This manual describes the part names, dimensions, mounting, and specifications of the product. Before use, read this manual and the manuals of all relevant products fully to acquire proficiency in handling and operating the product. Make sure to learn all the product information, safety information, and precautions.

Read this manual in a safe spot so that it can be taken out and read whenever necessary. Always forward it to the end user. Registration of Phillips is a registered trademark of Phillips Screw Company. The company and product names described in this manual are registered trademarks or trademarks of their respective companies.

Effective December 2017

Specifications are subject to change without notice.

© 2013 MITSUBISHI ELECTRIC CORPORATION

Safety Precaution

Read these precautions before use. The equipment may be impaired.

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

Indicates that incorrect handling may cause hazardous conditions, resulting in moderate or slight personal injury or physical damage.

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

STARTUP AND MAINTENANCE

• Do not touch any terminal while the PLC’s power is on.
• Do not connect or disconnect terminals when the PLC is using electricity.
• Before cleaning or inspection, terminals, cut off all phases of the power supply to the unit to avoid electrical shock.
• After reconnecting or replacing the circuit, check that the unit is operating correctly.
• An operation error may damage the machine or cause accidents.

DIAGNOSIS

• The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in section 3.1 by using dedicated packaging boxes and shock-absorbing films.
• Failure to do so may cause failures in the PLC. After transportation, verify operation of the PLC and check for damage of the mounting part, etc.

SAFETY PRECAUTIONS

• Turn off the power to the PLC before disconnecting or connecting the following devices. Failure to do so may cause equipment failures or malfunctions.
• Peripheral devices, display module, expansion boards, special adapters and memory cassette
• Do not use the chemical 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.

PROGRAMMABLE CONTROLLER

MELSEC-F

FX3S-30MD/FX3S-2AD

PROJECTED MANUFACTURING

Manual No. JY997D51701E

Handbook Name: FX3S-30MD/FX3S-2AD Hardware Manual

This product conforms with CE directive, however, this document does not guarantee that a mechanical system including this product will comply with CE directive. Compliance with 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 office.

Certification with CE directive (CE Marking)

This product comes with CE Marking. However, this document does not guarantee that a mechanical system including this product will comply with CE directive.

Compliance with LVD directive (EN61010-2-21:2013)

• An external connection or other AC power supply terminal and AC input/output terminal, connect the circuit separated from a dangerous voltage by a double/shielded insulation.
• Between the components having the adjacent relay output terminals, if an external power supply is higher than 120 V AC, the insulation is basic. Therefore, when using 120 V AC or higher external power supply and 30 V DC/AC or lower external power supply between the adjacent commons, do not handle 30 V DC/AC or lower external power supply as a touchable part. (When handling 30 V DC/AC or lower external power supply as a touchable part, add a basic insulation.)
• Do not wire two or more cremp terminals to one terminal. (If the wiring with two or more wires is needed, take an appropriate same action as adding an external terminal)
• For crimp terminals to be used for the wiring applied with 30 V AC or higher, use the products with insulating sleeves.
• Cutoff device such as a breaker or a circuit protector should be installed in accordance with the following standards.
• Use EN60947-1 or EN60947-3 standards.

For the control panel, use the product having sufficient strength, fire protection and shielding property to an installation environment.

• 24 V DC of the power supply must be supplied from the circuit double/shielded insulation from the main power supply (Mains).

Caution for compliance with CE Directive

• Please use the FX3S programmable controllers while installed in conductive shielded control panels under a general industrial environment.
• Programmable controllers are so sensitive that static electricity may cause failures in 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 controller.

For the control panel, use the product having sufficient strength, fire protection and shielding property to an installation environment.

• 24 V DC of the power supply must be supplied from the circuit double/shielded insulation from the main power supply (Mains).

Caution for compliance with LVD directive (EN61010-2-21:2013)

• Turn off the power to the PLC before connecting or disconnecting the following devices. Failure to do so may cause equipment failures or malfunctions.
• Peripheral devices, display module, expansion boards, special adapters and memory cassette
• Do not use the chemical 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.

PREREQUISITES

This manual describes the part names, dimensions, mounting, cabling and precautions all relevant products fully to acquire proficiency in handling and operating the specifications of the product. Before use, read this manual and the manuals of

2. Outline

2.1 Part names

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Top cover</td>
</tr>
<tr>
<td>2</td>
<td>Terminal name plate</td>
</tr>
<tr>
<td>3</td>
<td>Shows a function grounding terminal.</td>
</tr>
<tr>
<td>4</td>
<td>Input display LEDs (red)</td>
</tr>
<tr>
<td>5</td>
<td>Peripheral device connecting connector cover</td>
</tr>
<tr>
<td>6</td>
<td>Operation status display LEDs</td>
</tr>
<tr>
<td>7</td>
<td>Switch Canberra</td>
</tr>
<tr>
<td>8</td>
<td>RUN Green</td>
</tr>
<tr>
<td>9</td>
<td>ERR Red</td>
</tr>
<tr>
<td>10</td>
<td>DIN rail mounting hooks</td>
</tr>
</tbody>
</table>

When the top covers are open

Incorporated Items

Check if the following product name and items are included in the package.

