

JAPANESE Side Side B ENGLISH

PROGRAMMABLE CONTROLLERS MEISER-F

FX3U-1PG

INSTALLATION MANUAL



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. 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

© 2012 Mitsubishi Electric Corporation Safety Precaution (Read these precautions before use.)

This manual classifies the safety precautions into two categories:

AWARNING and ACAUTION

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

Depending on the circumstances, procedures indicated by ACAUTION may also cause severe injury.

It is important to follow all precautions for personal safety

Associated Manuals

Manual name	Manual No.	Description
FX3U-1PG User's Manual	JY997D47301 MODEL CODE: 09R629	Describes details of the FX3U- 1PG pulse output block.
FX3∪ Series User's Manual - Hardware Edition	JY997D16501 MODEL CODE: 09R516	Explains the FX3U Series PLC specifications for I/O, wiring, installation, and maintenance.
FX3UC Series User's Manual - Hardware Edition	JY997D28701 MODEL CODE: 09R519	Explains the FX3UC Series PLC specifications 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 product manuals or documents, consult with the Mitsubishi Electric dealer from who you purchased your product.

Certification of UL. cUL standards

FX3U-1PG 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

1. Introduction

FX3U-1PG Pulse Output Block (hereinafter referred to as FX3U-1PG) is a special function block that can output a maximum 200 kHz pulse train and drive one servo motor or stepping motor through the servo amplifier or stepping motor driver.

accordance with the contents of this note will comply with the following standards. motor per unit Compliance to EMC directive and LVD directive for the entire mechanical module 2) A pulse train of max. 200 kHz can be output. (transistor output) should be checked by the user/manufacturer. For more information please consult with

3) The connected FX3U/FX3UC*1 PLC reads/writes the positioning data from/to the EX3U-1PG Regarding the standards that comply with the main unit, please refer to either the FX

1.1 Major Features of the FX3U-1PG

*1 For connection to the FX3UC PLC, the FX2NC-CNV-IF or FX3UC-1PS-5V is needed

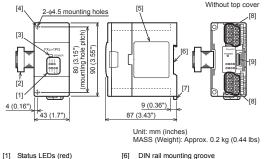
1) FX3U-1PG controls the positioning operation of one servo motor or stepping

1.2 Incorporated Items

Check to ensure the following product and items are included in the package.

Included Item	
FX3U-1PG	1 unit
Special unit/block No. label	1 sheet
Dust proof protection sheet	1 sheet
Manuals (Japanese version, English version)	1 manual each

1.3 External Dimensions and Part Names



[0]	(DIN rail: DIN46277, 35 mm (1.38") width)
[7]	DIN rail mounting hook
[8]	Terminal block (M3 screw)
[9]	Extension connector

[4] Direct mounting hole 2 holes of 64.5 (0.18") (mounting screw: M4 screw)

[5] Name plate 1.4 Status LEDs

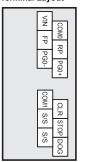
[2] Extension cable

[3] Power LED (green)

LED LED Status Description display color 5 V DC is not being supplied from the PLC OFF POWER Green ON 5 V DC is being supplied from the PLC OFF STOP input OFF STOP Red ON STOP input ON OFF DOG input OFF DOG Red ON DOG input ON OFF Zero point signal OFF PG0 Red ON Zero point signal ON Forward pulse or pulse train interrupted OFF FP Red Flicker Forward pulses or pulse train is being output Reverse pulse or directional output interrupted OFF RP Red Flicker Reverse pulses is being output ON Directional output is being output OFF CLR signal is not output CLR Red ON CLR signal is being output

LED display	LED color	Status	Description	
			OFF	Operating normally
ERR Re		Flicker	Error occurred	
		ON	CPU error occurred	

