Panasonic

Programmable Controller

FP-XH Series

User's Manual

Basic

Western version

WUME-FPXHBASG-061

2024.6 | industry.panasonic.com/

(MEMO)

Introduction

Thank you for purchasing a Panasonic product. Before you use the product, please carefully read through the user's manual, and understand it in detail to use the product properly.

Types of Manuals

- The following user's manuals are available for the FP-XH series. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded on our website:https://industry.panasonic.com/global/en/downloads/?tab=manual.

Unit name or purpose of use	Manual name	Manual code
FP-XH Control Unit FP-X Expansion Unit FP-X Extension Cassette	FP-XH User's Manual (Basic)	WUME-FPXHBASG
	FP-XH Series Programming Manual	WUME-FPXHPGRG
Positioning Function / PWM Output / High-speed Counter Function	FP-XH User's Manual (Positioning / PWM Output / High-speed Counter)	WUME-FPXHPOSG
Communication Functions	FP-XH User's Manual (COM Communication)	WUME-FPXHCOMG
FP-X Extension (Communication) Cassette		

SAFETY PRECAUTIONS

- To prevent accidents or personal injuries, please be sure to comply with the following items.
- Prior to installation, operation, maintenance and inspection, please read this manual carefully for proper use.
- Before using the product, please fully understand the knowledge related to the equipment, safety precautions and all other precautions.
- Safety precautions are divided into two levels in this manual: Warning and Caution.

⚠ WARNING	Incorrect operation may lead to death or serious injury.

- Take appropriate safety measures for the external circuit of the product to ensure the security of the whole system in case of abnormalities caused by product failure or external factors.
- Do not use this product in areas with inflammable gases.
  Otherwise it may lead to an explosion.
- Do not put this product into a fire.
  Otherwise it may cause damage to the battery or other electronic parts.
- Do not impact, charge or heat the lithium battery, and do not put it into a fire.
  Otherwise it may lead to fire or damage.

⚠ CAUTION	Incorrect operation may lead to injury or material loss.

- To prevent the excessive exothermic heat or smoke generation of the product, a certain margin is required for guaranteed characteristics and performance ratings of relative products.
- Do not disassemble or modify the product.
  Otherwise it may lead to the excessive exothermic heat or smoke generation of the product.
- Do not touch terminal blocks during power-on.
  Otherwise it may result in an electric shock.
- Create an emergency stop and interlock circuit in the external devices.
- Connect wires and connectors reliably.
  Otherwise it may lead to the excessive exothermic heat or smoke generation of the product.
- Do not carry out construction (wiring, removal, etc.) during power-on.
  Otherwise it may result in an electric shock.
- If the equipment is used in a manner not specified by the Panasonic, the protection provided by the equipment may be impaired.
- This product has been developed/produced for industrial use only.

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Compatibility with the conventional FP-X series

The FP-XH series is upward compatible with a conventional FP-X Control Unit. However, be careful with the following points.

■ Hardware compatibility

- The FP-XH series can be used in combination with FP-X Expansion Units.

- The FP-X Extension Cassette (Communication Cassette) and FP-X Extension Cassette (Function Cassette) can also be used. With the FP-XH Control Unit, there are less restrictions on the installation position.
- The wiring for the transistor type Control Unit is different. The external power supply (24 V DC) for driving the output circuit is not necessary.
- The backup battery type is different. A special battery for the FP-XH series is required.
- The port for connecting to a personal computer is USB 2.0 (miniB type).

■ Software compatibility

- The positioning function has been largely improved. A table setting mode has been added to facilitate simplified setting and programming. In addition, position control patterns and home return patterns have been added.
- For using the projects (programs, comments and system registers) created for the conventional FP-X, the projects must be converted to the projects for the FP-XH using the “Convert PLC Type” function of the tool software.
- All the instructions for the conventional FP-X are supported.

Instruction	Section	Main differences in specifications
SYS1	Communication condition settings	The ranges that can be specified for the port number and baud rate are extended.
F12 (ICRD)	F-ROM reading	The range for the block number to be specified when an instruction is executed is extended.
P13 (PICWT)	F-ROM writing	
F145 (SEND)	Data send instruction	The range for the COM port number to be specified when the MEWTOCOL master or MODBUS master is sent is extended.
F146 (RECV)	Data receive instruction	
F172 (PLSH)	Pulse output (JOG operation) instruction	The characteristic of the acceleration / deceleration zone are different.
F173 (PWMH)	PWM output instructions	Parameter settings are simplified.
F380 (POSST)	Positioning table start	Added for the positioning function (table setting mode).
F381 (JOGST)	JOG operation start	
F382 (ORGST)	Home return start	
F383 (MPOST)	Positioning table simultaneous start	
F384 (PTBLR)	Reading positioning parameters	
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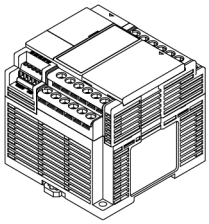
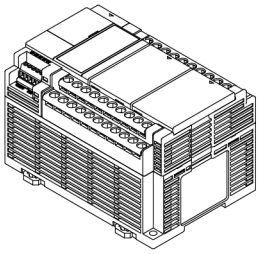
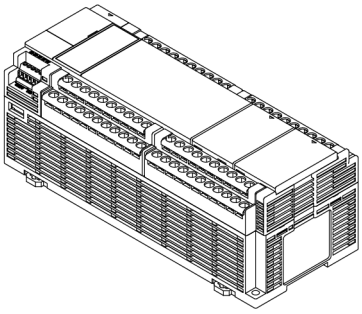
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1 System Configuration

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1.1 List of Units

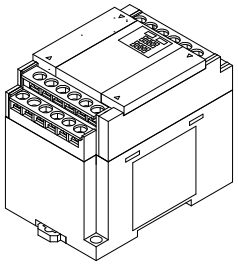
1.1.1 FP-XH Control Units

The following types are available depending on the number of points, power supply, and output type.

Number of points	14 points / 30 points / 60 points
Power supply	100 to 240 V AC or 24 V DC
Output	Relay or transistor (NPN output or PNP output)

1.1.2 FP-X Expansion Units

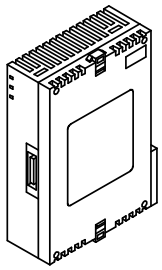


The following types are available depending on the number of points, power supply, and output type.

■ FP-X Expansion Units

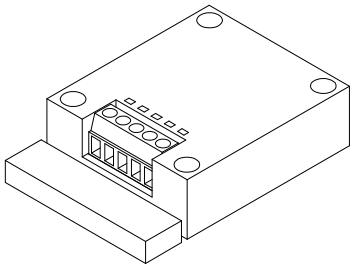
Number of points	14 points (for output only) / 16 points (for input only) / 16 (8/8) points	30 (16/14) points
Power supply	No power supply	100 to 240 V AC or 24 V DC
Output	Relay or transistor (NPN output or PNP output)	

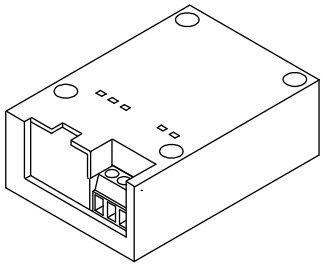
1.1.3 FP-X Expansion FP0 Adapter



The FP-X Expansion FP0 Adapter is an interface adapter that can be connected to the FP0 Series Expansion Unit / Intelligent Unit.

1.1.4 FP-X Extension Cassettes (Communication Cassettes)

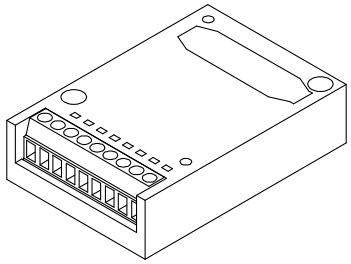


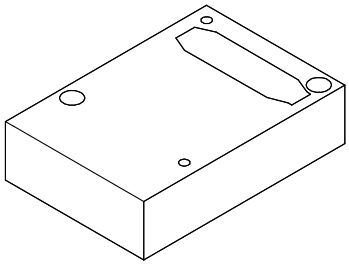


The following types are available depending on the type of communication interface or the number of channels.

Communication method	RS-232C (5-wire) x 1 channel
	RS-232C (3-wire) x 2 channel
	RS-485 / RS-422 x 1 channel
	RS-485 × 1 channel ＋ RS-232C (3-wire) × 1 channel
	RS-485 × 2 channel
	Ethernet × 1 channel + RS-232C (3-wire) × 1 channel

1.1.5 FP-X Extension Cassettes (Function Cassettes)





The following types are available depending on the output type and function.

Analog I/O	Analog input x 2 channels Analog output x 2 channels Analog input x 2 channels + analog output x 1 channel
Digital I/O	8-point input, 8-point transistor output 4-point input + 3-point transistor output
Pulse I/O	High-speed counter × 2 channels + pulse output × 1 channel
Master memory	Master memory + real-time clock

1.2 List of Unit Model Numbers

1.2.1 FP-XH Control Units

Item name	Specifications		Product no.
	Input and output specifications	Power supply	
FP-XH C14R Control Unit	8-point DC input, 6-point relay output	100 to 240 V AC	AFPXHC14R
		24 V DC	AFPXHC14RD
FP-XH C14T Control Unit	8-point DC input, 6-point transistor output (NPN)	100 to 240 V AC	AFPXHC14T
		24 V DC	AFPXHC14TD
FP-XH C14P Control Unit	8-point DC input, 6-point transistor output (PNP)	100 to 240 V AC	AFPXHC14P
		24 V DC	AFPXHC14PD
FP-XH C30R Control Unit	16-point DC input, 14-point relay output	100 to 240 V AC	AFPXHC30R
		24 V DC	AFPXHC30RD
FP-XH C30T Control Unit	16-point DC input, 14-point transistor output (NPN)	100 to 240 V AC	AFPXHC30T
		24 V DC	AFPXHC30TD
FP-XH C30P Control Unit	16-point DC input, 14-point transistor output (PNP)	100 to 240 V AC	AFPXHC30P
		24 V DC	AFPXHC30PD
FP-XH C60R Control Unit	32-point DC input, 28-point relay output	100 to 240 V AC	AFPXHC60R
		24 V DC	AFPXHC60RD
FP-XH C60T Control Unit	32-point DC input, 28-point transistor output (NPN)	100 to 240 V AC	AFPXHC60T
		24 V DC	AFPXHC60TD
FP-XH C60P Control Unit	32-point DC input, 28-point transistor output (PNP)	100 to 240 V AC	AFPXHC60P
		24 V DC	AFPXHC60PD

1.2.2 FP-X Expansion Units

Item name	Specifications		Product no.
	Input and output specifications	Power supply	
FP-X E16 Expansion I/O Unit	8-point DC input, 8-point relay output	-	AFPX-E16R
	8-point DC input, 8-point transistor output (NPN)	-	AFPX-E16T
	8-point DC input, 8-point transistor output (PNP)	-	AFPX-E16P
FP-X E30 Expansion I/O Unit	16-point DC input, 14-point relay output	100 to 240 V AC	AFPX-E30R
		24 V DC	AFPX-E30RD
	16-point DC input, 14-point transistor output (NPN)	100 to 240 V AC	AFPX-E30T
		24 V DC	AFPX-E30TD

Item name	Specifications		Product no.
	Input and output specifications	Power supply	
	16-point DC input, 14-point transistor output (PNP)	100 to 240 V AC	AFPX-E30P
		24 V DC	AFPX-E30PD
FP-X E16 Expansion Input Unit	16-point DC input	-	AFPX-E16X
FP-X E14R Expansion Output Unit	14-Point relay output	-	AFPX-E14YR

(Note 1) An 8 cm expansion cable is provided with the Expansion Unit.

1.2.3 FP-X Expansion FP0 Adapter

Name	Specifications	Product no.
FP-X Expansion FP0 Adapter	For connecting the FP0 Expansion Unit	AFPX-EFP0

(Note 1) An 8 cm expansion cable is provided with the Expansion Unit.

1.2.4 FP-X Extension Cassettes (Communication Cassettes)

Name	Specifications	Product no.
FP-X Communication Cassette	5-wire RS-232C x 1 channel	AFPX-COM1
	3-wire RS-232C x 2 channels	AFPX-COM2
	RS-485 / RS-422 (isolated) x 1 channel	AFPX-COM3
	RS-485 (isolated) x 1 channel + 3-wire RS-232C x 1 channel	AFPX-COM4
	RS-485 (isolated) x 2 channels (non-isolated between channels)	AFPX-COM6
	Ethernet × 1 channel + RS-232C 3-wire × 1 channel	AFPX-COM5

1.2.5 FP-X Extension Cassettes (Function Cassettes)

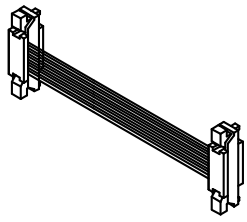
Name		Specifications	Product no.
Analog I/O	FP-X Analog Input Cassette	Analog input (non-isolated) x 2 channels	AFPX-AD2
	FP-X Analog Output Cassette	Analog output (isolated) x 2 channels (isolated between channels)	AFPX-DA2
	FP-X Analog I/O Cassette	Analog input (isolated) x 2 channels (non-isolated between channels) + Analog output (isolated) x 1 channel	AFPX-A21

Name		Specifications	Product no.
	FP-X Thermocouple Cassette	Thermocouple input (isolated) x 2 channels (isolated between channels)	AFPX-TC2
	FP-X Resistance Thermometer Cassette	Resistance thermometer input (isolated) x 2 channels (isolated between channels)	AFPX-RTD2
Digital I/O	FP-X Input Cassette	8-point DC input	AFPX-IN8
	FP-X Output Cassette	8-point transistor output (NPN)	AFPX-TR8
	FP-X Output Cassette	6-point transistor output (PNP)	AFPX-TR6P
	FP-X I/O Cassette	4-point DC input + 3-point transistor output (NPN)	AFPX-IN4T3
FP-X Pulse I/O Cassette		High-speed counter × 2 channels + pulse output × 1 channel	AFPX-PLS
FP-X Master Memory Cassette		Master memory + real-time clock	AFPX-MRTC

1.2.6 Options

Name	Specifications	Product no.
FP-XH Backup Battery	Required when expanding the hold area of the operation memory or when using the clock / calendar function.	AFPABAT001
FP-X terminal block (C30/C60)	For C30/C60 control unit for E30 expansion I/O unit with 21-pin cover (no printing) 4 pcs/pack	AFPX-TAN1

1.2.7 Maintenance Parts

	Name	Specifications	Product no.
	FP-X Expansion Cable(Note 1)(Note 2)	8 cm	AFPX-EC08
		30 cm	AFPX-EC30
		80 cm	AFPX-EC80
	FP0 Power supply cable	For the Expansion FP0 Adapter, length: 1 m	AFPG805

(Note 1) An 8 cm expansion cable (AFPX-EC08) is provided with the FP-X Expansion Unit or with the FP-X Expansion FP0 Adapter. The total length of the expansion cable should be within 160 cm.

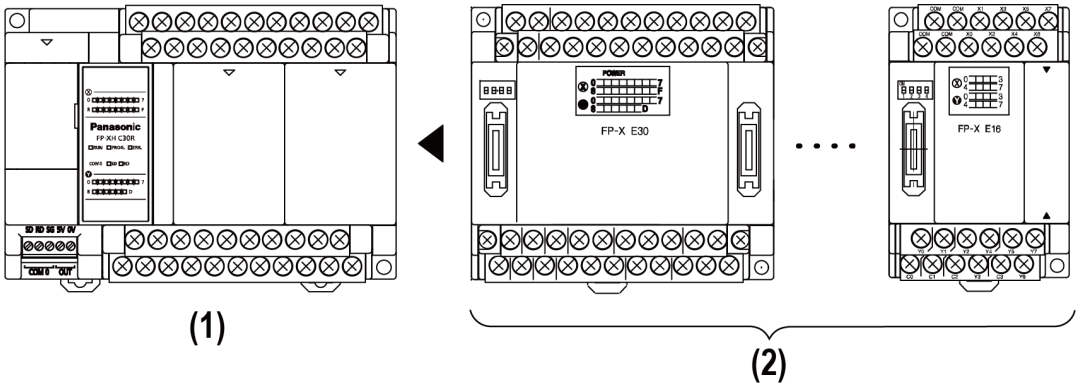
(Note 2) If a longer expansion cable is used, an I/O check error may occur due to noise, etc. In such a case, it is recommended that measures such as installing a ferrite core be taken.

1.3 Restrictions on Combinations of Units

1.3.1 Restrictions on Using FP-X Expansion Units

■ Restrictions on the number of Expansion Units and mounting order (1)

- Up to 8 Expansion Units can be connected.



(1)	FP-XH Control Units	(2)	FP-X Expansion Units

■ Maximum number of control inputs / outputs

Type of Control Unit	Control unit No. of inputs / outputs of a single control unit	FP-X-E30 No. of inputs / outputs when using Expansion Units
FP-XH C14 Control Unit	14 points	Max. 254 points
FP-XH C30 Control Unit	30 points	Max. 270 points
FP-XH C60 Control Unit	60 points	Max. 300 points

■ Restrictions on combinations of Expansion Cables

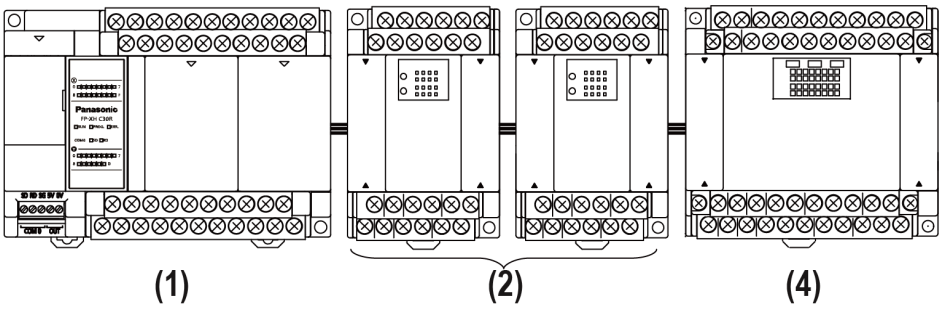
- The total length of the expansion cables should be within 160 cm.

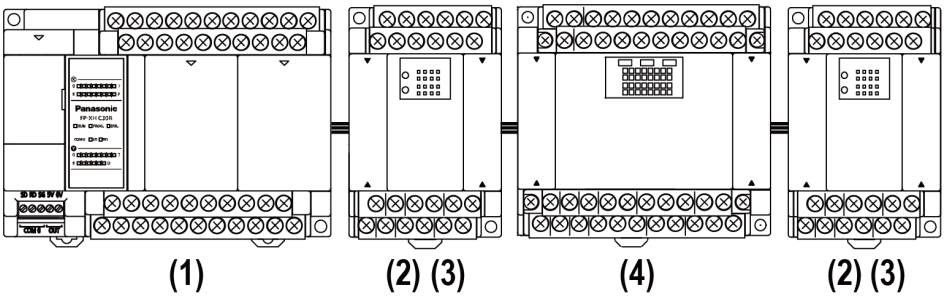
■ Restrictions on combinations of Expansion Units (2)

- The number of units which can be expanded depends on the Expansion Unit type.

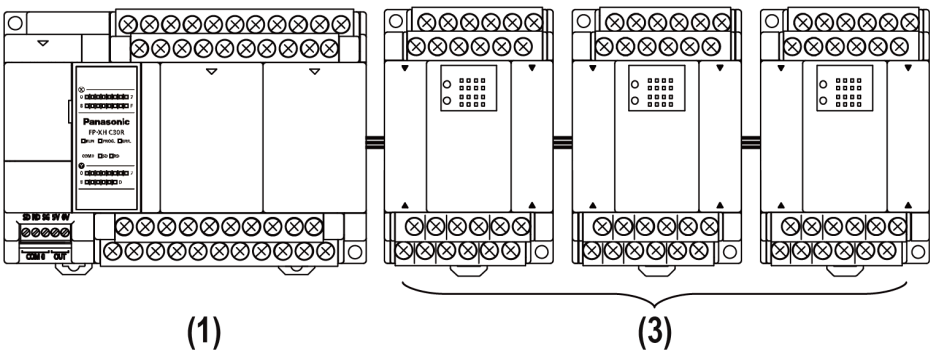
	Unit type		Remarks
(1)	FP-XH Control Unit		
(2)	FP-X Expansion I/O Unit	E14YR, E16R	Expansion I/O Unit that does not have a built-in power supply
		E16X, E16T, E16P (earlier than Ver. 3.0)	
(3)	FP-X Expansion I/O Unit	E16X, E16T, E16P (Ver. 3.0 or later)	Expansion I/O Unit that does not have a built-in power supply
(4)	FP-X Expansion I/O Unit	E30	Expansion I/O Unit that has a built-in power supply

- Among the FP-X Expansion I/O Units, those in the group (2) in the above table cannot be connected next to each other. However, they can be connected to the right of the Expansion I/O Unit that has a built-in power supply.





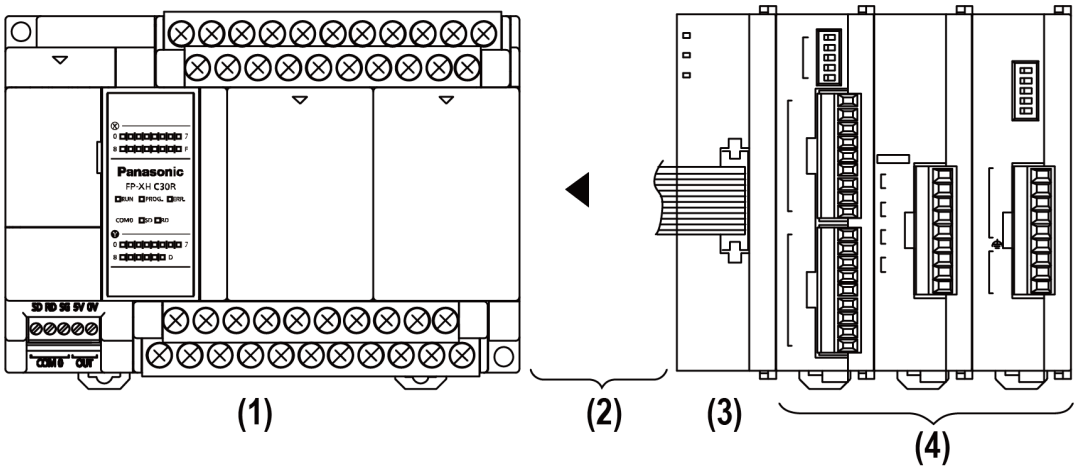
- Among the FP-X Expansion I/O Units that do not have a built-in power supply, those in the group (3) in the above table can be connected together up to three units.



1.3.2 Restrictions on Using FP-X Expansion FP0 Adapter

■ FP-X Expansion FP0 Adapter installation position

- Up to three FP0 Expansion Units can be connected via the FP-X Expansion FP0 Adapter.
- Up to seven FP-X Expansion Units can be connected when using the FP-X Expansion FP0 Adapter.
- Only one FP-X Expansion FP0 Adapter can be connected at the last position of the FP-X Expansion Bus. Install it on the right of the FP-X Expansion Unit / FP-X0 Expansion Unit.



(1)	FP-XH Control Unit	(2)	FP-X Expansion Unit	(3)	FP-X Expansion FP0 adapter	(4)	FP0 Expansion Unit Intelligent Unit

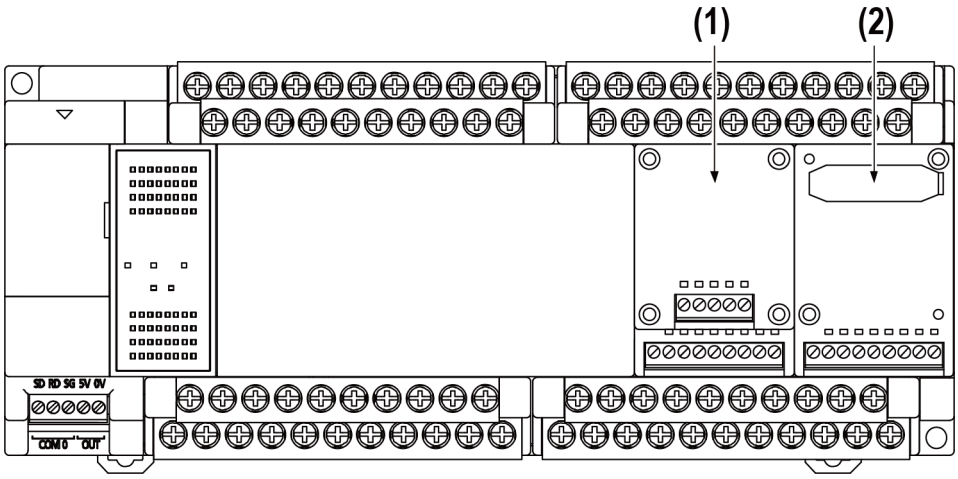
■ FP0 Expansion Unit / FP0 Intelligent Unit installation sequence

- Install the FP0 Thermocouple Input Unit on the right side of all other FP0 Units. If it is installed on the left side, the total precision will deteriorate.
- Install the FP0 CC-Link Unit on the right side of all other FP0 Units. There is no expansion connector on the right side.

1.3.3 Restrictions on Combinations of Extension Cassettes

■ Extension Cassette mounting position (1)

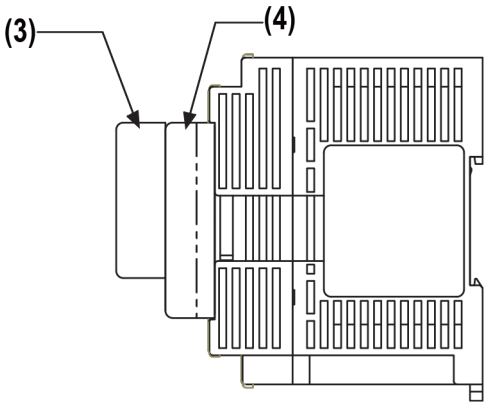
- The FP-XH Control Unit is provided with two cassette mounting parts. In case of the C14 model, only the cassette mounting part 1 can be used.



(1)	Cassette mounting part 1	(2)	Cassette mounting part 2

■ Extension Cassette mounting position (2)

- The Function Cassette can be put together with the Communication Cassette and mounted on the same cassette mounting part. When doing so, be sure to put the Communication Cassette on top of the Function Cassette.



(3)	Communication Cassette	(4)	Function Cassette

■ Number of of Extension Cassettes to be mounted

- Up to two Function Cassettes and up to two Communication Cassettes can be mounted.

■ Types of Extension Cassettes and mounting position (●: Available, ○: Conditionally available, Blank: Not available)

Cassette type			Mounting parts on the Control Unit	
			Cassette mounting part 1	Cassette mounting part 2
Type	Item name	Product number	FP-XH Control Unit	FP-XH Control Unit (excluding C14)
Communication Cassette (Note 1)	Communication Cassette	AFPX-COM1	●(Note 2)	●(Note 2)
		AFPX-COM2	●	●
		AFPX-COM3	●	●
		AFPX-COM4	●	●
		AFPX-COM5	●	●
		AFPX-COM6	●	●
Function Cassette (Note 3)	Analog Input Cassette	AFPX-AD2	●	●
	Analog Output Cassette	AFPX-DA2	●	●
	Analog I/O Cassette	AFPX-A21	●	●
	Thermocouple Cassette	AFPX-TC2	●	●
	RTD Cassette	AFPX-RTD2	●	●
	Input Cassette	AFPX-IN8	●	●

Cassette type			Mounting parts on the Control Unit	
			Cassette mounting part 1	Cassette mounting part 2
Type	Item name	Product number	FP-XH Control Unit	FP-XH Control Unit (excluding C14)
	Output Cassette	AFPX-TR8	●	●
	Output Cassette	AFPX-TR6P	●	●
	I/O Cassette	AFPX-IN4T3	●	●
	Pulse I/O Cassette	AFPX-PLS	○(Note 4)	○(Note 4)
	Master Memory Cassette	AFPX-MRTC	○(Note 5)	○(Note 5)

(Note 1) When mounting it together with the Function Cassette, mount it on top of the Function Cassette.

(Note 2) With the AFPX-COM1, RS/CS control is possible.

(Note 3) When mounting the Function Cassette on C30, or C60 model, the Cassette can be mounted either on the cassette mounting part 1 or cassette mounting part 2.

(Note 4) The Pulse I/O Cassette cannot be mounted on the Transistor Output Type Control Unit. If it is mounted, the self-diagnostic error (27: Unit installed limit) will occur.

(Note 5) Only one FP-X Master Memory Cassette can be mounted. If two FP-X Master Memory Cassettes are mounted, the self-diagnostic error (27: Unit installed limit) will occur.

1.3.4 Restrictions on Communication Functions

- There are the following restrictions on functions to be used when using the communication ports equipped with the Control Unit and Communication Cassettes.
- Allocated communication port numbers vary according to the mounting positions of cassettes.

■ Types of communication ports / Communication Cassettes (●: Available, Blank: Not available)

Product no.	Communication interface	Allocated communication port no.				
		Control Unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
Control Unit standard equipment	RS-232C (3-wire type) x 1 channel	●				
AFPX-COM1	RS-232C (5-wire type) x 1 channel		●		●	
AFPX-COM2	RS-232C (3-wire type) x 2 channels		●	●	●	●
AFPX-COM3	RS-485 / RS-422 x 1 channel		●		●	
AFPX-COM4	RS-485 x 1 channel		●		●	
	RS-232C (3-wire type) x 1 channel			●		●

Product no.	Communication interface	Allocated communication port no.				
		Control Unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
AFPX-COM5	Ethernet port x 1 channel		●		●	
	RS-232C (3-wire type) x 1 channel			●		●
AFPX-COM6	RS-485 x 2 channels		●	●	●	●

(Note 1) The RS-232C port of the AFPX-COM1 is a 5-wire type, and the RS/CS control can be performed.

(Note 2) For the AFPX-COM1, select either RS-485 or RS-422. Use the switch on the Communication Cassette to select the port.

(Note 3) For the AFPX-COM4, both 1-channel RS-485 and 1-channel RS-232C (3-wire type) can be used.

(Note 4) For the AFPX-COM5, both 1-channel Ethernet and 1-channel RS-232C (3-wire type) can be used.

■ **Available functions for each communication port (●: Available, ○: Conditionally available, Blank: Not available)**

Communication functions to be used		Allocated communication port no.				
		Control Unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
PLC Link		○	○			
MEWTOCOL-COM	Master	●	●	●	●	●
	Slave	●	●	●	●	●
MODBUS-RTU	Master	●	●	●	●	
	Slave	●	●	●	●	
General-purpose communication		●	●	●	●	

(Note 1) For the PLC link, either one of the standard COM0 port mounted in the Control Unit and the COM 1 port of a Cassette can be used.

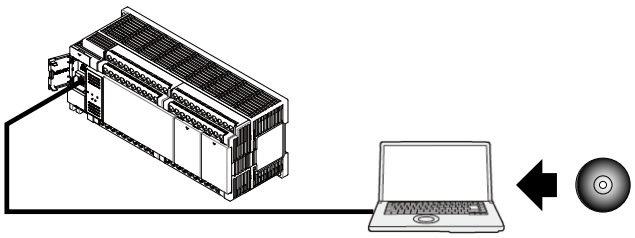
(Note 2) The COM4 port only supports MEWTOCOL-COM communication. In addition, the communication parameters (unit number, communication format, baud rate) when the power is ON are same as the setting of the COM3 port. After RUN, you can also change the conditions by SYS1 instruction.

1.3.5 Restrictions on Combined Use of Functions

- For the FP-XH series, communication with external devices can be performed via up to a maximum of five communication interfaces in combination of the standard COM0 port mounted in the Control Unit and the COM1 to COM4 ports of the Communication Cassette.
- When using all five ports (COM0 to COM4), the usable baud rate is up to 115.2 kbps and usable pulse output function is up to 2 axes. When using four or less ports, the usable baud rate is up to 230.4 kbps and usable pulse output function is up to 6 axes.

1.4 Programming Tools

1.4.1 Software Support and Suitable Cable



■ Tool software

To use the FP-XH, the software with the following versions are required.

Software	Applicable version	Product no.
Control FPWIN GR7	Ver.2.5 or later	AFPSGR7EN
Control FPWIN Pro7	Ver.7.03 or later	AFPSPR7A

(Note 1) The latest version is provided free of charge via our websitehttps://industry.panasonic.com/global/en/downloads/?tab=software. Use the latest version.

■ PC connection cable

Use a commercial USB cable.

Cable type	Length
USB 2.0 cable (A:Mini B)	Max. 5 m

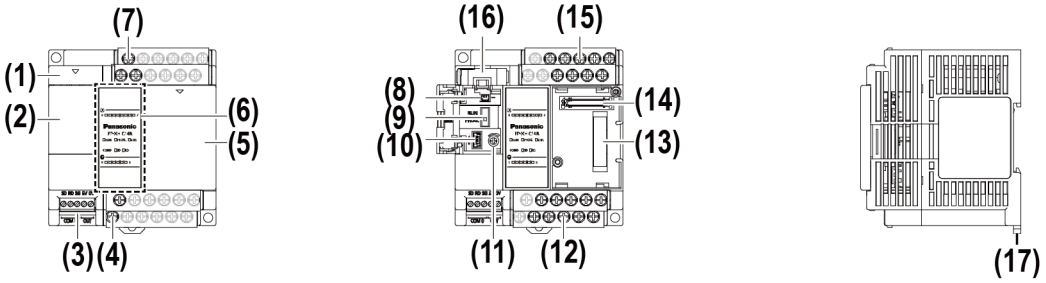
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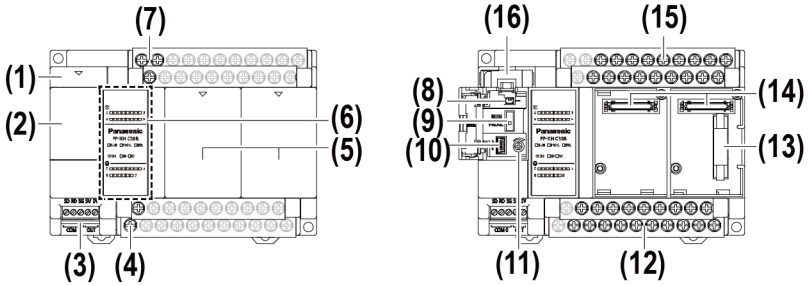
2.1 Names and Functions of Parts

2.1.1 Names and Functions of Parts

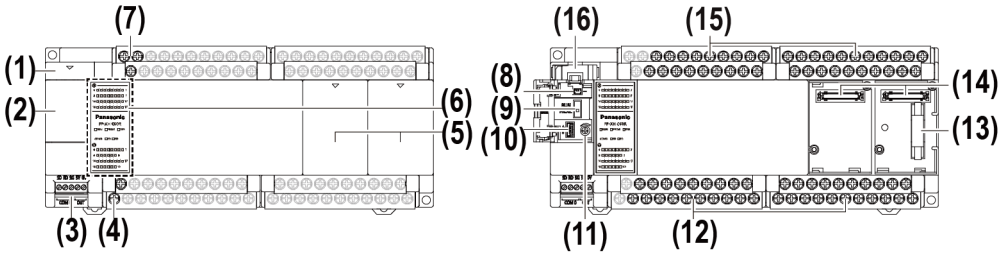
■ **FP-XH C14 Control Unit**



■ **FP-XH C30 Control Unit**



■ **FP-XH C60 Control Unit**



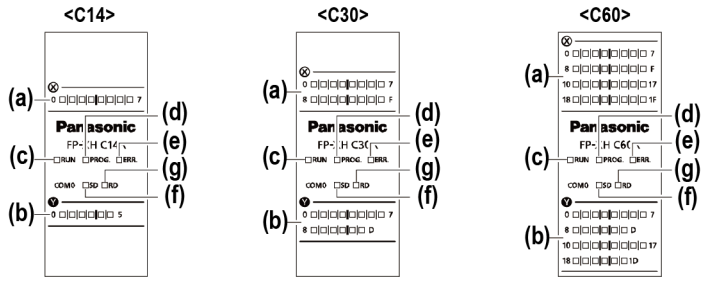
■ **Names and functions of parts**

No.	Name	Function
(1)	Battery cover	This is a space for installing an optional backup battery.
(2)	Operating unit cover	There are a built-in battery connector, RUN / PROG. mode selection switch, USB port connector, and analog potentiometer.
(3)	COM0 port	Three-wire RS-232C port. A power supply terminal (5 V) is also provided for connecting our Programmable Display GT Series.
(4)	Service power supply	It can be used as service power supply for the input circuit.

No.	Name	Function	
	terminal block for input circuit		
(5)	Cassette mounting part cover	This is a space for installing an optional communication cassette and Function Cassette.	
(6)	Operation monitor LEDs / Input and output indicator LEDs	Indicate the operation mode, error occurrence state, communication state of COM0 port and input and output states.	
(7)	Power supply terminal	This is used to connect the power supply to drive the Control Unit.	
(8)	Battery connector	This is used to insert the connector of a dedicated battery (AFPABAT001).	
(9)	RUN / PROG. mode selection switch	RUN (Up):	Sets to the RUN mode. The program is executed and operation begins.
		PROG. (Down)	Sets to the PROG. mode.
(10)	USB port connector	This is used to connect with a PC on which tool software is used.	
(11)	Analog potentiometer	Turning the potentiometer changes the values of special DT. It can be used for the functions such as analog timer.	
(12)	Output terminal	This is used to connect an output device.	
(13)	Expansion unit connector	This is used to connect the expansion cable for mounting the Expansion Unit.	
(14)	Extension cassette connector	This is used to mount an optional Extension Cassette (Communication Cassette or Function Cassette).	
(15)	Input terminal	This is used to connect an input device.	
(16)	Battery holder	This is used to hold a dedicated battery for using the clock / calendar function and extending the backup area of the operation memory. The dedicated battery (AFPABAT001) is sold separately.	
(17)	DIN hook	This is used to install the unit on a DIN rail.	

(Note 1) Whether the switch is set to RUN or PROG., the mode can be switched through remote operation from the tool software. When power is turned ON again, it operates in the mode set on the switch.

2.1.2 Specifications of Operation Indicator LEDs

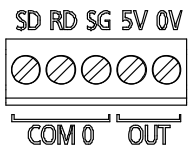


No.	LED name		Color	Data to display	
(a)	X		Green	Indicates the input state.	
(b)	Y		Green	Indicates the output state.	
(c)	RUN		Green	ON	Turns ON when a program is being executed in RUN mode.
				Flashes	RUN and PROG. LEDs flash alternately when the forced I/O function is executed.
(d)	PROG.		Green	ON	Turns ON when the unit operation stops in PROG. mode.
				Flashes	RUN and PROG. LEDs flash alternately when the forced I/O function is executed.
(f)	COM0	SD	Green	Flashes when data is sent via the COM0 port.	
(g)		RD	Green	Flashes when data is received via the COM0 port.	
(e)	ERR.		Red	Flashes	Lit when an error is detected by self-diagnosis.
				ON	This lights if a hardware error occurs, or operation slows because of the program, and the watchdog timer is activated.

2.1.3 Specifications of COM0 Port

- This is a general-purpose three-wire RS-232C port.
- A 5 V power supply terminal is provided for connecting our Programmable Display GT02 / GT02L Series.

■ Terminal layout



LED name		Description	
COM 0	SD	Send data (Unit to external devices)	This is a general-purpose three-wire RS-232C port.
	RD	Receive data (External devices to Unit)	
	SG	Signal grounding	
OUT	5V	5 V DC is output as the power supply for the Programmable Display GT Series.	
	0V		

2.2 Power Supply Specifications

2.2.1 AC Power Supply Type

■ AC power supply type

Item		Specifications	
		C14	C30/C60
Rated voltage		100 to 240 V AC	
Operating voltage range		85 to 264 V AC	
Inrush current (240 V AC at ambient temperature of 25℃)		40 A or less	45 A or less
Momentary power off time		10 ms (when using 200 V AC)	
Frequency		50 / 60 Hz (47 to 63 Hz)	
Leakage current		0.75 mA or less between input and protective earth terminals	
Guaranteed life of internal power supply part		30,000 hours (at ambient temperature of 55℃)	
Fuse		Built-in (Cannot be replaced)	
Isolation method		Transformer insulation	
Terminal screw		M3	
Consumption current	100 V AC	C14R: 185 mA or less C14T: 175 mA or less C14P: 175 mA or less	C30R: 330 mA or less C30T: 310 mA or less C30P: 310 mA or less C60R: 380 mA or less C60T: 335 mA or less C60P: 335 mA or less
	200 V AC	C14R: 115 mA or less C14T: 110 mA or less C14P: 110 mA or less	C30R: 200 mA or less C30T: 190 mA or less C30P: 190 mA or less C60R: 235 mA or less C60T: 205 mA or less C60P: 205 mA or less

2.2.2 AC Power Supply Type: Service Power Supply for Input Circuit

■ AC power supply type: Specifications of service power supply for input circuit

Item	Specifications	
	C14	C30/C60
Rated voltage	24 V DC	
Operating voltage range	21.6 to 26.4 V DC	
Rated output current	0.15 A	0.4 A

Item	Specifications	
	C14	C30/C60
Overcurrent protection function	Available	
Terminal screw	M3	

2.2.3 DC Power Supply Type

■ DC power supply type

Item	Specifications
	C14/C30/C60
Rated voltage	24 V DC
Operating voltage range	21.6 to 26.4 V DC
Inrush current	12 A or less (240 V AC at ambient temperature of 25℃)
Momentary power off time	10 ms
Guaranteed life of internal power supply part	30,000 hours (at ambient temperature of 55℃)
Fuse	Built-in (Cannot be replaced)
Isolation method	Non-isolated
Terminal screw	M3
Consumption current	C14RD: 95 mA or less C14TD: 90 mA or less C14PD: 90 mA or less C30RD: 160 mA or less C30TD: 115 mA or less C30PD: 115 mA or less C60RD: 275 mA or less C60TD: 170 mA or less C60PD: 170 mA or less

2.3 Input and Output Specifications (Relay Output Type)

2.3.1 Input Specifications

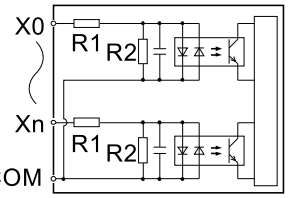
■ Specifications

Item		Specifications		
		C14R	C30R	C60R
Isolation method		Optical coupler		
Rated input voltage		24 V DC		
Operating voltage range		21.6 to 26.4 V DC		
Rated input current		Approx. 4.7 mA (X0 to X7) / Approx. 4.3 mA (X8 or later)		
Input points per common		8 points/common	16 points/common	16 points/common x 2
		(Either the positive or negative of input power supply can be connected to common terminal.)		
Min. ON voltage / Min. ON current		19.2 V DC/3 mA		
Max. OFF voltage / Max. OFF current		2.4 V DC/1 mA		
Input impedance		5.1 kΩ (X0 to X7) / 5.6 kΩ (X8 or later)		
Response time(Note 1)	OFF→ON	X0 to X7	0.6 ms or less (For normal input) 50 µs or less (For high-speed counter, pulse catch and interrupt input settings)	
		X8 or later	0.6 ms or less	
	ON→OFF	Same as above.		
Operating mode indicator		LED		
EN61131-2 applicable type		Type3 (However, the above specifications must be met.)		

(Note 1) These specifications apply when the rating is 24 V DC and the ambient temperature is 25 °C.

■ Internal circuit diagram

X0 to Xn



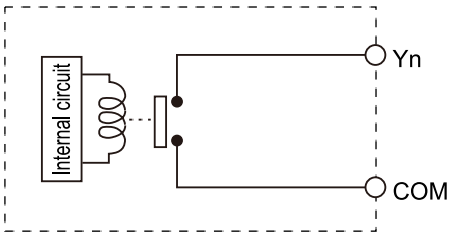
X0 to X7: R1 = 5.1 kΩ, R2 = 3 kΩ
X8 to Xn: R1 = 5.6 kΩ, R2 = 1 kΩ

2.3.2 Output Specifications

■ Specifications

Item		Specifications		
		C14R	C30R	C60R
Isolation method		Relay insulation		
Output type		1a relay output		
Rated control capacity		2 A at 250 V AC, 2 A at 30 V DC (resistive load)		
	Per common	6A or less	8A or less	
Input points per common		1-point common x 3 3-point common x 1	1-point common x 2 4-point common x 3	1-point common x 6 2-point common x 1 4-point common x 5
Response time	OFF→ON	Approx. 10 ms		
	ON→OFF	Approx. 8 ms		
Life	Mechanical	20 million times or more (Frequency of switching: 180 times/min.)		
	Electrical	100 thousand times or more (Frequency of switching at the rated control capacity: 20 times/min.)		
Operating mode indicator		LED		
EN61131-2 Applicable type		Type3 (However, the above specifications must be met.)		

■ Internal circuit diagram



2.4 Input and Output Specifications (Transistor Output Type)

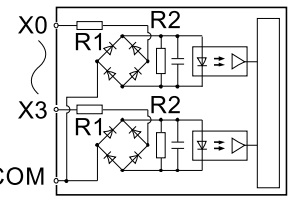
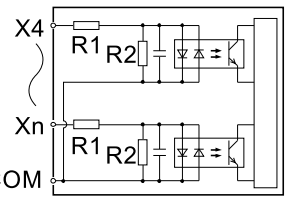
2.4.1 Input Specifications

■ Specifications

Item			Specifications		
			C14T / C14P	C30T / C30P	C60T / C60P
Isolation method			Optical coupler		
Rated input voltage			24 V DC		
Operating voltage range			21.6 to 26.4 V DC		
Rated input current			Approx. 12 mA (X0 to X3) / Approx. 4.7 mA (X4 to X7) / Approx. 4.3 mA (X8 or later)		
Input points per common			8 points/common	16 points/common	16 points/common x 2
			(Either the positive or negative of input power supply can be connected to common terminal.)		
Min. ON voltage / Min. ON current			19.2 V DC/3 mA		
Max. OFF voltage / Max. OFF current			2.4 V DC/1 mA		
Input impedance			Approx. 2 kΩ (X0 to X3) / Approx. 5.1 kΩ (X4 to X7) / Approx. 5.6 kΩ (X8 or later)		
Response time(Note 1)	OFF→ON	X0 to X3	135 µs or less (For normal input) 5 µs or less (For high-speed counter, pulse catch and interrupt input settings)		
		X4 to X7	135 µs or less (For normal input) 50 µs or less (For high-speed counter, pulse catch and interrupt input settings)		
		X8 or later	0.6 ms or less		
	ON→OFF		Same as above.		
Operating mode indicator			LED		
EN61131-2 applicable type			Type3 (However, the above specifications must be met.)		

(Note 1) These specifications apply when the rating is 24 V DC and the ambient temperature is 25 °C.

■ Internal circuit diagram

X0 to X3	X4 to Xn
	
R1 = 2 kΩ, R2 = 680 kΩ	X4 to X7: R1 = 5.1 kΩ, R2 = 3 kΩ X8 to Xn: R1 = 5.6 kΩ, R2 = 1 kΩ

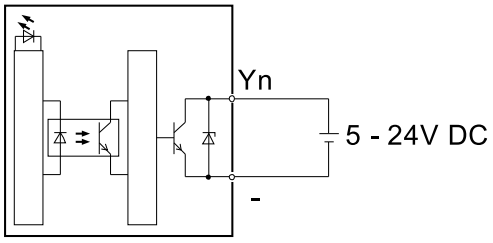
2.4.2 Output Specifications (NPN Output)

■ Specifications

Item		Specifications		
		C14T	C30T	C60T
Isolation method		Optical coupler		
Output type		NPN open collector		
Rated load voltage		5 to 24 V DC		
Allowable load voltage range		4.75 to 26.4 V DC		
Rated load current		0.5 A		
Max. inrush current		1.5 A		
Off state leakage current		1 µA or less		
ON-state max. voltage drop		0.3 V DC or less		
Overcurrent protection function		None		
Input points per common		6-point common	6-point common x 1 8-point common x 1	6-point common x 2 8-point common x 2
Response time (Note 1)	OFF→ON	2 µs or less (Y0 to Y3) 1 ms or less (Y4 or later)	2 µs or less (Y0 to Y7) 1 ms or less (Y8 or later)	2 µs or less (Y0 to YB) 1 ms or less (YC or later)
	ON→OFF	8 µs or less (Y0 to Y3) 1 ms or less (Y4 or later)	8 µs or less (Y0 to Y7) 1 ms or less (Y8 or later)	8 µs or less (Y0 to YB) 1 ms or less (YC or later)
Surge absorber		Zener diode		
Operating mode indicator		LED		
EN61131-2 applicable type		Type3 (However, the above specifications must be met.)		

(Note 1) These specifications apply when the ambient temperature is 25 °C.

■ Internal circuit diagram



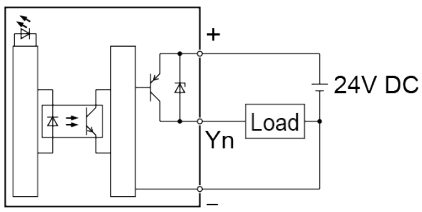
2.4.3 Output Specifications (PNP Output)

■ Specifications

Item		Specifications		
		C14P	C30P	C60P
Insulation system		Optical coupler		
Output type		PNP open collector		
Rated load voltage		24 V DC		
Allowable load voltage range		21.6 to 26.4 V DC		
Rated load current		0.5 A		
Max. inrush current		1.5 A		
Off state leakage current		1 μA or less		
ON-state max. voltage drop		0.5 V DC or less		
Overcurrent protection function		None		
Input points per common		6-point common	6-point common x 1 8-point common x 1	6-point common x 2 8-point common x 2
Response time (Note 1)	OFF→ON	2 μs or less (Y0 to Y3) 1 ms or less (Y4 or later)	2 μs or less (Y0 to Y7) 1 ms or less (Y8 or later)	2 μs or less (Y0 to YB) 1 ms or less (YC or later)
	ON→OFF	8 μs or less (Y0 to Y3) 1 ms or less (Y4 or later)	8 μs or less (Y0 to Y7) 1 ms or less (Y8 or later)	8 μs or less (Y0 to YB) 1 ms or less (YC or later)
Surge absorber		Zener diode		
Operating mode indicator		LED		
EN61131-2 Applicable type		Type3 (However, the above specifications must be met.)		

(Note 1) These specifications apply when the ambient temperature is 25 °C.

■ Internal circuit diagram



2.5 Terminal Layout

2.5.1 Relay Output (AC Power Supply Type)

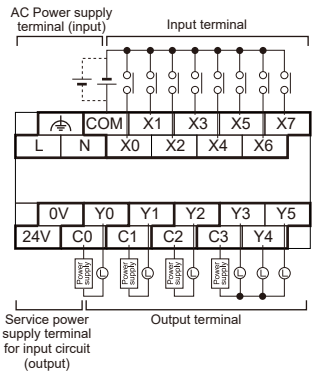
Input terminal

COM terminals in the same terminal block are connected within the unit. However, input terminal 1 and input terminal 2 of the C60 are independent from other terminals. (These terminals are not connected internally.)