FX3S-30MD/FX3S-2AD

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Optional equipment connector</td>
</tr>
<tr>
<td>2</td>
<td>Input/output terminals</td>
</tr>
<tr>
<td>3</td>
<td>Analog input terminal block</td>
</tr>
<tr>
<td>4</td>
<td>RUN/STOP switch</td>
</tr>
</tbody>
</table>

Materials [Japanese/English]

1 manual

Included Items

- Dust proof protection sheet 1 sheet
- POZW Green: On while on power is on the PLC.}
- Switch Canberra | Green On while on power is on the PLC. |
- ERR Red | Flashing when a program error occurs. |
- DIN rail mounting hooks |

When the top covers are open

Incorporated Items

Check if the following product name and items are included in the package.

FX3S-30MD/FX3S-2AD

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Optional equipment connector</td>
</tr>
<tr>
<td>2</td>
<td>Input/output terminals</td>
</tr>
<tr>
<td>3</td>
<td>Analog input terminal block</td>
</tr>
<tr>
<td>4</td>
<td>RUN/STOP switch</td>
</tr>
</tbody>
</table>

Materials [Japanese/English]

1 manual

Included Items

- Dust proof protection sheet 1 sheet
- POZW Green: On while on power is on the PLC.}
- Switch Canberra | Green On while on power is on the PLC. |
- ERR Red | Flashing when a program error occurs. |
- DIN rail mounting hooks |

When the top covers are open

Incorporated Items

Check if the following product name and items are included in the package.

FX3S-30MD/FX3S-2AD

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Optional equipment connector</td>
</tr>
<tr>
<td>2</td>
<td>Input/output terminals</td>
</tr>
<tr>
<td>3</td>
<td>Analog input terminal block</td>
</tr>
<tr>
<td>4</td>
<td>RUN/STOP switch</td>
</tr>
</tbody>
</table>

Materials [Japanese/English]

1 manual

Included Items

- Dust proof protection sheet 1 sheet
- POZW Green: On while on power is on the PLC.}
- Switch Canberra | Green On while on power is on the PLC. |
- ERR Red | Flashing when a program error occurs. |
- DIN rail mounting hooks |
### 3.4 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 unit. For the special adapters, refer to the following manual.


#### 3.4.1 Mounting hole pitches

Refer to the External Dimensions (section 2.2) for the product’s mounting hole pitch information.

#### 3.4.2 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).

#### 3.3 Procedures for installing to DIN rail

The products can be installed on a DIN46277 rail (35 mm (1.38") wide).

This section explains the installations of the main units. For the special adapters, refer to the following manual.


#### 3.3.1 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. B) onto the DIN rail.

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

### 3.2 Installation

Install the PLC in an environment conforming to the generic specifications (section 3.1), installation precautions and notes.

#### 3.2.1 Affixing the dust proof sheet

The product can be affixed to the ventilation port before beginning the installation and wiring work.

Be sure to remove the dust proof sheet when the installation and wiring work is completed.

→ For the affixing procedure, refer to the instructions on the dust proof sheet.
4. Power supply/input/output specifications and examples of external wiring

For the details refer to the following manual.


4.1 Wiring

4.1.1 Cable end treatment and tightening torque

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

- If tightening torque exceeds 0.8 Nm, the PLC will burn out.
- Do not tighten terminal screws with a torque outside the above-mentioned range. Failure to do so will cause equipment failures or malfunctions.
- When one wire is connected to one terminal

- [Terminals] 6.2 mm (0.25") or less
- [Screw] 3.2 to 3.6 [N·m]

- [Terminals] 6.2 mm (0.25") or more
- [Screw] 3.2 to 4.0 [N·m]

4.1.2 Precautions

- Make sure the screwdriver does not touch the section part of the terminal block.

4.2 Power supply specifications

4.2.1 Input specifications

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

- Input signal voltage: 24V DC supply power source

4.2.2 Example of external wiring

100 to 240 V AC power is supplied to the main unit.

- 4.4.2 Examples of input wiring

- Input operation display

- Input circuit insulation

- Input output specifications

4.4.3 Instructions for connecting input devices

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


4.5 Output specifications and example of external wiring

4.5.2 Life of relay output contact

For the details of life of relay output contact, refer to the following manual.


