STARTUP AND MAINTENANCE 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.
- Do not use chemical solvents to clean the PLC. You may cause fire, equipment failures, or malfunctions.
- For repair, contact your local Mitsubishi Electric representative.
- Turn off the power to the PLC before connecting or disconnecting any connection cable.
- Failure to do so may cause equipment failures or malfunctions.
- Turn off the power to the PLC before attaching or disconnecting the following devices.
  - Peripheral devices, display module, expansion boards, special adapters and memory cassette.
  - Do not use the chemicals for cleaning.
  - If there is the possibility of touching the PLC inside a control panel in maintenance, make sure to discharge to avoid the influence of static electricity.

**CAUTION**

DISPOSAL PRECAUTIONS

Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.

**CAUTION**

**TRANSPORTATION AND STORAGE PRECAUTIONS**

The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in section 2.1.7 by using dedicated packaging materials. Failure to do so may cause failures in the PLC. After transportation, very operation of the PLC and check for damage of the mounting part, etc.

**CAUTION**

**Associated manuals**

For the necessary product specifications or documents, consult with your Mitsubishi Electric representative.

**Associated manuals**

FX3S Series PLC (main unit) comes with this document (hardware manual).

For a detailed explanation of the FX3S Hardware series and information on PLC programming, refer to the relevant documents.

**How to obtain manuals**

Please consult Mitsubishi Electric for information on UL, CUL standards and the corresponding types of equipment.

**Compliance with EC directive (CE Marking)**

This product complies with EC directive; however, this document does not guarantee that a mechanical system including this product will comply with EC directive.

**Compliance with LVD directive**

Compliance to EMC directive and LVD directive of the entire mechanical system should be confirmed by the user’s machine manufacturer. For more details please contact the local Mitsubishi Electric sales representative.

**Caution for compliance with EC Directive**

- Please use the FX3S Series programmable controller while installed in conductive shielded control panels under a general industrial environment.
- Programmable controllers are open-type devices that must be installed and used within control panels. Please secure the control panel lid to the controller (for protection). Installation within a control panel greatly affects the safety of the system and aids in shielding noise from the programmable controller.
- For the control panel, use the product having sufficient fire, protection, and shielding property for an installation environment.
- Use 24 V DC of the power supply must be supplied from the circuit double/ reinforced insulated from the main power supply (MAINS).

**Caution for compliance with the LVD directive (EN61158-2-2013)**

- To an external connection rather than AC power supply terminals (AC input/output terminals), connect the circuit separated from a dangerous voltage by a double/reinforced insulation.
- Between the common having the adjacent relay output terminals, if an external power supply is higher than 120 V in AC, the insulation is basic. Therefore, when using 120 V AC or higher external power supply and 30 V DC or 30 V AC or lower external power supply as the adjacent common, do not handle 30 V DC or lower external power supply as a touchable part. (When handling 30 V DC or lower external power supply as a touchable part, add a basic insulation.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire more than an external terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
- Do not wire two or more cramped terminals to one terminal. (If the wiring with two or more terminals is needed, take an appropriate action such as adding an external terminal.)
### 1.2 External dimensions and weight

- **FX3S-10M**: Approx. 2.70 \(\times\) 2.24 \(\times\) 0.82 in (73.6 \(\times\) 57.0 \(\times\) 20.8 mm)
- **FX3S-20M**: Approx. 5.25 \(\times\) 2.24 \(\times\) 0.82 in (133.4 \(\times\) 57.0 \(\times\) 20.8 mm)
- **FX3S-30M**: Approx. 7.59 \(\times\) 2.24 \(\times\) 0.82 in (193.2 \(\times\) 57.0 \(\times\) 20.8 mm)

**Weight**
- **FX3S-10M**: 0.48 lbs (0.22 kg)
- **FX3S-20M**: 0.40 lbs (0.18 kg)
- **FX3S-30M**: 0.66 lbs (0.30 kg)

**Installation**
- 35-mm-wide DIN rail or Direct (screw) mounting (M4×2)

### 2.1 Generic specifications

#### Ambient conditions
- **Temperature**: 0 to 55 °C (50 to 131 °F) when operating and 20 to 75 °C (68 to 167 °F) when stored
- **Humidity**: 5 to 95% RH (no condensation) when operating

#### Operating conditions
- **Input**: 24 V DC (±10%)
- **Output**: 24 V DC (±10%)
- **Power**: 1.6 W

#### Electromagnetic compatibility
- **Conduction immunity**: 5 kV for 1 min
- **Radiated immunity**: 150 V for 1 min

### INSTALLATION

#### Notes
- When the dust proof sheet is supplied with units, keep the sheet applied to the unit until the installation and wiring work is completed.
- Failure to do so may cause fire, equipment failures or malfunctions.
- When drilling screw holes or wiring, make sure cutting or wire debris do not enter the ventilation slits.
- Installing the product on a horizontal surface is recommended.
- When mounting on a wall, make sure it is not too far from the ground.
- The dust proof sheet should be affixed to the ventilation port before beginning installation and wiring work.

#### Terminal pins
- Use the terminal pins that are shown below the table.

#### Terminal pins

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Electric strength</th>
<th>Insulation resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5VDC (+)</td>
<td>1.5 kV AC for 1 min</td>
<td>Not allowed</td>
</tr>
<tr>
<td>-5VDC (-)</td>
<td>1.5 kV AC for 1 min</td>
<td>Not allowed</td>
</tr>
<tr>
<td>+24V (+)</td>
<td>1.5 kV AC for 1 min</td>
<td>Not allowed</td>
</tr>
<tr>
<td>-24V (-)</td>
<td>1.5 kV AC for 1 min</td>
<td>Not allowed</td>
</tr>
</tbody>
</table>

#### Grounding pins
- Use the ground pin of the PLC for grounding.
- For the special adapters, refer to the following manual.

