Panasonic

Programmable Controller

FP-XH Series

User's Manual

Basic

WUME-FPXHBAS-03

2021.6 | panasonic.net/id/pidsx

(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 from our Download Center: https://industrial.panasonic.com/ac/c/dl_center/.

Unit name or purpose of use	Manual name	Manual code
FP-XH Control Unit	FP-XH User's Manual (Basic)	WUME-FPXHBAS
FP-XH Control Unit	FP-XH Programming Manual	WUME-FPXHPGR
Positioning Function / PWM Output / High-speed Counter Function	FP-XH User's Manual (Positioning / PWM Output / High-speed Counter)	WUME-FPXHPOS
Ethernet Communication Function	FP-XH User's Manual (Ethernet Communication)	WUME-FPXHET
Communication Functions	FP-XH User's Manual (COM Communication)	WUME-FPXHCOM
FP-X Extension (Communication) Cassette	FP-XH User's Manual (COM Communication)	WUME-FPXHCOM
FP-X Expansion Unit	FP-X Series User's Manual	WUME-FPX
FP-X Function Cassettes	FP-X Series User's Manual	WUME-FPX

Handling Precautions

■ **In this manual, the following symbols are used to indicate safety information that must be observed.**

Stop	Indicates an action that is prohibited or a matter that requires caution.
!	Indicates an action that must be taken.
Info.	Indicates supplemental information.
Note	Indicates details about the subject in question or information useful to remember.
1 2 Procedure	Indicates operation procedures.

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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Camellia assebler implementation.

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Notation of Products

In this manual, product names are described as follows to simplify descriptions.

No. of points	Output	Product No.	Notation 1 (No. of points)	Notation 2 (No. of points + Output)
14 points	Relay	AFPXHC14R	FP-XH C14 Control Unit or C14	C14R
		AFPXHC14RD		
	Transistor	AFPXHC14T		C14T
		AFPXHC14TD		
30 points	Relay	AFPXHC30R	FP-XH C30 Control Unit or C30	C30R
		AFPXHC30RD		
	Transistor	AFPXHC30T		C30T
		AFPXHC30TD		
40 points	Relay	AFPXHC40R	FP-XH C40 Control Unit or C40	C40R
		AFPXHC40RD		
	Transistor	AFPXHC40T		C40T
		AFPXHC40TD		
60 points	Relay	AFPXHC60R	FP-XH C60 Control Unit or C60	C60R
		AFPXHC60RD		
	Transistor	AFPXHC60T		C60T
		AFPXHC60TD		
38 points (Analog type)		AFPXHC38AT	FP-XH C38AT Control Unit or C38AT	C38AT
40 points (Ethernet type)		AFPXHC40ET	FP-XH C40ET Control Unit or C40ET	C40ET
60 points (Ethernet type)		AFPXHC60ET	FP-XH C60ET Control Unit or C60ET	C60ET

Compatibility with the conventional FP-X / FP-X0 series

The FP-XH series is upward compatible with a conventional FP-X / FP-X0 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 and FP-X0 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	
F385 (PTBLW)	Writing positioning parameters	

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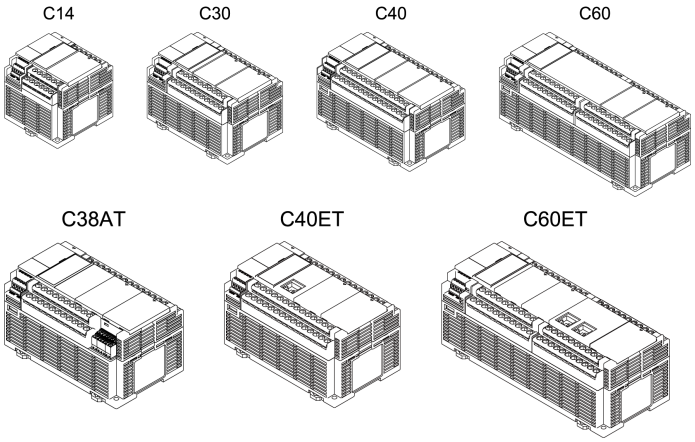
1 System Configuration

1.1 List of Units

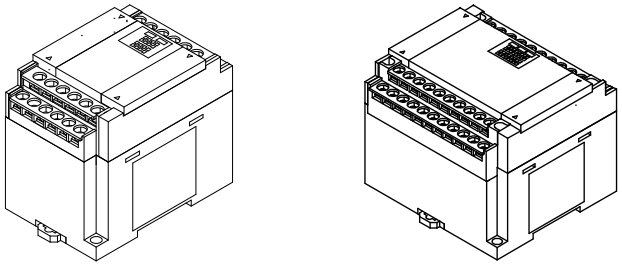
1.1.1 FP-XH Control Units



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

Number of points	Power supply	Output
14 points / 30 points / 40 points / 60 points	100 to 240 V AC or 24 V DC	Relay or transistor (NPN output)
38 points (analog type)	100 to 240 V AC	Transistor (NPN output) + Analog I/O
40 points / 60 points (Ethernet type)	100 to 240 V AC	Transistor (NPN output)

1.1.2 FP-X Expansion Units / FP-X0 Expansion Units



The following types are available depending on the number of points, power supply, and output type. They can be commonly used with the conventional FP-X or FP-X0 Units.

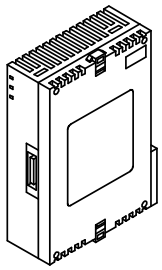
■ FP-X Expansion Units

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

■ FP-X0 Expansion Units

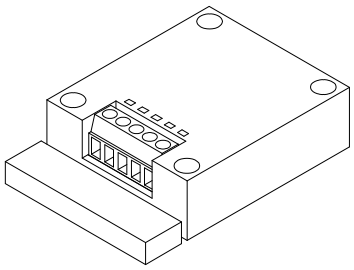
Number of points	24 points	40 points
Power supply	No power supply	24 V DC
Output	Relay or transistor (NPN output or PNP output)	

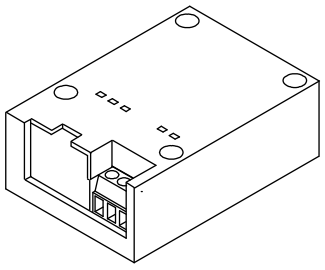
1.1.3 FP-X Expansion FP0 Adapter



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)



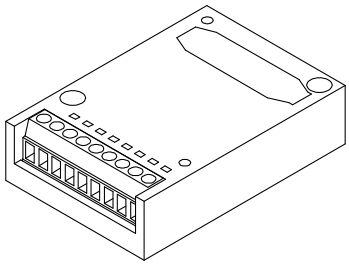


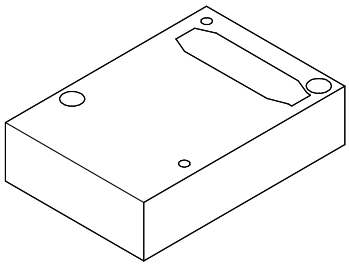
The following types are available depending on the type of communication interface or the number of channels.

Communication method	RS-232C (5-wire type) x 1 channel
	RS-232C (3-wire type) x 2 channels
	RS-485 / RS-422 x 1 channel

	RS-485 x 1 channel + RS-232C (3-wire type) x 1 channel
	RS-485 x 2 channels
	Ethernet x 1 channel + RS-232C (3-wire type) x 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(Note 1)	Master memory + real-time clock

(Note 1) Master Memory Cassettes cannot be used on C40ET or C60ET.

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 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, transistor output (NPN)	100 to 240 V AC	AFPXHC30T
		24 V DC	AFPXHC30TD
FP-XH C40R Control Unit	24-point DC input, 16-point relay output	100 to 240 V AC	AFPXHC40R
		24 V DC	AFPXHC40RD
FP-XH C40T Control Unit	24-point DC input, 16-point transistor output (NPN)	100 to 240 V AC	AFPXHC40T
		24 V DC	AFPXHC40TD
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 C38AT Control Unit (analog type)	24-point DC input, 14-point transistor output (NPN)	100 to 240 V AC	AFPXHC38AT
FP-XH C40ET Control Unit (Ethernet type)	24-point DC input, 16-point transistor output (NPN)	100 to 240 V AC	AFPXHC40ET
FP-XH C60ET Control Unit (Ethernet type)	32-point DC input, 28-point transistor output (NPN)	100 to 240 V AC	AFPXHC60ET

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

Item name	Specifications		Product no.
	Input and output specifications	Power supply	
	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
	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-X0 Expansion Units

Item name	Specifications		Product no.
	Input and output specifications	Power supply	
FP-X0 E24 Expansion I/O Unit	16-point DC input, 8-point relay output	-	AFPX0E24R
	16-point DC input, 8-point transistor output (NPN)	-	AFPX0E24T
	16-point DC input, 8-point transistor output (PNP)	-	AFPX0E24P
FP-X0 E40 Expansion I/O Unit	24-point DC input, 16-point relay output	24 V DC	AFPX0E40RD
	24-point DC input, 16-point transistor output (NPN)	24 V DC	AFPX0E40TD
	24-point DC input, 16-point transistor output (PNP)	24 V DC	AFPX0E40PD

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

1.2.4 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.

1.2.5 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 port + 3-wire RS-232C x 1 channel	AFPX-COM5

1.2.6 FP-X Extension Cassettes (Function Cassettes)

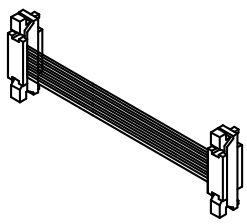
Name		Specifications	Product no.
Analog I/O	FP-X Analog Input Cassette	Analog input (non-isolated) x 2 channels	AFPX-AD2
	FP-X Analog Output Cassette	Analog output (isolated) x 2 channels (isolated between channels)	AFPX-DA2
	FP-X Analog I/O Cassette	Analog input (isolated) x 2 channels (non-isolated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

(Note 1) Master Memory Cassettes cannot be used on C40ET or C60ET.

1.2.7 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.	AFPXHBATT

1.2.8 Maintenance Parts

	Name	Specifications	Product no.
	FP-X Expansion Cable (Note)	8 cm	AFPX-EC08
		30 cm	AFPX-EC30
		80 cm	AFPX-EC80
	FP0 Power supply cable	For the Expansion FP0 Adapter, length: 1 m	AFP0581

(Note 1) An 8 cm expansion cable is provided with the FP0 Expansion Unit or with the FP0 Intelligent Unit. The total length of the expansion cable should be within 160 cm.

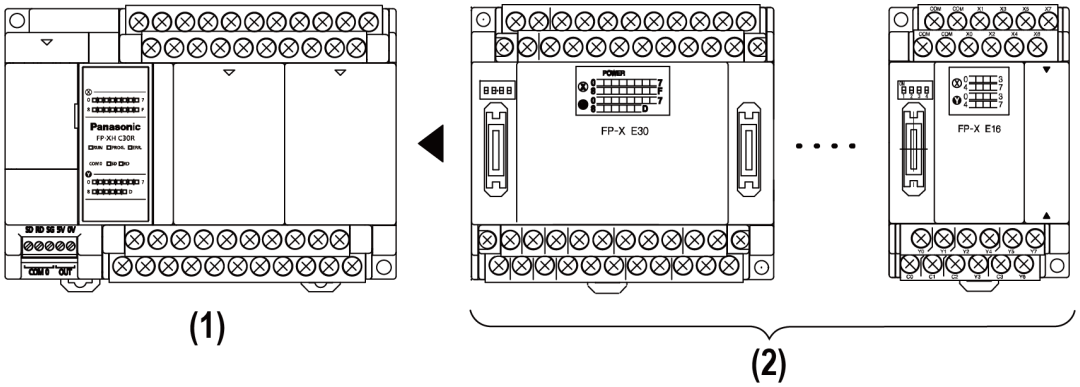
(Note 2) If a longer expansion cable is used, an I/O check error may occur due to noise, etc. In such a case, it is recommended that measures such as installing a ferrite core be taken.

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 Unit	(2)	FP-X / FP-X0 Expansion Unit

■ **Maximum number of controllable I/O points**

Type of Control Unit	Number of I/O points in a single Control Unit	Number of I/O points when using FP-X-E30 Expansion Units	Number of I/O points when using FP-X0-E40 Expansion Units
FP-XH C14 Control Unit	14 points	Max. 254 points	Max. 334 point
FP-XH C30 Control Unit	30 points	Max. 270 points	Max. 350 point
FP-XH C40 Control Unit FP-XH C40ET Control Unit	40 points	Max. 280 points	Max. 360 point
FP-XH C60 Control Unit FP-XH C60ET Control Unit	60 points	Max. 300 points	Max. 380 point
FP-XH C38AT Control Unit	38 points	Max. 278 points	Max. 358 point

■ **Restrictions on combinations of Expansion Cables**

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

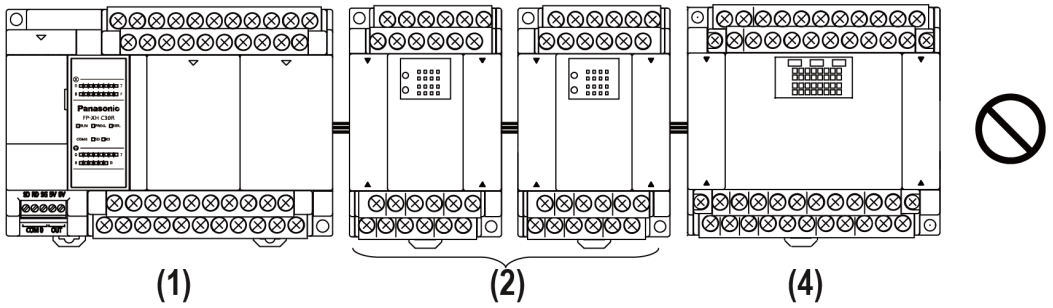
■ **Restrictions on combinations of Expansion Units (2)**

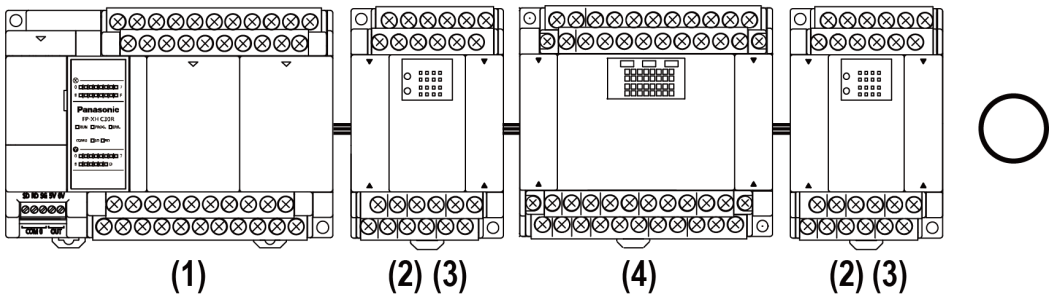
- The number of units which can be expanded depends on the Expansion Unit type.

	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)	

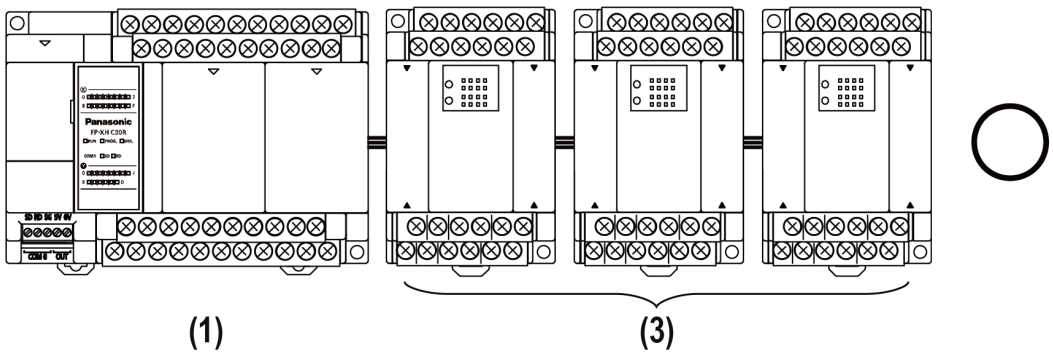
	Unit type		Remarks
(3)	FP-X Expansion I/O Unit	E16X, E16T, E16P (Ver. 3.0 or later)	Expansion I/O Unit that does not have a built-in power supply
	FP-X0 Expansion I/O Unit	E24R, E24T, E24P	
(4)	FP-X Expansion I/O Unit	E30	Expansion I/O Unit that has a built-in power supply
	FP-X0 Expansion I/O Unit	E40	

- 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.





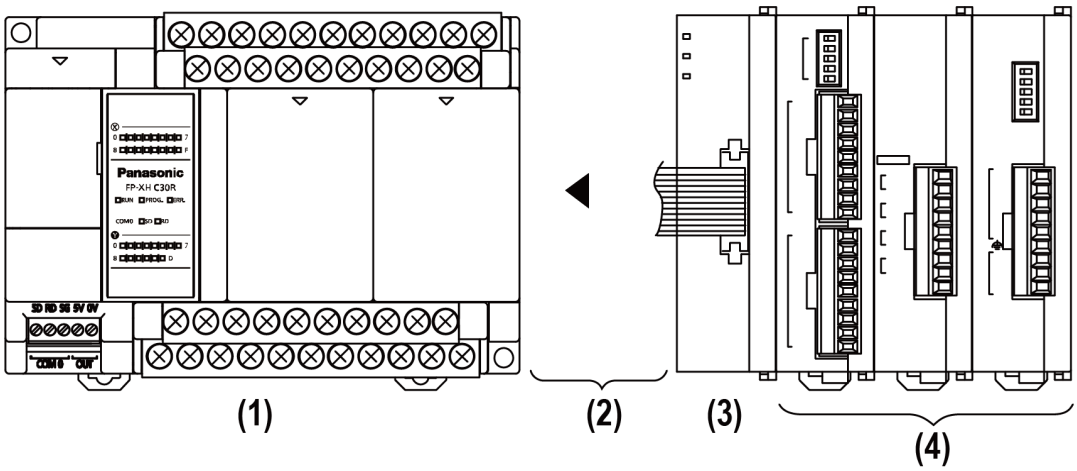
- Among the FP-X Expansion I/O Units that do not have a built-in power supply, those in the group (3) in the above table can be connected together up to three units.



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 / FP-X0 Expansion Unit	(3)	FP-X Expansion FP0 adapter	(4)	FP0 Expansion Unit Intelligent Unit

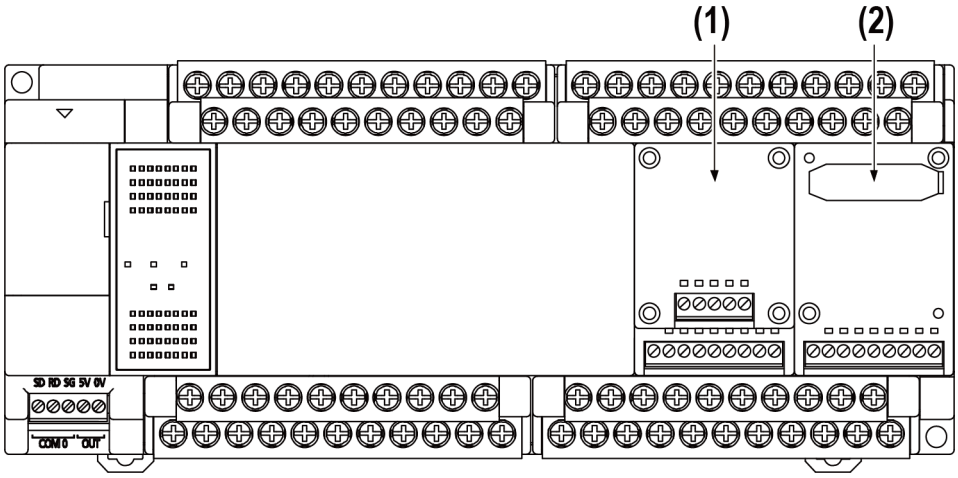
■ FP0 Expansion Unit / FP0 Intelligent Unit installation sequence

- 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)

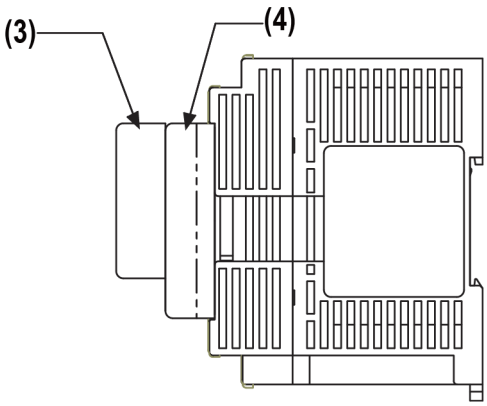
- The FP-XH Control Unit is provided with two cassette mounting parts. In case of the C14 model, only the cassette mounting part 1 can be used.



(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	●	●
	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 a Control Unit other than C14, 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) If the following rules are violated, the self-diagnostic error (27: Restrictions on the number of units installed) will occur.

- Only one Master Memory Cassette can be mounted.
- Master Memory Cassettes cannot be used on C40ET or C60ET.

1.3.4 Restrictions on Communication Functions to be Used

- When a communication port that is built in the control unit as standard equipment or a Communication Cassette is used, the following restrictions are applied depending on functions to be used.
- Allocated communication port No. varies depending on where the cassette is installed.

■ Types of communication ports / cassettes (●: Available; ○: Conditionally available; Blank: Not available)

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

(Note 1) The RS-232C port of AFPX-COM1 is a 5-wire type capable of RS / CS control.

(Note 2) Select either RS-485 or RS-422 for AFPX-COM3. They can be selected using the switch on the Communication Cassette.

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

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

■ List of available functions by communication port (●: Available; ○: Conditionally available; Blank: Not available)

Available communication functions		Allocated communication port No.					
		Control Unit		Cassette mounting part 1		Cassette mounting part 2	
		USB	COM0	COM1	COM2	COM3	COM4
PLC link			○	○			
MEWTOCOL-COM	Master		●	●	●	●	●
	Slave	●	●	●	●	●	●
MODBUS-RTU(Note 3)	Master		●	●	●	●	

Available communication functions		Allocated communication port No.					
		Control Unit		Cassette mounting part 1		Cassette mounting part 2	
		USB	COM0	COM1	COM2	COM3	COM4
	Slave		●	●	●	●	
General-purpose communication			●	●	●	●	

(Note 1) For PLC link, only one port may be used (either COM0 port that is built in the Control Unit as standard equipment, or COM1 port on a cassette).

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

(Note 3) The AFPX-COM5 Cassette (Ethernet type) does not support MODBUS-RTU (master / slave).

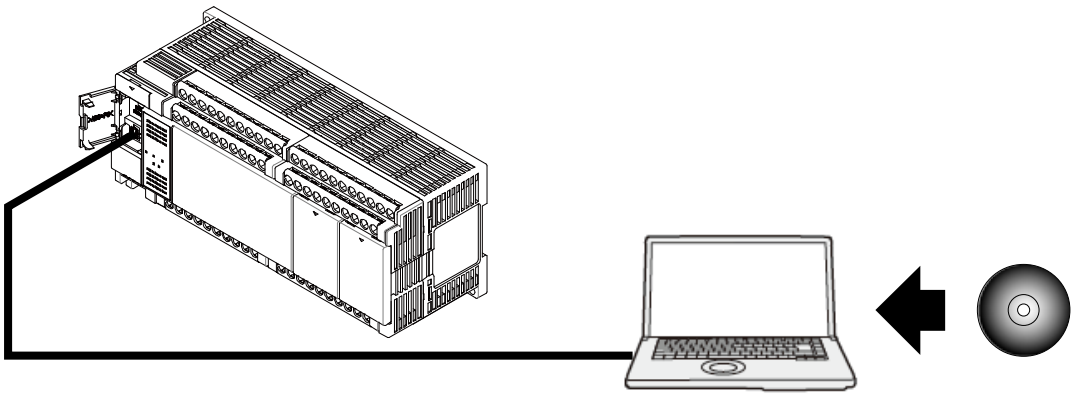
(Note 4) When all the five ports from COM0 to COM4 are used, the baud rate is set to the maximum of 115.2 kbps and the available pulse output function is set to allow the maximum of two channels. When four or less number of ports are used, the baud rate is set to the maximum of 230.4 kbps and the available pulse output function is set to allow the maximum of six channels.

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 Usage Environment and Applicable Cables



■ Tool software

Software type	Operating system	Hard disk capacity	Product no.
Control FPWIN GR7 (English version)	Windows (R) 10 (32-bit version / 64-bit version) Windows (R) 8.1 (32-bit version / 64-bit version) Windows (R) 8 (32-bit version / 64-bit version) Windows (R) 7 SP1 or later (32-bit version / 64-bit version) Windows (R) Vista SP2 Windows (R) XP SP3	120 MB or more	AFPSGR7EN
Control FPWIN Pro7	Windows (R) 10 (32-bit version / 64-bit version) Windows (R) 8.1 (32-bit version / 64-bit version) Windows (R) 8 (32-bit version / 64-bit version) Windows (R) 7 SP1 or later (32-bit version / 64-bit version)	400 MB or more	AFPSPR7A

(Note 1) The latest version is provided free of charge via our website (https://industrial.panasonic.com/ac/c/dl_center/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

1.4.2 Applicable software version

For using the FP-XH, the following software versions are required.

Item		Applicable version	
	Programming tool software Control FPWIN GR / GR7 / Pro7	C14 / C30 / C40 / C60	FPWIN GR Ver. 2.93 or later FPWIN GR7 Ver. 2.5 or later FPWIN Pro7 Ver. 7.03 or later
		C38AT	FPWIN GR7 Ver. 2.24.0 or later FPWIN Pro7 Ver. 7.2.5.0 or later
		C40ET / C60ET	FPWIN GR7 Ver.2.29.0 or later FPWIN Pro7 Ver.7.5.1.0 or later
	Configurator PMX	It is used for using the pulse output function in the table setting mode. It is incorporated in the FPWIN GR / GR7 / Pro7 and can be started from the option menu.	

(Note 1) The latest version is provided free of charge at our download center http://industrial.panasonic.com/ac/c/dl_center. Use the latest version.

(Note 2) To use the FP-XH in FPWIN Pro7, it is also necessary to install a setup file. For details, see the above website.

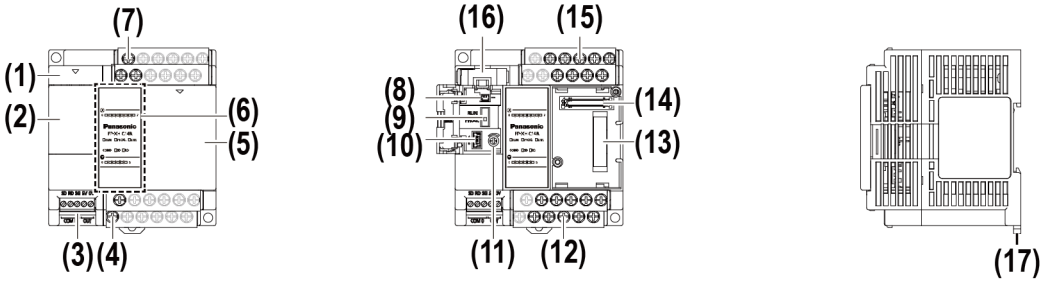
(MEMO)

2 Control Unit Specifications

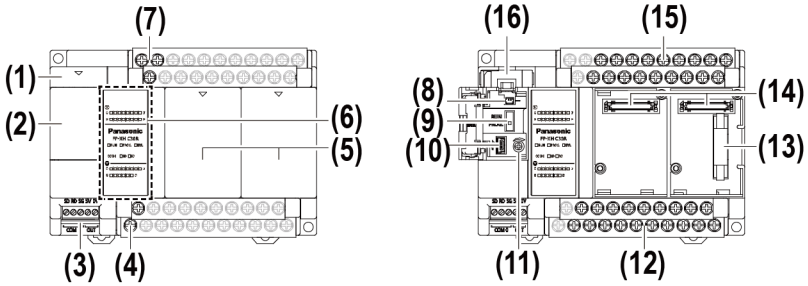
2.1 Names and Functions of Parts

2.1.1 Names and Functions of Parts (C14, C30, C40, C60, C38AT)

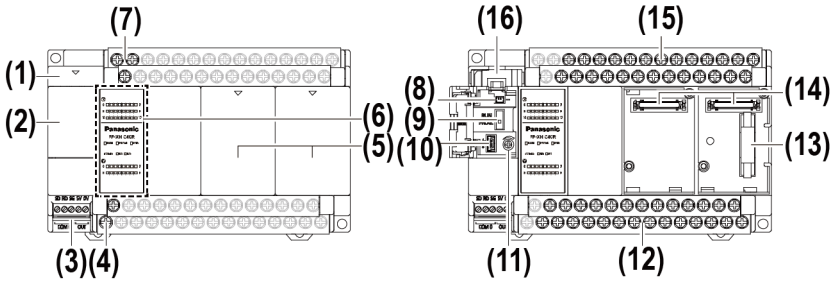
■ **FP-XH C14 Control Unit**



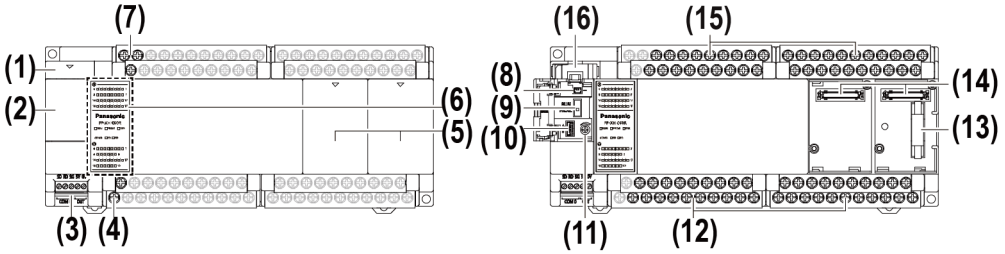
■ **FP-XH C30 Control Unit**



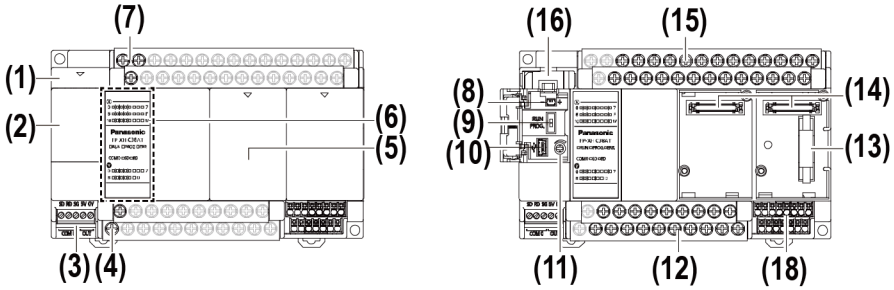
■ **FP-XH C40 Control Unit**



■ **FP-XH C60 Control Unit**



■ FP-XH C38AT Control Unit



(Note): The side surface is common to every model.