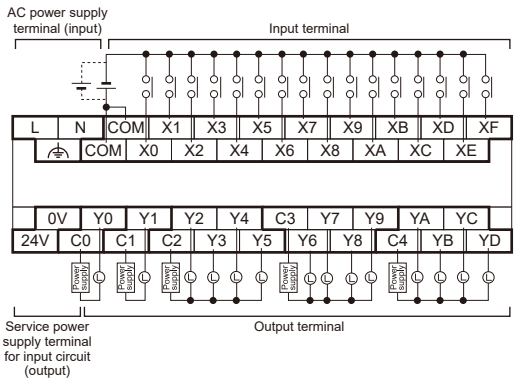
Output terminal

Each COM terminal (C0, C1 …) is independent. Use them in the range surrounded by the bold black lines.

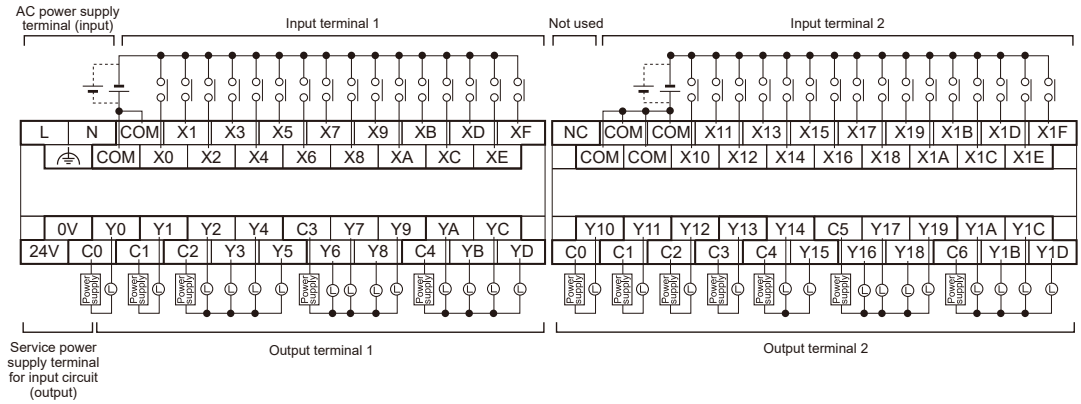
■ AFPXHC14R



■ AFPXHC30R



■ **AFPXHC60R**



2.5.2 Relay Output (DC Power Supply Type)

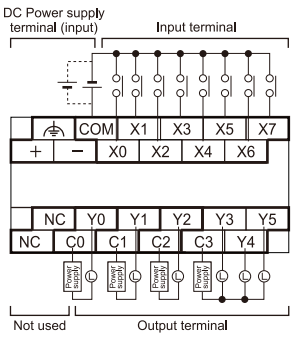
Input terminal

COM terminals in the same terminal block are connected within the unit. However, input terminal 1 and input terminal 2 of the C60 are independent from other terminals. (These terminals are not connected internally.)

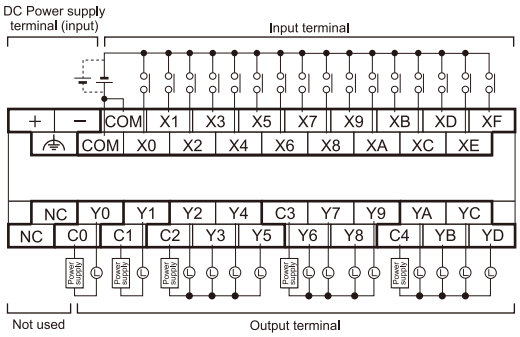
Output terminal

Each COM terminal (C0, C1 …) is independent. Use them in the range surrounded by the bold black lines.

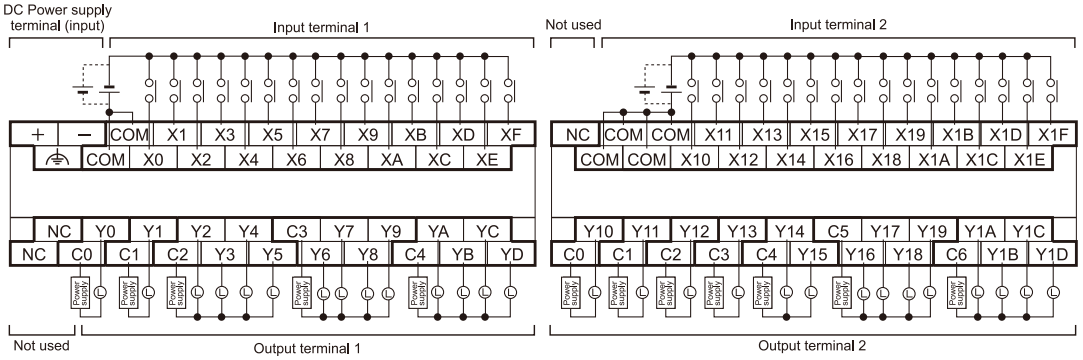
■ **AFPXHC14RD**



■ **AFPXHC30RD**



■ **AFPXHC60RD**



2.5.3 Transistor Output (AC Power Supply Type)

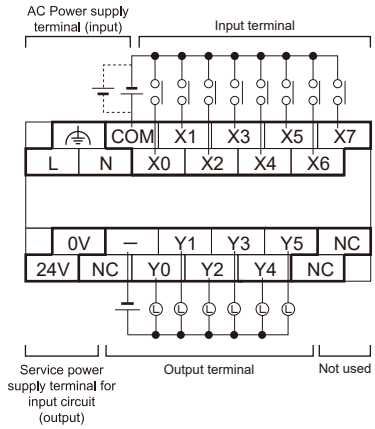
Input terminal

COM terminals in the same terminal block are connected within the unit. However, input terminal 1 and input terminal 2 of the C60 are independent from other terminals. (These terminals are not connected internally.)

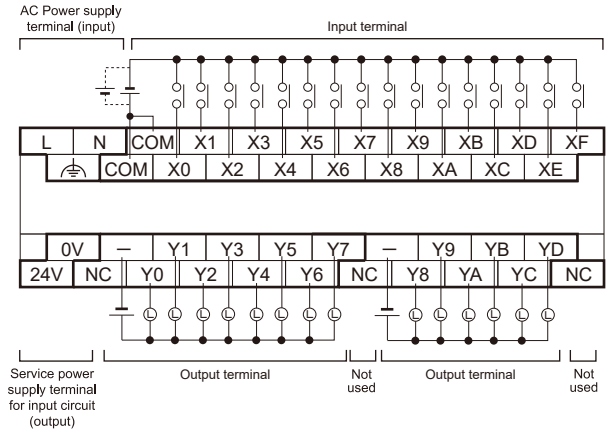
Output terminal

The negative terminals are connected within the unit.

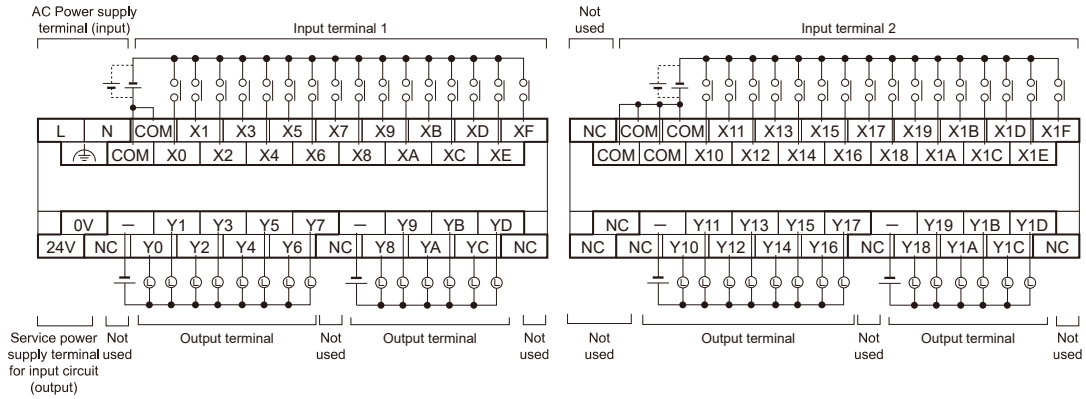
■ AFPXHC14T (NPN output)



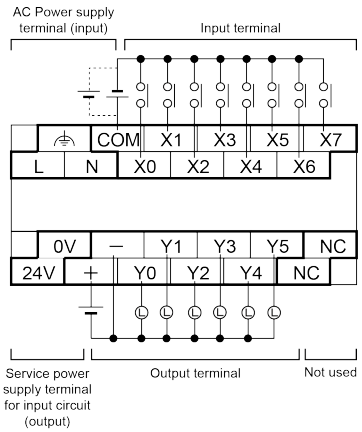
■ AFPXHC30T (NPN output)



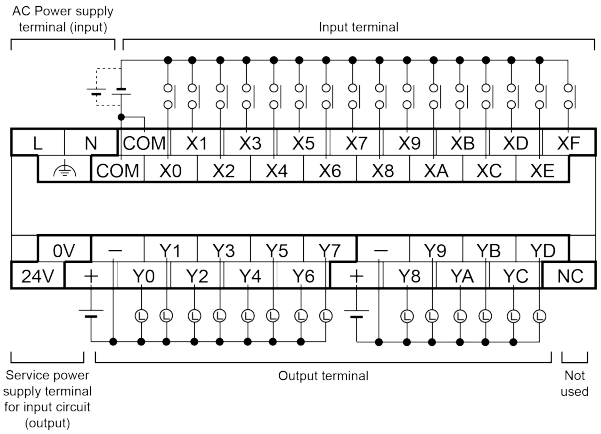
■ AFPXHC60T (NPN output)



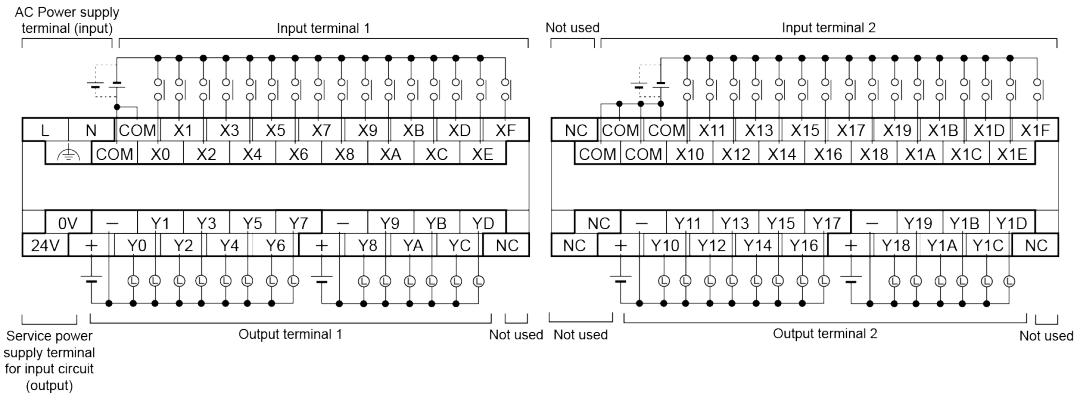
■ AFPXHC14P (PNP output)



■ AFPXHC30P (PNP output)



■ AFPXHC60P (PNP output)



2.5.4 Transistor Output (DC Power Supply Type)

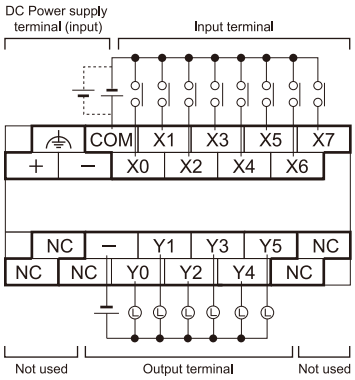
Input terminal

COM terminals in the same terminal block are connected within the unit. However, input terminal 1 and input terminal 2 of the C60 are independent from other terminals. (These terminals are not connected internally.)

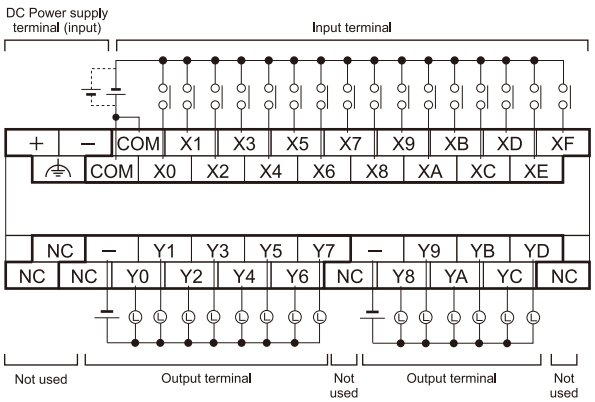
Output terminal

The negative terminals are connected within the unit.

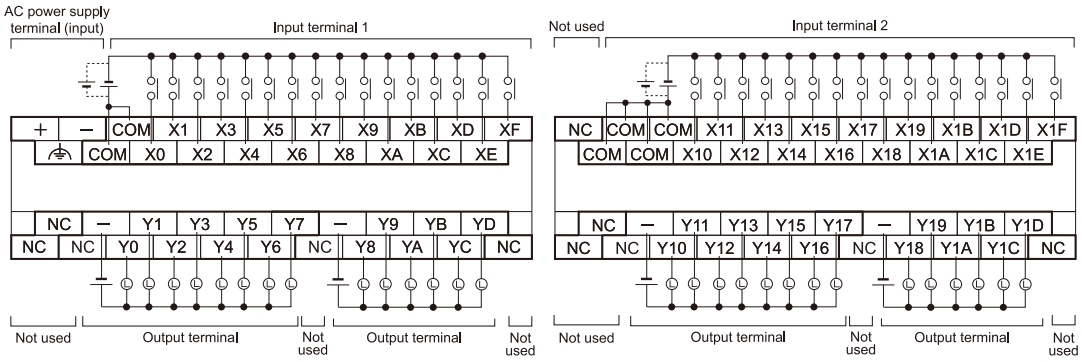
■ AFPXHC14TD (NPN output)



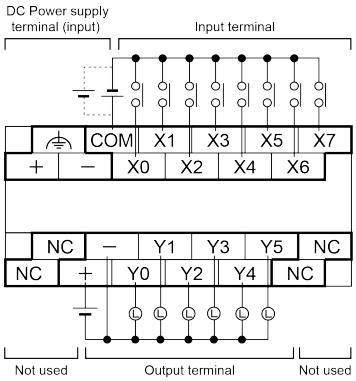
■ AFPXHC30TD (NPN output)



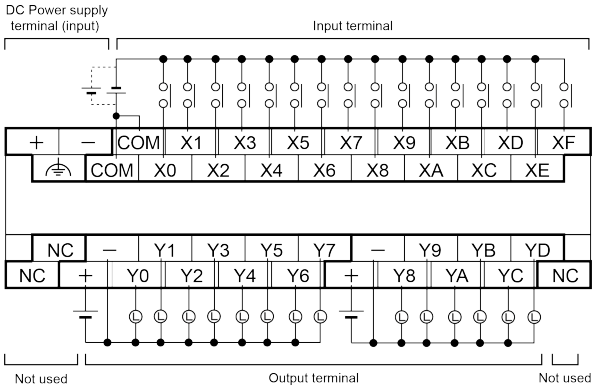
■ AFPXHC60TD(NPN output)



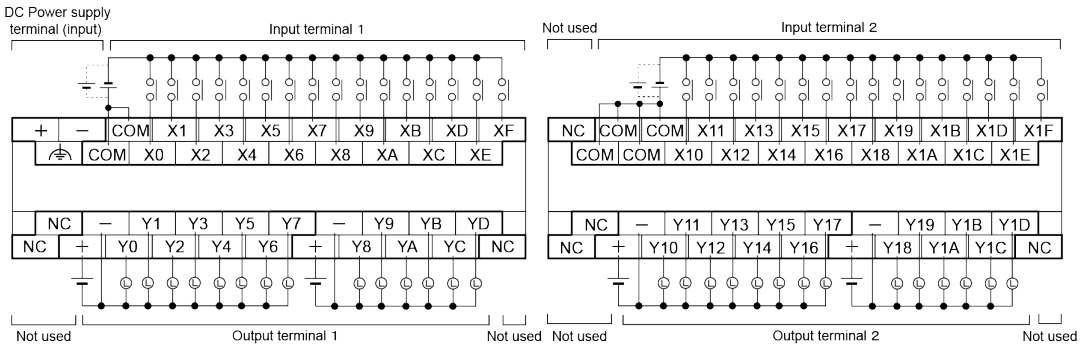
■ AFPXHC14PD (PNP output)



■ AFPXHC30PD (PNP output)



■ AFPXHC60PD (PNP output)



(MEMO)

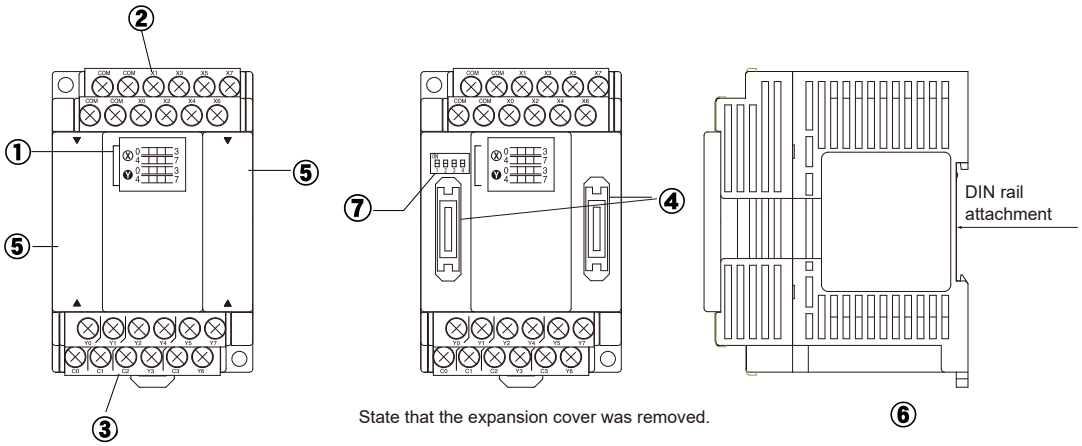
3 Expansion Unit/Expansion Adapter Specifications

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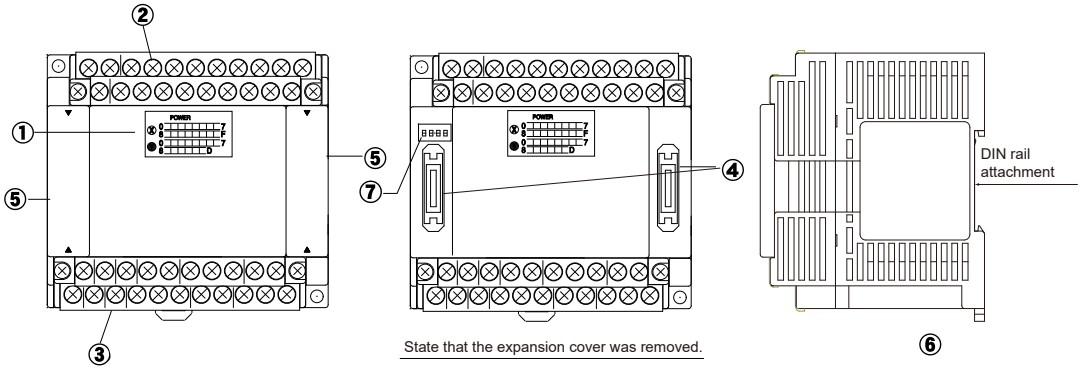
3.1 FP-X Expansion Unit

3.1.1 Parts and Functions

■ **FP-X E16 expansion I/O unit**



■ **FP-X E30 expansion I/O unit**



(1) Output display LED

Displays the ON/OFF state of the input/output.

(2) Input terminal block

This is the input terminal. A solderless terminal for M3 can be used.

(3) Output terminal table

This is the output terminal. A solderless terminal for M3 can be used.

(4) Expansion connector

Connects with the control unit, expansion unit and the expansion FP0 adapter using the exclusive expansion cable.

(5) Expansion cover

It is used after the expansion cable has been fitted.

(6) DIN rail attachment lever (single-touch hook)

This lever enables the expansion unit to attach to a DIN rail at a touch.

(7) Terminator setting DIP switch

All switches should be turned on for the expansion unit installed at the last position.

3.1.2 Power Supply Specifications

■ AC power supply

Item	Specifications
	E30
Rated voltage	100 to 240 V AC
Voltage regulation	85 to 264 V AC
Inrush current	40 A or less (at 240 V AC, 25 °C)
Momentary power off time	10 ms (when using 100 V AC)
Frequency	50 / 60 Hz (47 to 63 Hz)
Leakage current	0.75 mA or less between input and protective earth terminals
Built-in power supply guaranteed lifetime	20,000 hours (at 55°C)
Fuse	Built-in (Cannot be replaced)
Insulation method	Transformer insulation
Terminal screw	M3

■ Service Power Supply for Input (Output) (AC power supply type only)

Item	Specifications
	E30
Rated output voltage	24 V DC
Voltage regulation	21.6 to 26.4 V DC
Rated output current	0.4 A
Overcurrent protection function(Note 1)	Available
Terminal screw	M3

(Note 1) This is a function to protect overcurrent temporarily. If a current load that is out of the specifications is connected, it may lead to damages.

■ DC Power Supply

Item	Specifications
	E30
Rated voltage	24 V DC

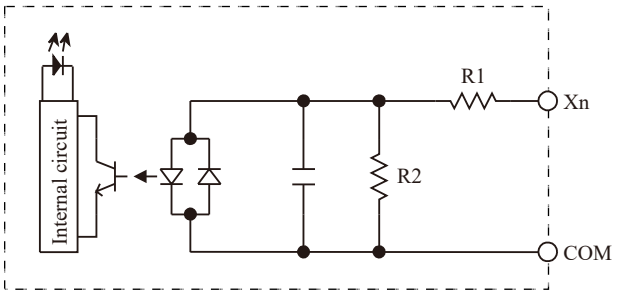
Item	Specifications
	E30
Voltage regulation	20.4 to 28.8 V DC
Inrush current	12 A or less (at 25°C)
Momentary power off time	10 ms
Built-in power supply guaranteed lifetime	20,000 hours (at 55°C)
Fuse	Built-in (Cannot be replaced)
Insulation method	Transformer insulation
Terminal screw	M3

3.1.3 Input / Output Specifications

■ Input specifications

Item		Specifications	
		E16	E30
Insulation method		Optical coupler	
Rated input voltage		24 V DC	
Operating voltage range		21.6 V DC to 26.4 V DC	
Rated input current		Approx. 4.3 mA	
Input points per common		8-points/common	16-points/common
		(Either the positive or negative of input power supply can be connected to common terminal.)	
Min. on voltage/Min. on current		19.2 V DC/3 mA	
Max. off voltage/Max. off current		2.4 V DC/1 mA	
Input impedance		Approx. 5.6 kΩ	
Response time	OFF→ON	0.6 ms or less	
	ON→OFF	0.6 ms or less	
Operating mode indicator		LED display	
EN61131-2 applied type		TYPE3 (however, according to the above specifications)	

■ Circuit diagram



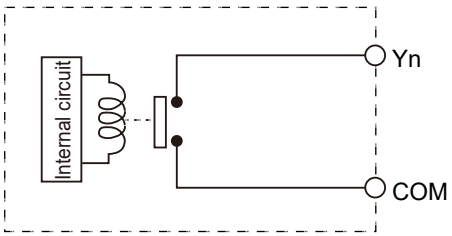
: R1=5.6 kΩ R2=1 kΩ

■ Relay output specifications

Item		Specifications	
		E16 / E14	E30
Insulation method		Relay insulation	
Output type		1a output (Relay cannot be replaced.)	
Rated control capacity(Note 1)		2 A 250 V AC, 2 A 30 V DC	
		(6 A or less/common)	(8 A or less/common)
Input points per common		1-point/common, 3-points/common	1-point/common, 4-points/common
Response time	OFF→ON	Approx. 10 ms	
	ON→OFF	Approx. 8 ms	
Lifetime	Mechanical	20 million times or more (Frequency of switching: 180 times/min.)	
	Electrical	100 thousand times or more (Frequency of switching at the rated control capacity: 20 times/min.)	
Surge absorber		None	
Operating mode indicator		LED display	

(Note 1) Resistance load

■ Circuit diagram

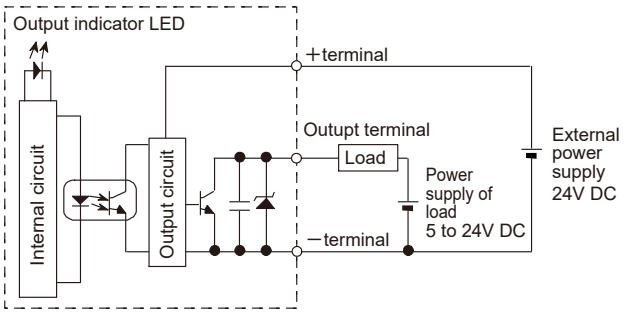


■ Transistor type (NPN)

Item	Specifications	
	E16	E30
Insulation method	Optical coupler	

Item			Specifications	
			E16	E30
Output type			Open collector	
Rated load voltage			5 to 24 V DC	
Allowable load voltage range			4.75 to 26.4 V DC	
Max. load current			0.5A	
Max. inrush current			1.5 A	
Input points per common			8-points/common	8-points/common, 6-points/common
Off state leakage current			1 μA or less	
ON state max. voltage drop			0.3 V DC or less	
Response time	OFF→ON		1 ms or less	
	ON→OFF		1 ms or less	
External power supply (+, – terminals)	Voltage		21.6 to 26.4 V DC	
	Current	Y0 to Y7	45 mA or less	45 mA or less
		Y8 to YD	—	35 mA or less
Surge absorber			Zener diode	
Operating mode indicator			LED display	

■ Circuit diagram

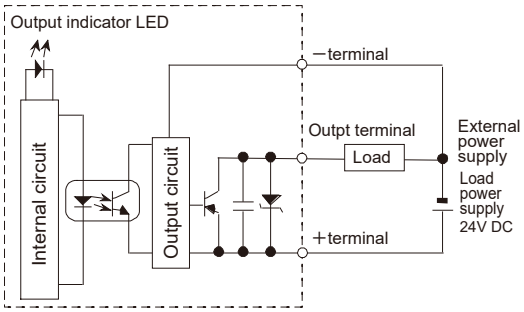


■ Transistor type (PNP)

Item	Specifications	
	E16	E30
Insulation method	Optical coupler	
Output type	Open collector	
Rated load voltage	24 V DC	
Allowable load voltage range	21.6 to 26.4 V DC	
Max. load current	0.5A	
Max. inrush current	1.5 A	
Input points per common	8-points/common	8-points/common, 6-points/common
Off state leakage current	1 μA or less	

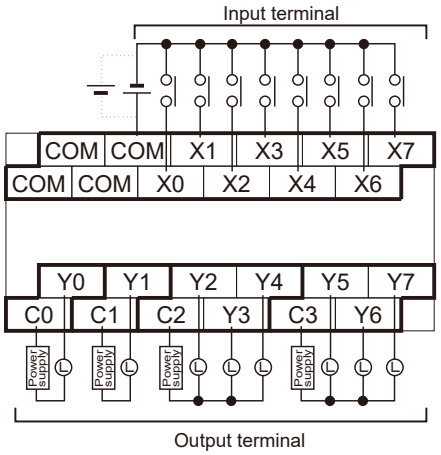
Item			Specifications	
			E16	E30
ON state max. voltage drop			0.5 V DC or less	
Response time	OFF→ON		1 ms or less	
	ON→OFF		1 ms or less	
External power supply (+, – terminals)	Voltage		21.6 to 26.4 V DC	
	Current	Y0 to Y7	65 mA or less	65 mA or less
		Y8 to YD	—	50 mA or less
Surge absorber			Zener diode	
Operating mode indicator			LED display	

■ Circuit diagram



3.1.4 Terminal Layout

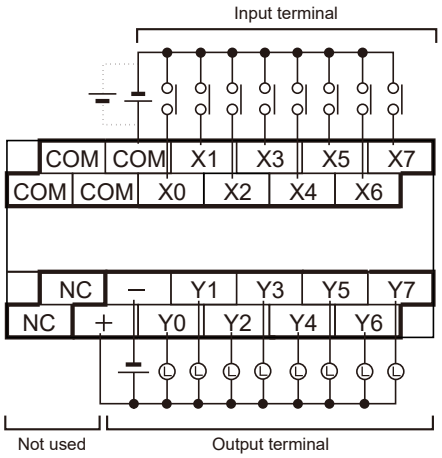
■ AFPX-E16R



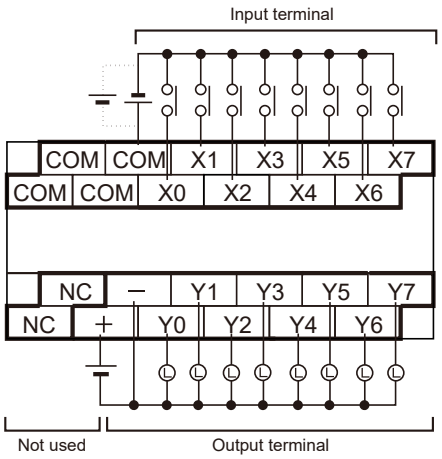
- Relations between the output terminals and COM terminals

Y1 ——— C0
Y0 ——— C1
Y2 to Y4 ——— C2
Y5 to Y7 ——— C3

■ AFPX-E16T

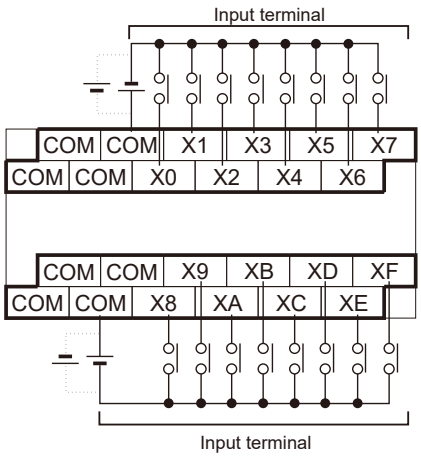


■ AFPX-E16P

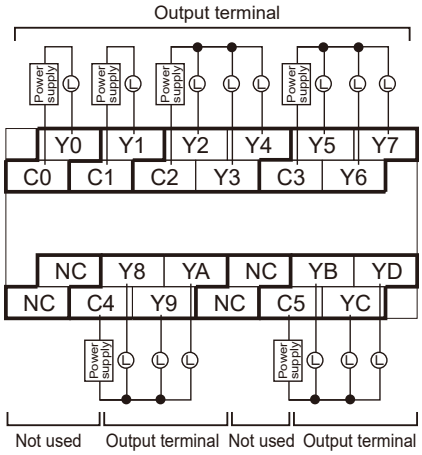


+, −: Power supply for Y0 to Y7

■ AFPX-E16X



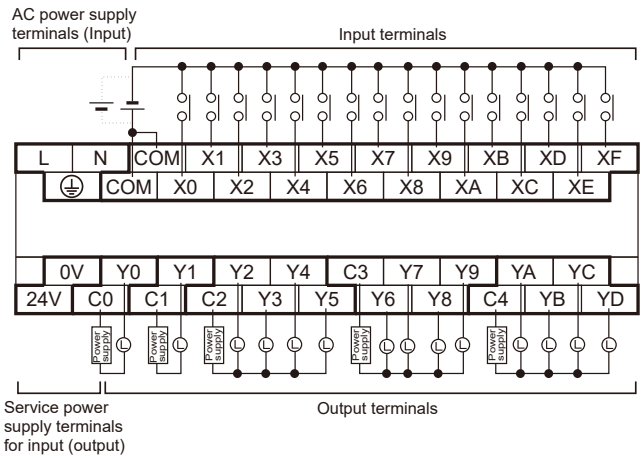
■ AFPX-E14YR



● Relations between the output terminals and COM terminals

Y1 ——— C0
Y0 ——— C1
Y2 to Y4 ——— C2
Y5 to Y7 ——— C3
Y8 to YA ——— C4
YB to YD ——— C5

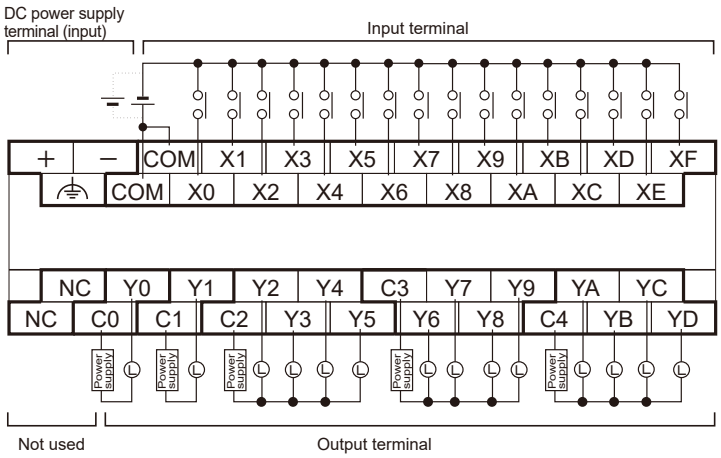
■ AFPX-E30R



● Relation between output terminals and COM terminals

Y0 ——— C0
Y1 ——— C1
Y2 to Y5 ——— C2
Y6 to Y9 ——— C3
YAto YD ——— C4

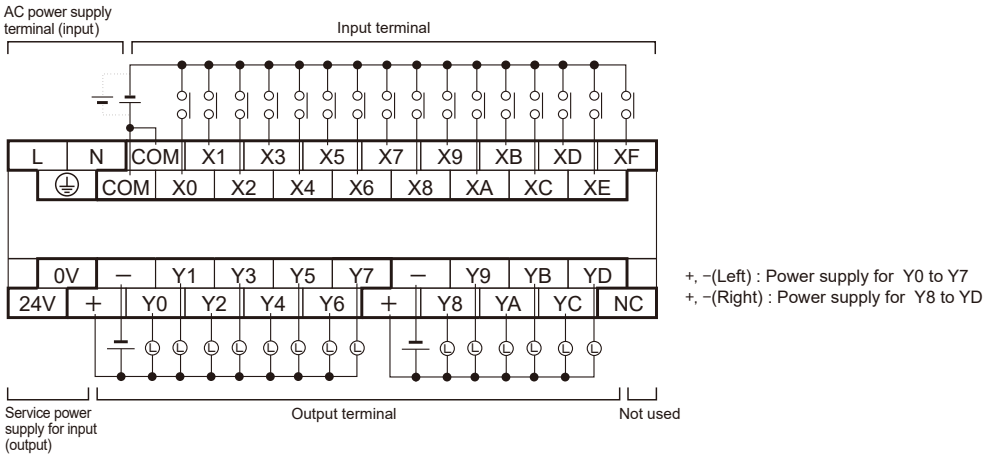
■ AFPX-E30RD



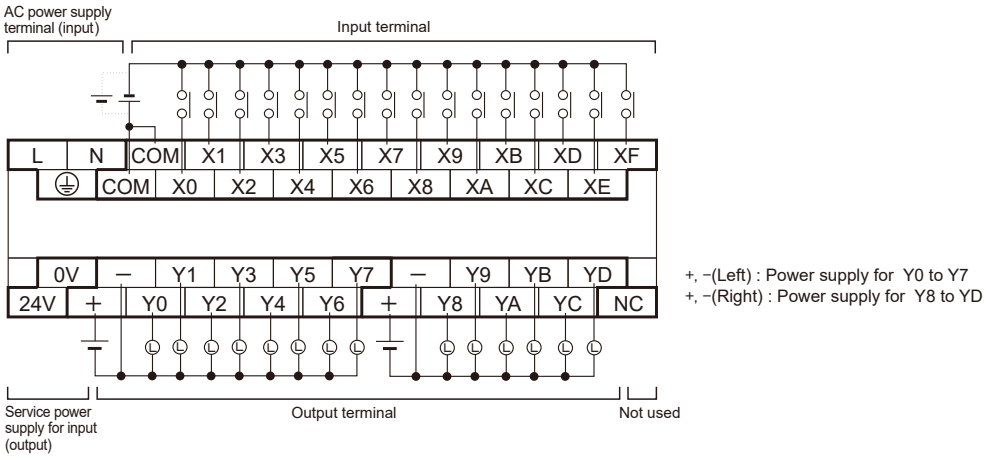
● Relation between output terminals and COM terminals

Y0 ——— C0
Y1 ——— C1
Y2 to Y5 ——— C2
Y6 to Y9 ——— C3
YA to YD ——— C4

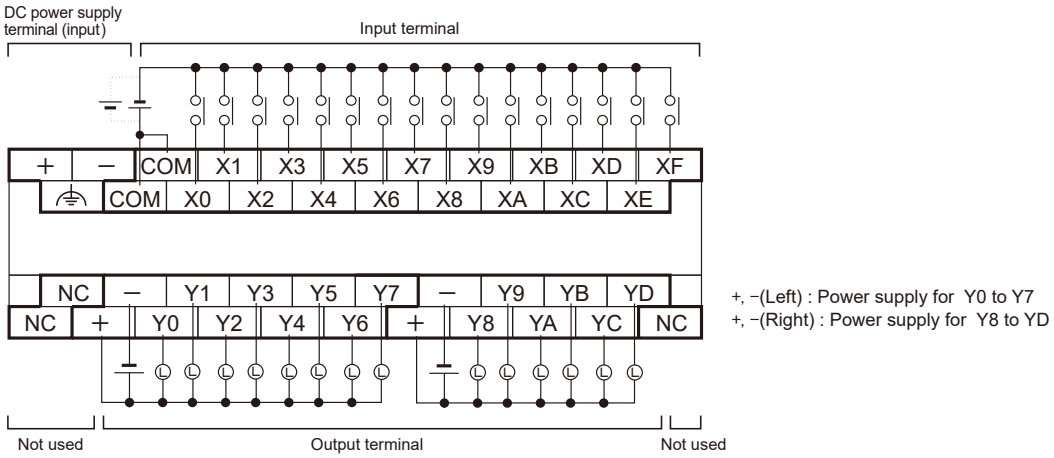
■ AFPX-E30T



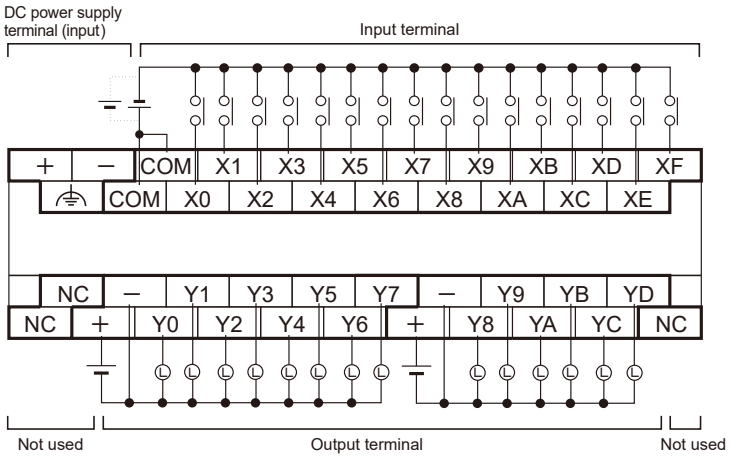
■ AFPX-E30P



■ AFPX-E30TD



■ AFPX-E30PD



+, −(Left) : Power supply for Y0 to Y7
+, −(Right) : Power supply for Y8 to YD

Input terminal:

Each COM terminal in the same terminal block is connected within the unit.

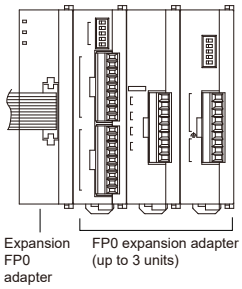
Output terminal:

Each COM port (CO, C1 …) of Ry type is separate. Each power supply terminal of Tr type is separate. Use them in the range surrounded by the bold black lines.

3.2 FP-X Expansion FP0 Adapter

3.2.1 Overview

For the FP-XH, a maximum of 3 units of the FP0 expansion units (expansion I/O unit, intelligent unit) can be used using the expansion FP0 adapter.



All FP0 expansion unit can be used.

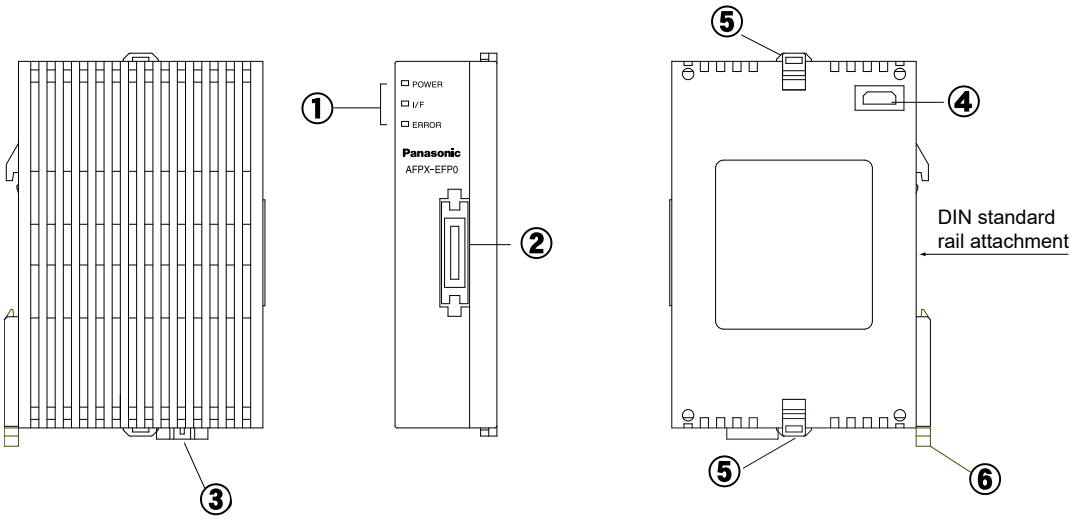
- DC input unit
- Transistor output unit
- Relay output unit
- Analog input/output unit
- Thermocouple unit
- Network unit

Note

- The expansion FP0 adapter does not function by itself. Always connect the FP0 expansion unit to it.

3.2.2 Parts and Functions

■ FP-X expansion FP0 adapter (AFPX-EFP0)



(1) State indicator LEDs

LED		LED and operation status
POWER	Green	When the power of 24 V DC is supplied and the communication starts with the control unit, the LED lights. When the communication cannot be carried out, it goes out.
I/F	Green	When the communication starts with the control unit, the LED lights. When the communication cannot be carried out, it goes out. When the FP0 expansion unit is not connected, it flashes.
ERROR	Red	When an error occurs on the connection with the FP0 expansion unit, it flashes.

(2) FP-X expansion bus connector

Connects the FP-X control unit (or FP-X expansion unit). The provided expansion cable (AFPX-EC08) is used for the connection.

It is not necessary to specify the TERM (terminal) setting for the expansion FP0 adapter.

(3) Power supply connector (24 V DC)

Supply 24 V DC. The provided power supply cable (AFP0581) is used for the connection.

Supply the power from the service power supply for the input of the FP-X control unit.

(4) FP0 expansion connector

Connects the FP0 expansion unit.

(5) Expansion hook

This hook is used to secure the FP0 expansion unit.

(6) DIN rail attachment lever (single-touch hook)

This lever enables the expansion unit to attach to a DIN rail at a touch. The lever is also used for installation on the mounting plate slim type (AFP0803).

■ General specifications

Item	Specifications
Rated voltage	24 V DC
Voltage regulation	21.6 to 26.4 V DC
Inrush current	20 A or less (24 V DC, at 25°C)
Fuse	Built-in (Cannot be replaced)
Insulation method	Non-isolated
Power supply connector	3-pin connector (Power supply cable AFP0581 is provided.)

4 Function Cassette Specifications

4.1 FP-X Analog Input Cassette 4-2
4.2 FP-X Analog Output Cassette.....4-6
4.3 FP-X Analog I/O Cassette.....4-10
4.4 FP-X Thermocouple Cassette.....4-18
4.5 FP-X RTD (Resistance Temperature Detector) Cassette 4-20
4.6 FP-X Input Cassette.....4-23
4.7 FP-X Output Cassette.....4-24
4.8 FP-X I/O Cassette.....4-27
4.9 FP-X Pulse I/O Cassette.....4-29
4.10 FP-X Master Memory Cassette.....4-32

4.1 FP-X Analog Input Cassette

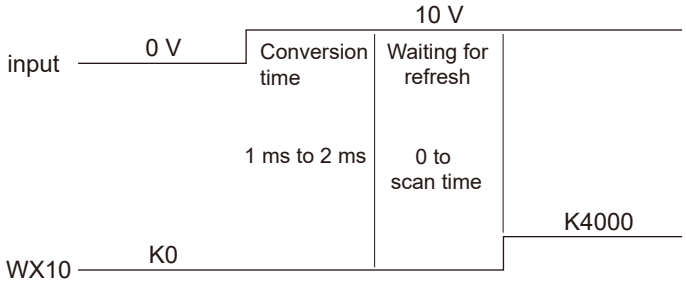
■ Product No.: AFPX-AD2

Item		Specifications
No. of input points		2 channels/cassette
Input range	Voltage	0 to 10 V
	Current	0 to 20 mA
Digital conversion value		K0 to K4000(Note 1)
Resolution		1/4000 (12 bits)
Conversion speed		1 ms/channel
Total accuracy		±1% F.S. or less (0 to 55°C)
Input impedance	Voltage	40 kΩ
	Current	125 Ω
Absolute max. rating	Voltage	-0.3 to +15 V
	Current	-2 to +30 mA
Input protection		Diode
Isolation		Non-isolated between analog part and internal digital circuit part
Occupation No. of I/O contacts		Input 32-points

(Note 1) When the analog input values exceed the upper and lower limits, the digital values maintain the upper and lower limit values.

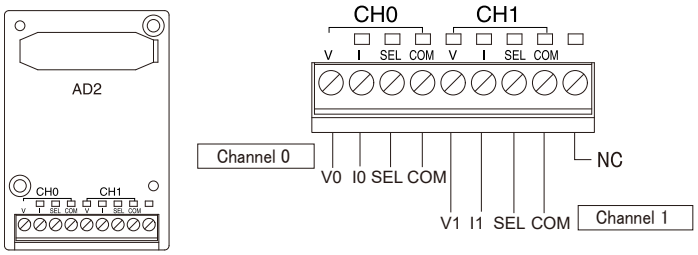
As the resolution is 12 bits, the higher 4 bits of the input contact are always 0.

(Note 2) Following time is required to reflect the analog data in the input of the control unit.



(Note 3) Averaging cannot be processed with the cassette. If averaging is necessary, use a ladder program to execute averaging process.

■ Terminal layout

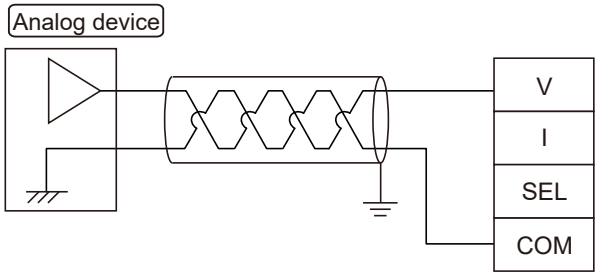


(Note 1) No LED display.

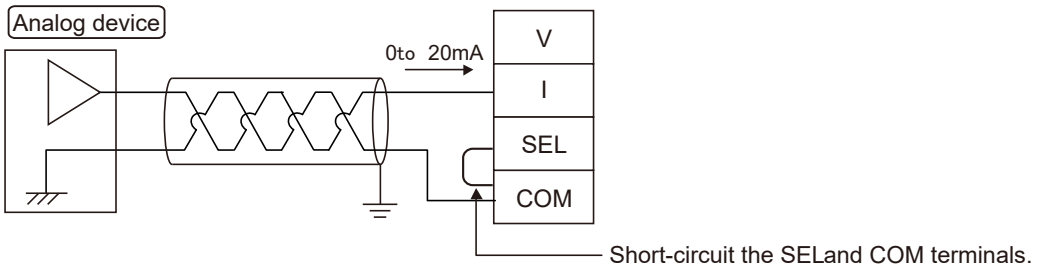
CH0	V	Voltage input
	I	Current input
	SEL	Voltage/current select
	COM	Common
CH1	V	Voltage input
	I	Current input
	SEL	Voltage/current select
	COM	Common
NC		Not used

■ Connection method

With voltage input (0 to 10V)



With current input (0 to 20 mA)



- For wire connection, use double-core twisted-pair shielded wires. When connecting, ground the shield wire.
  However, do not ground the shielded wire depending on the conditions of the external noise.
- Do not place the analog input signal wire close to (or bundle with) an AC power line, high-voltage line, or load wire.

■ I/O Allocation

- Each channel data is allocated as I/O data as shown below.

Analog input cassette input channel	Installed slot No.	
	Cassette mounting part 1 Slot 0	Cassette mounting part 2 Slot 1
CH0	WX10	WX20
CH1	WX11	WX21

■ 0 mA to 20 mA DC input

Conversion characteristics graph

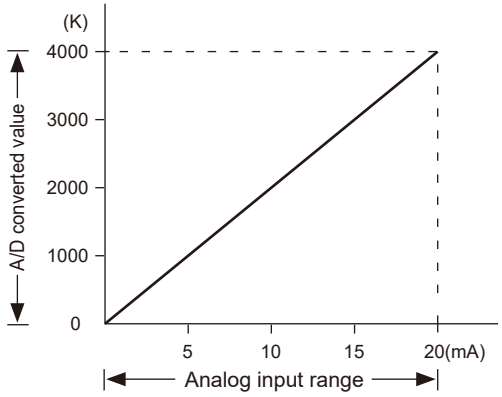


Table of A/D converted values

Input current (mA)	A/D converted value
0.0	0
2.5	500
5.0	1000
7.5	1500
10.0	2000
12.5	2500
15.0	3000
17.5	3500
20.0	4000

When exceeding the rated range

Input value	Converted value
0 mA or less (Negative value)	0
20 mA or more	4000

■ 0 V to 10 V DC input

Conversion characteristics graph

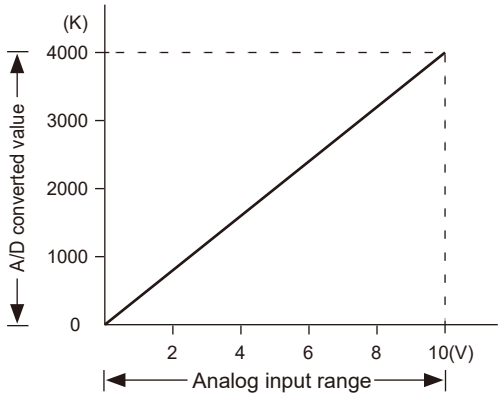


Table of A/D converted values

Input voltage (V)	A/D converted value
0.0	0
1.0	400
2.0	800
3.0	1200
4.0	1600
5.0	2000
6.0	2400
7.0	2800
8.0	3200
9.0	3600
10.0	4000

When exceeding the rated range

Input value	Converted value
0 V or less (Negative value)	0
10 V or more	4000

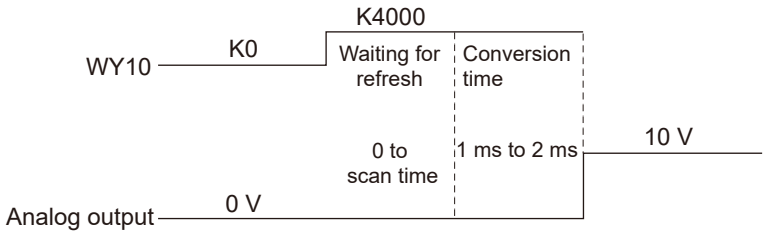
4.2 FP-X Analog Output Cassette

■ Product No.: AFPX-DA2

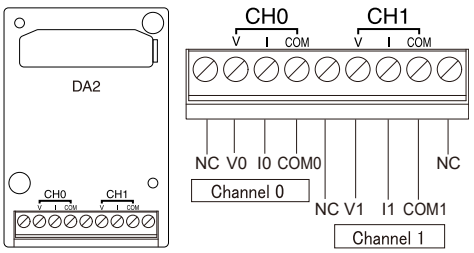
Item		Specifications
No. of output points		2 channels/cassette
Output range	Voltage	0 to 10 V
	Current	0 to 20 mA
Digital value		K0 to K4000(Note 1)
Resolution		1/4000 (12 bits)
Conversion speed		1 ms/1 channel
Total accuracy		±1% F.S. or less (0 to 55°C)
Output impedance		0.5 Ω (Voltage output)
Output max. current		10 mA (Voltage output)
Output allowable load resistance		600 Ω or less (Current output)
Insulation method		● Between analog output terminal and internal digital circuit part Transformer isolation, Isolation IC Isolation ● Between each channel of analog output terminals Transformer isolation, Isolation IC Isolation

(Note 1) When a digital value exceeds the upper/lower limits, D/A conversion is not performed (existing analog output value is kept as of).

