



Side A JAPANESE
Side B ENGLISH

PROGRAMMABLE CONTROLLERS
MELSEC-F

FX2N-1PG-E INSTALLATION MANUAL



Manual Number	JY997D50601
Revision	B
Date	April 2015

This manual describes the part names, dimensions, mounting, wiring, 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.

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

Registration:

The company and product names described in this manual are registered trademarks or the trademarks of their respective companies.

Effective April 2015

Specifications are subject to change without notice.

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Safety Precaution (Read these precautions before use.)

This manual classify the safety precautions into two categories:

WARNING and **CAUTION**.

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

Depending on circumstances, procedures indicated by **CAUTION** may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Associated Manuals

Manual name	Manual No.	Description
FX2N-1PG/FX-1PG User's Manual	JY992D65301 MODEL CODE: 09R610	Describes FX2N-1PG/FX-1PG pulse output block details.
FX3U Series User's Manual - Hardware Edition	JY997D16501 MODEL CODE: 09R516	Explains FX3U Series PLC specification details for I/O, wiring, installation, and maintenance.
FX3UC Series User's Manual - Hardware Edition	JY997D28701 MODEL CODE: 09R519	Explains FX3UC Series PLC specification details for I/O, wiring, installation, and maintenance.
FX2N HARDWARE MANUAL	JY992D66301 MODEL CODE: 09R508	Explains FX2N Series PLC specification details for I/O, wiring, installation, and maintenance.
FX2NC (D/UL) HARDWARE MANUAL	JY992D87201	Explains FX2NC (D/UL) Series PLC specification details for I/O, wiring, installation, and maintenance.
FX2NC (DSS/DS) HARDWARE MANUAL	JY992D76401 MODEL CODE: 09R509	Explains FX2NC (DSS/DS) Series PLC specification details for I/O, wiring, installation, and maintenance.
FX3s/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition	JY997D16601 MODEL CODE: 09R517	Describes PLC programming for basic/applied instructions and devices.

How to obtain manuals

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

Certification of UL, cUL standards

FX2N-1PG-E units comply with the UL standards (UL, cUL).

UL, cUL File Number: E95239

Regarding the standards that comply with the main unit, please refer to either the FX series product catalog or consult with your nearest Mitsubishi product provider.

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 for the entire mechanical module should be checked by the user/manufacturer. For more information please consult with your nearest Mitsubishi product provider.

Requirement for Compliance with EMC directive

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

Attention

- This product is designed for use in industrial applications.

Note

- Authorized Representative in the European Community:
Mitsubishi Electric Europe B.V.
Gothaer Str. 8, 40880 Ratingen, Germany

Type: Programmable Controller (Open Type Equipment)

Models: MELSEC FX2N series manufactured

from September 1st, 1997 FX2N-1PG-E

Standard	Remark
EN61131-2:2007 ¹ Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated Emission • Conducted Emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

¹ FX2N-1PG-E products produced before July 31 2010 comply with EN61131-2:2003.

Caution for EC Directive

Notes for compliance with EN61131-2:2007

General notes on the use of the power supply cable.

The FX2N-1PG-E unit require that the cable used for power supply is 30 m or less.

1. Outline

1.1 Outline

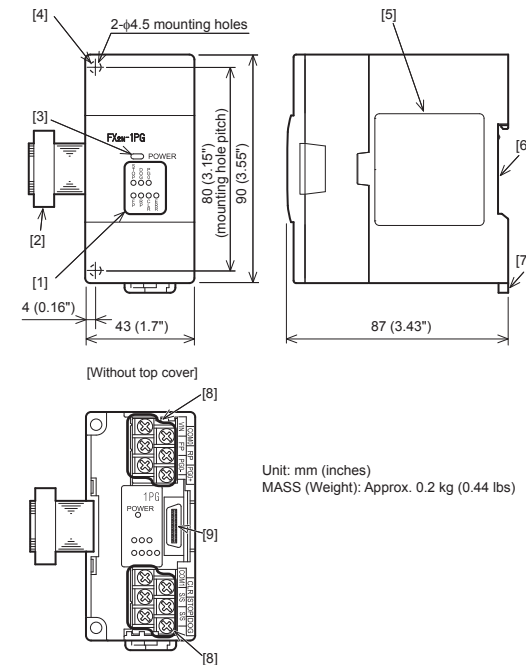
The FX2N-1PG-E pulse output block performs simple positioning of an independent axis (not interpolation control between multiple axes) by supplying a prescribed quantity of pulses (100 kHz maximum) to drive amplifiers for servo or stepper motors.