1.5 Terminal Layout



Terminal name	Description			
VIN	Power terminal for pulse output			
COM0	COM0 Common terminal for pulse output			
FP	Terminal which outputs forward pulse or pulse train			
RP	Terminal which outputs reverse pulse or direction signal			
PG0-	G0- Input terminal for zero point signal			
PG0+	PG0+ Power terminal for zero point signal			
COM1	Common terminal for CLR signal output			
CLR	Terminal for CLR signal output			
S/S	24 V DC power terminal for STOP input and DOG input			
STOP Terminal for STOP input or interrupt input 1				
DOG Terminal for DOG input or interrupt input 0				

 Terminal block screw size and tightening torque Terminal block screw: M3 screw

Tightening torque: 0.5 to 0.8 Nom

Do not tighten the terminal block mounting screws exceeding the specified 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 FX3U-1PG User's Manual.

2. Installation

INSTALLATION

For details on installation, refer to the following manual. → Refer to FX3U-1PG User's Manual.

PRECAUTIONS · Make sure to cut off all phases of the power supply externally before attempting installation work

Failure to do so may cause electric shock or damage to the product.

INSTALLATION PRECAUTIONS

- Use the product within the generic environment specifications described i PLC main unit manual (Hardware Edition).
- 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.

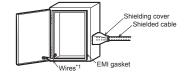
· This product is designed for use in industrial applications. · Authorized Representative in the European Community: Mitsubishi Electric Europe B.V. Gothaer Str. 8, 40880 Ratingen, Germany Programmable Controller (Open Type Equipment) MELSEC FX3U series manufactured from September 1st. 2012 FX3U-1PG

Standard	Remark
EN61131-2: 2007 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

Installation in Enclosure

Programmable logic controllers are open-type devices that must be installed and used within conductive control cabinets. Please use the programmable logic controller while installed within a conductive shielded control cabinet. Please secure the cabinet door to the control cabinet (for conduction). Installation within a control cabinet greatly affects the safety of the system and aids in shielding noise from the programmable logic controller.

- Ground the control cabinet with the thickest possible grounding cable.
- To ensure that there is electric contact between the control cabinet and its door connect the cabinet and its doors with thick wires.
- In order to suppress the leakage of radio waves, the control cabinet structure must have minimal openings. Also, wrap the cable holes with a shielding cover or other shielding devices
- The gap between the control cabinet and its door must be as small as possible by attaching EMI gaskets between them.



- *1 These wires are used to improve the conductivity between the door and control cabinet
- Note for compliance with EN61131-2: 2007
- General note on the use of the power supply cable. The FX3U-1PG unit requires that the cable used for power supply is 30 m or less.
- . The shield of the twisted pair cable used for the FP, RP, PG0, and CLR signal wires should be grounded at both ends of the cable.
- · Please attach a ferrite core less than 200 mm from the other end of the FP, RP,
- PG0, and CLR signal wires. The ferrite core should be a product equivalent to ZCAT3035-1330 by TDK Corp.

→ For system configuration, refer to FX3U-1PG User's Manual.

High-energy surge Voltage drops and interruptions Conducted RF Power frequency magnetic field
Fast transient burst

Caution for EC Directive

Control cabinet

- The control cabinet must be conductive.

Compliance with EC directive (CE Marking)

Requirement for Compliance with EMC directive

used as directed by the appropriate documentation.

your nearest Mitsubishi product provider.

Attention

Note

Type:

Models

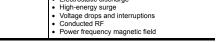
This note does not guarantee that an entire mechanical module produced in

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

series product catalog or consult with your nearest Mitsubishi product provider.



INSTALLATION PRECAUTIONS

- 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 or
- the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock. • Connect extension cables securely to their designated connectors.
- Loose connections may cause malfunctions.

2.1 Connection with PLC

The FX3U-1PG 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 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 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. \rightarrow Refer to FX3U Series User's Manual - Hardware Edition.

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

3. Specification

For details on specifications, refer to the following manual.

→ Refer to FX3U-1PG User's Manual

 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.

