizontally on a wall as shown in section 2.2.

**8.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**9.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**10.** Install the product securely using a DIN rail or mounting screws.

**11.** If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.

**12.** When drilling screw holes or wiring, make sure cutting or wire debris does not enter the ventilation slits.

**13.** Failure to do so may cause fire, equipment failures or malfunctions.

**14.** 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.


**16.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**17.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**18.** Install the product securely using a DIN rail or mounting screws.

**19.** Failure to do so may cause fire, equipment failures or malfunctions.

**20.** 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.


**22.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**23.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**24.** Install the product securely using a DIN rail or mounting screws.

**25.** Failure to do so may cause fire, equipment failures or malfunctions.

**26.** 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.


**28.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**29.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**30.** Install the product securely using a DIN rail or mounting screws.

**31.** Failure to do so may cause fire, equipment failures or malfunctions.

**32.** 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.


**34.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**35.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**36.** Install the product securely using a DIN rail or mounting screws.

**37.** Failure to do so may cause fire, equipment failures or malfunctions.

**38.** 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.


**40.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**41.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**42.** Install the product securely using a DIN rail or mounting screws.

**43.** Failure to do so may cause fire, equipment failures or malfunctions.

**44.** 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.


**46.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**47.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**48.** Install the product securely using a DIN rail or mounting screws.

**49.** Failure to do so may cause fire, equipment failures or malfunctions.

**50.** 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.


**52.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**53.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**54.** Install the product securely using a DIN rail or mounting screws.

**55.** Failure to do so may cause fire, equipment failures or malfunctions.

**56.** 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.


**58.** If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.

**59.** Do not touch the conductive parts of the product directly to avoid failure or malfunctions.

**60.** Install the product securely using a DIN rail or mounting screws.

**61.** Failure to do so may cause fire, equipment failures or malfunctions.

**62.** 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.
2.2 Installation location

Install the PLC in an environment conforming to the generic specifications (section 2.1), installation precautions and notes.


Installation location in enclosure

Space in enclosure

Extension devices can be connected on the left and right sides of the main unit of the PLC. If you intend to add extension devices in the future, keep necessary spaces on the left and right sides.

2.2.1 Affixing The Dust Proof Sheet

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

→ For the affixing procedure, refer to the instructions on the dust proof sheet. Be sure to remove the dust proof sheet when the installation and wiring work is completed.

2.2.2 Affixing The Dust Proof Sheet

The dust proof sheet should be placed on the ventilation port before installation and wiring work is completed.


2.3 Procedures for installing to and detaching from DIN rail

The products can be installed on a DIN44277 rail (35 mm (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) Push out all DIN rail mounting hooks (below fig.A).

2) Fit the upper edge of the DIN rail mounting groove (right fig.C) onto the DIN rail.

3) Lock the DIN rail mounting hooks (below fig.D) while pressing the PLC against the DIN rail.

2.4 Procedures for installing directly (with M4 screws)

The product can be installed directly on the panel (with screws).

As for the details of the installation/detaching for input/output 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/blocks and special adapters, refer to the following manual.


2.4.2 Installation

1) Make mounting holes in the mounting surface referring to the external dimensions diagram.

2) Fit the main unit (A in the right figure) 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 (Section 1.2).

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

As for the details of the power supply wiring and input/output wiring, refer to the following manual.


WIRING PRECAUTIONS

- Do not bundle the control line together with or lay it close to the main circuit or power line. As a guideline, lay the control line at a distance of at least 30 to 50mm (1.19" to 1.97") away from the PLC output and other power lines.

- Use class D grounding (grounding resistance of 100Ω or less) with a wire of 2mm² or thicker on the ground terminal of the FX3G 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 debris does not enter the ventilation slits.

- Failure to do so may cause fire, equipment failures or malfunctions.

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, triac 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.

DESIGN PRECAUTIONS

- Simultaneously turn on and off the power supplies of the main unit and extension devices.

- Even if the AC power supply causes an instantaneous power failure for less than 10 ms, the PLC can continue to operate.

- Even if the DC power supply causes an instantaneous power failure for less than 5 ms, the PLC can continue to operate.

- 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 input is on).

- Do not wire vacant terminals externally.

- Input/output wiring 50 to 100m (164’1” to 328’1”) long will cause almost no problems of noise, but, generally, the wiring length should be less than 20m (65’7”) to ensure the safety.

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

- Install module so that excessive force will not be applied to the built-in programming connectors, power connectors or I/O connectors.

- Failure to do so may result in wire damage/breakage or PLC failure.
3.1 Wiring
This section explains the wiring of the terminal type.
For the connectors types, refer to the following manual.

3.1.1 Cable end treatment and tightening torque
For the terminals of FX3G 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.