1.2 Incorporated Items

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

Included Items	
FX2N-1PG-E	1 unit
No. labels for special modules	1 sheet
Dust proof protection sheet	1 sheet
Manuals (Japanese/English)	1 manual

1.3 External Dimensions, Part Names

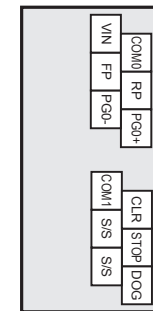


- | | |
|---|--|
| [1] Status LEDs (red) | [6] DIN rail mounting groove (DIN rail: DIN46277, 35 mm (1.38") width) |
| [2] Extension cable | [7] DIN rail mounting hook |
| [3] Power LED (green) | [8] Terminal block (M3 screw) |
| [4] Direct mounting hole 2 holes of $\phi 4.5$ (0.18") (mounting screw: M4 screw) | [9] Extension connector |
| [5] Name plate | |

1.4 Status LED

LED Display	Description
POWER	Indicates power status of FX2N-1PG-E. Lighted when 5 V is supplied from PLC.
STOP	Lighted when the stop command is input to the STOP terminal.
DOG	Lighted when DOG input is entered.
PGO	Lighted when zero point signal is entered.
FP	Flashes when forward pulse or pulses are output.
RP	Flashes when reverse pulse is output. Lighted when direction is output.
CLR	Lighted when CLR signal is output.
ERR	Flashes when error has occurred. Start command is not accepted when error has occurred.

1.5 Terminal Layout



Terminal Name	Description
VIN	Power terminal for pulse output (5 to 24 V DC, 35 mA or less)
COM0	Common terminal for pulse output
FP	Terminal which outputs forward pulse or pulses. 100 kHz, 20 mA or less (5 to 24 V DC)
RP	Terminal which outputs reverse pulse or direction. 100 kHz, 20 mA or less (5 to 24 V DC)
PGO-	Enters zero point signal from drive unit or servo amplifier. Response pulse width: 4 μ s or more
PGO+	Power terminal for zero point signal. (5 to 24 V DC, 20 mA or less)
COM1	Common terminal for CLR output
CLR	Output for clearing deviation counter. (5 to 24 V DC, 20 mA or less) Output pulse width: 20 ms (Output when return to home position is completed or LIMIT SWITCH input is given.)
S/S	24 V DC power terminal for STOP input and DOG input. Connected to sensor power supply of PLC or external power supply.
STOP	DECELERATION STOP input. Can function as stop command input in external command operation mode.
DOG	Offers following different functions depending on operation mode. • Machine home position return operation: NEAR POINT SIGNAL input • Interrupt single-speed operation: INTERRUPT input • External command operation: DECELERATION START input

1.5.1 Terminal screws and tightening torque

For the terminals of FX2N-1PG-E, M3 screws are used.

Tighten the screws to a torque of 0.5 to 0.8 N·m.

Do not tighten terminal screws with a torque exceeding the regulation torque.

Failure to do so may cause equipment failures or malfunctions.

For details on the wiring needed to connect to the terminal blocks shown in the figure above, refer to the following manual.

→ Refer to FX2N-1PG/FX-1PG User's Manual.

2. Installation

INSTALLATION PRECAUTIONS	⚠ WARNING
<ul style="list-style-type: none"> Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product. 	