- 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.

- 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:
- 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 100mm (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
- 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 termina blocks.

Failure to do so may result in wire damage/breakage or PLC failure.

VIRING PRECAUTIONS

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

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- 6	Failure	to dr) SO M	av cai	ISP F	electric	shock	ord	damage	to	the	nrod	i Li

PRECAUTIONS

 Connect the DC power supply wiring to the dedicated terminal 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 that cutting and wiring debris do 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.

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

TRANSPORTATION AND STORAGE PRECAUTIONS ACAUTION

 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.

Alter transportation, verify the operations of the FEG.

3.1 Applicable PLC

DISPOSAL

WIRING

n.	Model name	Applicability	Maximum number of connectable units
	FX3U Series PLC	Ver. 2.20 and later	8 units
ıl.	FX3UC Series PLC*1	Ver. 2.20 and later	6 units

The version number can be checked by reading the last three digits of device D8001/ D8101.

*1 An FX2NC-CNV-IF or FX3UC-1PS-5V is necessary to connect the FX3U-1PG with the FX3UC PLC.

3.2 General Specifications

Items other than the following are equivalent to those of the PLC main unit. For general specifications, refer to the manual of the PLC main unit.

→ Refer to FX3U Series User's Manual - Hardware Edition. → Refer to FX3UC Series User's Manual - Hardware Edition.

Item	S	pecification		
Dielectric withstand voltage	500 V AC for one minute	Between all terminals and groun		
Insulation resistance	5 $M\Omega$ or more by 500 V DC megger	terminal		
3.3 Power Supply Specifications				

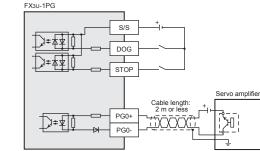
	ltem	Specification				
	Input signal	24 V DC ±10% Current consumption 40 mA or less				
Drive power supply	Output signal	For pulse output: 5 to 24 V DC Current consumption 35 mA or less For CLR signal: 5 to 24 V DC Current consumption 20 mA or less				
	Inner control	5 V DC Current consumption 150 mA (Power is supplied through the extension cable from the PLC.)				

3.4 Performance Specifications

Item Number of control axes Positioning program		Specification			
		One axis			
		Created by sequence programs (using FROM/TO instruction or direct specification of the buffer memory etc. on the MOV instruction etc. ^{*1})			
	Method	Increment, Absolute			
	Unit	PLS, µm, 10 ⁻⁴ inch, mdeg			
	Unit magnification	1, 10, 100, 1000-fold			
Desitientes	Range	-2,147,483,648 to 2,147,483,647 PLS			
Positioning	Operation speed	Hz, cm/min, inch/min, 10deg/min			
	Output frequency	1 Hz to 200 kHz			
	Acceleration/ deceleration process	Trapezoidal acceleration/deceleration: 1 to 32,767 ms Approximate S-shaped acceleration/deceleration: 1 to 5,000 ms			

Item		Specification				
		Motor system: 1 ms or less Machine system: 2 ms or less				
Number of I	O occupied points	8 points (taken from either the input or output points of the PLC)				
FX3GC/F 3.5 Input	FX3U/FX3UC Progra	instructions and methods, refer to the FX3S/FX3G/ mming Manual. and wiring example				
	Item	Specification				
		STOP: Deceleration stop input or used for interrupt input of External command positioning, Interrupt 2- speed positioning operation				
Input signal name	Group 1	DOG: Used for DOG input of DOG type mechanical zero return operation or used for interrupt input of External command positioning, Interrupt 1-speed positioning, Interrupt stop, Interrupt 2-speed positioning operation				
	Group 2	PG0: Zero point signal input Used for DOG type mechanical zero return operation				
	Signal voltage	24 V DC (Power is supplied from S/S terminal.)				
	Input current	7.0 mA				
	ON current	4.5 mA or more				
	OFF current	1.5 mA or less				
Group 1	Signal form	No-voltage contact input Sink input: NPN open collector transistor Source input: PNP open collector transistor				
	Response time	DOG input: 1 ms STOP input: 4 ms				
	Circuit insulation	Photo-coupler insulation				
	Operation display	LED ON at input ON				
	Signal voltage	5 to 24 V DC				
	Input current	20 mA or less				
	ON current	4.0 mA or more				
Group 2	OFF current	0.5 mA or less				
2.00p 2	Signal form	NPN open collector transistor				
	Response time	4 µs or more				
	Circuit insulation	Photo-coupler insulation				
	Operation display	LED ON at input ON				