(Note 2) The following time is required to reflect the output of the control unit in the analog output.



■ Terminal layout

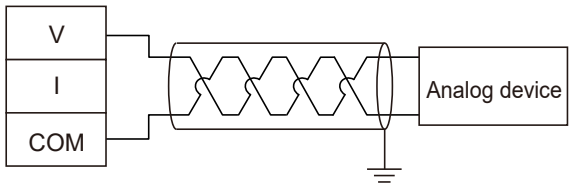


CH0	V	Voltage input
	I	Current input
	COM	Common

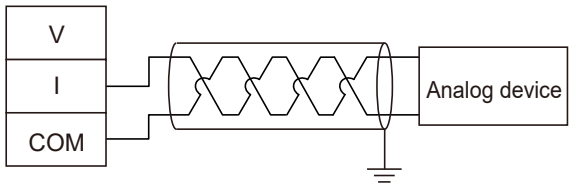
CH1	V	Voltage input
	I	Current input
	COM	Common
NC		Not used

■ Connection method

With voltage output (0 to 10V)

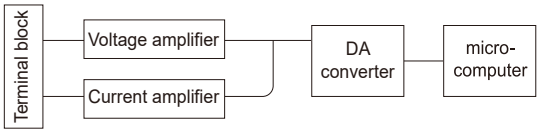


With current output (0 to 20 mA)



- For wire connection, use double-core twisted-pair shielded wires. When connecting, ground the shield wire.
  However, do not ground the shielded wire depending on the conditions of the external noise.
- Do not place the analog output signal wire close to (or bundle with) an AC power line, high-voltage line, or load wire.
- A voltage amplifier and a current amplifier is connected in parallel to one DA converter IC.
  Do not connect an analog device to the voltage output terminal and current output terminal of the same channel simultaneously.

DA part Internal block diagram



■ I/O allocation

- Each channel data is allocated as I/O data as shown below.

Analog output cassette output channel	Installed slot No.	
	Cassette mounting part 1 Slot 0	Cassette mounting part 2 Slot 1
CH0	WY10	WY20
CH1	WY11	WY21

■ 0 mA to 20 mA output

Conversion characteristics graph

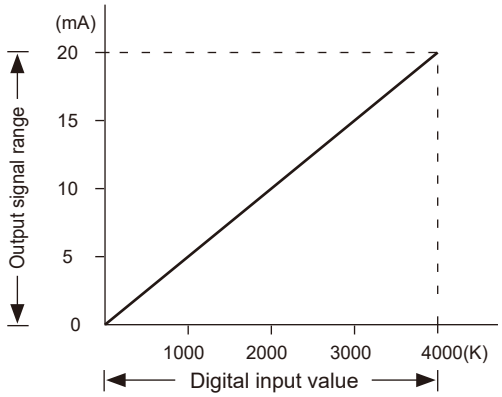


Table of D/A converted values

Digital input value	Output current (mA)
0	0.0
500	2.5
1000	5.0
1500	7.5
2000	10.0
2500	12.5
3000	15.0
3500	17.5
4000	20.0

When exceeding the rated range

Digital input value	Analog output value
Negative value	Unchanged (Value preceding the input of a negative value)
4001 or more	Unchanged (Value preceding the input of 4001)

■ 0 V to 10 V output

Conversion characteristics graph

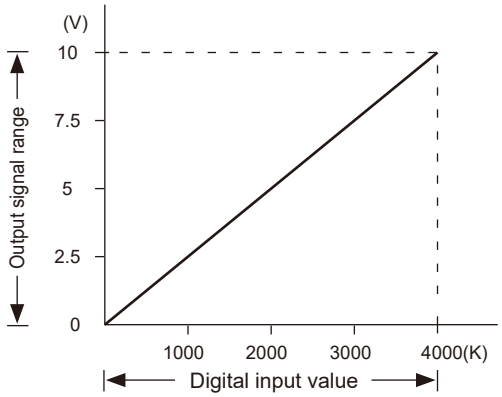


Table of D/A converted values

Input voltage (V)	A/D converted value
0	0.0
400	1.0
800	2.0
1200	3.0
1600	4.0
2000	5.0
2400	6.0
2800	7.0
3200	8.0
3600	9.0
4000	10.0

When exceeding the rated range

Digital input value	Analog output value
Negative value	Unchanged (Value preceding the input of a negative value)
4001 or more	Unchanged (Value preceding the input of 4001)

4.3 FP-X Analog I/O Cassette

■ Product No.: AFPX-A21

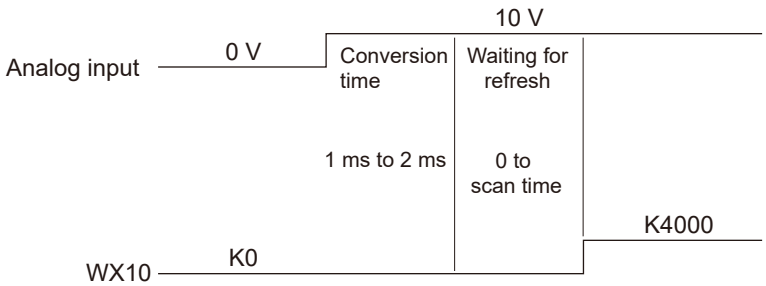
Input specifications

Item		Specifications
No. of input points		2 channels/cassette
Input range	Voltage	0 to 10 V, 0 to 5 V
	Current	0 to 20 mA
Digital conversion value		K0 to K4000
Resolution		1/4000 (12 bits)
Conversion speed		1 ms/channel
Total accuracy		±1% F.S. or less (0 to 55°C)
Input impedance	Voltage	1M Ω
	Current	250 Ω
Absolute max. input	Voltage	-0.5V, +15V (Voltage input)
	Current	+30 mA (Current input)
Insulation method		● Between analog input terminal and internal digital circuit part Transformer insulation, isolation IC insulation ● Between analog input terminal and analog output terminal Transformer insulation, isolation IC insulation

(Note 1) When the analog input values exceed the upper and lower limits, the digital values maintain the upper and lower limit values.

As the resolution is 12 bits, the higher 4 bits of the input contact are always 0.

(Note 2) Following time is required to reflect the analog data in the input of the control unit.



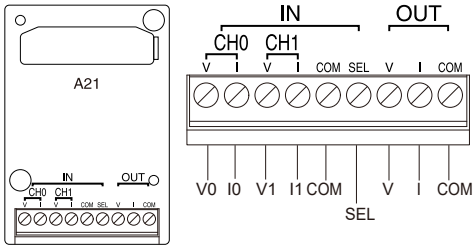
(Note 3) Averaging cannot be processed with the cassette. If averaging is necessary, use a ladder program to execute averaging process.

Output specifications

Item		Specifications
No. of output points		1 channel/cassette
Output range	Voltage	0 to 10 V
	Current	0 to 20 mA

Item	Specifications
Digital value	K0 to K4000
Resolution	1/4000 (12 bits)
Conversion speed	1 ms/1 channel
Total accuracy	±1% F.S. or less (0 to 55°C)
Output impedance	0.5 Ω (Voltage output)
Output max. current	10 mA (Voltage output)
Output allowable load resistance	600 Ω or less (Current output)
Insulation method	● Between analog output terminal and internal digital circuit part Transformer insulation, isolation IC insulation ● Between analog output terminal and analog input terminal Transformer insulation, isolation IC insulation

■ Terminal layout

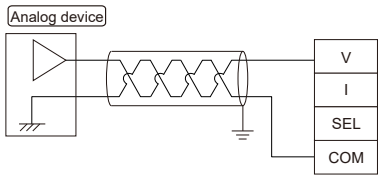


Input	CH0	V	Voltage input
		I	Current input
	CH1	V	Voltage input
		I	Current input
	COM		Common (for input)
	SEL(Note 1)		Input range selection 0 to 10 V or 0 to 5 V, 0 to 20mA
Output	V		Voltage input
	I		Current input
	COM		Common (for output)

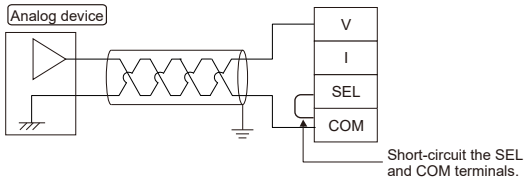
(Note 1) The CH0 and CH1 will be the same range according to switching of the SEL terminal. However, the inputs of 0 to 5 V and 0 to 20 mA can be used at the same time depending on the connection.

■ Connection method

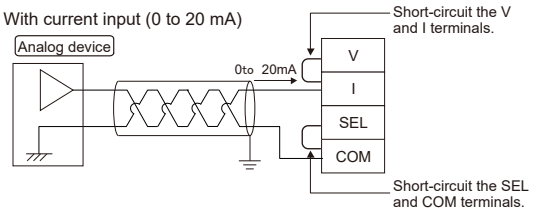
With voltage input (0 to 10V)



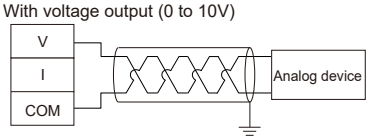
With voltage input (0 to 5V)



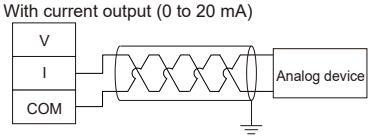
With current input (0 to 20 mA)



With voltage output (0 to 10V)



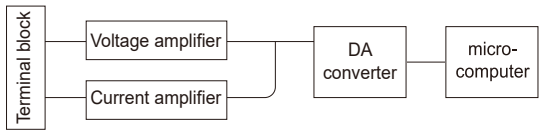
With current output (0 to 20 mA)



- For wire connection, use double-core twisted-pair shielded wires. When connecting, ground the shield wire.
  However, do not ground the shielded wire depending on the conditions of the external noise.
- Do not place the analog input/output wire close to (or bundle with) an AC power line, high-voltage line, or load wire.
- A voltage amplifier and a current amplifier is connected in parallel to one DA converter IC.
  Do not connect an analog device to the voltage output terminal and current output terminal of the same channel simultaneously.

Stop

DA part Internal block diagram



■ I/O allocation

- Each channel data is allocated as I/O data as shown below.

Channel	Installed slot No.	
	Cassette mounting part 1 Slot 0	Cassette mounting part 2 Slot 1
Input CH0	WX10	WX20
Input CH1	WX11	WX21
Output CH0	WY10	WY20

■ 0 mA to 20 mA DC input

Conversion characteristics graph

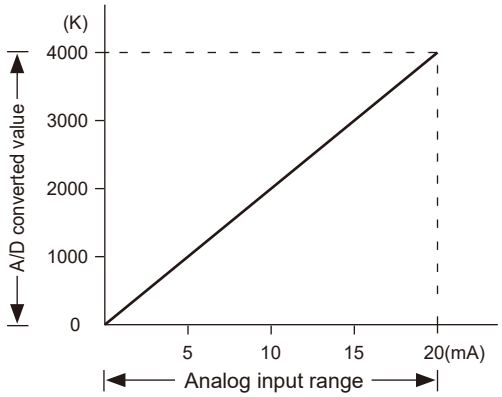


Table of A/D converted values

Input current (mA)	A/D converted value
0.0	0
2.5	500
5.0	1000
7.5	1500
10.0	2000
12.5	2500
15.0	3000
17.5	3500
20.0	4000

When exceeding the rated range

Input value	Converted value
0 mA or less (Negative value)	0
20 mA or more	4000

■ 0V to 10V DC input

Conversion characteristics graph

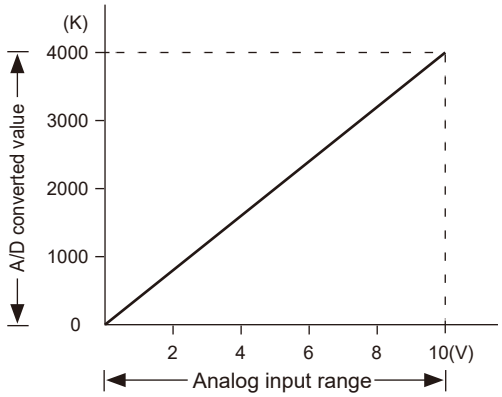


Table of A/D converted values

Input voltage (V)	A/D converted value
0.0	0
1.0	400
2.0	800
3.0	1200
4.0	1600
5.0	2000
6.0	2400
7.0	2800
8.0	3200
9.0	3600
10.0	4000

When exceeding the rated range

Input value	Converted value
0 V or less (Negative value)	0
10 V or more	4000

■ 0 V to 5 V DC input

Conversion characteristics graph

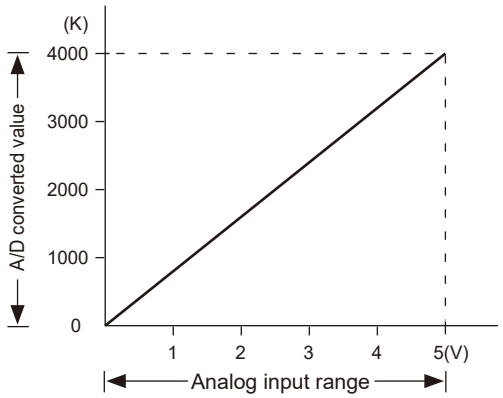


Table of A/D converted values

Input voltage (V)	A/D converted value
0.0	0
0.5	400
1.0	800
1.5	1200
2.0	1600
2.5	2000
3.0	2400
3.5	2800
4.0	3200
4.5	3600
5.0	4000

When exceeding the rated range

Input value	Converted value
0 V or less (Negative value)	0
5 V or more	4000

■ 0 mA to 20 mA output

Conversion characteristics graph

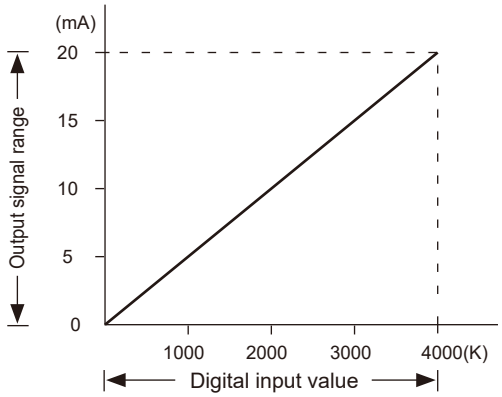


Table of D/A converted values

Digital input value	Output current (mA)
0	0.0
500	2.5
1000	5.0
1500	7.5
2000	10.0
2500	12.5
3000	15.0
3500	17.5
4000	20.0

When exceeding the rated range

Digital input value	Analog output value
Negative value	Unchanged (Value preceding the input of a negative value)
4001 or more	Unchanged (Value preceding the input of 4001)

■ 0 V to 10 V output

Conversion characteristics graph

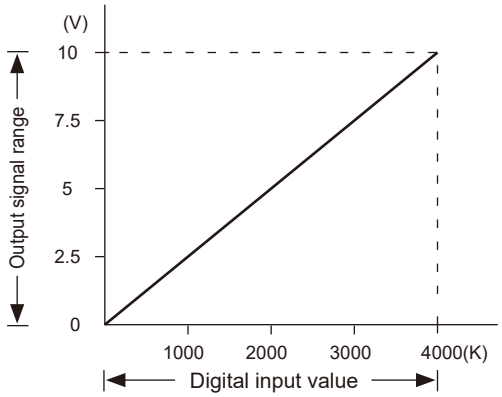


Table of D/A converted values

Digital input value	Output current (mA)
0	0.0
400	1.0
800	2.0
1200	3.0
1600	4.0
2000	5.0
2400	6.0
2800	7.0
3200	8.0
3600	9.0
4000	10.0

When exceeding the rated range

Digital input value	Analog output value
Negative value	Unchanged (Value preceding the input of a negative value)
4001 or more	Unchanged (Value preceding the input of 4001)

4.4 FP-X Thermocouple Cassette

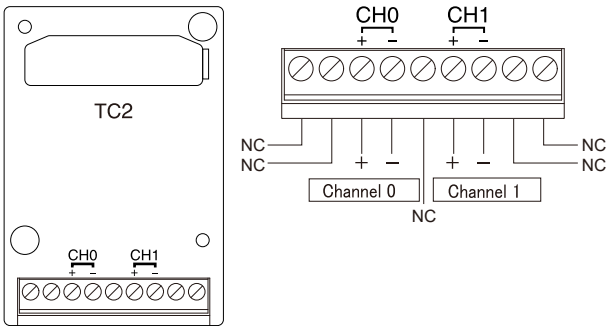
■ Product No.: AFPX-TC2

Item	Specifications
No. of input points	2 channels/cassette
Input range	Thermocouple type K (-50.0 to 500.0 °C) Thermocouple type J (-50.0 to 500.0 °C)
Digital value	In normal condition: K-500 to K5000 When exceeding rated range: K-501, K5001 or K8000 When wire is broken: K8000 When data is getting ready: K8001
Resolution	0.2 °C (The indication is 0.1 °C by the software averaging procedure.)
Sampling cycle	200 ms / 2 channels
Total accuracy	0.5% F.S. or less + Cold junction error 1.5 °C
Input impedance	344 kΩ
Insulation method	Transformer isolation, Isolation IC Isolation

(Note 1) When the wire of thermocouple is broken, the digital value will change to K8000 within 70 seconds.
Practice in the ladder program a process for avoiding a risk, would be resulting from a broken wire, and exchange the thermocouple.

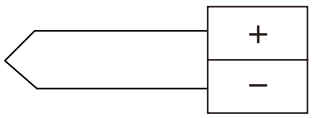
(Note 2) From the Power-on to the converted data Ready, the digital value will be K8001. Create a ladder program not to use the data obtained during that period.

■ Terminal layout

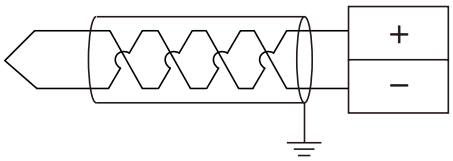


CH0	+	Thermocouple input +
	-	Thermocouple input -
CH1	+	Thermocouple input +
	-	Thermocouple input -
NC		Used by the system. Do not connect anything.

■ Connection method



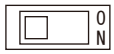
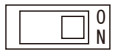
- Keep the space more than 100 mm between the input line and the power line/high-voltage line.
- It is recommended to ground the unit using the shielded compensating wire.



■ Range setting switch

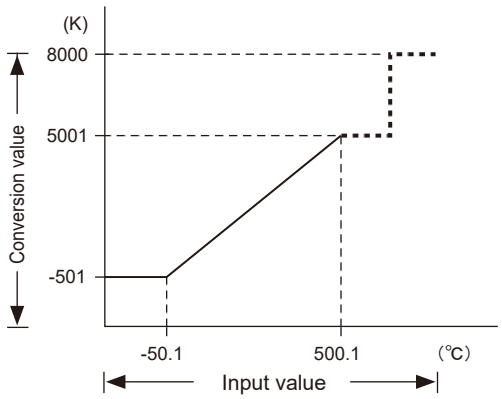
Select the thermocouple type K or J with the switch at the back. (The CH0 and CH1 will be the same range.)

Switch (backside)

 OFF	Thermocouple type K
 ON	Thermocouple type J

■ K and J range

Conversion characteristics graph



When exceeding the rated range

Input value	Converted value
-50.1 °C or less	K -501
500.1 °C or more	K 5001 or K 8000
When wire is broken	K 8000

4.5 FP-X RTD (Resistance Temperature Detector) Cassette

■ Product No.: AFPX-RTD2

Item	Specifications
No. of input points	2 channels/cassette
Input range	RTD Pt100(Note 1) (-200.0 to +850.0 °C)
Digital value	In normal condition: K-2000 to K8500 When exceeding rated range: K-2150 to K-2001, K8501 to K8650(Note 2) When wire is broken: K20000 When data is getting ready: K20001(Note 3)(Note 4)
Resolution	0.1 °C (Minimum unit)
Sampling cycle	200 ms or less(Note 5)
Total accuracy	±0.2% F.S. or less (Ambient temperature: 0 to +55°C)(Note 6)
Allowable input wire resistance	Resistance value per wire: 10 Ω or less
Insulation method	Between analog input circuit and internal circuit: Transformer insulation: photo coupler insulation Between analog input channels: Transformer isolation
Occupation No. of I/O contacts	Input 32 points(Note 7)

(Note 1) Use a 3-wire type RTD.

(Note 2) When exceeding the rated range, reference values which are not in the range of the conversion accuracy assurance are indicated up to ±15 °C. However, if the temperature drops (below -230 °C) or rise (over 900 °C) more, the data will be the same value (K20000) as the one at the time of disconnection.

(Note 3) The digital value will be K20001 from the Power-on to the converted data Ready (approx. 3 seconds) or when an error occurs (watchdog timer time-out error) on the microcomputer for the RTD cassette.

Take care of the use of the data during this period not to influence other programs.

(Note 4) From the disconnection to the recovery and converted data Ready (approx. 3 seconds), the digital value will be K20001. Take care of the use of the data during this period not to influence other programs.

(Note 5) The conversion speed is 200 ms or less regardless of the number of channels to be used. And it will be reflected in the internal data register after the completion of a scan.

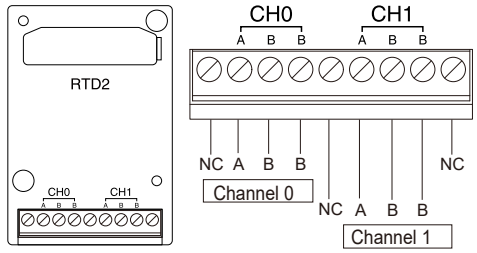
(Note 6) The full scale (F.S.) is -200 to 850 °C for the accuracy range of RTD Pt100.

(Note 7) Each channel data is allocated as I/O data as shown below.

RTD cassette input channel	Installed slot	
	Expansion slot 0 (Cassette position)	Expansion slot 1 (Cassette position)
Channel 0 (CH0)	WX10	WX20
Channel 1 (CH1)	WX11	WX21

(Note 8) Supply power for 15 minutes or more after the power-on for performing the accurate measurement before using the cassette.

■ Terminal layout

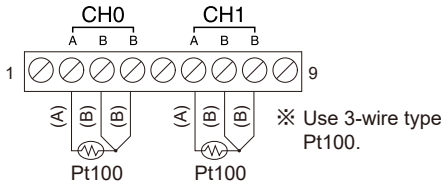


CH0	A	RTD input A
	B	RTD input B
	B	RTD input B
CH1	A	RTD input A
	B	RTD input B
	B	RTD input B
NC		Do not connect anything.

■ Connection method

Connect each channel as mentioned below. After the connection, confirm that the polarity and terminal positions are correctly connected.

When inputting RTD



(Note 1) When extending the lead wire of RTD, use 3 wires in the same resistance and the same length.

(Note 2) Do not place the input signal line close to an AC power line or high-voltage line. Also, do not bundle it with them.

(Note 3) Use shielded wires for the input signal line and ground them.
However, do not ground the shielded wire depending on the conditions of the external noise.

(Note 4) Do not connect one RTD to other equipment in parallel (input).

■ RTD input range

Conversion characteristics graph

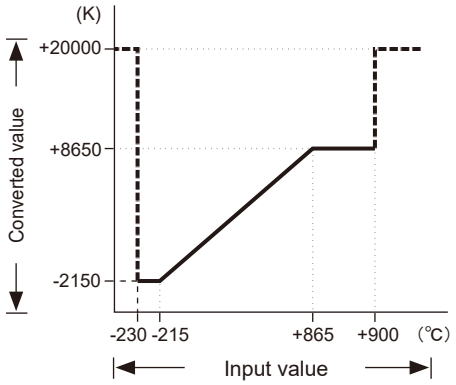


Table of converted values

Input value [°C]	Converted value
-200	-2000
0	0
850	8500

When exceeding the rated range

Input value	Converted value
-215 °C or less	-2150
865 °C or more	8650
Disconnection	20000

(Note 1) When exceeding the maximum/minimum value (exceeding the rated range), the converted values will be the values as mentioned above. However, if the temperature drops (below -230 °C) or rises (over 900 °C) more, the data will be the same value (+20000) as the one at the time of disconnection.

(Note 2) In the following ranges, reference values which accuracy is not assured are indicated: from the upper limit to the point 15 °C higher than it and from the lower limit to the point 15 °C lower than it.

■ About RTD input range

Note

- From the Power-on to the converted data Ready (approx. 3 seconds), the digital value will be K20001.

  Take care of the use of the data during this period not to influence other programs.
- From the disconnection or exceeding the rated range (digital value: K20000) to the recovery and converted data Ready (approx. 3 seconds), the digital value will be K20001.

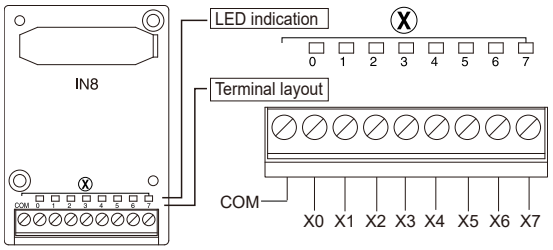
  Take care of the use of the data during this period not to influence other programs.

4.6 FP-X Input Cassette

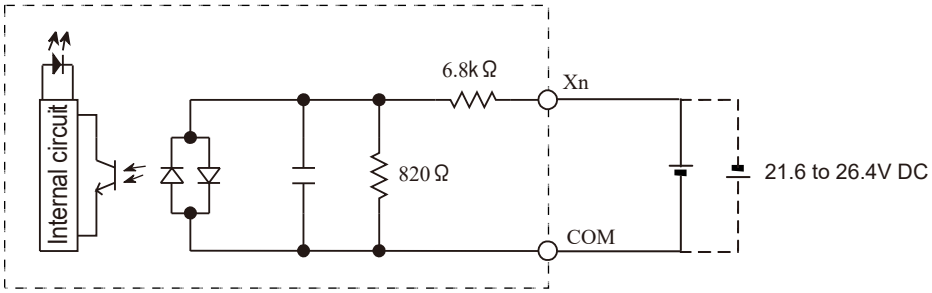
■ Product No.: AFPX-IN8

Item		Specifications
Insulation method		Optical coupler
Rated input voltage		24 V DC
Operating voltage range		21.6 to 26.4 V DC
Rated input current		Approx. 3.5 mA
Input points per common		8 points/common (Either the positive or negative of input power supply can be connected to common terminal.)
Min. on voltage/Min. on current		19.2 V DC/3 mA
Max. off voltage/Max. off current		2.4 V DC/1 mA
Input impedance		Approx. 6.8 kΩ
Response time	OFF→ON	1.0 ms or less
	ON→OFF	1.0 ms or less
Operating mode indicator		LED display
EN61131-2 Applicable type		TYPE3 (however, according to the above specifications)

■ LED indication/Terminal layout



■ Circuit diagram

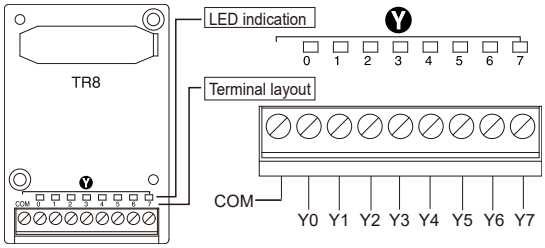


4.7 FP-X Output Cassette

■ Product No.: AFPX-TR8

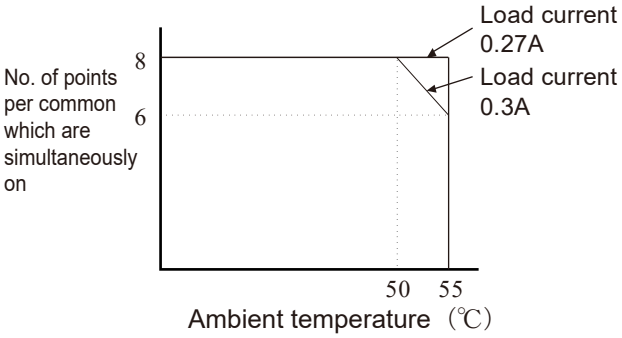
Item		Specifications
Insulation method		Optical coupler
Output type		Open corrector (NPN)
Rated load voltage		24 V DC
Allowable load voltage range		21.6 to 26.4 V DC
Max. load current		0.3 A
Max. inrush current		1.5 A
Output points per common		8 points/common
Off state leakage current		1 μA or less
On state max. voltage drop		1.5 V DC or less
Response time	OFF→ON	0.1 ms or less
	ON→OFF	0.8 ms or less
Surge absorber		Zener diode
Operating mode indicator		LED display

■ LED indication/Terminal layout

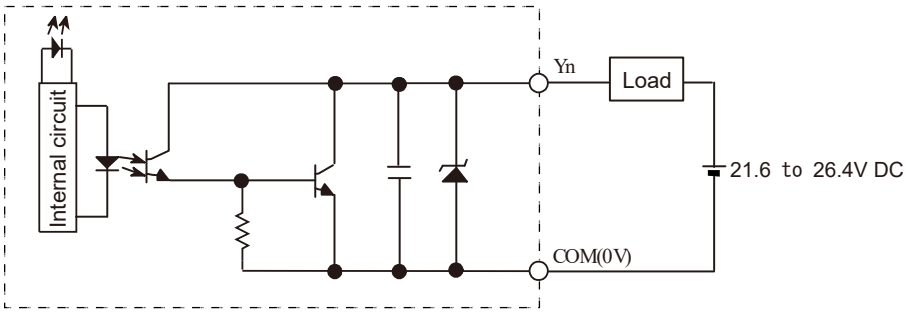


■ Limitations on number of simultaneous on points

Keep the number of points which are simultaneously on within the following range as determined by the ambient temperature.



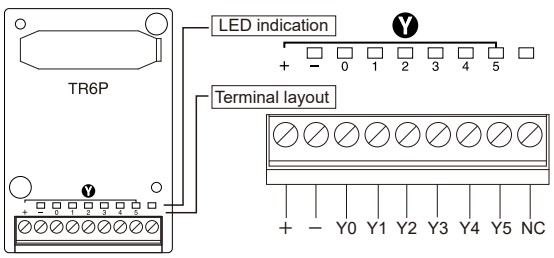
■ Circuit diagram



■ Product No.: AFPX-TR6P

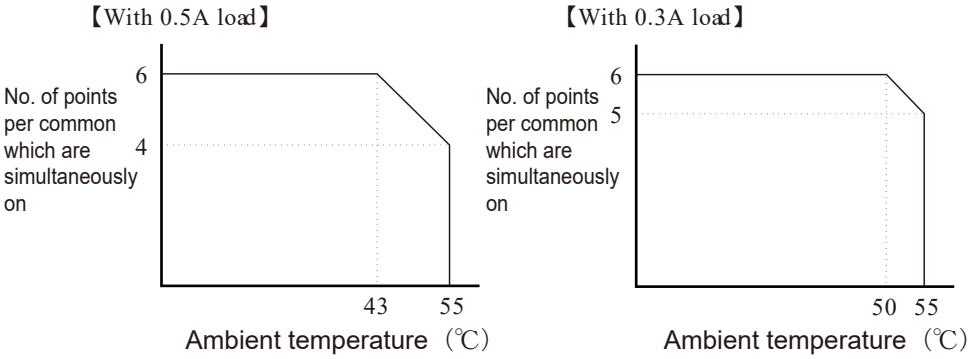
Item		Specifications
Insulation method		Optical coupler
Output type		Open corrector (PNP)
Rated load voltage		24 V DC
Allowable load voltage range		21.6 to 26.4 V DC
Max. load current		0.5 A
Max. inrush current		1.5 A
Output points per common		6 points/common
Off state leakage current		1 μA or less
On state max. voltage drop		1.5 V DC or less
Response time	OFF→ON	0.1 ms or less
	ON→OFF	0.8 ms or less
Surge absorber		Zener diode
Operating mode indicator		LED display

■ LED indication/Terminal layout

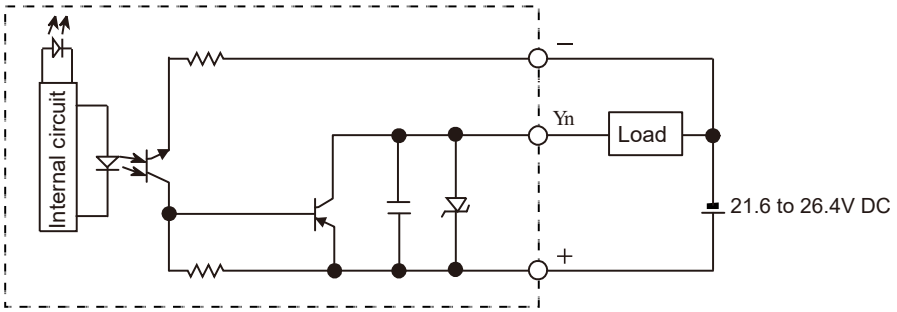


■ Limitations on number of simultaneous on points

Keep the number of points which are simultaneously on within the following range as determined by the ambient temperature.



■ **Circuit diagram**



4.8 FP-X I/O Cassette

■ Product No.: AFPX-IN4T3

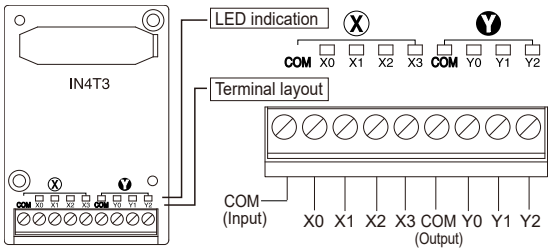
Input specifications

Item	Specifications
Rated input voltage	24 V DC
Operating voltage range	21.6 to 26.4 V DC
Rated input current	Approx. 3.5 mA
Input points per common	4 points/common
Min. on voltage/Min. on current	19.2 V DC/3 mA
Max. off voltage/Max. off current	2.4 V DC/1 mA
Input impedance	6.8 kΩ
Response time	1 ms or less
Operating mode indicator	LED display

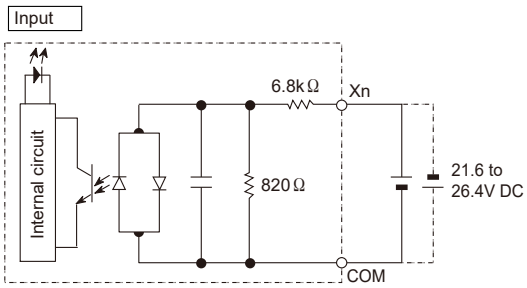
Output specifications

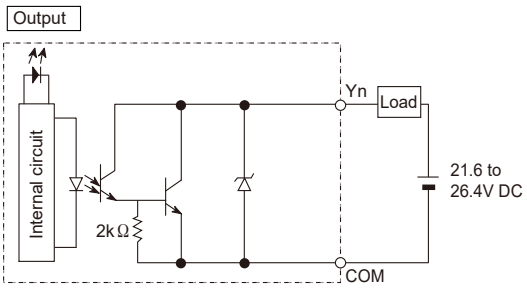
Item	Specifications
Output type	NPN open collector
Rated load voltage	24 V DC
Rated load current	0.3 A
Output points per common	3 points/common
Response time	0.1ms or less (OFF→ON), 0.8ms or less (ON→OFF)
Operating mode indicator	LED display

■ LED indication/Terminal layout



■ Circuit diagram





4.9 FP-X Pulse I/O Cassette

- The pulse I/O cassette cannot be used with the FP-XH control unit Tr type.

■ Product No.: AFPX-PLS

High-speed counter part

Item		Specifications
Insulation method		Optical coupler
No. of input points	For high-speed counter	Single-phase 2 channels, 2-phase 1 channel
	For pulse catch	3 points
	For interrupt input	3 points
	For normal input	3 points
Rated input voltage		24 V DC
Operating voltage range		21.6 to 26.4V DC
Rated input current		Approx. 8 mA
Input points per common		3 points/common
Min. on voltage/Min. on current		19.2 V DC / 6 mA
Max. off voltage/Max. off current		2.4 V DC / 1.3 mA
Input impedance		Approx. 3 kΩ
Response time	OFF→ON	5 μs or less(Note 1)
	ON→OFF	5 μs or less(Note 1)
Operating mode indicator		LED display
EN61131-2 Applicable type		TYPE3 (however, according to the above specifications)

(Note 1) This is the specification when the rated input voltage is 24 V DC at 25 °C.

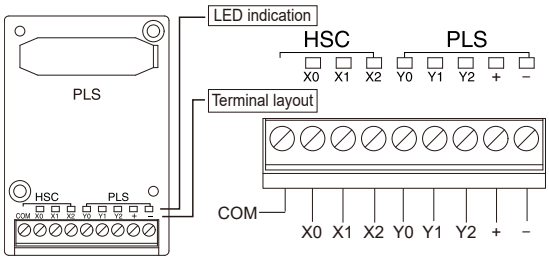
As the input of the pulse I/O cassette is for the counter input, the response time is quick. Therefore, if it is used as a normal input, it is recommended to add a timer by a ladder program to prevent chattering or noises to be received as input signals.

Pulse output part

Item		Specifications
Insulation method		Optical coupler
No. of output points	For pulse output	1ch
	For PWM output	1ch
	For normal output	3 points
Output type		Open corrector (NPN)
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		0.3A

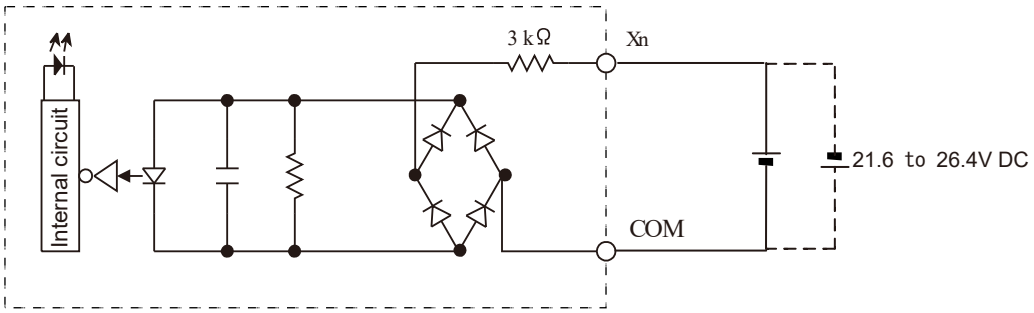
Item			Specifications
Max. inrush current			1.5 A
Output points per common			3 points/common
Off state leakage current			1 μA or less
ON state max. voltage drop			0.2 V DC or less
Response time	Y0 Y1	OFF→ON	2 μs or less (when the load current is 15 mA or more.)
		ON→OFF	5 μs or less (when the load current is 15 mA or more.)
	Y2	OFF→ON	1 ms or less
		ON→OFF	1 ms or less
External power supply (+, – terminals)			21.6 to 26.4 V DC
Surge absorber			Zener diode
Operating mode indicator			LED display

■ LED indication/Terminal layout

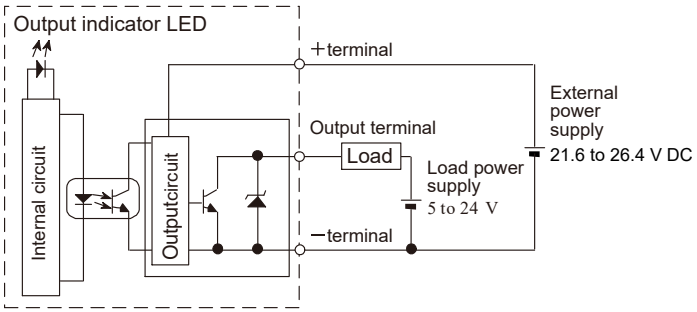


■ Circuit diagram

High-speed counter part



Pulse output part



4.10 FP-X Master Memory Cassette

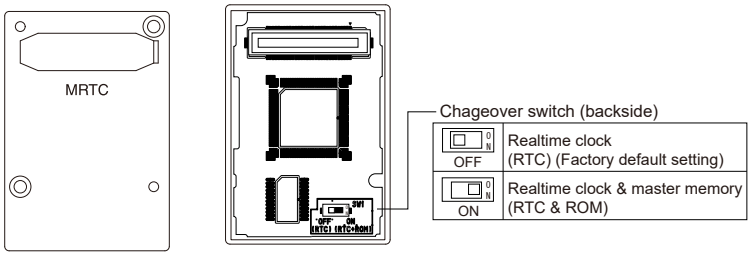
■ Product No.: AFPX-MRTC

Item		Specifications
Clock/Calendar	Setting items	Year (last 2 digits), month, day hour (24-hour display), minute, second and day of week
	Accuracy	At 0 °C: less than 104 seconds per month At 25 °C: less than 51 seconds per month At 55 °C: less than 155 seconds per month
Master memory function	Memory capacity	Flash ROM (512 kB)
	Storable data	System registers
		Ladder programs
		Comment data (328 kB)
		F-ROM data area
		Security function

- Only the Clock/Calendar function is valid at the factory setting.
  Install a battery in the control unit to use the Clock/Calendar function.
  If the battery is not installed, the Clock/Calendar does not function.

■ Function changeover switch (between the Clock/Calendar and the master memory)

Use the switch at the back of the cassette to switch between the Clock/Calendar and master memory functions.



5 Allocation of I/O Numbers

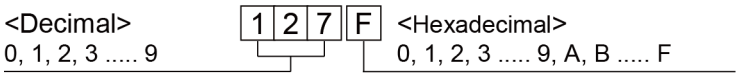
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5.1 Basics of I/O Allocation

5.1.1 How to Count I/O Numbers

■ How to count and express I/O numbers

- Since I/O number are handled in units of 16 points, they are expressed as a combination of a device type code and the lowest-digit of a decimal or hexadecimal number.
- In the case of external inputs, they are expressed as X0 to X9 and XA to XF. In the case of external outputs, they are expressed as Y0 to Y9 and YA to YF.



5.1.2 Concept of I/O Number Allocation

■ I/O numbers of Control Unit

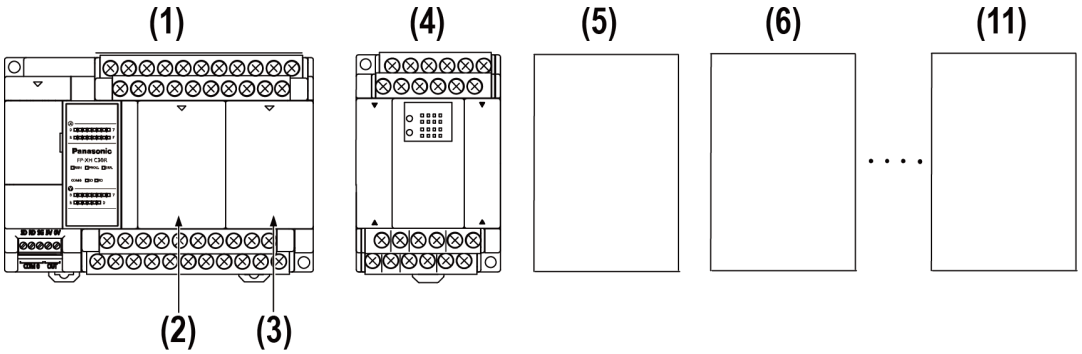
Fixed areas are allocated to I/O numbers.

■ I/O numbers of Expansion Unit

The starting number allocated to each Expansion Unit varies according to the installation position.

■ I/O numbers allocated to Function Cassette

Fixed areas are allocated to I/O numbers according to the installation position.



■ List of I/O numbers

Unit type and installation position		Input		Output	
		I/O number		I/O number	
(1)	Control unit	X0 to X9F	WX0 to WX9	Y0 to Y9F	WY0 to WY9

Unit type and installation position		Input		Output	
		I/O number		I/O number	
(2)	Cassette mounting part 1 (Slot 0)	X100 to X19F	WX10 to WX19	Y100 to Y19F	WY10 to WY19
(3)	Cassette mounting part 2 (Slot 1)	X200 to X29F	WX20 to WX29	Y200 to Y29F	WY20 to WY29
(4)	1st Expansion Unit	X300 to X39F	WX30 to WX39	Y300 to Y39F	WY30 to WY39
(5)	2nd Expansion Unit	X400 to X49F	WX40 to WX49	Y400 to Y49F	WY40 to WY49
(6)	3rd Expansion Unit	X500 to X59F	WX50 to WX59	Y500 to Y59F	WY50 to WY59
(7)	4th Expansion Unit	X600 to X69F	WX60 to WX69	Y600 to Y69F	WY60 to WY69
(8)	5th Expansion Unit	X700 to X79F	WX70 to WX79	Y700 to Y79F	WY70 to WY79
(9)	6th Expansion Unit	X800 to X89F	WX80 to WX89	Y800 to Y89F	WY80 to WY89
(10)	7th Expansion Unit	X900 to X99F	WX90 to WX99	Y900 to Y99F	WY90 to WY99
(11)	8th Expansion Unit	X1000 to X109F	WX100 to WX109	Y1000 to Y109F	WY100 to WY109

(Note 1) The ranges of the I/O numbers which are actually used vary according to the types of cassettes and Expansion Units.

5.2 List of I/O Numbers for Each Unit

5.2.1 FP-XH Control Units

■ List of I/O numbers

Unit type	Input		Output	
	No. of input points	I/O number	No. of output points	I/O number
C14	8 points	X0 to X7	6 points	Y0 to Y5
C30	16 points	X0 to X9, XA to XF	14 points	Y0 to Y9, YA to YD
C60	32 points	X0 to X9, XA to XF X10 to X19, X1A to X1F	28 points	Y0 to Y9, YA to YD Y10 to Y19, Y1A to Y1D

5.2.2 FP-X Expansion Units

■ List of I/O numbers

Unit type	Input		Output	
	No. of input points	I/O number	No. of output points	I/O number
E16	8 points	X300 to X307	8 points	Y300-Y307
E30	16 points	X300 to X309, X30A to X30F	14 points	Y300 to Y309, Y30A to Y30D
E16X	16 points	X300 to X309, X30A to X30F	-	-
E14YR	-	-	14 points	Y300 to Y309, Y30A to Y30D

(Note 1) Each I/O number shown in the above table indicates the I/O number of the Expansion Unit connected first. The I/O numbers vary according to the order of installation.

5.2.3 FP-X Function Cassettes

■ List of I/O numbers (Analog I/O cassettes)

Installation position	Type	Input		Output	
		No. of input points	I/O number	No. of output points	I/O number
Cassette mounting part 1	Analog Input Cassette: AD2	2ch	WX10, WX11	-	-
	Analog Output Cassette: DA2	-	-	2ch	WY10, WY11

Installation position	Type	Input		Output	
		No. of input points	I/O number	No. of output points	I/O number
	Analog I/O Cassette: A21	2ch	WX10, WX11	1ch	WY10
	Thermocouple Input Cassette: TC2	2ch	WX10, WX11	-	-
	Resistance Thermometer Input Cassette: RTD2	2ch	WX10, WX11	-	-
Cassette mounting part 2	Analog Input Cassette: AD2	2ch	WX20, WX21	-	-
	Analog Output Cassette: DA2	-	-	2ch	WY20, WY21
	Analog I/O Cassette: A21	2ch	WX20, WX21	1ch	WY20
	Thermocouple Input Cassette: TC2	2ch	WX20, WX21	-	-
	Resistance Thermometer Input Cassette: RTD2	2ch	WX20, WX21	-	-

■ List of I/O numbers (Digital I/O cassettes)

Installation position	Type	Input		Output	
		No. of input points	I/O number	No. of output points	I/O number
Cassette mounting part 1	Input Cassette: IN8	8 points	X100 to X107	-	-
	Output Cassette: TR8	-	-	8 points	Y100 to Y107
	Output Cassette: TR6P	-	-	6 points	Y100 to Y105
	I/O Cassette: IN4T3	4 points	X100 to X103	3 points	Y100 to Y102
Cassette mounting part 2	Input Cassette: IN8	8 points	X200 to X207	-	-
	Output Cassette: TR8	-	-	8 points	Y200 to Y207
	Output Cassette: TR6P	-	-	6 points	Y200 to Y205
	I/O Cassette: IN4T3	4 points	X200 to X203	3 points	Y200 to Y202

■ List of I/O numbers (Pulse I/O cassettes)

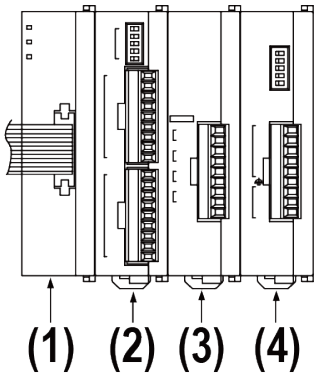
Installation position	Type	Input		Output	
		No. of input points	I/O number	No. of output points	I/O number
Cassette mounting part 1	High-speed Counter Cassette	3 points	X100 to X102	-	-
	Pulse Output Cassette	-	-	3 points	Y100 to Y102
Cassette mounting part 2	High-speed Counter Input Cassette	3 points	X200 to X202	-	-
	Pulse Output Cassette	-	-	3 points	Y200 to Y202

5.3 Allocation of FP0 Expansion Units

5.3.1 Concept of I/O Number Allocation

■ I/O numbers of FP0 Expansion Units and FP0 Intelligent Units

- The starting number allocated to each FP0 expansion block varies according to the installation position of the FP-X Expansion FP0 Adapter.
- The starting number allocated to each unit varies according to the installation order of the FP0 Expansion Units and FP0 Intelligent Units.