INSTALLATION PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> Use the product within the generic environment specifications described in PLC main unit manual. Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl₂, H₂S, SO₂, or NO₂), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind. If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur. Do not touch the conductive parts of the product directly. Doing so may cause device failures or malfunctions. Install the product securely using a DIN rail or mounting screws. Install the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities. When drilling screw holes or wiring, make sure that cutting and wiring debris do 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. Make sure to attach the top cover, offered as an accessory, before turning on the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock. Connect the extension cables securely to their designated connectors. Loose connections may cause malfunctions. 	

2.1 Connection with PLC

The FX2N-1PG-E connects on the right side of an PLC main unit or extension units/blocks (including special function units/blocks).
For connection to an FX3UC Series, FX2NC Series PLC or FX2NC Series PLC extension block, an FX2NC-CNV-IF or FX3UC-1PS-5V is required.
For details, refer to the respective PLC manual.

→ Refer to FX2N HARDWARE MANUAL.

→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

2.2 Mounting

The product is mounted by the following method.

- DIN rail mounting
- Direct mounting (mounting screw: M4 screw)

For details, refer to the respective PLC manual.

→ Refer to FX2N HARDWARE MANUAL.

→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

3. Specifications

DESIGN PRECAUTIONS	⚠ WARNING
<ul style="list-style-type: none"> Make sure to have the following safety circuits outside the PLC to ensure safe system operation even during external power supply problems or PLC failure. Otherwise, malfunctions may cause serious accidents. 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	⚠ CAUTION
<ul style="list-style-type: none"> Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to abnormal data written to the PLC under the influence of noise: <ol style="list-style-type: none"> Do not bundle the main circuit line together with or lay it close to the main circuit, high-voltage line or load line. Otherwise, noise disturbance and/or surge induction are likely to take place. As a guideline, lay the control line at least 100 mm (3.94") or more away from the main circuit or high-voltage lines. Ground the shield wire or shield of a shielded cable. Do not use common grounding with heavy electrical systems. Install module so that excessive force will not be applied to the terminal blocks. Failure to do so may result in wire damage/breakage or PLC failure. 	

WIRING PRECAUTIONS	⚠ WARNING
<ul style="list-style-type: none"> Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product. 	

WIRING PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> Connect the DC power supply wiring to the dedicated terminals described in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the PLC will burn out. Make sure to attach the top cover, offered as an accessory, before turning on the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock. 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. Make sure to properly wire the extension equipment 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. <ul style="list-style-type: none"> The disposal size of the cable end should follow the dimensions described in the manual. Tightening torque should follow the specifications in the manual. 	

DISPOSAL PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device. 	

TRANSPORTATION AND STORAGE PRECAUTIONS	⚠ CAUTION
<ul style="list-style-type: none"> The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in the general specifications of the PLC main unit manual. Failure to do so may cause failures in the PLC. After transportation, verify the operations of the PLC. 	

3.1 Applicable PLC

Model name	Maximum number of connectable units
FX2N Series PLC	8 units
FX2NC Series PLC ^{*1}	4 units
FX3U Series PLC	8 units
FX3UC Series PLC ^{*1}	8 units ^{**2}

^{*1} An FX2NC-CNV-IF or FX3UC-1PS-5V is necessary to connect the FX2N-1PG with the FX3UC PLC or FX2NC PLC.

^{**2} Up to 7 units can be connected to the FX3UC-32MT-LT-(2) PLC.

3.2 General Specifications

The general specifications are equivalent to those of the main unit of the FX PLC. For general specifications, refer to the manual of the PLC main unit.

→ Refer to FX2N HARDWARE MANUAL.