- When one wire is connected to one terminal
- When two wires are connected to one terminal

3.1.2 Removal and installation of quick-release terminal block

Removal
Unscrew the terminal block mounting screw (both right and left screws) evenly, and remove the terminal block.
Installation
Place the terminal block in the specified position, and tighten the terminal block mounting screw evenly (both right and left screws).
Tightening torque 0.5 to 0.8 Nm
Do not tighten the terminal block mounting screws with a torque exceeding the regulation torque.
Failure to do so may cause equipment failures or malfunctions.
* Pay attention so that the center of the terminal block is not lifted.

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 [Main unit, Input/output extension units]

<table>
<thead>
<tr>
<th>Item</th>
<th>Specified voltage</th>
<th>DC power type</th>
<th>Main unit</th>
<th>Input/output extension units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>100 to 240V AC</td>
<td>24V DC</td>
<td>24V DC</td>
<td></td>
</tr>
<tr>
<td>Allowable supply voltage</td>
<td>85 to 264V AC</td>
<td>20.4 to 28.8V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50/60Hz</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable instantaneous power failure time</td>
<td>Operation can be continued upon occurrence of instantaneous power failure for 10 ms or less.</td>
<td>Operation can be continued upon occurrence of instantaneous power failure for 5 ms or less.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2.2 Example of external wiring (AC power type)
100 to 240V AC power is supplied to the main unit and input/output extension unit.
→ 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. If it cannot be grounded independently, ground it jointly as shown below.

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)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main unit</td>
<td></td>
</tr>
<tr>
<td>AC power type</td>
<td>DC power type</td>
</tr>
<tr>
<td>Power on</td>
<td>Power off</td>
</tr>
<tr>
<td>PLC</td>
<td>AC</td>
</tr>
</tbody>
</table>

* Class D grounding See section 3.3 for details.

3.4.2 Example of external wiring (DC power type)
24V DC power is supplied to the main unit and input/output extension unit.
→ For the details of wiring work, refer to section 3.1.

3.4.3 Connection of input/output extension unit
### 3.4.2 Examples of input wiring [AC power type]

- **1. Sink input type**
- **2. Source input type**

*Class D grounding*

See section 3.3 for details.

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

*2 Do not connect the [ ] terminals with others, since they are not available.

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

1. **Sink input type**
2. **Source input type**

*Class D grounding*

See section 3.3 for details.

*1 Main unit, Input/output extension unit (Common to both sink and source inputs)

*2 Input/output extension block (Common to both sink and source inputs)

#### 3.4.4 Instructions for connecting input devices

As for the details of instructions for connecting input devices, refer to the following manual.


1. In the case of no-voltage contact:
   - The input current of this PLC is 5 to 7mA at 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. 4V 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 input device with built-in parallel resistance:
   - Use a device with a parallel resistance of 15kΩ or more.
   - When the resistance is less than 15kΩ, connect a bleeder resistor.

4. In the case of 2-wire proximity switch:
   - Use a two-wire proximity switch whose leakage current is 1.5mA or less when the switch is off.
   - When the current is 1.5mA or more, connect a bleeder resistor.

5. In the case of no-voltage contact:
   - Use input devices applicable to this minute current.

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

- **Input response time**: Approx. 10ms
- **Input circuit insulation**: Photocoupler insulation
- **Input signal form**: Contact input
- **Input signal current**: 4.7mA/100V AC 50Hz
- **Input signal voltage**: 100V AC to 120V
- **Input connecting type**: Refer to FX3G Series User’s Manual - Hardware Edition

#### 3.5 Relay output specifications and example of external wiring

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


#### 3.5.1 Relay output specifications

<table>
<thead>
<tr>
<th>Number of output points</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX2N-48ER-UA1/UL</td>
<td>24 points</td>
</tr>
<tr>
<td>FX3G-60MR</td>
<td>4 points</td>
</tr>
<tr>
<td>FX2N-16EYR</td>
<td>24 points</td>
</tr>
<tr>
<td>FX3G-40MR</td>
<td>10 points</td>
</tr>
<tr>
<td>FX2N-8EYR</td>
<td>16 points</td>
</tr>
<tr>
<td>FX3G-14MR</td>
<td>24 points</td>
</tr>
<tr>
<td>FX2N-8ER</td>
<td>16 points</td>
</tr>
<tr>
<td>FX3G-24MR</td>
<td>24 points</td>
</tr>
</tbody>
</table>

**Output connecting type**
Refers to FX3G Series User’s Manual - Hardware Edition

**Output form**
Relay

**External power supply**
30V DC or less
240V AC or less

**Max. load**
- Resistance load: 2A (point)*3
- Inductive load: 80VA

**Min. load**
- 5V DC, 2mA (reference value)

**Open circuit leakage current**
- Approx. 10mA

**Display of output operation**
LED on panel lights when power is applied to relay coil.

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

*2 Between 250V and 240V, CE, UL, and cUL are not compliant.