(1)	FP-X Expansion FP0 Adapter	(2)	FP0 Expansion unit 1	(3)	FP0 Expansion unit 2	(4)	FP0 Expansion unit 3

■ List of I/O numbers

FP-X Expansion FP0 Adapter installation position	FP0 Expansion Unit installation order					
	Expansion unit 1		Expansion unit 2		Expansion unit 3	
	Input	Output	Input	Output	Input	Output
1st Expansion Unit	X300 to X31F	Y300 to Y31F	X320 to X33F	Y320 to Y33F	X340 to X35F	Y340 to Y35F
2nd Expansion Unit	X400 to X41F	Y400 to Y41F	X420 to X43F	Y420 to Y43F	X440 to X45F	Y440 to Y45F
3rd Expansion Unit	X500 to X51F	Y500 to Y51F	X520 to X53F	Y520 to Y53F	X540 to X55F	Y540 to Y55F
4th Expansion Unit	X600 to X61F	Y600 to Y61F	X620 to X63F	Y620 to Y63F	X640 to X65F	Y640 to Y65F
5th Expansion Unit	X700 to X71F	Y700 to Y71F	X720 to X73F	Y720 to Y73F	X740 to X75F	Y740 to Y75F
6th Expansion Unit	X800 to X81F	Y800 to Y81F	X820 to X83F	Y820 to Y83F	X840 to X85F	Y840 to Y85F
7th Expansion Unit	X900 to X91F	Y900 to Y91F	X920 to X93F	Y920 to Y93F	X940 to X95F	Y940 to Y95F

FP-X Expansion FP0 Adapter installation position	FP0 Expansion Unit installation order					
	Expansion unit 1		Expansion unit 2		Expansion unit 3	
	Input	Output	Input	Output	Input	Output
8th Expansion Unit	X1000 to X101F	Y1000 to Y101F	X1020 to X103F	Y1020 to Y103F	X1040 to X105F	Y1040 to Y105F

(Note 1) The ranges of the I/O numbers which are actually used vary according to the types of cassettes and Expansion Units.

5.3.2 Types and I/O Numbers of FP0R Expansion Units

The following table shows the I/O numbers when FP-X Expansion FP0 Adapter is connected to the Control Unit as the first Expansion Unit.

■ List of I/O numbers (1st Expansion Unit)

Unit type		Number of allocation	Expansion unit 1	Expansion unit 2	Expansion unit 3
FP0R Expansion Unit	AFP0RE8X	Input (8 points)	X300 to X307	X320 to X327	X340 to X347
	AFP0RE8R	Input (4 points)	X300 to X303	X320 to X323	X340 to X343
		Output (4 points)	Y300 to Y303	Y320 to Y323	Y340 to Y343
	AFP0E8YT/P AFP0RE8YR	Output (8 points)	Y300 to Y307	Y320 to Y327	Y340 to Y347
	AFP0RE16X	Input (16 points)	X300 to X30F	X320 to X32F	X340 to X34F
	AFP0RE16R AFP0RE16T/P	Input (8 points)	X300 to X307	X320 to X327	X340 to X347
		Output (8 points)	Y300 to Y307	Y320 to Y327	Y340 to Y347
	AFP0RE16YT/P	Output (16 points)	Y300 to Y30F	Y320 to Y32F	Y340 to Y34F
	AFP0RE32T/P	Input (16 points)	X300 to X30F	X320 to X32F	X340 to X34F
		Output (16 points)	Y300 to Y30F	Y320 to Y32F	Y340 to Y34F
FP0R Analog Input Unit	AFP0RAD4(Note 1) AFP0RAD8	Input (16 points) CH0, 2, 4, 6	WX30 (X300 to X30F)	WX32 (X320 to X32F)	WX34 (X340 to X34F)
		Input (16 points) CH1, 3, 5, 7	WX31 (X310 to X31F)	WX33 (X330 to X33F)	WX35 (X350 to X35F)
		Output (16 points) Range setting	WY30 (Y300 to Y30F)	WY32 (Y320 to Y32F)	WY34 (Y340 to Y34F)
		Output (16 points) Averaging setting	WY31 (Y310 to Y31F)	WY33 (Y330 to Y33F)	WY35 (Y350 to Y35F)

Unit type		Number of allocation	Expansion unit 1	Expansion unit 2	Expansion unit 3
FP0R Analog Output Unit	AFP0RDA4	Input (32 points) Status	WX30 (X300 to X30F)	WX32 (X320 to X32F)	WX34 (X340 to X34F)
			WX31 (X310 to X31F)	WX33 (X330 to X33F)	WX35 (X350 to X35F)
		Output (16 points) CH0, 2 (Note 2)	WY30 (Y300 to Y30F)	WY32 (Y320 to Y32F)	WY34 (Y340 to Y34F)
		Output (16 points) CH1, 3 (Note 2)	WY31 (Y310 to Y31F)	WY33 (Y330 to Y33F)	WY35 (Y350 to Y35F)
FP0R Analog I/O Unit	AFP0RA21 (Note 3) AFP0RA42	Input (16 points) CH0, 2	WX30 (X300 to X30F)	WX32 (X320 to X32F)	WX34 (X340 to X34F)
		Input (16 points) CH1, 3	WX31 (X310 to X31F)	WX33 (X330 to X33F)	WX35 (X350 to X35F)
		Output (16 points) CH0 (Note 4)	WY30 (Y300 to Y30F)	WY32 (Y320 to Y32F)	WY34 (Y340 to Y34F)
		Output (16 points) CH1 (Note 4)	WY31 (Y310 to Y31F)	WY33 (Y330 to Y33F)	WY35 (Y350 to Y35F)

(Note 1) For AFP0RAD4, data of CH0 to CH3 is handled.

(Note 2) In the 14-bit mode, it can be used for switching the output range.

(Note 3) For AFP0RA21, data of input CH0 / CH1 and output CH0 is handled.

(Note 4) In the 14-bit mode, it can be used for switching the input and output ranges, and setting the averaging for input.

5.3.3 Types and I/O Numbers of FP0 Expansion Units

The following table shows the I/O numbers when FP-X Expansion FP0 Adapter is connected to the Control Unit as the first Expansion Unit.

■ List of I/O numbers (1st Expansion Unit)

Unit type		Number of allocation	Expansion unit 1	Expansion unit 2	Expansion unit 3
FP0 Expansion Unit	FP0-E8X	Input (8 points)	X300 to X307	X320 to X327	X340 to X347
	FP0-E8R	Input (4 points)	X300 to X303	X320 to X323	X340 to X343
		Output (4 points)	Y300 to Y303	Y320 to Y323	Y340 to Y343

Unit type		Number of allocation	Expansion unit 1	Expansion unit 2	Expansion unit 3
	FP0-E8YT/P FP0-E8YR	Output (8 points)	Y300 to Y307	Y320 to Y327	Y340 to Y347
	FP0-E16X	Input (16 points)	X300 to X30F	X320 to X32F	X340 to X34F
	FP0-E16R FP0-E16T/P	Input (8 points)	X300 to X307	X320 to X327	X340 to X347
		Output (8 points)	Y300 to Y307	Y320 to Y327	Y340 to Y347
	FP0-E16YT/P	Output (16 points)	Y300 to Y30F	Y320 to Y32F	Y340 to Y34F
	FP0-E32T/P	Input (16 points)	X300 to X30F	X320 to X32F	X340 to X34F
		Output (16 points)	Y300 to Y30F	Y320 to Y32F	Y340 to Y34F
FP0 Analog I/O Unit	FP0-A21	Input (16 points) CH0	WX30 (X300 to X30F)	WX32 (X320 to X32F)	WX34 (X340 to X34F)
		Input (16 points) CH1	WX31 (X310 to X31F)	WX33 (X330 to X33F)	WX35 (X350 to X35F)
		Output (16 points)	WY30 (Y300 to Y30F)	WY32 (Y320 to Y32F)	WY34 (Y340 to Y34F)
FP0 A/D Conversion Unit FP0 Thermocouple Unit	FP0-A80 FP0-TC4 FP0-TC8	Input (16 points) CH0, 2, 4, 6	WX30 (X300 to X30F)	WX32 (X320 to X32F)	WX34 (X340 to X34F)
		Input (16 points) CH1, 3, 5, 7	WX31 (X310 to X31F)	WX33 (X330 to X33F)	WX35 (X350 to X35F)
FP0 D/A Conversion Unit	FP0-A04V FP0-A04I	Input (16 points)	WX30 (X300 to X30F)	WX32 (X320 to X32F)	WX34 (X340 to X34F)
		Output (16 points) CH0, 2	WY30 (Y300 to Y30F)	WY32 (Y320 to Y32F)	WY34 (Y340 to Y34F)
		Output (16 points) CH1, 3	WY31 (Y310 to Y31F)	WY33 (Y330 to Y33F)	WY35 (Y350 to Y35F)
FP0 I/O Link Unit	FP0-IOL	Input (32 points)	X300 to X31F	X320 to X33F	X340 to X35F
		Output (32 points)	Y300 to Y31F	Y320 to Y33F	Y340 to Y35F

(Note 1) The data for each channel of the FP0 A/D Conversion Unit (FP0-A80), FP0 Thermocouple Unit (FP0-TC4 / FP0-TC8) and FP0 D/A Conversion Unit (FP0-A04V / FP0-A04I) is converted and read or written by a user program including a conversion data switching flag.

(Note 2) Regarding the FP0 CC-Link Slave Unit, please refer to the exclusive manual. (The starting address should be replaced.)

(MEMO)

6 Installation and Wiring

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6.1 Installation

6.1.1 Installation Environment and Space

■ Installation environment

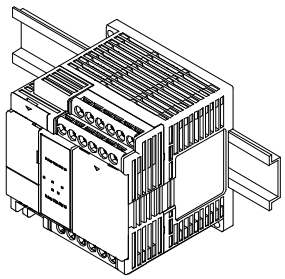
- The unit is intended for use within the environmental conditions shown below. Operating environment (Use the unit within the range of the general specifications when installing)
  - Surrounding air temperature: 0 to +55 °C
  - Surrounding air humidity: 10 to 95% RH (at 25 °C and non-condensing)
  - Pollution degree: 2
  - Altitude: 2000 m above sea level or lower
  - Protection class:
    Class II (AC power supply type or relay output type)
    Class III (other than AC power supply type or relay output type)
  - Overvoltage category: II or lower
  - Installation location: In a control panel
- Do not use it in the environmental conditions shown below.
  - Direct sunlight
  - Sudden temperature changes causing condensation.
  - Inflammable or corrosive gas.
  - Excessive airborne dust, metal particles or saline matter.
  - Benzine, paint thinner, alcohol or other organic solvents or strong alkaline solutions such as ammonia or caustic soda.
  - Direct vibration, shock or direct drop of water.
  - Influence from power transmission lines, high voltage equipment, power cables, power equipment, radio transmitters, or any other equipment that would generate high switching surges. (100 mm or more)

■ Static electricity

- Before touching the unit, always touch a grounded piece of metal in order to discharge static electricity.
- Do not touch connector pins directly.

■ Measures regarding heat discharge

- Always install the unit with the LED display section facing upward on the left side in order to discharge heat.



- Do not install the unit stacked up, horizontally or upside down. Doing so will prevent proper cooling of the unit and cause overheating inside.
- Do not install the unit above devices which generate heat such as heaters, transformers or large scale resistors.

■ Installation space

- Leave at least 50 mm of space between the top surface or the bottom surface of the unit and the wiring duct or other device to secure sufficient ventilation space around the unit.
- In order to eliminate any effects from noise emission, power wires and electromagnetic devices should be kept at least 100 mm away from the surfaces of the unit. When installing the unit behind the doors of the control board, be especially careful to secure clearances as above.
- Secure a space for connecting a cable for a programming tool.
- About protection class II appliances

  Keep the conductive part of the unit at least 6 mm away from the peripheral circuits or housing to ensure reinforced insulation.

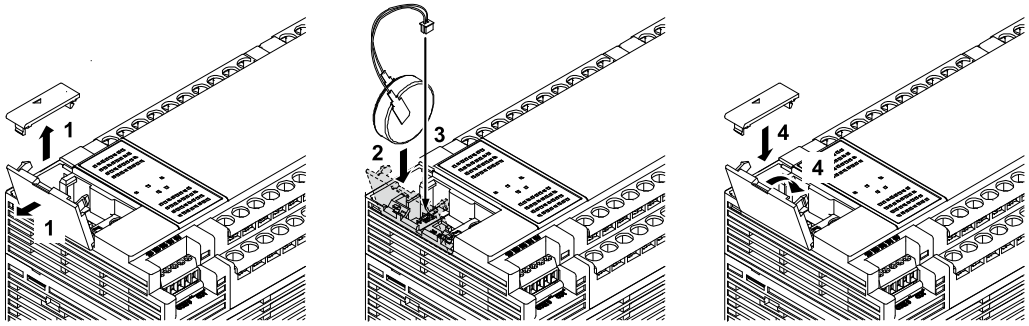
6.2 Installation of Backup Battery

6.2.1 Installation of Backup Battery

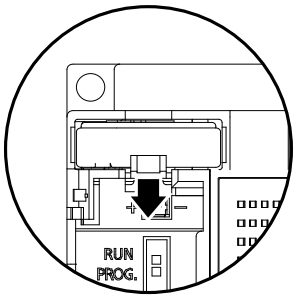
- The procedure for installing the backup battery is as follows.

Procedure

1. Open the operating unit cover and the battery cover.
2. Insert the backup battery in the battery holder.
3. Connect the battery connector.
4. Close the operating unit cover and the battery cover.



- Open the lever part for removing the backup battery.



Info.

- The backup battery is used for using the clock / calendar function and extending the backup area of the operation memory.
- For details on the function and lifetime of backup battery and on hold area setting, refer to "8.1 Memory Backup".

6.3 Installation of Extension Cassette

6.3.1 Precautions When Installing the Extension Cassette

- Fix the Extension Cassette using the screws provided with the Control Unit.
- The screw tightening torque should be 0.3 to 0.5 N·m. Securely tighten them.

■ Recommended screws

Type	Input	Quantity
Tapping screw	Material: SW pan head (+) P-tight, 2.6 x 16 Galvanized, trivalent chromate (black)	2 pcs./1 cassette

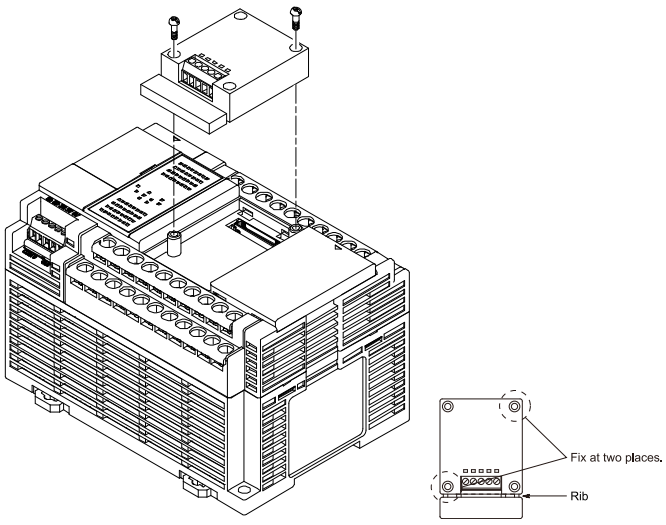
- The installation must be carried out when the power supply is OFF. If the power supply is ON, it may cause faults.
- Do not touch the back side and the connector of the Extension Cassette. The parts such as IC may be damaged by static electricity.

6.3.2 Installing the Communication Cassette

The communication cassette can be installed on the Control Unit or on the Function Cassette.

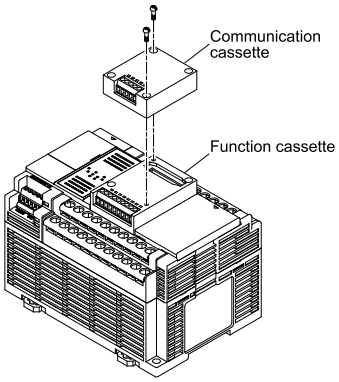
■ Installation on the Control Unit

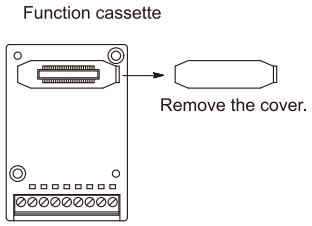
- Connect the connector on the back of the communication cassette with the connector of the cassette mounting part of the Control Unit, and secure the two positions, bottom left and top right of the communication cassette, with the screws.
- It is no problem if the ribs remain. The AFPX-COM5 has no rib.

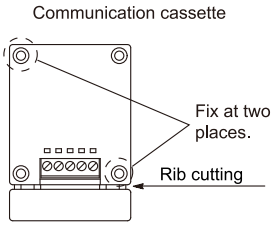


■ Installation on the Function Cassette

- Connect the connector on the back of the Function Cassette with the connector of the cassette mounting part of the Control Unit, and secure the two positions, bottom left and top right of the Function Cassette, with the screws.





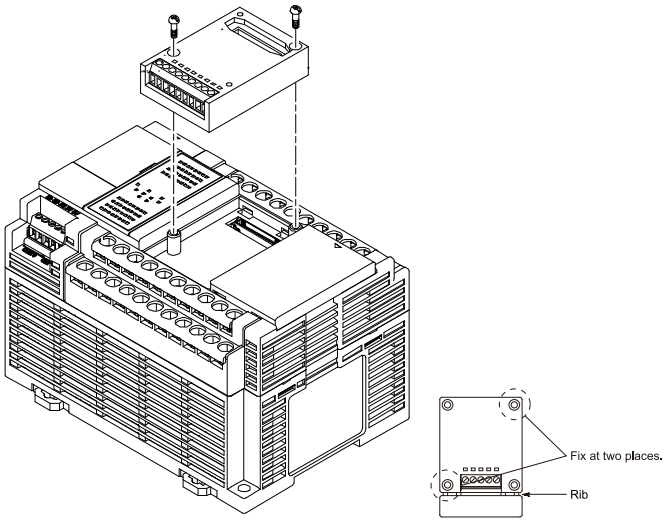


6.3.3 Installing the Function Cassette

The function cassette can be installed only on the Control Unit.

■ Installation on the Control Unit

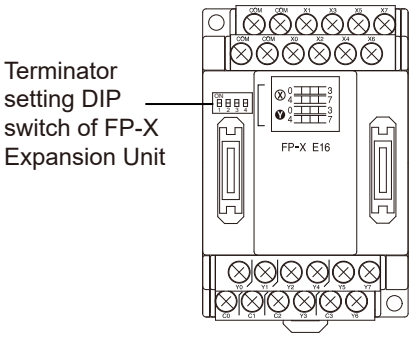
- Connect the connector on the back of the Function Cassette with the connector of the cassette mounting part of the Control Unit, and secure the two positions, bottom left and top right of the Function Cassette, with the screws.



6.4 Connection of FP-X Expansion Unit

6.4.1 Setting of the Terminator Setting Switch

- The terminator setting DIP switch on the Expansion Unit installed at the last position turn ON all switches.



6.4.2 Checking FP-X Expansion Cable

- Connect the FP-X Expansion Unit and the FP-X Expansion FP0 Adapter to the Control Unit using the exclusive expansion cable.
- An 8 cm expansion cable (AFPX-EC08) is provided with the FP-X Expansion Unit or with the FP-X Expansion FP0 Adapter.
- If longer expansion cables are required for installing units on top of one another, separately order 30 cm cable (AFPX-EC30) or 80 cm cable (AFPX-EC80).

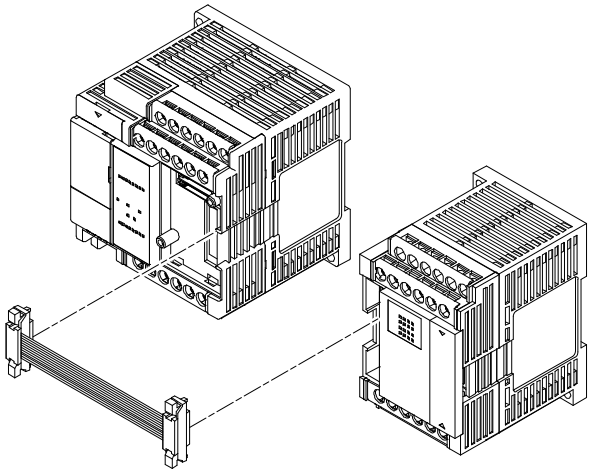
- The total length of the expansion cables should be within 160 cm.
- Install the expansion cables (AFPX-EC30 or EC80) away from the devices and wirings generating noises as much as possible.

6.4.3 Connection of FP-X Expansion Unit

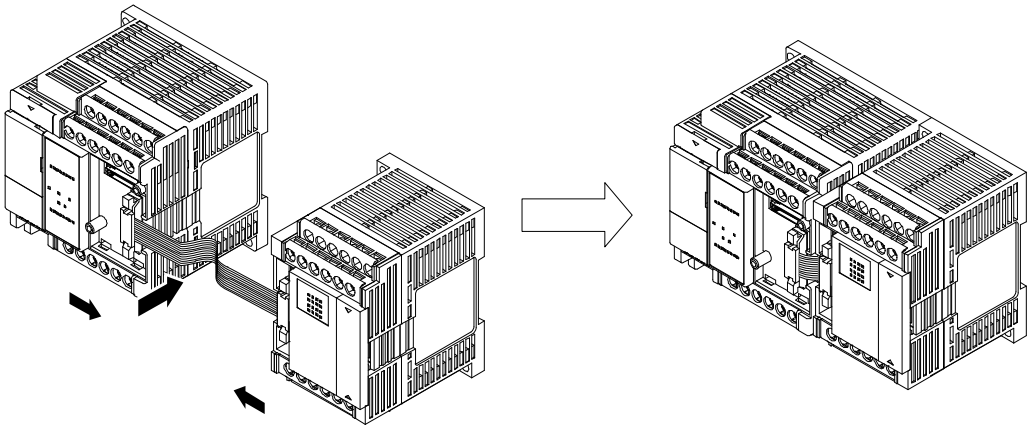
Connect the FP-X Expansion Unit according to the following procedure.

Procedure

1. Remove the expansion cover from the Control Unit and from the Expansion Unit.
2. Attach the expansion connector cable to the expansion connector part of the Control Unit and to the expansion connector part (left side) of the expansion I/O unit.



3. Put the units close together so that the expansion cable is housed between the units.



4. Install the expansion cover.

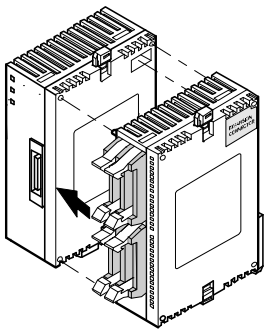
6.5 Connection of FP0 Expansion Unit

6.5.1 Connection of FP0 Expansion Unit

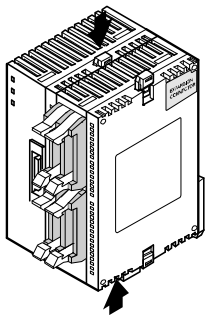
- The FP0 Expansion Unit (Expansion Unit or Intelligent Unit) are connected to the right side of the FP-X Expansion FP0 Adapter.
- To expand the unit, use the right-side connector and expansion hooks available for FP0 expansion on the side of the unit.

1 2 Procedure

1. Lift the expansion hooks on the top and bottom sides of the unit with a screwdriver.
2. Align the pins at the four corners of the Expansion Unit.
   Firmly match the connectors so that there is no gap between the units.



3. Press down the expansion hooks lifted in step 1 to secure the units.



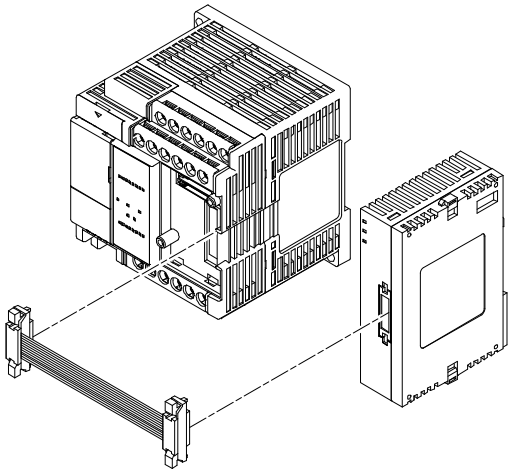
6.5.2 Connection of FP-X Expansion FP0 Adapter

Connect the FP-X Expansion Unit according to the following procedure.

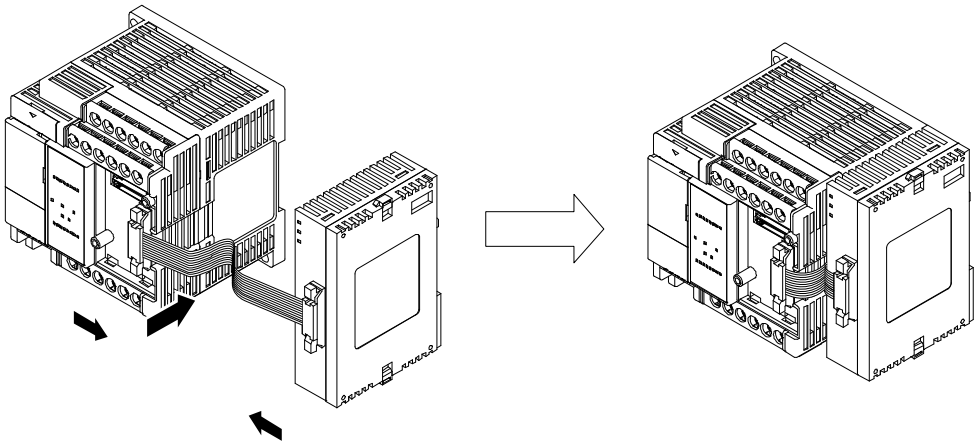
1 2 Procedure

1. Remove the expansion cover from the Control Unit and from the Expansion Unit.

2. Attach the expansion connector cable to the expansion connector part of the Control Unit and to the expansion connector part (left side) of the FP-X Expansion FP0 Adapter.



3. Put the units close together so that the expansion cable is housed between the units.



4. Install the expansion cover.

- Although there is no terminator setting switch on the Expansion FP0 Adapter, the terminator setting has been done within the Expansion FP0 Adapter. Turn off the terminator setting switches of the other Expansion Units.

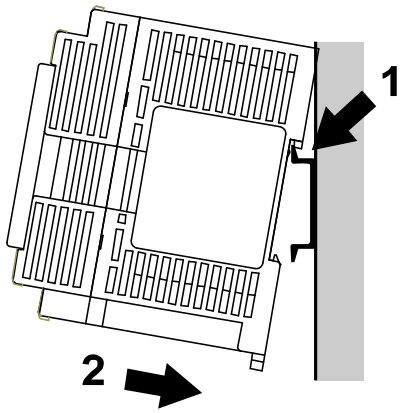
6.6 Installation

6.6.1 Attachment to DIN Rail and Removal from DIN Rail

Attachment procedure

Procedure

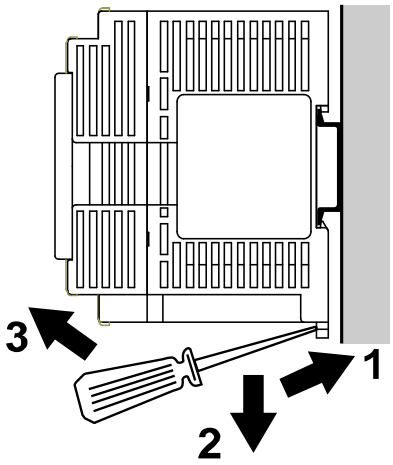
1. Fully pull down the DIN rail attachment lever on the back of the unit.
2. Fit the top of the unit attachment part into the DIN rail.
3. While pressing down the unit attachment part onto the DIN rail, fit the bottom of the unit attachment part into the DIN rail.
4. Push up the DIN rail attachment lever on the back of the unit until it clicks to lock.



Removal procedure

Procedure

1. Fully pull down the DIN rail attachment lever on the back of the unit.
2. Pull the bottom of the unit toward you.
3. While lifting the unit, remove it from the DIN rail.



6.6.2 Installation with screws

Use M4 size screws for the installation.

Info.

- For details on installation dimensions, refer to "13.8.2 Mounting Dimensions".

6.7 Wiring the Power Supply

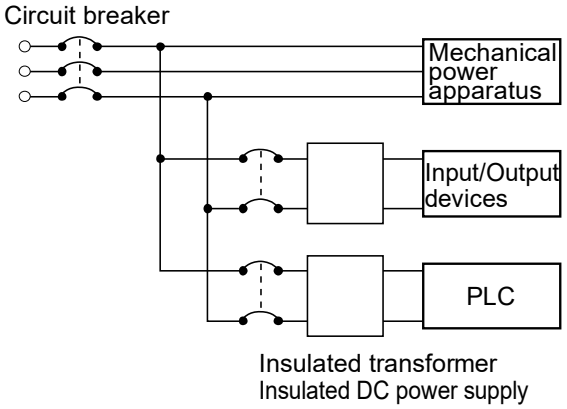
6.7.1 Common Precautions

■ Selection of power supply

- Use a low noise power supply.
- The inherent noise resistance is sufficient for the noise superimposed on the power wires, however, the noise can be attenuated further by using the insulation transformer or insulated power supply.

■ Isolation of power supply systems

Isolate the wiring systems to the units, input/output devices, and mechanical power apparatus.

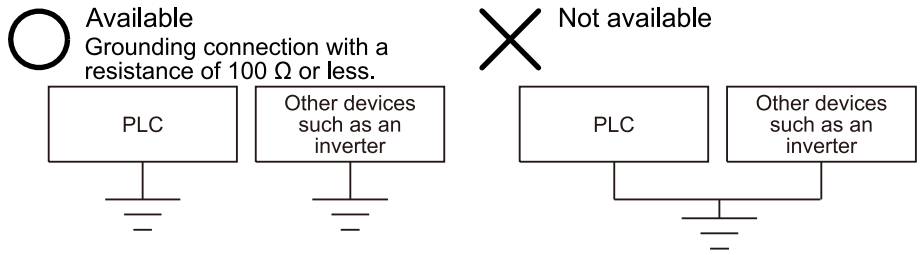


■ Power supply sequence

- The power supply sequence should be set up so that the power supply of the PLC turns off before the power supplies for input and output.
- If the power supplies for input and output turns off before the power to the PLC, the control unit will detect the input fluctuations and may begin an unscheduled operation.

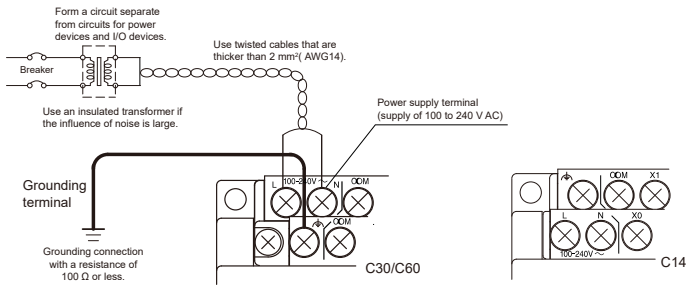
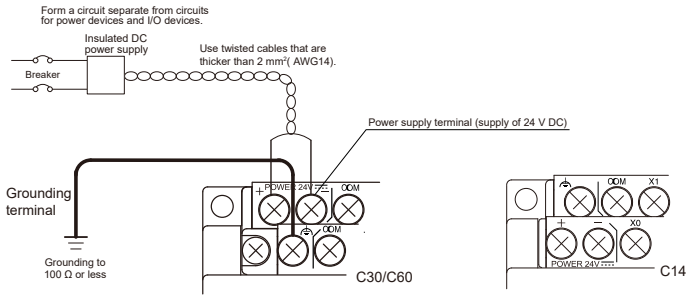
6.7.2 Grounding

- Ground the unit to obtain sufficient noise suppression.
- The point of grounding should be as close to the PLC unit as possible. The ground wire should be as short as possible.
- Sharing the ground with another device may have an adverse effect. Therefore, be sure that grounding is dedicated.
- The grounding terminal of the AC power supply unit should have a resistance of 100 Ω or less.



6.7.3 Power Supply of Control Unit / Expansion Unit

■ Power supply wiring (FP-XH Control Unit / FP-X Expansion Unit)

Unit	Wiring diagram
AC power supply Type	
DC power supply Type	

■ Power supply voltage

Confirm that the voltage of the connected power supply is within the allowable range.

Model	Rated input voltage	Allowable voltage range	Rated frequency	Allowable frequency range
AC power supply type	100 to 240 V AC	85 to 264 V AC	50 / 60 Hz	47 to 63 Hz
DC power supply type	24 V DC	20.4 to 28.8 V DC	-	-

- Power supply terminal locations are different among the units (C14, C30 and C60).

■ Power supply cable

- Use power supply cables that are thicker than 2 mm^2 (AWG14) to minimize the voltage drop.
- Also, twist the power supply cables to minimize adverse effects from noise.

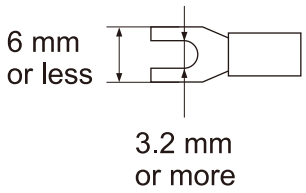
■ Suitable wires

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.6 N·m

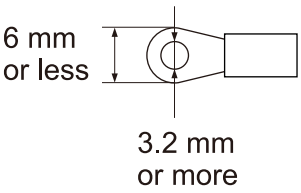
■ Suitable crimp terminals

M3 terminal screws are used for the terminal. Use the following crimp terminals for wiring to the terminals.

Fork type terminal



Round type terminal



■ Suitable crimp terminals

(Note 1)

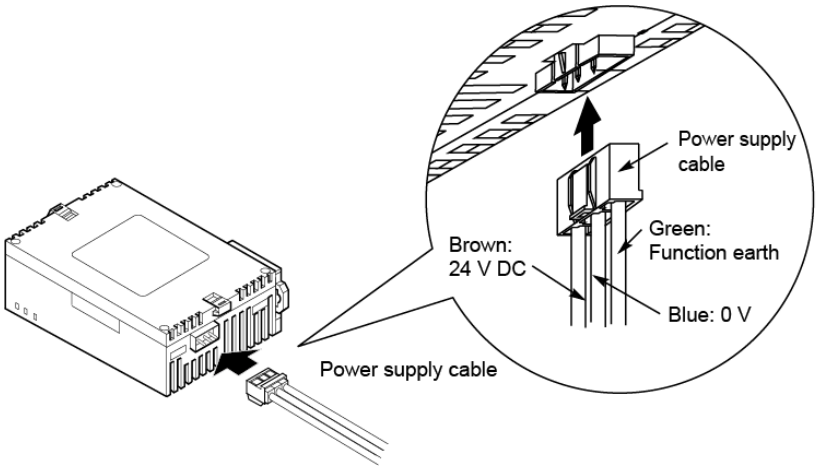
Shape	Part No.	Suitable wires
Round type	2-MS3	1.04 to 2.63 mm^2
Fork type	2-N3A	

(Note 1) Use wires that are thicker than 2 mm^2.

- Using the power supply with voltage and frequency that are beyond the allowable ranges, or using inappropriate wires may cause the fault of the power supply of the PLC.

6.7.4 Power Supply of FP-X Expansion FP0 Adapter / FP0 Expansion Unit

■ Wiring the power supply (FP-X Expansion FP0 Adapter / FP0 Expansion Unit)

Unit	Wiring diagram
FP-X FP0 Expansion Adapter FP0 Expansion Unit FP0 Intelligent Unit	

■ Selection of power supply

- To protect the system against erroneous voltage from the power supply line, use an insulated power supply with an internal protective circuit (cable with reinforced insulation or double insulation).
- The regulator on the unit is a non-Isolated type.
- To turn the power supplies ON simultaneously, supply the power for the Expansion FP0 Adapter from the service power supply for the input circuit of the FP-XH Control Unit.

■ Power supply voltage

- Confirm that the voltage of the connected power supply is within the allowable range.

Rated input voltage	Allowable voltage range
24 V DC	20.4 to 28.8 V DC

■ Power supply cable

- Use the power supply cable (Part no.: AFPG805) that comes with the unit to connect the power supply.
  Brown: 24 V DC, Blue: 0 V, Green: Function earth
- Also, twist the power supply cables to minimize adverse effects from noise.

■ Power supply sequence

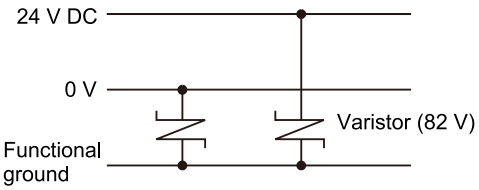
- To ensure and ease the power supply sequence of the Expansion FP0 Adapter, supply the power for the Expansion FP0 Adapter from the service power supply for the input circuit of the FP-X Control Unit.
- The power supply sequence should be set up so that power to the FP0 Expansion Unit is turned ON before the FP-X system power supply.

- The power supply sequence should be set up so that power to the FP-X system and FP0 Expansion Unit is turned OFF before the input / output power supplies. If the power supplies for input and output turn off before them, the Control Unit will detect the input fluctuations and may begin an unscheduled operation.

Operation	Power supply sequence
When turning ON	Power supply for FP0 → Power supply for FP-X and Expansion FP0 Adapter → Power supply for input and output
When turning OFF	Power supply for FP-X and Expansion FP0 Adapter → Power supply for FP0 → Power supply for input and output

■ Grounding of FP-X Expansion FP0 Adapter / FP0 Expansion Unit

- Ground the function earth (green) of the cable supplied with the unit. Conversely, depending on your environment, grounding may cause a problem.
- The power supply line of the FP-X Expansion FP0 Adapter is connected to the function earth through a varistor, If there is an irregular potential between the power supply line and the earth, the varistor may be shorted.



Power supply line for Expansion FP0 Adapter

6.8 Wiring of Input and Output

6.8.1 Precautions on Wirings of Input and Output

■ Wiring position

Arrange the wiring so that the input and output wiring are separated, and these wirings are separated from the power wiring, as much as possible. Do not route them through the same duct or tie them in a bundle. Separate the input/output wires from the power and high voltage wires by at least 100 mm.

■ Selection of wires

Be sure to select the thickness (dia.) of the input and output wires while taking into consideration the required current capacity.

■ Power supply

Wiring should be carried out after the power supply to the PLC was turned off. Also turn of the power supply when the control unit, expansion units and various cassettes are connected. If they are connected during the power supply is on, it may cause the fault or malfunction.

6.8.2 Service Power Supply for Input and Output (Control Unit and Expansion Unit: E30)

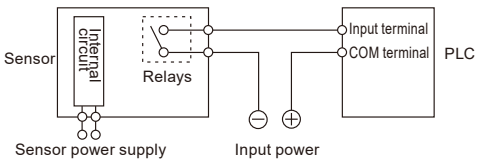
■ Use of the service power supply for input circuit

- Use it for the input circuit and the Expansion FP0 Adapter.
- Use an external power supply for the FP0 Expansion Unit.
- When it is used for another device, confirm the consumption current of the device side before it is connected.
- If excess current is being supplied for a long time, the power supply may be damaged.

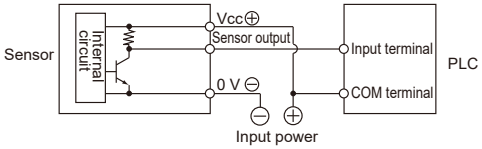
6.8.3 Input Wiring

■ Connection of photoelectric sensor and proximity sensor

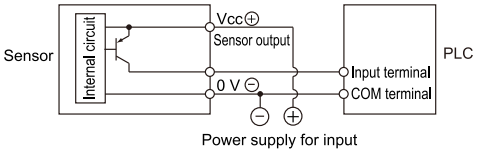
Relay output type



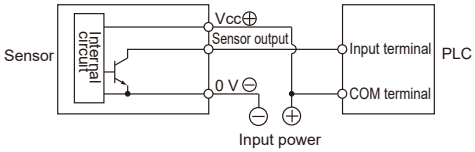
NPN open collector output type



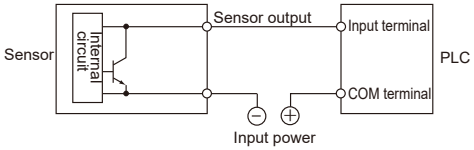
PNP open collector output type



Voltage output type

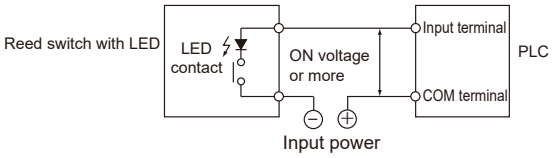


Two-wire output type



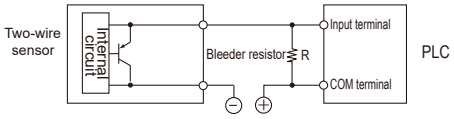
■ Precaution when using LED-equipped reed switch

When a LED is connected in series to an input contact such as LED-equipped reed switch, make sure that the voltage applied to the PLC input terminal is greater than the ON voltage. In particular, take care when connecting a number of switches in series.



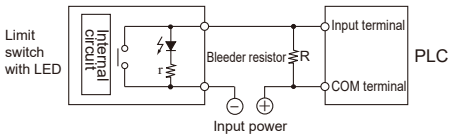
■ Precaution when using two-wire type sensor

If the input of PLC does not turn OFF because of leakage current from the two-wire type sensor (photoelectric sensor or proximity sensor), the use of a bleeder resistor is recommended, as shown below.



■ Precaution when using LED-equipped limit switch

If the input of PLC does not turn off because of leakage current from the LED-equipped limit switch, the use of a bleeder resistor is recommended, as shown below.

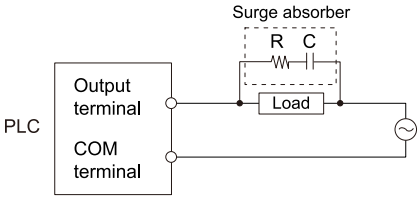


6.8.4 Output Wiring

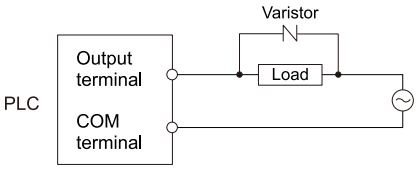
■ Protective circuit for inductive loads

With an inductive load, a protective circuit should be installed in parallel with the load. When switching DC inductive loads with relay output type, be sure to connect a diode across the ends of the load because the service life of the relay largely depends on whether a protective circuit is provided or not.

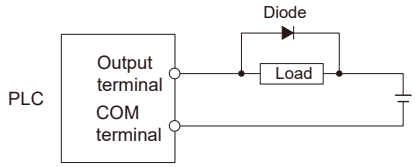
When using an AC inductive load



Example of surge absorber Resistance: 50 Ω
Capacity: 0.47 μF



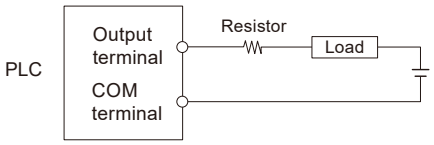
When using an DC inductive load

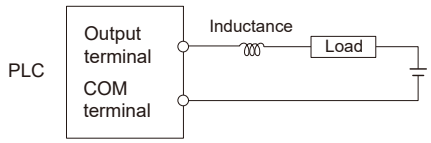


Diode	Reverse voltage	Higher than 3 times the rated load voltage
	Average rectified current	Greater than the load current

■ Precautions when using capacitive loads

When connecting loads with large in-rush currents, to minimize their effect, connect a protection circuit as shown below.




PLC
Output terminal
COM terminal
Inductance
Load

6.9 Wiring the Terminal Block

6.9.1 Suitable wires

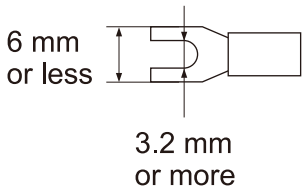
■ Suitable wires

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.6 N·m

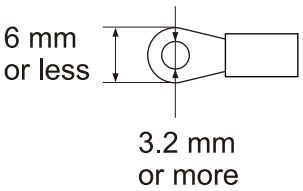
■ Suitable crimp terminals

- M3 terminal screws are used for the terminal. Use the following crimp terminals for wiring to the terminals.
- When using the round type terminal, remove the terminal block covers before starting work.

Fork type terminal

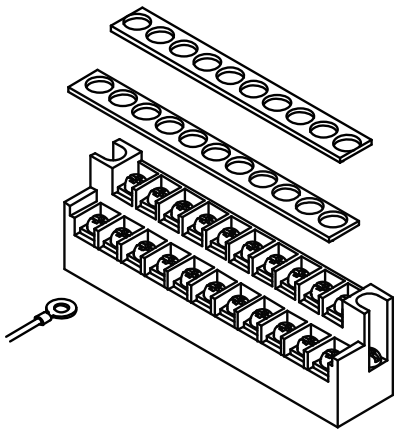


Round type terminal



6.9.2 Terminal block covers

- When using the round type terminal, remove the terminal block covers before starting work.



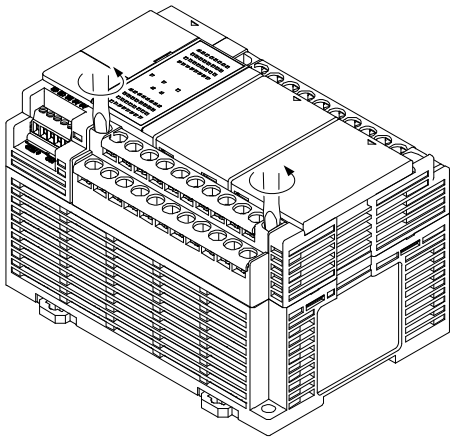
- Install the terminal block covers as they were after wiring to prevent electric shock.

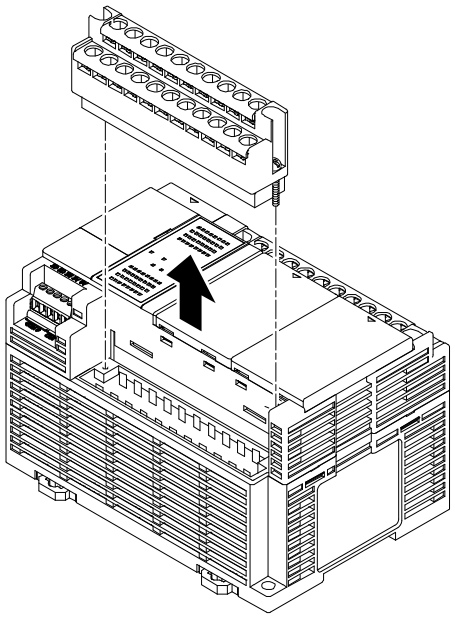
6.9.3 Installing / Removing the Terminal Block (C30 / C60)

The terminal block used for C30 and C60 can be removed because it is installed using screws.

■ Removing the terminal block

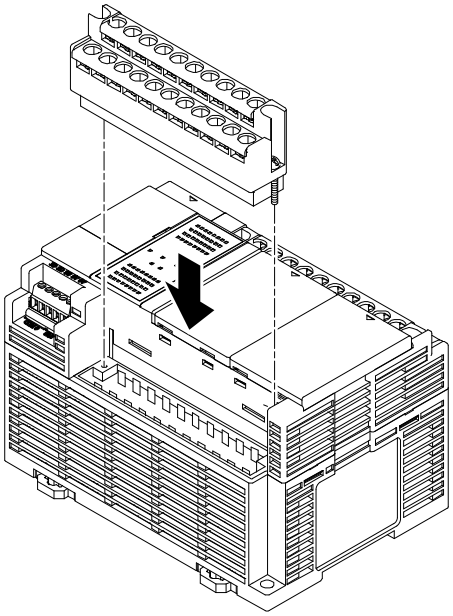
Loosen the two mounting screws. The mounting screws are fixed to the terminal block and cannot be removed.

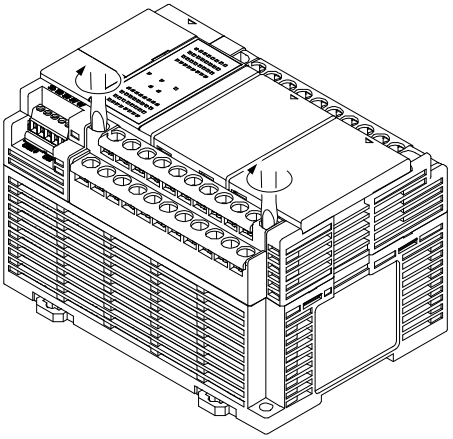




■ Installing the terminal block

- Start tightening the screws when the terminal block is slightly lifted up. When the screws are tightened, the terminal block is secured in place.
- The tightening torque should be 0.25 to 0.35 N·m.





6.10 Safety Measures

6.10.1 Safety Measures

■ Precautions regarding system design

- In certain applications, malfunction may occur for the following reasons:
  - Power on timing differences between the PLC system and input/output or mechanical power apparatus.
  - Response time lag when a momentary power drop occurs.
  - Abnormality in the PLC unit, external power supply, or other devices.

In order to prevent a malfunction resulting in system shutdown, choose the adequate safety measures.

■ Providing an interlock circuit

- When a motor clockwise / counter-clockwise operation is controlled, provide an interlock circuit externally.

■ Providing an emergency stop circuit

- Provide a circuit to the PLC externally, which turns OFF the power supply of the output device in case of emergency.

■ Power supply sequence

- The PLC should be started after booting the I/O device and mechanical power apparatus.
- When turning OFF the PLC, stop the operation of the PLC first, and then turn OFF the I/O devices and power equipment.

■ Grounding

- When installing the PLC next to devices that generate high voltages from switching, such as inverters, do not ground them together. Use an exclusive ground with a resistance of less than 100 Ω for each device.

■ Prevention of electric shock

- Make sure to install the terminal cover after wiring.

6.10.2 Instantaneous Power Failure

■ Operation of instantaneous power failure

- If the duration of the power failure of the power supply is less than 10 ms, the FP-XH Control Unit continues to operate. If it is 10 ms or longer, the operation varies according to conditions such as the combination of units and the power supply voltage. In some cases, the unit performs the same operation as resetting the power supply.
- Although the duration of the power failure for the Expansion FP0 Adapter is 10 ms, judge the permissible time for the system after confirming the permissible duration of the power failure for the DC power supply that supplies power to the Expansion FP0 Adapter. Supply the

power for the FP-X Expansion FP0 Adapter from the service power supply for the input of the FP-X Control Unit.

- When using the Expansion Unit with a built-in power supply (E30, Expansion FP0 Adapter), depending on the duration of the momentary power failure, either one of the units may be put in halted state and I/O verify error may occur. In such case, turn the power OFF and then ON.

6.10.3 Watchdog Timer

- The watchdog timer is a program error and hardware error detection timer.
- It is set to 640 ms for the FP-XH Control Unit.
- Once the watchdog timer functions, the "ERR.LED" on the front face of the control unit turns ON. At this time, all outputs from the output units are turned OFF and the unit is put in halted state.