→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

3.3 Performance Specifications

Item	Specifications
Drive power supply	<ul style="list-style-type: none"> +24V (for input signals): 24 V DC ±10% Current consumption: 40 mA or less +5V (for internal control): 5 V DC, 55 mA Supplied from PLC via extension cable. For pulse output: 5 V to 24 V DC current consumption: 35 mA or less

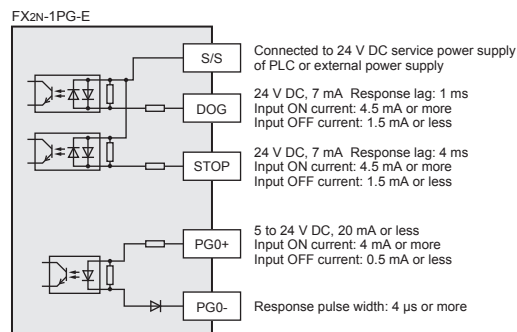
Item	Specifications
Number of I/O points occupied	8 input or output points of PLC for each FX2N-1PG-E
Number of control axes	One axis
Command speed	<ul style="list-style-type: none"> Operations are enabled at pulse speed of 10 Hz to 100 kHz. Command unit can be selected among Hz, cm/min, 10 deg/min and inch/min.
Setting pulse	<ul style="list-style-type: none"> 0 to ± 999.999 Absolute position specification or relative travel specification can be selected. Command unit can be selected among pulse, μm, mdeg and 10⁻⁴ inch. Multiplication of 10⁰, 10¹, 10² or 10³ can be set for position data.
Pulse output format	Forward (FP) and reverse (RP) pulse or pulse (PLS) with direction (DIR) can be selected. Transistor output. 5 to 24 V DC, 20 mA or less
External I/O	<ul style="list-style-type: none"> Photocoupler insulation and LED operation indication are offered for every point. 3 input points: (STOP/DOG) 24 V DC, 7 mA and (PG0[†]) 24 V DC, 20 mA 3 output points (FP/RP/CLR): 5 to 24 V DC, 20 mA or less (For details, refer to FX2N-1PG/FX-1PG User's Manual.)
Communication with PC	16-bit RAM (without battery backup) buffer memories (BFMs) #0 to #31 are built in FX2N-1PG-E. Data communication with PC is performed using FROM/TO instructions ^{*2} . 32-bit data is processed by combining two BFMs. (For details, refer to FX2N-1PG/FX-1PG User's Manual.)

[†] One zero point signal PG0 is entered by flowing the current from the PG0+ terminal to the PG0- terminal.

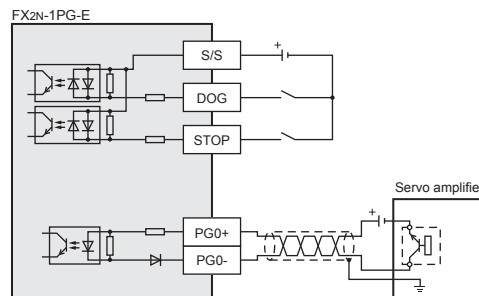
^{*2} FX3U/FX3UC Series PLC can use direct specification of buffer memory. Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition for details.

3.4 Input Specifications and Wiring Example

3.4.1 Input specifications

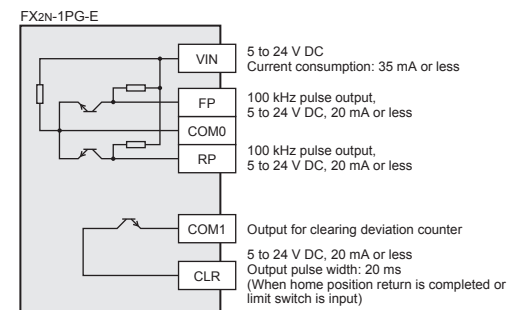


3.4.2 Input wiring example

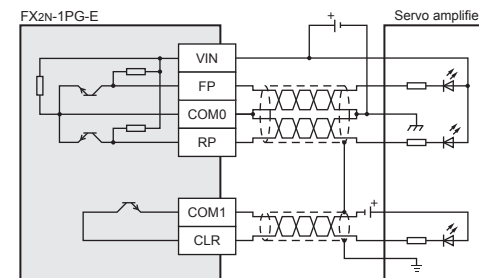


3.5 Output Specifications and Wiring Example

3.5.1 Output specifications



3.5.2 Output wiring example



This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

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.

⚠ 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 special 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 failsafe functions in the system.