■ Names and functions of parts

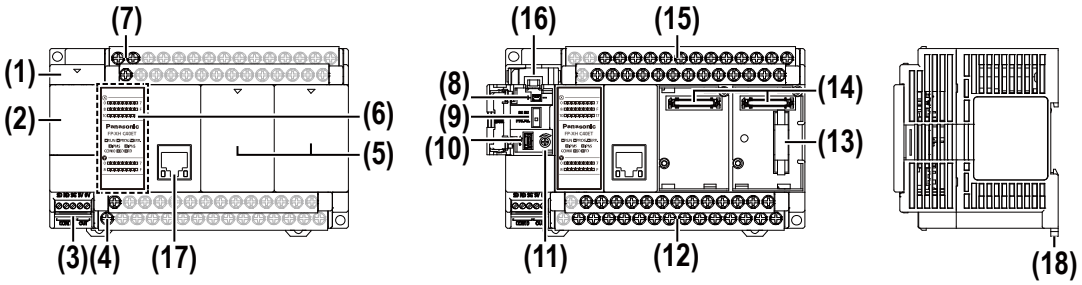
No.	Name	Function	
(1)	Battery cover	This is a space for installing an optional backup battery.	
(2)	Operating unit cover	There are a built-in battery connector, RUN / PROG. mode selection switch, USB port connector, and analog potentiometer.	
(3)	COM0 port	Three-wire RS-232C port. A power supply terminal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

No.	Name	Function
(17)	DIN hook	This is used to install the unit on a DIN rail.
(18)	Analog I/O terminals	This is used to connect an analog I/O device. (C38AT only)

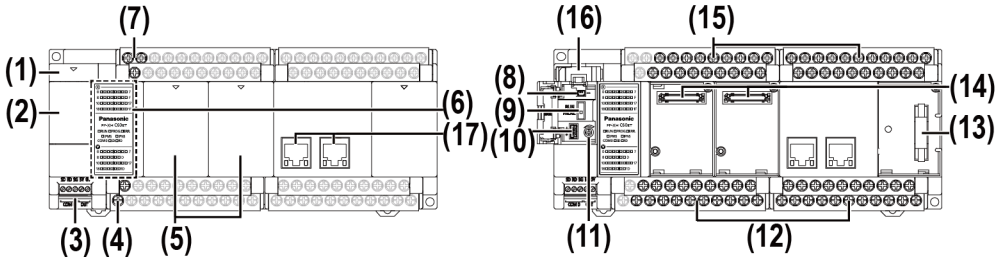
(Note 1) Whether the switch is set to RUN or PROG., the mode can be switched through remote operation from the tool software. When power is turned ON again, it operates in the mode set on the switch.

2.1.2 Names and Functions of Parts (C40ET, C60ET)

■ FP-XH C40ET Control Unit



■ FP-XH C60ET Control Unit



■ Names and functions of parts

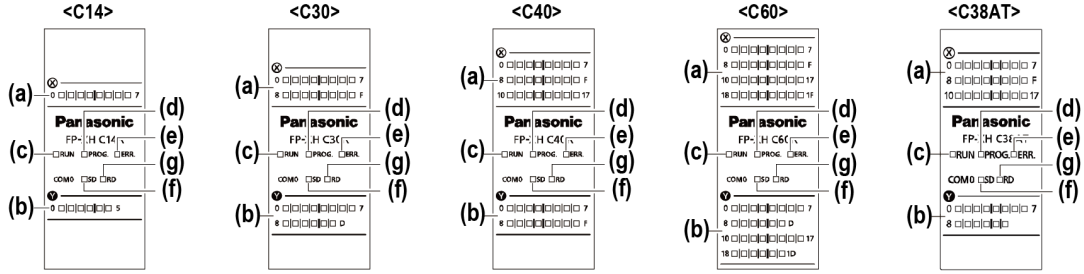
No.	Name	Function
(1)	Battery cover	This is a space for installing an optional backup battery.
(2)	Operating unit cover	There are a built-in battery connector, RUN / PROG. mode selection switch, USB port connector, and analog potentiometer.
(3)	COM0 port	Three-wire RS-232C port. A power supply terminal (5 V) is also provided for connecting our Programmable Display GT Series.
(4)	Service power supply terminal block for input	It can be used as service power supply for the input circuit.
(5)	Cassette mounting part cover	This is a space for installing an optional communication cassette and function cassette.
(6)	Status indicator LEDs / I/O indicator LEDs	Indicates the operation mode, error occurrence state, communication state of COM0 port, and input and output states.

No.	Name	Function	
(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 (AFPXHBATT).	
(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 (AFPXHBATT) is sold separately.	
(17)	LAN port	This is used for connection to Ethernet. The MAC address is marked on the side of the unit. The FP-XH C60ET Control Unit is provided with two LAN ports. The IP address and MAC address are common to both LAN ports. Using both ports can simplify the wiring.	
(18)	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.

2.1.3 Specifications of Operation Indicator LEDs (C14, C30, C40, C60, C38AT)

<C14> <C30> <C40> <C60> <C38AT>

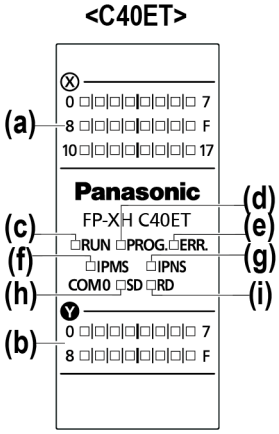


No.	LED name	Color	Data to display
(a)	X	Green	Indicates the input state.
(b)	Y	Green	Indicates the output state.

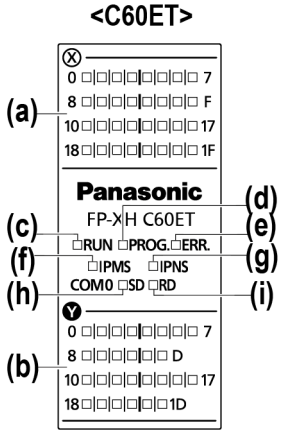
No.	LED name		Color	Data to display	
(c)	RUN		Green	Lit	Lit while a program is being executed in RUN mode.
				Flashing	RUN and PROG. LEDs flash alternately when the forced I/O function is executed.
(d)	PROG.		Green	Lit	Lit while the unit operation is stopped in PROG. mode.
				Flashing	RUN and PROG. 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	Flashing	Flashes when an error is detected by self-diagnosis.
				Lit	Lights up when a hardware error occurs or the watchdog timer is activated because the program causes operation to slow down.

2.1.4 Specifications of Operation Indicator LEDs (C40ET, C60ET)

<C40ET>



<C60ET>



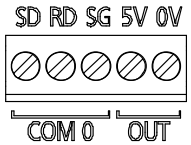
No.	LED name	Color	Data to display	
(a)	X	Green	Indicates the input state.	
(b)	Y	Green	Indicates the output state.	
(c)	RUN	Green	Lit	Lit while a program is being executed in RUN mode.
			Flashing	RUN and PROG. LEDs flash alternately when the forced I/O function is executed.
(d)	PROG.	Green	Lit	Lit while the unit operation is stopped in PROG. mode.
			Flashing	RUN and PROG. LEDs flash alternately when the forced I/O function is executed.
(e)	ERR.	Red	Flashing	Flashes when an error is detected by self-diagnosis.

No.	LED name		Color	Data to display	
				Lit	Lights up when a hardware error occurs or the watchdog timer is activated because the program causes operation to slow down.
(f)	IPMS		-	Unlit	The EtherNet/IP function is disabled.
			Green	Lit	The EtherNet/IP function is normally activated.
				Flashing	This state does not exist.
			Red	Lit	Unrecoverable fault occurs.
				Flashing	Recoverable fault occurs.
(g)	IPNS		-	Unlit	The EtherNet/IP function is disabled or IP address is not established.
			Green	Lit	At least one connection is established.
				Flashing	Connection is not established, but an IP address is acquired.
			Red	Lit	This state does not exist.
				Flashing	This state does not exist.
(h)	COM0	SD	Green	Flashes when data is sent via the COM0 port.	
(i)		RD	Green	Flashes when data is received via the COM0 port.	

2.1.5 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 / C40 / C60 / C38AT / C40ET / C60ET
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	C30R: 330 mA or less C30T: 310 mA or less C40R: 345 mA or less C40T: 320 mA or less C60R: 380 mA or less C60T: 335 mA or less C38AT: 360 mA or less C40ET: 380 mA or less C60ET: 395 mA or less
	200 V AC	C14R: 115 mA or less C14T: 110 mA or less	C30R: 200 mA or less C30T: 190 mA or less C40R: 215 mA or less C40T: 195 mA or less C60R: 235 mA or less C60T: 205 mA or less C38AT: 225 mA or less C40ET: 245 mA or less C60ET: 250 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 / C40 / C60 / C38AT / C40ET / C60ET
Rated voltage	24 V DC	
Operating voltage range	21.6 to 26.4 V DC	
Rated output current	0.15 A	0.4 A
Overcurrent protection function	Available	
Terminal screw	M3	

2.2.3 DC Power Supply Type

■ DC power supply type

Item	Specifications
	C14 / C30 / C40 / 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 C30RD: 160 mA or less C30TD: 115 mA or less C40RD: 185 mA or less C40TD: 130 mA or less C60RD: 275 mA or less C60TD: 170 mA or less

2.3 Input and Output Specifications (Relay Output Type)

2.3.1 Input Specifications

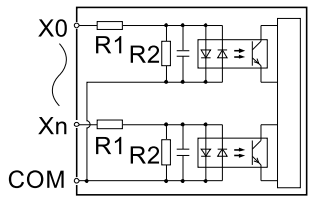
■ Specifications

Item			Specifications			
			C14R	C30R	C40R	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	24 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



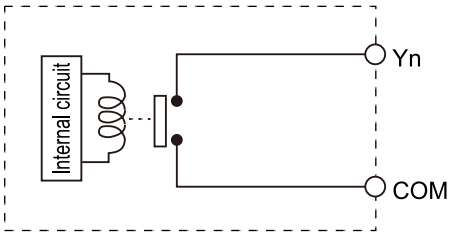
X0 to X7: R1 = 5.1 kΩ, R2 = 3 kΩ
X8 to Xn: R1 = 5.6 kΩ, R2 = 1 kΩ

2.3.2 Output Specifications

■ Specifications

Item		Specifications			
		C14R	C30R	C40R	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 2 2-point common x 1 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)

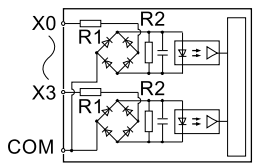
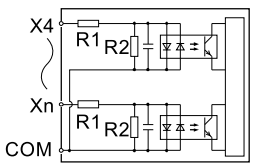
2.4.1 Input specifications (C14, C30, C40, C60 and C38AT)

■ Specifications

Item		Specifications			
		C14T	C30T	C40T / C38AT	C60T
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	24 points/ common	16 points/common x 2
		(Either the positive or negative pole 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

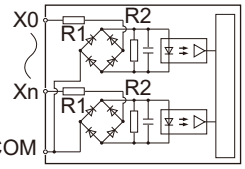
2.4.2 Input Specifications (C40ET, C60ET)

■ Specifications

Item		Specifications		
		C40ET		C60ET
Isolation method		Digital isolator		
Rated input voltage		24 V DC		
Operating voltage range		21.6 to 26.4 V DC		
Rated input current		Approx. 7.2 mA (X0 to X3) / Approx. 5.1 mA (X4 or later)		
Input points per common		24 points/common		16 points/common x 2
		(Either the positive or negative pole 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. 3 kΩ (X0 to X3) / Approx. 4.7 kΩ (X4 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 Xn	
	X0-X3: R1 = 3 kΩ, R2 = 1.2 kΩ X8 to Xn: R1 = 4.7 kΩ, R2 = 1.2 kΩ

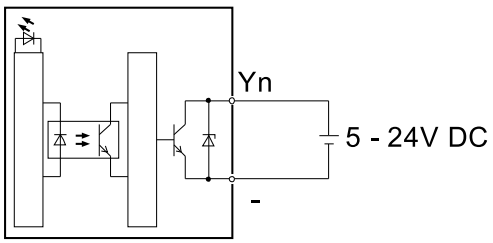
2.4.3 Output Specifications (C14, C30, C40, C60)

■ Specifications

Item		Specifications			
		C14T	C30T	C40T	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	8-point common x 2	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



2.4.4 Output Specifications (C38AT, C40ET, C60ET)

Item		Specifications		
		C38AT	C40ET	C60ET
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		0.5 V DC or less		
Overcurrent protection function		Available		
		Automatically reset separately for Y0 to Y7 and Y8 to YD	Automatically reset separately for Y0 to Y7 and Y8 to YF	Automatically reset separately for Y0 to YB and YC to Y1D
Input points per common		6-point common x 1 8-point common x 1	8-point common x 2	6-point common x 2 8-point common x 2
Response time (Note 1)	OFF→ON	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 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.

2.5 Analog I/O Specifications (C38AT Only)

2.5.1 Analog Input Specifications

Item			Specifications
Number of channels			4 channels
Input range (Resolution)	FP-X mode	Voltage	0 to 10 V DC (Resolution: 1/4,000) 0 to 5 V DC (Resolution: 1/4,000)
		Current	0 to 20 mA (Resolution: 1/4,000)
	FP-XH mode	Voltage	-10 to 10 V DC (Resolution: 1/64,000) -5 to 5 V DC (Resolution: 1/64,000) 0 to 10 V DC (Resolution: 1/32,000) 0 to 5 V DC (Resolution: 1/32,000) 1 to 5 V DC (Resolution: 1/25,600) (Note 1)
		Current	0 to 20 mA (Resolution: 1/32,000) 4 to 20 mA (Resolution: 1/25,600) (Note 1)
Digital Input range	FP-X mode	0 to 10 V DC 0 to 5 V DC	K 0 to K +4000
		0 to 20 mA	K 0 to K +4000
	FP-XH mode	-10 to 10 V DC -5 to 5 V DC	K -32000 to K +32000
		0 to 10 V DC 0 to 5 V DC	K 0 to K +32000
		1 to 5 V DC	K 0 to K +25600
		0 to 20 mA	K 0 to K +32000
		4 to 20 mA	K 0 to K +25600
Conversion speed			1 ms/all channels
Total accuracy	Voltage		±0.2% F.S. or less (at 25℃) ±0.4% F.S. or less (at 0 to 55℃)
	Current		±0.3% F.S. or less (at 25℃) ±0.6% F.S. or less (at 0 to 55℃)
Input impedance	Voltage		Approx. 1 MΩ
	Current		Approx. 250 Ω
Absolute max. input	Voltage input		-15 to 15 V DC voltage input
	Current input		-30 to 30 mA current Input
Isolation method (Note 2)	Between output terminal and internal circuit		Isolated IC, isolated DC/DC converter
	Between channels		Non-isolated
Average speed	Moving average		10 times
	No. of averaging times		Set to 64 times / 128 times.
Disconnection detection			Disconnection detection is possible when set to +1 to +5 V and +4 to +20 mA ranges.

Item	Specifications
	(Detection level: 0.7 V or less, 2.8 mA or less)

(Note 1) The accuracy full scale (F.S.) for voltage of 1 to 5 V DC and current of 4 to 20 mA is 0 to 5 V DC and 0 to 20 mA respectively.

(Note 2) The channel between the analog input and analog output terminals is non-isolated.

2.5.2 Analog Output Specifications

Item			Specifications
Number of channels			2ch
Output range (Resolution)	FP-X mode	Voltage	0 to 10 V DC (Resolution: 1/4,000)
		Current	0 to 20 mA (Resolution: 1/4,000)
	FP-XH mode	Voltage	-10 to 10 V DC (Resolution: 1/64,000) -5 to 5 V DC (Resolution: 1/64,000) 0 to 10 V DC (Resolution: 1/32,000) 0 to 5 V DC (Resolution: 1/32,000) 1 to 5 V DC (Resolution: 1/25,600) (Note 1)
		Current	0 to 20 mA (Resolution: 1/32,000) 4 to 20 mA (Resolution: 1/25,600) (Note 1)
Analog output setting range	FP-X mode	0 to 10 V DC	K 0 to K +4000
		0 to 20 mA	K 0 to K +4000
	FP-XH mode	-10 to 10 V DC -5 to 5 V DC	K -32000 to K +32000
		0 to 10 V DC 0 to 5 V DC	K 0 to K +32000
		1 to 5 V DC	K 0 to K +25600
		0 to 20 mA	K 0 to K +32000
		4 to 20 mA	K 0 to K +25600
Conversion speed			1 ms/all channels
Output impedance (voltage output)			0.5 Ω or less
Maximum output current (voltage output)			±10 mA
Output allowable load resistance (current output)			500 Ω or less
Isolation method	Between output terminal and internal circuit		Isolated IC Isolated DC/DC converter
	Between channels		Non-isolated
Total accuracy	Voltage		±0.2% F.S. or less (at 25℃) ±0.4% F.S. or less (at 0 to 55℃)
	Current		±0.3% F.S. or less (at 25℃) ±0.6% F.S. or less (at 0 to 55℃)

(Note 1) The accuracy full scale (F.S.) for voltage of 1 to 5 V DC and current of 4 to 20 mA is 0 to 5 V DC and 0 to 20 mA respectively.

2.6 Terminal Layout

2.6.1 Relay Output (AC Power Supply Type)

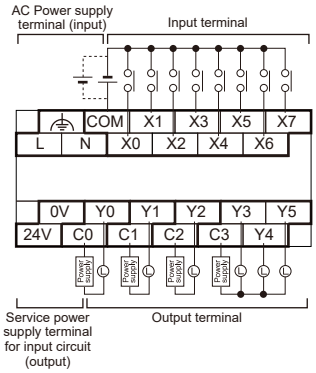
Input terminal

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.)

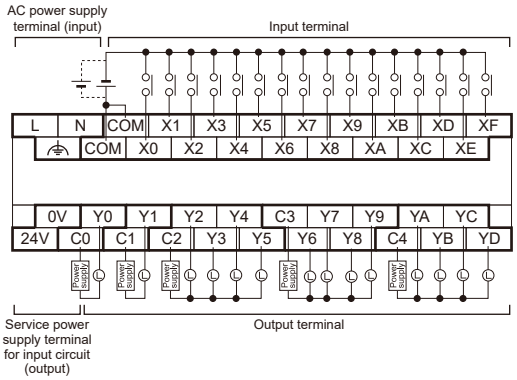
Output terminal

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

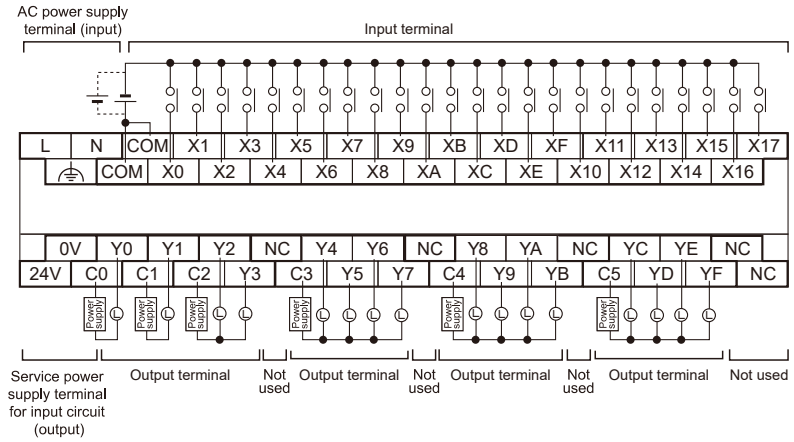
■ **AFPXHC14R**



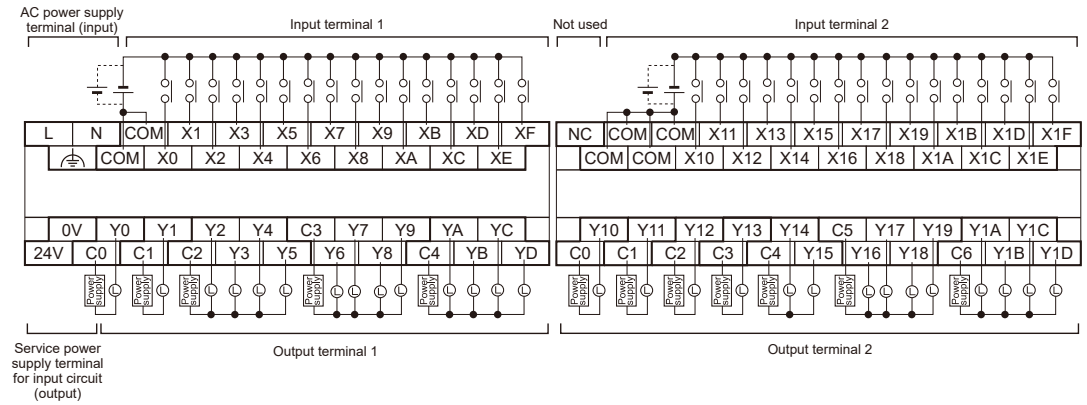
■ **AFPXHC30R**



■ **AFPXHC40R**



■ **AFPX-C60R**



2.6.2 Relay Output (DC Power Supply Type)

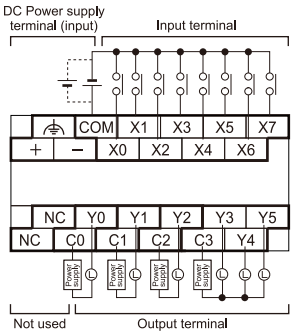
Input terminal

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.)

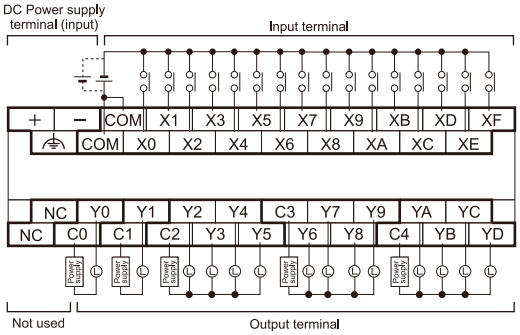
Output terminal

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

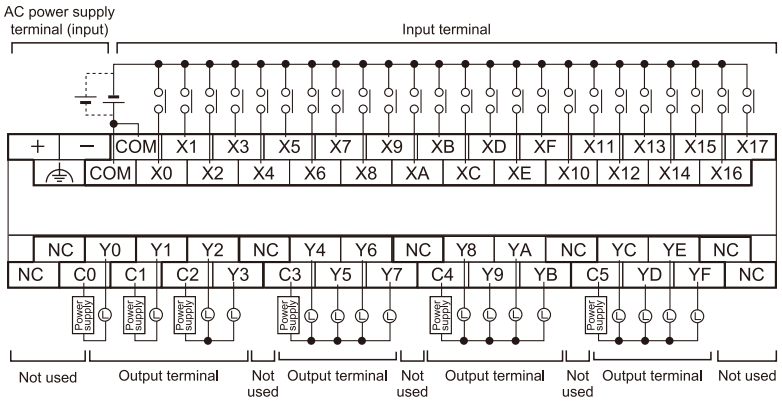
■ AFPXHC14RD



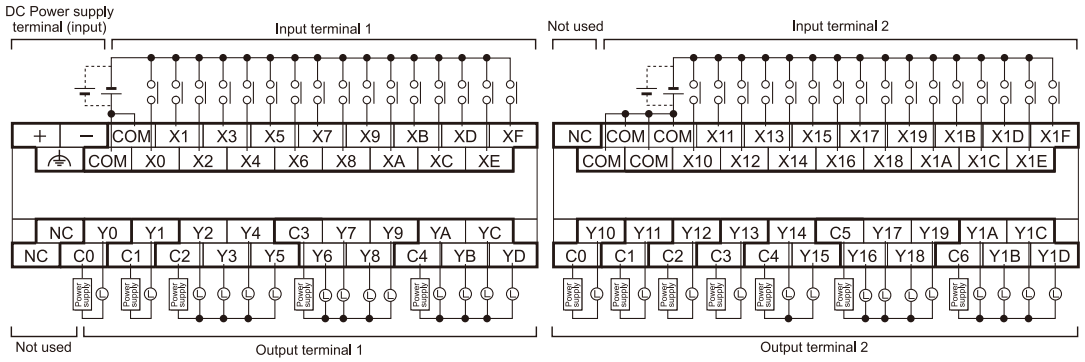
■ AFPXHC30RD



■ AFPX-C40RD



■ AFPX-C60RD



2.6.3 Transistor Output (AC Power Supply Type)

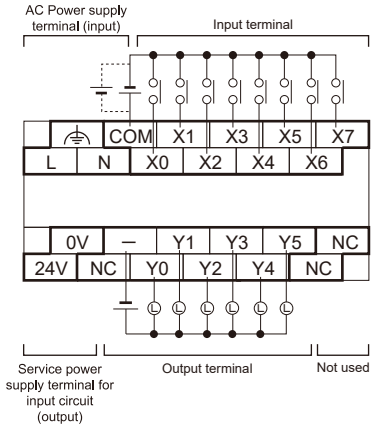
Input terminal

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.)

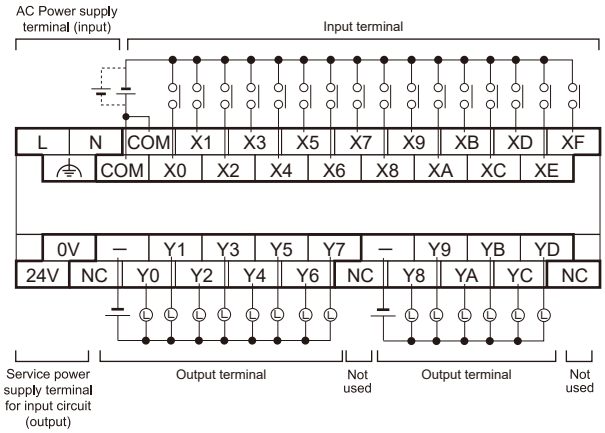
Output terminal

The negative terminals are connected within the unit.

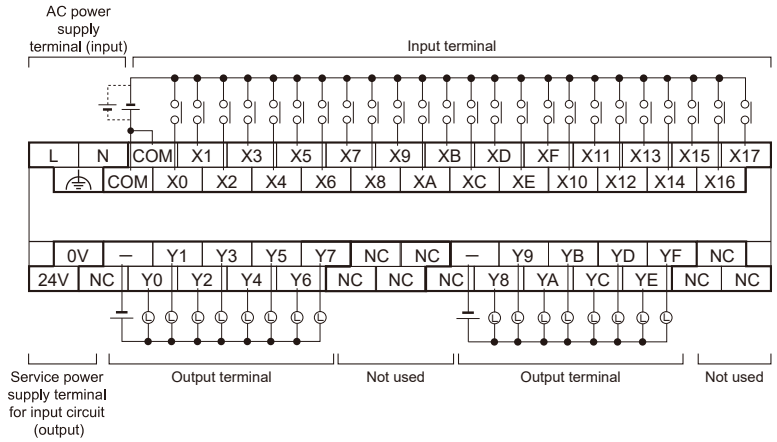
■ AFPXHC14T



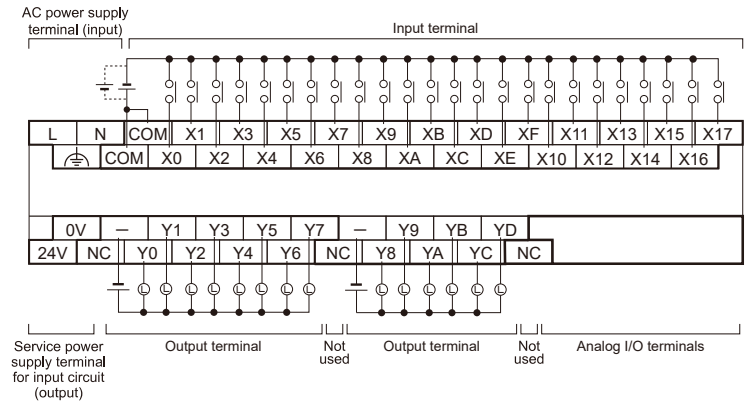
■ AFPXHC30T

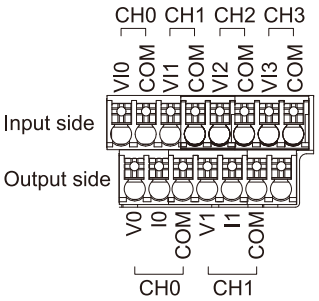


■ AFPXHC40T / AFPXHC40ET

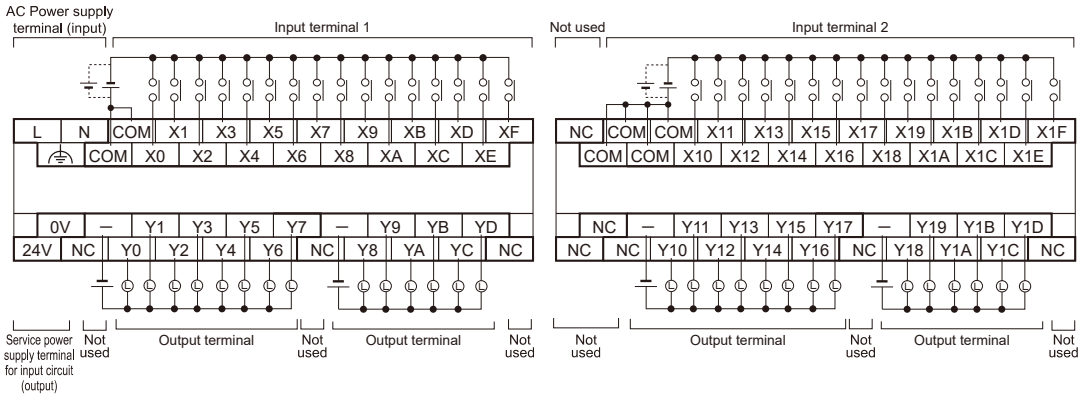


■ AFPXHC38AT





■ AFPXHC60T / AFPXHC60ET



2.6.4 Transistor Output (DC Power Supply Type)

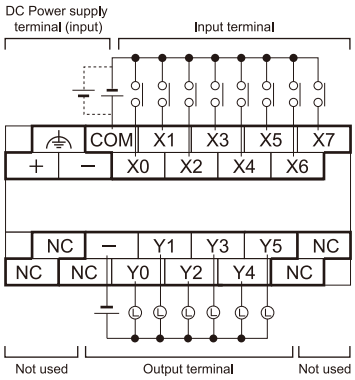
Input terminal

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.)