3.5.2 Input wiring example



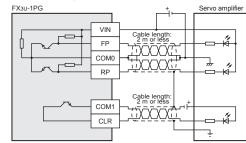
3.6 Output specifications and wiring example

3.6.1 Output specifications

	Item	Specification
Output	Group 1	FP: Forward pulse or pulse train
signal		RP: Reverse pulse or direction signal
name	Group 2	CLR: CLR signal

Item		Specification			
	Output form	Transistor			
Group 1	Output system	Forward (FP) and reverse (RP) pulse or pulse (PLS) with direction (DIR) can be selected.			
	Output frequency	1 Hz to 200 kHz			
	Rated load voltage	5 to 24 V DC			
	Max. load current	20 mA or less			
	VIN current consumption	5 to 24 V DC 35 mA or less			
	Output ON voltage	1.0 V or less			
	Operation display	LED ON at output ON			
	Output form	Transistor			
	Output system	Pulse (Output pulse width: 20 ms)			
Group 2	Rated load voltage	5 to 24 V DC			
Group 2	Max. load current	20 mA or less			
	Output ON voltage	1.5 V or less			
	Operation display	LED ON at output ON			

3.6.2 Output wiring example



3.7 Wiring Precautions

- 1) The power supply used for FP, RP, PG0, and CLR should be separate from the power supply used for the other signals.
- 2) In an environment with a lot of noise, when malfunctions such as position gap occur, the influence of noise may be mitigated with the following measures.
- Attach a noise filter (TDK-Lambda Corp. MXB-1210-33 or similar) on the FX3U-1PG power supply line, one on the end nearest the servo amplifier, and one on the end nearest the power supply unit.
- Attach a ferrite core (TDK Corp. ZCAT3035-1330 or similar) to the VIN, FP, RP, PG0, and CLR signal wires, on the end nearest the servo amplifier.

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 Mitsubish Electric.
- This product has been manufactured under strict quality control. However when installing the product where major accidents or losses could occur if the
- when installing the product where major accidents or losses could occur if th 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



A JAPANESE

April 2015

B ENGLISH



PROGRAMMABLE CONTROLLERS MELSEC-F

FX₃U-1PG

INSTALLATION MANUAL



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. 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. Revistration: Registration:

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

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

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ecial

Compliance with EC directive (CE Marking)	1.1	Major Features of the FX3U-1PG
This note does not guarantee that an entire mechanical module produced in	1)	FX3U-1PG controls the positioning operat
accordance with the contents of this note will comply with the following standards.		motor per unit.
Compliance to EMC directive and LVD directive for the entire mechanical module	2)	A pulse train of max. 200 kHz can be output
should be sheeled by the user/menufesturer. For more information places consult with		

1) FX3U-1PG controls the posit ning operation of one servo motor or stepping motor per unit.