4.5.3 Example of relay output wiring

4.5.4 Cautions in external wiring

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

4.6 Transistor output specifications and example of external wiring

For details, refer to the following manual.

4.6.1 Transistor output specifications

<table>
<thead>
<tr>
<th>Number of output points</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 points</td>
<td></td>
</tr>
</tbody>
</table>

Output specification

<table>
<thead>
<tr>
<th>Output form</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX3S-30MT/ES-2AD</td>
<td>Terminal block (M3 screw)</td>
</tr>
</tbody>
</table>

External wiring of source output type

1. External wiring of sink output type

External power supply

5.0-25 V DC

Max. load

0.5 A or less

Inductive load

12 V 24 DC

Open circuit leakage current

0.1 mA or less/30 V DC

ON voltage

1.5 V or less

Response time

OFF→ON: 0.14 ms to 1.5 ms
ON→OFF: 0.2 ms to 220 ms or more (at 24 V DC)

Output circuit insulation

Photocoupler insulation

Output operation display

LED on panel lights when photocoupler is driven.

5. Terminal block output

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

5.1 Output operation

Output terminal

24V COM Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14

5.2 Output terminal capacity

*1 The total load current of resistance loads per common terminal should be the following value.
1 output point/common terminal 0.5 A or less
4 output points/common terminal 0.8 A or less

As for the number of output per common terminal, refer to "Chapter 5 interpretation of partition and the following manual.


*2 The total of inductive loads per common terminal should be the following value.
4 output points/common terminal: 19.2 W or less/24 V DC
1 output point/common terminal: 12 W or less/24 V DC

5.3 Resistance load

- 4 output points/common terminal: 0.8 A or less
- 1 output point/common terminal: 0.5 A or less

5.4 Load supply

[Diagram of Load Supply]

5.5 Device allocation

Y00 to Y015

5.6 Wiring to analog device

Wiring to analog device should use wire from the following table.

<table>
<thead>
<tr>
<th>No. of wire per terminal</th>
<th>Solid wire</th>
<th>Stranded wire</th>
<th>Patches with plastic sleeve</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.14 to 1.5 mm (AWG26 to 16)</td>
<td>0.14 to 1.0 mm (AWG26 to 16)</td>
<td>0.25 to 0.5 mm (AWG24 to 20)</td>
</tr>
<tr>
<td>2</td>
<td>0.14 to 0.5 mm (AWG26 to 20)</td>
<td>0.14 to 0.2 mm (AWG26 to 24)</td>
<td>-</td>
</tr>
</tbody>
</table>

5.7 Warnings

- Make sure not to cut off all phases of the power supply externally before attempting installation or wiring work.
- Do not do to it may cause electric shock or damage to the product.

6. Built-in analog specifications and wiring

For details on the built-in analog input specifications and wiring, refer to the following manual.

6.1 Analog input terminal block (European type)

1) Wire size

Wiring to analog device should use wire from the following table.

<table>
<thead>
<tr>
<th>No. of wire per terminal</th>
<th>Wire size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Solid wire (0.14 to 1.5 mm)</td>
</tr>
<tr>
<td>2</td>
<td>Solid wire (0.14 to 0.5 mm)</td>
</tr>
</tbody>
</table>

6.2 Analog input specifications and external wiring

6.2.1 Analog input performance specifications

<table>
<thead>
<tr>
<th>Range</th>
<th>0 to 10 V DC (Input resistance: 115 kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute maximum input</td>
<td>±0.5 V, ±0.5 V</td>
</tr>
</tbody>
</table>

6.2.2 Example of analog input

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model</th>
<th>Cautionary note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoenix Contact Co., Ltd.</td>
<td>CRIMPFOX ZA 2A</td>
<td>No. 2 core shielded twisted pair cable for analog input lines, and separate the analog input lines from other power lines or inductive lines.</td>
</tr>
<tr>
<td>Phoenix Contact Co., Ltd.</td>
<td>CRIMPFOX 5F-2F</td>
<td>Use the 2-core shielded twisted pair cable for the analog input lines, and separate the analog input lines from other power lines or inductive lines.</td>
</tr>
</tbody>
</table>

6.3 Analog input terminal block layouts

- Use the 2-core shielded twisted pair cable for the analog input lines, and separate the analog input lines from other power lines or inductive lines.
- Make sure to short-circuit the “V+” and “V-” terminals when the device is not used.

Note: This symbol mark is for China only.

Contains hazardous substances. Contains cadmium (Cd), mercury (Hg), lead (Pb), lead + tin (Sn) alloys, hexavalent chromium (Cr(VI)), hexachlorobutadiene (HCBD), and polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).