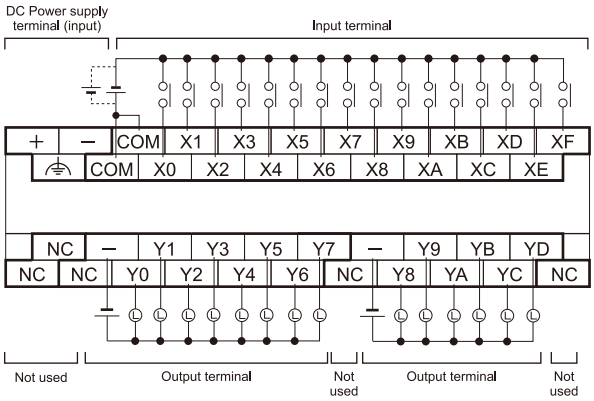
Output terminal

The negative terminals are connected within the unit.

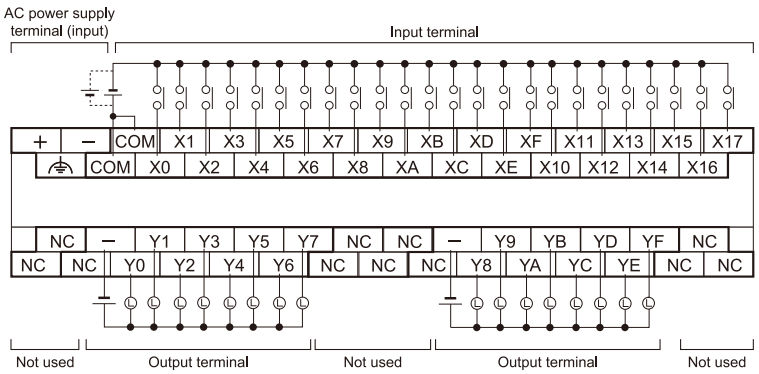
■ AFPXHC14TD



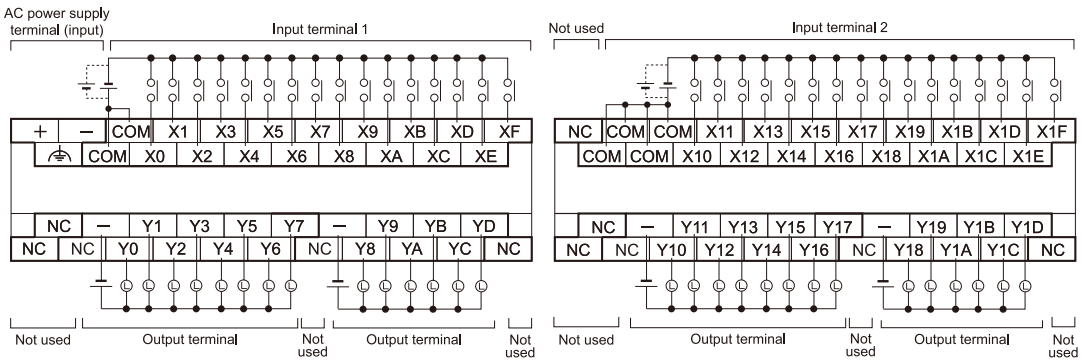
■ AFPXHC30TD



■ AFPXHC40TD



■ AFPXC60TD



(MEMO)

3 Allocation of I/O Numbers

3.1 Basics of I/O Allocation

3.1.1 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.

<Decimal>
0, 1, 2, 3 9

1	2	7	F

<Hexadecimal>
0, 1, 2, 3 ..... 9, A, B ..... F

3.1.2 Concept of I/O Number Allocation

■ I/O numbers of Control Unit

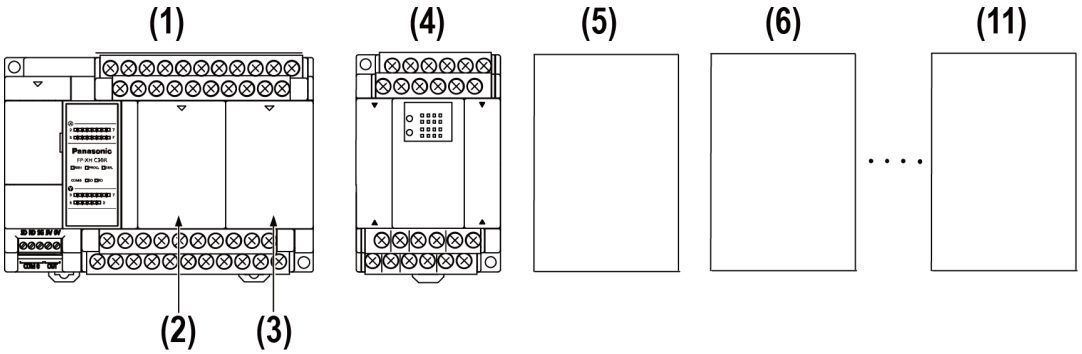
Fixed areas are allocated to I/O numbers.

■ 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.

(Note 2) The C38AT occupies the following I/O numbers for analog inputs and outputs. For details, refer to "9.2 I/O Allocation of the Analog I/O Section".

Compatible mode	Input I/O number	Output I/O number
FP-XH mode	X1100 to X125F (WX110 to WX125)	Y1100 to Y125F (WY110 to WY125)
FP-X mode	X20 to X7F (WX2 to WX7)	Y10 to Y3F (WY1 to WY3)

3.2 List of I/O Numbers for Each Unit

3.2.1 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
C40, C40ET	24 points	X0 to X9, XA to XF X10 to X17	16 points	Y0 to Y9, YA to YF
C60, C60ET	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
C38AT	24 points	X0 to X9, XA to XF X10 to X17	14 points	Y0 to Y9, YA to YD

(Note 1) For I/O allocation of the analog I/O section, refer to "9.2 I/O Allocation of the Analog I/O Section".

3.2.2 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 to Y305
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.

3.2.3 FP-X0 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
E24	16 points	X300 to X309, X30A to X30F	8 points	Y300 to Y305
E40	24 points	X300 to X309, X30A to X30F X310 to X317	16 points	Y300 to Y309, Y30A to Y30F

(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.

3.2.4 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
	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	Input Cassette: IN8	8 points	X100 to X107	-	-

Installation position	Type	Input		Output	
		No. of input points	I/O number	No. of output points	I/O number
mounting part 1	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)

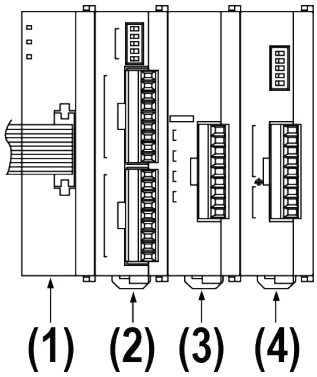
Installation position	Type	Input		Output	
		No. of input points	I/O number	No. of output points	I/O number
Cassette mounting part 1	High-speed Counter Cassette	3 points	X100 to X102	-	-
	Pulse Output Cassette	-	-	3 points	Y100 to Y102
Cassette mounting part 2	High-speed Counter Input Cassette	3 points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

3.3 Allocation of FP0 Expansion Units

3.3.1 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.

3.3.2 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.

3.3.3 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.)

4 Installation and Wiring

4.1 Installation

4.1.1 Installation Environment and Space

■ Installation environment

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
- Overvoltage category: II or lower
- Installation location: Inside a control panel with a protective structure conforming to IP54 or higher (made of metal with sufficient strength)
- Indoor use

Do not use it in the following environments.

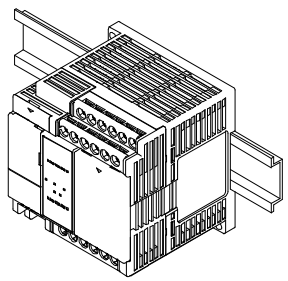
- Direct sunlight
- Sudden temperature changes causing condensation.
- Inflammable or corrosive gas.
- Excessive airborne dust, metal particles or saline matter.
- Benzine, paint thinner, alcohol or other organic solvents or strong alkaline solutions such as ammonia or caustic soda.
- Direct vibration, 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.

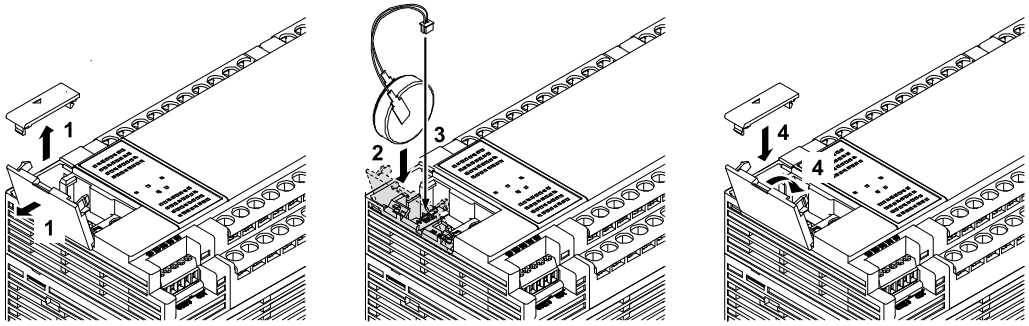
4.2 Installation of Backup Battery

4.2.1 Installation of Backup Battery

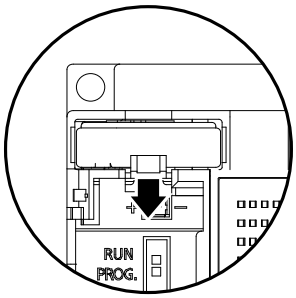
- The procedure for installing the backup battery is as follows.

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 "6.1 Memory Backup".

4.3 Installation of Extension Cassette

4.3.1 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

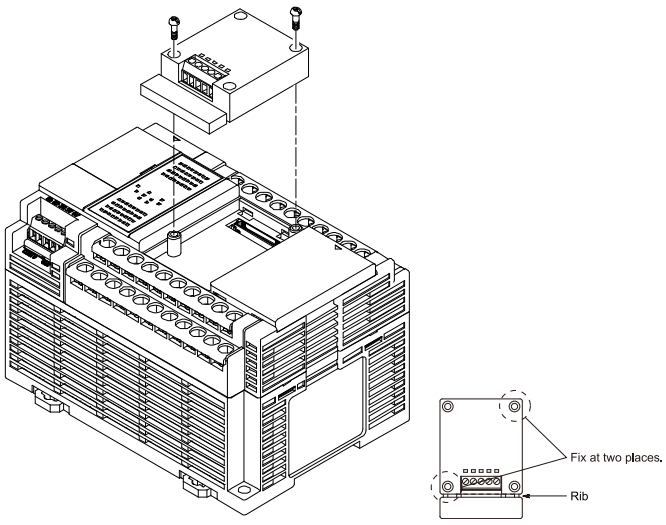
- The installation must be carried out when the power supply is OFF. If the power supply is ON, it may cause faults.
- Do not touch the back side and the connector of the Extension Cassette. The parts such as IC may be damaged by static electricity.

4.3.2 Installing the Communication Cassette

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

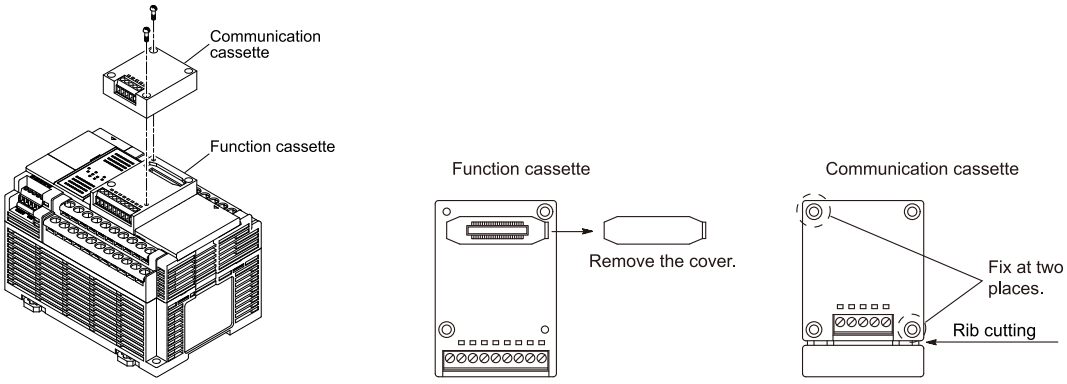
■ Installation on the Control Unit

- 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.

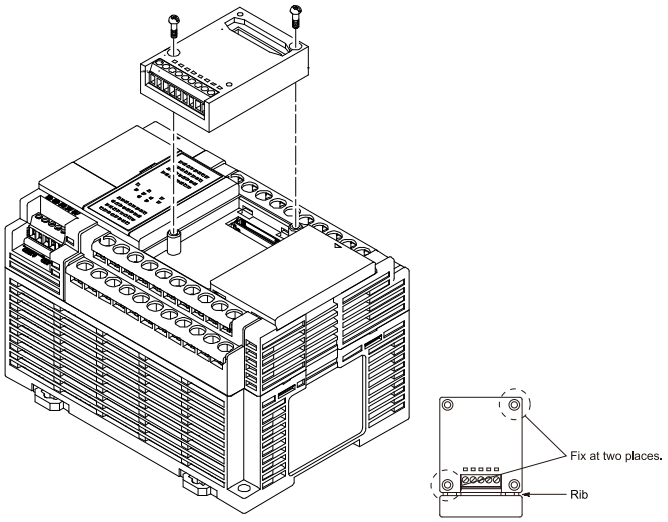


4.3.3 Installing the Function Cassette

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

■ Installation on the Control Unit

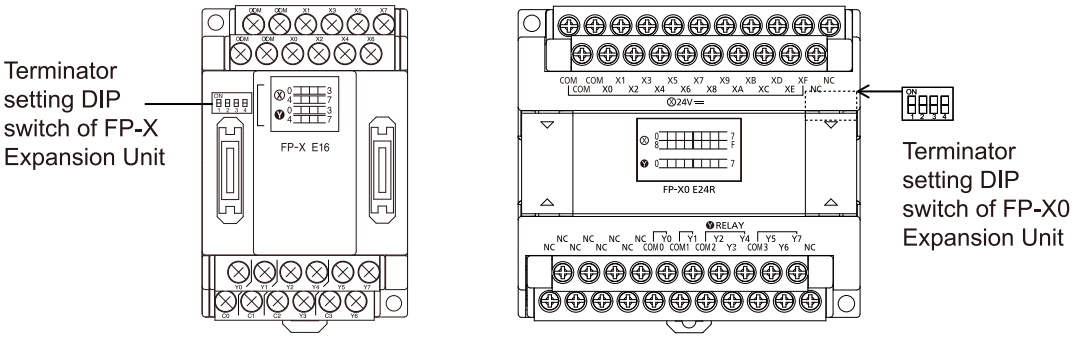
- Connect the connector on the back of the Function Cassette with the connector of the cassette mounting part of the Control Unit, and secure the two positions, bottom left and top right of the Function Cassette, with the screws.



4.4 Connection of FP-X Expansion Unit

4.4.1 Setting of the Terminator Setting Switch

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



4.4.2 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).

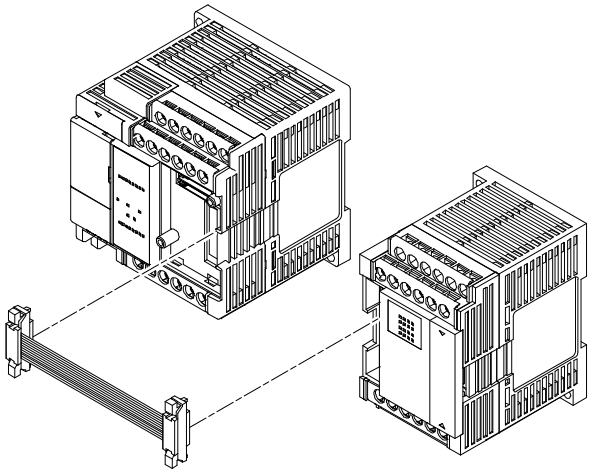
- The total length of the expansion cables should be within 160 cm.
- Install the expansion cables (AFPX-EC30 or EC80) away from the devices and wirings generating noises as much as possible.

4.4.3 Connection of FP-X Expansion Unit

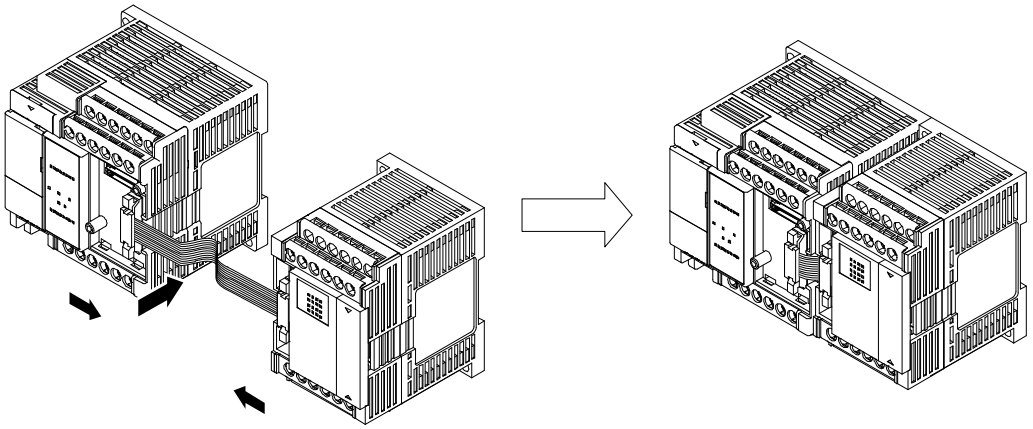
Connect the FP-X Expansion Unit according to the following procedure.

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.

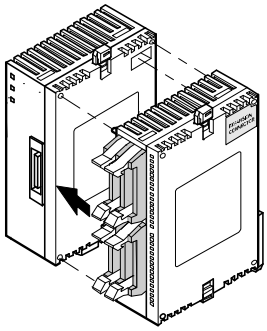
4.5 Connection of FP0 Expansion Unit

4.5.1 Connection of FP0 Expansion Unit

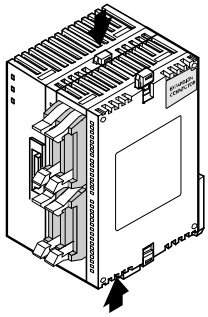
- The FP0 Expansion Unit (Expansion Unit or Intelligent Unit) are connected to the right side of the FP-X Expansion FP0 Adapter.
- To expand the unit, use the right-side connector and expansion hooks available for FP0 expansion on the side of the unit.

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.



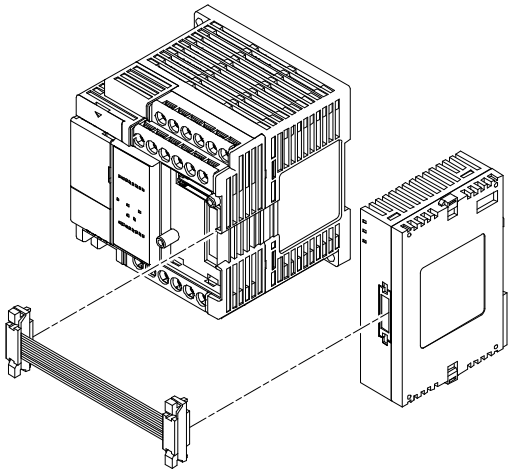
4.5.2 Connection of FP-X Expansion FP0 Adapter

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

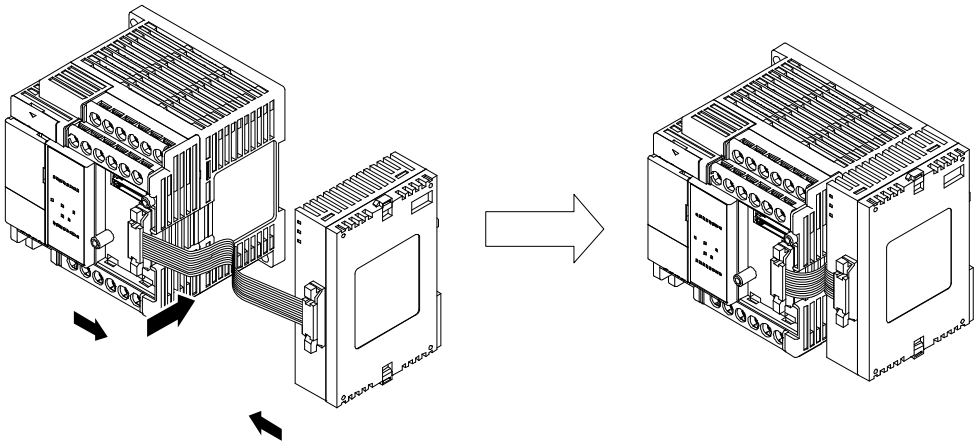
Procedure

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 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.

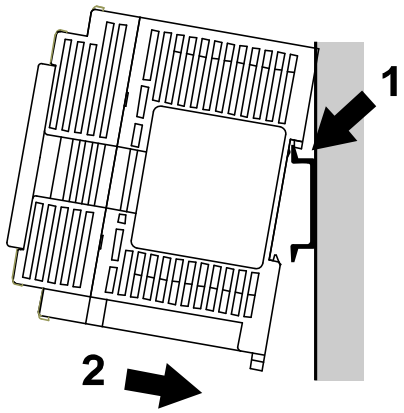
4.6 Installation

4.6.1 Attachment to DIN Rail and Removal from DIN Rail

Attachment procedure

Procedure

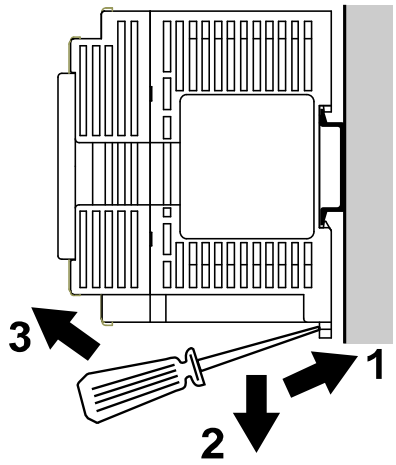
1. Fully pull down the DIN rail attachment lever on the back of the unit.
2. Fit the top of the unit attachment part into the DIN rail.
3. While pressing down the unit attachment part onto the DIN rail, fit the bottom of the unit attachment part into the DIN rail.
4. Push up the DIN rail attachment lever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



4.6.2 Installation with screws

Use M4 size screws for the installation.

Info.

- For details on installation dimensions, refer to "12.12.2 Mounting Dimensions".

4.7 Wiring the Power Supply

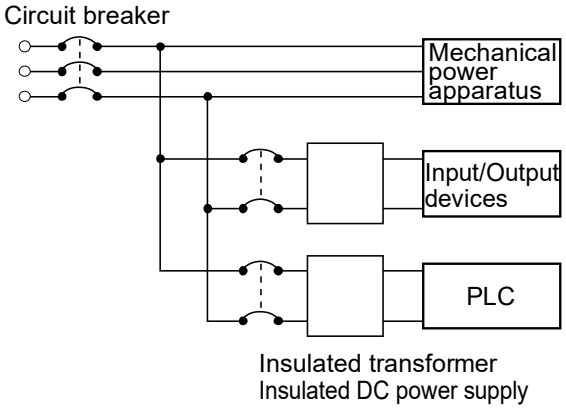
4.7.1 Common Precautions

■ 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.

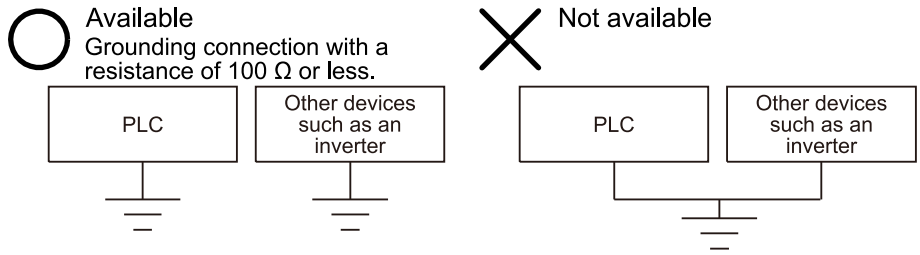


■ Power supply sequence

- 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.

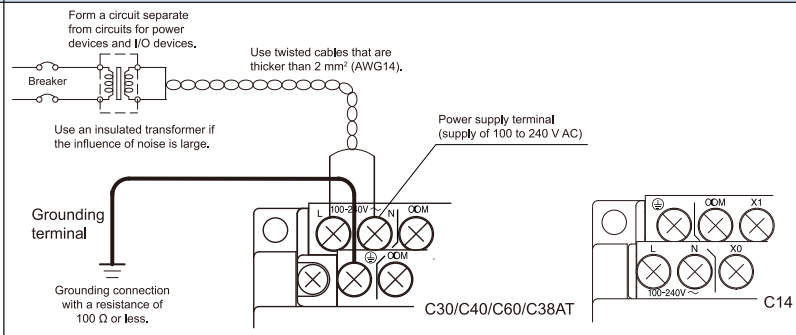
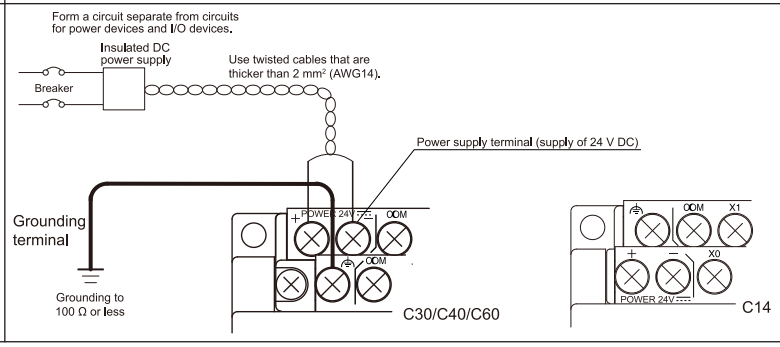
4.7.2 Grounding

- 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.



4.7.3 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 and C30, C40, C60, and C38AT).

■ 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.

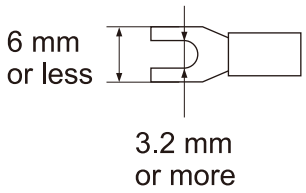
■ Suitable wires

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.5 to 0.6 N·m

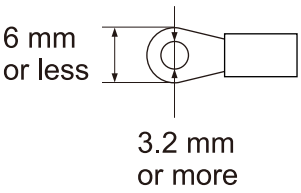
■ Suitable crimp terminals

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)

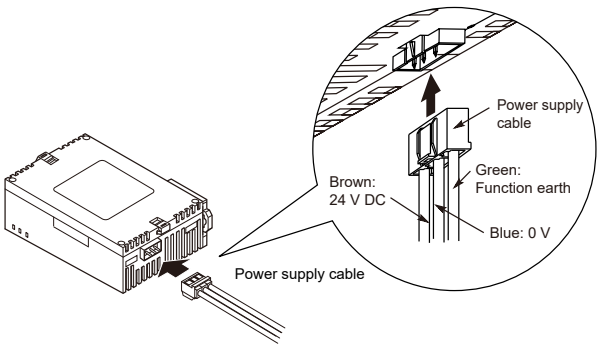
Shape	Part No.	Suitable wires
Round type	2-MS3	1.04 to 2.63 mm^2
Fork type	2-N3A	

(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.

4.7.4 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.:AFP0581) 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.

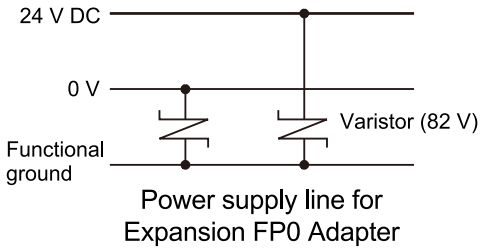
■ Power supply sequence

- 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.



4.8 Wiring of Input and Output

4.8.1 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.

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

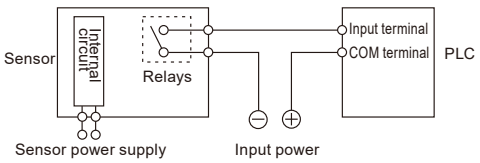
■ Use of the service power supply for input circuit

- 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.

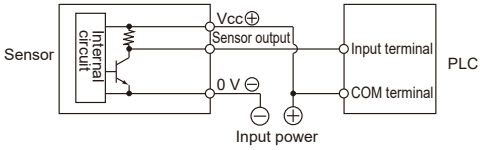
4.8.3 Input Wiring

■ Connection of photoelectric sensor and proximity sensor

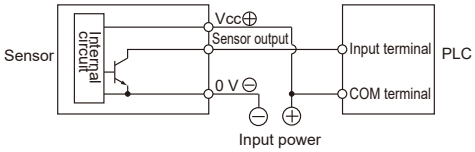
Relay output type



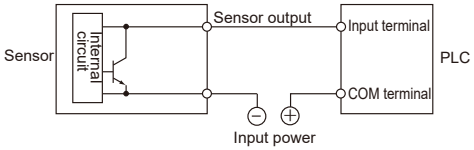
NPN open collector output type



Voltage output type

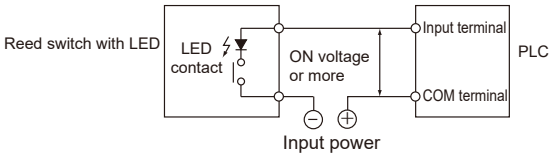


Two-wire output type



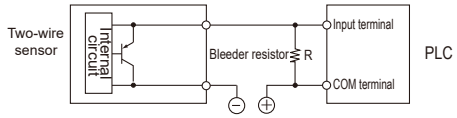
■ Precaution when using LED-equipped reed switch

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.