2) A pulse train of max. 200 kHz can be output. (transistor output) 3) The connected FX3U/FX3UC*1 PLC reads/writes the positioning data from/to the

FX3U-1PG. *1 For connection to the FX3UC PLC, the FX2NC-CNV-IF or FX3UC-1PS-5V is

needed. 1.2 Incorporated Items

Included Item	
FX3U-1PG	1 unit
Special unit/block No. label	1 sheet
Dust proof protection sheet	1 sheet
Manuals (Japanese version, English version)	1 manual each

87 (3.43") Unit: mm (inches) MASS (Weight): Approx. 0.2 kg (0.44 lbs)

- DIN rail mounting groove (DIN rail: DIN46277, [6] 35 mm (1.38") width)
- DIN rail mounting hook [7] Terminal block (M3 screw) [8]

9 (0.36")

Direct mounting hole 2 holes of \(\phi 4.5 (0.18'') (mounting screw: M4 screw) Extension connector [9]

[5]	Name plate
1.4	Status LEDs

[1] Status LEDs (red)

[2] Extension cable

[4]

[3] Power LED (green)

4 (0.16")

43 (1.7")

LED display	LED color	Status	Description
POWER Green		OFF	5 V DC is not being supplied from the PLC
POWER	Green	ON	5 V DC is being supplied from the PLC
STOP	Red	OFF	STOP input OFF
310P	Reu	ON	STOP input ON
DOG Red		OFF	DOG input OFF
DOG	Reu	ON	DOG input ON
PG0 Red	Bod	OFF	Zero point signal OFF
	Reu	ON	Zero point signal ON
FP Red		OFF	Forward pulse or pulse train interrupted
FF	Reu	Flicker	Forward pulses or pulse train is being output
		OFF	Reverse pulse or directional output interrupted
RP	Red	Flicker	Reverse pulses is being output
		ON	Directional output is being output
CLR	Red	OFF	CLR signal is not output
OLK	Red	ON	CLR signal is being output

1.5 Terminal Layout ≨ Ŧ 쮸 PG0-PG ρ S/S S/S Termina Description name Power terminal for pulse output VIN COM0 Common terminal for pulse output FP Terminal which outputs forward pulse or pulse train RP Terminal which outputs reverse pulse or direction signal PG0 nput terminal for zero point signa PG0+ Power terminal for zero point signal COM1 Common terminal for CLR signal output CLR Terminal for CLR signal output 24 V DC power terminal for STOP input and DOG input S/S STOP Terminal for STOP input or interrupt input 1 Terminal for DOG input or interrupt input 0 DOG Terminal block screw size and tightening torque Terminal block screw: M3 screw

Status

OFF

ON

Flicker Error occurred

colo

Red

display

ERR

Description

Operating normally

CPU error occurred

Ierminal block screw: M3 screw Tightening forque: 0.5 to 0.8 N=m Do not tighten the terminal block mounting screws exceeding the specified 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 FX3∪-1PG User's Manual

2. Installation For details on installation, refer to the following manual

→ Refer to FX3U-1PG User's Manual

ISTALLATION RECAUTIONS		
attempting installation	off all phases of the power sup n work. cause electric shock or damage t	
ISTALLATION RECAUTIONS		
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Use the product within the generic environment specifications described in PLC main unit manual (Hardware Edition). 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 rail cont wind the second s

- If the product is used in such conditions, electric shock, fire, malfunction 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 security using a Division industry setews. 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.