(MEMO)

7 Procedures Before Starting Operation

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7.1 Before Turning On the Power

7.1.1 Check Items

After the wiring, check the following items before turning on the power supply.

■ **Check items**

	Item	Description
1	Installation of each unit	Whether the unit type matches the device list during the design stage or not. Whether the unit mounting screws are properly tightened or not; and whether there is any looseness or not.
2	Wiring	Whether the terminal screws are properly tightened or not; and whether there is any looseness or not. Whether the wiring of terminal matches the signal name or not. Whether the wiring has sufficient thickness for expected current or not.
3	Connecting cables	Whether the cables are securely connected or not.
4	Mode setting	Whether the mode switch is set to “PROG.” or not.
5	Others	Carefully check if there is any potential for an accident.

7.1.2 Procedures Before Starting Operation

Procedures following installation and wiring and before starting operation are as follows.

1. Turn on the power supply.

1. Before turning on the power supply, check the items referring to "7.1.1 Check Items".
2. Turn on the power supply of the control unit and check that the "PROG." LED (green) of the control unit is on.

2. Input a program.

1. Create a program using the tool software.
2. Use the "Totally Check Project" of the tool software to check for syntax errors.

3. Check the output wiring.

Use the forced I/O function to check the output wiring.

4. Check the input wiring.

Check the input wiring by using the input display LEDs or the monitoring function of the tool software.

5. Perform a test operation.

1. Set the mode switch to "RUN" and check that the "RUN" LED is turned on.
2. Check the sequence operation.

6. Perform debugging.

1. If there is an error in the operation, check the program using the monitoring function of the tool software.
2. Correct the program.

7. Save the program.

Save the created program.

7.2 Offline Edit of Program

7.2.1 Elements of Program

The items below are created as program data by the following procedure.

■ Program configuration

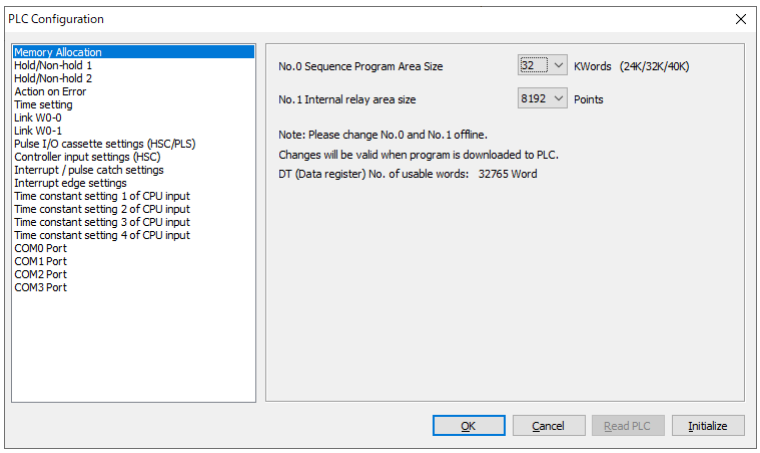
Classification	Description
Program	Arbitrary program
Comment	Max. 2 MB I/O comments, explanatory notes, interlinear comments
System register	Set the allocations for using the hold areas of the operation memory, operation mode when an error occurs, communication, high-speed counter and pulse output function.
Positioning parameters Positioning table data	For using the pulse output function in the table setting mode, set in the Configurator PMX. The set positioning parameters and positioning table data are saved as part of a program file. By exporting or importing on the Configurator PMX, only the data related to positioning can be saved as another file.

7.2.2 System Register Settings

Set system registers by the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

Procedure

1. Select **Options**>**System register settings** from the menu bar.
   The "PLC Configuration" dialog box appears.



2. Select and set desired items.
3. Click the [OK] button.

The set contents will be saved as part of the program.

Type of system register

Classification	Description
Memory allocation	Set this item when changing the program capacity or the number of internal relay.
Hold / Non-hold	Set this item when changing the hold area of the operation memory for internal relays and data registers. For enabling this setting, a battery for memory backup (sold separately) needs to be installed.
Action on Error	The operation mode when an error such as operation error occurs can be selected. When installing the battery for memory backup, set the error annunciation function to be enabled.
Time setting	Set the timeout period when using the communication function or constant scan time.
PC link W0 setting	Allocate the unit numbers and link areas when using the PLC link function.
Control Unit input settings (HSC / PLS / PWM)	Allocate the I/O signals and channels when using the HSC (high-speed counter), PLS (pulse output) and PWM (PWM output) functions.
Interrupt / pulse catch settings	Specify the input allocated when using the interrupt input or pulse catch input. For the interrupt input, edges to be valid can be selected.
Interrupt edge settings	
Time constant setting of Control Unit input	Specify the input to which the time constant filter to enable the input is applied.
COM Port	Set the communication parameters such as unit numbers, baud rate and transmission format when using the communication function via the COM port.

Info.

- System registers are set for using various functions and change the default settings of the hold type areas. It is not necessary to set them when those functions are not used.

REFERENCE

13.4 List of System Registers

7.2.3 Setting of Positioning Parameters

When using the pulse output function in the table setting mode, set the parameters by the Configurator PMX. The Configurator PMX is started from the **Option** menu of FPWIN GR7.

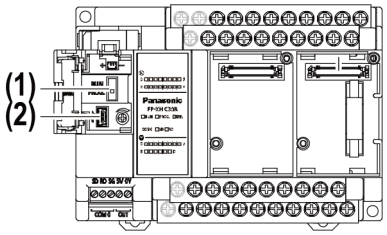
Info.

- For the details of the pulse output function in table setting mode and the operation of Configurator PMX, refer to the *FP0H User's Manual (Positioning / PWM Output / High-speed Counter)*.

7.3 Program Download and Operation

7.3.1 Before Turning ON the Power

Before turning ON the power supply, check the mode selection switch of the Control Unit. The operation varies as follows according to the state when the power supply turns ON.



(1)	Mode selection switch	(2)	USB port

■ Operational difference between the modes

Classification	Description
Power supply is turned ON in PROG. mode.	● When the power supply turns ON, the data in the Control Unit and computer (programs, comments, system register data and data registers) exist. ● By operating the tool software, data can be downloaded from a computer to the Control Unit or uploaded from the Control Unit to a computer. ● When necessary data such as a program is not written in the Control Unit, turn on the power supply in PROG. mode.
Power supply is turned ON in RUN mode.	● When the power supply turns ON, data saved in the internal memory (F-ROM) of the Control Unit is transferred to the memory of the Control Unit and the operation is started. ● When necessary data such as programs are saved and ready to be run, turn on the power supply in RUN mode.

■ Switching the mode by the tool software

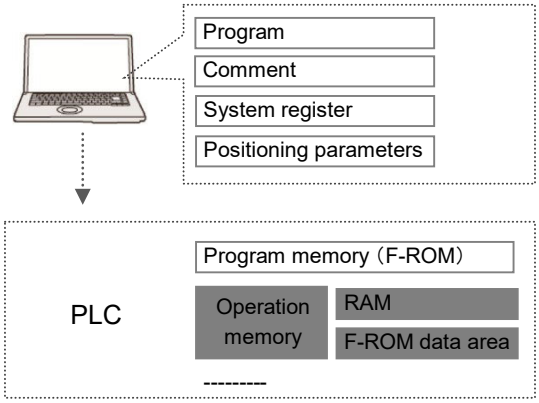
- When the power supply is on and the unit is in online state, the operation mode can be changed by the tool software. However, when the power supply is turned OFF and turned ON again, the unit operates in the mode selected by the mode selection switch.

■ Connection between a computer and the Control Unit

- A computer is connected to the USB port of the Control Unit. A USB 2.0 cable (A: mini-B) is used for the connection.

7.3.2 Program Download and Mode Switching

- Programs created by the tool software are downloaded to the Control Unit.
- Downloaded programs are saved in the program memory (F-ROM) and held even in case of power outage.

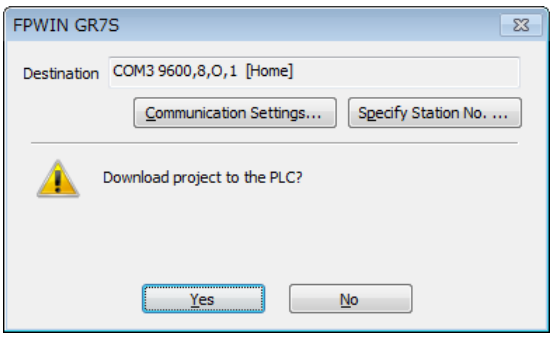


Procedure for downloading

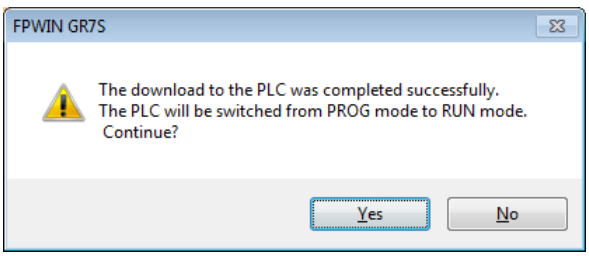
Download project data by the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

Procedure

1. Select **Online>Switch to Online Mode** from the menu bar.
2. Select **Online>Download to PLC (Entire Project)** from the menu bar.
   A confirmation message dialog box appears.



3. Click the [Yes] button.
   The project will be downloaded. A message dialog box to confirm whether to switch the mode or not appears.



4. Click the [Yes] or [No] button.
   Click [Yes] to switch to RUN mode. Press [No] to change to the monitor mode.

Info.

- Before switching the mode to RUN mode, fully confirm that the activation of the PLC will not cause a dangerous situation.
- If an error occurs when switching the mode to RUN mode, the "ERR." LED will flash and it will return to PROG. mode.

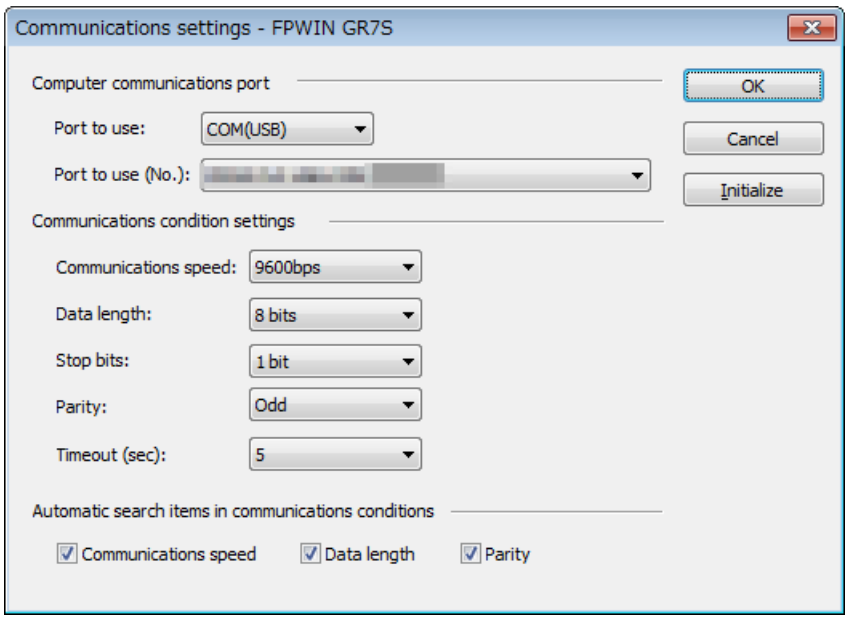
REFERENCE

11.2 What to Do If an Error Occurs

If "MEWNET device open error" occurs

Clear the error by the following procedure.

1. Confirm that the power supply of the control unit is on.
2. Confirm that the computer and the control unit are connected with a USB cable.
3. Select **Online**>**Communication Settings** from the menu bar.
   The "Communication Settings" dialog box appears.



4. Confirm the port number and press the [OK] button.
   Confirm that the computer and control unit can communicate with each other.

Info.

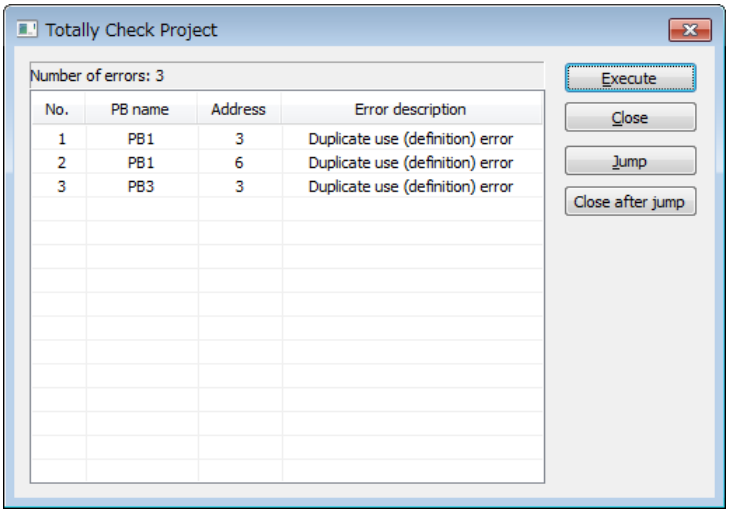
- The port number can be confirmed by the device manager of the computer.

7.3.3 Totally Checking Project

- Syntax errors can be confirmed by the total check function.
- It is possible to check if there is a duplicated use of coil or a missing in pair instructions (such as MC and MCE, JP and LBL, and SUB and RET).

Procedure

1. Select **Online**>**Switch to Online Mode** from the menu bar.
2. Select **Debug**>**Totally Check Project** from the menu bar.
   The Totally Check Project dialog box appears.
3. Press the [Execute] button.
   The check result appears. If there is an error, press the [Jump] button. The window jumps to the line containing the error.

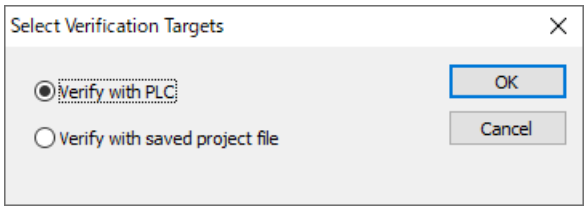


7.3.4 Verifying Project

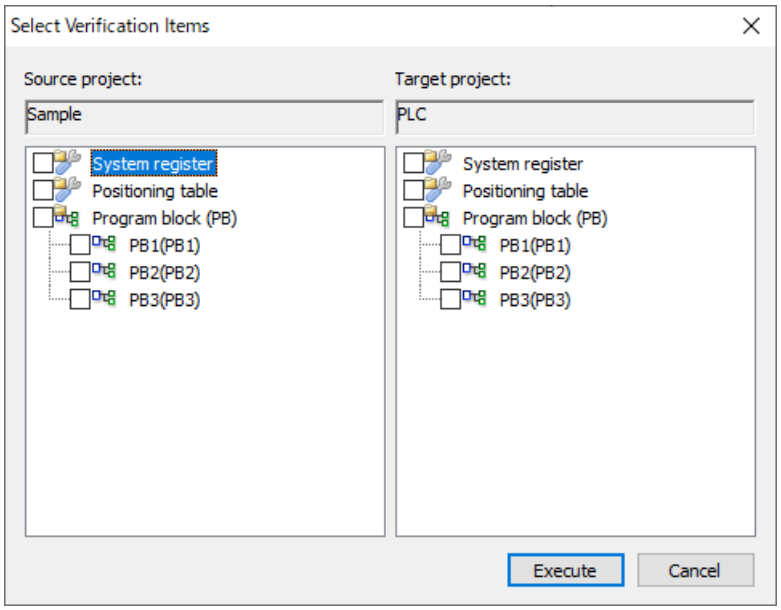
Verify the project to check that the program being edited in a computer is the same as that in the Control Unit as necessary. The following procedure is explained on the condition that the FPWIN GR7 has already started.

Procedure

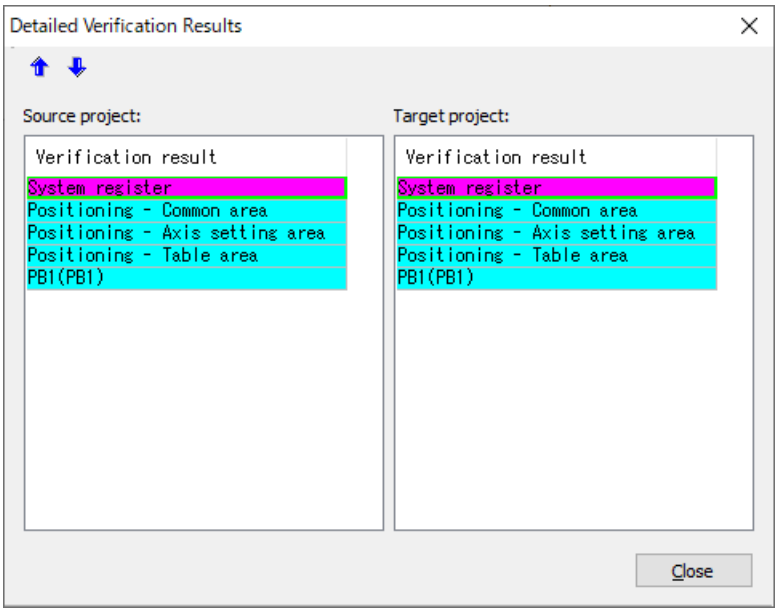
1. Select **Online**>**Switch to Online Mode** from the menu bar.
2. Select **Debug**>**Verify Program** from the menu bar.
   The "Verify Program" dialog box appears.



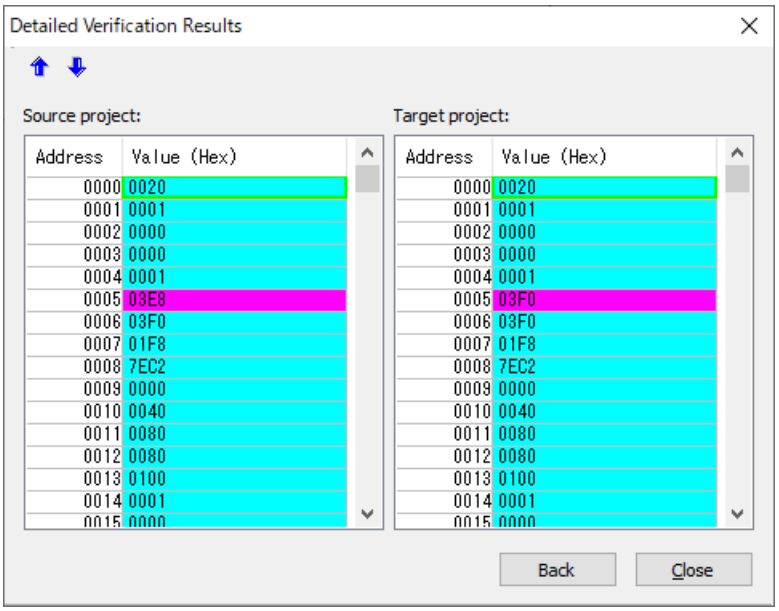
3. Select the verification target, and press the [OK] button.
The "Select Verification Items" dialog box appears.



4. Select an item and press the [Execute] button.
The verification result is displayed. A mismatched item is displayed in a pink color.



Double-clicking this item displays the detailed information.



Verification result

Verification content	Example of mismatch
System register	When the setting contents of a system register do not match, it is detected as mismatch.
Positioning table	When a positioning parameter and positioning table are different, it is detected as mismatch.
PB1	The mismatched program block number is displayed.

Info.

- If items in a program or system register are mismatched when switching the offline mode to online mode, a message box indicating the content will appear.

7.4 Online Edit

7.4.1 Overview of Online Edit

Editing can be performed on the FP-XH Control Unit under the following conditions even when a computer and PLC are connected online.

■ Online edit

Classification	Mode		Point
	PROG.	RUN	
Program	Available	Available	● In ladder symbol mode, a maximum of 512 steps can be rewritten in each operation. ● As for rewriting in RUN mode, there are restrictions in the conditions to ensure consistency between programs. ● Whole programs and comments can be downloaded even in RUN mode.
Comment	Available	Available	● Programs and comments can be rewritten even in RUN mode.
System register	Available	Not available	● They can be rewritten in PROG. mode only. When attempting to perform rewriting in RUN mode, a message box to confirm the switching to PROG. mode appears.
Positioning data	Not available	Not available	● It cannot be rewritten online. It should be edited offline and downloaded as a whole program.

(Note 1) While online edit is performed, input comments are displayed, but the comments are not saved in the memory of the Control Unit

(Note 2) With the FPWIN GR, comments cannot be rewritten online. It should be downloaded as a whole program. Note that whole programs and comments can be downloaded even in RUN mode.

7.4.2 Online Edit of Program

⚠ WARNING

● Changing a program during the operation should be performed fully considering safety.

■ Online edit of program

The online edit of programs can be executed in PROG. or RUN mode.

Info.

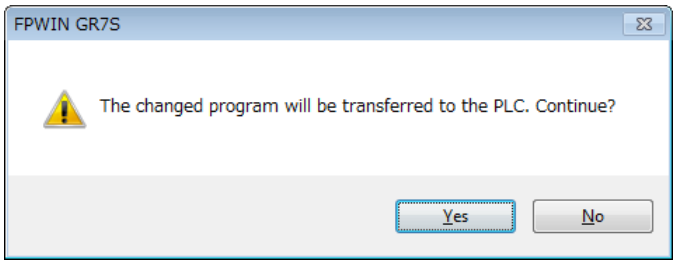
For details on rewriting in RUN mode and restrictions, refer to the “FP-X User’s Manual (WUME-FPX)”.

Procedure of rewriting blocks

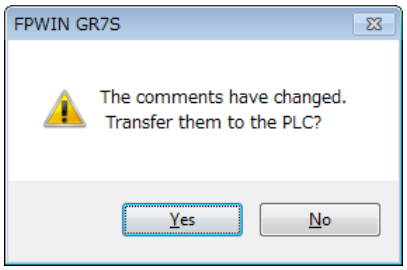
Programs can be changed in PROG. or RUN mode. The following procedure is explained on the condition that the online edit is performed with the FPWIN GR7.

Procedure

1. Change an arbitrary program, press the <Ctrl> key and <F1> key, and execute "Convert PB".
   A confirmation message dialog box appears.



2. Press the [Yes] button.
   A dialog box to confirm that the comment is changed appears.



3. Press the [Yes] button.
   Once the conversion is complete successfully, the status bar shows a message.

Info.

- Interlinear comments are linked with mnemonic addresses of programs and managed within the PLC. When a program is changed online, download the program to adjust the positions of interlinear comments. Also, confirm the address position of each interlinear comment in the interlinear comment list dialog box of FPWIN GR7, and change them as necessary.

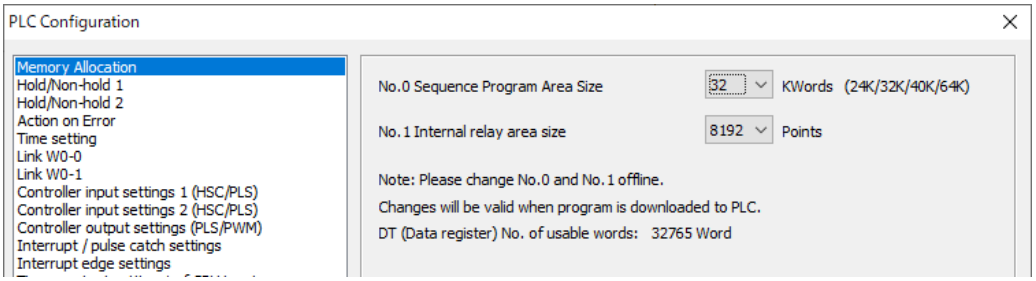
7.4.3 Online Edit of System Register

System registers can be changed only in PROG. mode. The following procedure is explained on the condition that the online edit is performed with the FPWIN GR7.

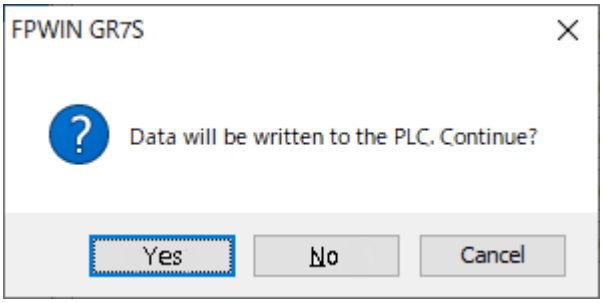
Procedure

1. Select **Options**>**System register settings** from the menu bar.

The "PLC Configuration" dialog box appears.



2. Change a desired system register, and press the [OK] button.
A confirmation message dialog box appears.



3. Click the [Yes] button.
A message indicating the completion of writing the system register into the PLC appears.

- Please change the system register number 0 offline.

7.5 Program Block

7.5.1 Overview of Program Block

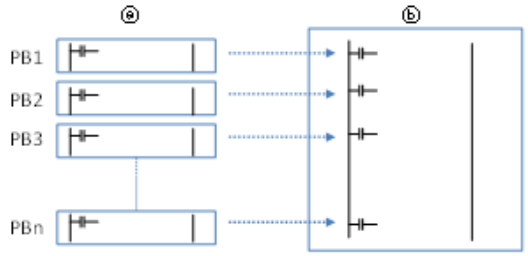
By using the FPWIN GR7, a program can be divided into multiple program blocks (PB) and edited.

■ Restrictions in program blocks (For FP0H)

Item	Description
Maximum number of PBs	Max. 256 pcs
No. of program steps per PB	No restriction

■ Execution order of program blocks

- Program blocks are connected and executed as one program.
- Only one ED instruction is described at the end of a main program. Programs up to the ED instruction are executed cyclically.
- Arrange sub programs (interrupt programs, subroutines) after the ED instruction. When the order is not correct, "Not paired error" or "Program area error" occurs.



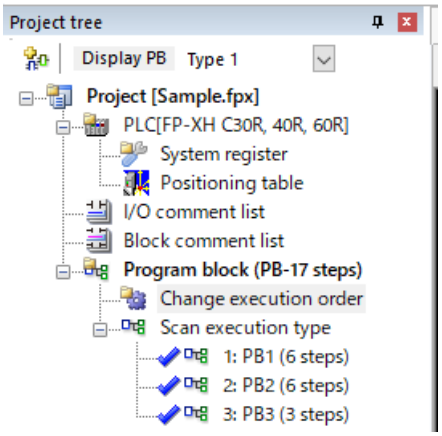
(a)	Program block	(b)	Program comprised of program blocks

7.5.2 Changing the Execution Order of Program Blocks

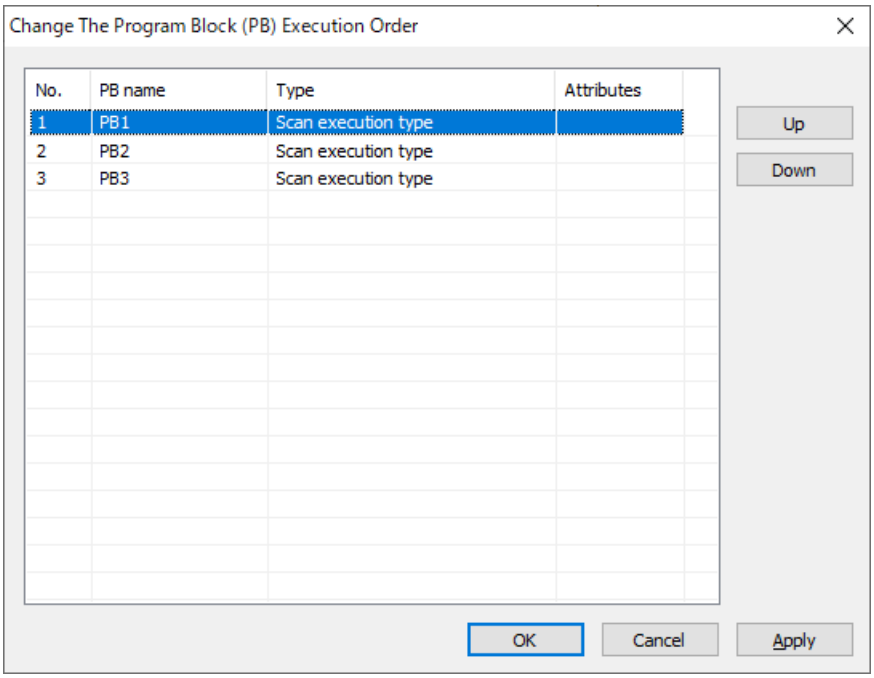
The execution order of program blocks can be arbitrarily changed after creating the program blocks. The following procedure describes the case when three program blocks have been already created.

1 2 Procedure

1. Double-click "Change execution order" in the project tree.



The "Change the Program Block (PB) Execution Order" dialog box appears.



2. Select the PB you want to change the execution order, and press the [Up] or [Down] button.
3. Click the [Yes] button.
   The project tree shows the PB names in the changed order.

(MEMO)

8 Memory / Master Memory Cassette

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8.1 Memory Backup

8.1.1 Backup of Program Memory

The contents downloaded to the Control Unit are held even in case of power outage.

■ Backup of program memory

Classification	Remarks
Program	
Comment	Max. 2 MB (I/O comments, explanatory notes, interlinear comments)
System register	
Positioning data	Including positioning parameters and positioning table data set by the Configurator PMX

8.1.2 Backup of Operation Memory

- There are an area which holds data and an area which does not hold data in case of power outage in the operation memory.
- For the FP-XH Control Unit, the fixed areas will be backed up in case of power outage or switching the mode (RUN to PROG.).

■ Non-hold area and hold area

Classification	Description
Non-hold area	Data contents will be reset to zero in case of power outage or switching the mode (RUN to PROG.).
Hold area	The last operation data will be held in case of power outage or switching the mode (RUN to PROG.).

■ Automatic backup in case of power outage

Classification	Hold area		
Counter	16 points	C1008 to C1023	
Counter elapsed value area	16 words	EV1008 to EV1023(Note 1)	
Internal relay	128 points	R5040 to R511F or R2480 to R255F(Note 2)	
Data register	315 words	C14	DT11970 to DT12284
		C30/C60 (Note 3)	DT11970 to DT12284 (when 40k-step program capacity is selected) DT32450 to DT32764 (when 32k-step program capacity is selected) DT65218 to DT65532 (when 12k-step program capacity is selected)

(Note 1) The counter target value area SV is not held.

(Note 2) The range of the internal relays varies according to the setting of the internal relay capacity (system register no. 2).

(Note 3) With the C30, and C60, the range of the data registers varies according to the setting of the program capacity (system register no. 0).

■ Backup by user program P13 (ICWT) instruction

Classification	Description
Usage method	Data registers can be transferred to the F-ROM area by describing the P13 (ICWT) instruction using a user program. The area of continuous blocks is specified. 2 K words are treated as one block. It is read from the F-ROM area to the data register by the F12 (ICRD) instruction.
No. of times of writing	Up to 10000 times

8.1.3 Backup of Operation Memory (With Battery)

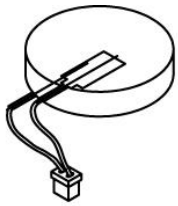
- Install an optional backup battery when the hold area is insufficient in the initial state or for using the clock / calendar function.
- When the battery is installed, all of the following areas will be backed up in case of power outage or switching the mode (RUN to PROG.).

■ Backup with backup battery

<table>
<tr><th colspan="3">Classification</th><th>Hold area</th></tr>
<tr><td rowspan="7">Operation memory</td><td colspan="2">Timer and counter</td><td rowspan="7">Hold areas or non-hold areas can be specified arbitrarily by setting the system registers no. 6 to no. 13 using the tool software. (All points can be also held.)</td></tr>
<tr><td colspan="2">Timer and counter elapsed value area</td></tr>
<tr><td colspan="2">Internal relay</td></tr>
<tr><td colspan="2">Data register</td></tr>
<tr><td colspan="2">Step ladder</td></tr>
<tr><td colspan="2">Link relay</td></tr>
<tr><td colspan="2">Link register</td></tr>
<tr><td rowspan="2">Special Data register</td><td rowspan="2">Clock / calendar</td><td>Monitor area</td><td>DT90053: Hour / Min. (reading only)</td></tr>
<tr><td>Setting, monitor area</td><td>DT90054: Minute / Second, DT90055: Day / Hour, DT90056: Year / Month, DT90057: Day of week</td></tr>
</table>

(Note 1) When battery exhaustion is detected when the power turns ON, the operation memory in the hold area will be cleared to zero.

■ Type of backup battery (sold separately)

Appearance	Item name	Specifications	Product no.
	Backup battery FP-XH	With a connector	AFPABAT001

(Note 1) The conventional FP-X series battery cannot be used.

■ Number of installed batteries

For the FP-XH, only one battery is installed.

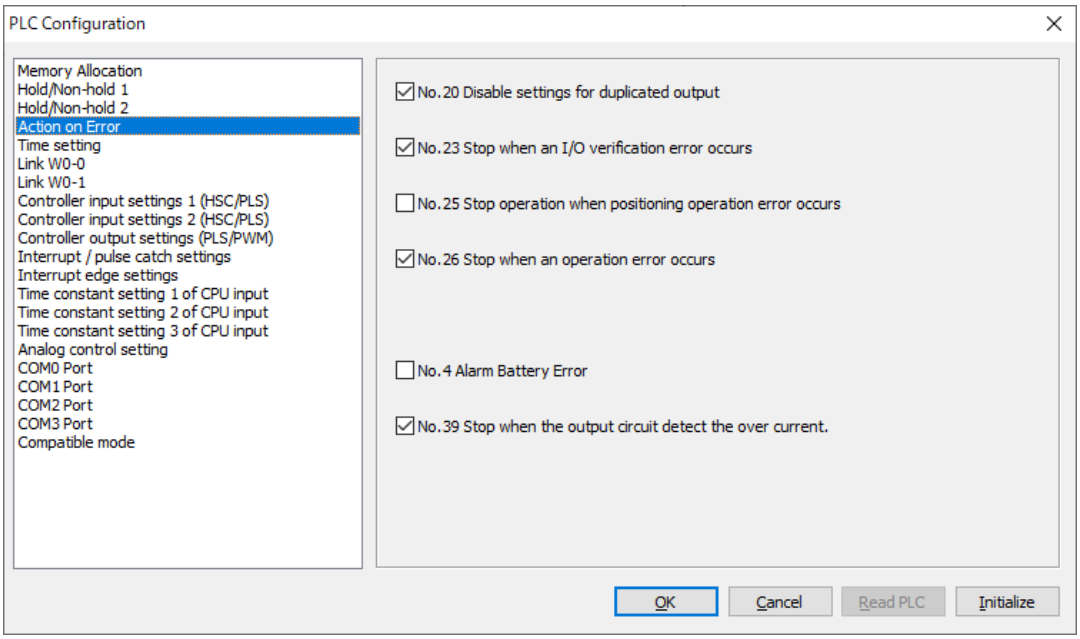
Info.

- For the details of how to install the battery, refer to "6.2 Installation of Backup Battery".

8.1.4 Settings of Battery Error Alarm and Hold Area

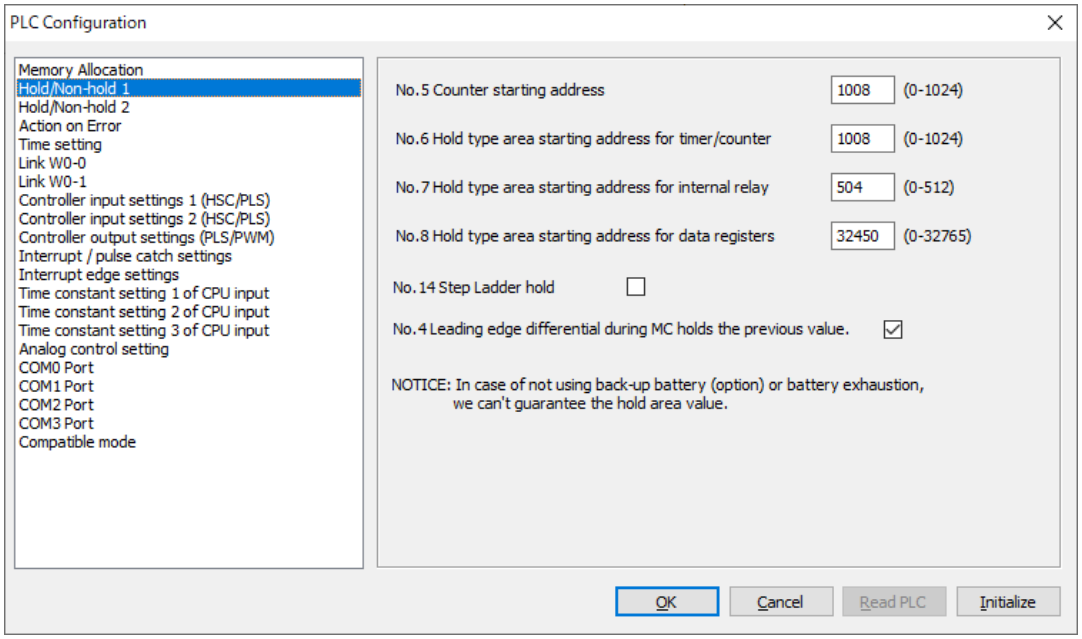
■ Setting of the battery error alarm

- When installing the backup battery, check the box of system register [No. 4 Alarm Battery Error].
- When a residual capacity of a battery is reduced, the "ERR.LED" of the Control Unit will be lit and the error will be notified.



■ Settings of Hold area / Non-hold area

To change the range of the hold area in the operation memory such as data registers, set the system registers no. 6 to no. 14.



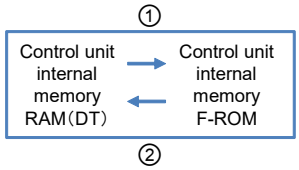
Info.

- When “Battery Error Alarm” is not set, the "ERR.LED" will not flash even if a battery error is detected.
- The setting of the system registers Nos. 6 to 14 are effective only when the backup battery is installed. Without the battery, use at the default settings.

8.2 RAM / ROM Transfer Function

8.2.1 Overview of Functions

This is a function to back up the data of all areas of data registers into the internal F-ROM area of the control unit by the tool software.



8.2.2 Operation Using Tool Software

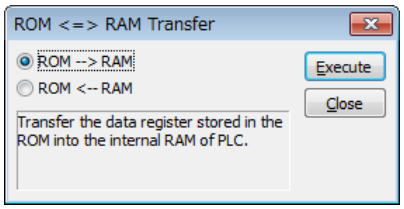
The following procedure is explained on the condition that the FPWIN GR7 has already started.

Info.

- This operation can be executed only in PROG. mode.
- Data in all areas of data registers are transferred. The specifications are different from those of conventional models FP0R, FPsigma and FP-X.

Procedure

1. Select **Online**>**Switch to Online Mode** from the menu bar.
2. Select **Tools**>**ROM <=> RAM** from the menu bar.
   The "ROM <=> RAM Transfer" dialog box appears.



3. Select the transfer direction and click the [Execute] button.
   For ROM->RAM transfer, transfer from the F-ROM area to the data register area.
   For RAM->ROM transfer, transfer from the data register area to the F-ROM area.

8.3 Function of Master Memory Cassette

8.3.1 Overview of Functions

The Master Memory Cassette has not only a memory backup or copy function but also a real-time clock function. Only one Master Memory Cassette can be installed on the FP-XH Control Unit.

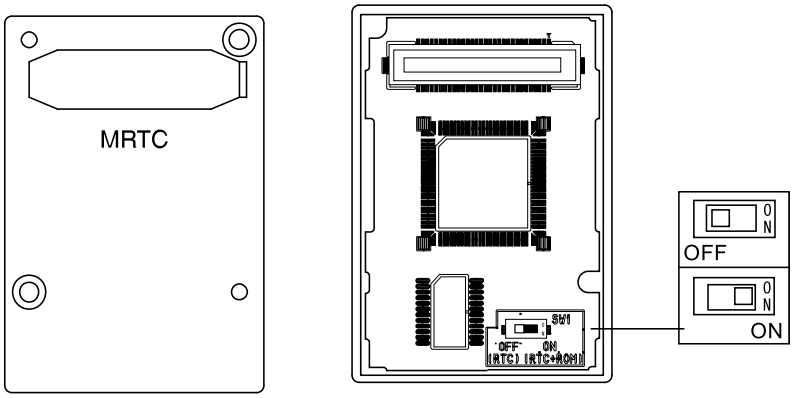
■ Master memory function

Item	Specifications	
Clock / calendar (Real-time clock)	Setting item	Year (Last two numbers), month, day, hour (24-hour), minute, second and day of the week
	Accuracy	At 0 °C: less than 104 seconds per month, at 25 °C: less than 51 seconds per month, 55 °C: less than 155 seconds per month
Master Memory Function	Memory capacity	Flash ROM (512 kB)
	Storable data	System register, ladder program, positioning data Comment data (328 kB) F-ROM data area, security function (password, upload protection)

8.3.2 Settings of Master Memory Unit

■ Function selection switch setting

Check the switch setting before installation.

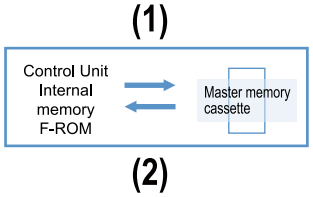


Switch setting	Specifications
OFF (RTC)	Factory default setting. Only the real-time clock function operates.
ON (RTC ＋ ROM)	Both the real-time clock function and the master memory function operate.

8.4 Master Memory Function

8.4.1 Overview of Functions

The master memory function is used to back up or copy programs and data stored in the Control Unit.



■ Transfer between the master memory and the Control Unit

Transfer direction	Transfer method	Transfer content
(1)	Operation using tool software	(Data items that are always transferred) Ladder programs, system registers, positioning data, security information (password)
		(Data items that are selected on the dialog box) Security information (upload protection), comment data, F-ROM data area(Note 1)(Note 2)
(2)	Operation using tool software	(Data items that are always transferred) Ladder programs, system registers, positioning data, security information
		(Data items that are selected on the dialog box)(Note 3) Comment data, F-ROM data area
	Changing to the RUN mode Power supply is turned ON in RUN mode.	All the contents written in the Master Memory Unit is transferred to the built-in memory (F-ROM) of the Control Unit.

(Note 1) The F-ROM data area is designated by the block number in units of 2K words.

(Note 2) Items that are not selected when data is transfered from the internal memory to the master memory are deleted in the master memory.

(Note 3) If comment data area or F-ROM data area does not exist on the master memory, they cannot be selected on the menu.

8.4.2 Before Turning ON the Power

If the master memory function is enabled by turning ON the function selection switch (RTC + ROM) of the Master Memory Cassette, operation conditions vary depending on the mode when the power supply is turned ON.

■ When power supply is turned ON in PROG. mode

- When the power supply is turned ON, the data (programs, comments, system register data and data registers) exists in the Control Unit and also in the Master Memory Unit.
- By operating the tool software, data can be transferred from the internal memory to the master memory or from the master memory to the internal memory.
- When copying the data stored in the Control Unit to the Master Memory Cassette, turn on the power supply in the PROG. mode. When the mode is switched to the RUN mode, the contents in the Master Memory Cassette is transferred to the internal memory.

■ When power supply is turned ON in RUN mode

- When the power supply is turned ON, the data (programs, comments, system register data, data registers, and positioning data) stored in the Master Memory Unit is transferred to the memory of the Control Unit.
- The data stored in the Control Unit before power supply is turned ON is overwritten.
- When necessary data (programs, comments, system register data, and data registers) is saved in the master memory, turn on the power supply in the RUN mode.

Info.

- Perform installation of the Master Memory Cassette or data transfer from the Control Unit to the Master Memory Cassette only after finishing settings or program editing. Depending on the operation conditions, the following errors may occur.

Error message	Operation conditions
42FromPLC: Basic procedural error, no support error	If programs before conversion exist in the offline state.
63FromPLC: Application error, mode error	If an attempt is made to transfer data from the Master Memory Cassette in the RUN mode.
65FromPLC: Application error, protect error	If an attempt is made to edit programs with the Master Memory Cassette installed.
A master memory is not installed in the connected PLC.	The function selection switch of the Master Memory Cassette is not switched to ON (RTC + ROM side). Or, the Master Memory Cassette is not installed.

- If the cassette is installed or removed while the power supply is turned ON, an I/O check error will occur.

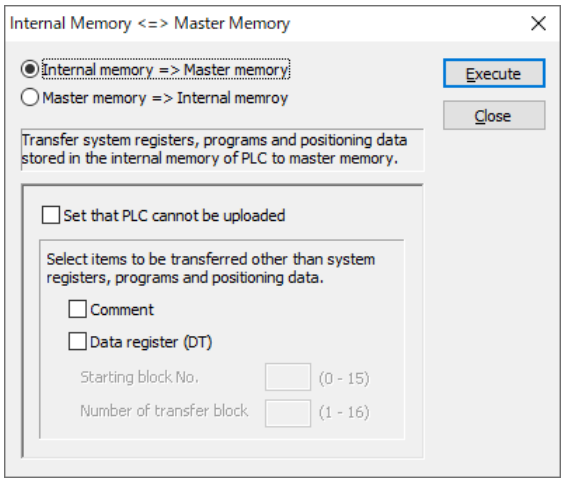
8.4.3 Data Transfer to Master Memory Cassette

Data such as programs, system registers, comments set by options, and data registers can be transferred to the Master Memory Cassette.

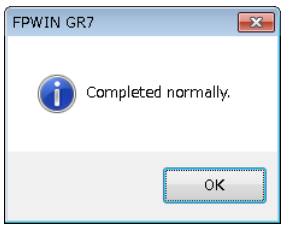
Data transfer from the Control Unit to the Master Memory Cassette is performed using the FPWIN GR7 according to the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

1 2 Procedure

1. Select **Online**>**Online Edit** from the menu bar.
2. Select **Tool**>**Internal memory⇔ Master memory** from the menu bar.
   The "Internal memory <=> Master memory transfer" dialog box is displayed.



3. Select the transfer direction. Press the [Execute] button.
   Once the transfer is completed, the following message appears.



Option settings

Classification	Description
Not possible to upload	When the check box is set to ON, the Master Memory Cassette set in the upload protection setting is created. The Control Unit that is transferred with this Master Memory Cassette mounted will also be set to the upload protection setting.
Comment	When the check box is set to ON, the comments (I/O comments, explanatory notes, interlinear comments) stored in the internal memory (F-ROM) of the Control Unit are transferred.
F-ROM data area (For transferring data registers)	When the check box is set to ON, the data for data registers stored in the F-ROM data area of the Control Unit is transferred to the Master Memory Cassette. Specify the starting block No. and the number of blocks to be transferred. Blocks are formed in units of 2K words. The maximum number of blocks that can be transferred to the master memory is 20 blocks (40,960 words).

Specification of F-ROM data area

Block No.	DT number conversion range		Block No.	DT number conversion range	
0	DT0	DT2047	16	DT30768	DT32815
1	DT2048	DT4095	17	DT32816	DT34863
2	DT4096	DT6143	18	DT34864	DT36911
3	DT6144	DT8191	19	DT36912	DT38959
4	DT8192	DT10239	20	DT38960	DT41007
5	DT10240	DT12287	21	DT41008	DT43055
6	DT12288	DT14335	22	DT43056	DT45103
7	DT14336	DT16383	23	DT45104	DT47151
8	DT16384	DT18431	24	DT47152	DT49199
9	DT18432	DT20479	25	DT49200	DT51247
10	DT20480	DT22527	26	DT51248	DT53295
11	DT22528	DT24575	27	DT53296	DT55343
12	DT24576	DT26623	28	DT55344	DT57391
13	DT26624	DT28671	29	DT57392	DT59439
14	DT28672	DT30719	30	DT59440	DT61487
15	DT30720	DT30767	31	DT61488	DT65535

Info.

- At the start of transfer, all data in the Master Memory Cassette is deleted once. Comments that are not selected as the transfer range and values of the F-ROM data area are stored in the Master Memory Cassette.
- The transfer from the RAM built in the Control Unit to the F-ROM area is performed by using the “RAM to ROM transfer function” of the tool software or the P13 (ICWT) instruction.
- Writing using the P13 (ICWT) instruction or reading using F12 (ICRD) instruction can be performed up to the maximum of 32 blocks (65536 words).

8.4.4 Data Transfer from Master Memory Cassette to Control Unit

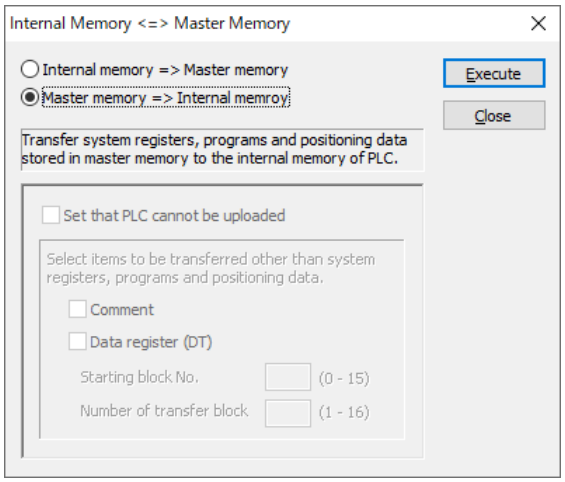
Data that is stored in the Master Memory Cassette can be transferred to the Control Unit according to the following procedure.

Data transfer from the Control Unit to the Master Memory Cassette is performed by the FPWIN GR7 according to the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

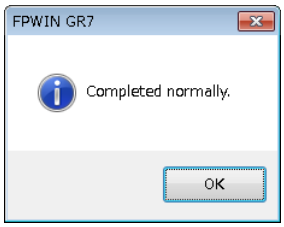
Procedure

1. Select **Online**>**Online Edit** from the menu bar.

2. Select **Tool>Internal memory⇔ Master memory** from the menu bar.
The "Internal memory <=> Master memory transfer" dialog box is displayed.



3. Change the transfer direction to "Master memory => Internal memory" side and press the [Execute] button.
Once the transfer is completed, the following message appears.



Info.

- Once the data is transferred, afterwards, the information in the Master Memory Cassette is compared with the information in the internal memory when the mode is changed from PROG. to RUN, and the matched information is not transferred.

Option settings

Classification	Description
Comment	When the check box is set to ON, the comments (I/O comments, explanatory notes, interlinear comments) stored in the Master Memory Cassette are transferred to the internal memory (F-ROM) of the Control Unit. If no comment data is stored in the Master Memory Unit, the check box is not displayed.
F-ROM data area Data register	When the check box is set to ON, the data stored in the Master Memory Cassette is transferred to the F-ROM data area of the Control Unit. If no data is stored in the Master Memory Unit, the check box is not displayed.

8.4.5 Using Master Memory Cassette with Other Models

There are the following restrictions between PLC that created the Master Memory Cassette and the PLC with the Master Memory Cassette mounted.

■ Using among FP-XH Control Unit models

- Possible to use if the output format and the number of I/O points are the same. 30-point models, and 60-point models are treated as the same group.
- For the combination that cannot be used, a self-diagnostic error (E25) will occur.