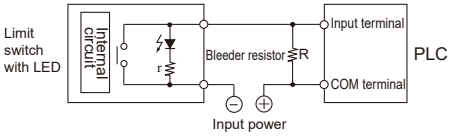
■ Precaution when using two-wire type sensor

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.

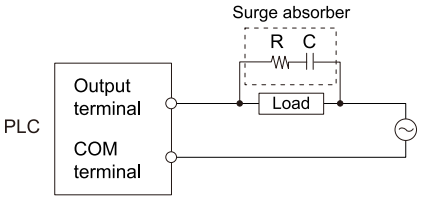


4.8.4 Output Wiring

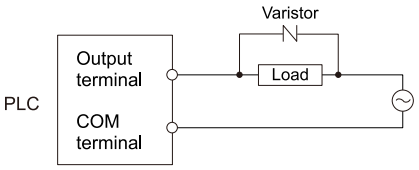
■ Protective circuit for inductive loads

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.

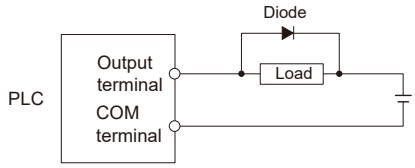
When using an AC inductive load



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



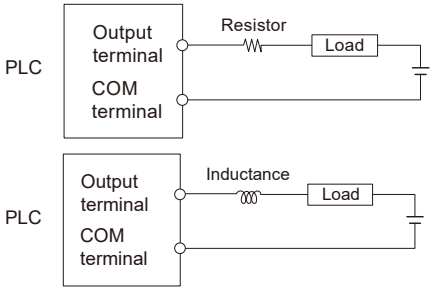
When using an DC inductive load



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.



4.9 Wiring the Terminal Block

4.9.1 Suitable wires

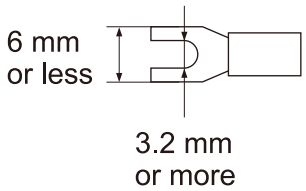
■ Suitable wires

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.5 to 0.6 N·m

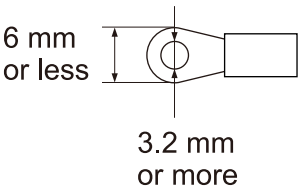
■ Suitable crimp terminals

- 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

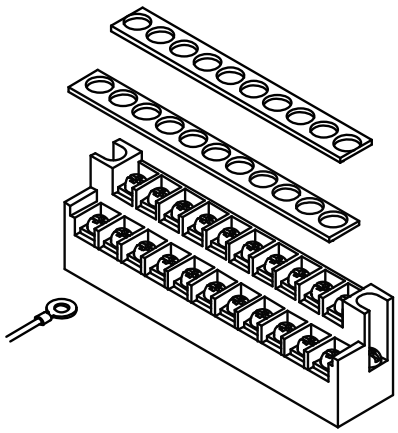


Round type terminal



4.9.2 Terminal block covers

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



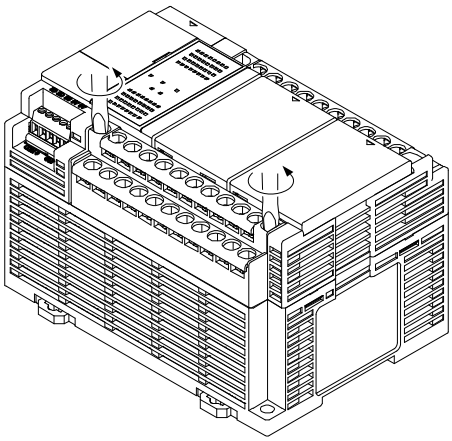
- Install the terminal block covers as they were after wiring to prevent electric shock.

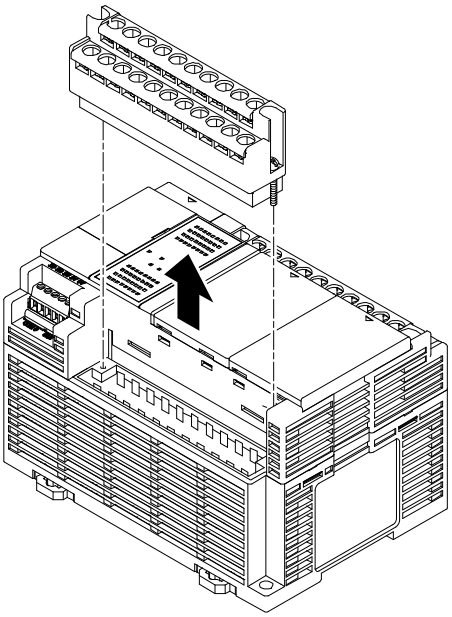
4.9.3 Installing / Removing the Terminal Block (C30 / C40 / C60 / C38AT)

The terminal block used for C30, C40, C60 or C38AT can be removed because it is installed using screws.

■ Removing the terminal block

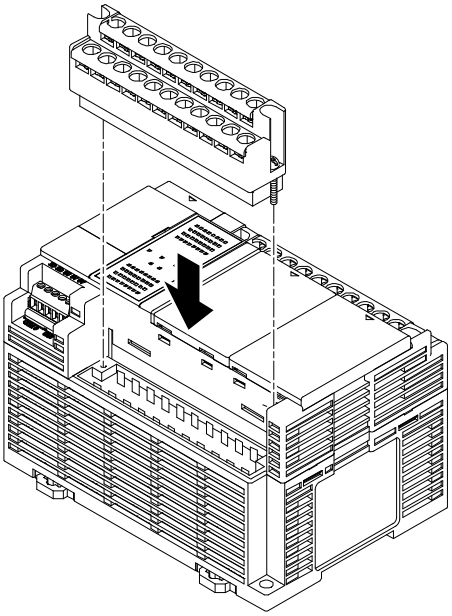
Loosen the two mounting screws. The mounting screws are fixed to the terminal block and cannot be removed.

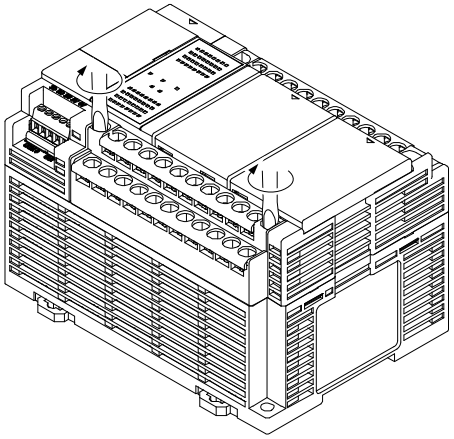




■ Installing the terminal block

- 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.





4.10 Wiring the Analog I/O

4.10.1 Wiring the Terminal Block

■ Suitable parts and tools

A spring connection type is used for the terminal block of the analog I/O section. Use the suitable parts listed below for wiring.

Suitable wires (stranded wires)

Size	Nominal cross-sectional area
AWG#24 to 16	0.2 mm^2 to 1.5 mm^2

Rod terminals with compatible Isolation sleeve

Manufacturer	Cross-sectional area	Size	Model number
Phoenix Contact Co., Ltd.	0.25 mm^2	AWG#24	AI 0,25-6 YE
	0.50 mm^2	AWG#20	AI 0,5-6 WH
	0.75 mm^2	AWG#18	AI 0,75-6 GY
	1.00 mm^2	AWG#18	AI 1-6 RD

Crimping tool dedicated to rod terminals

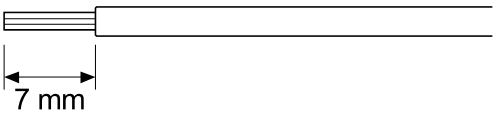
Manufacturer	Model number	Product No.
Phoenix Contact Co., Ltd.	CRIMPFOX UD 6	1204436

4.10.2 Wiring Method

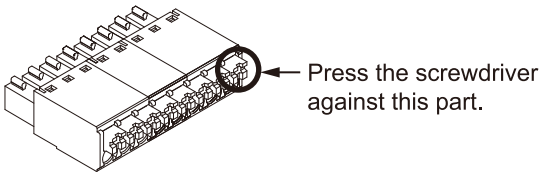
Perform wiring of the terminal block for the analog I/O section according to the following procedure.

Procedure

1. Strip the sheath from the electric wire.



2. While pressing the tab on the terminal block using a flat-blade screwdriver, insert the wire all the way until it stops. Confirm that the electric wire is fixed in place when the screwdriver is released.



(Note 1) The above illustration shows an eight-pin type when it is removed from the unit.

(Note 2) Use a screwdriver listed in the following table as a dedicated tool or equivalent (blade width: 0.4 x 2.5).

Manufacturer	Model number	Production number
Phoenix Contact Co., Ltd	SZS 0, 4x2, 5	1205037

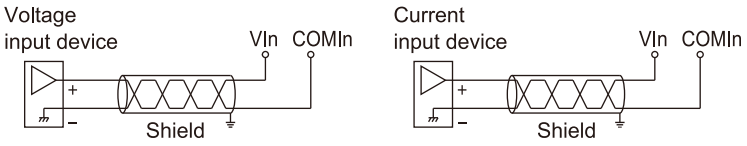
- The following precautions should be observed to avoid broken or disconnected wires.
  - When removing the wire's sheath, be careful not to scratch the core wire.
  - Do not twist the wires to connect them.
  - Do not solder the wires to connect them. The solder may break due to vibration.
  - After wiring, make sure stress is not applied to the wire.

4.10.3 Connecting to Other Devices

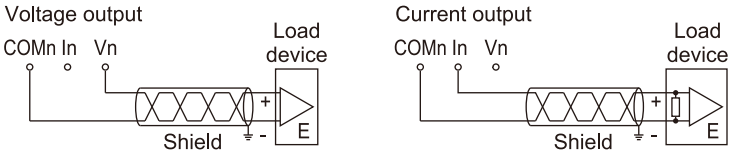
Refer to the following wiring diagrams and connect to other devices.

■ Wiring diagram

Analog input



Analog output



(Note 1) Switching between voltage and current or switching the input range is set by a program.

- Use double-core twisted-pair shielded wires. It is recommended to ground them. However, depending on the conditions of the external noise, it may be better not to ground the shielding.
- Do not place the analog input wiring line or analog output wiring line close to the AC line, high-tension line, or load other than that for the PLC. Also, do not bundle the wiring line with them.

4.11 Safety Measures

4.11.1 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.

4.11.2 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.

4.11.3 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.

5 Procedures Before Starting Operation

5.1 Before Turning On the Power

5.1.1 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.

5.1.2 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 "5.1.1 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.

5.2 Offline Edit of Program

5.2.1 Elements of Program

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

■ Program configuration

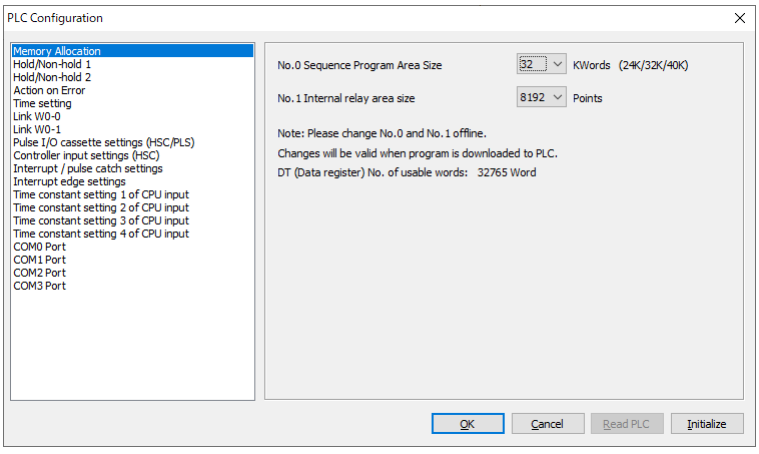
Classification	Description
Program	Arbitrary program
Comment	Max. 2 MB I/O comments, explanatory notes, interlinear comments
System register	Set the allocations for using the hold areas of the operation memory, operation mode when an error occurs, communication, high-speed counter and pulse output function.
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.
Ethernet settings	Set the parameters related to IP address, connection, communication mode and Ethernet communication. (C40ET and C60ET only)
EtherNet/IP settings	Set the parameters related to Ethernet/IP communication. (C40ET and C60ET only)

5.2.2 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.
Analog control settings (C38AT only)	When using the C38AT in the FP-XH mode, set the I/O range of analog I/O terminals.
Compatible mode (C38AT only)	"FP-X mode" or "FP0H mode" can be selected to retain compatibility with FP-X C38A. For details of the FP-X mode, refer to "9.1.2 Compatibility with FP-X C38A".

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

12.4 List of System Registers

5.2.3 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)*.

5.2.4 Setting of Ethernet Communication Parameters

- Ethernet communication settings other than EtherNet/IP communication settings are configured in "Ethernet Setting".
- EtherNet/IP communication settings are configured in "EtherNet/IP Setting".
- "Ethernet Setting" and "EtherNet/IP Setting" can be opened from the **Options** menu of FPWIN GR7.

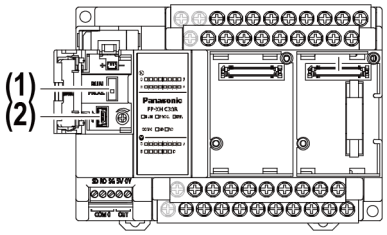
Info.

- For details on Ethernet communication, refer to the *FP- XH User's Manual (Ethernet Communication)*.

5.3 Program Download and Operation

5.3.1 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

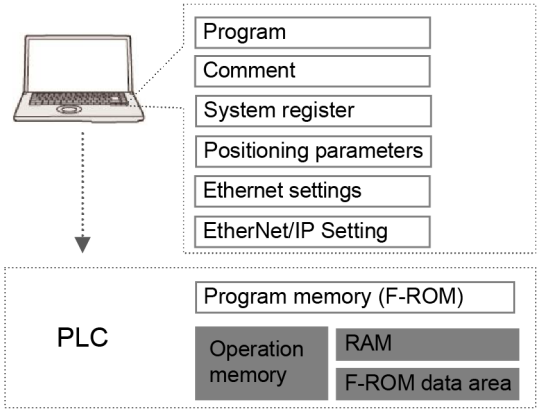
- When the power supply is on and the unit is in online state, the operation mode can be changed by the tool software. However, when the power supply is turned OFF and turned ON again, the unit operates in the mode selected by the mode selection switch.

■ 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.

5.3.2 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.

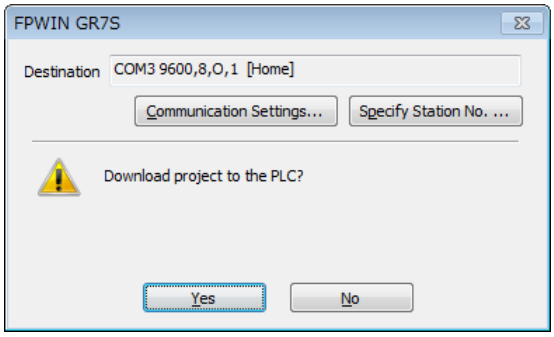


Procedure for downloading

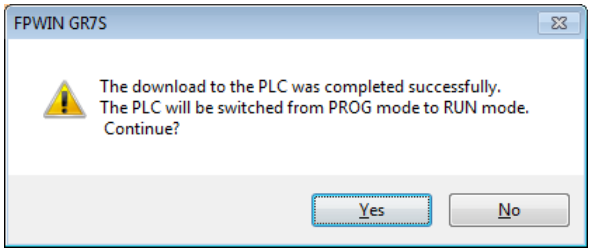
Download project data by the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

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.

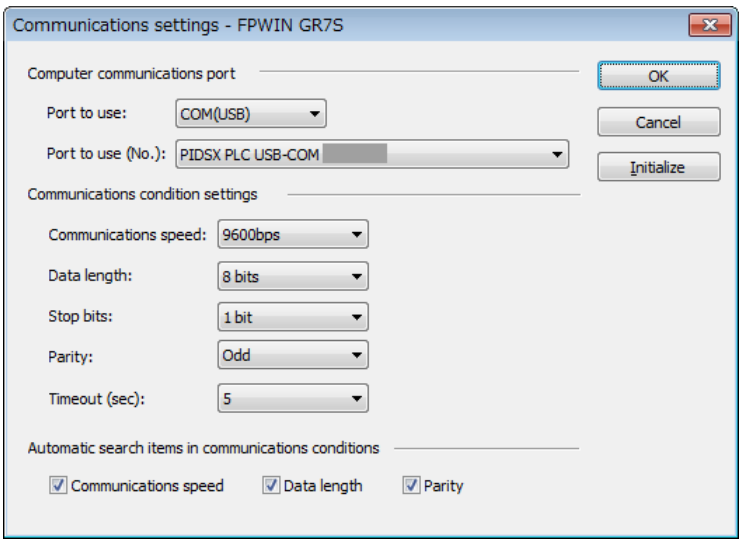
REFERENCE

10.2 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.

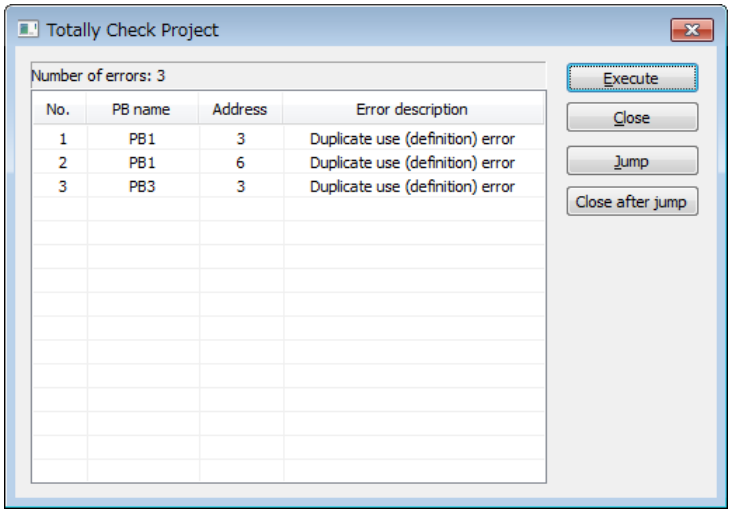
- The port number can be confirmed by the device manager of the computer.

5.3.3 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.

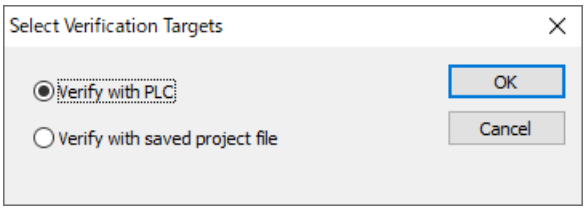


5.3.4 Verifying Project

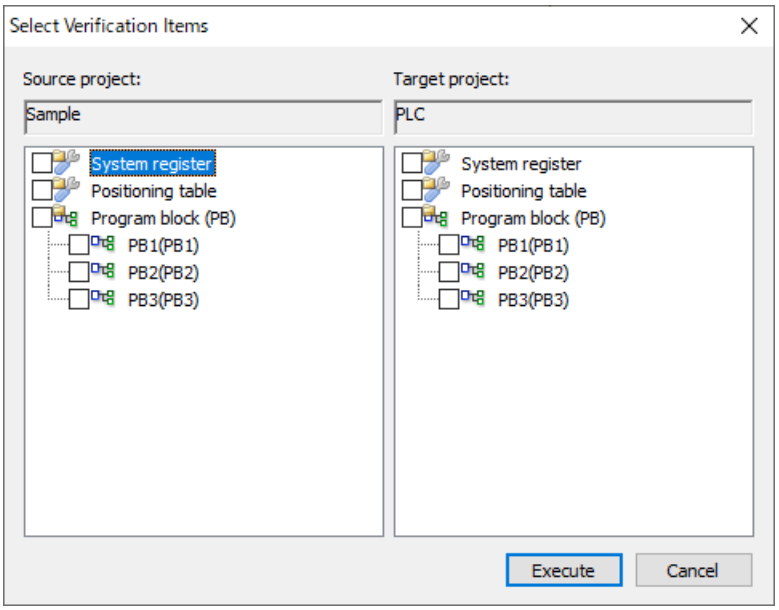
Verify the project to check that the program being edited in a computer is the same as that in the Control Unit as necessary. The following procedure is explained on the condition that the FPWIN GR7 has already started.

Procedure

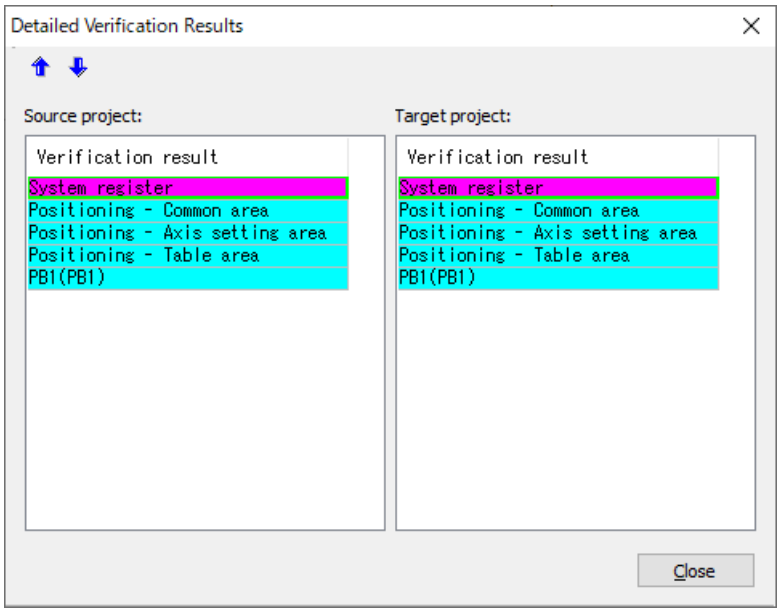
1. Select **Online**>**Switch to Online Mode** from the menu bar.
2. Select **Debug**>**Verify Program** from the menu bar.
   The "Verify Program" dialog box appears.



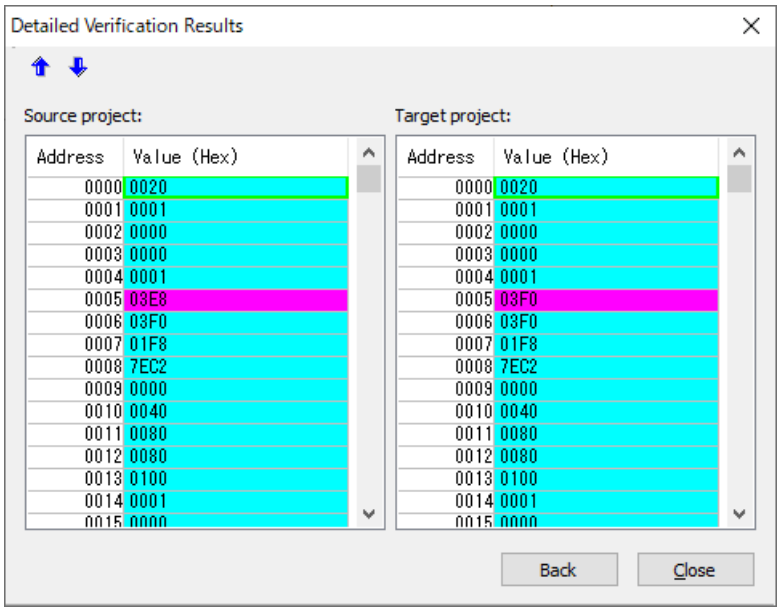
3. Select the verification target, and press the [OK] button.
The "Select Verification Items" dialog box appears.



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.
Ethernet settings	The mismatched items are displayed. (C40ET and C60ET only)

Verification content	Example of mismatch
EtherNet/IP settings	

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.

5.4 Online Edit

5.4.1 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.
Ethernet settings	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. (C40ET and C60ET only)
EtherNet/IP setting			

(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.

5.4.2 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.

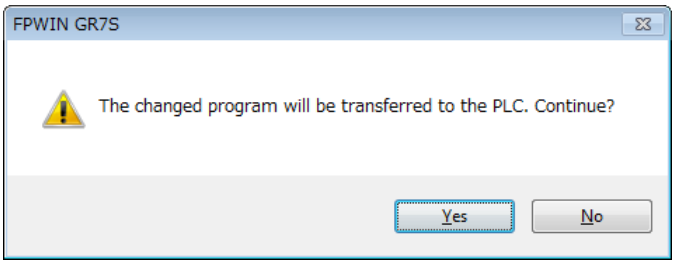
For details on rewriting in RUN mode and restrictions, refer to the “FP-X User’s Manual (WUME-FPX)”.

Procedure of rewriting blocks

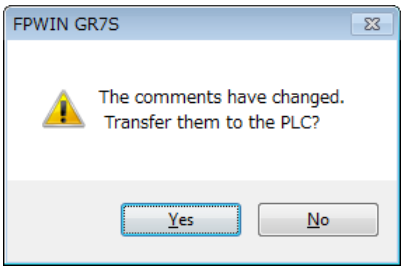
Programs can be changed in PROG. or RUN mode. The following procedure is explained on the condition that the online edit is performed with the FPWIN GR7.

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.

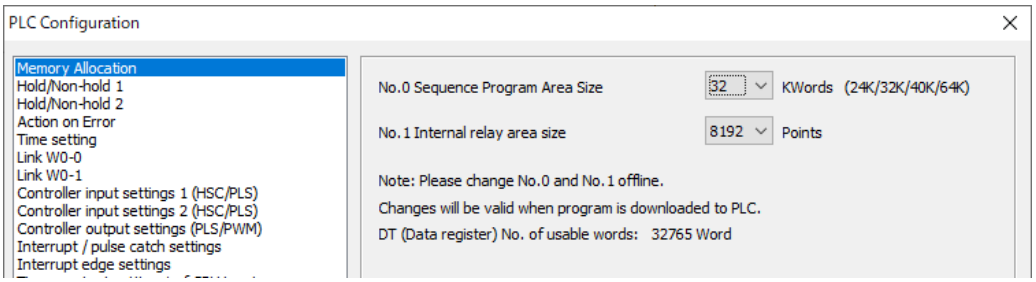
5.4.3 Online Edit of System Register

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.

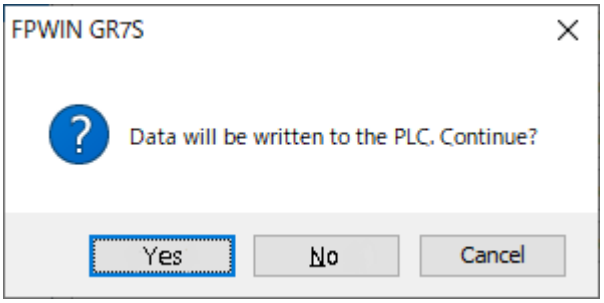
Procedure

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.

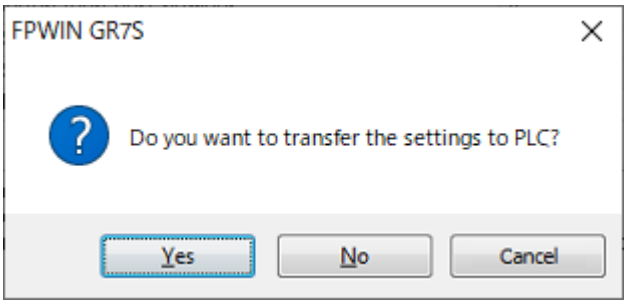
5.4.4 Online Editing for Ethernet Settings and EtherNet/IP Settings

Ethernet settings and EtherNet/IP settings can be changed only in PROG. mode. The following procedure is explained assuming that online edit has been performed with the FPWIN GR7.

Procedure

1. Select **Options**>**Ethernet Setting** or **EtherNet/IP Setting** from the menu bar.
   The corresponding dialog box will be displayed. If **EtherNet/IP Setting** is selected, the "Ethernet Setting" dialog box will also be displayed simultaneously.

2. Change any desired Items and click the [OK] button.
   A confirmation message dialog box will be displayed.



3. Click the [Yes] button.
A message will be displayed indicating that writing to the PLC has been completed.

5.5 Program Block

5.5.1 Overview of Program Block

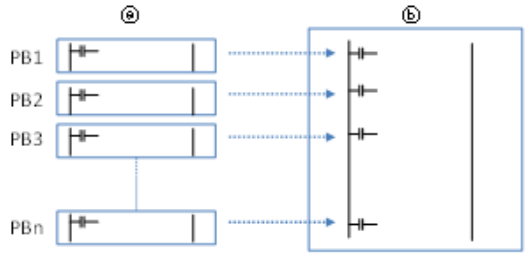
By using the FPWIN GR7, a program can be divided into multiple program blocks (PB) and edited.

■ 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.