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN



PROGRAMMABLE CONTROLLERS
MELSEC-F

Side A JAPANESE
Side B ENGLISH

FX2N-1PG-E INSTALLATION MANUAL



Manual Number	JY997D50601
Revision	B
Date	April 2015

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In any case, it is important to follow the directions for usage.

Associated Manuals

Manual name	Manual No.	Description
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2. Installation

INSTALLATION PRECAUTIONS **WARNING**

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS **CAUTION**

- Use the product within the generic environment specifications described in PLC main unit manual. Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl₂, H₂S, SO₂, or NO₂), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind. If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.
- Do not touch the conductive parts of the product directly. Doing so may cause device failures or malfunctions.
- Install the product securely using a DIN rail or mounting screws.
- Install the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.
- When drilling screw holes or wiring, make sure that cutting and wiring debris do 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.
- Make sure to attach the top cover, offered as an accessory, before turning on the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock.
- Connect the extension cables securely to their designated connectors. Loose connections may cause malfunctions.

2.1 Connection with PLC

The FX2N-1PG-E connects on the right side of an PLC main unit or extension units/blocks (including special function units/blocks). For connection to an FX3UC Series, FX2NC Series PLC or FX2NC Series PLC extension block, an FX2NC-CN/IF or FX3UC-1PS-5V is required. For details, refer to the respective PLC manual.

→ Refer to FX2N HARDWARE MANUAL.

→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

2.2 Mounting

The product is mounted by the following method.

- DIN rail mounting
- Direct mounting (mounting screw: M4 screw)

For details, refer to the respective PLC manual.

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3. Specifications

DESIGN PRECAUTIONS **WARNING**

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

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How to obtain manuals

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Certification of UL, cUL standards

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UL, cUL File Number: E95239
Regarding the standards that comply with the main unit, please refer to either the FX series product catalog or consult with your nearest Mitsubishi product provider.

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 for the entire mechanical module should be checked by the user/manufacturer. For more information please consult with your nearest Mitsubishi product provider.

Requirement for Compliance with EMC directive

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

Attention

- This product is designed for use in industrial applications.

Note

- Authorized Representative in the European Community:
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Gothaer Str. 8, 40880 Ratingen, Germany

Type: Programmable Controller (Open Type Equipment)

Models: MELSEC FX2N series manufactured from September 1st, 1997 FX2N-1PG-E

Standard	Remark
EN61131-2:2007 ¹⁾ Programmable controllers - Equipment requirements and tests	Compliance with all relevant aspects of the standard. EMI • Radiated Emission • Conducted Emission EMS • Radiated electromagnetic field • Fast transient burst • Electrostatic discharge • High-energy surge • Voltage drops and interruptions • Conducted RF • Power frequency magnetic field

¹⁾ FX2N-1PG-E products produced before July 31 2010 comply with EN61131-2:2003.

Caution for EC Directive

Notes for compliance with EN61131-2:2007

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1.1 Outline

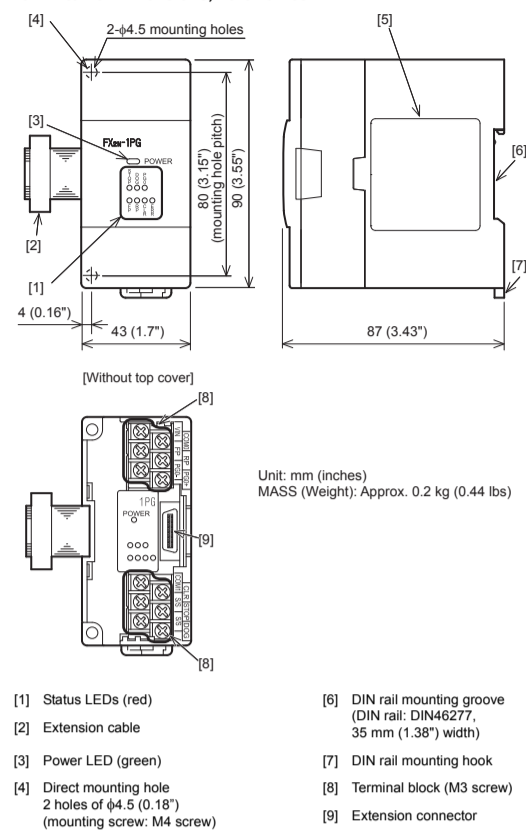
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1.2 Incorporated Items