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	WIRING PRECAUTIONS	<u>∕</u> ∆CAUT	ION		Item	Mo
When drilling screw holes or wiring, make sure that cutting and wiring debris	When drilling scre	Positioning	Starting time	Ma		
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	 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. 			Number of I/O occupied points		8 p of t
 De sure to reactive nor outpeted. 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 				-1 For details of other applied in		
the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock.						
 Connect extension cables securely to their designated connectors. Loose connections may cause malfunctions. 				Item		
2.1 Connection with PLC The FX3U-1PG connects on the right side of an PLC main unit or extension units/	DISPOSAL PRECAUTIONS CAUTION • Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device.					ST(inp spe
blocks (including special function units/blocks). For connection to an FX3UC Series PLC or FX2NC Series PLC extension block, an FX2NC-CNV-IF or FX3UC-1PS-5V is required.				Input signal name		DO zer
For details, refer to the respective PLC manual. → Refer to FX3U Series User's Manual - Hardware Edition. → Refer to FX3UC Series User's Manual - Hardware Edition.	TRANSPORTATION AND STORAGE PRECAUTIONS					Ex po po:
2.2 Mounting The product is mounted by the following method. • DIN rail mounting	 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. 				Group 2	PG Us ope
 Direct mounting (mounting screw: M4 screw) For details, refer to the respective PLC manual. A Refer to FXau Series User's Manual - Hardware Edition. 	3.1 Applicable PLC				Signal voltage	24 (Po
\rightarrow Refer to FX3UC Series User's Manual - Hardware Edition.			Maximum number of		Input current	7.0
3. Specification	Model name	Applicability	connectable units		ON current	4.5
For details on specifications, refer to the following manual. \rightarrow Refer to FX3U-1PG User's Manual.	FX3U Series PLC	Ver. 2.20 and later	8 units		OFF current	1.5
→ Refer to FX30-1PG User's Manual.	FX3UC Series PLC ^{*1} Ver. 2.20 and later 6 units The version number can be checked by reading the last three digits of device D8001/ D8101.			Group 1	Signal form	No Sin So
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 '1 An FX2NC-CNV-IF or FX3UC-1PS-5V is necessary to connect the FX3U-1 the FX3UC PLC.					Response time	DC ST
failure. Otherwise, malfunctions may cause serious accidents.	3.2 General Spe	cifications			Circuit insulation	Ph

3

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DISPOSAL PRECAUTIO							STOP: Deceleration stop input or used for interrupt input of External command positioning, Interrupt 2- speed positioning operation
 Please contact a certified electronic waste disposal company for the environmentally safe recycling and disposal of your device. 					Input signal	Group 1	DOG: Used for DOG input of DOG type mechanical zero return operation or used for interrupt input of External command positioning, Interrupt 1-speed
TRANSPOR			САUТИ	N	name		positioning, Interrupt stop, Interrupt 2-speed positioning operation
than those Failure to	e specif do so m	ied in the g ay cause f				Group 2	PG0: Zero point signal input Used for DOG type mechanical zero return operation
3.1 Applic					l	Signal voltage	24 V DC (Power is supplied from S/S terminal.)
Model na			pplicability	Maximum number of		Input current	7.0 mA
				connectable units		ON current	4.5 mA or more
FX3U Series			and later	8 units		OFF current	1.5 mA or less
	FX3UC Series PLC ^{*1} Ver. 2.20 and later 6 units The version number can be checked by reading the last three digits of device D8001/				Group 1	Signal form	No-voltage contact input Sink input: NPN open collector transistor Source input: PNP open collector transistor
*1 An FX2N	DB101. *1 An FX2NC-CNV-IF or FX3UC-1PS-5V is necessary to connect the FX3U-1PG with the FX3UC PLC.					Response time	DOG input: 1 ms STOP input: 4 ms
3.2 Gener						Circuit insulation	Photo-coupler insulation
				ose of the PLC main unit. the PLC main unit.		Operation display	LED ON at input ON
				User's Manual - Hardware Edition. User's Manual - Hardware Edition.		Signal voltage	5 to 24 V DC
ltem				Decification		Input current	20 mA or less
Dielectric wit	hstand					ON current	4.0 mA or more
voltage	notana	500 V AC	for one minute	Between all terminals and ground	0	OFF current	0.5 mA or less
Insulation		o was of more by ooo v		terminal	Group 2	Signal form	NPN open collector transistor
resistance	-	DC megg				Response time	4 µs or more
3.3 Power		ly Specif	ications			Circuit insulation	Photo-coupler insulation
	Item			Specification		Operation display	LED ON at input ON
	Input s	ignal	24 V DC ±10% Current consum	nption 40 mA or less	3.5.2 Inpu	ut wiring example	
Drive power supply	Output signal		For pulse output: 5 to 24 V DC Current consumption 35 mA or less For CLR signal: 5 to 24 V DC Current consumption 20 mA or less		FX3U-1	PG	
	Inner control		5 V DC Current consumption 150 mA (Power is supplied through the extension cable from the PLC.)			<u>≠本¥ ↓ </u> ≠本¥ Ì	