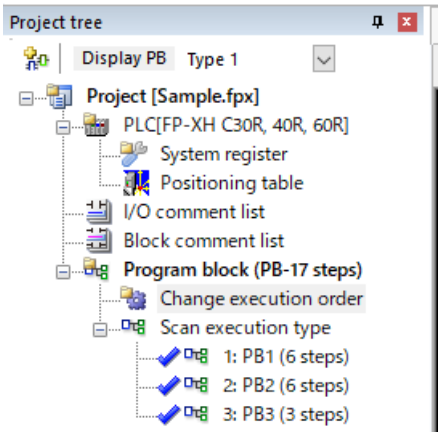
(a)	Program block	(b)	Program comprised of program blocks

5.5.2 Changing the Execution Order of Program Blocks

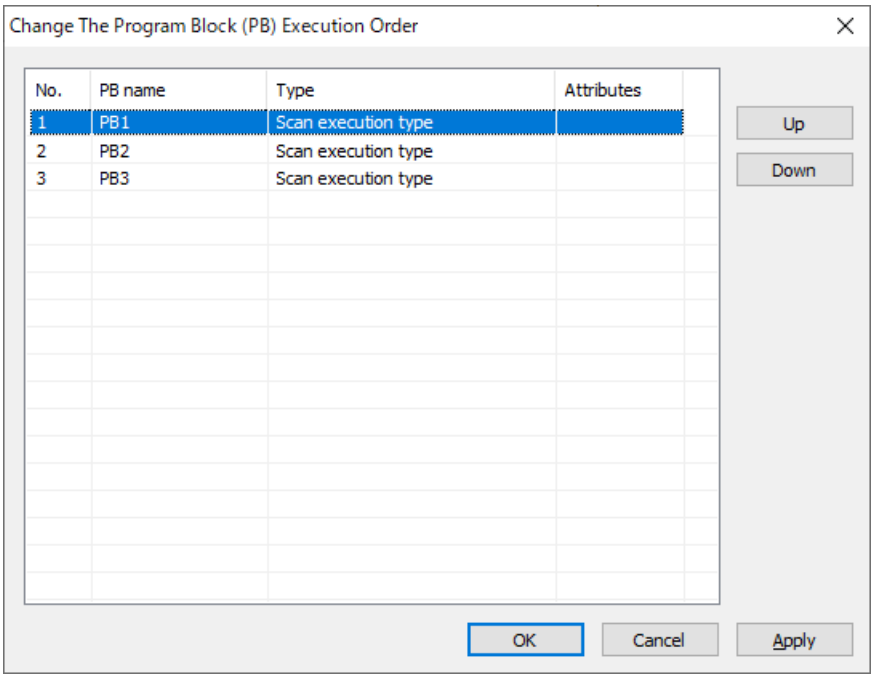
The execution order of program blocks can be arbitrarily changed after creating the program blocks. The following procedure describes the case when three program blocks have been already created.

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)

6 Memory / Master Memory Cassette

6.1 Memory Backup

6.1.1 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

6.1.2 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 / C40 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)
		C38AT (Note 3)(Note 4)	DT11970 to DT12284 (when 64k-step program capacity is selected)

Classification	Hold area		
			DT24258 to DT24572 (when 40k-step program capacity is selected) DT32450 to DT32764 (when 32k-step program capacity is selected) DT65218 to DT65532 (when 24k-step program capacity is selected)
EtherNet/IP parameter		C40ET C60ET	Session timer (2 bytes)

(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, C40, C60, or C38AT, the range of the data registers varies according to the setting of the program capacity (system register no. 0).

(Note 4) The backup area is for the FP-XH mode. In the FP-X mode, the area is DT32710 to DT32764 (55 words)

■ 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

6.1.3 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.).

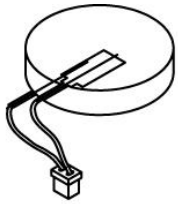
■ Backup with backup battery

Classification			Hold area
Operation memory	Timer and counter		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.)
	Timer and counter elapsed value area		
	Internal relay		
	Data register		
	Step ladder		
	Link relay		
	Link register		
Special Data register	Clock / calendar	Monitor area	DT90053: Hour / Min. (reading only)

Classification			Hold area
		Setting, monitor area	DT90054: Minute / Second, DT90055: Day / Hour, DT90056: Year / Month, DT90057: Day of week

(Note 1) If battery exhaustion is detected when the power is turned ON, the operation memory in the hold type area will be cleared to zero. For C40ET and C60ET, special relay R9108 also turns ON.

■ Type of backup battery (sold separately)

Appearance	Item name	Specifications	Product no.
	Backup battery for the FP-XH	With a connector	AFPXHBATT

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

■ Number of installed batteries

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

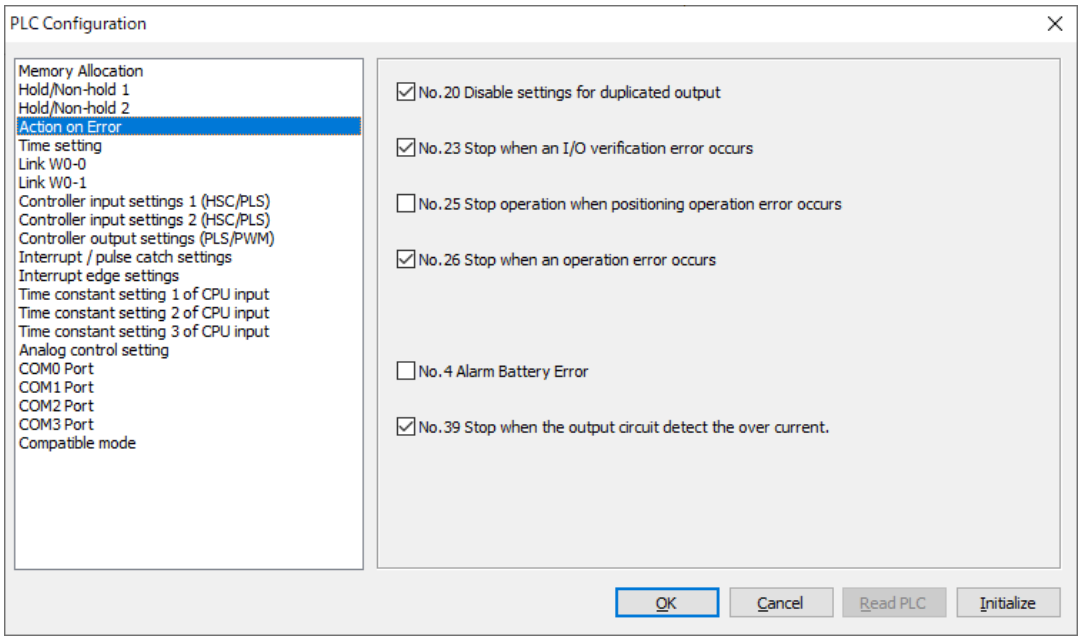
Info.

- For the details of how to install the battery, refer to "4.2 Installation of Backup Battery".

6.1.4 Settings of Battery Error Alarm and Hold Area

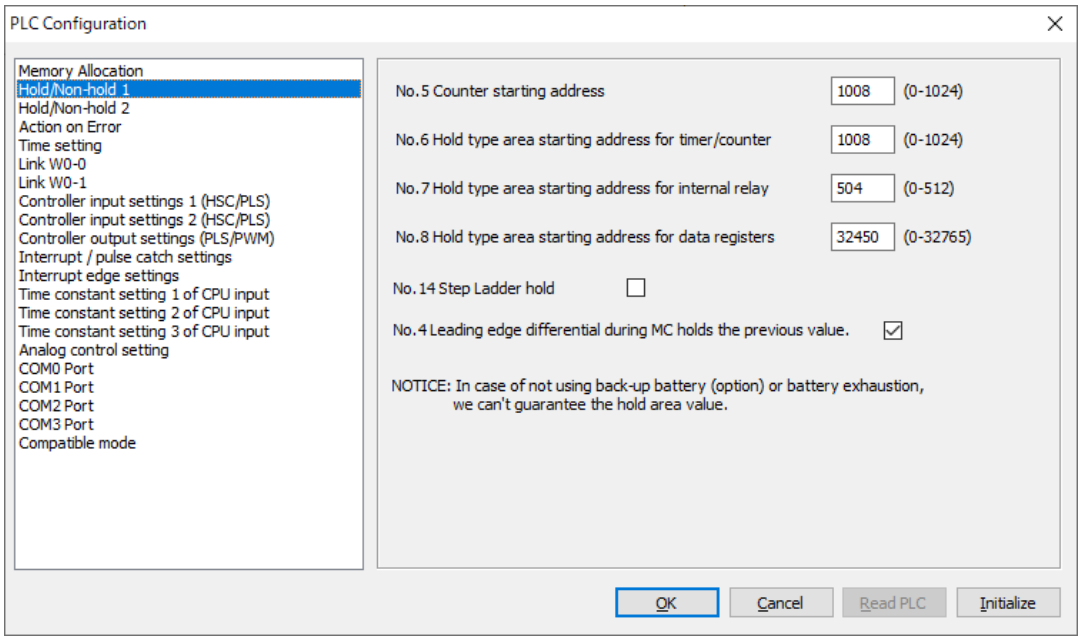
■ Setting of the battery error alarm

- 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.



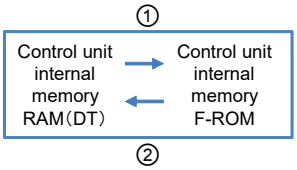
Info.

- 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.

6.2 RAM / ROM Transfer Function

6.2.1 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.



6.2.2 Operation Using Tool Software

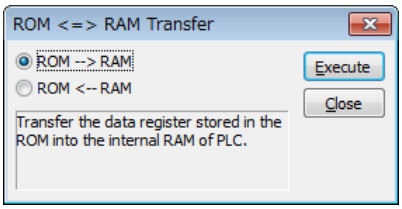
The following procedure is explained on the condition that the FPWIN GR7 has already started.

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.

6.3 Function of Master Memory Cassette

Master Memory Cassettes can be used on C14, C30, C40, C60, and C38AT.

Master Memory Cassettes cannot be used on C40ET or C60ET. If a Master Memory Cassette is mounted, the self-diagnostic error (27: Unit installed limit) will occur.

6.3.1 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

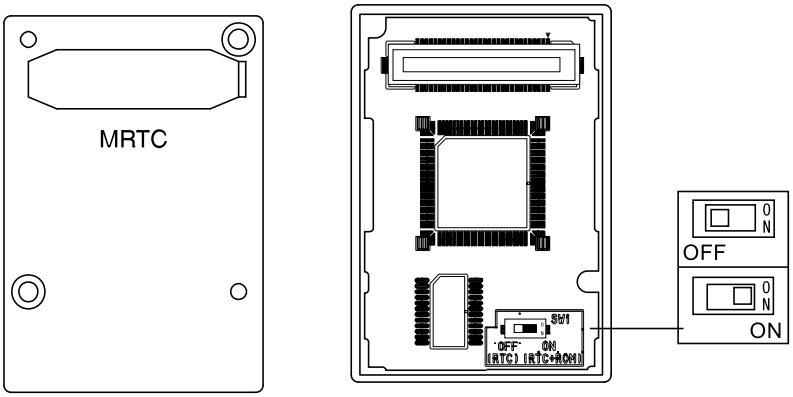
Item	Specifications	
Clock / calendar (Real-time clock)	Setting item	Year (Last two numbers), month, day, hour (24-hour), minute, second and day of the week
	Accuracy	At 0 °C: less than 104 seconds per month, at 25 °C: less than 51 seconds per month, 55 °C: less than 155 seconds per month
Master Memory 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)

(Note 1) The C38AT has a built-in clock / calendar (real-time clock). The real-time clock function of the Master Memory Cassette does not work.

6.3.2 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.

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

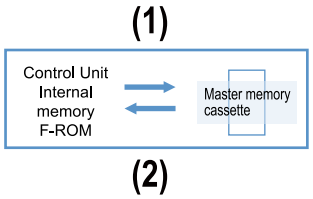
6.4 Master Memory Function

Master Memory Cassettes can be used on C14, C30, C40, C60, and C38AT.

Master Memory Cassettes cannot be used on C40ET or C60ET. If a Master Memory Cassette is mounted, the self-diagnostic error (27: Unit installed limit) will occur.

6.4.1 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)(Note 1)
		(Data items that are selected on the dialog box) Security information (upload protection), comment data, F-ROM data area(Note 2)(Note 3)
(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 4) 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) With the C38AT, the program capacity may exceed 40K steps. If that happens, an address error (66) occurs when data is transfered from the internal memory to the master memory.

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

(Note 3) Items that are not selected when data is transfered from the internal memory to the master memory are deleted in the master memory.

(Note 4) If comment data area or F-ROM data area does not exist on the master memory, they cannot be selected on the menu.

6.4.2 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.

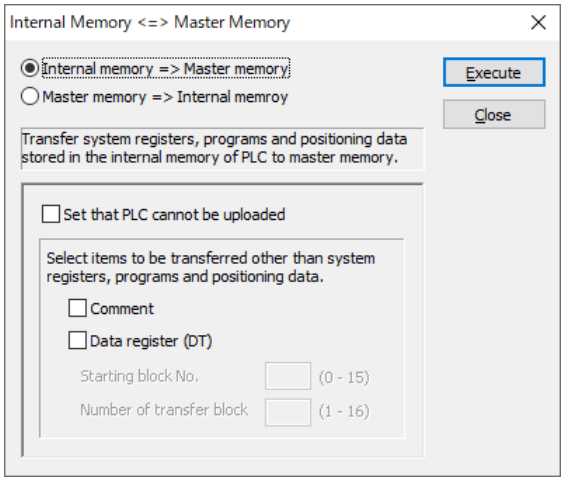
6.4.3 Data Transfer to Master Memory Cassette

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

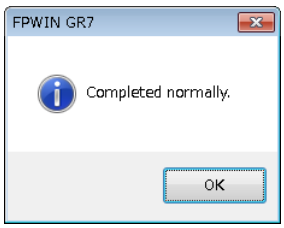
Data transfer from the Control Unit to the Master Memory Cassette is performed using the FPWIN GR7 according to the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

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.

Classification	Description
	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).

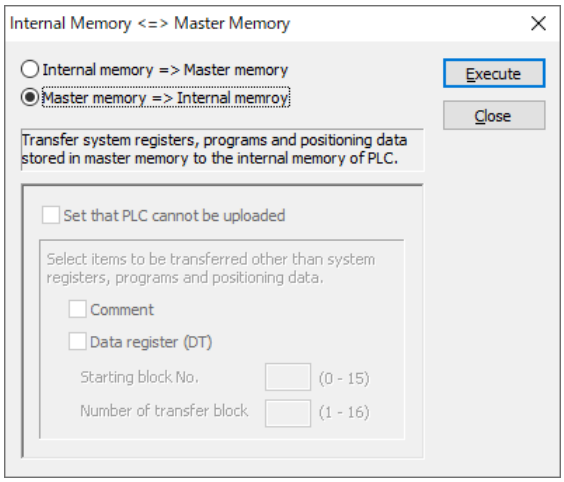
6.4.4 Data Transfer from Master Memory Cassette to Control Unit

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

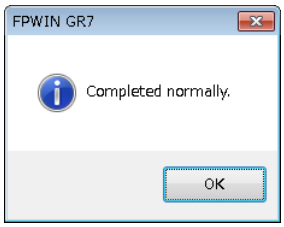
Data transfer from the Control Unit to the Master Memory Cassette is performed by the FPWIN GR7 according to the following procedure. The following procedure is explained on the condition that the FPWIN GR7 has already started.

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.

6.4.5 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, 40-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	C40	C60	C14	C30	C38AT	C40	C60
Installed PLC	Relay output type	C14	●	E25	E25	E25	E25	E25	E25	E25	E25
		C30	E25	●	●	●	E25	E25	E25	E25	E25
		C40	E25	●	●	●	E25	E25	E25	E25	E25
		C60	E25	●	●	●	E25	E25	E25	E25	E25
	Transistor output type	C14	E25	E25	E25	E25	●	E25	E25	E25	E25
		C30	E25	E25	E25	E25	E25	●	●	●	●
		C38AT	E25	E25	E25	E25	E25	●	●	●	●
		C40	E25	E25	E25	E25	E25	●	●	●	●
		C60	E25	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.

6.5 Clock / calendar

6.5.1 Overview of Functions

The clock data is stored in the special data register and read by user programs.

■ Operational differences between models

Model	Description
C40ET, C60ET	The Control Unit incorporates the clock / calendar function. Master Memory Cassettes cannot be used. Time can be set by acquiring the time from the SNTP server.(Note 1)
C38AT	The Control Unit incorporates the clock / calendar function. The real-time clock function of the Master Memory Cassette does not work.(Note 1)
Others	The Master Memory Cassette incorporates the clock / calendar function.

(Note 1) Even if no battery is loaded, the clock / calendar function can be used. In such a case, date and time must set when the power is turned on. Calendar information will be erased when the power is turned off.

■ Specifications of clock/calendar function

Item	Specifications
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, at 55 °C: less than 155 seconds per month **C40ET, C60ET** At 0 °C: less than 140 seconds per month, at 25 °C: less than 90 seconds per month, at 55 °C: less than 240 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	○	○

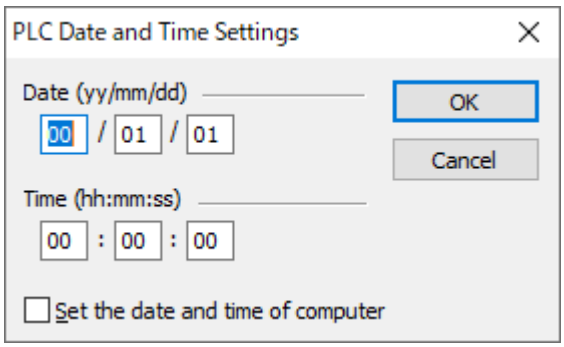
(Note 1) For data of day of the week, an arbitrary day of the week is specified in the range of H00 to H06.

6.5.2 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.

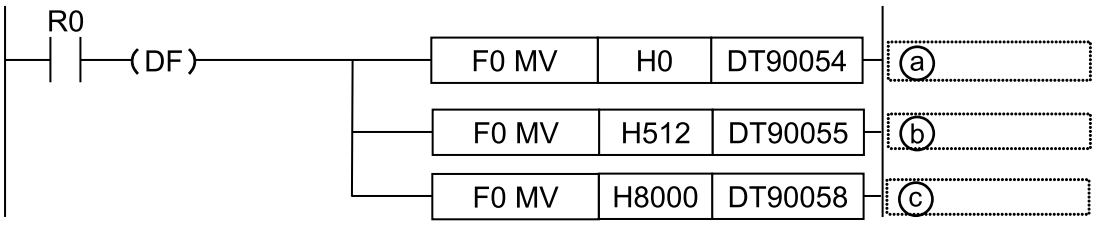


Info.

- 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.

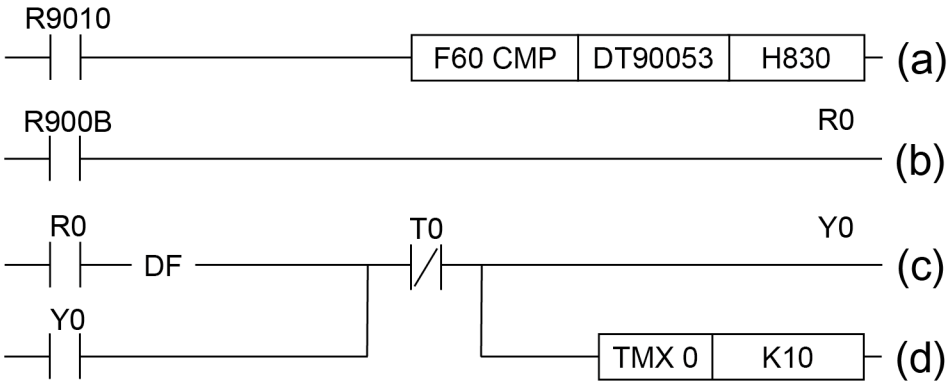
■ Time acquisition from SNTP server (C40ET, C60ET only)

Set the acquisition method in "Ethernet Setting". For details, refer to the *FP- XH User's Manual (Ethernet Communication)*.

6.5.3 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.

7 Security Function

7.1 Password Protect Function (C14, C30, C40, C60, C38AT)

7.1.1 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, C40, C60, or C38AT, the FP-XH Control Unit must be Ver. 1.1 or later and the FPWINGR Ver. 2.94 or later.

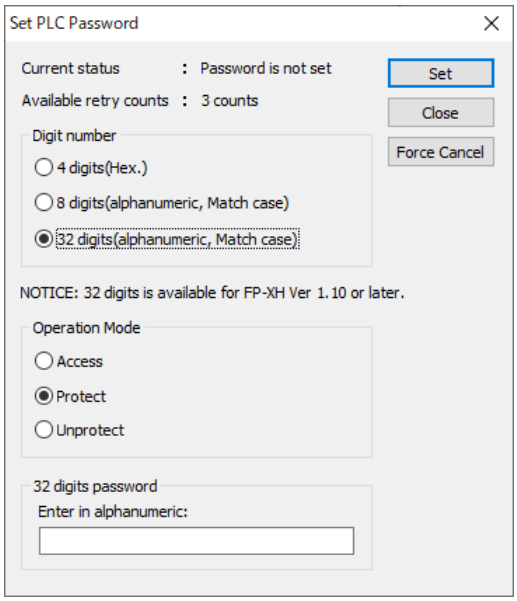
- Do not forget your password. If you forget your password, you cannot read programs. Even if you ask us for your password, we cannot crack it.

7.1.2 Setting using FPWIN GR7

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.

7.1.3 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.

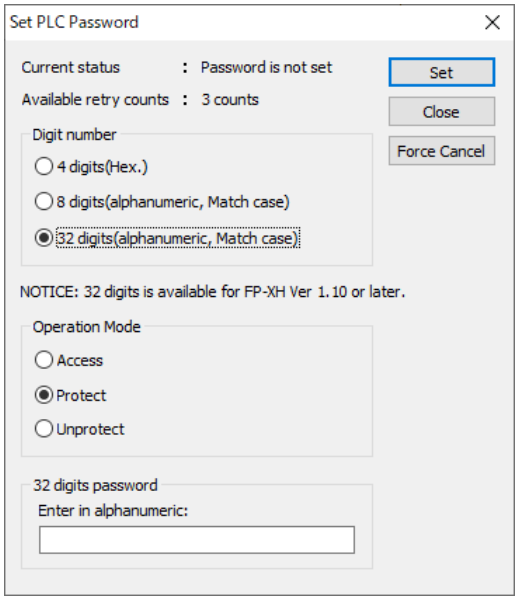
(Note 1) In the “xx” part, either 4, 8, or 32 is input depending on the set number of digits.

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

7.1.4 Setting to prohibit access with a password

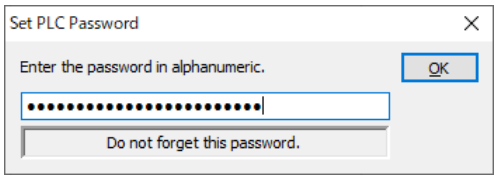
Procedure

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

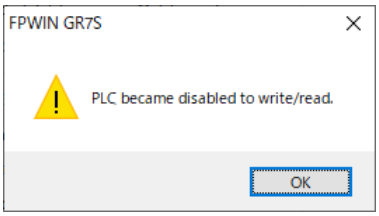


2. Set the items in the table below, and click on the [Set] button.

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.

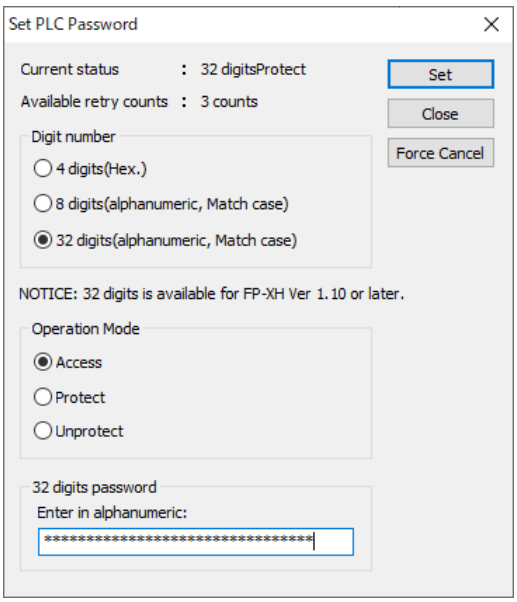


4. Click the [OK] button.

7.1.5 Setting to allow access with a password

Procedure

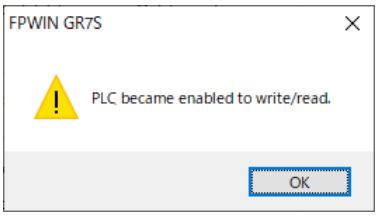
1. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar.
The "Set PLC Password" dialog box is displayed.



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.

7.1.6 Canceling the password protection

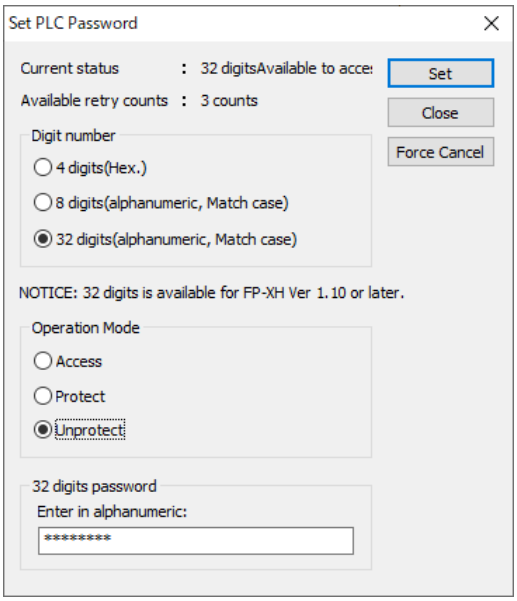
Following two methods are available to cancel the password setting.

	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.)

Canceling the password protection

1 2 Procedure

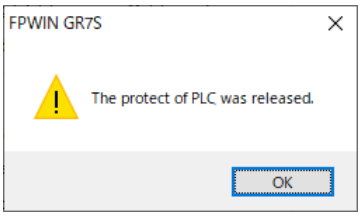
1. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar.
The "Set PLC Password" dialog box is displayed.



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.



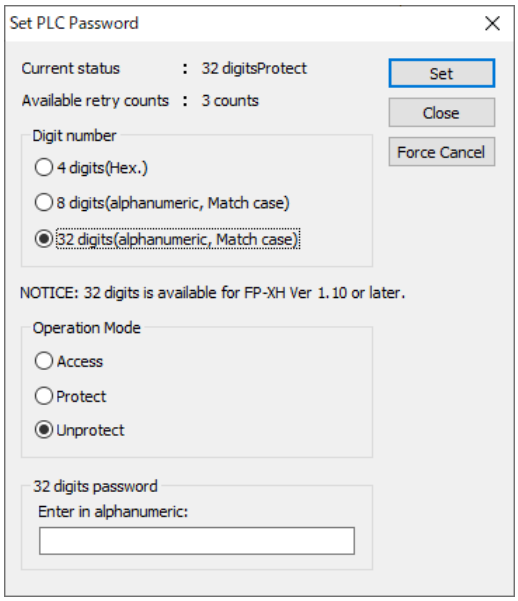
3. Click the [OK] button.

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

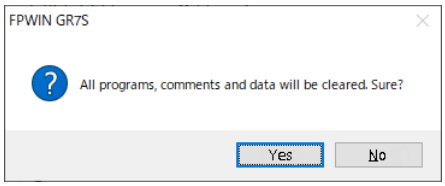
Executing the force cancel (Programs and security information are all deleted.)

Procedure

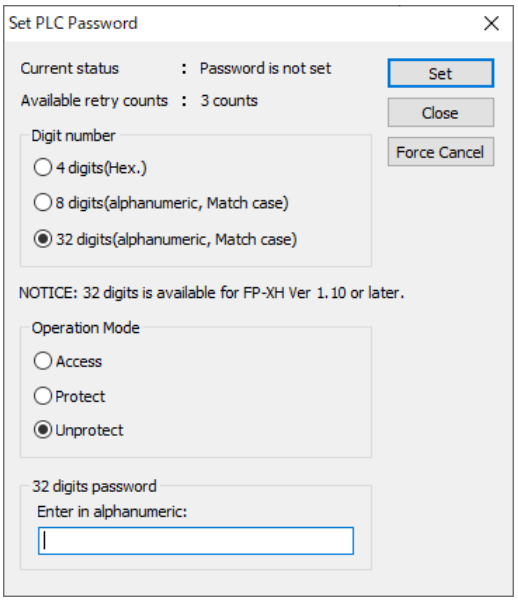
1. Select **Tools (T)**> **PLC Security Settings (S)**> **Set PLC Password (P)** from the menu bar. The "Set PLC Password" dialog box is displayed.



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.


Set PLC Password
Current status : Password is not set
Available retry counts : 3 counts
Set
Close
Force Cancel
Digit number
4 digits(Hex.)
8 digits(alphanumeric, Match case)
32 digits(alphanumeric, Match case)
NOTICE: 32 digits is available for FP-XH Ver 1.10 or later.
Operation Mode
Access
Protect
Unprotect
32 digits password
Enter in alphanumeric:

7.2 Password Protect Function (C40ET, C60ET)

7.2.1 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, only a password within 4 digits or 8 digits can be set. It is set using four digits or eight digits out of 32 digits from the left.

■ Password input restrictions

Digit number of password	Usable characters
32-digit password	For passwords, 8 to 32 one-byte alphanumeric characters (case-sensitive) and symbols can be used. A password must include at least one uppercase letter, at least one lowercase letter, and at least one numeric character. <Example of valid password> ABcd1234 <Examples of invalid password> Less than 8 characters: Abc-123 No lowercase letter included: ABCD-1234 No uppercase letter included: abcd-1234 No numeric character included: ABCD-efgh

- 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.

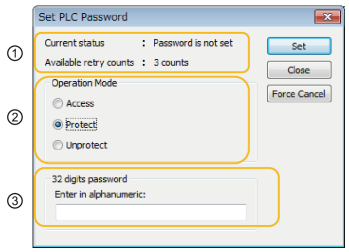
7.2.2 Setting using FPWIN GR7

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 appears.

7.2.3 Set PLC Password dialog box

■ Set PLC password dialog box



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

■ Setting state of a password

Item		Settings
Current status	Password is not set	Password is not set.
	32 digits Protect	A password is set and access is prohibited.
	32 digits access available	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. To enter the password again, reboot the PLC by turning off and on the power. Or enter the password at a certain period of time.(Note 1)

(Note 1) The wait time for entering the password again varies according the number of failures.