#### Installation
- Push out all DIN rail mounting hooks (below fig. A)
- Fit the upper edge of the DIN rail mounting groove (right fig. B) onto the DIN rail.

### 2.4 Procedures for installing directly (with M4 screws)

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

#### Mounting hole pitches
- Refer to External Dimensions (section 1.2).
3. Power supply/input/output specifications and examples of external wiring

**WIRING PRECAUTIONS**

- **CAUTION**
  - Do not wire vacant terminals externally.
  - The temperature rating of the cable should be 80°C or more.
  - Make sure to cut off all phases of the power supply are not wired correctly.
  - Noise may cause malfunctions.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Tightening torque should follow the specifications in the manual.
  - When choosing the screws when wiring, make sure cutting or wire damage does not enter the ventilation slits.
  - Failure to do so may cause fire, equipment failures or malfunctions.
  - Make sure to propely wire to the main unit 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.
  - Make sure to propely wire to the main unit in accordance with the rated voltage, current, and frequency of each terminal.
  - The disposal size of the cable end should follow the dimensions described in the manual.
  - Tightening torque should follow the specifications in the manual.
  - Tightening the screws using a Philips-head screwdriver No. 2 (shaft diameter 6mm (0.24") or less). Make sure that the screwdriver does not touch the partition part of the terminal block.

**Notes**

- Input/output 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 (65'7") to ensure the safety.

### 3.1 Wiring

#### 3.1.1 Cable end treatment and tightening torque

For the terminals of FX3S series PLC, M3 screws are used. The electric wire end should be treated as shown below. Tighten the screws to a torque of 0.5 to 0.8 Nm.

- Do not tighten terminal screws with a torque outside the above-mentioned range. Failure to do so may cause equipment failures or malfunctions.
- When one wire is connected to one terminal:
  - 6.2 mm (0.24") or less
  - Terminal screw: Solderless terminal
  - Terminal: Terminal

#### 3.2 Power supply specifications and example of external wiring

- For details, refer to the following manual.

#### 3.2.1 Power supply specifications

**Item**

<table>
<thead>
<tr>
<th>Certification</th>
<th>AC power type</th>
<th>DC power type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse</td>
<td>19 W</td>
<td>5 W</td>
</tr>
<tr>
<td>Fuse</td>
<td>19 W</td>
<td>5 W</td>
</tr>
<tr>
<td>Fuse</td>
<td>20 W</td>
<td>7 W</td>
</tr>
<tr>
<td>Fuse</td>
<td>21 W</td>
<td>9 W</td>
</tr>
</tbody>
</table>

*1 This item shows values when all 24 V DC service power supplies are used in the maximum configuration connectable to the main unit, and includes the input current (5 or 7 mA per point). (The DC power type main unit does not have a 24 V DC service power supply.)

**Example of external wiring (AC power type) 100 to 240 V AC power is supplied to the main unit.**

#### 3.3 Grounding

*Gound the PLC independently if possible.*
- Perform class D grounding. (Grounding resistance: 100 Ohm or less)
- Ground the PLC independently if possible.
- If it cannot be grounded independently, ground it jointly as shown below.

**Example of grounding (Best condition)**

- 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

For details, refer to the following manual.


### 3.4.1 Input specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of input points</td>
<td>FX3S-10M: 6 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-14M: 8 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-20M: 12 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-30M: 18 points</td>
</tr>
</tbody>
</table>

#### Input connecting type
- Fixed terminal block (M3 screw)
- Sink input
- Source input

#### Input signal form
- AC power type 24 V DC +10%, -10%
- DC power type 20-42 V DC

#### Input impedance
- X000 to X007: 20 kΩ
- X010 to X017: 3 kΩ

#### Input current
- 1.5 mA or less
- 4.5 mA or more

#### Input voltage
- 24 V DC

#### Fuse
- 5 mA/24 V DC

### 3.4.4 Instructions for connecting input devices

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


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

For details, refer to the following manual.


#### 3.5.1 Relay output specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output points</td>
<td>FX3S-10M/MT: 4 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-14M/MT: 6 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-20M/MT: 8 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-30M/MT: 14 points</td>
</tr>
</tbody>
</table>

#### Output connecting type
- Fixed terminal block (M3 screw)

#### Output current
- 0.2 ms or less/200 mA or more

#### Output circuit insulation
- Photocoupler insulation

#### Output operation display
- LED on panel lights when photocoupler is driven.

### 3.6 Transistor output specifications and example of external wiring

For details, refer to the following manual.


#### 3.6.1 Transistor output specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output points</td>
<td>FX3S-10M: 6 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-14M: 8 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-20M: 12 points</td>
</tr>
<tr>
<td></td>
<td>FX3S-30M: 18 points</td>
</tr>
</tbody>
</table>

#### Output connecting type
- Fixed terminal block (M3 screw)

#### Output current
- 0.5 A or less/24 V DC

#### Output circuit insulation
- Photocoupler insulation

#### Output operation display
- LED on panel lights when photocoupler is driven.

### 3.7.7 Cautions in external wiring

As for the details of cautions in external wiring, refer to the following manual.


#### 3.4.4 Instructions for connecting input devices

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


### 4. Terminal block layouts

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


#### 4.1 Terminal block layouts

<table>
<thead>
<tr>
<th>Output terminal</th>
<th>24V</th>
<th>COM1</th>
<th>Y000</th>
<th>Y015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partition</td>
<td>0V</td>
<td>100</td>
<td>Y00</td>
<td>Y01</td>
</tr>
</tbody>
</table>

---

1 Class D grounding.
2 Do not connect the [ ] terminals with others, since they are not available.