*3 Do not take input signals from loads generating surge.
3.5.3 Example of relay output wiring

---

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>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 points</td>
<td>Y000, Y001: 0.2ms or less/200mA or more (at 24VDC)</td>
</tr>
<tr>
<td>3 points</td>
<td>Y002 or more: 0.2ms or less/200mA or more (at 24VDC)</td>
</tr>
<tr>
<td>4 points</td>
<td>Y003 or more: 0.2ms or less/200mA or more (at 24VDC)</td>
</tr>
</tbody>
</table>

### 3.6.2 External Wiring of Transistor Output

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC power supply</td>
<td>Y0</td>
</tr>
<tr>
<td>COM0</td>
<td></td>
</tr>
<tr>
<td>Y0</td>
<td></td>
</tr>
<tr>
<td>PLC</td>
<td></td>
</tr>
</tbody>
</table>

Circuits insulation Photocoupler insulation

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

---

1) Each value inside ( ) indicates the number of occupied points.
2) The total load current of resistance loads per common terminal should be the following value or less.
3) The response time is as follows in the FX2N-8ET-H:
   - OFF→ON: 0.2ms or less/1A
   - ON→OFF: 0.4ms or less/1A
4) The total value 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

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


---

* The total load current of resistance loads per common terminal should be the following value or less.
  - 1 output point/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 The total load current of resistance loads per common terminal should be the following value or less.
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  - 4 output points/common terminal: 8A
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As for the number of outputs per common terminal, refer to “Chapter 4 interpretation of partition” and the following manual.


---

3) Capacitive load

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

When a load connected to the output terminal short-circuits, the PLC circuit itself may be damaged. Fit a protective fuse on the output used. Refer to the table below for other specifications.

### 3.5.4 Cautions in external wiring

As for the details of instructions for connecting input devices, refer to the following manual.


Protection circuit for load short-circuiting

When a load connected to the output 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 relay 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 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>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>5 to 10 times the load voltage</td>
</tr>
<tr>
<td>Forward 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>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance</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.

---

1) Inductive load

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

When a load connected to the output terminal short-circuits, the PLC circuit itself may be damaged. Fit a protective fuse on the output used. Refer to the table below for other specifications.

### 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 when contacts at shutdown may cause arcing. At a fixed current consumption, as the power factor (phase between current and voltage) gets smaller, the arc energy gets larger.

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

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<td>Forward current</td>
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</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.

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<th>Item</th>
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<tbody>
<tr>
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<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.

---

1) Inductive load

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

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

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<td>Resistance value</td>
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</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.
3.7 Triac output specifications and example of external wiring

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

### 3.7.1 Triac output specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output points</td>
<td>FX2N-16EY, FX2N-32EY</td>
</tr>
<tr>
<td>Output connecting type</td>
<td>Refer to FX3G 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 242V AC</td>
</tr>
<tr>
<td>Max. load</td>
<td>Resistance load 0.3A/point¹</td>
</tr>
<tr>
<td></td>
<td>Inductive load 15VA/100V AC, 30VA/200V AC</td>
</tr>
<tr>
<td>Min. load</td>
<td>0.4VA/100V AC, 1.6VA/200V AC</td>
</tr>
<tr>
<td>Open circuit leakage</td>
<td>current 1ma/100V AC, 2mA/200V AC</td>
</tr>
<tr>
<td>Response time</td>
<td>OFF→ON 1ms or less</td>
</tr>
<tr>
<td></td>
<td>ON→OFF 10ms or less</td>
</tr>
<tr>
<td>Circuit insulation</td>
<td>Photo-thyristor insulation</td>
</tr>
<tr>
<td>Display of output operation</td>
<td>LED on panel lights when photo-thyristor is driven.</td>
</tr>
</tbody>
</table>

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 : 0.6A

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

### 3.7.2 External Wiring of Triac Output

For details on the terminal block layout, refer to the following manual.

Interpretation of partition
The partition of the output terminals (see following figure) indicates the range of the output connected to the same common.

Example: FX3G-40MT/ES

```
Output terminal

0V Y0 Y1 • • •

24V COM0 COM1 • • •
```

<table>
<thead>
<tr>
<th>Item</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static electricity capacity</td>
<td>≈ 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.

### 3.7.3 Cautions in external wiring

As for the details of instructions for connecting input devices, refer to the following manual.

Protection circuit for load short-circuits
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.

Micro current load
The PLC’s internal Triac output circuit is equipped with a turn-off C-R absorber. When connecting a very low current load of “0.4VA/100V AC or less, or 1.6VA/200V AC or less”, please connect a surge absorber parallel to the load.

Select the rated voltage of a surge absorber that is suitable for the load being used. Refer to the table below for other specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static electricity capacity</td>
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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.

For safe use

- 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 purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with 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 fail-safes functions in the system.

Warranty
Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products, and to other duties.

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