Specification		ltem	Specification	
Motor system: 1 ms or less Machine system: 2 ms or less		Output form	Transistor	
8 points (taken from either the input or output points of the PLC)		Output system	Forward (FP) and reverse (RP) pulse or pulse (PLS) with direction (DIR) can be selected.	
nstructions and methods, refer to the FX3S/FX3G/ ming Manual.		Output frequency	1 Hz to 200 kHz	
nd wiring example	Group 1	Rated load voltage	5 to 24 V DC	
		Max. load current	20 mA or less	
Specification		VIN current consumption	5 to 24 V DC 35 mA or less	
STOP: Deceleration stop input or used for interrupt input of External command positioning, Interrupt 2-		Output ON voltage	1.0 V or less	
speed positioning operation		Operation display	LED ON at output ON	
DOG: Used for DOG input of DOG type mechanical zero return operation or used for interrupt input of		Output form	Transistor	
External command positioning, Interrupt 1-speed		Output system	Pulse (Output pulse width: 20 ms)	
positioning, Interrupt stop, Interrupt 2-speed positioning operation	Group 2	Rated load voltage	5 to 24 V DC	
PG0: Zero point signal input	Oloup 2	Max. load current	20 mA or less	
Used for DOG type mechanical zero return operation		Output ON voltage	1.5 V or less	
24 V DC		Operation display	LED ON at output ON	
(Power is supplied from S/S terminal.)	3.6.2 Out	tput wiring example	•	
7.0 mA	FX3U-1PC	3	+ Servo amplifier	
4.5 mA or more				
1.5 mA or less	VIN Cable length: 2 m or less			
No-voltage contact input Sink input: NPN open collector transistor Source input: PNP open collector transistor				
DOG input: 1 ms STOP input: 4 ms			Cable length	

Servo amplifie ΞŔ ÷'n 규 Cable length COM1 <u>ŤĨX X X Ť</u>Ĩ CLR Ţ

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 opposite positionic limits).

Installation in Enclosure Programmable logic controllers are open-type devices that must be installed and used within conductive control cabinets. Please use the programmable logic controller while installed within a conductive shielded control cabinet. Please secure the cabinet door to the control cabinet (for conduction). Installation within a control cabinet greatly affects the safety of the system and aids in shielding noise from the programmable logic controllery of the system and aids in shielding noise from the programmable logic controller

Control cabinet The control cabinet must be conductive

Compliance with EC directive (CE Marking)

Requirement for Compliance with EMC directive

This product is designed for use in industrial applications

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

Programmable Controller (Open Type Equipment) MELSEC FX3U series manufactured

tandard.

Radiated Emission

Conducted Emission

Radiated electromagne Fast transient burst Electrostatic discharge

Radiated electromagnetic field

High-energy surge Voltage drops and interruptions Conducted RF Power frequency magnetic field

EMI

EMS

used as directed by the appropriate documentation.

from September 1st, 2012 FX3U-1PG Standard

Attention

Note

Type

Models:

EN61131-2: 2007

and tests

Programmable controllers

Caution for EC Directive

Equipment requirement

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

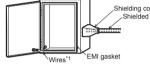
Regarding the standards that comply with the main unit, please refer to either the FX series product catalog or consult with your nearest Mitsubishi product provider.