No. of failures	Waiting time
3	10 minutes
6	30 minutes
9	60 minutes

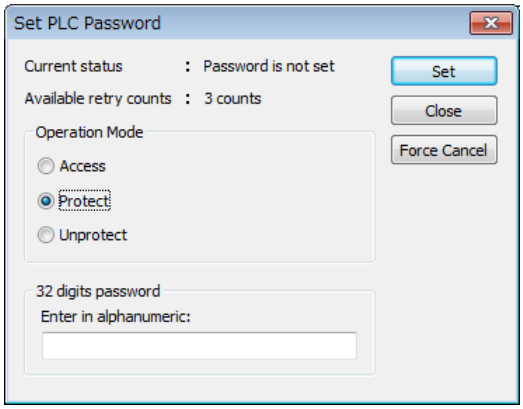
Note

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

7.2.4 Setting to prohibit access with a password

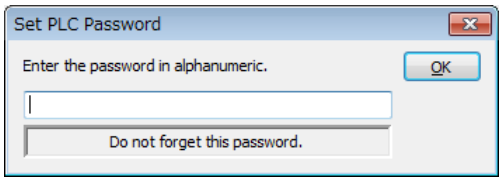
Procedure

1. Select **Tools**>**PLC Security Settings**>**Set PLC Password** from the menu bar.
   The "Set PLC Password" dialog box appears.

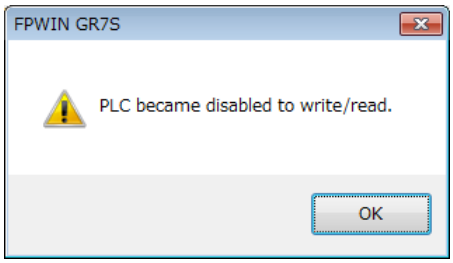


2. Set the items in the table below, and click on the [Settings] button.

Item	Settings
Operation mode	Select "Protect".
32-digit password	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.



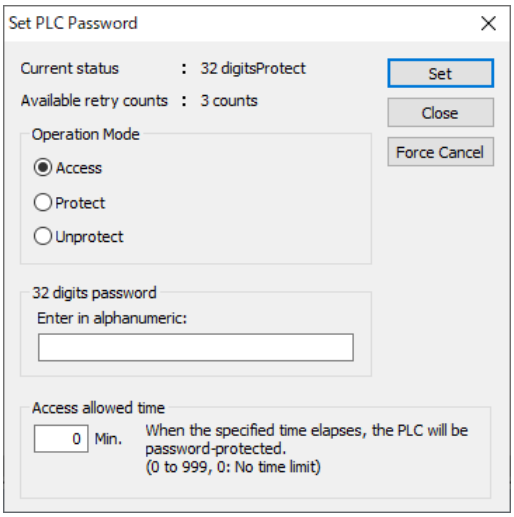
4. Click the [OK] button.

7.2.5 Setting to allow access with a password

The following procedure assumes that PLC password protection has been set.

Procedure

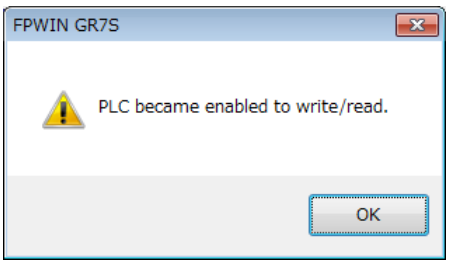
1. Select **Tools** > **PLC Security Settings** > **Set PLC Password** from the menu bar.
   The "Set PLC Password" dialog box is displayed.



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

Item	Settings
Operation mode	Select "Access".
32-digit password	Input the set password.
Access time	Select the allowed time for access. Range: 0 to 999 min. (0: Denotes no time limit) After the specified time has passed, access returns to being password protected.

   Once access is permitted, the following message appears.



3. Click the [OK] button.

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

7.2.6 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.)

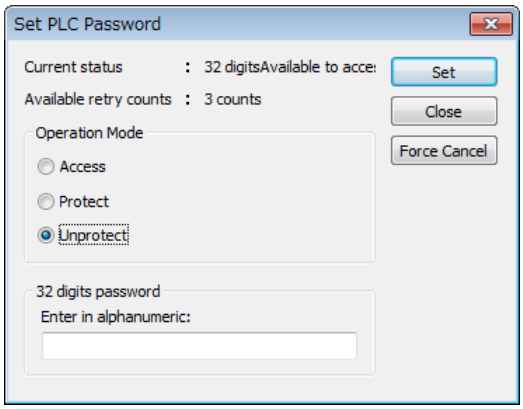
Unprotect

Info.

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

Procedure

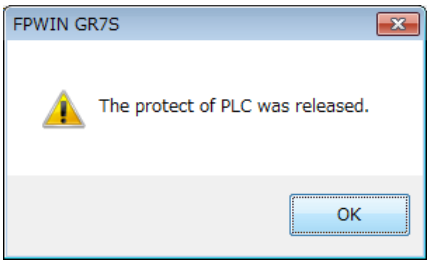
1. Select **Tools**>**PLC Security Settings**>**Set PLC Password** from the menu bar.
   The "Set PLC Password" dialog box appears.



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

Item	Settings
Operation mode	Select "Unprotect".
32-digit password	Input the set password.

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



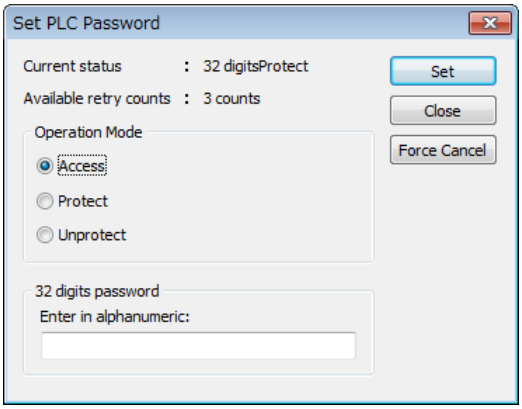
3. Click the [OK] button.

Force cancel

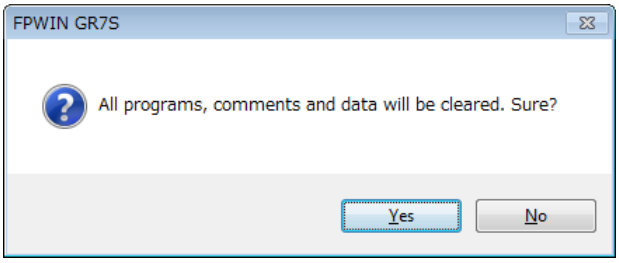
> **Stop**
> - Executing a force cancel will delete all programs, security information, and server certificates.

1 2 Procedure

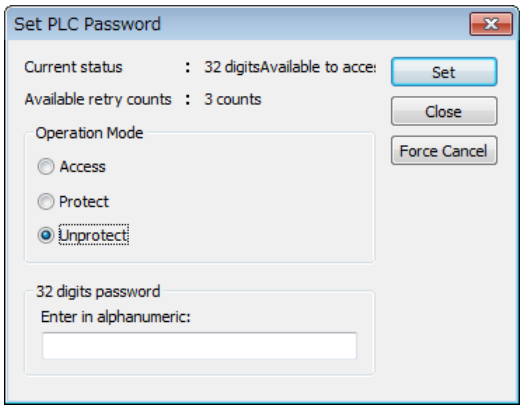
1. Select **Tools**>**PLC Security Settings**>**Set PLC Password** from the menu bar.
The "Set PLC Password" dialog box appears.



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



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


Set PLC Password
Current status : 32 digitsAvailable to acce
Available retry counts : 3 counts
Set
Close
Force Cancel
Operation Mode
Access
Protect
Unprotect
32 digits password
Enter in alphanumeric:

7.3 Program Upload Protection Function

7.3.1 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

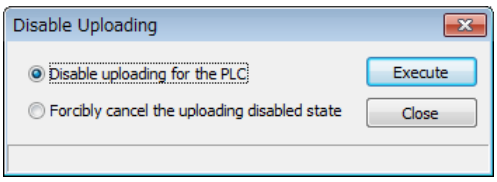
- The password setting can be specified simultaneously for the PLC in which this function is set.
- This function can be also set in a password-protected PLC.

- 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.

7.3.2 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.

7.4 Availability of Security Function

7.4.1 Security Operation Conditions (C14, C30, C40, C60, C38AT)

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	×	×	×	×	×

7.4.2 Security Operation Conditions (C40ET, C60ET)

The conditions for enabling the security operation in the Control Unit are as follows.

○: Available, x: Not available

Setting / Canceling Target of operation	Security function setting state		
	Security unset	Upload protection	32-digit password
Upload protection	○	○	×
32-digit password	○	×	○

(MEMO)

8 Other Functions

8.1 Analog Potentiometer

8.1.1 Overview of Functions

■ Overview of functions

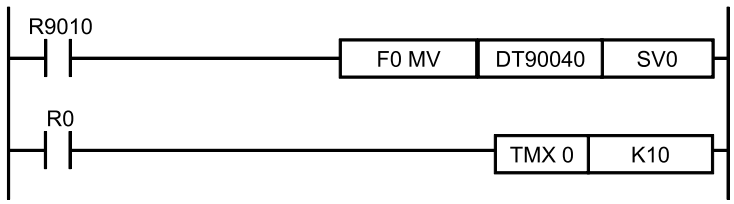
- The FP-XH Control Unit is equipped with one analog potentiometer.
- Turning the potentiometer changes the values of special data register DT90040 within the range of K0 to K4000. Using this function makes it possible to change the internal set values in the PLC without using the programming tool, so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

(Note) In case of the FP-X mode of the C38AT, the values of DT90040 varies within the range of K0 to K1000.

8.1.2 Example Showing How to Use Analog Potentiometer

■ Example of application to the timer

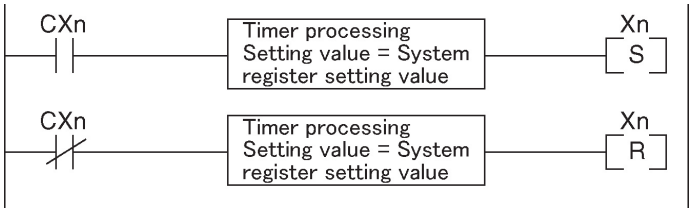
The value of the special data register (DT90040) that corresponds to the analog potentiometer V0 is sent to the setting value area (SV0) of TMX0 to set the time for the clock.



8.2 Input Time Constant Setting Function

■ 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 / C40 / C60 / C38AT / C40ET / C60ET
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	○	○

8.3 Sampling Trace Function

8.3.1 Operation of Sampling Trace Function

■ What is Sampling Trace Function?

- Using the sampling trace function makes it possible to take samplings, record, and collect the state of arbitrary16 bits + 3 words data registered in the PLC unit at arbitrary timing and to analyze changes in the bits and data in detail after stopping sampling at arbitrary timing.
- The sampling trace function is used in the time chart monitor function under the online menu of FPWIN GR7.
- The logging/trace function and sampling trace function cannot be used simultaneously. Either one of them can be used.

■ Instructions, special relays and special registers used for Sampling trace function

Number	Name	Operation
F155(SMPL)	Sampling instruction	Performs sampling of set data.
F156(STRG)	Sampling stop trigger instruction	Stops sampling.
R902C	Sample point flag	Sampling by instruction=0, Sampling at regular time intervals=1
R902D	Sampling trace end flag	When sampling trace starts=0 stops=1
R902E	Sampling stop trigger flag	Turns on when sampling stop trigger is on.
R902F	Sampling enable flag	Turns on when sampling operation starts.
DT90028	Interval of sampling trace	K0: Sampling by SMPL instruction K1 to K3000: (10 ms to 30 seconds) For sampling at regular time intervals

8.3.2 Details of Sampling Trace Function

■ No. of data collectable at one sampling

16 bits + 3 words

■ Sampling capacity

1000 samples

■ Types of sampling timing

1. Sampling at regular time intervals (sampling interval: 10 to 30,000 ms)
2. Sampling by F155(SMPL) instruction

- Sampling for every scan can be executed by the instruction. Also, more than one samplings can be executed in one scan.
- Timing for the execution of the F155 (SMPL) instruction can be set by the ladder sequence.

- It is not possible to activate the sampling at regular time intervals and the sampling by the F155(SMPL) instruction simultaneously.

■ How to stop sampling

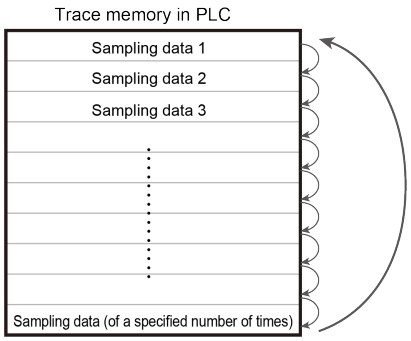
The following two methods are available for the stop trigger (request):

1. Deactivate request by the tool software
2. Deactivate request by the F156 (STRG) instruction

- If the stop trigger is activated, the PLC will continue sampling by the specified number of delays and then stop the sampling operation.
- Once the sampling operation stops, the data will be automatically retrieved by the tool software and will be indicated in a time chart.
- The number of samplings before and after the trigger point can be adjusted by the number of delays. For the initial settings (number of samplings: 1,000, number of delays: 100), the respective numbers of samplings before and after the trigger point are 900 and 100.

■ Operation image of sampling trace

Performs the trace operation for the number of samples specified in Sampling Configuration.

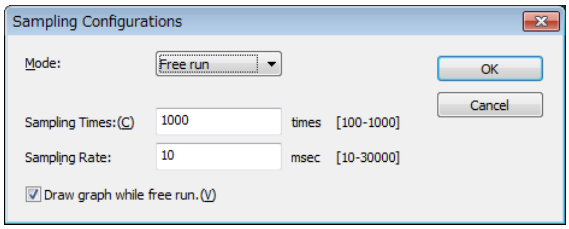


8.3.3 How to Use Sampling Trace

Sampling by free run

1 2 Procedure

1. From the menu bar of FPWIN GR7, select **Tools**>**Timing Chart**.
   The timing chart monitor window will be displayed.
2. Register the bit / word device to be monitored by selecting **Set**>**Register Device**.
3. Select **Set**>**Sampling Configurations**.
4. Set "Mode" to "Free run" and specify settings in "Sampling Times" and "Sampling Rate".

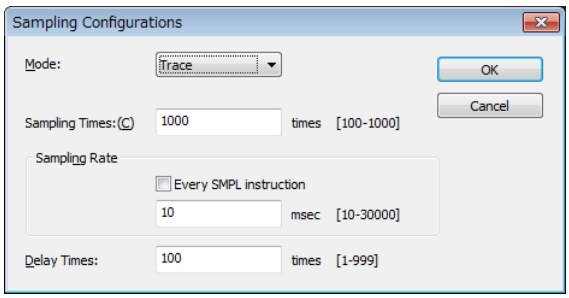


5. Click the [Start trace / free run] button.
   Chart drawing will be started and sampling will be performed the specified number of times.
6. To stop the trace, click the [Stop trace / free run] button.

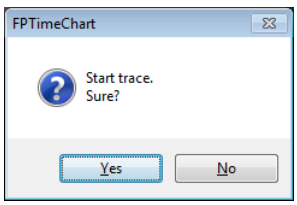
Sampling at regular time intervals

Procedure

1. From the menu bar of FPWIN GR7, select **Tools**>**Timing Chart**.
   The timing chart monitor window will be displayed.
2. Register the bit / word device to be monitored by selecting **Set**>**Register Device**.
3. Select **Set**>**Sampling Configurations**.
4. Set "Mode" to "Trace" and specify settings in "Sampling Times" and "Sampling Rate".



5. Click the "Start trace / free run" button.

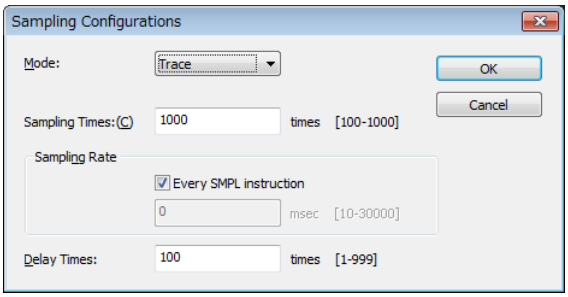


6. A confirmation message box will be displayed. Click"Yes".
   A trace will be started.
7. Click the [Stop trace / free run] button.
   After the trace stops, a timing chart will be displayed.

Sampling by instruction

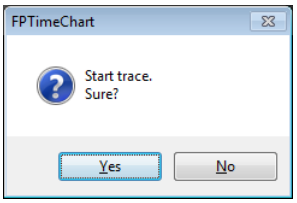
Procedure

1. From the menu bar of FPWIN GR7, select **Tools>Timing Chart**.
   The timing chart monitor window will be displayed.
2. Register the bit/word device to be monitored by selecting **Set>Register Device**.
3. Set "Mode" to "Trace" and set an appropriate value in "Sampling Rate".
4. Select the "Every SMPL instruction" check box.



   The sampling rate will be automatically set to 0.

5. Click the "Start trace / free run" button.
6. A confirmation message box will be displayed. Click" Yes".



   A trace will be started.

7. Click the [Stop trace / free run] button.
   After the trace stops, a timing chart will be displayed.

8.4 Transistor Output Overcurrent Detection (C38AT, C40ET, C60ET Only)

When overcurrent state is detected in the transistor output circuit, an output circuit overcurrent detection error (E58) occurs.

■ Checking the overcurrent detection state

The error state can be checked using the special relay (R910C: Overcurrent detection state).

Detection state	Special relay (R910C)
Overcurrent detection	ON
Normal state	OFF

■ Selecting the behavior at the time of overcurrent detection

The behavior at the time of error detection can be selected by using system register No. 39 "Operation stop when output circuit overcurrent is detected".

System register No. 39	Behavior at the time of error detection
0: Stop	The PLC stops operation and enters the PROG. mode.
1: Continue	The PLC maintains the RUN mode.

■ Behavior when "1: Continue" is selected

- The output overcurrent detection function of this product is executed separately for each of the following groups, rather than each output point.

Model	Group 1	Group 2
C38AT	Y0 to Y7	Y8 to YD
C40ET	Y0 to Y7	Y8 to YF
C60ET	Y0 to YB	YC to Y1D

- If an overcurrent state is detected in any output circuit within each group, all the output circuits included in the group will be forcibly turned OFF. Groups where overcurrent is not detected continue normal operation.
  - Example of overcurrent detection in C38AT

    If an overcurrent state is detected in output circuit Y5, all output circuits Y0 to Y7 will be forcibly turned OFF. Y8 to YD continues the normal operation.

9 Functions of FP-XH C38AT

9.1 Overview of Functions

9.1.1 Features of the Unit

The FP-XH C38AT is a Control Unit that has not only an analog I/O function but also a real-time clock function (RTC function).

The differences between the FP-XH C38AT and the FP-XH C40T are as summarized in the following table.

Specifications	FP-XH C40T	FP-XH C38AT
Digital I/O	40 points (24-point input, 16-point output)	38 points (24-point input, 14-point output)
Analog I/O	None Possible if the Analog I/O Cassette is mounted.	Available 4-point input, 2-point output
Real-time clock (RTC function)	None Possible if the Master Memory Cassette is mounted	Available
Program capacity	24, 32, 40K words	24, 32, 40, 64K words
Digital output overcurrent detection	None	Available

9.1.2 Compatibility with FP-X C38A

If the FP-XH C38AT is used as a replacement for the conventional FP-X C38A, the “FP-X mode” can be used. Although there are limitations on specifications, compatibility with FP-X C38A is maintained.

■ Differences between FP-X mode and FP-XH mode

Item		Specifications	
		Conventional FP-X C38A FP-XH C38AT, FP-X mode	FP-XH C38AT, FP-XH mode
I/O allocation of the analog I/O section		WX2 to 7, WY1 to 3	WX110 to 118, WY110 to 114
Analog input			
Input range (Resolution)	Voltage	0 to 10 V DC (Resolution: 1/4,000) 0 to 5 V DC (Resolution: 1/4,000)	-10 to 10 V DC (Resolution: 1/64,000) -5 to 5 V DC (Resolution: 1/64,000) 0 to 10 V DC (Resolution: 1/32,000) 0 to 5 V DC (Resolution: 1/32,000) 1 to 5 V DC (Resolution: 1/25,600)(Note 1)
	Current	0 to 20 mA (Resolution: 1/4,000)	0 to 20 mA (Resolution: 1/32,000) 4 to 20 mA (Resolution: 1/25,600)(Note 1)
Digital Input range	-10 to 10 V DC	-	K -32000 to K +32000

Item		Specifications	
		Conventional FP-X C38A FP-XH C38AT, FP-X mode	FP-XH C38AT, FP-XH mode
	-5 to 5 V DC		
	0 to 10 V DC 0 to 5 V DC	K 0 to K +4000	K 0 to K +32000
	1 to 5 V DC	-	K 0 to K +25600
	0 to 20 mA	K 0 to K +4000	K 0 to K +32000
	4 to 20 mA	-	K 0 to K +25600
Averaging setting	Moving average	-	10 times
	No. of averaging times	-	64 times/128 times
Disconnection detection		-	Disconnection detection is possible when set to +1 to +5 V and +4 to +20 mA ranges. (Detection level: 0.7 V or less, 2.8 mA or less)
Analog output			
Output range (Resolution)	Voltage	0 to 10 V DC (Resolution: 1/4,000)	-10 to 10 V DC (Resolution: 1/64,000) -5 to 5 V DC (Resolution: 1/64,000) 0 to 10 V DC (Resolution: 1/32,000) 0 to 5 V DC (Resolution: 1/32,000) 1 to 5 V DC (Resolution: 1/25,600)(Note 1)
	Current	0 to 20 mA (Resolution: 1/4,000)	0 to 20 mA (Resolution: 1/32,000) 4 to 20 mA (Resolution: 1/25,600)(Note 1)
Digital output setting range	-10 to 10 V DC -5 to 5 V DC	-	K -32000 to K +32000
	0 to 10 V DC	K 0 to K +4000	K 0 to K +32000
	0 to 5 V DC	-	
	1 to 5 V DC	-	K 0 to K +25600
	0 to 20 mA	K 0 to K +4000	K 0 to K +32000
	4 to 20 mA	-	K 0 to K +25600
Others			
Self-diagnosis error		-	Analog section operation error
Analog potentiometer input		1ch (K 0 to K +1000)	1ch (K 0 to K +4000)

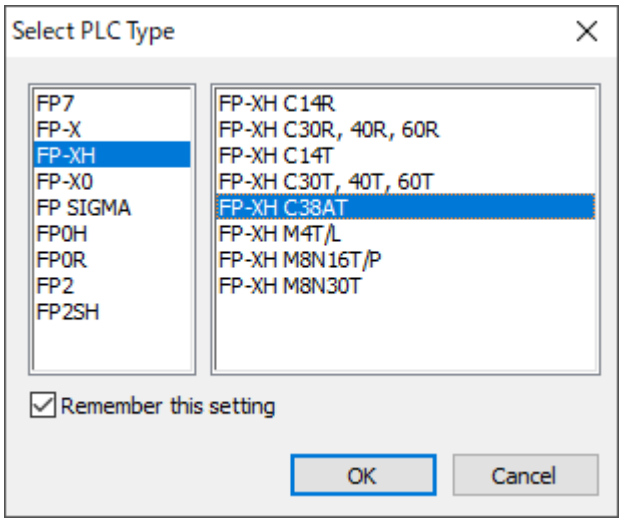
(Note 1) The accuracy full scale (F.S.) for voltage of 1 to 5 V DC and current of 4 to 20 mA is 0 to 5 V DC and 0 to 20 mA respectively.

9.1.3 Converting Projects for FP-X C38A

Projects for the conventional model FP-X C38A can be converted to projects for the FP-XH C38AT using the "Convert PLC Type" function. The following procedure is explained on the condition that a project for FP-X C38A has been already started on FPWIN GR7.

Procedure

1. Select **Tool**> **Convert PLC Type** from the menu bar.
2. Select "FP-XH" from the list on the left.



3. Select "FP-XH C38AT" and press the [OK] button.
4. The "Convert PLC Type" function will be executed and the project for the FP-X C38A will be converted to the FP-XH C38AT.

Info.

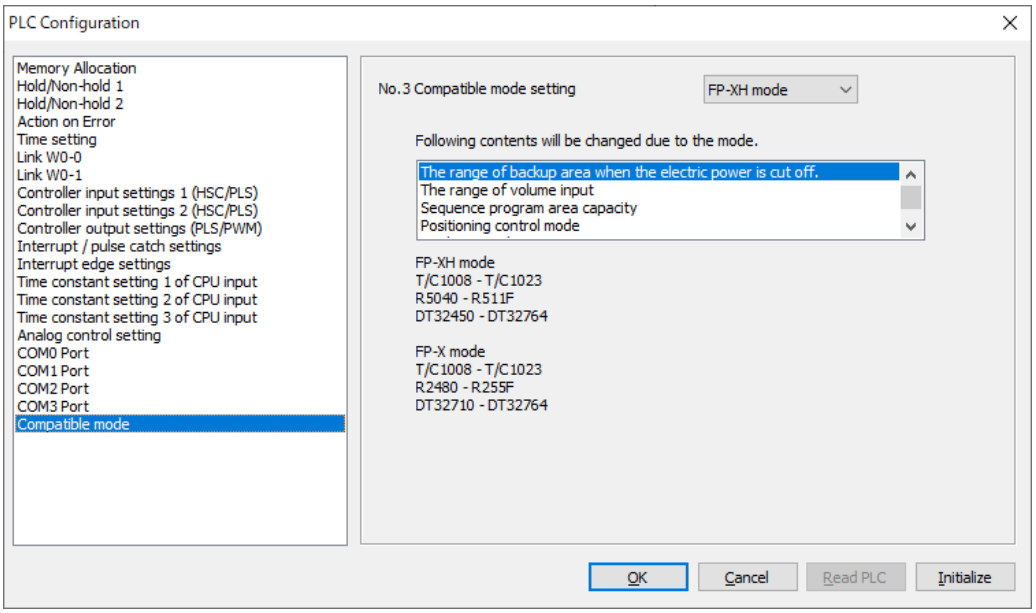
- When a project for the FP-X C38A is converted, "FP-X mode" will be automatically selected.

9.1.4 Converting from FP-X Mode to FP-XH Mode

Projects for the FP-X mode can be converted to projects for the FP-XH mode by changing the system register No. 3. The following procedure is explained on the condition that a project for FP-X mode has been already started on FPWIN GR7.

Procedure

1. Select **Options**>**System register settings** from the menu bar.
2. Select "Compatible mode" from the list on the left.



3. Change “No. 3 Compatible mode setting” to "FP-XH mode" and press the [OK] button.

4. Select **Online>Download to PLC (Entire Project)** from the menu bar.

- Please change the system registers number 3 offline.

9.2 I/O Allocation of the Analog I/O Section

Analog I/O data is allocated to the external input (WX) and external output (WY). I/O allocation for the FP-XH mode is different from that for the FP-X mode.

9.2.1 FP-XH Mode

■ **Input contact**

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>WX110</td><td>Analog input value CH0</td><td rowspan="4">Analog input conversion data area (Note 1)
Stores a digital conversion value equivalent to the analog input.
<Voltage range>
<table><tr><th>Analog input value</th><th>Digital conversion value</th></tr><tr><td>For -10 to 10 V, -5 to 5 V</td><td>K -32000 to K +32000</td></tr><tr><td>For 0 to 10 V, 0 to 5 V</td><td>K 0 to K +32000</td></tr><tr><td>For 1 to 5 V</td><td>K 0 to K +25600</td></tr></table>
<Current range>
<table><tr><th>Analog input value</th><th>Digital conversion value</th></tr><tr><td>For 0 to 20 mA</td><td>K 0 to K +32000</td></tr><tr><td>For 4 to 20 mA</td><td>K 0 to K +25600</td></tr></table></td></tr>
<tr><td>WX111</td><td>Analog input value CH1</td></tr>
<tr><td>WX112</td><td>Analog input value CH2</td></tr>
<tr><td>WX113</td><td>Analog input value CH3</td></tr>
<tr><td>WX114</td><td>Analog conversion preparation</td><td>When preparation is completed for converting analog I/O values, the bit of the corresponding channel turns ON.
<table><tr><th colspan="2">Channel</th><th>I/O allocation</th><th>Description</th></tr><tr><td rowspan="4">Analog input</td><td>CH0</td><td>X1140</td><td rowspan="6">0: Under preparation
1: Preparation completed</td></tr><tr><td>CH1</td><td>X1141</td></tr><tr><td>CH2</td><td>X1142</td></tr><tr><td>CH3</td><td>X1143</td></tr><tr><td rowspan="2">Analog output</td><td>CH0</td><td>X1148</td></tr><tr><td>CH1</td><td>X1149</td></tr></table></td></tr>
<tr><td>WX115</td><td>Input range setting confirmation</td><td>Stores newly set analog input range.
<table><tr><th>Channel</th><th>I/O allocation</th><th>Range setting</th></tr><tr><td>CH0</td><td>X1150 to X1153</td><td rowspan="4">H0: Do not use
H1: 0 to 10 V
H2: 0 to 5 V
H3: 0 to 20 mA
H4: -10 to 10 V
H5: -5 to 5 V
H6: 1 to 5 V
H7: 4 to 20 mA</td></tr><tr><td>CH1</td><td>X1154 to X1157</td></tr><tr><td>CH2</td><td>X1158 to X115B</td></tr><tr><td>CH3</td><td>X115C to X115F</td></tr></table></td></tr>
</table>

(Note 1) When the RUN mode is changed to the PROG. mode, analog input is converted to digital conversion value for the CH where the range is set.