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

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Manuals (Japanese/English)	1 manual

1.3 External Dimensions, Part Names

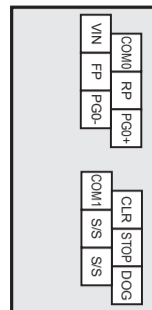


- [1] Status LEDs (red)
- [2] Extension cable
- [3] Power LED (green)
- [4] Direct mounting hole (2 holes of φ4.5 (0.18") (mounting screw: M4 screw)
- [5] Name plate
- [6] DIN rail mounting groove (DIN rail: DIN46277, 35 mm (1.38") width)
- [7] DIN rail mounting hook
- [8] Terminal block (M3 screw)
- [9] Extension connector

1.4 Status LED

LED Display	Description
POWER	Indicates power status of FX2N-1PG-E. Lighted when 5 V is supplied from PLC.
STOP	Lighted when the stop command is input to the STOP terminal.
DOG	Lighted when DOG input is entered.
PG0	Lighted when zero point signal is entered.
FP	Flashes when forward pulse or pulses are output.
RP	Flashes when reverse pulse is output. Lighted when direction is output.
CLR	Lighted when CLR signal is output.
ERR	Flashes when error has occurred. Start command is not accepted when error has occurred.

1.5 Terminal Layout



Terminal Name	Description
VIN	Power terminal for pulse output (5 to 24 V DC, 35 mA or less)
COM0	Common terminal for pulse output
FP	Terminal which outputs forward pulse or pulses. 100 kHz, 20 mA or less (5 to 24 V DC)
RP	Terminal which outputs reverse pulse or direction. 100 kHz, 20 mA or less (5 to 24 V DC)
PG0-	Enters zero point signal from drive unit or servo amplifier. Response pulse width: 4 μs or more
PG0+	Power terminal for zero point signal. (5 to 24 V DC, 20 mA or less)
COM1	Common terminal for CLR output
CLR	Output for clearing deviation counter. (5 to 24 V DC, 20 mA or less) Output pulse width: 20 ms (Output when return to home position is completed or LIMIT SWITCH input is given.)
S/S	24 V DC power terminal for STOP input and DOG input. Connected to sensor power supply of PLC or external power supply.
STOP	DECELERATION STOP input. Can function as stop command input in external command operation mode.
DOG	Offers following different functions depending on operation mode. • Machine home position return operation: NEAR POINT SIGNAL input • Interrupt single-speed operation: INTERRUPT input • External command operation: DECELERATION START input

1.5.1 Terminal screws and tightening torque

For the terminals of FX2N-1PG-E, M3 screws are used. Tighten the screws to a torque of 0.5 to 0.8 N·m. Do not tighten terminal screws with a torque exceeding the regulation torque. Failure to do so may cause equipment failures or malfunctions. For details on the wiring needed to connect to the terminal blocks shown in the figure above, refer to the following manual.
→ Refer to FX2N-1PG/FX-1PG User's Manual.

2. Installation

INSTALLATION PRECAUTIONS **WARNING**

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS **CAUTION**

- Use the product within the generic environment specifications described in PLC main unit manual. Never use the product in areas with excessive dust, oily smoke, conductive dusts, corrosive gas (salt air, Cl₂, H₂S, SO₂, or NO₂), flammable gas, vibration or impacts, or expose it to high temperature, condensation, or rain and wind. If the product is used in such conditions, electric shock, fire, malfunctions, deterioration or damage may occur.
- Do not touch the conductive parts of the product directly. Doing so may cause device failures or malfunctions.
- Install the product securely using a DIN rail or mounting screws.
- Install the product on a flat surface. If the mounting surface is rough, undue force will be applied to the PC board, thereby causing nonconformities.
- When drilling screw holes or wiring, make sure that cutting and wiring debris do 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.
- Make sure to attach the top cover, offered as an accessory, before turning on the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock.
- Connect the extension cables securely to their designated connectors. Loose connections may cause malfunctions.