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

Remark

Compliance with all relevant aspects of the

- est possible grounding cable.
- tween the control cabinet and its door ck wires.
- waves, the control cabinet structure the cable holes with a shielding cover
- its door must be as small as possible



or and control

- 30 m or less. LR signal wires
- P, RP, ent to

 should be grounded at both ends of the cable. Please attach a ferrite core less than 200 mm from the other end of the FP, PG0, and CLR signal wires. The ferrite core should be a product equivalen ZCAT3035-1330 by TDK Corp.
1. Introduction
FX3U-1PG Pulse Output Block (hereinafter referred to as FX3U-1PG) is a spe

function block that can output a maximum 200 kHz pulse train and drive one servo motor or stepping motor through the servo amplifier or stepping motor driver. \rightarrow For system configuration, refer to FX3U-1PG User's Manual.

11166
*1 These wires are used to improve the conductivity between the doc cabinet.
 Note for compliance with EN61131-2: 2007 General note on the use of the power supply cable. The FX3U-1PG unit requires that the cable used for power supply is 3
 The shield of the twisted pair cable used for the FP, RP, PG0, and CL should be arounded at both ands of the cable.

	-	Ground the control cabinet with the thicke
	-	To ensure that there is electric contact bet connect the cabinet and its doors with thic
the FX3U-	-	In order to suppress the leakage of radio v must have minimal openings. Also, wrap t or other shielding devices.
eries PLC D, wiring,	-	The gap between the control cabinet and by attaching EMI gaskets between them.
nance.		

- 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 RECAUTIONS

- Make sure to observe the following precautions in order to prevent an 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 lav 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 100mm (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 commor grounding with heavy electrical systems.
- Install module so that excessive force will not be applied to the termin blocks. Failure to do so may result in wire damage/breakage or PLC failure

WARNING

NIRING	
PRECAUTIONS	

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

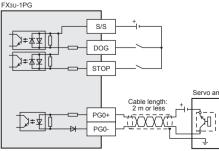
WIRING	
PRECAUTIONS	

Connect the DC power supply wiring to the de dicated terminal described

- If an AC power supply is connected to a DC input/output terminal or D ver supply terminal, the PLC will burn out.
- Make sure to attach the top cover, offered as an accessory, before turning of the power or initiating operation after installation or wiring work. Failure to do so may cause electric shock.

3.4 Performance Specifications

	ltem	Specification	
ber of c	ontrol axes	One axis	
ioning	program	Created by sequence programs (using FROM/TO instruction or direct specification of the buffer memory etc. on the MOV instruction etc. ^{*1})	
	Method	Increment, Absolute	
	Unit	PLS, µm, 10 ⁻⁴ inch, mdeg	
	Unit magnification	1, 10, 100, 1000-fold	
	Range	-2,147,483,648 to 2,147,483,647 PLS	
ioning	Operation speed	Hz, cm/min, inch/min, 10deg/min	
	Output frequency	1 Hz to 200 kHz	
	Acceleration/ deceleration process	Trapezoidal acceleration/deceleration: 1 to 32,767 ms Approximate S-shaped acceleration/deceleration: 1 to 5,000 ms	



- 3.6 Output specifications and wiring example
- 3.6.1 Output specifications

	Item	Specification
Output	Group 1	FP: Forward pulse or pulse train
signal		RP: Reverse pulse or direction signal
name	Group 2	CLR: CLR signal

3.7 Wiring Precautions

- 1) The power supply used for FP, RP, PG0, and CLR should be separate from
- a) the power supply used for the other signals.
 a) In an environment with a lot of noise, when malfunctions such as position gap occur, the influence of noise may be mitigated with the following measures. measures
- Attach a noise filter (TDK-Lambda Corp. MXB-1210-33 or similar) on the FX3U-1PG power supply line, one on the end nearest the servo amplifier, and one on the end nearest the power supply unit.
- Attach a ferrite core (TDK Corp. ZCAT3035-1330 or similar) to the VIN, FP, RP, PG0, and CLR signal wires, on the end nearest the servo amplifier.

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.

Warrantv

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 heen manufactured under strict quality control. However
- This product has been manufactured under strict quality control. Howeve 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