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>WX116</td><td>Output range setting confirmation</td><td>Stores newly set analog output range.
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Range setting</th></tr>
<tr><td>CH0</td><td>X1160 to X1163</td><td rowspan="2">H0: Do not use
H1: 0 to 10 V
H2: 0 to 5 V
H3: 0 to 20 mA
H4: -10 to 10 V
H5: -5 to 5 V
H6: 1 to 5 V
H7: 4 to 20 mA</td></tr>
<tr><td>CH1</td><td>X1164 to X1167</td></tr>
</table></td></tr>
<tr><td>WX117</td><td>Analog input status</td><td>Stores the analog input status.
<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>X1170</td><td>CH0 Disconnection detection flag</td><td rowspan="4">When disconnection is detected: ON
When disconnection is recovered: OFF
Enabled only for the following range settings.
● 4 to 20 mA
● 1 to 5 V
The detection level for disconnection detection is as follows.
● 4 to 20 mA: 2.8 mA or less
● 1 to 5 V: 0.7 V or less</td></tr>
<tr><td>X1171</td><td>CH1 Disconnection detection flag</td></tr>
<tr><td>X1172</td><td>CH2 Disconnection detection flag</td></tr>
<tr><td>X1173</td><td>CH3 Disconnection detection flag</td></tr>
<tr><td>X1174 to X117F</td><td>Not used</td><td>Do not use.</td></tr>
</table></td></tr>
<tr><td>WX118</td><td>Analog output status</td><td>Stores the analog output status.
<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>X1180</td><td>CH0 data writing status</td><td rowspan="2">0: Normal
1: Error
An error is notified when the data read from the memory area (WY111 / WY112) exceeds each range.
While the error is notified, either the maximum or minimum value data is converted.</td></tr>
<tr><td>X1181</td><td>CH1 data writing status</td></tr>
<tr><td>X1182 to X118F</td><td>Not used</td><td>Do not use.</td></tr>
</table></td></tr>
</table>

■ Output contact

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>WY110</td><td>Input range setting area (Note 1)</td><td>The analog input range reads and sets the range settings written in this area.
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Range setting</th></tr>
<tr><td>CH0</td><td>Y1100 to Y1103</td><td rowspan="4">H0: Do not use
H1: 0 to 10 V
H2: 0 to 5 V
H3: 0 to 20 mA
H4: -10 to 10 V
H5: -5 to 5 V
H6: 1 to 5 V
H7: 4 to 20 mA
H8 to F: Do not use</td></tr>
<tr><td>CH1</td><td>Y1104 to Y1107</td></tr>
<tr><td>CH2</td><td>Y1108 to Y110B</td></tr>
<tr><td>CH3</td><td>Y110C to Y110F</td></tr>
</table></td></tr>
<tr><td>WY111</td><td>Analog output value CH0</td><td rowspan="2">Reads the written digital value and outputs a value equivalent to the analog output . (Note 2)
<Voltage range>
<table>
<tr><th>Analog output value</th><th>Digital conversion value</th></tr>
<tr><td>For -10 to 10 V, -5 to 5 V</td><td>K -32000 to K +32000</td></tr>
<tr><td>For 0 to 10 V, 0 to 5 V</td><td>K 0 to K +32000</td></tr>
<tr><td>For 1 to 5 V</td><td>K 0 to K +25600</td></tr>
</table>
<Current range>
<table>
<tr><th>Analog input value</th><th>Digital conversion value</th></tr>
<tr><td>For 0 to 20 mA</td><td>K 0 to K +32000</td></tr>
<tr><td>For 4 to 20 mA</td><td>K 0 to K +25600</td></tr>
</table></td></tr>
<tr><td>WY112</td><td>Analog output value CH1</td></tr>
<tr><td>WY113</td><td>Output range setting area (Note 1)</td><td>The analog output range reads and sets the range settings written in this area.
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Range setting</th></tr>
<tr><td>CH0</td><td>Y1130 to Y1133</td><td rowspan="2">H0: Do not use
H1: 0 to 10 V
H2: 0 to 5 V
H3: 0 to 20 mA
H4: -10 to 10 V
H5: -5 to 5 V
H6: 1 to 5 V
H7: 4 to 20 mA
H8 to F: 0 to 10 V</td></tr>
<tr><td>CH1</td><td>Y1134 to Y1137</td></tr>
</table></td></tr>
</table>

(Note 1) Whether the range setting with WY is enabled or disabled depends on the settings of system registers Nos. 451 and 452.

Settings of system registers Nos. 451 and 452	Range setting with WY
Do not use	The range setting initially written is enabled.

Settings of system registers Nos. 451 and 452	Range setting with WY
Either range is set.	Invalid

(Note 2) When the RUN mode is changed to the PROG. mode, the analog output will be 1 V if 1 to 5 V is selected or 4 mA if 4 to 20 mA is selected. If other options are selected, the output will be 0 V or 0 mA.

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>WY114</td><td>Averaging processing setting</td><td>The analog input averaging processing reads and sets the settings written in this area.
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Description</th></tr>
<tr><td>CH0</td><td>Y1140 to Y1143</td><td rowspan="4">H0: Do not use
H1: Moving average 10 times (Maximum and minimum values are deleted.)
H2: No. of averaging times: 64 times
H3: No. of averaging times: 128 times
H4 to F: Do not use</td></tr>
<tr><td>CH1</td><td>Y1144 to Y1147</td></tr>
<tr><td>CH2</td><td>Y1148 to Y114B</td></tr>
<tr><td>CH3</td><td>Y114C to Y114F</td></tr>
</table></td></tr>
</table>

9.2.2 FP-X Mode

■ Input contact

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>WX2</td><td>Analog input value CH0</td><td rowspan="3">Analog input conversion data area (Note 1)
Stores a digital conversion value equivalent to the analog input.
<Voltage range>
<table>
<tr><th>Analog input value</th><th>Digital conversion value</th></tr>
<tr><td>For 0 to 10 V, 0 to 5 V</td><td>K 0 to K 4000</td></tr>
</table>
<Current range>
<table>
<tr><th>Analog input value</th><th>Digital conversion value</th></tr>
<tr><td>For 0 to 20 mA</td><td>K 0 to K 4000</td></tr>
</table></td></tr>
<tr><td>WX3</td><td>Analog input value CH1</td></tr>
<tr><td>WX4</td><td>Analog input value CH2</td></tr>
<tr><td>WX5</td><td>Analog input value CH3</td><td></td></tr>
<tr><td>WX6</td><td>Analog conversion preparation</td><td>When preparation is completed for converting analog input values, the bit of the corresponding channel turns ON.
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Description</th></tr>
<tr><td>CH0</td><td>X60</td><td rowspan="4">0: Under preparation
1: Preparation completed</td></tr>
<tr><td>CH1</td><td>X61</td></tr>
<tr><td>CH2</td><td>X62</td></tr>
<tr><td>CH3</td><td>X63</td></tr>
</table></td></tr>
<tr><td>WX7</td><td>Input range setting confirmation</td><td>Stores newly set analog input range.</td></tr>
</table>

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Description</th></tr>
<tr><td>CH0</td><td>X70 to X73</td><td rowspan="4">H0: Do not use
H1: 0 to 10 V
H2: 0 to 5 V
H3: 0 to 20 mA</td></tr>
<tr><td>CH1</td><td>X74 to X77</td></tr>
<tr><td>CH2</td><td>X78 to X7B</td></tr>
<tr><td>CH3</td><td>X7C to X7F</td></tr>
</table>
</td></tr>
</table>

(Note 1) When the RUN mode is changed to the PROG. mode, analog input is converted to digital conversion value only for the CH where the range is set.

■ Output contact

<table>
<tr><th>I/O number</th><th>Name</th><th>Description</th></tr>
<tr><td>WY1</td><td>Input range setting area</td><td>
The analog input range reads and sets the range settings written in this area. (Note 1)
<table>
<tr><th>Channel</th><th>I/O allocation</th><th>Description</th></tr>
<tr><td>CH0</td><td>X10 to X13</td><td rowspan="4">H0: Do not use
H1: 0 to 10 V
H2: 0 to 5 V
H3: 0 to 20 mA
H4 to F: 0 to 10 V</td></tr>
<tr><td>CH1</td><td>X14 to X17</td></tr>
<tr><td>CH2</td><td>X18 to X1B</td></tr>
<tr><td>CH3</td><td>X1C to X1F</td></tr>
</table>
</td></tr>
<tr><td>WY2</td><td>Analog output value CH0</td><td rowspan="2">Sets a digital conversion value equivalent to the analog output. (Note 2)
<Voltage range>
<table>
<tr><th>Analog output value</th><th>Digital conversion value</th></tr>
<tr><td>For 0 to 10V</td><td>K 0 to K 4000</td></tr>
</table>
<Current range>
<table>
<tr><th>Analog input value</th><th>Digital conversion value</th></tr>
<tr><td>For 0 to 20 mA</td><td>K 0 to K 4000</td></tr>
</table>
Both voltage and current are always output because only one range is available respectively for the voltage and for the current.</td></tr>
<tr><td>WY3</td><td>Analog output value CH1</td></tr>
</table>

(Note 1) The range setting initially written in WY1 after the power supply is turned ON is enabled.

(Note 2) When the RUN mode is changed to the PROG. mode, the analog output will output 0 V or 0 mA.

9.3 Analog Input Functions

9.3.1 Analog Input Specifications

Item			Specifications
Number of channels			4 channels
Input range (Resolution)	FP-X Mode	Voltage	0 to 10 V DC (Resolution: 1/4,000) 0 to 5 V DC (Resolution: 1/4,000)
		Current	0 to 20 mA (Resolution: 1/4,000)
	FP-XH Mode	Voltage	-10 to 10 V DC (Resolution: 1/64,000) -5 to 5 V DC (Resolution: 1/64,000) 0 to 10 V DC (Resolution: 1/32,000) 0 to 5 V DC (Resolution: 1/32,000) 1 to 5 V DC (Resolution: 1/25,600) (Note 1)
		Current	0 to 20 mA (Resolution: 1/32,000) 4 to 20 mA (Resolution: 1/25,600) (Note 1)
Digital input range	FP-X Mode	0 to 10 V DC 0 to 5 V DC	K 0 to K +4000
		0 to 20 mA	K 0 to K +4000
	FP-XH Mode	-10 to 10 V DC -5 to 5 V DC	K -32000 to K +32000
		0 to 10 V DC 0 to 5 V DC	K 0 to K +32000
		1 to 5 V DC	K 0 to K +25600
		0 to 20 mA	K 0 to K +32000
		4 to 20 mA	K 0 to K +25600
Conversion speed			1 ms/all channels
Total accuracy	Voltage		±0.2% F.S. or less (at 25℃) ±0.4% F.S. or less (at 0 to 55℃)
	Current		±0.3% F.S. or less (at 25℃) ±0.6% F.S. or less (at 0 to 55℃)
Input impedance	Voltage		Approx. 1 MΩ
	Current		Approx. 250 Ω
Absolute max. input	Voltage input		-15 to 15 V DC voltage input
	Current input		-30 to 30 mA current input
Isolation method (Note 2)	Between output terminal and internal circuit		Isolated IC, isolated DC/DC converter
	Between channels		Non-isolated
Average speed	Moving average		10 times
	No. of averaging times		Set to 64 times / 128 times.
Disconnection detection			Disconnection detection is possible when set to +1 to +5 V and +4 to +20 mA ranges.

Item	Specifications
	(Detection level: 0.7 V or less, 2.8 mA or less)

(Note 1) The accuracy full scale (F.S.) for voltage of 1 to 5 V DC and current of 4 to 20 mA is 0 to 5 V DC and 0 to 20 mA respectively.

(Note 2) The channel between the analog input and analog output terminals is non-isolated.

9.3.2 Changing and Confirming Analog Input Ranges (Using System Registers)

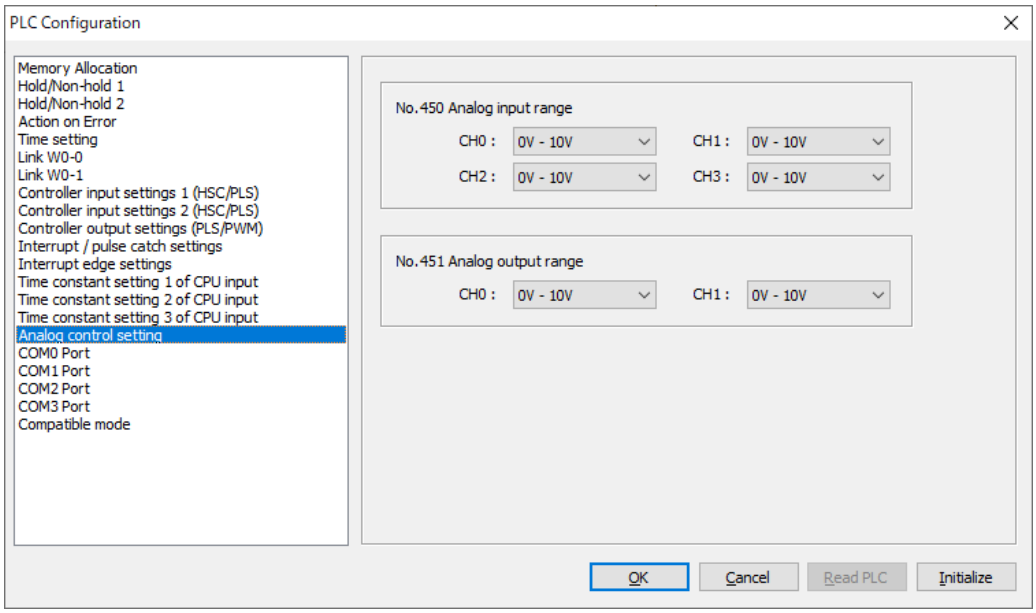
In the FP-XH mode, analog input ranges can be changed using system register settings of the FPWIN GR7. The following procedure is explained on the condition that the FPWIN GR7 has already started.

Info.

In the FP-X mode, analog input ranges cannot be changed using system registers. Ranges can be set only with WY. Refer to "9.3.3 Changing and Confirming Analog Input Ranges (Using WX and WY)"

Procedure

1. Select **Options**>**System register settings** from the menu bar.
2. Select "Analog input range setting" from the list on the left.



3. Change the channels to be used and press the [OK] button.
4. Select **Online**>**Download to PLC (Entire Project)** from the menu bar.

Settings

No.	Default	Description
450 Analog input range setting CH0 to CH3	0 to 10 V	0: Do not use 1: 0 V to 10 V 2: 0 V to 5 V 3: 0 mA to 20 mA 4: -10 V to +10 V 5: -5 V to +5 V 6: 1 V to 5 V 7: 4 mA to 20 mA

9.3.3 Changing and Confirming Analog Input Ranges (Using WX and WY)

The analog input range can be changed and confirmed using WX and WY.

- Using the user program, enter values in “Input range setting area” to change the analog input range.
- Using the user program, read values entered in “Input range setting confirmation” to confirm the analog input range.

■ I/O allocation, input range setting, and conditions of use

Item		FP-XH mode	FP-X mode
I/O Allocation	Input range setting area	WY110	WY1
	Input range setting confirmation	WX115	WX7
Input range setting		H0: Do not use H1: 0 to 10 V H2: 0 to 5 V H3: 0 to 20 mA H4: -10 to 10 V H5: -5 to 5 V H6: 1 to 5 V H7: 4 to 20 mA H8 to F: Do not use	H0: Do not use H1: 0 to 10 V H2: 0 to 5 V H3: 0 to 20 mA H4 to F: 0 to 10 V
Conditions of use		Set the system register No. 450 to “Do not use”.	None

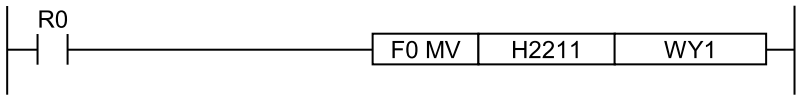
■ I/O contents

The range setting data for each channel data is allocated from the lower level in the order of CH0, CH1, CH2, and CH3.

bit no.	15			12	11			8	7			4	3			0
Corresponding channel	CH3				CH2				CH1				CH0			

■ Sample programs

When using the FP-X mode, enter H2211 in WY1 to set CH0 and CH1 to the “0 to 10 V” range and CH2 and CH3 to the “0 to 5 V” range.



Note

- The input range is set when the PROG. mode is changed to the RUN mode.
- If system registers or programs are changed after the mode is changed to the PROG. mode, it is not necessary to cycle the power.

9.3.4 Reading Analog Input Data

Using an external input, read analog input data to a desired area.
Set the following operations using a user program.

- Confirm that the “analog conversion preparation” flag is ON.
- Using the user program, read the “analog input value”.

■ I/O Allocation

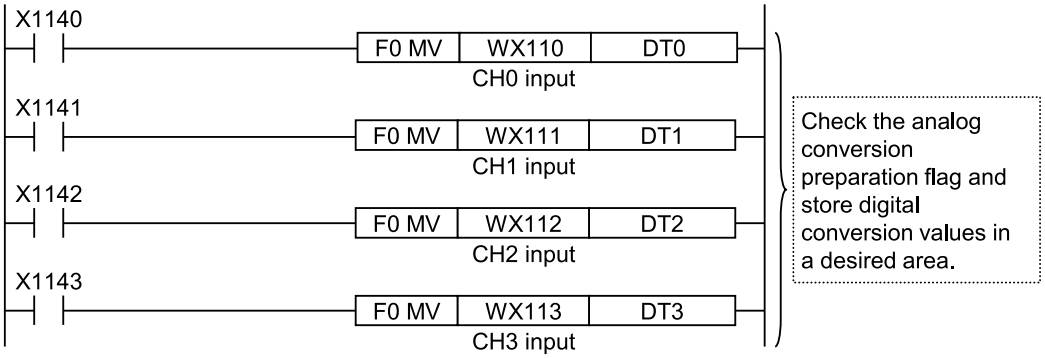
External input	FP-XH mode				FP-X mode			
	CH0	CH1	CH2	CH3	CH0	CH1	CH2	CH3
Analog input value	WX110	WX111	WX112	WX113	WX2	WX3	WX4	WX5
Analog conversion preparation flag	X1140	X1141	X1142	X1143	X60	X61	X62	X63

■ Data range to be saved in the “analog input value” for each range

Analog input range	FP-XH mode	FP-X mode
Voltage range:-10 to 10 V, -5 to 5 V	K-32000 to K32000	No setting
Voltage range: 0 to 10 V, 0 to 5 V Current range: 0 to 20 mA	K0 to K32000	K0 to K4000
Voltage range: 1 to 5 V Current range: 4 to 20 mA	K0 to K25600	No setting

■ Sample programs

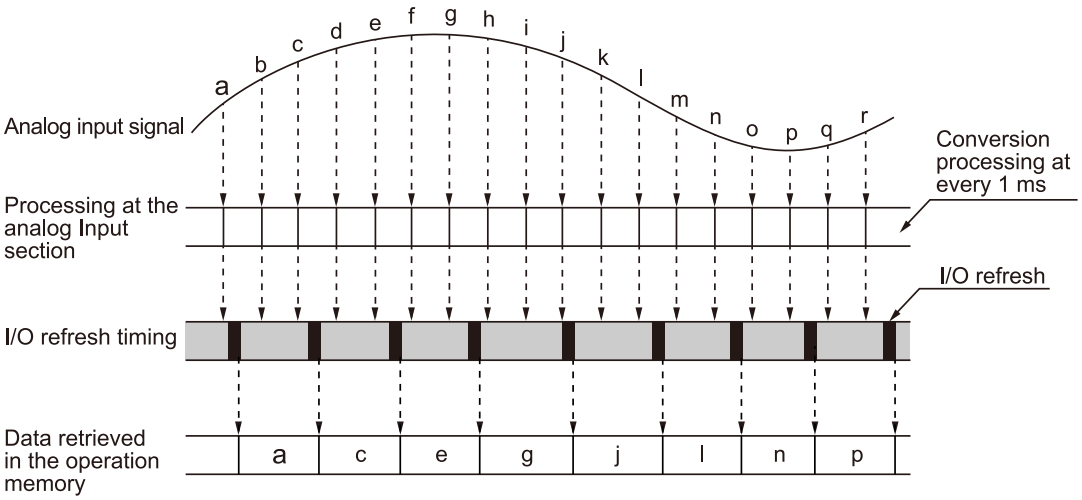
In the FP-XH mode, the digital conversion value is read from “WX110 to WX113” to “DT0 to DT3”.



9.3.5 Input Processing Timing

■ Timing when data is retrieved in the operation memory (WX)

- Analog input values for all channels are converted into digital values in units of 1 ms.
- Converted digital values are retrieved into the operation memory at the I/O refresh timing.
- Analog input value conversion is not synchronized with I/O refresh of the operation memory. Therefore, the latest data is retrieved into the operation memory at the I/O refresh timing.



9.4 Analog Output Functions

9.4.1 Analog Output Specifications

Item			Specifications
Number of channels			2ch
Output range (Resolution)	FP-X mode	Voltage	0 to 10 V DC (Resolution: 1/4,000)
		Current	0 to 20 mA (Resolution: 1/4,000)
	FP-XH mode	Voltage	-10 to 10 V DC (Resolution: 1/64,000) -5 to 5 V DC (Resolution: 1/64,000) 0 to 10 V DC (Resolution: 1/32,000) 0 to 5V DC (Resolution: 1/32,000) 1 to 5 V DC (Resolution: 1/25,600) (Note 1)
		Current	0 to 20 mA (Resolution: 1/32,000) 4 to 20 mA (Resolution: 1/25,600) (Note 1)
Analog output setting range	FP-X mode	0 to 10 V DC	K 0 to K +4000
		0 to 20 mA	K 0 to K +4000
	FP-XH mode	-10 to 10 V DC -5 to 5 V DC	K -32000 to K +32000
		0 to 10 V DC 0 to 5 V DC	K 0 to K +32000
		1 to 5 V DC	K 0 to K +25600
		0 to 20 mA	K 0 to K +32000
		4 to 20 mA	K 0 to K +25600
Conversion speed			1 ms/all channels
Output impedance (voltage output)			0.5 Ω or less
Maximum output current (voltage output)			±10 mA
Output allowable load resistance (current output)			500 Ω or less
Isolation method (Note 2)	Between output terminal and internal circuit		Isolated IC Isolated DC/DC converter
	Between channels		Non-isolated
Total accuracy	Voltage		±0.2% F.S. or less (at 25℃) ±0.4% F.S. or less (at 0 to 55℃)
	Current		±0.3% F.S. or less (at 25℃) ±0.6% F.S. or less (at 0 to 55℃)

(Note 1) The accuracy full scale (F.S.) for voltage of 1 to 5 V DC and current of 4 to 20 mA is 0 to 5 V DC and 0 to 20 mA respectively.

(Note 2) The channel between the analog input and analog output terminals is non-isolated.

(Note 3) When the power supply to the Control Unit is turned ON or OFF, voltage (equivalent to 2 V) may be output from the output terminal for approx. 100 ms while the power is ON and approx. 1 second while the power is OFF. If it is a problem on your system, take necessary measures externally to avoid the

transitional condition, e.g. turning ON PLC before external devices or turning OFF external devices before PLC.

9.4.2 Changing and Confirming Analog Output Ranges (Using System Registers)

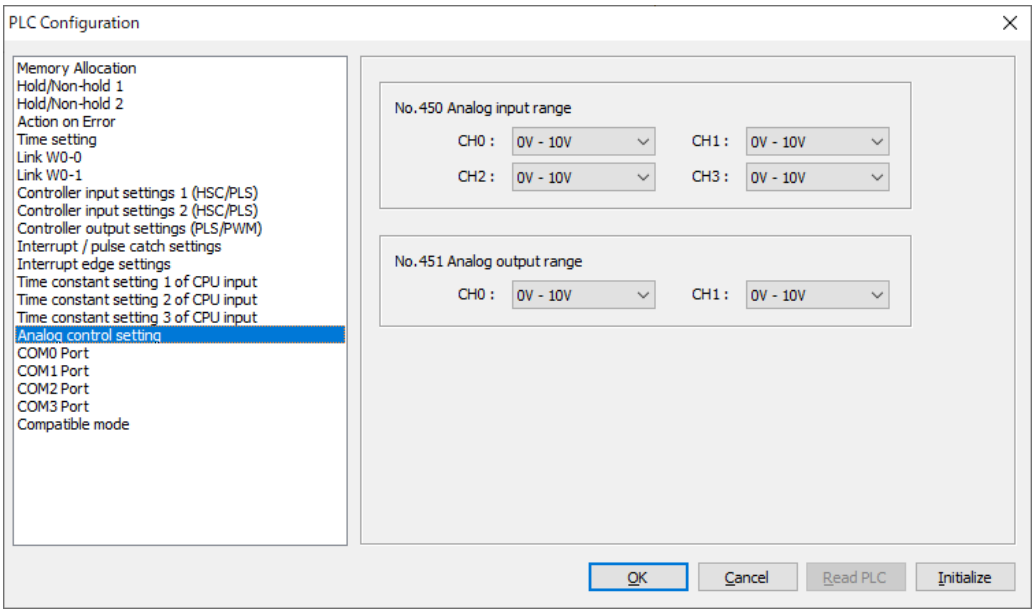
In the FP-XH mode, analog output ranges can be changed using system register settings of the FPWIN GR7. The following procedure is explained on the condition that the FPWIN GR7 has already started.

Info.

In the FP-X mode, analog output ranges cannot be changed using system registers. Ranges can be set only with WY. Refer to "9.4.3 Changing and Confirming Analog Output Ranges (Using WX and WY)"

Procedure

1. Select **Options**>**System register settings** from the menu bar.
2. Select "Analog output range setting" from the list on the left.



3. Change the channels to be used and press the [OK] button.
4. Select **Online**>**Download to PLC (Entire Project)** from the menu bar.

Settings

No.	Default	Description
451	0 to 10 V	0: Do not use

No.	Default	Description
Analog output range setting CH0 to CH1		1: 0 V to 10 V 2: 0 V to 5 V 3: 0 mA to 20 mA 4: -10 V to +10 V 5: -5 V to +5 V 6: 1 V to 5 V 7: 4 mA to 20 mA

9.4.3 Changing and Confirming Analog Output Ranges (Using WX and WY)

In the FP-XH mode, the analog output range can be changed and confirmed using WX and WY.

- Using the user program, enter values in “Output range setting area” to change the analog output range.
- Using the user program, read values entered in “Output range setting confirmation” to confirm the analog output range.

In the FP-X mode, the output range cannot be changed or confirmed using WX and WY. The output is always provided in the “0 to 10 V” range or “0 to 20 mA “range.

■ I/O allocation, output range setting, and conditions of use

Item		FP-XH mode
I/O Allocation	Output range setting area	WY113
	Output range setting confirmation	WX116
Output range setting		H0: Do not use H1: 0 to 10 V H2: 0 to 5 V H3: 0 to 20 mA H4: -10 to 10 V H5: -5 to 5 V H6: 1 to 5 V H7: 4 to 20 mA H8 to F: Do not use
Conditions of use		Set the system register No. 451 to “Do not use”.

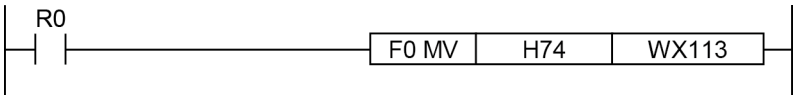
■ I/O contents

The range setting data for each channel data is allocated from the lower level in the order of CH0 and CH1.

bit no.	15			12	11			8	7			4	3			0
Corresponding channel									CH1				CH0			

■ Sample programs

Enter H74 in WY113 to set CH0 to the “-10 to 10 V” range and CH1 to the “4 to 20 mA” range.



9.4.4 Writing Analog Output Data

Using an external output, write analog output data for each channel.
Set the following operations using a user program.

- Confirm that the “analog conversion preparation” flag is ON. (FP-XH mode only)
- Using the user program, write the “analog output value”.

■ I/O Allocation

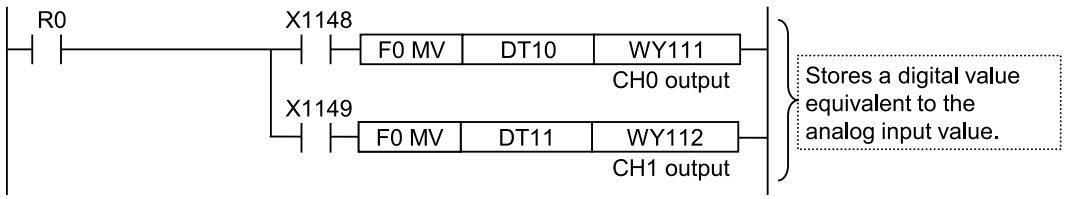
External output	FP-XH mode		FP-X mode	
	CH0	CH1	CH0	CH1
Analog output value	WY111	WX112	WY2	WY3
Analog conversion preparation flag	X1148	X1149	-	-

■ Data range to be written in the “analog output value” for each range

Analog output range	FP-XH mode	FP-X mode
Voltage range:-10 to 10 V, -5 to 5 V	K-32000 to K32000	No setting
Voltage range: 0 to 10 V Current range: 0 to 20 mA	K0 to K32000	K0 to K4000
Voltage range: 0 to 5 V		No setting
Voltage range: 1 to 5 V Current range: 4 to 20 mA	K0 to K25600	No setting

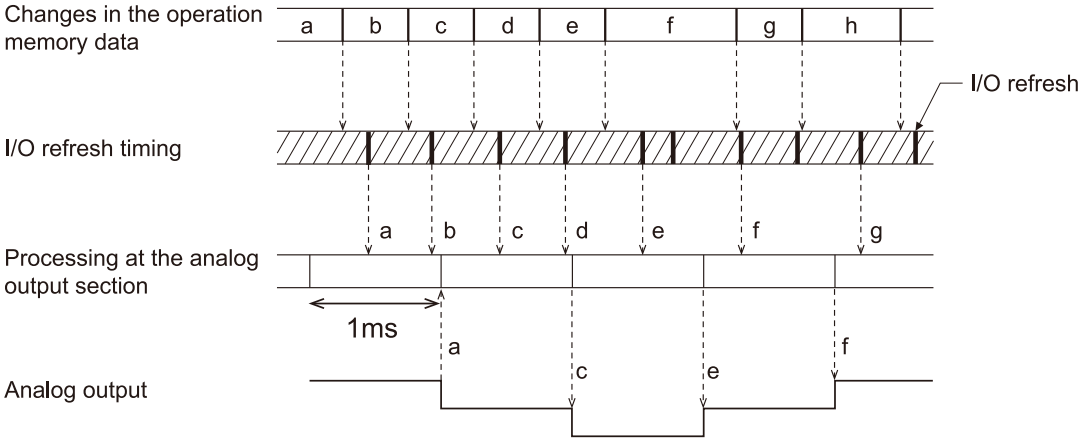
■ Sample programs

In the FP-XH mode, write the digital values saved in DT10 and DT11 into WY111 and WY112.