			PLC that created master memory					
			Relay output type			Transistor output type		
			C14	C30	C60	C14	C30	C60
Installed PLC	Relay output type	C14	●	E25	E25	E25	E25	E25
		C30	E25	●	●	E25	E25	E25
		C60	E25	●	●	E25	E25	E25
	Transistor output type	C14	E25	E25	E25	●	E25	E25
		C30	E25	E25	E25	E25	●	●
		C60	E25	E25	E25	E25	●	●

(Note 1) ●: Operation possible, E25: Occurrence of self-diagnostic error

■ Operations when self-diagnosis error (E25) occurs

- It is not possible to change to the RUN mode. Transfer operation from the master memory to the internal memory is not executed.
- Transfer operation from the internal memory to the master memory can be executed.

■ Using Master Memory Unit created by the conventional FP-X Control Unit

- Under the same conditions shown in the above table between FP-XH models, the Mater Memory Unit created by the conventional FP-X Control Unit can be installed and used on the FP-XH Control Unit.
- However, the Master Memory Unit created by the FP-XH Control Unit cannot be used on the FP-X Control Unit.

8.5 Clock / calendar

8.5.1 Overview of Functions

- The Master Memory Cassette incorporates the clock / calendar function.
- The clock data is stored in the special data register and read by user programs.

■ Function of Master Memory Unit

Item	Specifications	
Clock / calendar (Real-time clock)	Function	Year (Last two numbers), month, day, hour (24-hour), minute, second and day of the week Supports up to year 2099. Supports leap years.
	Accuracy	At 0 °C: less than 104 seconds per month, at 25 °C: less than 51 seconds per month, 55 °C: less than 155 seconds per month

■ Area used for the clock / calendar

Special DT no.	Data contents				R	W
	High byte		Low byte			
DT90053	Hour data	H00 to H23	Minute data	H00 to H59	○	×
DT90054	Minute data	H00 to H59	Second data	H00 to H59	○	○
DT90055	Day data	H00 to H31	Hour data	H00 to H23	○	○
DT90056	Year data	H00 to H99	Month data	H00 to H12	○	○
DT90057	-		Day-of-the-week data	H00 to H06	○	○

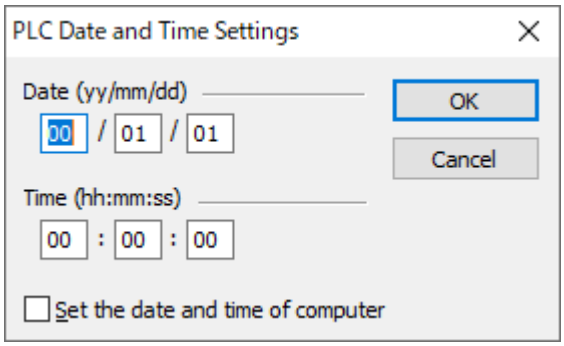
(Note 1) For the data of day of week, an arbitrary day of week is specified in the range of H00 to H06.

8.5.2 Clock / calendar Setting

The clock / calendar can be set by the tool software or user program.

■ Setting with tool software

Select **Set PLC Date / Time** from the menu bar. If the day-of-the-week data needs to be set, use the user program.

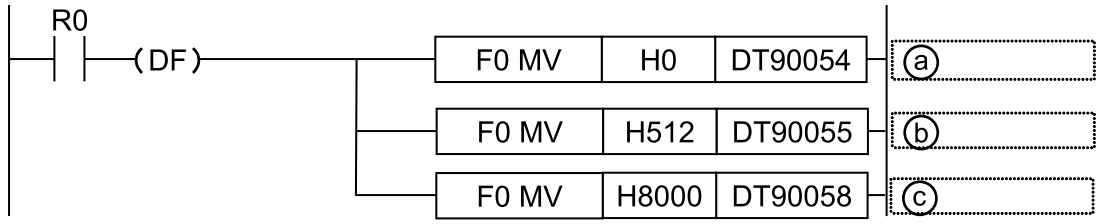


Info.

- The clock / calendar data is backed up by the battery. Attach the battery before setting.

■ Setting with user programs

Write H8000 to DT90058 after writing the clock data in the special data registers DT90054 to DT90057. Perform the transfer with the differential instruction, or transfer H8000 through H0000 in this order. Please do not always write H8000.

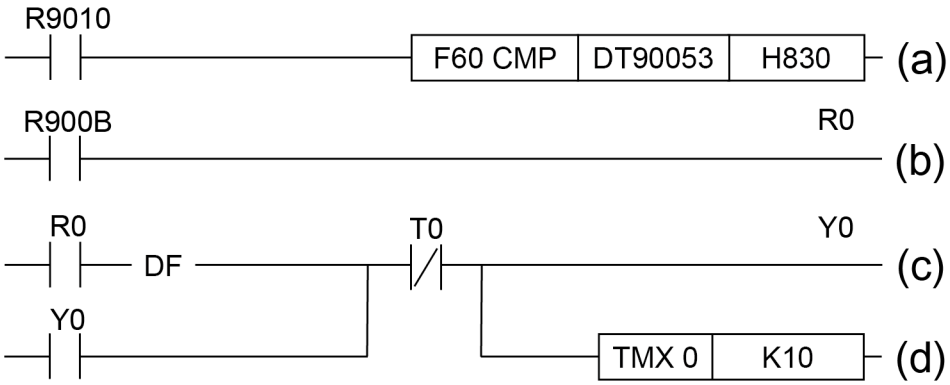


(a)	Set 0 minute 0 second.	(b)	Set 12 pm on the 5th day.	(c)	Set the time.

8.5.3 Application Example of Clock / calendar

■ Usage example (Automatic start at a fixed time)

- In the example shown here, the clock / calendar (real-time clock) function is used to output the (Y0) signal for one second, at 8:30 a.m. every day. Here, the “Hour/minute” data stored in the special data register DT90053 is used to output the signal at the appointed time.
- The hour data is stored in the upper 8 bits of DT90053 and the minute data in the lower 8 bits, in the BCD format. This hour and minute data is compared with the appointed time (BCD), and the R900B (=flag) special internal relay is used to detect whether or not it matches the appointed time.



(a)	The value of the special data register DT90053 (Hour/minute data) is compared with the value of H830 (8:30).				
(b)	Comparison match output	(c)	Appointed time output pulse (1 second)	(d)	0.1-second timer Set K10. It is used as 1-second timer.

9 Security Function

9.1 Password Protect Function 9-2
9.1.1 Overview of Functions 9-2
9.1.2 Setting with tool software 9-2
9.2 Program Upload Protection Function 9-9
9.2.1 Overview of Functions 9-9
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9.3.1 Control Unit 9-11

9.1 Password Protect Function

9.1.1 Overview of Functions

■ Overview of Password Protect Function

This function is used to prohibit reading and writing programs and system registers by setting a password. There are two ways to set a password as below.

1. Set using the programming tool.
2. Set using an instruction (SYS1 instruction). However, when using the instruction, 32-digit passwords cannot be set.

■ Characters usable for password

Digit number of password	Usable characters
4-digit password	4 characters of the following 16 characters, 0 to 9 and A to F, can be used.
8-digit password	A maximum of 8 one-byte characters (case-sensitive) and symbols can be used.
32-digit password	A maximum of 32 one-byte characters (case-sensitive) and symbols can be used.

(Note 1) To use the 32-digit password for the C14, C30, or C60, the FP-XH Control Unit must be Ver. 1.1 or later and the FPWINGR Ver. 2.94 or later is required.

- Do not forget your password. If you forget your password, you cannot read programs. Even if you ask us for your password, we cannot crack it.

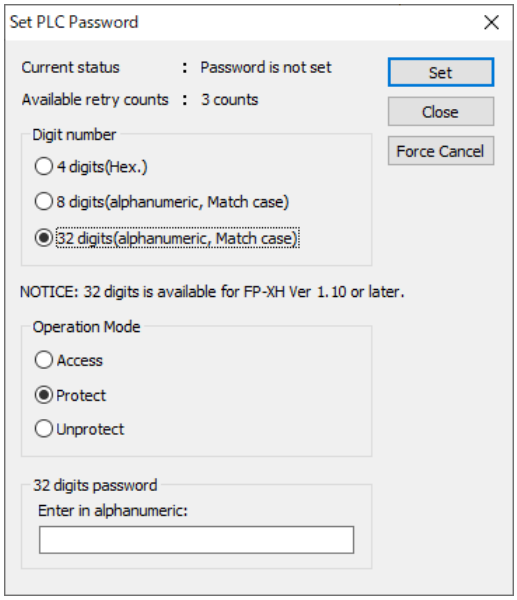
9.1.2 Setting with tool software

Setting using FPWIN GR7

1 2 Procedure

1. Select **Online (L)**> **Switch to Online Mode (N)** from the menu bar, or press <CTRL> + <F2> keys simultaneously.
   The screen switches to “Online Monitor”.
2. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar.
   The "Set PLC Password" dialog box is displayed.

Set PLC password dialog box



(1)	Indicates the current status of the password setting.
(2)	Specify the type of the password to be used.
(3)	Specify an operation mode. Access: Accessing programs is performed by entering a password. Protect: A password is set. Unprotect: The password setting is released.
(4)	Input a password.

Confirmation of the password settings

Item		Settings
Current status	Password is not set	Password is not set.
	xx digits protect(Note 1)	A password is set and access is prohibited.
	xx digits access available(Note 1)	A password is set and access is allowed. (The status that inputting the password completes and that can access programs.)
No. of retries		This is the number of times that you can input the password in succession. You can input up to three times, and every time incorrect password is input, the number will decrease. If you fail to input the correct password for 3 times in succession, you cannot access the program. Turn the power supply of the PLC OFF and then ON again to try to input the password again.

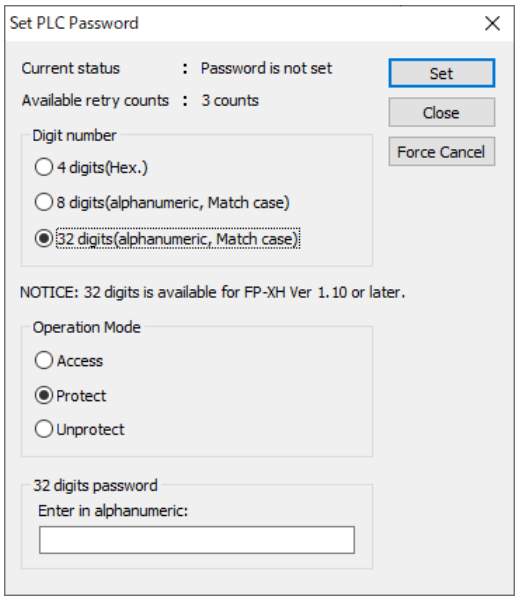
(Note 1) In the “xx” part, either 4, 8, or 32 is input depending on the set number of digits.

- If the power supply of the PLC is turned OFF / ON when the access is permitted, the PLC will be password protected again.

Setting to prohibit access with a password

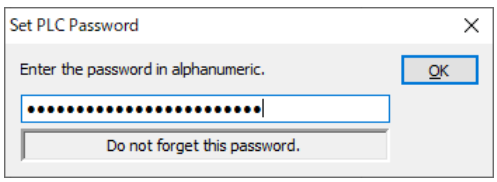
Procedure

1. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar.
   The "Set PLC Password" dialog box is displayed.

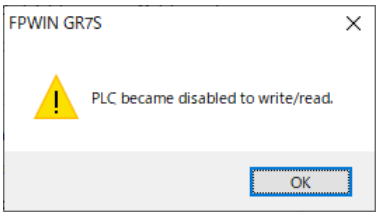


2. Set the items in the table below, and click on the [Set] button.

Item	Settings
Number of digits	Select the number of digits.
Operation mode	Select "Protect".
4-digit, 8-digit, and 32-digit passwords	Input a password to be set.



3. Input the password for confirmation again, and click the [OK] button.
   Once the PLC is in write-read inhibit state (password-protected), the following message appears.

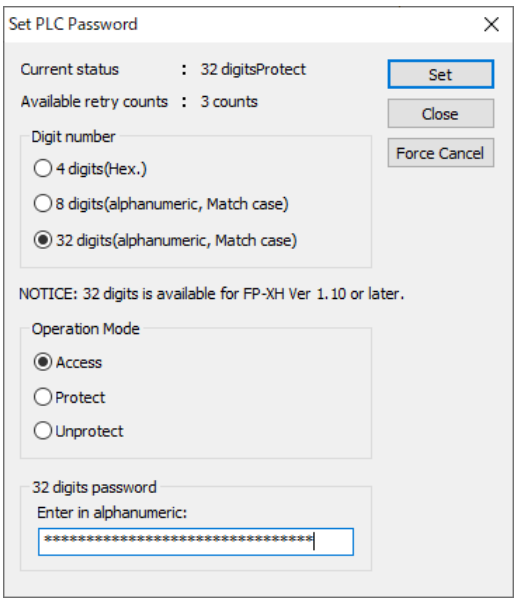


4. Click the [OK] button.

Setting to allow access with a password

Procedure

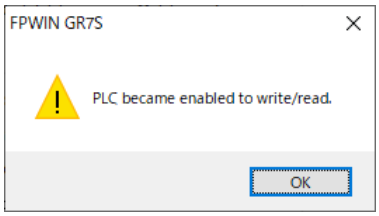
1. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar.
The "Set PLC Password" dialog box is displayed.



2. Set the items in the table below, and click on the [Set] button.

Item	Settings
Number of digits	Select the number of digits.
Operation mode	Select "Access".
4-digit, 8-digit, and 32-digit passwords	Input the set password.

Once access is permitted, the following message appears.



3. Click the [OK] button.

> **Stop**
> - If the power supply of the PLC is turned OFF / ON when the access is permitted, the PLC will be password protected again.

Canceling the password protection

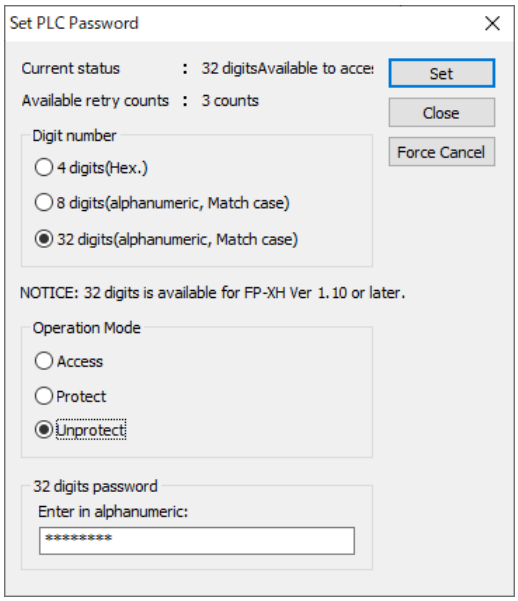
Following two methods are available to cancel the password setting.

	Description	Program
Unprotect	The registered password is specified and canceled.	All programs are retained.
Force Cancel	All programs and security information are deleted and the password is canceled.	All programs are deleted. (The upload protection setting is also deleted.)

Unprotect

1 2 Procedure

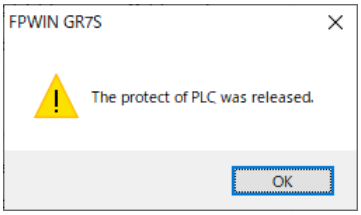
1. Select **Tools (T)**>**PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar.
The "Set PLC Password" dialog box is displayed.



2. Set the items in the table below, and click on the [Set] button.

Item	Settings
Number of digits	Select the number of digits.
Operation mode	Select"Unprotect".
4-digit, 8-digit, and 32-digit passwords	Input the set password.

Once the cancellation of protection is completed, the following message appears.



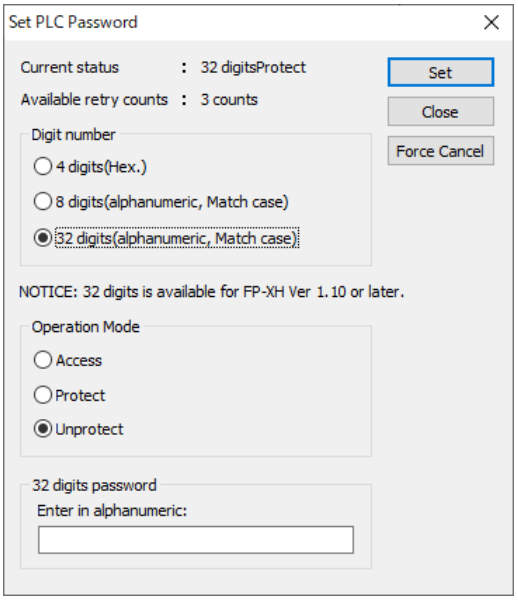
3. Click the[OK] button.

- Unless the access is permitted, the cancellation of password cannot be executed.

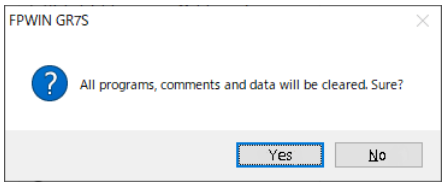
Executing the force cancel (Programs and security information are all deleted.)

Procedure

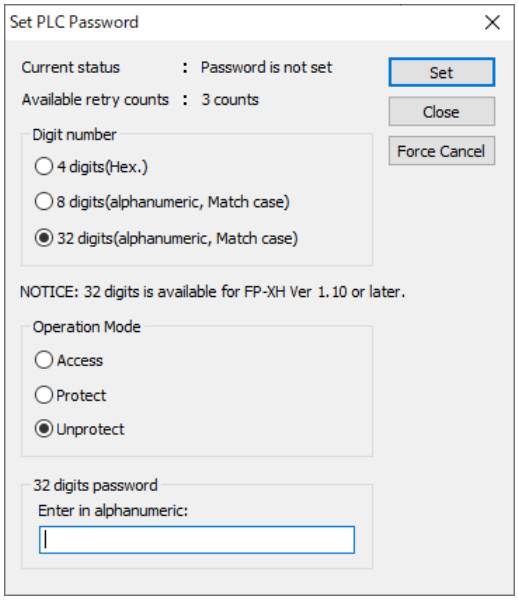
1. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar. The "Set PLC Password" dialog box is displayed.



2. Click the [Force Cancel] button.
A confirmation message appears.



3. Confirm the message and click the [Yes] button.
"Current status" shows "Password is not set". All programs and security information were deleted.



9.2 Program Upload Protection Function

9.2.1 Overview of Functions

■ Overview of program upload protection function

- This function is to prohibit reading programs and system registers by setting to disable program uploading.
- If the upload protection is set, note that the ladder programs and system registers will be disabled to be uploaded after that.
- The setting can be canceled using the programming tool, however, all ladder programs, system registers and password information will be deleted when the setting is canceled.
- Editing the files that are controlled with a PC can be carried out online using the programming tool. However, the programs will be broken if the programs are not absolutely matched. When using this function, store ladder programs as files without fail.

■ Interaction with the password protect function

- The password setting can be specified simultaneously for the PLC in which this function is set.
- This function can be also set in a password-protected PLC.

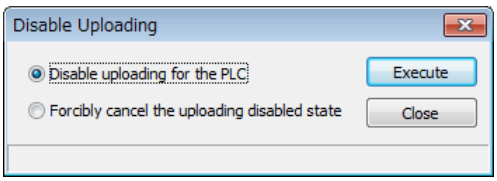


- All programs and security information will be deleted when the upload protection setting is canceled. We cannot restore the deleted programs even if you ask us.

9.2.2 Configuration

Procedure

1. Select **Online**>**Switch to Online Mode** from the menu bar.
   The screen switches to "Online".
2. Select **Tools**>**PLC Security Settings**>**Disable Uploading** in the menu bar.
   The "Disable Uploading" dialog box appears.



3. Select "Disable uploading for the PLC", and press the [Execute] button.

Force cancel

Procedure

1. Select "Forcibly cancel the uploading disabled state" in the "Upload settings" dialog box, and press the [Execute] button.

9.3 Availability of Security Function

9.3.1 Control Unit

The conditions for enabling the security operation in the Control Unit vary depending on whether the Master Memory Cassette is available or not.

■ Without Master Memory Cassette

○: Available, ×: Not available

		Status of security				
		Security unset	Upload protection	4-digit password	8-digit password	32-digit password
Setting / canceling operation	Upload protection	○	○	○	○	○
	4-digit password	○	○	○	×	×
	8-digit password	○	○	×	○	×
	32-digit password	○	○	×	×	○

■ With Master Memory Cassette mounted

○: Available, ×: Not available

		Status of security				
		Security unset	Upload protection	4-digit password	8-digit password	32-digit password
Setting / canceling operation	Upload protection	×	×	×	×	×
	4-digit password	×	×	×	×	×
	8-digit password	×	×	×	×	×
	32-digit password	×	×	×	×	×

(MEMO)

10 Other Functions

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10.1 Analog Potentiometer

10.1.1 Overview of Functions

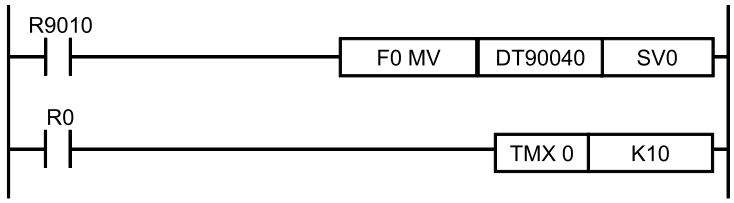
■ Overview of functions

- The FP-XH Control Unit is equipped with one analog potentiometer.
- Turning the potentiometer changes the values of special data register DT90040 within the range of K0 to K4000. Using this function makes it possible to change the internal set values in the PLC without using the programming tool, so this can be used, for example, with analog clocks, to change the set value by turning the potentiometer from outside.

10.1.2 Example Showing How to Use Analog Potentiometer

■ Example of application to the timer

The value of the special data register (DT90040) that corresponds to the analog potentiometer V0 is sent to the setting value area (SV0) of TMX0 to set the time for the clock.

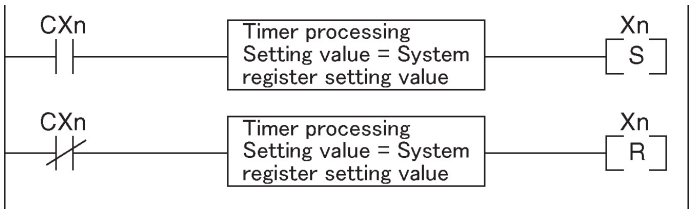


10.2 Input Time Constant Setting Function

10.2.1 Overview of functions

■ Operation when setting the input time constant processing

- The input time constant of the Control Unit can be set by changing the values of the system registers no. 430 to 437 using the programming tool.
- If this setting is specified, an operation like the equivalent circuit below will be performed. By the setting, the noises or chattering of input will be removed.



CXn = Input signal of Xn contact

Xn = Image memory of input Xn

Note

- The input signal of X contact is retrieved at the timing of the normal I/O refresh.
- If the partial refresh instruction is executed for the input in the time constant processing, the time constant processing will be invalid, and the input status at the time will be read out and set.
- The time constant processing can also be set for inputs of other devices (Expansion Unit) than the Control Unit by using the F182 (FILTR) instruction
- The timer instruction is not used for the timer processing in this equivalent circuit.
- The time constant processing is invalid when the high-speed counter, pulse catch or interrupt has been specified.

■ Input time constant setting function and applicable models

System register No.	Control Unit input I/O No.	Applicable model	
		C14	C30/C60
430	X0 to X3	○	○
431	X4 to X7	○	○
432	X8 to XB	○	○
433	XC to XF	○	○
434	X10 to X13	○	○
435	X14 to X17	○	○
436	X18 to X1B	○	○
437	X1C to X1F	○	○

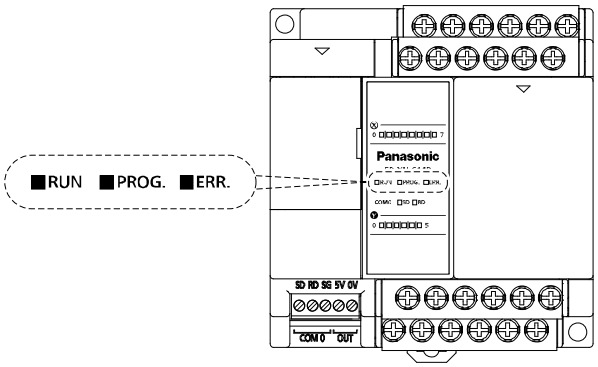
(MEMO)

11 Troubleshooting

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11.1 Self-diagnosis function

11.1.1 Operation Monitor LEDs of Control Unit

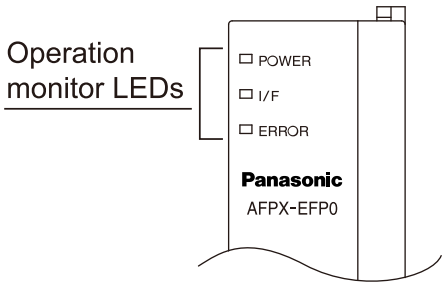


- The Control Unit has a self-diagnostic function which identifies errors and stops operation if necessary.
- When an error occurs, the status of the operation monitor LEDs on the Control Unit vary, as shown in the table below.

■ LEDs related to self-diagnostic errors

	LED display			Description	Operation status
	RUN	PROG.	ERR.		
In normal condition	ON	OFF	OFF	Normal operation	Operating
	OFF	ON	OFF	Program mode LED does not flash even if the forcing output is performed in program mode.	Stop
	Flashes	Flashes	OFF	Forcing input/output in RUN mode "RUN" and "PROG." LEDs flash alternately.	Operating
Abnormal condition	ON	OFF	Flashes	Self-diagnostic error (During operation)	Operating
	OFF	ON	Flashes	Self-diagnostic error (During stop)	Stop
	OFF	ON	ON	System watchdog timer has been activated.	Stop

11.1.2 Operation Monitor LEDs of FP-X Expansion FP0 Adapter



- The FP-X Expansion FP0 Adapter has a self-diagnostic function which identifies errors and stops operation if necessary.
- When an error occurs, the status of the operation monitor LEDs on the Control Unit vary, as shown in the table below.

■ LEDs related to self-diagnostic errors

○: Lights (on), △: Flashes, ×: Off, -: Lights or off

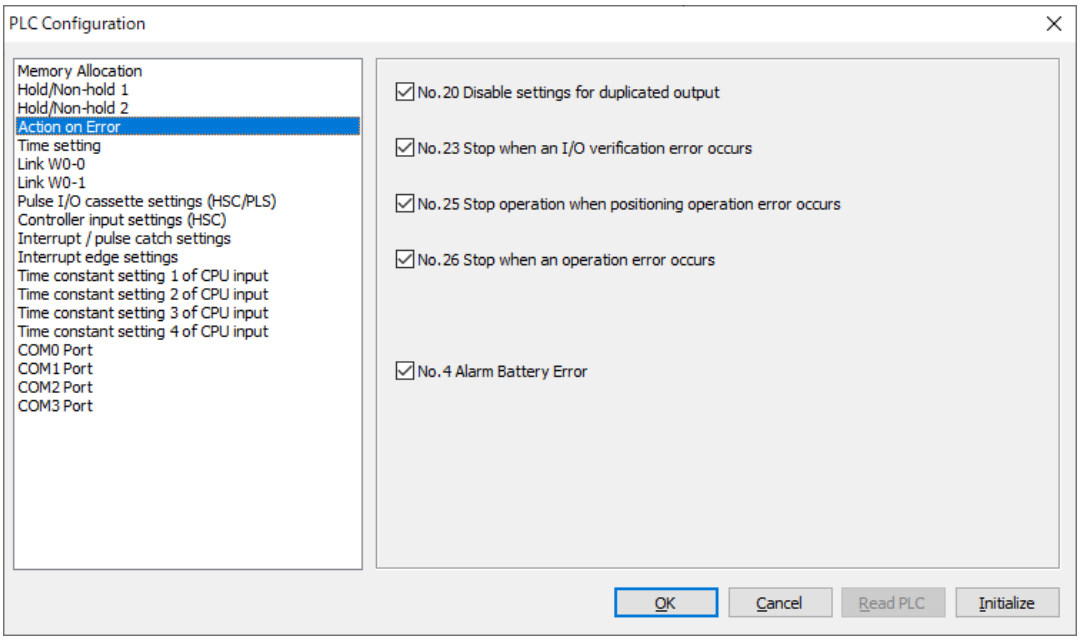
	LED display			Description
	POWER	I/F	ERR.	
Normal operation	○	○	×	Normal operation
Error	○	△	×	FP0 / FP0R Expansion Unit is not connected.
	○	○	△	The FP0 Expansion Unit, that had been connected when the power supply for the Control Unit was turned ON, was disconnected. An error has occurred when data is accessed between the Expansion FP0 Adapter and FP0 / FP0R Expansion Unit due to noise, etc.
	○	×	×	The power supply to the Expansion FP0 Adapter turned ON later than that to the Control Unit.

11.1.3 Operation Mode When an Error Occurs

- Normally, when an error occurs, the operation stops. For some errors, the user may select whether operation is to be continued or stopped by setting the system registers.

■ "PLC Configuration" dialog box of FPWIN GR7

To specify the steps to be taken by the FPWIN GR7 if a PLC error occurs, select **Option (O)**>**System Register Setting** from the menu bar, and click on the "Action on Error" tab. The screen shown below is displayed.


PLC Configuration
Memory Allocation
Hold/Non-hold 1
Hold/Non-hold 2
Action on Error
Time setting
Link W0-0
Link W0-1
Pulse I/O cassette settings (HSC/PLS)
Controller input settings (HSC)
Interrupt / pulse catch settings
Interrupt edge settings
Time constant setting 1 of CPU input
Time constant setting 2 of CPU input
Time constant setting 3 of CPU input
Time constant setting 4 of CPU input
COM0 Port
COM1 Port
COM2 Port
COM3 Port
No.20 Disable settings for duplicated output
No.23 Stop when an I/O verification error occurs
No.25 Stop operation when positioning operation error occurs
No.26 Stop when an operation error occurs
No.4 Alarm Battery Error
OK
Cancel
Read PLC
Initialize

11.2 What to Do If an Error Occurs

11.2.1 ERR. LED Flashes

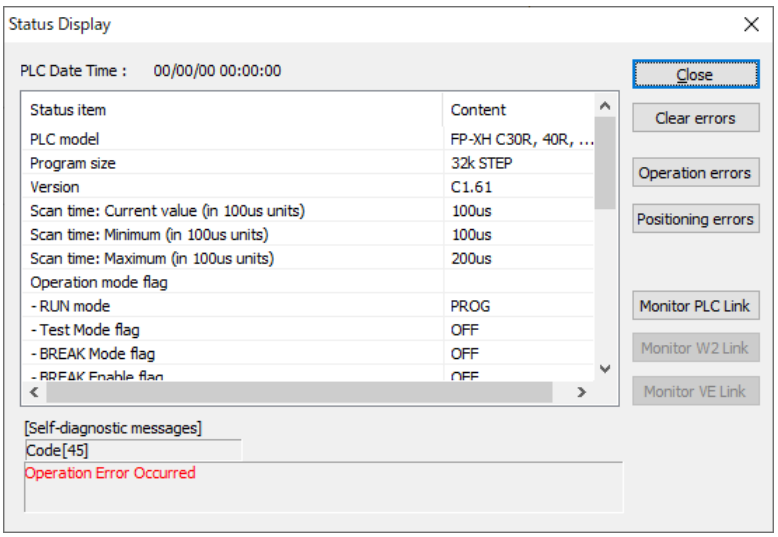
■ **Situation**

A syntax error or self-diagnostic error has occurred.

■ **Solution**

1. Check the error code using the programming tool.

If a PLC error occurs during programming or debugging, the following "Status Display" dialog box is displayed automatically. Check the contents of the self-diagnosed error.



2. Confirm the error code and eliminate the cause.

Error Codes and How to Handle Them

Error code	Situation	Solution
1 to 9	Syntax error occurs.	● Change the PLC mode to the PROG. mode and clear the error. ● Execute a total-check function using FPWIN GR7 to determine the location of the syntax error and correct the program.
20 or more	Self-diagnostic error occurs.	● Refer to the list of error codes and correct the settings or programs. ● Use the programming tool in the PROG. mode to clear the error.

Info.

- In the case of an error code 43 or higher, the error can be cleared by pressing the [Clear Error Log] button in the "Status Display" dialog box. In the PROG. mode, the power supply can be turned OFF and then ON again to clear the error, but all of the contents of the operation memory except hold type data will be cleared.
- When the positioning error (error code 44) occurs, the detailed information on the error can be confirmed. Press the [Positioning errors] button to check the error code.
- When the operation error (error code 45) occurs, the address at which the error occurred is stored in special data registers DT90017 and DT90018. If this happens, click on the [Operation Err] button in the “Status Display” dialog box and confirm the address at which the error occurred before canceling the error.

Info.

- For details of the solution when the positioning error (error code 44) occurs, refer to "13.7.2 Self-diagnostic Errors".

11.2.2 Mode does Not Change to RUN Mode

■ Situation

A syntax error or a self-diagnostic error that caused operation to stop has occurred.

■ Solution

1. Check if the "ERR."LED is flashing or lights.
2. Use the tool software to perform "Totally Check Project" to identify the location of the syntax error.

11.2.3 ERR. LED Lights

■ Situation

The system watchdog timer has been activated and the operation of the controller has stopped.

■ Solution

1. Switch the mode to the PROG. mode and turn on the power supply again.
   If the "ERR." LED lights again, there may be a problem with the unit. If it goes out, the problem may have been caused by noise or another temporary phenomenon.
2. Switch the mode to the RUN mode.
   When the "ERR." LED turns ON after switching the mode to the RUN mode, the program execution time is too long. Review the program and correct it if necessary.
3. Check the surrounding environment if there is no influence of noise.
   If there is no problem in the program, there may be a problem in the surrounding environment. Check the wirings including a ground wiring.

Note

When reviewing the program, check the following items.

- Check if the program is programmed to be in an infinite loop by an instruction which controls the flow of a program such as JP instruction and LOOP instruction.
- Check if interrupt instructions are executed in succession.

11.2.4 ALL LEDs are OFF

■ Situation

It is possible that sufficient power is not supplied.

■ Solution

Check the condition according to the following procedure.

1. Power off the unit and double-check the wiring status. (e.g. Is there any loose terminal?)
2. Check if the power supplied to the control unit is in the range of the rating.
3. Check if a large voltage fluctuation does not occur.
4. Disconnect the power supply wiring to the other devices if the power supplied to the control unit is shared with them.
   If the LED of the unit turns on in this processing, under capacity of power supply is possible. Review the power supply design.

11.2.5 A Protect Error Message Appears

■ Situation

It may be due to the Master Memory Cassette used or a password is set.

■ Solution (When using the Master Memory Cassette)

1. The program editing cannot be carried out when the Master Memory Cassette is used. Turn off the power supply and remove the Master Memory Cassette.

■ Solution (When using the password function)

1. Select **Tools**>**Set PLC Password** in the FPWIN GR7. The "Set PLC Password" dialog box is displayed.
2. Select "Access" and click the [Set] button. The protection will be canceled.

Info.

- Pressing the [Force Cancel] button will delete all programs saved to the PLC.

11.2.6 Diagnosing Output Malfunction

■ Situation

Possible factors are those caused by software such as a program or I/O allocation and caused by hardware such as wirings or power supply.

■ Solution (Check of output condition)

Check the conditions in the order of the output side and input side.

1. Check if the output indicator LEDs of the units are on.
   When the LEDs are on, go to the next step. When they are off, go to step "Step 4".
2. Check the wiring state of the loads such as looseness of terminals.
   If the LED of the unit turns on in this processing, under capacity of power supply is possible. Review the power supply design.
3. Check if the voltage is properly applied to the loads.
   If the applied voltage is correct, there is probably an abnormality in the load. If the correct voltage is not applied, there is probably an abnormality in the output part of the unit.
4. Monitor the output state using the tool software.
   If the monitor state is on, there is probably a duplicated output error.
5. Forcibly turn on/off the corresponding output using the forced I/O function of the tool software.
   If the output LED of the unit turns on, check the condition on the input side. If the LED remains off, there is probably an abnormality in the output section.

■ Solution (Check of input condition)

Clarify the situation in the following procedure.

1. Check if the input indicator LEDs of the unit are on.
   When the LEDs are off, go to the next step. When they are on, go to step "Step 3".
2. Check the wiring state of the input device such as looseness of terminals.
   If the LED of the unit turns on in this processing, under capacity of power supply is possible. Review the power supply design.
3. Check if the voltage is properly applied to the input terminals.
   If the applied voltage is correct, there is probably an abnormality in the input part of the unit. If the correct voltage is not applied, there is probably an abnormality in the power supply or the input device.
4. Monitor the input state using the tool software.
   If the monitor state is off, there is probably an abnormality in the input part of the unit.
   If the monitor state is on, review the program and correct it if necessary. When the input device uses the two-wire type sensor, there may be an influence of leakage current.

Info.

- When reviewing the program, check the following items.
  1. Check for the duplicated use of output. Check if the output has been written.
  2. Check if the flow of the program has not been changed by a control instruction such as MC instruction or JP instruction.
  3. Check if the allocation in the I/O map matches the mounting state.

11.2.7 Expansion Unit does not Operate

■ Situation

The settings for the Expansion Unit may be incorrect.

1. Check if the terminal settings for the Expansion Unit are correct.
Check if the terminal setting is specified for multiple expansion units.

2. Check if the Expansion FP0 Adapter is installed at the last position.
When the FP-X Expansion FP0 Adapter is installed at the last position, the terminal settings for other Expansion Units are not necessary.

3. Check if the power supply has turned ON and OFF in a short time such as instantaneous power failure.
There is a possibility that the Expansion Unit has not been recognized due to the occurrence of power failure. Turn the power OFF and then ON.

11.2.8 Communication Error Occurs (RS-232C)

■ Object

Product no.	Communication interface	Allocated communication port no.				
		Control unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
Control unit standard equipment	RS-232C (3-wire type) x 1 channel	•				
AFPX-COM1	RS-232C (5-wire type) x 1 channel		•		•	
AFPX-COM2	RS-232C (3-wire type) x 2 channels		•	•	•	•
AFPX-COM4	RS-232C (3-wire type) x 1 channel			•		•
AFPX-COM5	RS-232C (3-wire type) x 1 channel			•		•

■ Situation

The connection or setting may be incorrect.

1. Check the setting of the system register.
   Check if the setting corresponding to the allocated communication port number is correct. When the PLC link function is selected, check if the link areas do not overlap.
2. Check if the CS signal is on.
   When the three-wire type is used, connect the RS signal and CS signal, and turn on the CS signal. When the five-wire type is used, check the communication cassette LED and the RS signal of the destination device.
3. Check the connection with the destination device.
   Confirm that the SD terminal of the destination device is connected to the RD terminal of the PLC, and the RD terminal of the destination device is connected to the SD terminal of the PLC. Check that the both SG terminals are connected.

11.2.9 Communication Error Occurs (RS-422)

■ Object

Product no.	Communication interface	Allocated communication port no.				
		Control unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
AFPX-COM3	RS-485 / RS-422 x 1 channel		•		•	

■ Situation

The connection or setting may be incorrect.

1. Check the setting of the system register.
   Check if the setting corresponding to the allocated communication port number is correct. When the PLC link function is selected, check if the link areas do not overlap.
2. Check if the terminal unit is correctly connected.
3. Check if transmission cables are securely connected to the send data terminal and the receive data terminal of a connected device.
4. Check if the transmission cables are within the specifications range.

11.2.10 Communication Error Occurs (RS-485)

■ Object

Product no.	Communication interface	Allocated communication port no.				
		Control unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
AFPX-COM3	RS-485 / RS-422 x 1 channel		●		●	
AFPX-COM4	RS-485 x 1 channel		●		●	
AFPX-COM6	RS-485 x 2 channels		●	●	●	●

■ Situation

The connection or setting may be incorrect.

1. Check the setting of the system register.
   Check if the setting corresponding to the allocated communication port number is correct. When the PLC link function is selected, check if the link areas do not overlap.
2. Check if the terminal unit is correctly connected.
   Do not designate any unit other than those at both ends of the network as a terminal station.
3. Check if the transmission cables are securely connected between the (+) transmission terminals and between the (-) transmission terminals of each device.
4. Check if the transmission cables are within the specifications range.
   Use only one type of cable. Do not mix more than one type.

11.2.11 Communication Error Occurs (Ethernet)

■ Object

Product no.	Communication interface	Allocated communication port no.				
		Control unit	Cassette mounting part 1		Cassette mounting part 2	
		COM0	COM1	COM2	COM3	COM4
AFPX-COM5	Ethernet port x 1 channel		●		●	

■ Situation

If the "ERR.LED" is not lit, the connection or setting may be incorrect.

1. Check the setting of the system register.
   Check if the setting corresponding to the allocated communication port number is correct.
2. Check if the LAN cable is securely connected to each cassette or a PC.

3. When using a HUB for the connection, check if the power supply of the HUB is on.
4. Check if the LINK / ACT LED lights up.
   When the LED is OFF, the LAN cable is not connected correctly.
5. Check the destination IP addresses.
6. Check if the transmission format and baud rate for the COM1 port of the Control Unit matches the configuration setting of the FP-X communication cassette (AFPX-COM5).

■ Situation

If the "ERR.LED" is lit, the connection or setting may be incorrect.

1. Check the status with the Configurator WD.
   If the "IP duplicate error" is indicated for the status, the IP address may be duplicate on the network. Specify an IP address that is not duplicate.
   If the "DHCP error" is indicated for the status, getting IP from the DHCP server has failed. Check if there is no problem on the network system.

12 Maintenance and Inspection

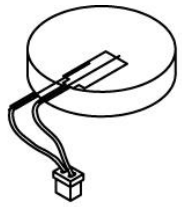
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12.1 Handling of Backup Battery

12.1.1 Replacement of Backup Battery

The backup battery of the FP-XH Control Unit can be replaced while the power is on. The procedure for replacing the backup battery is as follows.

Type of backup battery (sold separately)

Appearance	Item name	Specifications	Product no.
	Backup battery FP-XH	With a connector	AFPABAT001

Number of installed batteries

For the FP-XH, only one battery is installed.

Procedure

1. Supply power to the Control Unit for more than five minutes.
   Charge the built-in capacitor to retain the contents of the memory during the replacement of the battery.
2. Turn OFF the power.
3. Open the cover.
4. Remove the used battery.
5. Install a new battery within two minutes after turning OFF the power.
6. Close the cover.

Info.

- For the FP-XH Control Unit, the battery can be replaced while power is ON. If the battery is to be replaced while power is off, replace the battery within 2 minutes after supplying power for at least 5 minutes in order to charge the built-in capacitor. If the built-in capacitor has not been sufficiently charged, clock / calender data may become indefinite. Make sure that the battery connector cable is not pinched by the cover.

12.1.2 Lifetime and Time for Replacement of Backup Battery

■ Lifetime of backup battery

Master memory cassette	Type of control unit	Lifetime of backup battery	Remar
When installed	C14/ C30/ C60	5 years or more	When operating 8 hours a day
When not installed	C14/ C30/ C60	5 years or more	When operating 8 hours a day

(Note 1) Note that the lifetime in actual use may be shorter than the typical lifetime depending on the use conditions.

■ How to check the replacement time of the backup battery

When using a backup battery, take either one of the following measures so that the replacement time of the backup battery can be checked.

- Enable system register No.4 “Alarm Battery Error”.
  If the system register No. 4 "Alarm Battery Error" is enabled, the "ERR." LED of the Control Unit will flash when the backup battery voltage drops and a battery error is detected.
- Create a program that reports the error to the outside.
  The special internal relays (R9005 and R9006) will go on if the backup battery voltage drops and a battery error is detected. Using the special internal relays, create a program for reporting the error to the outside.

Note

- The special internal relays (R9005 and R9006) will be on when a backup battery error is detected regardless of the setting of the system register.

■ Replacement of the backup battery

- Although data will be retained for about a week after the detection of backup battery error without power, the battery should be replaced as soon as possible.
- In consideration of the replacement time, have a spare backup battery in advance.

- If a week has passed without power after the special internal relays (R9005 and R9006) turned on or the "ERR." LED of the control unit flashed, retained memory data may be lost.
- Regardless of time passed from detection of a backup battery error, supply power to the control unit for at least five minutes before replacing the backup battery.

12.2 Inspection

In order to use the unit in the optimal conditions, ensure routine / periodic inspection.

■ Inspection items

Inspection item	Description	Criterion	Related page
Power supply	Check the lighting state of the "RUN", "PROG.", and "POWER LED" of the Control Unit.	Normal when either LED is on.	"P.2-3"
Display of the operation monitor LEDs	Check the RUN mode indicator LED. Check the "ERR.LED".	On in RUN mode. Normally “off“.	"P.2-3"
Installation	State of installation to the DIN rail, including looseness Loose or wobbly unit	The unit should be securely installed.	"P.6-12"
Connection state	Loose terminal screw Proximity to a solderless terminal Loose connector	There should be no looseness. They should be tightened in parallel. They are locked. There should be no looseness in the connector part.	"P.6-6"～"P.6-23"
Power supply voltage of the unit	Voltage between terminals	100 to 240 V AC Or 24 V DC (by type)	"P.2-5"
Power supply voltage of the I/O circuit	Supplied voltage	100 to 240 V AC Or 24 V DC (by type)	"P.2-7" to "P.2-7"
Usage conditions	Ambient temperature / in-board temperature Ambient humidity / in-board humidity Ambient air	0 to +55 °C 10 to 95% RH Free from excessive dust and corrosive gases	"P.6-3"
Backup battery	Backup battery for the Control Unit	Periodic replacement	"P.6-5" "P.12-2"

13 Specifications

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13.1 Control Unit Specifications

13.1.1 General Specifications

■ General specifications

Item		Specifications		
Operating ambient temperature		0 to +55 °C		
Storage ambient temperature		-40 to +70℃		
Operating ambient humidity		10 to 95 %RH (at 25 °C, non-condensing)		
Storage ambient humidity		10 to 95 %RH (at 25 °C, non-condensing)		
Breakdown voltage (Detection current 5 mA)			AC power supply type	DC power supply type
	Relay output Type	Between power supply terminal and earth terminal	1500 V AC for 1 minute	500 V AC for 1 minute
		Between power supply terminal and service power supply terminal	1500 V AC for 1 minute	-
		Between input terminal and earth terminal	1500 V AC for 1 minute	500 V AC for 1 minute
		Between output terminal and earth terminal	1500 V AC for 1 minute	1500 V AC for 1 minute
	Transistor Output type	Between power supply terminal and earth terminal	1500 V AC for 1 minute	500 V AC for 1 minute
		Between power supply terminal and service power supply terminal	1500 V AC for 1 minute	-
		Between input terminal and earth terminal	1500 V AC for 1 minute	500 V AC for 1 minute
		Between output terminal and earth terminal	500 V AC for 1 minute	500 V AC for 1 minute
Isolationresistance (Test voltage: 500 V DC)		Between power supply terminal and earth terminal	100 MΩ or more	100 MΩ or more
		Between power supply terminal and service power supply terminal		
		Between power supply terminal and internal circuit		
		Between input terminal and earth terminal		
		Between output terminal and earth terminal		
Vibration resistance		5 to 8.4 Hz, 3.5-mm single amplitude 8.4 to 150 Hz, Acceleration 9.8 m/s^2 10 min. each in the X, Y and Z directions (1 octave/min)		
Shock resistance		147 m/s^2, 4 times each in the X, Y, and Z directions		
Noise resistance		1000 V [P-P] with pulse widths of 50 ns and 1μs (using a noise simulator) (Power supply terminal)		

■ List of consumption current (AC power supply type)

Model	When using 100 V AC	When using 200 V AC
C14R	185 mA or less	115 mA or less
C14T	175 mA or less	110 mA or less
C14P	175 mA or less	110 mA or less
C30R	330 mA or less	200 mA or less
C30T	310 mA or less	190 mA or less
C30P	310 mA or less	190 mA or less
C60R	380 mA or less	235 mA or less
C60T	335 mA or less	205 mA or less
C60P	335 mA or less	205 mA or less

■ List of consumption current (DC power supply type)

Model	When using 200 V DC
C14RD	95 mA or less
C14TD	90 mA or less
C14PD	90 mA or less
C30RD	160 mA or less
C30TD	115 mA or less
C30PD	115 mA or less
C60RD	275 mA or less
C60TD	170 mA or less
C60PD	170 mA or less

■ Weight

Model	Weight
C14R	320 g
C14RD	280 g
C14T	300 g
C14TD	265 g
C14P	300 g
C14PD	265 g
C30R	510 g
C30RD	440 g
C30T	475 g
C30TD	405 g
C30P	475 g
C30PD	405 g

Model	Weight
C60R	785g
C60RD	715g
C60T	710g
C60TD	635g
C60P	710 g
C60PD	635 g

13.1.2 Performance Specifications

Item			Specifications		
			C14	C30	C60
No. of controllable I/O points			14 points Input: 8 points Output: 6 points	30 points Input: 16 points Output: 14 points	60 points Input: 32 points Output: 28 points
Programming method / Control method			Relay symbol / Cyclic operation		
Program memory			Built-in Flash ROM (Backup battery is not required.)		
Comment storage			All comments including I/O comments, explanatory notes, interlinear comments can be stored. (Backup battery is not necessary: 1M bytes)		
No. of instructions		Basic instructions	Approx. 110		
		High-level instructions	Approx. 220		
Program capacity			16K steps:	24K / 32K / 40K steps (switch-over)(Note 1)	
Operation speed(Note 5)			Up to 7K steps: Basic instruction: 0.04 μs/step or faster, high-level instruction: 0.22 μs/step or faster		
			7K steps or more: Basic instruction: 0.7 μs/step or faster, high-level instruction: 1.73 μs/step or faster)		
I/O refresh + base time			CPU alone: 0.12 ms or less With the Expansion Unit E16: 0.34 ms × number of units With the Expansion Unit E30: 0.47 ms × number of units With the Expansion FP0 Expansion Adapter: 1.4 ms + FP0 Expansion Unit refresh time		
Operation memory	Link relay	External input (X)	1760 points (X0 to X109F)(Note 2)		
		External output (Y)	1760 points (Y0 to Y109F)(Note 2)		
		Internal relay (R)	8192 points (R0 to R511F) or 4096 points (R0 to R255F)(Note 3)		
		Timer / Counter (T/C)	1024 points (Initial settings: Timer: 1008 points, Counter: 16 points)(Note 4) Timer: Can be measured up to (in 1 msec / 10 msec / 100 msec / 1 sec unit) x 32767. Counter: Can be measured up to 1 to 32767.		
		Link relay (L)	2048 points (L0 to L127F)		

Item			Specifications		
			C14	C30	C60
	Memory area	Data register (DT)	12K words	64K / 32K / 12K words (DT0 to DT32764) (Note 1)	
		Link data register (LD)	256 words (LD0 to LD255)		
		Index register (I)	14 words (I0 to ID)		

(Note 1) When changing the system register no.0 (sequence program capacity setting), the data register (DT) capacity will also change.

(Note 2) The number of points in the above table is the number of points of operation memory. The number of points actually available to be used as I/O points is determined by the hardware configuration.