2.1 Connection with PLC

The FX2N-1PG-E connects on the right side of an PLC main unit or extension units/blocks (including special function units/blocks). For connection to an FX3UC Series, FX2NC Series PLC or FX2NC Series PLC extension block, an FX2NC-CN/IF or FX3UC-1PS-5V is required. For details, refer to the respective PLC manual.

→ Refer to FX2N HARDWARE MANUAL.

→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

2.2 Mounting

The product is mounted by the following method.

- DIN rail mounting
- Direct mounting (mounting screw: M4 screw)

For details, refer to the respective PLC manual.

→ Refer to FX2N HARDWARE MANUAL.

→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

3. Specifications

DESIGN PRECAUTIONS **WARNING**

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

- Most importantly, 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).
- 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.
- 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 **CAUTION**

- Make sure to observe the following precautions in order to prevent any damage to the machinery or accidents due to abnormal data written to the PLC under the influence of noise:
1) Do not bundle the main circuit line together with or lay it close to the main circuit, high-voltage line or load line. Otherwise, noise disturbance and/or surge induction are likely to take place. As a guideline, lay the control line at least 100 mm (3.94") or more away from the main circuit or high-voltage lines.
2) Ground the shield wire or shield of a shielded cable. Do not use common grounding with heavy electrical systems.
- Install module so that excessive force will not be applied to the terminal blocks. Failure to do so may result in wire damage/breakage or PLC failure.

WIRING PRECAUTIONS **WARNING**

- Make sure to cut off all phases of the power supply externally before attempting installation or wiring work. Failure to do so may cause electric shock or damage to the product.

WIRING PRECAUTIONS **CAUTION**

- Connect the DC power supply wiring to the dedicated terminals described in this manual. If an AC power supply is connected to a DC input/output terminal or DC power supply terminal, the PLC will burn out.
- Make sure to attach the top cover, offered as an accessory, before turning on the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock.
- 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.
- Make sure to properly wire the extension equipment 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.

DISPOSAL PRECAUTIONS **CAUTION**

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

TRANSPORTATION AND STORAGE PRECAUTIONS **CAUTION**

- The PLC is a precision instrument. During transportation, avoid impacts larger than those specified in the general specifications of the PLC main unit manual. Failure to do so may cause failures in the PLC. After transportation, verify the operations of the PLC.

3.1 Applicable PLC

Model name	Maximum number of connectable units
FX2N Series PLC	8 units
FX2NC Series PLC ¹⁾	4 units
FX3U Series PLC	8 units
FX3UC Series PLC ¹⁾	8 units ²⁾

¹⁾ An FX2NC-CN/IF or FX3UC-1PS-5V is necessary to connect the FX2N-1PG with the FX3UC PLC or FX2NC PLC.

²⁾ Up to 7 units can be connected to the FX3UC-32MT-LT(-2) PLC.

3.2 General Specifications

The general specifications are equivalent to those of the main unit of the FX PLC.

For general specifications, refer to the manual of the PLC main unit.
→ Refer to FX2N HARDWARE MANUAL.
→ Refer to FX2NC HARDWARE MANUAL.

→ Refer to FX3U Series User's Manual - Hardware Edition.

→ Refer to FX3UC Series User's Manual - Hardware Edition.