(Note 3) Can be selected by the setting of the system register no. 1 (internal relay capacity). To provide compatibility with the conventional FP-X Series Control Unit, select 4,096 points.

(Note 4) The number of timer / counter points can be changed by the setting of the system register no.5.

(Note 5) If the version of the C14 / C30 / C60 is earlier than 1.30, the operation speed becomes faster up to 5K steps.

Item		Specifications	
		Relay output type	Transistor output type
Differential points (DF, DF/, DFI)		Points for program capacity	
Master control relay points		256 points	
No. of labels (JMP+LOOP)		256 points	
No. of step ladders		1000 steps	
No. of subroutines		500 subroutines	
Interrupt program		Interrupt by an external input or interrupt when the high-speed counter target value matches x 8 programs. Periodical interrupt (0.1 ms unit, 0.5 ms unit, or 10 ms unit) x 1 program(Note 1)	
Sampling trace		Sampling by commands/Sampling at regular time intervals (For one sampling: 16 bits + 3 words) x 1000 samples	
PLC link function		Max. 16 units, link relay: 1024 points, link register: 128 words	
Constant scan		Available	
Security function		Password (4-digit, 8-digit, 32-digit), Upload protection	
Self-diagnostic function		Watchdog timer, program syntax check	
Rewriting in RUN mode		Available (downloading in RUN mode, program rewriting in RUN mode (512 steps max.)	
High-speed counter (Note 2)(Note 3)	Control unit input	Single-phase 8 channels or 2-phase 4 channels Single-phase 8 channels: 10 kHz each 2-phase 4 channels: 5 kHz each	Single-phase 8 channels or 2-phase 4 channels High speed single-phase (4 channels): 100 kHz each Middle speed single-phase (4 channels): 10 kHz each High speed 2-phase (2 channels): 50 kHz each Middle speed 2-phase (2 channels): 10 kHz each

<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="2">Specifications</th></tr>
<tr><th>Relay output type</th><th>Transistor output type</th></tr>
<tr><td colspan="2"></td><td>C14: Single-phase 2 channels or 2-phase 1 channel
C30 / C60: Single-phase 4 channels or 2-phase 2 channels
(With two cassettes installed)
At single-phase: 100 kHz each, at 2-phase: 50 kHz</td><td>Installation not possible</td></tr>
<tr><td rowspan="3">Pulse output / PWM output(Note 2) (Note 3)</td><td rowspan="2">Control unit output</td><td rowspan="2">None</td><td>Pulse output:
C14: 3 channels, C30: 4 channels, C60: 6 channels
Max. output frequency: 100 kHz</td></tr>
<tr><td>PWM output: 3 channels (C14), 4 channels (other than C14)
1 Hz to 70 kHz (Resolution of 1000)
70k to 100 kHz (Resolution of 100)</td></tr>
<tr><td>Pulse I/O
With cassette installed</td><td>Pulse output:
C14: 1 channel, C30 / C60: 2 channels when 2 cassettes are installed.
Max. output frequency: 100 kHz each
PWM output: 2 channels
1 Hz to 70 kHz (Resolution of 1000)
70k to 100 kHz (Resolution of 100)</td><td>Installation not possible</td></tr>
<tr><td colspan="2">Pulse catch input
Interrupt input(Note 3)</td><td>14 points (Input of Control Unit: 8 points, Pulse I/O cassette: 3 points x 2)</td><td>8 points
(Control Unit input: 8 points)</td></tr>
<tr><td colspan="2">Periodical interrupt</td><td colspan="2">0.5 ms to 1.5 s (0.5 ms unit), 10 ms to 30 s (10 ms unit)</td></tr>
<tr><td colspan="2">Potentiometer input</td><td colspan="2">1 channel (K0 to K4000)</td></tr>
<tr><td colspan="2">Clock / calendar</td><td colspan="2">Year (Last two numbers), month, day, hour (24-hour), minute, second and day of the week. Supports up to year 2099. Supports leap years.
Available only when the Master Memory Cassette (AFPX-MRTC) and battery are installed(Note 4)</td></tr>
<tr><td colspan="2">Flash ROM backup</td><td colspan="2">Guaranteed number of times of writing: Up to 10000 times
Automatic backup when power is off
Counter: 16 points, Internal relay: 128 points, Data register: 315 words
Operation using the tool software or by the F-ROM read / write (F12 / P13) instruction
Backup is possible with data registers in units of 2K words.</td></tr>
<tr><td colspan="2">Battery backup</td><td colspan="2">Hold areas or non-hold areas can be specified by setting the system registers.</td></tr>
<tr><td colspan="2">Battery lifetime</td><td colspan="2">5 years or more in the actual use condition (operating 8 hours a day)</td></tr>
</table>

(Note 1) There are following three types of interval settings of interrupt periodical programs.
0.1 ms unit / 0.5 ms unit / 10 ms unit

(Note 2) The maximum counting speed and maximum output frequency for the high-speed counter, pulse output, and PWM output indicate the specifications for the voltage of 24 V DC and ambient temperature of 25℃. The frequency may decrease depending on voltage, temperature or combination of functions used.

(Note 3) The inputs and outputs used for each function of the high-speed counter, pulse output, PWM output, pulse catch input, or interrupt input cannot be allocated in duplication.

(Note 4) If the battery is not installed, date and time data is deleted when the power supply is turned OFF. The date and time data needs to be set when the power supply is turned ON.

13.2 Communication Function Specifications

13.2.1 Communication Specifications of Control Unit

■ USB port (For tool software)

Item	Specifications
Standard	USB2.0 FULL SPEED
Communication functions	MEWTOCOL-COM (slave)

■ COM0 port

Item	Specifications
Interface	RS-232C (3-wire type) x 1 channel
Transmission distance	15 m(Note 1)
Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 307200 bit/s
Communication method	Half-duplex transmission
Synchronous method	Start stop synchronous system
Transmission format	Data length: 7 bit / 8 bits, stop bit: 1 bit / 2 bits, parity: None / Yes (Odd / Even) Start code: STX / No STX, end code: CR / CR+LF / None / ETX
Data transmission order	Transmits from bit 0 character by character.
Communication functions	PLC link MEWTOCOL-COM (Master / Slave) MODBUS RTU (Master / Slave) General-purpose communication Modem initialization

(Note 1) When communication is performed at a baud rate of 38400 bit/s or higher, use the cable not longer than 3 m. For wiring the RS-232C, a shielded wire must be used to increase noise suppression.

13.2.2 Communication Cassette Specifications

■ RS-232C / RS-422 / RS-485 interface

Item	Specifications				
	AFPX-COM1 AFPX-COM5	AFPX-COM2	AFPX-COM3	AFPX-COM4	AFPX-COM6
Interface	RS-232C x 1 channel (Note 1)	RS-232C (3-wire type) x 2 channels	RS-485 / RS-422 x 1 channel (Note 2)(Note 3)	RS-485 x 1 channel, RS-232C (3-wire type) x 1 channel	RS-485 x 2 channels (Note 3)

Item	Specifications				
	AFPX-COM1 AFPX-COM5	AFPX-COM2	AFPX-COM3	AFPX-COM4	AFPX-COM6
				(Note 3)	
Transmission distance	RS-232C: Max. 15 m(Note 4) When using RS-422: Max. 400 m When using RS-485: Max. 1,200 m(Note 5)(Note 6)				
Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 307200 bit/s				
Communication method	Half-duplex transmission				
Synchronous method	Start stop synchronous system				
Transmission format	Data length: 7 bit / 8 bits, stop bit: 1 bit / 2 bits, parity: None / Yes (Odd / Even) Start code: STX / No STX, end code: CR / CR+LF / None / ETX				
Data transmission order	Transmits from bit 0 character by character.				
Communication function and no. of connected units	PLC Link: Max. 16 units MEWTOCOL-COM (Master / Slave): Max. 99 units MODBUS RTU (Master / Slave): Max. 99 units General-purpose communication: Max. 99 units Modem initialization				

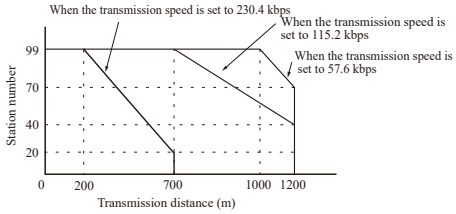
(Note 1) The AFPX-COM1 is a 5-wire type. When using it as a 3-wire type, short-circuit the RS-CS terminal.

(Note 2) RS-485 and RS-422 can be switched over by switching the DIP switch on the cassette.

(Note 3) When connecting a commercially available device that has an RS-485 / RS-422 interface, please confirm operation using the actual device. In some cases, the number of units, transmission distance, and baud rate vary depending on the connected device.

(Note 4) When communication is performed at a baud rate of 38400 bit/s or higher, use the cable not longer than 3 m. For wiring the RS-232C, a shielded wire must be used to increase noise suppression.

(Note 5) The transmission distance is limited by the baud rate and the number of connected units when setting RS-485 as follows. For the baud rate of 38400 bit/s or less, the distance is up to 1200 m, and the number of connected units is 99. When using in combination with the C-NET adapter, the maximum number of connected units is limited to 32, and the baud rate is limited to 19200 bit/s or less.



(Note 6) The converter SI-35 manufactured by Lineeye Co., Ltd. is recommendable for the RS-485 at the computer side.

■ Ethernet port

Item	Specifications	
	AFPX-COM5	
Interface	IEEE802.3u, 100BASE-TX / 10BASE-T	
Baud rate	100 Mbps, 10 Mbps(Note 1)	
Transmission system	Baseband	
Max. segment length	100 m(Note 2)	
Communication cable	UTP cable (Category 5)	
Communication protocol	TCP/IP, UDP/IP, ICMP, ARP, DHCP	
Function	Auto-negotiation function MDI / MDI-X Auto-crossover function	
Communication functions	MEWTOCOL-COM (Master / Slave)	Max. 1 connection (Client) Max. 3 connections (Server)
	General-purpose communication	Max. 1 connection (Client)

(Note 1) Switching between different speeds is done automatically by auto negotiation function.

(Note 2) The standards cite 100 m as the maximum, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. Also, if the hub is positioned close to a control board, we recommend using it at a distance of 10 m or less.

13.3 Operation Memory Area

■ List of operation memory areas

Item		Specifications	
		C14	C30 / C60
Relay	External input (X)(Note 1)	1760 points (X0 to X109F)	
	External output (Y)(Note 1)	1760 points (Y0 to Y109F)	
	Internal relay (R)(Note 2)	4096 points (R0 to R255F) or 8192 points (R0 to R511F)	
	Link relay (L)	2048 points (L0 to L127F)	
	Timer / Counter (T/C) (Note 3)	1024 points (1008 points for Timer: T0 to T1007, 16 points for Counter: C1008 to C1023) Timer: Can be measured up to (in 1 msec / 10 msec / 100 msec / 1 sec unit) x 32767. Counter: Can be measured up to 1 to 32767.	
	Special internal relay (R)	256 points (R9000 to R915F)	
Memory area	External input (WX)	110 words (WX0 to WX109)	
	External output (WY)	110 words (WY0 to WY109)	
	Internal relay (WR)	256 words (WR0 to WR255) or 512 words (WR0 to WR511)(Note 2)	
	Link relay (WL)	128 words (WL0 to WL127)	
	Data register (DT)(Note 4)	12285 words (DT0 to DT12284)	12285 words (DT0 to DT12284) 32765 words (DT0 to DT32764) 65533 words (DT0 to DT65532)
	Special data register (DT)	500 words (DT90000 to DT90499)	
	Link data register (LD)	256 words (LD0 to LD255)	
	Timer / counter set value area (SV)	1024 words (SV0 to SV1023)	
	Timer / counter elapsed value area (EV)	1024 words (EV0 to EV1023)	
	Index register (I)	14 words (I0 to ID)	
Constant	Decimal constants (K)	K-32,768 to K32,767 (for 16-bit operation) K-2,147,483,648 to K2,147,483,647 (for 32-bit operation)	
	Hexadecimal constants (H)	H0 to HFFFF (for 16-bit operation) H0 to HFFFFFFFF (for 32-bit operation)	
	Floating point type real numbers (f)	F-1.175494 x 10^{-38} to F-3.402823 x 10^{38} F 1.175494 x 10^{-38} to F 3.402823 x 10^{38}	
Positioning memory		1800 words Out of these words, positioning table area: 20 tables for each channel, 250 words	

(Note 1) The number of points in the above table is the number of points of operation memory. The number of points actually available to be used as I/O points is determined by the hardware configuration.

(Note 2) Can be selected by the setting of the system register no. 1 (internal relay capacity). To provide compatibility with the conventional FP-X Series Control Unit, select 4,096 points.

(Note 3) The number of timer / counter points can be changed by the setting of the system register no.5.

(Note 4) When changing the system register no.0 (sequence program capacity setting), the data register (DT) capacity will also change.

Program capacity		24K	32K	40K	64K
Data register capacity	C30 / C60	65533 words	32765 words	12285 words	No setting

(Note 5) For details on retention and non-retention areas, refer to " "8.1 Memory Backup"".

(Note 6) For details on the configuration of positioning memory , refer to the *FP-XH User's Manual (Positioning / PWM Output / High-speed Counter)*.

13.4 List of System Registers

13.4.1 List of System Registers

	No.	Name	Default	Setting range and description	
Memory Allocation	0	Setting of sequence program area size	16	C14: 16K words (fixed)	
			32	C30 / C60: 24, 32, 40K words(Note 1)(Note 2)	
	1	Internal relay area size	8192	4096, 8192(Note 3)	
Hold / Non-hold 1	5	Counter starting address	1008	0 to 1024	(Note 2)(Note 4)
	6	Hold type area starting address for timer / counter	1008	0 to 1024	
	7	Hold type area starting address for internal relay	504	0 to 512	
	8	Hold type area starting address for data registers	C14:12230 C30/C60: 32450	0 to 65533	
	14	Holding the step ladder	Non-hold	Hold / Non-hold	
	4	Leading edge detection of the differential instruction during MC holds the previous value	Hold	Hold / Non-hold	
Hold / Non-hold 2	10	Hold type area starting word address setting for link relays for PC (PLC) link W0-0	64	0 to 64	
	11	Hold type area starting word address setting for link relays for PC (PLC) link W0-1	128	64 to 128	
	12	Hold type area starting word address setting for link data registers for PC (PLC) link W0-0	128	0 to 128	
	13	Hold type area starting word address setting for link data registers for PC (PLC) link W0-1	256	128 to 256	
Action on Error	20	Disable settings for duplicated output	Disable	Disable / Enable	
	23	Stop operation when an I/O verification error occurs	Stop	Stop / Run	
	25	Stop operation when positioning operation error occurs	Run	Run / Stop	
	26	Stop operation when calculating error occurs	Stop	Stop / Run	
	4	Alarm the battery abnormality	No	No: The self-diagnostic error is not notified in case of battery error, and the "ERR.LED" does not flash.	

	No.	Name	Default	Setting range and description
				Yes: The self-diagnostic error is notified in case of battery error, and the "ERR.LED" flashes.

(Note 1) The system register no. 0 (Setting of sequence program area size) can be set only in off-line editing. To make the setting effective, you need to download it to the Control Unit.

(Note 2) If you change the system register no. 0 (Setting of sequence program area size), the size of the data register DT will be changed.

(Note 3) Select "4096" points for the system register no. 1 (Internal relay area size) to remain compatibility between the conventional FP-X Control Unit and the hold area when power supply is turned OFF.

(Note 4) The data in the range set by the system register is retained only when a backup battery is installed. Use the default values as they are when the battery is not installed.

	No.	Name	Default	Setting range and description
Time setting	31	Waiting time for managing multiple frame	6500.0 ms	10 to 81900 ms (in 2.5 ms unit)
	32	SEND / RECV / RMRD / RMWT instruction waiting time	10000.0 ms	10 to 81900 ms (in 2.5 ms unit)
	34	Constant scan time	Normal scan	0: Normal scan (in 0.5 ms unit) 0 to 350 ms: Scan at a specified time interval
	36	Expansion unit recognition time	0	0 to 10 seconds (in 0.1 second unit) 0: No waiting time
	37	Task time priority setting(Note 1)	Standard	Normal / Operation
PC link W0-0 setting	40	Size of link relays	0	0 to 64 words
	41	Size of link data registers	0	0 to 128 words
	42	Send area starting word address of link relay	0	0 to 63
	43	Size of link relays used for send area	0	0 to 64 words
	44	Send area starting address of link data register	0	0 to 127
	45	Size of link data registers used for send area	0	0 to 127 words
	46	PC (PLC) link switch flag	Normal	Normal / Reverse
	47	MEWNET-W0 PC (PLC) link max. station no.	16	1 to 16
	48	PC (PLC) link baud rate(Note 2)	115200 bps	115200 bps / 230400 bps
PC link W0-1 setting	50	Size of link relays	0	0 to 64 words
	51	Size of link data registers	0	0 to 128 words
	52	Send area starting word address of link relay	64	64 to 127
	53	Size of link relays used for send area	0	0 to 64 words
	54	Send area starting address of link data register	128	128 to 255

	No.	Name	Default	Setting range and description
	55	Size of link data registers used for send area	0	0 to 127 words
	57	MEWNET-W0 PC (PLC) link max. station no.	16	1 to 16

(Note 1) By selecting "Operation", the time taken for the communication processing is reduced for one port per scan. The operation processing takes priority.

(Note 2) The system register no. 48 (PLC link baud rate) is set in the same dialog box for the COM0 port and COM1 port settings.

■ FP-XH transistor type

	No.	Name	Default	Setting range and description
Control Unit input settings (HSC)	400	High-speed counter setting (X0 to X3)	CH0: Not Set X0 as High Speed Counter	Not Set X0 as High Speed Counter Addition input (X0) Subtraction input (X0) 2 phase input (X0, X1) One input (X0, X1) Direction distinction (X0, X1)
			X0: Normal input(Note 4)	Normal input J-point positioning start input of pulse output CH0
			CH1: Not Set X1 as High Speed Counter	Not Set X1 as High Speed Counter Addition input (X1) Subtraction input (X1)
			X1: Normal input(Note 4)	Normal input J-point positioning start input of pulse output CH1
			CH2: Not Set X2 as High Speed Counter	Not Set X2 as High Speed Counter Addition input (X2) Subtraction input (X2) 2 phase input (X2, X3) One input (X2, X3) Direction distinction (X2, X3)
			X2: Normal input	Normal input Home input of pulse output CH4 (C60 only)
			CH3: Not Set X3 as High Speed Counter	Not Set X3 as High Speed Counter Addition input (X3) Subtraction input (X3)
			X3: Normal input	Normal input Home input of pulse output CH5 (C60 only)

(Note 1) When the high-speed counter CH0, CH2, CH4 and CH6 are set to one of 2-phase, individual and direction distinction, the setting of CH1, CH3, CH5 and CH7 are invalid.

(Note 2) The hard reset input of the high-speed counter is available only for CH0 and CH2. X6 can be allocated to CH0 and X7 can be allocated to CH2.

(Note 3) If the same input is set to the high-speed counter, pulse catch, and interrupt input, the priority order is as follows; 1. High-speed counter, 2. Pulse catch, 3. Interrupt input.

<Example> When the high-speed counter is used in the addition input mode, specifying X0 as interrupt input or pulse catch input will be invalid, and X0 will be activated as the counter input of the high-speed counter.

(Note 4) When the positioning control mode setting is set to FP-X compatibility instruction mode, the J-point positioning start input cannot be selected.

	No.	Name	Default	Setting range and description
Control Unit input settings (HSC / PLS)	401	High-speed counter / pulse output setting (X4 to X7)	CH4: Not Set X4 as High Speed Counter	Not Set X4 as High Speed Counter Addition input (X4) Subtraction input (X4) 2 phase input (X4, X5) One input (X4, X5) Direction distinction (X4, X5)
			X4: Normal input	Normal input Home input of pulse output CH0
			CH5: Not Set X5 as High Speed Counter	Not Set X5 as High Speed Counter Addition input (X5) Subtraction input (X5)
			X5: Normal input	Normal input Home input of pulse output CH1
			CH6: Not Set X6 as High Speed Counter	Not Set X6 as High Speed Counter Addition input (X6) Subtraction input (X6) 2 phase input (X6, X7) One input (X6, X7) Direction distinction (X6, X7)
			X6: Normal input	Normal input Home input of pulse output CH2 Reset input of high-speed counter CH0
			CH7: Not Set X7 as High Speed Counter	Not Set X7 as High Speed Counter Addition input (X7) Subtraction input (X7)
			X7: Normal input	Normal input Home input of pulse output CH3 Reset input of high-speed counter CH2

(Note 1) When the high-speed counter CH0, CH2, CH4 and CH6 are set to one of 2-phase, individual and direction distinction, the setting of CH1, CH3, CH5 and CH7 are invalid.

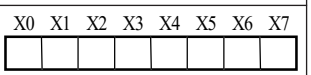
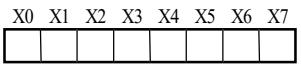
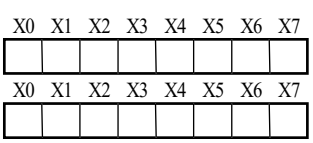
(Note 2) The hard reset input of the high-speed counter is available only for CH0 and CH2. X6 can be allocated to CH0 and X7 can be allocated to CH2.

(Note 3) If the same input is set to the high-speed counter, pulse catch, and interrupt input, the priority order is as follows; 1. High-speed counter, 2. Pulse catch, 3. Interrupt input.

<Example> When the high-speed counter is used in the addition input mode, specifying X0 as interrupt input or pulse catch input will be invalid, and X0 will be activated as the counter input of the high-speed counter.

(Note 4) X4 to X7 can be also used as the home input of the pulse output CH0 to CH3. Select this input when using home input for the home return function of pulse output. In that case, X4 to X7 cannot be set as the high-speed counter.

■ FP-XH transistor type

	No.	Name		Default	Setting range and description
Control Unit output settings 2 (PLS / PWM)	407	Positioning control start setting		Table setting mode	Table setting mode FP-X compatible instruction mode
	402	Pulse / PWM output setting (Y0 to YB)	CH0:	Normal output (Y0, Y1)	Normal output (Y0, Y1) PWM output (Y0), Normal output (Y1) Pulse output [Table setting mode] (Y0, Y1) Pulse output (Y0, Y1)
			CH1:	Normal output (Y2, Y3)	Normal output (Y2, Y3) PWM output (Y2), Normal output (Y3) Pulse output [Table setting mode] (Y2, Y3) Pulse output (Y2, Y3)
			CH2:	Normal output (Y4, Y5)	Normal output (Y4, Y5) PWM output (Y4), Normal output (Y5) Pulse output [Table setting mode] (Y4, Y5) Pulse output (Y4, Y5)
			CH3:	Normal output (Y6, Y7)	Normal output (Y6, Y7) PWM output (Y6), Normal output (Y7) Pulse output [Table setting mode] (Y6, Y7) Pulse output (Y6, Y7)
			CH4:	Normal output (Y8, Y9)	Normal output (Y8, Y9) Pulse output [Table setting mode] (Y8, Y9) Pulse output (Y8, Y9)
			CH5:	Normal output (YA, YB)	Normal output (YA, YB) Pulse output (YA, YB) PWM output (YA), Normal output (YB)
Interrupt / pulse catch settings	403	Pulse catch input setting		Not set	 The pressed contact is set as pulse catch input.
	404	Interrupt input settings		Not set	 The pressed contact is set as pulse catch input.
Interrupt edge setting	405	Control Unit input interrupt Edge settings		Leading edge	 The pressed contacts are set as leading and trailing edges.

(Note 1) If the no. 407 (Positioning control start setting) is changed, the selection of the no. 402 (Pulse / PWM output setting) will be switched.

(Note 2) For using the pulse output [Table setting mode] function, pulse output function and PWM output function, the Control Unit output setting must be set. The output specified for the pulse output and PWM output cannot be used as normal output.

(Note 3) If the same input is set to the high-speed counter, pulse catch, and interrupt input, the priority order is as follows; 1. High-speed counter, 2. Pulse catch, 3. Interrupt input.

<Example> When the high-speed counter is used in the addition input mode, specifying X0 as interrupt input or pulse catch input will be invalid, and X0 will be activated as the counter input of the high-speed counter.

(Note 4) The settings of Nos. 403 to 406 are specified for each contact on the screen.

■ FP-XH relay type

	No.	Name	Default	Setting range and description
Pulse I/O cassette setting (HSC / PLS)	407	Positioning control start setting	Table setting mode	Table setting mode FP-X compatible instruction mode
	400	High-speed counter setting (X100 to X102)	CH8: Not Set X100 as High Speed Counter	Not Set X100 as High Speed Counter 2 phase input (X100, X101) 2 phase input (X100, X101) Reset input (X102) Addition input (X100) Addition input (X100) Reset input (X102) Subtraction input (X100) Subtraction input (X100) Reset input (X102) One input (X100, X101) One input (X100, X101) Reset input (X102) Direction distinction (X100, X101) Direction distinction (X100, X101) Reset input (X102)
			X100: Normal output (Note 7)	Normal input J-point positioning start input of pulse output CH0
			CH9: Not Set X101 as High Speed Counter	Not Set X101 as High Speed Counter Addition input (X101) Addition input (X101) Reset input (X102) Subtraction input (X101) Subtraction input (X101) Reset input (X102)
		Pulse output settings	CH0: Normal output	Normal output (Y100, Y101)

	No.	Name	Default	Setting range and description
		(Y100 to Y101)		Pulse output [Table setting mode] (Y100, Y101) Pulse output (Y100, Y101) PWM output (Y100), Normal output (Y101)

(Note 1) If the no. 407 (Positioning control start setting) is changed, the selection of the no. 400 (Pulse/ PWM output setting) will be switched.

(Note 2) When the operation mode is set to 2-phase, individual, or direction distinction, the settings of CH9 in system register no. 400 are invalid.

(Note 3) When the reset input settings are overlapped, priority is given to the setting of CH9 in system register no.400 and the setting of CHB in no.401.

(Note 4) The CH8, CH9, and CH0 input signals in no. 400 are the signals when the Pulse I/O Cassette (AFPX-PLS) is installed on the cassette mounting part 1.

(Note 5) The output cannot be used as a normal output if the operation mode is set for the pulse output CH0. If the operation mode is set to 1 for the pulse output CH0, reset input settings for the high-speed counters CH8 and CH9 are invalid.

(Note 6) For using the pulse output [Table setting mode] function, pulse output function and PWM output function, the Control Unit output setting must be set. The output specified for the pulse output and PWM output cannot be used as normal output.

(Note 7) When the positioning control mode setting is set to FP-X compatibility instruction mode, the J-point positioning start input cannot be selected.

	No.	Name	Default	Setting range and description	
Pulse I/O cassette setting (HSC / PLS)	401	High-speed counter setting (X200 to X202)	CHA: Not Set X200 as High Speed Counter	Not Set X200 as High Speed Counter	
				2 phase input (X200, X201)	
				2 phase input (X200, X201)	Reset input (X202)
				Addition input (X200)	
				Addition input (X200)	Reset input (X202)
				Subtraction input (X200)	
				Subtraction input (X200)	Reset input (X202)
				One input (X200, X201)	
				One input (X200, X201)	Reset input (X202)
				Direction distinction (X200, X201)	
				Direction distinction (X200, X201)	Reset input (X202)
			X200: Normal input	Normal input J-point positioning start input of pulse output CH1	
			CHB: Not Set X201 as High Speed Counter	Not Set X201 as High Speed Counter	
				Addition input (X201)	

	No.	Name	Default	Setting range and description
				Addition input (X201) Reset input (X202) Subtraction input (X201) Subtraction input (X201) Reset input (X202)
		Pulse output settings (Y200 to Y201)	CH1: Normal output	Normal output (Y200, Y201) Pulse output [Table setting mode] (Y200, Y201) Pulse output (Y200, Y201) PWM output (Y200), Normal output (Y201)

(Note 1) If the no. 407 (Positioning control start setting) is changed, the selection of the no. 401 (Pulse / PWM output setting) will be switched.

(Note 2) When the operation mode is set to 2-phase, individual, or direction distinction, the settings of CHB in system register no. 401 are invalid.

(Note 3) When the reset input settings are overlapped, priority is given to the setting of CH9 in system register no.400 and the setting of CHB in no.401.

(Note 4) The CHA, CHB, and CH1 input signals in no. 401 are the signals when the Pulse I/O Cassette (AFPX-PLS) is installed on the cassette mounting part 2.

(Note 5) The output cannot be used as a normal output if the operation mode is set for the pulse output CH1. If the operation mode is set to 1 for the pulse output CH1, reset input settings for the high-speed counters CHA and CHB are invalid.

(Note 6) For using the pulse output [Table setting mode] function, pulse output function and PWM output function, the Control Unit output setting must be set. The output specified for the pulse output and PWM output cannot be used as normal output.

■ FP-XH relay type

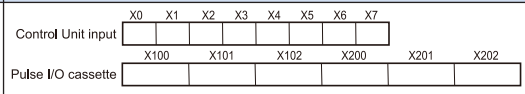
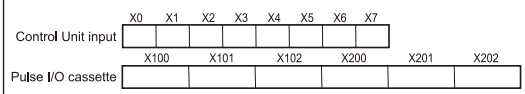
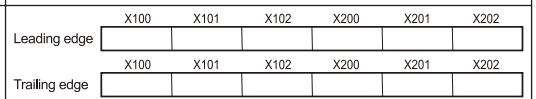
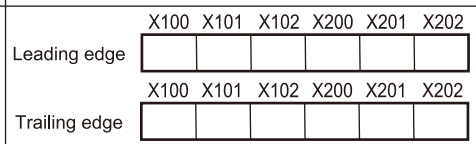
	No.	Name	Default	Setting range and description
Control Unit input settings (HSC)	402	High-speed counter setting (X0 to X7)	CH0: Not Set X0 as High Speed Counter	Not Set X0 as High Speed Counter Addition input (X0) Subtraction input (X0) 2 phase input (X0, X1)
			CH1: Not Set X1 as High Speed Counter	Not Set X1 as High Speed Counter Addition input (X1) Subtraction input (X1) 2 phase input (X0, X1)
			CH2: Not Set X2 as High Speed Counter	Not Set X2 as High Speed Counter Addition input (X2) Subtraction input (X2) 2 phase input (X2, X3)
			CH3: Not Set X3 as High Speed Counter	Not Set X3 as High Speed Counter Addition input (X3) Subtraction input (X3) 2 phase input (X2, X3)
			CH4:	Not Set X4 as High Speed Counter Addition input (X4) Subtraction input (X4)

	No.	Name	Default	Setting range and description
			Not Set X4 as High Speed Counter	2 phase input (X4, X5)
			CH5: Not Set X5 as High Speed Counter	Not Set X5 as High Speed Counter Addition input (X5) Subtraction input (X5) 2 phase input (X4, X5)
			CH6: Not Set X6 as High Speed Counter	Not Set X6 as High Speed Counter Addition input (X6) Subtraction input (X6) 2 phase input (X6, X7)
			CH7: Not Set X7 as High Speed Counter	Not Set X7 as High Speed Counter Addition input (X7) Subtraction input (X7) 2 phase input (X6, X7)

(Note 1) For counting 2-phase inputs, only CH0, CH2, CH4 and CH6 can be used. When specifying 2-phase input to CH0, CH2, CH4, or CH6, provide the same setting although the setting for CH1, CH3, CH5, or CH7 that corresponds to each CH number is disregarded.

(Note 2) When system registers Nos. 400 to 404 are set for the same input contact simultaneously, the priority order is as follows; 1. High-speed counter 2. Pulse catch 3. Interrupt input

<Example> When the high-speed counter is used in the addition input mode, specifying X0 as interrupt input or pulse catch input will be invalid, and X0 will be activated as the counter input of the high-speed counter.

	No.	Name	Default	Setting range and description
Interrupt / pulse catch settings	403	Pulse catch input setting	Not set	 The pressed contact is set as pulse catch input.
	404	Interrupt input settings	Not set	 The pressed contact is set as interrupt input.
Interrupt edge settings	405	Effective interrupt edge setting for Control Unit え input	Leading edge	 The pressed contacts are set as leading and trailing edges.
	406	Pulse I/O cassette interrupt edge setting	Leading edge	 The pressed contacts are set as leading and trailing edges.

(Note 1) For counting 2-phase inputs, only CH0, CH2, CH4 and CH6 can be used. When specifying 2-phase input to CH0, CH2, CH4, or CH6, provide the same setting although the setting for CH1, CH3, CH5, or CH7 that corresponds to each CH number is disregarded.

(Note 2) The settings of Nos. 403 to 406 are specified for each contact on the screen.

(Note 3) When system registers Nos. 400 to 404 are set for the same input contact simultaneously, the priority order is as follows; 1. High-speed counter 2. Pulse catch 3. Interrupt input

<Example> When the high-speed counter is used in the addition input mode, specifying X0 as interrupt input or pulse catch input will be invalid, and X0 will be activated as the counter input of the high-speed counter.

	No.	Name	Default	Setting range and description
COM0 / COM1 / COM2 / COM3 port setting	410 411	Unit No.	1	1 to 99
	412	Communication mode	Computer Link	Computer Link General-purpose communication PC(PLC) Link MODBUS RTU
		Modem connection	No	Yes / No
	413 414	Transmission format	Data length: 8 bits Parity check: Odd Stop bit: 1 bit	Data length: 7bits / 8bits Parity check: None / Odd / Even Stop bit: 1 / 2 Terminator selection: Code / Time Terminator: CR / CR+LF / None Header: STX not exist. / STX exists
	415	Baud rate	9600 bps	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, 230400 bps
	416	(COM1) Receive buffer starting address during general-purpose communication	0	0 to 65532
	417	(COM1) Receive buffer size during general-purpose communication	2048	0 to 2048
	418	(COM2) Receive buffer starting address during general-purpose communication	2048	0 to 65532
	419	(COM2) Receive buffer size during general-purpose communication	2048	0 to 2048
	420	(COM0) Receive buffer starting address during general-purpose communication	4096	0 to 65532
	421	(COM0)	2048	0 to 2048

	No.	Name	Default	Setting range and description
		Receive buffer size during general-purpose communication		
	422	(COM3) Receive buffer starting address during general-purpose communication	6144	0 to 65532
	423	(COM3) Receive buffer size during general-purpose communication	2048	0 to 2048
	424	(COM0) Terminator judgement time (x 0.01 ms)	0	0 or 1 to 10000 (0.01 ms to 100 ms) When terminator judgement time is 0, transmission time is that for approx. 4 bytes.
	425	(COM1) Terminator judgement time (x 0.01 ms)	0	
	426	(COM2) Terminator judgement time (x 0.01 ms)	0	
	427	(COM3) Terminator judgement time (x 0.01 ms)	0	

(Note 1) When computer link or MODOBUS RTU is selected by No. 412 (Transmission mode), no. 413 (Transmission format) and no. 415 (Baud rate) can be set.

(Note 2) When selecting only the general-purpose communication in No. 412 (communication mode), you can set no. 413: transmission format terminal selection, end and start codes. In addition, when selecting the terminal as time only through no. 413, you can select no. 424 to no. 427.

(Note 3) The PC(PLC) link function is only available for COM0 or COM1 port. The transmission format is as follows: data length: 8 bits, parity: odd, stop bit: 1 bit (fixed). In addition, select the baud rate in PC link W0-0 system register no. 48 item.

	No.	Name	Default	Setting range and description
Time constant setting of Control Unit input	430	Time constant setting of Control Unit input 1 X0 to X3	None	None 1 ms 2 ms 4 ms 8 ms 16 ms 32 ms 64 ms 128 ms 256 ms
	431	Time constant setting of Control Unit input 1 X4 to X7		
	432	Time constant setting of Control Unit input 2 X8 to XB		
	433	Time constant setting of Control Unit input 2 XC to XF		
	434	Time constant setting of Control Unit input 3 X10 to X13		

	No.	Name	Default	Setting range and description
	435	Time constant setting of Control Unit input 3 X14 to X17		
	436	Time constant setting of Control Unit input 4 X18 to X1B		
	437	Time constant setting of Control Unit input 4 X1C to X1F		

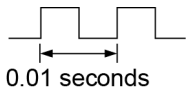
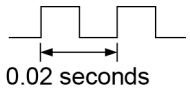
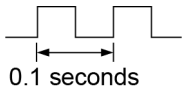
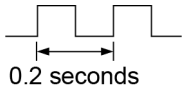
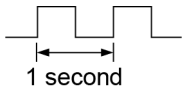
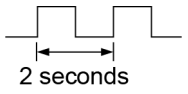
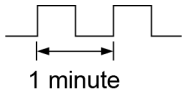
13.5 List of Special Relays

WR900 (Specified in units of words)

Relay no.	Name	Description
R9000	Self-diagnostic error flag	Turns ON when a self-diagnostic error occurs. → The self-diagnostic result is stored in DT90000.
R9001	Not used	
R9002	Function cassette I/O error flag	Turns ON when an abnormality is detected in the I/O type Function Cassette.
R9003	Function cassette error flag	Turns ON when an abnormality is detected in the Function Cassette.
R9004	I/O verification error flag	Turns ON when an I/O verification error is detected.
R9005	Backup battery error flag (current type)	Turns ON when a battery error occurs. Even if you choose not to notify battery error in the system register, this is also ON when the battery runs out.
R9006	Backup battery error flag (hold)	Turns ON when a battery error occurs. Even if you choose not to notify battery error in the system register, this is also ON when the battery runs out. Once a battery error has been detected, this is held even after recovery has been made. → It goes OFF if the power supply is turned OFF.
R9007	Operation error flag (hold) (ER flag)	Turns ON when an operation error occurs after the unit has started operating, and remains ON while the unit operation continues. → The address where the error occurred is stored in DT90017. (It indicates the first operation error that has occurred.)
R9008	Operation error flag (latest) (ER flag)	Turns ON every time an operation error occurs. →The address where the operation error occurred is stored in DT90018. Every time a new error occurs, the data will be updated.
R9009	Carry flag (CY flag)	This flag is set when the operation result overflow or under flow occurs, or when performing a shift system instruction.
R900A	> flag	Executes a comparison instruction, and turns ON if the result is larger.
R900B	= flag	Executes a comparison instruction, and turns ON if the result is equal. Executes operation instruction, and turns ON if the result is '0'.
R900C	< flag	Executes a comparison instruction, and turns ON if the result is smaller.
R900D	Auxiliary timer contact	Executes the auxiliary timer instruction (F137 / F138), and turns ON after the lapsed of a set time. Turns OFF when the execution condition turns to OFF.
R900E (R9130)	COM0 port communication error	Turns ON if a communication error is detected when using the COM0 port.
R900F	Constant scan error flag	Turns ON if the scan time exceeds the set time (system register no. 34) when performing the constant scan. It also turns ON when 0 is set in the system register no. 34.

(Note 1) The same function is allocated to the special internal relay in parentheses.

WR901 (Specified in units of words)

Relay no.	Name	Description
R9010	Always ON relay	Always on.
R9011	Always OFF relay	Always off.
R9012	Scan pulse relay	Turns ON and OFF alternately at each scan.
R9013	Initial pulse relay (ON)	Turns ON for only the first scan after operation (RUN) has been started, and turns OFF for the second and subsequent scans.
R9014	Initial pulse relay (OFF)	Turns OFF for only the first scan after operation (RUN) has been started, and turns ON for the second and subsequent scans.
R9015	Step ladder Initial pulse relay (ON)	Turns ON in the first scan only, following startup of any single process, during stepladder control.
R9016	Not used	
R9017	Not used	
R9018	0.01-sec clock pulse relay	Clock pulse with a 0.01-second cycle. 
R9019	0.02-sec clock pulse relay	Clock pulse with a 0.02-second cycle. 
R901A	0.1-sec clock pulse relay	Clock pulse with a 0.1-second cycle. 
R901B	0.2-sec clock pulse relay	Clock pulse with a 0.2-second cycle. 
R901C	1-sec clock pulse relay	Clock pulse with a 1-second cycle. 
R901D	2-sec clock pulse relay	Clock pulse with a 2-second cycle. 
R901E	1-min clock pulse relay	Clock pulse with a 1-minute cycle. 
R901F	Not used	

WR902 (Specified in units of words)

Relay no.	Name	Description
R9020	RUN mode flag	Turns OFF while the mode selector is set to PROG. Turns ON while the mode selector is set to RUN.
R9021	Not used	
R9022	Not used	

Relay no.	Name	Description
R9023	Not used	
R9024	Not used	
R9025	Not used	
R9026	Message flag	Turns ON when the message display instruction (F149) is executed.
R9027	Not used	
R9028	Not used	
R9029	Force flag	Turns ON during forced ON / OFF operation for input/output relays or timer / counter contacts.
R902A	Interrupt enable flag	Turns ON while the external interrupt trigger is enabled.
R902B	Not used	
R902C	Sample point flag	Sampling by instruction = 0 Sampling at constant time intervals = 1
R902D	Sampling trace end flag	When the sampling operation stops = 1 When the sampling operation starts = 0
R902E	Sampling stop trigger flag	When the sampling stop trigger occurs = 1 When the sampling stop trigger stops = 0
R902F	Sampling enable flag	When sampling starts = 1 When sampling stops = 0

WR903 (Specified in units of words)

Relay no.	Name	Description
R9030	Not used	
R9031	Not used	
R9032 (R9139)	COM1 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication.
R9033	Print instruction execution flag	Off: Not executed On: Being executed
R9034	Program edit flag in RUN mode	This is a special internal relay which turns ON for only the first scan following the completion of rewriting in RUN mode.
R9035	Not used	
R9036	Not used	
R9037 (R9138)	COM1 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.
R9038 (R913A)	COM1 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R9039 (R913B)	COM1 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication. Turns OFF when the transmission is requested in the general-purpose communication.

Relay no.	Name	Description
R903A	Not used	
R903B	Not used	
R903C	Not used	
R903D	Not used	
R903E (R9132)	COM0 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R903F (R9133)	COM0 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication. Turns OFF when the transmission is requested in the general-purpose communication.

(Note 1) R9030 to R903F will change even during one scanning cycle. In addition, the same functions are allocated to the special internal relays in parentheses.

WR904 (Specified in units of words)

Relay no.	Name	Description
R9040 (R9131)	COM0 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication function.
R9041 (R913E)	COM1 port PC (PLC) link flag	Turns ON when using the PC (PLC) link function.
R9042 (R9141)	COM2 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication function.
R9043	Not used	
R9044 (R913C)	COM1 port SEND / RECV instruction execution flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM1 port. OFF: Not executable (Instruction is being executed) ON: Executable
R9045 (R913D)	COM1 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM1 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90124.
R9046	Not used	
R9047 (R9140)	COM2 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.
R9048 (R9142)	COM2 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R9049 (R9143)	COM2 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication.

Relay no.	Name	Description
		Turns OFF when the transmission is requested in the general-purpose communication.
R904A (R9144)	COM2 port SEND / RECV instruction execution flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM2 port. OFF: Not executable (Instruction is being executed) ON: Executable
R904B (R9145)	COM2 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM2 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90125.
R904C to R904F	Not used	

(Note 1) R9040 to R904F will change even during one scanning cycle. In addition, the same functions are allocated to the special internal relays in parentheses.

WR905 (Specified in units of words)

Relay no.	Name	Description
R9050	MEWNET-W0 PC (PLC) link transmission error flag	When using MEWNET-W0 Turns ON when a transmission error occurs in the PC (PLC) link. Turns ON when there is an error in the setting for the PC (PLC) area link.
R9051 to R905F	Not used	

WR906 (Specified in units of words)

Relay no.	Name		Description
R9060	MEWNET-W0 Transmission assurance relay for PC (PLC) link 0	Unit no. 1	Unit no. 1 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9061		Unit no. 2	Unit no. 2 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9062		Unit no. 3	Unit no. 3 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9063		Unit no. 4	Unit no. 4 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF

Relay no.	Name		Description
R9064		Unit no. 5	Unit no. 5 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9065		Unit no. 6	Unit no. 6 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9066		Unit no. 7	Unit no. 7 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9067		Unit no. 8	Unit no. 8 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9068		Unit no. 9	Unit no. 9 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9069		Unit no. 10	Unit no. 10 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R906A		Unit no. 11	Unit no. 11 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R906B		Unit no. 12	Unit no. 12 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R906C		Unit no. 13	Unit no. 13 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R906D		Unit no. 14	Unit no. 14 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF

Relay no.	Name		Description
R906E		Unit no. 15	Unit no. 15 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R906F		Unit no. 16	Unit no. 16 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF

WR907 (Specified in units of words)

Relay no.	Name		Description
R9070	MEWNET-W0 Operation mode relay for PC (PLC) link 0	Unit no. 1	Turns ON when the unit no. 1 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9071		Unit no. 2	Turns ON when the unit no. 2 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9072		Unit no. 3	Turns ON when the unit no. 3 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9073		Unit no. 4	Turns ON when the unit no. 4 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9074		Unit no. 5	Turns ON when the unit no. 5 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9075		Unit no. 6	Turns ON when the unit no. 6 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9076		Unit no. 7	Turns ON when the unit no. 7 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9077		Unit no. 8	Turns ON when the unit no. 8 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9078		Unit no. 9	Turns ON when the unit no. 9 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9079		Unit no. 10	Turns ON when the unit no. 10 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907A		Unit no. 11	Turns ON when the unit no. 11 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907B		Unit no. 12	Turns ON when the unit no. 12 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907C		Unit no. 13	Turns ON when the unit no. 13 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907D		Unit no. 14	Turns ON when the unit no. 14 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907E		Unit no. 15	Turns ON when the unit no. 15 is in RUN mode. Turns OFF when the unit is in PROG. mode.

Relay no.	Name		Description
R907F		Unit no. 16	Turns ON when the unit no. 16 is in RUN mode. Turns OFF when the unit is in PROG. mode.

WR908 (Specified in units of words)

Relay no.	Name		Description
R9080	MEWNET-W0 Transmission assurance relay for PC (PLC) link 1	Unit no. 1	Unit no. 1 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9081		Unit no. 2	Unit no. 2 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9082		Unit no. 3	Unit no. 3 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9083		Unit no. 4	Unit no. 4 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9084		Unit no. 5	Unit no. 5 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9085		Unit no. 6	Unit no. 6 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9086		Unit no. 7	Unit no. 7 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9087		Unit no. 8	Unit no. 8 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9088		Unit no. 9	Unit no. 9 When normally communicating in the PC (PLC) link mode: ON

Relay no.	Name		Description
			When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R9089		Unit no. 10	Unit no. 10 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R908A		Unit no. 11	Unit no. 11 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R908B		Unit no. 12	Unit no. 12 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R908C		Unit no. 13	Unit no. 13 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R908D		Unit no. 14	Unit no. 14 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R908E		Unit no. 15	Unit no. 15 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF
R908F		Unit no. 16	Unit no. 16 When normally communicating in the PC (PLC) link mode: ON When stopping, an error occurs or the PC (PLC) link is not performed: OFF

WR909 (Specified in units of words)

Relay no.	Name		Description
R9090	MEWNET-W0 Operation mode relay for PC (PLC) link 1	Unit no. 1	Turns ON when the unit no. 1 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9091		Unit no. 2	Turns ON when the unit no. 2 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9092		Unit no. 3	Turns ON when the unit no. 3 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9093		Unit no. 4	Turns ON when the unit no. 4 is in RUN mode. Turns OFF when the unit is in PROG. mode.

Relay no.	Name		Description
R9094		Unit no. 5	Turns ON when the unit no. 5 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9095		Unit no. 6	Turns ON when the unit no. 6 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9096		Unit no. 7	Turns ON when the unit no. 7 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9097		Unit no. 8	Turns ON when the unit no. 8 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9098		Unit no. 9	Turns ON when the unit no. 9 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9099		Unit no. 10	Turns ON when the unit no. 10 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909A		Unit no. 11	Turns ON when the unit no. 11 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909B		Unit no. 12	Turns ON when the unit no. 12 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909C		Unit no. 13	Turns ON when the unit no. 13 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909D		Unit no. 14	Turns ON when the unit no. 14 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909E		Unit no. 15	Turns ON when the unit no. 15 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909F		Unit no. 16	Turns ON when the unit no. 16 is in RUN mode. Turns OFF when the unit is in PROG. mode.

WR910 to WR912 (Specified in units of words)

Relay no.	Name		Description
R9100 to R910F	Not used		
R9110	High-speed counter control flag	HSC-CH0	Turns ON while the F166 (HC1S) or F167 (HC1R) instruction is executed when using the high-speed counter function. Turns OFF when the operation is completed. (Note 1)
R9111		HSC-CH1	
R9112		HSC-CH2	
R9113		HSC-CH3	
R9114		HSC-CH4	
R9115		HSC-CH5	
R9116		HSC-CH6	
R9117		HSC-CH7	
R9118		HSC-CH8	
R9119		HSC-CH9	
R911A		HSC-CHA	
R911B		HSC-CHB	

Relay no.	Name		Description
R911C	Pulse output control flag	PLS-CH0	When using the pulse output function or PWM output function with the F17x instruction, turns ON when the F171 (SPDH), F172 (PLSH), F173 (PWMH), F174 (SP0H) or F175 (SPSH) instruction is executed and the pulse output is performed. Turns OFF when the operation completed. (Note 2)
R911D		PLS-CH1	
R911E		PLS-CH2	
R911F		PLS-CH3	
R9120		PLS-CH4	
R9121		PLS-CH5	
R9122 to R912F	Not used		

(Note 1) R9118 to R911B are valid only when the pulse output cassette is installed on the relay type Control Unit.

(Note 2) R9120 to R9121 are valid only for the transistor type Control Unit.

WR913 (Specified in units of words)

Relay no.	Name	Description
R9130 (R900E)	COM0 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.
R9131 (R9040)	COM0 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication function.
R9132 (R903E)	COM0 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R9133 (R903F)	COM0 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication. Turns OFF when the transmission is requested in the general-purpose communication.
R9134	COM0 port SEND / RECV instruction execution flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM0 port. OFF: Not executable (Instruction is being executed) ON: Executable
R9135	COM0 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM0 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90123.
R9136	COM0 port PC (PLC) link flag	Turns ON when using the PC (PLC) link function.
R9137	Not used	
R9138 (R9037)	COM1 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.

Relay no.	Name	Description
R9139 (R9032)	COM1 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication function.
R913A (R9038)	COM1 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R913B (R9039)	COM1 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication. Turns OFF when the transmission is requested in the general-purpose communication.
R913C (R9044)	COM1 port SEND / RECV instruction execution flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM1 port. OFF: Not executable (Instruction is being executed) ON: Executable
R913D (R9045)	COM1 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM1 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90124.
R913E (R9041)	COM1 port PC (PLC) link flag	Turns ON when using the PC (PLC) link function.
R913F	Not used	

(Note 1) R9130 to R913F will change even during one scanning cycle. In addition, the same functions are allocated to the special internal relays in parentheses to retain compatibility with the conventional model FP-X Control Unit.

WR914 (Specified in units of words)

Relay no.	Name	Description
R9140 (R9047)	COM2 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.
R9141 (R9042)	COM2 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication function.
R9142 (R9048)	COM2 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R9143 (R9049)	COM2 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication. Turns OFF when the transmission is requested in the general-purpose communication.
R9144 (R904A)	COM2 port SEND / RECV instruction execution flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM2 port. OFF: Not executable (Instruction is being executed) ON: Executable

Relay no.	Name	Description
R9145 (R904B)	COM2 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM2 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90125.
R9146	Not used	
R9147	Not used	
R9148	COM3 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.
R9149	COM3 port communication mode flag	Turns ON when using the general-purpose communication function. Turns OFF when using a function other than the general-purpose communication function.
R914A	COM3 port reception done flag during general-purpose communication	Turns ON when the end code is received in the general-purpose communication.
R914B	COM3 port transmission done flag during general-purpose communication	Turns ON when the transmission ends in the general-purpose communication. Turns OFF when the transmission is requested in the general-purpose communication.
R914C	COM3 port SEND / RECV instruction execution flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM3 port. OFF: Not executable (Instruction is being executed) ON: Executable
R914D	COM3 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM3 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90127.
R914E	Not used	
R914F	Not used	

(Note 1) R9140 to R914F will change even during one scanning cycle. In addition, the same functions are allocated to the special internal relays in parentheses to retain compatibility with the conventional model FP-X Control Unit.

WR915 (Specified in units of words)

Relay no.	Name	Description
R9150	COM4 port communication error flag	Turns ON if a transmission error occurs when performing data communication. Turns OFF when a transmission request is made by the F159 (MTRN) instruction.
R9151 to R9153	Not used	
R9154	COM4 port	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM4 port.

Relay no.	Name	Description
	SEND / RECV instruction execution flag	OFF: Not executable (Instruction is being executed) ON: Executable
R9155	COM4 port SEND / RECV instruction execution end flag	Indicates the execution state of the F145 (SEND) or F146 (RECV) instruction for the COM4 port. OFF: Normal end ON: Abnormal end (Communication error occurs) The error code is stored in DT90128.
R9156 to R915F	Not used	

13.6 List of Special Data Registers

Register no.	Name	Description	R	W
DT90000	Self-diagnosis error code	When a self-diagnostic error occurs, the error code is stored.	○	×
DT90001	Not used		×	×
DT90002	Position where the Function Cassette I/O error occurred	When an error occurs in the Function Cassette, the corresponding bit turns ON. 15 11 7 3 2 1 0 (Bit No.) 2 1 (Extension number) ON(1): Error OFF(0): Normal	○	×
DT90003 to DT90005	Not used		×	×
DT90006	Position where the Function Cassette error occurred	When an error occurs in the Function Cassette, the corresponding bit turns ON. 15 11 7 3 2 1 0 (Bit No.) 2 1 (Extension number) ON(1): Error OFF(0): Normal	○	×
DT90007	System register error no.	When there is an inconsistency in the setting of a system register, the corresponding system register no. is stored.	○	×
DT90008	Communication error flag COM4 port	The error content when using the COM4 port is stored. ON (1): Error, OFF (0): Normal bit no. 15 8 7 0 0 0 0 0 0 0 0 0 0 0 0 0 H00 fixed COM4 overflow error COM4 parity error COM4 framing error COM4 overrun error	○	×
DT90009	Communication error flag COM2 port / COM3 port	The error content when using the COM2 / COM3 port is stored. ON (1): Error, OFF (0): Normal bit no. 15 8 7 0 0 0 0 0 0 0 0 0 0 COM3 overflow error COM3 parity error COM3 framing error COM3 overrun error COM2 overflow error COM2 parity error COM2 framing error COM2 overrun error	○	×
DT90010	FPX Expansion position of I/O verification mismatched unit	When the installation state of FP-X Expansion I/O Unit changes from the state that it was in when the power was turned ON, the bit corresponding to	○	×

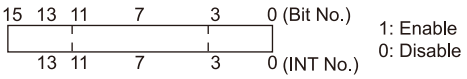
Register no.	Name	Description	R	W
		the unit number turns ON (1). Monitor with BIN display. 15 11 7 3 2 1 0 (Bit no.) 4 3 2 1 (Unit no.) ON(1)：Abnormal OFF(0)：Normal		
DT90011	Expansion Cassette position of verification mismatched unit	When the installation state of FP-X Expansion Cassette changes from the state that it was in when the power was turned ON, the bit corresponding to the Expansion Cassette installation position number turns ON (1). Monitor with BIN display. 15 11 7 3 2 1 0 (Bit No.) 2 1 (Extension number) ON(1): Error OFF(0): Normal	○	×
DT90012 to DT90013	Not used		×	×
DT90014	Operation auxiliary register for data shift instruction	As a result of the execution of data shift instruction F105 (BSR) or F106 (BSL), the overflowed 1-digit data is stored in bit 0 to bit 3. Reading and writing the value is available by the F0 (MV) instruction.	○	○
DT90015 DT90016	Operation auxiliary register for division instruction	When executing the 16-bit division instruction F32(%) or F52(B%), the remainder of 16 bits is stored in DT90015. When executing the 32-bit division instruction F33(D%) or F53(DB%), the remainder of 32 bits is stored in DT90015 to DT90016. Reading and writing the value is available by the F1 (DMV) instruction.	○	○
DT90017	Address with operation error (Hold)	The address where the first operation error occurred after starting the operation is stored. Monitor using decimal display.	○	×
DT90018	Address with operation error (Latest)	The address where the operation error occurred is stored. It will be updated every time an error occurs. Monitor using decimal display.	○	×
DT90019	RING counter (2.5 ms)(Note 2)	The stored value is incremented by one every 2.5 ms. (H0 to HFFFF) Difference between the values of 2 points (absolute value) x 2.5 ms = Elapsed time between the 2 points	○	×
DT90020	RING counter (10 μs)(Note 2) (Note 3)	The stored value is incremented by one every 10.67 μs. (H0 to HFFFF) Difference between the values of 2 points (absolute value) x 10.00 μs = Elapsed time between the 2 points Note) The accurate figure is 10.00 μs.	○	×
DT90021	Not used		×	×
DT90022	Scan time (Current value) (Note 1)	The current value of scan time is stored. [Stored value (decimal)] x 0.1 ms	○	×

Register no.	Name	Description	R	W
		Example) For K50, it is within 5 ms.		
DT90023	Scan time (Minimum value) (Note 1)	The minimum value of scan time is stored. [Stored value (decimal)] x 0.1 ms Example) For K50, it is within 5 ms.	○	×
DT90024	Scan time (Maximum value) (Note 1)	The maximum value of scan time is stored. [Stored value (decimal)] x 0.1 ms Example) For K125, it is within 12.5 ms.	○	×

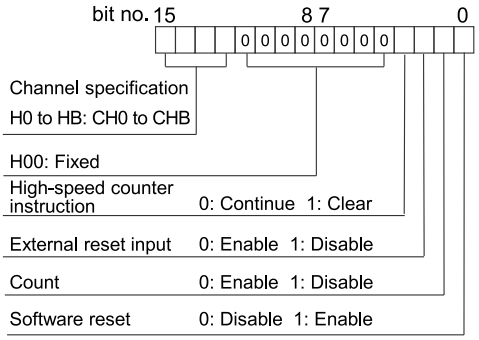
(Note 1) The scan time display shows the operation cycle time only in RUN mode. In PROG. mode, the scan time of operation is not displayed. The maximum and minimum values are cleared when switching the mode between RUN and PROG.

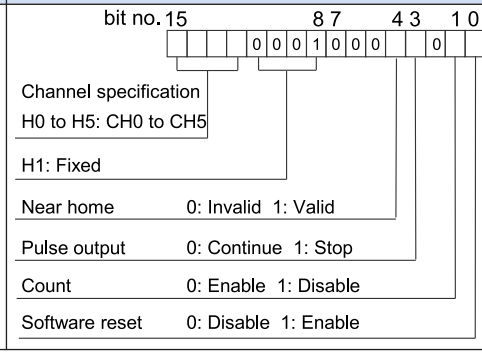
(Note 2) It is updated once at the beginning of every scan.

(Note 3) DT90020 is also updated when executing the F0 (MV), DT90020 and D instructions, therefore, it can be used for measuring a block time.

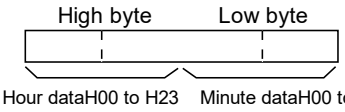
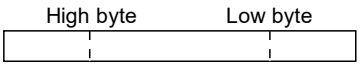
Register no.	Name	Description	R	W
DT90025	Interrupt enable (mask) status (INT0 to 13)	The content set by the ICTL instruction is stored. Monitor with BIN display.  INT0 to INT7: Interrupt input X0 to X7 INT8 to INT10: Interrupt input X100 to X102 INT11 to INT13: Interrupt input X200 to X202 INT0 to INT9: High-speed counter match interrupt CH0 to CH9 INT11 to INT12: High-speed counter match interrupt CHA, CHB	○	×
DT90026	Not used		×	×
DT90027	Periodical interrupt interval (INT24)	The content set by the ICTL instruction is stored. K0: Periodical interrupt is not used K1 to K3000: 0.1 ms to 0.35 s or 0.5 ms to 1.5 s or 10 ms to 30 s	○	×
DT90028	Interval of sampling trace	K0: Sampling by the SMPL instruction K1 to K3000 (×10 ms): 10 ms to 30 s	○	×
DT90029	Not used		×	×
DT90030	Character storage by F149 MSG instruction	The content (characters) set by the message display instruction (F149) is stored.	○	×
DT90031				
DT90032				
DT90033				
DT90034				
DT90035				
DT90036	Not used		×	×

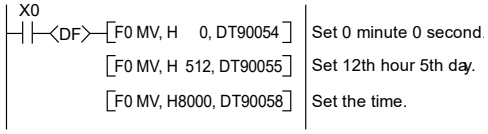
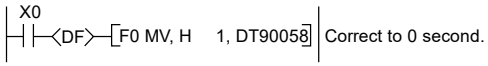
Register no.	Name	Description	R	W
DT90037	Work 1 for search instruction	When executing the F96 (SRC) instruction, the number that matches the search data is stored.	○	×
DT90038	Work 2 for search instruction	When executing the F96 (SRC) instruction, the relative position that matches is stored.	○	×
DT90039	Not used		×	×
DT90040	Potentiometer input	The value of potentiometer input (K0 to K4000) is stored. It can be applied to the analog timer by reading it to the data register using a user program.	○	×
DT90041 to DT90043	Not used		×	×
DT90044	System work	Used by the system.	○	×
DT90045 to DT90051	Not used		×	×

Register no.	Name	Description	R	W
DT90052	High-speed counter control flag	When using the high-speed counter function, various controls such as resetting the high-speed counter, disabling the count and clearing the execution of an instruction can be performed by writing values with the MV instruction (F0). 	○	○
DT90052	Pulse output control flag	When using the pulse output function with the F17x instruction, various controls such as near home input, stopping the pulse output and canceling an instruction can be performed by writing values using the MV instruction (F0).	○	○

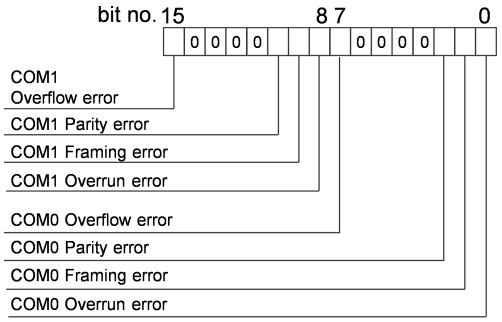
Register no.	Name	Description	R	W
				

(Note 1) When selecting the positioning function in the table setting mode, the control using the pulse output control flag by DT90052 cannot be performed.

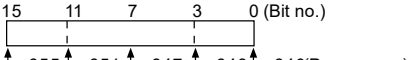
Register no.	Name	Description	R	W
DT90053	Real-time clock monitoring (hour and minute)	The hour and minute data of the real-time clock is stored. You can only read, cannot write. 	○	×
DT90054	Real-time clock (minute and second)	The year, month, day, hour, minute, second and day-of-the-week data of the real-time clock is stored. The built-in real-time clock is applicable until 2099 and supports leap years. The real-time clock can be set (time synch) by writing desired values using the programming tool or a program based on the transfer instruction (F0).  DT90054: Minute data (H00 to H59) / Second data (H00 to H59) DT90055: Day data (H01 to H31) / Hour data (H00 to H23) DT90056: Year data (H00 to H99) / Month data (H01 to H12) DT90057: — / Day of week data (H00 to H06) The day of the week is not set automatically. Allocate an arbitrary value in the range of H0 to H6.	○	○
DT90055	Real-time clock (day and hour)			
DT90056	Real-time clock (year and month)			
DT90057	Real-time clock (day of week)			
DT90058	Real-time clock time setting and 30-second compensation register	It is used to adjust the time of the built-in real-time clock. ● Adjust the time by a program By setting the MSB of DT90058 to 1, the time is adjusted to that written to DT90054 to DT90057 by the F0 instruction. After the execution of the	○	○

Register no.	Name	Description	R	W
		time adjustment, DT90058 will be cleared to zero. (It cannot be executed using any other instructions than F0 instruction.) <Example> Turn X0 ON to set the time to 12:00:00 on the 5th day.  ● Correct a difference within 30 seconds. By setting the LSB of DT90058 to 1, the time is moved up or down to be just 0 second. After the execution of the correction, DT90058 will be cleared to zero. <Example> Turn X0 ON to correct the time to be 0 second.  When the time is 0 to 29 seconds when the correction is executed, it is moved down. When it is 30 to 59 seconds, it is moved up. In the above example, when the time is 5 minutes 29 seconds, it will be 5 minutes 0 seconds. When the time is 5 minutes 35 seconds, it will be 6 minutes 0 seconds.		

(Note 1) When rewriting the values of DT90054 to DT90057 using the programming tool, it is not necessary to write the data to DT90058 because the time adjustment is performed when rewritten.

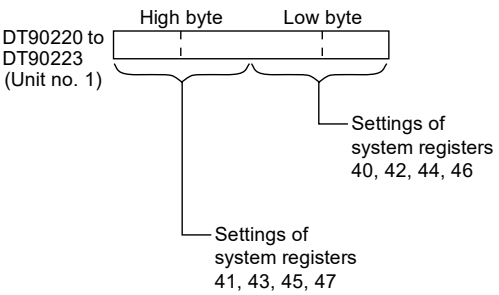
Register no.	Name	Description	R	W
DT90059	Communication error code COM0 port / COM1 port	When a communication error occurs, the error code is stored. ON (1): Error, OFF (0): Normal 	○	×
DT90060	Step ladder process (0 to 15)	Indicates the starting status of the step ladder process. When the process starts, the bit corresponding to its process number turns ON. Monitor with BIN display.	○	○
DT90061	Step ladder process (16 to 31)			
DT90062	Step ladder process (32 to 47)			

Register no.	Name	Description	R	W
DT90063	Step ladder process (48 to 63)	<Example> 15 11 7 3 0 (Bit no.) DT90060 15 11 7 3 0 (Process no.) 1：Starting 0：During stop The data can be written using the programming tool.		
DT90064	Step ladder process (64 to 79)			
DT90065	Step ladder process (80 to 95)			
DT90066	Step ladder process (96 to 111)			
DT90067	Step ladder process (112 to 127)			
DT90068	Step ladder process (128 to 143)			
DT90069	Step ladder process (144 to 159)			
DT90070	Step ladder process (160 to 175)			
DT90071	Step ladder process (176 to 191)			
DT90072	Step ladder process (192 to 207)			
DT90073	Step ladder process (208 to 223)			
DT90074	Step ladder process (224 to 239)			
DT90075	Step ladder process (240 to 255)			
DT90076	Step ladder process (256 to 271)			
DT90077	Step ladder process (272 to 287)			
DT90078	Step ladder process (288 to 303)			
DT90079	Step ladder process (304 to 319)			
DT90080	Step ladder process (320 to 335)			
DT90081	Step ladder process (336 to 351)			
DT90082	Step ladder process (352 to 367)			
DT90083	Step ladder process (368 to 383)			
DT90084	Step ladder process (384 to 399)			
DT90085	Step ladder process (400 to 415)			

Register no.	Name	Description	R	W
DT90086	Step ladder process (416 to 431)	Indicates the starting status of the step ladder process. When the process starts, the bit corresponding to its process number turns ON. Monitor with BIN display. <Example> 15 11 7 3 0 (Bit no.) DT90100  655 651 647 643 640(Process no.) 1：Starting 0：During stop The data can be written using the programming tool.	○	○
DT90087	Step ladder process (432 to 447)			
DT90088	Step ladder process (448 to 463)			
DT90089	Step ladder process (464 to 479)			
DT90090	Step ladder process (480 to 495)			
DT90091	Step ladder process (496 to 511)			
DT90092	Step ladder process (512 to 527)			
DT90093	Step ladder process (528 to 543)			
DT90094	Step ladder process (544 to 559)			
DT90095	Step ladder process (560 to 575)			
DT90096	Step ladder process (576 to 591)			
DT90097	Step ladder process (592 to 607)			
DT90098	Step ladder process (608 to 623)			
DT90099	Step ladder process (624 to 639)			
DT90100	Step ladder process (640 to 655)			
DT90101	Step ladder process (656 to 671)			
DT90102	Step ladder process (672 to 687)			
DT90103	Step ladder process (688 to 703)			
DT90104	Step ladder process (704 to 719)			
DT90105	Step ladder process (720 to 735)			
DT90106	Step ladder process (736 to 751)			
DT90107	Step ladder process (752 to 767)			
DT90108	Step ladder process (768 to 783)			

Register no.	Name	Description	R	W
DT90109	Step ladder process (784 to 799)			
DT90110	Step ladder process (800 to 815)			
DT90111	Step ladder process (816 to 831)			
DT90112	Step ladder process (832 to 847)			
DT90113	Step ladder process (848 to 863)			
DT90114	Step ladder process (864 to 879)			
DT90115	Step ladder process (880 to 895)			
DT90116	Step ladder process (896 to 911)			
DT90117	Step ladder process (912 to 927)			
DT90118	Step ladder process (928 to 943)			
DT90119	Step ladder process (944 to 959)			
DT90120	Step ladder process (960 to 975)			
DT90121	Step ladder process (976 to 991)			
DT90122	Step ladder process (992 to 999) (High byte is not used.)			
DT90123	COM0 SEND / RECV instruction end code	When an error occurs when executing the SEND / RECV instruction, the error code is stored.	○	×
DT90124	COM1 SEND / RECV instruction end code		○	×
DT90125	COM2 SEND / RECV instruction end code		○	×
DT90126	Forced ON/OFF operating station display	Used by the system.	○	×
DT90127	COM3 SEND / RECV instruction end code	When an error occurs when executing the SEND / RECV instruction, the error code is stored.	○	×
DT90127	COM4 SEND / RECV instruction end code		○	×

Register no.	Name	Description	R	W
DT90128 to DT90139	Not used		×	×
DT90140	MEWNET-W0 PC (PLC) link 0 status	PLC link 0 No. of times of reception	○	×
DT90141		PC (PLC) link 0 Reception interval (current value) (x2.5 ms)		
DT90142		PC (PLC) link 0 Reception interval (minimum value) (x2.5 ms)		
DT90143		PC (PLC) link 0 Reception interval (maximum value) (x2.5 ms)		
DT90144		PC (PLC) link 0 No. of times of transmission		
DT90145		PC (PLC) link 0 Transmission interval (current value) (x2.5 ms)		
DT90146		PC (PLC) link 0 Transmission interval (minimum value) (x2.5 ms)		
DT90147		PC (PLC) link 0 Transmission interval (maximum value) (x2.5 ms)		
DT90148	MEWNET-W0 PC (PLC) link 1 status	PC (PLC) link 1 No. of times of reception	○	×
DT90149		PC (PLC) link 1 reception interval (current value) (x2.5 ms)		
DT90150		PC (PLC) link 1 reception interval (minimum value) (x2.5 ms)		
DT90151		PC (PLC) link 1 reception interval (maximum value) (x2.5 ms)		
DT90152		PC (PLC) link 1 No. of times of transmission		
DT90153		PC(PLC) link 1 transmission interval (current value) (x2.5 ms)		
DT90154		PC(PLC) link 1 transmission interval (minimum value) (x2.5 ms)		
DT90155		PC(PLC) link 1 transmission interval (maximum value) (x2.5 ms)		
DT90156	MEWNET-W0 PC (PLC) link 0 status	PC (PLC) link 0 Work for measuring reception interval	○	×
DT90157		PC (PLC) link 0 Work for measuring transmission interval		
DT90158	MEWNET-W0 PC (PLC) link 1 status	PC (PLC) link 1 Work for measuring reception interval	○	×
DT90159		PC (PLC) link1 work for measuring transmission interval		
DT90160	MEWNET-W0 PC (PLC) link 0 unit no.	The unit number of PC (PLC) link 0 is stored.	○	×
DT90161	MEWNET-W0 PC (PLC) link 0 Error flag	The error content of PC (PLC) link 0 is stored.	○	×
DT90162 to DT90169	Not used		×	×
DT90170	MEWNET-W0	PC (PLC) link address duplicate destination	○	×

<table>
<tr><th>Register no.</th><th colspan="2">Name</th><th>Description</th><th>R</th><th>W</th></tr>
<tr><td>DT90171</td><td colspan="2" rowspan="10">PC (PLC) link 0 status</td><td>No. of missing tokens</td><td rowspan="10"></td><td rowspan="10"></td></tr>
<tr><td>DT90172</td><td>No. of duplicate tokens</td></tr>
<tr><td>DT90173</td><td>No. of no signal states</td></tr>
<tr><td>DT90174</td><td>No. of times of receptions of undefined commands</td></tr>
<tr><td>DT90175</td><td>No. of sum check errors for reception</td></tr>
<tr><td>DT90176</td><td>No. of received data format errors</td></tr>
<tr><td>DT90177</td><td>Number of transmission errors</td></tr>
<tr><td>DT90178</td><td>No. of procedure errors</td></tr>
<tr><td>DT90179</td><td>No. of duplicate master units</td></tr>
<tr><td>DT90180
to DT90218</td><td colspan="2">Not used</td><td></td><td>×</td><td>×</td></tr>
<tr><td>DT90219</td><td colspan="2">Unit number switch of DT90220 to DT90251</td><td>0: Unit nos. 1 to 8, 1: Unit nos. 9 to 16</td><td>○</td><td>×</td></tr>
<tr><td>DT90220</td><td rowspan="4">PC (PLC) link
Unit no. 1 or 9</td><td>System registers 40 and 41</td><td rowspan="9">The settings of the system register related to the PC (PLC) function of each unit number is stored as follows.
<Example>
When DT90219 is 0;


When the system register no. 46 of the home unit is the standard setting, the values in the home unit will be copied for nos. 46 and 47.
When the system register no. 46 of the home unit is the reverse setting, the nos. 40 to 45 and 47 corresponding to those of the home unit will be 50 to 55 and 57, and 46 will be set as it is.
Also, nos. 40 to 45 corresponding to other units will be the values after correcting the received values, and nos. 46 and 57 of the home unit will be set for nos. 46 and 47.</td><td rowspan="9">○</td><td rowspan="9">×</td></tr>
<tr><td>DT90221</td><td>System registers 42 and 43</td></tr>
<tr><td>DT90222</td><td>System registers 44 and 45</td></tr>
<tr><td>DT90223</td><td>System registers 46 and 47</td></tr>
<tr><td>DT90224</td><td rowspan="4">PC (PLC) link
Unit no. 2 or 10</td><td>System registers 40 and 41</td></tr>
<tr><td>DT90225</td><td>System registers 42 and 43</td></tr>
<tr><td>DT90226</td><td>System registers 44 and 45</td></tr>
<tr><td>DT90227</td><td>System registers 46 and 47</td></tr>
<tr><td>DT90228</td><td rowspan="3">PC (PLC) link
Unit no. 3 or 11</td><td>System registers 40 and 41</td></tr>
<tr><td>DT90229</td><td>System registers 42 and 43</td></tr>
<tr><td>DT90230</td><td>System registers 44 and 45</td></tr>
</table>

Register no.	Name		Description	R	W
DT90231		System registers 46 and 47			
DT90232	PC (PLC) link Unit no. 4 or 12	System registers 40 and 41			
DT90233		System registers 42 and 43			
DT90234		System registers 44 and 45			
DT90235		System registers 46 and 47			
DT90236	PC (PLC) link Unit no. 5 or 13	System registers 40 and 41			
DT90237		System registers 42 and 43			
DT90238		System registers 44 and 45			
DT90239		System registers 46 and 47			
DT90240	PC (PLC) link Unit no. 6 or 14	System registers 40 and 41			
DT90241		System registers 42 and 43			
DT90242		System registers 44 and 45			
DT90243		System registers 46 and 47			
DT90244	PC (PLC) link Unit no. 7 or 15	System registers 40 and 41			
DT90245		System registers 42 and 43			
DT90246		System registers 44 and 45			
DT90247		System registers 46 and 47			

Register no.	Name		Description	R	W
DT90248	PC (PLC) link Unit no. 8 or 16	System registers 40 and 41			
DT90249		System registers 42 and 43			
DT90250		System registers 44 and 45			
DT90251		System registers 46 and 47			
DT90252 to DT90299	Not used			×	×

Common to FP-XH relay type / transistor type

Register no.	Name			Description	R	W
DT90300	Elapsed value area	Low word	HSC-CH0	The counting area of the high-speed counter Control Unit input CH0 (X0) or (X0, X1)	○	○
DT90301		High word			○	○
DT90302	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90303		High word			○	○
DT90304	Elapsed value area	Low word	HSC-CH1	The counting area of the high-speed counter Control Unit input (X1).	○	○
DT90305		High word			○	○
DT90306	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90307		High word			○	○
DT90308	Elapsed value area	Low word	HSC-CH2	The counting area of the high-speed counter Control Unit input (X2) or (X2, X3).	○	○
DT90309		High word			○	○
DT90310	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90311		High word			○	○
DT90312	Elapsed value area	Low word	HSC-CH3	The counting area of the high-speed counter Control Unit input (X3).	○	○
DT90313		High word			○	○

Register no.	Name			Description	R	W
DT90314	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90315		High word			○	○
DT90316	Elapsed value area	Low word	HSC-CH4	The counting area of the high-speed counter Control Unit input (X4) or (X4, X5).	○	○
DT90317		High word			○	○
DT90318	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90319		High word			○	○
DT90320	Elapsed value area	Low word	HSC-CH5	The counting area of the high-speed counter Control Unit input (X5).	○	○
DT90321		High word			○	○
DT90322	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90323		High word			○	○
DT90324	Elapsed value area	Low word	HSC-CH6	The counting area of the high-speed counter Control Unit input (X6) or (X6, X7).	○	○
DT90325		High word			○	○
DT90326	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90327		High word			○	○
DT90328	Elapsed value area	Low word	HSC-CH7	The counting area of the high-speed counter Control Unit input (X7).	○	○
DT90329		High word			○	○
DT90330	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90331		High word			○	○

(Note 1) Only the F1 (DMV) instruction can perform the reading and writing of elapsed value area.

(Note 2) The target value area is set when the high-speed counter target value match instruction F166 (HC1S) or F167 (HC1R) is executed. It cannot be written by a user program.

FP-XH relay type

Register no.	Name			Description	R	W
DT90332	Elapsed value area	Low word	HSC-CH8	The counting area of the high-speed counter input (X100) or (X100, X101) of the pulse I/O cassette .	○	○

Register no.	Name			Description	R	W
DT90333		High word			○	○
DT90334	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90335		High word			○	○
DT90336	Elapsed value area	Low word	HSC-CH9	The counting area of the high-speed counter input (X101) of the pulse I/O cassette .	○	○
DT90337		High word			○	○
DT90338	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90339		High word			○	○
DT90340	Elapsed value area	Low word	HSC-CHA	The counting area of the high-speed counter input (X200) or (X200, X201) of the pulse I/O cassette .	○	○
DT90341		High word			○	○
DT90342	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90343		High word			○	○
DT90344	Elapsed value area	Low word	HSC-CHB	The counting area of the high-speed counter input (X201) of the pulse I/O cassette .	○	○
DT90345		High word			○	○
DT90346	Target value area	Low word		When executing the F166 (HC1S) and F167 (HC1R) instructions, the target value is set.	○	○
DT90347		High word			○	○

(Note 1) Only the F1 (DMV) instruction can perform the reading and writing of elapsed value area.

(Note 2) The target value area is set when the high-speed counter target value match instruction F166 (HC1S) or F167 (HC1R) is executed. It cannot be written by a user program.

(Note 3) DT90332 to DT90347 are valid only when the pulse I/O cassette is installed on the relay type Control Unit.

FP-XH relay type (FP-X compatible instruction mode)

Register no.	Name			Description	R	W
DT90348	Elapsed value area	Low word	PLS-CH0	The counting area of the pulse output (Y100, Y101) of the pulse I/O cassette.	○	○
DT90349		High word			○	○
DT90350	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○

Register no.	Name			Description	R	W
DT90351		High word			○	○
DT90352	Elapsed value area	Low word	PLS-CH1	The counting area of the pulse output (Y200, Y201) of the pulse I/O cassette.	○	○
DT90353		High word			○	○
DT90354	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90355		High word			○	○
DT90356 to DT90371	Not used				×	×

(Note 1) Only the F1 (DMV) instruction can perform the reading and writing of elapsed value area.

(Note 2) Only the F1 (DMV) instruction can perform the reading of target value area.

(Note 3) The target value area is set when the pulse output instruction F171(SPDH), F172(PLSH), F174(SP0H), or F175(SPSH) is executed. It cannot be written by a user program.

FP-XH transistor type (FP-X compatible instruction mode)

Register no.	Name			Description	R	W
DT90348	Elapsed value area	Low word	PLS-CH0	The counting area of the pulse output CH0 (Y0, Y1).	○	○
DT90349		High word			○	○
DT90350	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90351		High word			○	○
DT90352	Elapsed value area	Low word	PLS-CH1	The counting area of the pulse output CH1 (Y2, Y3)	○	○
DT90353		High word			○	○
DT90354	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90355		High word			○	○
DT90356	Elapsed value area	Low word	PLS-CH2	The counting area of the pulse output CH2 (Y4, Y5)	○	○
DT90357		High word			○	○
DT90358	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90359		High word			○	○
DT90360	Elapsed value area	Low word	PLS-CH3	The counting area of the pulse output CH3 (Y6, Y7)	○	○
DT90361		High word			○	○
DT90362	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90363		High word			○	○
DT90364	Elapsed value area	Low word	PLS-CH4	The counting area of the pulse output CH4 (Y8, Y9)	○	○
DT90365		High word			○	○
DT90366	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90367		High word			○	○

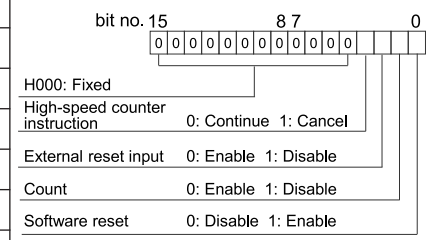
Register no.	Name			Description	R	W
DT90368	Elapsed value area	Low word	PLS-CH5	The counting area of the pulse output CH5 (YA, YB).	○	○
DT90369		High word			○	○
DT90370	Target value area	Low word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90371		High word			○	○

(Note 1) Only the F1 (DMV) instruction can perform the reading and writing of elapsed value area.

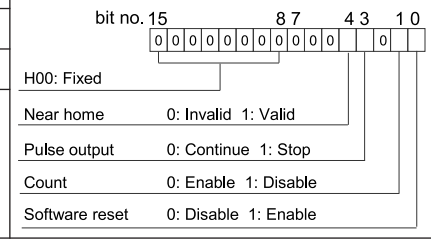
(Note 2) Only the F1 (DMV) instruction can perform the reading of target value area.

(Note 3) The target value area is set when the pulse output instruction F171(SPDH), F172(PLSH), F174(SP0H), or F175(SPSH) is executed. It cannot be written by a user program.

Common to FP-XH relay type / transistor type

Register no.	Name		Description	R	W
DT90380	High-speed counter function control flag monitor area	HSC-CH0	When using the high-speed counter function, the contents set into the data register DT90052 by the F0 (MV) instruction are stored for each channel. 	○	×
DT90381		HSC-CH1		○	×
DT90382		HSC-CH2		○	×
DT90383		HSC-CH3		○	×
DT90384		HSC-CH4		○	×
DT90385		HSC-CH5		○	×
DT90386		HSC-CH6		○	×
DT90387		HSC-CH7		○	×
DT90388		HSC-CH8		○	×
DT90389		HSC-CH9		○	×
DT90390		HSC-CHA		○	×
DT90391		HSC-CHB		○	×

Common to FP-XH relay type / transistor type (FP-X compatible instruction mode)

Register no.	Name		Description	R	W
DT90392	Pulse output function control flag monitor area	PLS-CH0	When using the pulse output function, the contents set into the data register DT90052 by the F0 (MV) instruction are stored for each channel. 	○	×
DT90393		PLS-CH1		○	×
DT90394		PLS-CH2		○	×
DT90395		PLS-CH3		○	×
DT90396		PLS-CH4		○	×
DT90397		PLS-CH5		○	×

(Note 1) Only the F1 (DMV) instruction can perform the reading of the area (DT90392 to DT90397).

13.7 List of Error Codes

13.7.1 List of Syntax Check Errors

Error codes 1 to 8

Code	Name	Operation	Error contents and steps to take
E1	Syntax error	Stop	● A sequence program with a syntax error has been written. ● Change to PROG. mode and correct the error.
E2	Duplicate use (definition) error(Note 1)	Stop	● The relay is used in the 'Out' instruction or 'Keep' instruction more than once. It also occurs when using the same timer / counter number. ● Change to PROG. mode and correct the program so that one relay is not used for two or more instructions. Or, set the duplicated output to "enable" in the system register no. 20. A timer / counter instruction double definition error will be detected even if double output permission has been selected.
E3	Not paired error	Stop	● For instructions which must be used in a pair (such as JP and LBL), one instruction is either missing or in an incorrect position. ● Change to PROG. mode and enter the two instructions which must be used in a pair in the correct positions.
E4	Parameter mismatch error	Stop	● An instruction has been written which does not agree with system register settings. The number setting in a program does not agree with the timer / counter range setting. ● Change to PROG. mode, check the system register settings, and change so that the settings and the instruction agree.
E5	Program area error(Note 1)	Stop	● An instruction which must be written in a specific area (main program area or subprogram area) has been written to a different area (for example, a subroutine SUB to RET is placed before an ED instruction). ● Change to PROG. mode and enter the instruction into the correct area.
E6	Compile memory full	Stop	● The program is too large to compile in the program memory. ● Change to PROG. mode and reduce the total number of steps for the program.
E7	High-level instruction type error	Stop	● In the program, high-level instructions, which execute in every scan and at the leading edge of the trigger, are programmed to be triggered by one contact. ● Correct the program so that the high-level instructions executed in every scan and only at the leading edge are triggered separately.
E8	High-level instruction operand combination error	Stop	● There is an incorrect operand in an instruction which requires a specific combination of operands (for example, the operands must all be of a certain type). ● Enter the correct combination of operands.

(Note 1) The error codes E2 and E5 are detected even when rewriting data with syntax errors in RUN mode. In this case, nothing will be written into the Control Unit. The operation continues.

13.7.2 Self-diagnostic Errors

Code	Name	Operation	Error contents and steps to take
E20	Watchdog timeout	Stop	● The watchdog timer is activated and the operation stops. A hardware error or operation congestion occurs. ● Check if an endless loop occurs by a control instruction which changes the flow of the process of a program (such as JP and LOOP). If there is no problem in the program, there may be an error in the hardware.
E22	Hardware error	Stop	● There may be an error in the hardware. Please contact your dealer.
E25	Master memory model unmatch error	Stop	● The models of master memories are different. Use the master memories created with the same model.
E26	User ROM error	Stop	● When the master memory cassette is mounted, the master memory cassette may be damaged. ● Remove the master memory cassette and check whether the error occurs. If the error does not occur, the master memory is damaged. ● Rewrite the master memory and use it again. When the error does not turn off, please contact your dealer.
E27	Restrictions on the number of units installed	Stop	● The number of the installed units exceeds the limitation. ● Turn off the power and re-configure units referring to the hardware manual.
E34	I/O status error	Stop	● An abnormal unit is installed. ● Check the slot number with DT90036, and replace the abnormal unit with a normal unit.
E40	I/O error	Stop	● There may be an error in the Function Cassette. Check the position where the error occurs with the special data register DT90002 and fix the error. ● In the tool software, it can also be checked with the [I/O Error] button in the status display dialog box.
E41	Special unit out of control	Stop	● There may be an error in an intelligent unit. Check the position where the error occurs with the special data register DT90006 and fix the error. ● In the tool software, it can also be checked with the [Special Error] button in the "Status Display" dialog box.
E42	I/O verification error	Select	● The I/O unit (Expansion Unit) wiring condition has changed compared to that at time of power-up. ● Check the I/O unit whose wiring condition has changed with the special data registers DT90010 and DT90011. Or check the fitting state of the expansion connector. ● In the tool software, it can also be checked with the [Verification Error] button in the "Status Display" dialog box.
E44	Positioning operation error occurred	Select	● The error when using the table operation function occurs. ● The set parameter may be incorrect or the limit error may occur. ● Check if the parameter is in the settable range. ● The channel and content where the positioning operation error occurs can be confirmed by pressing the [Positioning errors] button in the "Status Display" dialog box.
E45	Operation error occurred	Select	● Inexecutable operation error occurs.

Code	Name	Operation	Error contents and steps to take
			● The address of the operation error can be confirmed by either special data registers DT90017 or DT90018. In the tool software, it can also be checked with the [Operation errors] button in the "Status Display" dialog box.
E48	System register setting error	Operation stops	● The setting value of a system register is abnormal. Check the setting again. Example) The error occurs when the range of the data registers or internal relays set in the system register no. 0 or no. 1 are inconsistent with the settings of hold / non-hold area in the system register no. 7 or no. 8, or the buffer area setting for the general-purpose communication in the system register nos. 416 to 423. ● The system register number can be confirmed by the special register DT90007.
E49	Expansion unit power supply sequence error	Operation stops	● The power supply to the Expansion Unit was turned ON later than that to the Control Unit. Turn on the power supply to the Expansion Unit earlier or at the same time as the Control Unit power supply.
E50	Battery error (A battery comes off or the voltage drops.)	Operation continues	● The voltage of the backup battery lowered or the backup battery is not installed in the Control Unit. Check the backup battery, and replace or connect it if necessary. ● This self-diagnostic error can be set to be notified or not by the system register no. 4.
E100 to E199	Self-diagnostic error set by F148	Stop	● An error that has been arbitrarily set by the high-level instruction F148 occurs. ● Take countermeasures according to the specified detection condition.
E200 to E299		Operation continues	

13.7.3 List of MEWTOCOL-COM Communication Error Codes

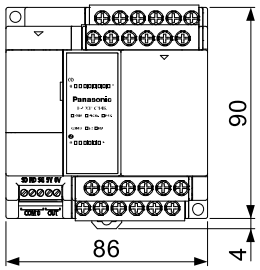
Code	Name	Description of error
!26	Unit number setting error	A command that cannot be used for global (unit no. FF) was received.
!40	BCC error	Transmission error occurred in received data.
!41	Format error	Command that does not match the format was received.
!42	NOT support error	An unsupported command was received.
!43	Multiframe process error	Another command was received during the multiframe processing.
!60	Parameter error	Specified parameter does not exist, or cannot be used.
!61	Data error	There is an error in the contact, data area, data number, size, range or format specification.
!62	Registration over error	The number of registration exceeded the restriction, or operation is performed without registration.
!63	PC mode error	Invalid command was executed in RUN mode.
!64	External memory error	There is an abnormality in hardware. There may be an abnormality in the internal ROM (F-ROM) / master memory.

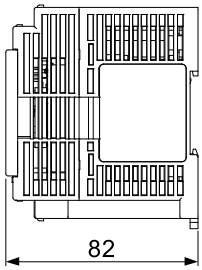
Code	Name	Description of error
		At the time of ROM transfer, a specified content exceeds the capacity. A reading / writing error occurred.
!65	Protection error	Write operation was performed to a program or system register when the unit is protected (password setting) or when the Master Memory Cassette is installed.
!66	Address error	The code format of address data is incorrect, or the range specification is incorrect.
!67	Missing program error / Missing data error	Program cannot be read as there is no program in program area or an error in memory contents. Or unregistered program was read.
!68	Rewriting is disabled while in RUN mode	Editing an instruction that cannot be rewritten in RUN mode (ED, SUB, RET, INT, IRET, SSTP or STPE) is attempted. Nothing is written to the Control Unit.
!71	Exclusive control error	A command that cannot be processed simultaneously with the command in process was executed.

13.8 Dimensions

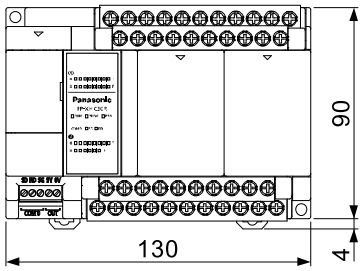
13.8.1 External Dimensions

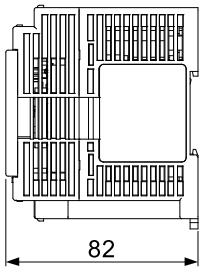
■ **FP-XH C14 Control Unit**



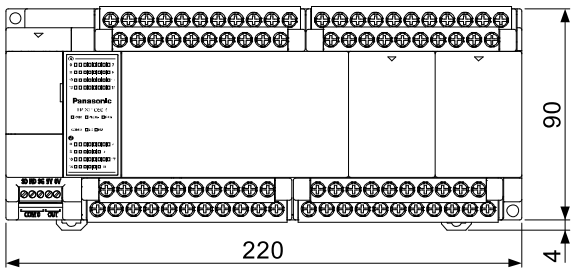


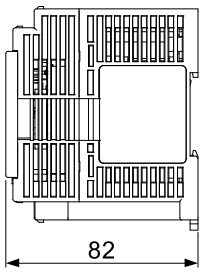
■ **FP-XH C30 Control Unit**



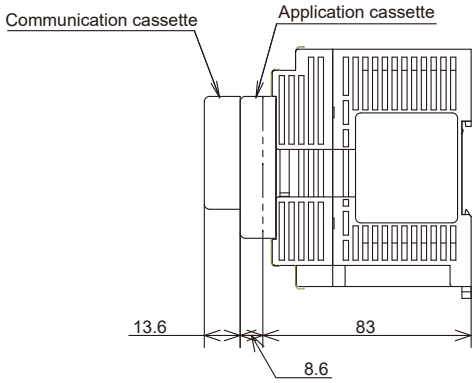


■ **FP-XH C60 Control Unit**

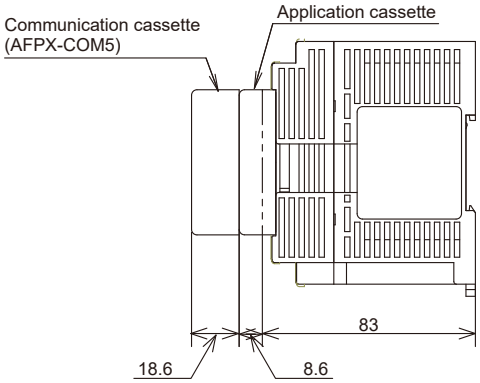




■ When installing add-on cassette



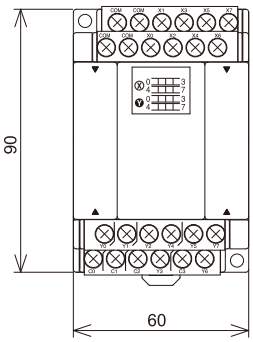
For the communication cassette AFPX-COM5



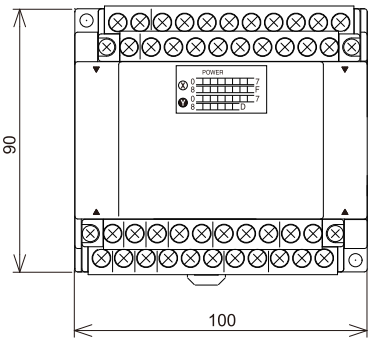
- AFPX-COM5 is 5 mm taller than other communication cassettes.

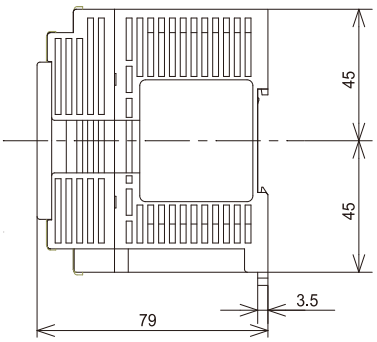
■ FP-X expansion unit

AFPX-E16/E14



AFPX-E30

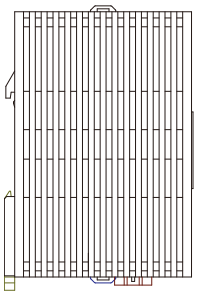


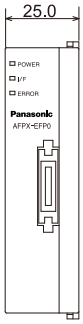


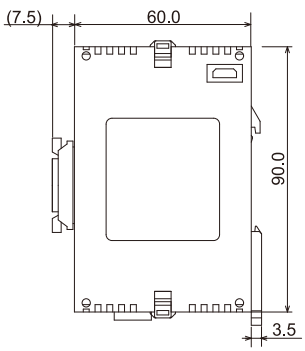
(mm)

■ FP-X expansion FP0 adapter

AFPX-EFP0

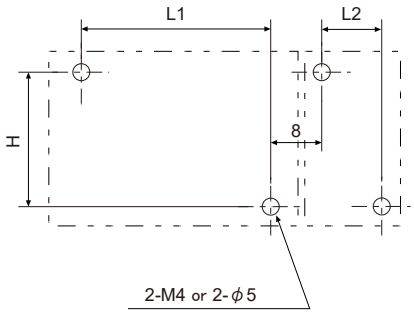






(mm)

13.8.2 Mounting Dimensions



FP-XH Control Unit

Model	L1	H
C14	78	82
C30	122	
C60	212	

FP-X Expansion Unit

Model	L2	H
E16	52	82
E30	92	

Unit: mm

Record of changes

Manual number can be found at the bottom of the cover page.

Date	Manual No.	Record of Changes
Oct. 2020	WUME-FPXHBASG-01	1st Edition
Nov. 2020	WUME-FPXHBASG-02	2nd Edition ● Terminal layout corrected (Section 2.5.1/2.5.3/4.7.3) ● "Device class" deleted
May. 2021	WUME-FPXHBASG-03	3rd Edition ● PNP transistor output type models added
Dec. 2022	WUME-FPXHBASG-04	4th Edition ● Change the tightening torque of the terminal block ● Added descriptions on the replacement time of the backup battery.
Mar. 2023	WUME-FPXHBASG-05	5th Edition ● Addition of the specification information for the usable FP-X series unit FP-X Expansion Unit FP-X Expansion FP0 Adapter FP-X Function Cassette
Apr. 2024	WUME-FPXHBASG-06	6th Edition ● Change in Corporate name

Order Placement Recommendations and Considerations

The Products and Specifications listed in this document are subject to change (including specifications, manufacturing facility and discontinuing the Products) as occasioned by the improvements of Products. Consequently, when you place orders for these Products, Panasonic Industry Co., Ltd. asks you to contact one of our customer service representatives and check that the details listed in the document are commensurate with the most up-to-date information.

[Safety precautions]
Panasonic Industry Co., Ltd. is consistently striving to improve quality and reliability. However, the fact remains that electrical components and devices generally cause failures at a given statistical probability. Furthermore, their durability varies with use environments or use conditions. In this respect, check for actual electrical components and devices under actual conditions before use. Continued usage in a state of degraded condition may cause the deteriorated insulation. Thus, it may result in abnormal heat, smoke or fire. Carry out safety design and periodic maintenance including redundancy design, design for fire spread prevention, and design for malfunction prevention so that no accidents resulting in injury or death, fire accidents, or social damage will be caused as a result of failure of the Products or ending life of the Products.

The Products are designed and manufactured for the industrial indoor environment use. Make sure standards, laws and regulations in case the Products are incorporated to machinery, system, apparatus, and so forth. With regard to the mentioned above, confirm the conformity of the Products by yourself.

Do not use the Products for the application which breakdown or malfunction of Products may cause damage to the body or property.
i) usage intended to protect the body and ensure security of life
ii) application which the performance degradation or quality problems, such as breakdown, of the Products may directly result in damage to the body or property

It is not allowed the use of Products by incorporating into machinery and systems indicated below because the conformity, performance, and quality of Products are not guaranteed under such usage.
i) transport machinery (cars, trains, boats and ships, etc.)
ii) control equipment for transportation
iii) disaster-prevention equipment / security equipment
iv) control equipment for electric power generation
v) nuclear control system
vi) aircraft equipment, aerospace equipment, and submarine repeater
vii) burning appliances
viii) military devices
ix) medical devices (except for general controls)
x) machinery and systems which especially require the high level of reliability and safety

[Acceptance inspection]
In connection with the Products you have purchased from us or with the Products delivered to your premises, please perform an acceptance inspection with all due speed and, in connection with the handling of our Products both before and during the acceptance inspection, please give full consideration to the control and preservation of our Products.

[Warranty period]
Unless otherwise stipulated by both parties, the warranty period of our Products is three years after the purchase by you or after their delivery to the location specified by you. The consumable items such as battery, relay, filter and other supplemental materials are excluded from the warranty.

[Scope of warranty]
In the event that Panasonic Industry Co., Ltd. confirms any failures or defects of the Products by reasons solely attributable to Panasonic Industry Co., Ltd. during the warranty period, Panasonic Industry Co., Ltd. shall supply the replacements of the Products, parts or replace and/or repair the defective portion by free of charge at the location where the Products were purchased or delivered to your premises as soon as possible.
However, the following failures and defects are not covered by warranty and we are not responsible for such failures and defects.
(1) When the failure or defect was caused by a specification, standard, handling method, etc. which was specified by you.
(2) When the failure or defect was caused after purchase or delivery to your premises by an alteration in construction, performance, specification, etc. which did not involve us.
(3) When the failure or defect was caused by a phenomenon that could not be predicted by the technology at purchasing or contracted time.
(4) When the use of our Products deviated from the scope of the conditions and environment set forth in the instruction manual and specifications.
(5) When, after our Products were incorporated into your products or equipment for use, damage resulted which could have been avoided if your products or equipment had been equipped with the functions, construction, etc. the provision of which is accepted practice in the industry.
(6) When the failure or defect was caused by a natural disaster or other force majeure.
(7) When the equipment is damaged due to corrosion caused by corrosive gases etc. in the surroundings.

The above terms and conditions shall not cover any induced damages by the failure or defects of the Products, and not cover your production items which are produced or fabricated by using the Products. In any case, our responsibility for compensation is limited to the amount paid for the Products.

[Scope of service]
The cost of delivered Products does not include the cost of dispatching an engineer, etc. In case any such service is needed, contact our sales representative.

Panasonic Industry Co., Ltd.

(MEMO)

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Please visit our website for inquiries and about our sales network.

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