3.3 Performance Specifications

Item	Specifications
Drive power supply	• +24V (for input signals): 24 V DC ±10% Current consumption: 40 mA or less • +5V (for internal control): 5 V DC, 55 mA Supplied from PLC via extension cable. • For pulse output: 5 V to 24 V DC current consumption: 35 mA or less

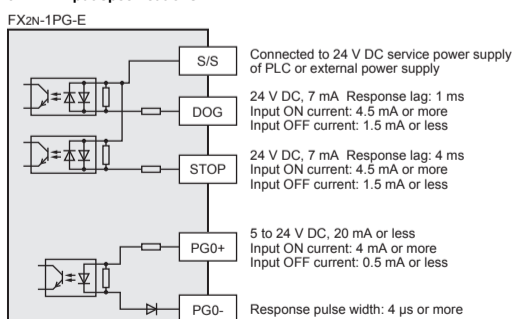
Item	Specifications
Number of I/O points occupied	8 input or output points of PLC for each FX2N-1PG-E
Number of control axes	One axis
Command speed	• Operations are enabled at pulse speed of 10 Hz to 100 kHz. • Command unit can be selected among Hz, cm/min, 10 deg/min and inch/min.
Setting pulse	• 0 to ± 999.999 • Absolute position specification or relative travel specification can be selected. • Command unit can be selected among pulse, μm, mdeg and 10 ⁻⁴ inch. • Multiplication of 10 ⁰ , 10 ¹ , 10 ² or 10 ³ can be set for position data.
Pulse output format	Forward (FP) and reverse (RP) pulse or pulse (PLS) with direction (DIR) can be selected. Transistor output. 5 to 24 V DC, 20 mA or less
External I/O	• Photocoupler insulation and LED operation indication are offered for every point. • 3 input points: (STOP/DOG) 24 V DC, 7 mA and (PG0 ⁺) 24 V DC, 20 mA • 3 output points (FP/RP/CLR): 5 to 24 V DC, 20 mA or less (For details, refer to FX2N-1PG/FX-1PG User's Manual.)
Communication with PC	16-bit RAM (without battery backup) buffer memories (BFMs) #0 to #31 are built in FX2N-1PG-E. Data communication with PC is performed using FROM/TO instructions ²⁾ . 32-bit data is processed by combining two BFMs. (For details, refer to FX2N-1PG/FX-1PG User's Manual.)

¹⁾ One zero point signal PG0 is entered by flowing the current from the PG0+ terminal to the PG0- terminal.

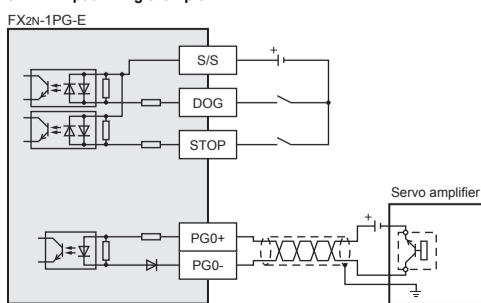
²⁾ FX3U/FX3UC Series PLC can use direct specification of buffer memory. Refer to the FX3S/FX3G/FX3GC/FX3U/FX3UC Series Programming Manual - Basic & Applied Instruction Edition for details.

3.4 Input Specifications and Wiring Example

3.4.1 Input specifications

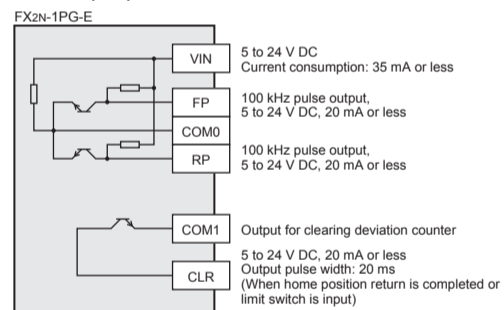


3.4.2 Input wiring example

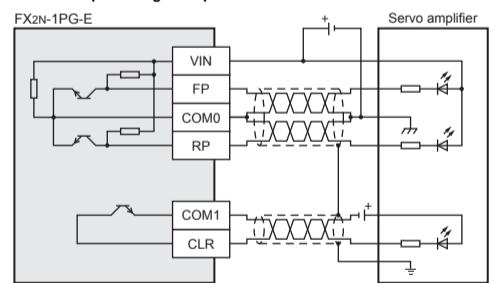


3.5 Output Specifications and Wiring Example

3.5.1 Output specifications



3.5.2 Output wiring example



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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 special 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 failsafe functions in the system.