9.4.5 Output Processing Timing

- Analog output data of the operation memory is written to the analog output section at the I/O refresh timing.
- The time required for the analog output section to convert digital data is 1 ms for every CH.
- The processing of the analog output section is not synchronized with the processing of the operation memory. Therefore, the analog output section converts the latest data written from the operation memory into analog values and outputs the converted values.

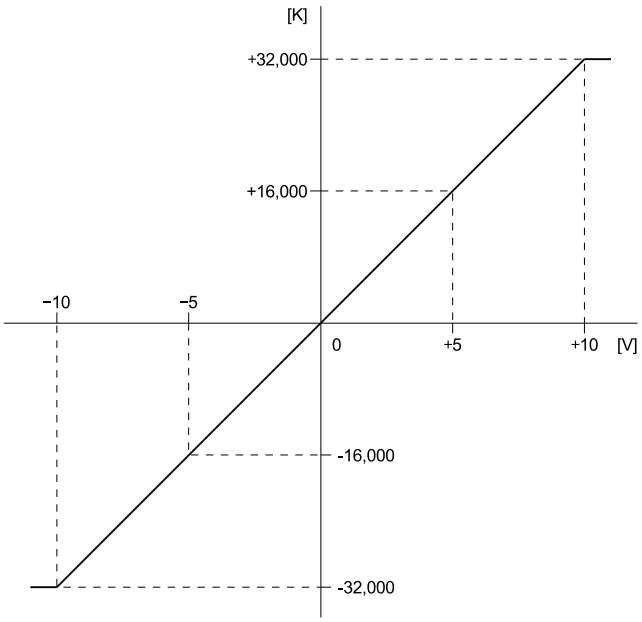


9.5 Analog I/O Conversion Characteristics

The following section describes conversion characteristics for setting each analog I/O range.

9.5.1 FP-XH Mode

■ **Voltage input range: -10 to +10 V**



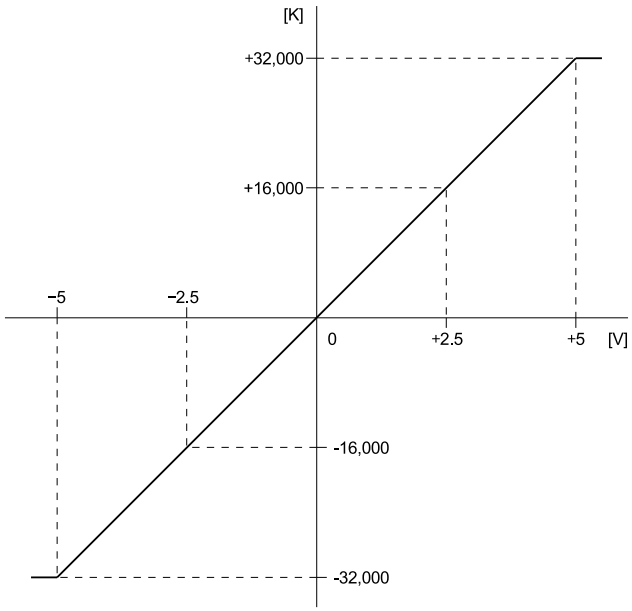
Input range: -10 to +10 V

Analog input value (V)	Digital conversion value (K)
+10	+32,000
+5	+16000
0	0
-5	-16000
-10	-32,000

When exceeding the rated range

Analog input value	Converted value
+10 V or more	+32,000
-10 V or less	-32,000

■ Voltage input range: -5 to +5 V



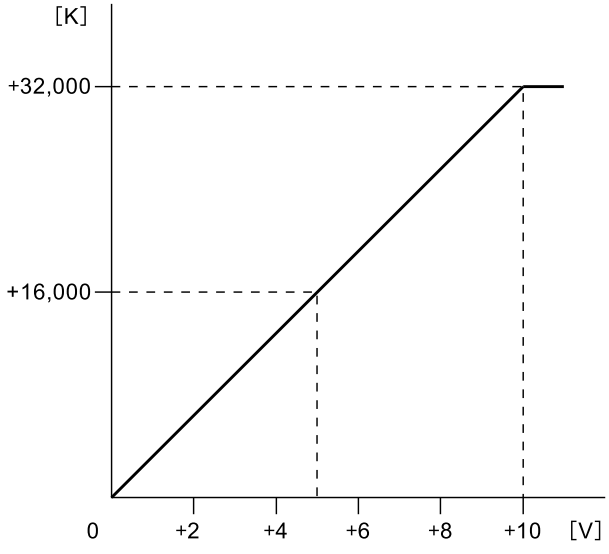
Input range: -5 to +5 V

Analog input value (V)	Digital conversion value (K)
+5	+32,000
+2.5	+16,000
0	0
-2.5	-16,000
-5	-32,000

When exceeding the rated range

Analog input value	Converted value
+5 V or more	+32,000
-5 V or less	-32,000

■ Voltage input range: 0 to +10 V



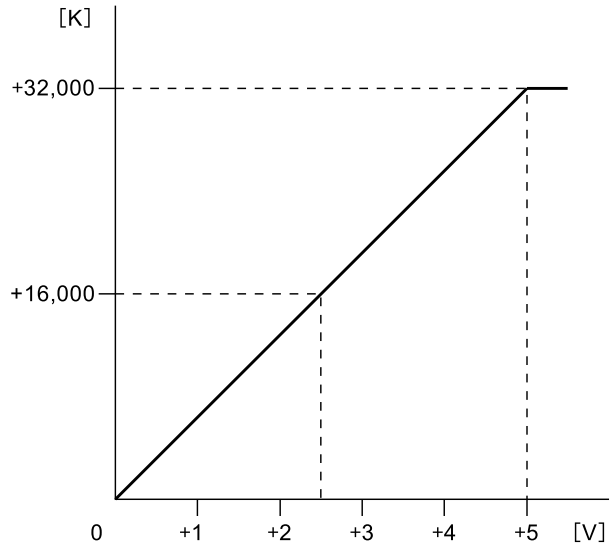
Input range: 0 to +10 V

Analog input value (V)	Digital conversion value (K)
+10	+32,000
+8	+25,600
+6	+19,200
+4	+12,800
+2	+6,400
0	0

When exceeding the rated range

Analog input value	Converted value
+10 V or more	+32,000
0 V or less	0

■ Voltage input range: 0 to +5 V



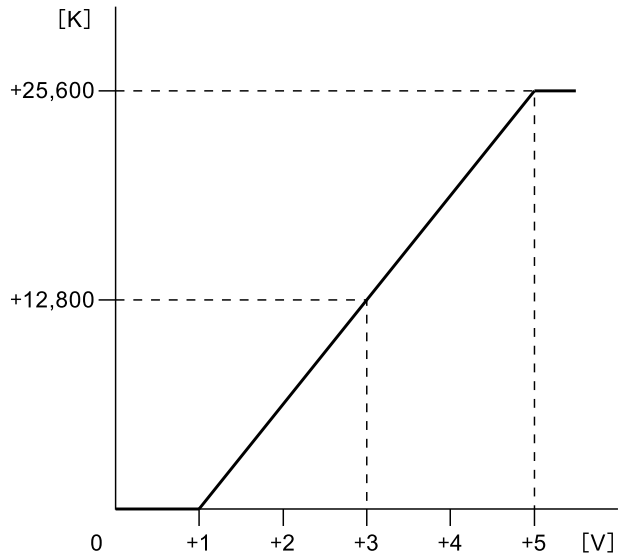
Input range: 0 to +5 V

Analog input value (V)	Digital conversion value (K)
+5	+32,000
+4	+25,600
+3	+19,200
+2	+12,800
+1	+6,400
0	0

When exceeding the rated range

Analog input value	Converted value
+5 V or more	+32,000
0 V or less	0

■ Voltage input range: 1 to +5 V



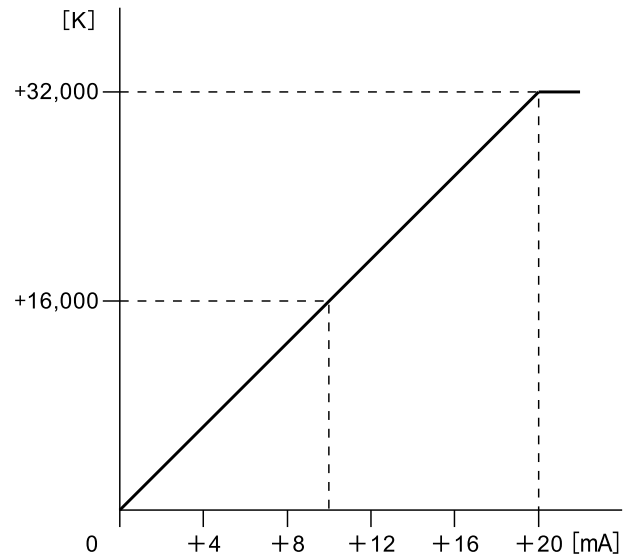
Input range: +1 to +5 V

Analog input value (V)	Digital conversion value (K)
+5	+25,600
+4	+19,200
+3	+12,800
+2	+6,400
+1	0
0	0

When exceeding the rated range

Analog input value	Converted value
+5 V or more	+25,600
+1 V or less	0

■ **Current Input range: 0 to +20 mA**



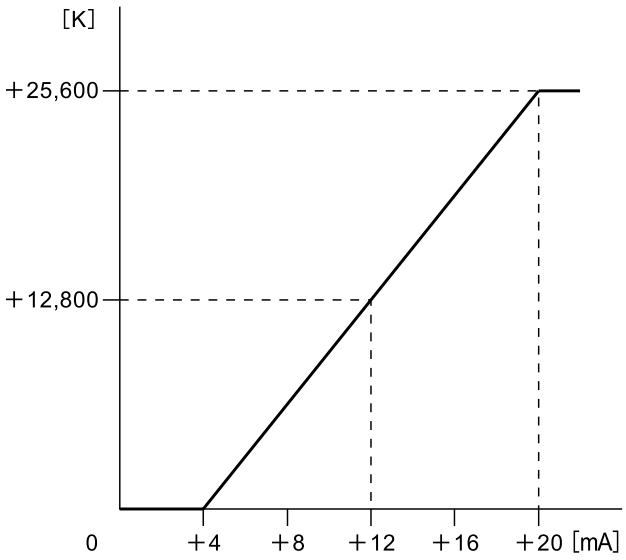
Input range: 0 to +20 mA

Analog input value (mA)	Digital conversion value (K)
+20	+32,000
+16	+25,600
+12	+19,200
+8	+12,800
+4	+6,400
0	0

When exceeding the rated range

Analog input value	Converted value
+20 mA or more	+32,000
0 mA or less	0

■ **Current Input range: 4 to +20 mA**



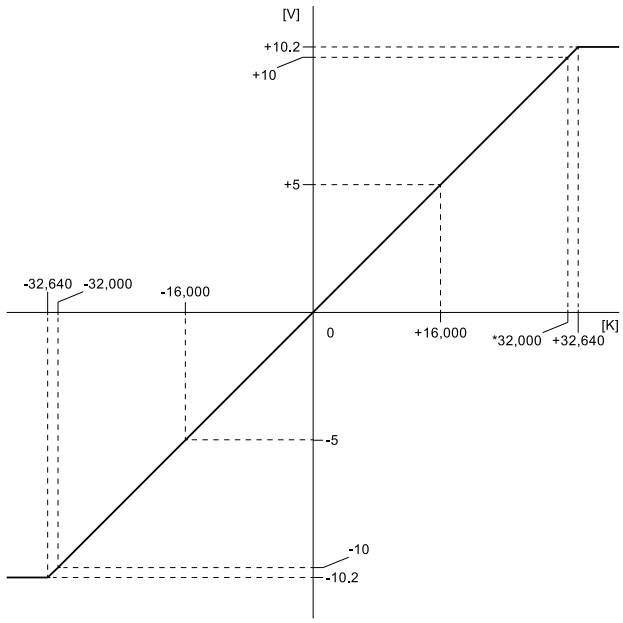
Input range: 4 to +20 mA

Analog input value (mA)	Digital conversion value (K)
+20	+25,600
+16	+19,200
+12	+12,800
+8	+6,400
+4	0
0	0

When exceeding the rated range

Analog input value	Converted value
+20 mA or more	+25,600
+4 mA or less	0

■ Voltage output range: -10 to +10 V



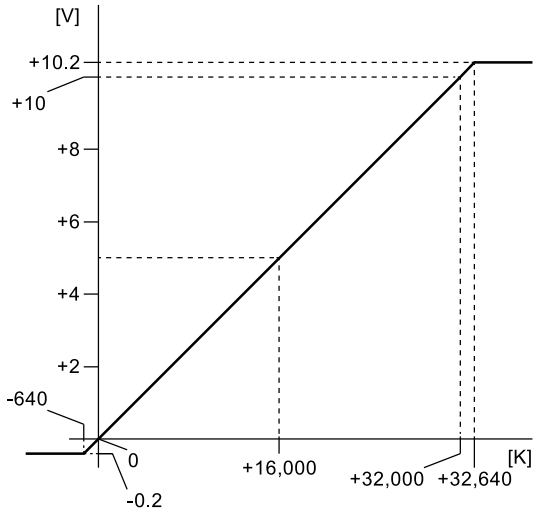
Output range: -10 to +10 V

Digital input value (K)	Analog output value (V)
+32,000	+10
+25,000	+5
0	0
-16,000	-5
-32,000	-10

When exceeding the rated range

Digital input value	Analog output value
+32,640 or more	Output at +10.2 V
-32,640 or less	Output at -10.2 V

■ Voltage output range: 0 to +10 V



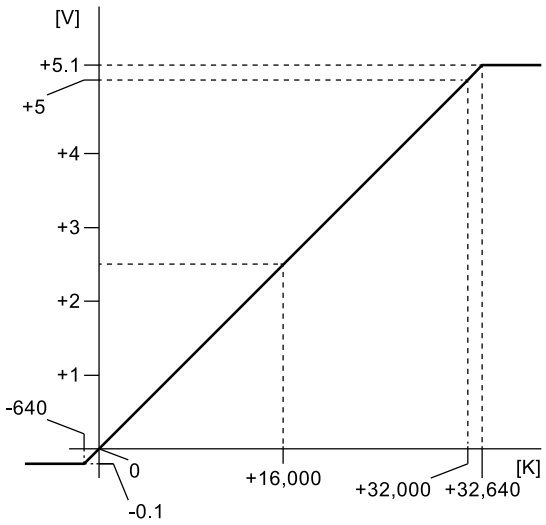
Output range: 0 to +10 V

Digital input value (K)	Analog output value (V)
+32,000	+10
+25,600	+8
+19,200	+6
+12,800	+4
+6,400	+2
0	0

When exceeding the rated range

Digital input value	Analog output value
+32,640 or more	Output at +10.2 V
-640 or less	Output at -0.2 V

■ Voltage output range: 0 to +5 V



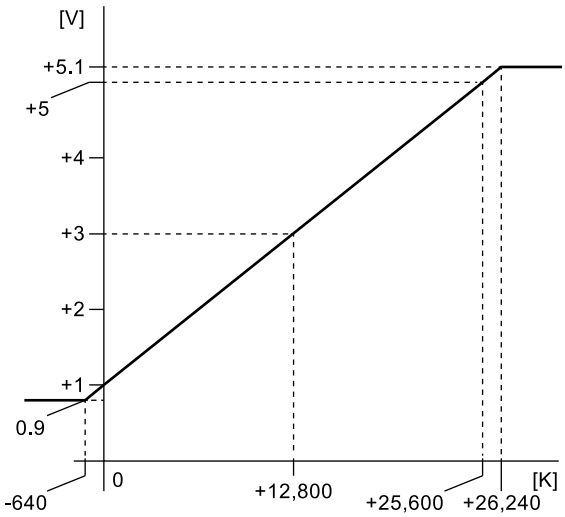
Output range: 0 to +5 V

Digital input value (K)	Analog output value (V)
+32,000	+5
+25,600	+4
+19,200	+3
+12,800	+2
+6,400	+1
0	0

When exceeding the rated range

Digital input value	Analog output value
+32,640 or more	Output at +5.1 V
-640 or less	Output at -0.1 V

■ Voltage output range: +1 to +5 V



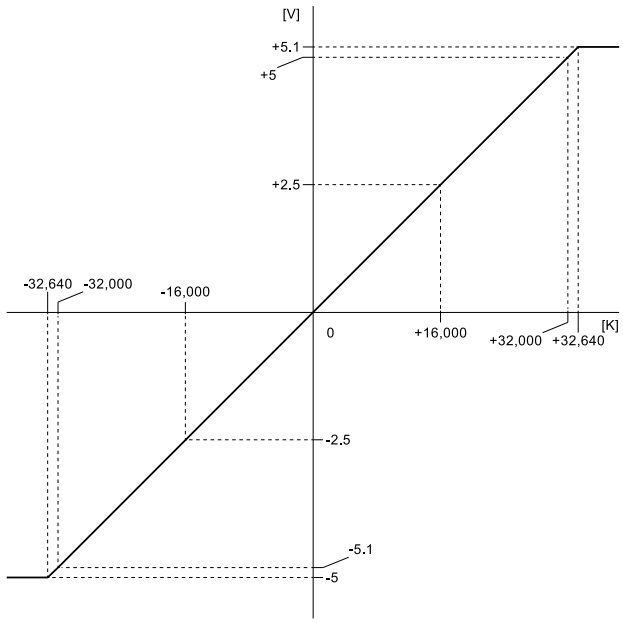
Output range: +1 to +5 V

Digital input value (K)	Analog output value (V)
+25,600	+5
+19,200	+4
+12,800	+3
+6,400	+2
0	+1

When exceeding the rated range

Digital input value	Analog output value
+26,240 or more	Output at +5.1 V
-640 or less	Output at 0.9 V

■ Voltage output range: -5 to +5 V



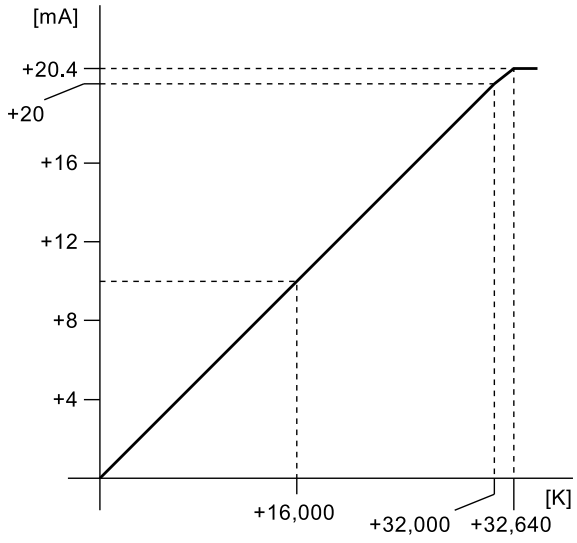
Output range: -5 to +5 V

Digital input value (K)	Analog output value (V)
+32,000	+5
+16,000	+2.5
0	0
-16,000	-2.5
-32,000	-5

When exceeding the rated range

Digital input value	Analog output value
+32,640 or more	Output at +5.1 V
-32,640 or less	Output at -5.1 V

■ Current output range: 0 to +20 mA



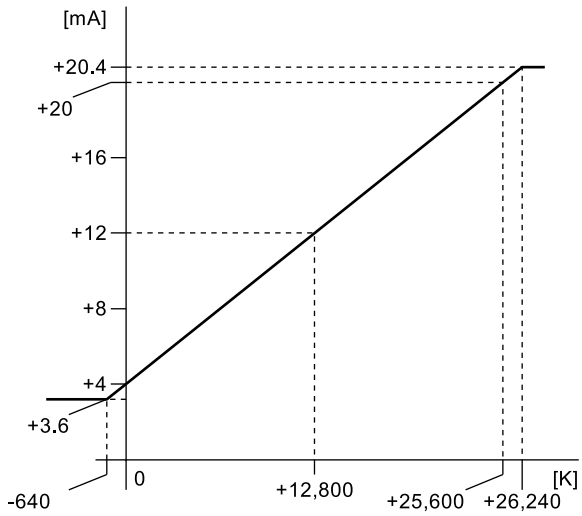
Output range: 0 to +20 mA

Digital input value (K)	Analog output value (mA)
+32,000	+20
+25,600	+16
+19,200	+12
+12,800	+8
+6,400	+4
0	0

When exceeding the rated range

Digital input value	Analog output value
+32,640 or more	Output at +20.4 mA
Negative value	Output at 0 mA

■ **Current output range: +4 to +20 mA**



Output range: +4 to +20 mA

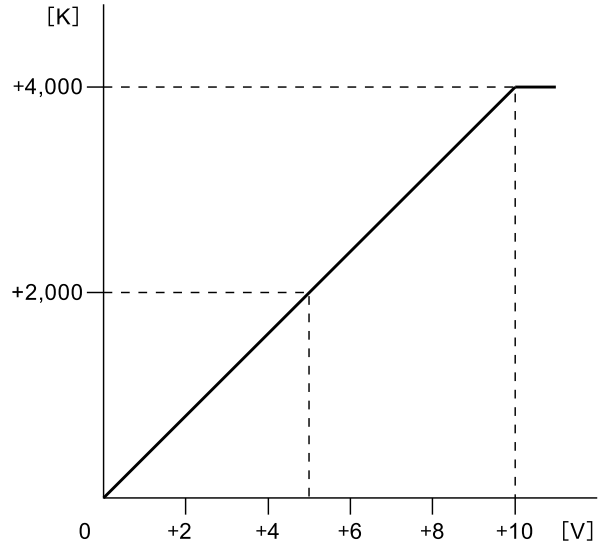
Digital input value (K)	Analog output value (mA)
+25,600	+20
+19,200	+16
+12,800	+12
+6,400	+8
0	+4

When exceeding the rated range

Digital input value	Analog output value
+26,240 or more	Output at +20.4 mA
-640 or less	Output at +3.6 mA

9.5.2 FP-X Mode

■ **Voltage input range: 0 to +10 V**



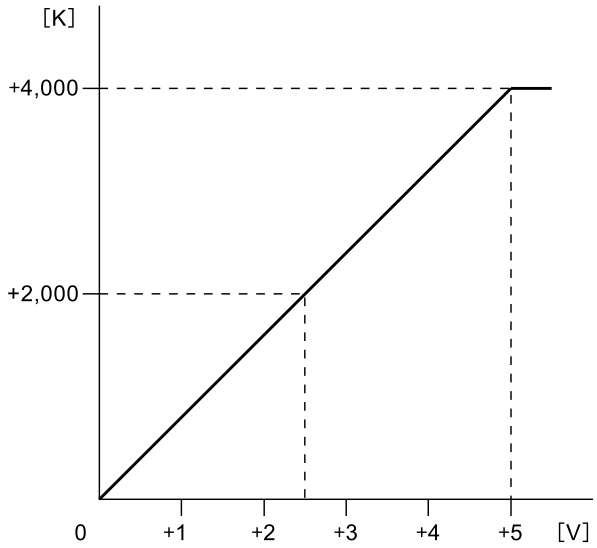
Input range: 0 to +10 V

Analog input value (V)	Digital conversion value (K)
+10	+4,000
+8	+3,200
+6	+2,400
+4	+1,600
+2	+800
0	0

When exceeding the rated range

Analog input value	Converted value
+10 V or more	+4,000
0 V or less	0

■ Voltage input range: 0 to +5 V



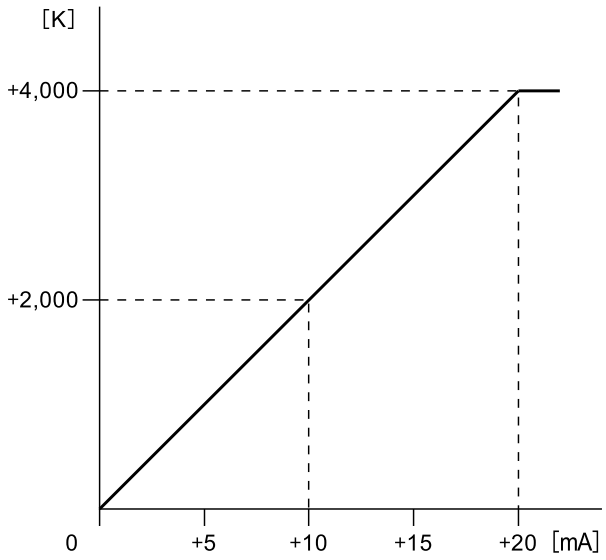
Input range: 0 to +5 V

Analog input value (V)	Digital conversion value (K)
+5	+4,000
+4	+3,200
+3	+2,400
+2	+1,600
+1	+800
0	0

When exceeding the rated range

Analog input value	Converted value
+5 V or more	+4,000
0 V or less	0

■ Current Input range: 0 to +20 mA



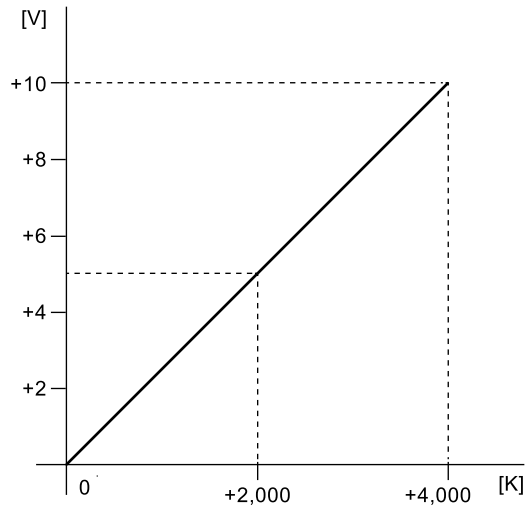
Input range: 0 to +20 mA

Analog input value (mA)	Digital conversion value (K)
+20	+4,000
+16	+3,200
+12	+2,400
+8	+1,600
+4	+800
0	0

When exceeding the rated range

Analog input value	Converted value
+20 mA or more	+4,000
0 mA or less	0

■ Voltage output range: 0 to +10 V



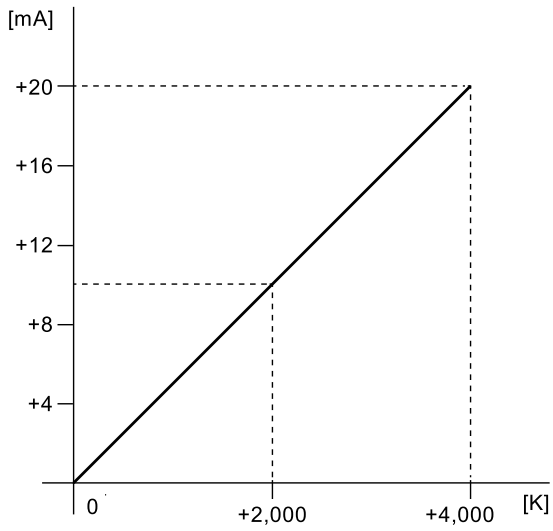
Output range: 0 to +10 V

Digital input value (K)	Analog output value (V)
+4,000	+10
+3,200	+8
+2,400	+6
+1,600	+4
+800	+2
0	0

When exceeding the rated range

Digital input value	Analog output value
+4,001 or more	Unchanged (Value preceding the input of +4,001 or more)
Negative value	Unchanged (Value preceding the input of a negative value)

■ Current output range: 0 to +20 mA



Output range: 0 to +20 mA

Digital input value (K)	Analog output value (mA)
+4,000	+20
+3,200	+16
+2,400	+12
+1,600	+8
+800	+4
0	0

When exceeding the rated range

Digital input value	Analog output value
+4,001 or more	Unchanged (Value preceding the input of +4,001 or more)
Negative value	Unchanged (Value preceding the input of a negative value)

(Note 1) Both voltage and current are always output because only one range is available respectively for the voltage and for the current.

9.6 Optional Functions

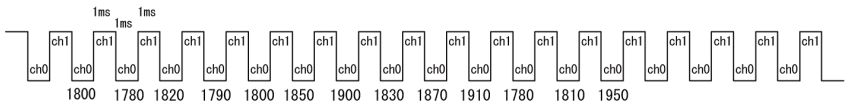
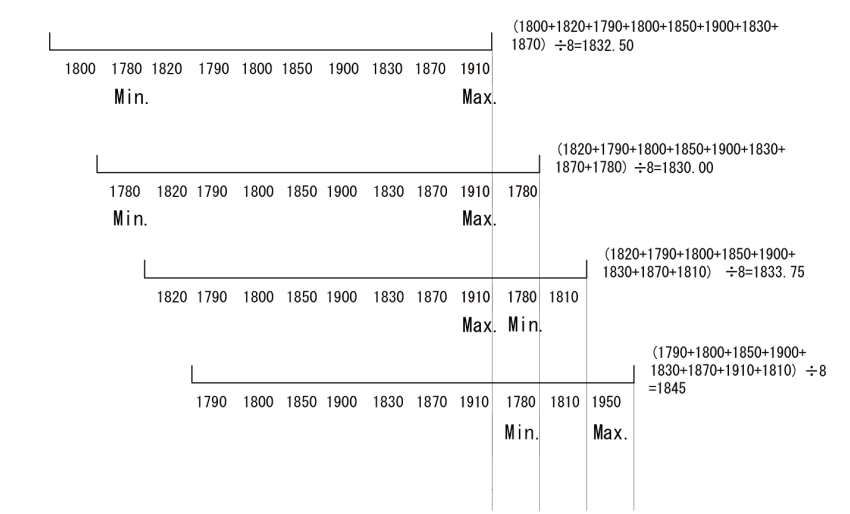
9.6.1 Analog Input Averaging Processing (FP-XH Mode Only)

Moving average 10 times

When averaging processing is selected, following processings are performed inside the analog unit.

■ **Moving average processing**

- Converted values retrieved from sampling are averaged and stored.
- Taking the past ten data values including the latest one, the maximum value and the minimum value are excluded and the remaining eight values are averaged and stored in the external input area (WX). If a fraction results from the calculation, it is rounded off.

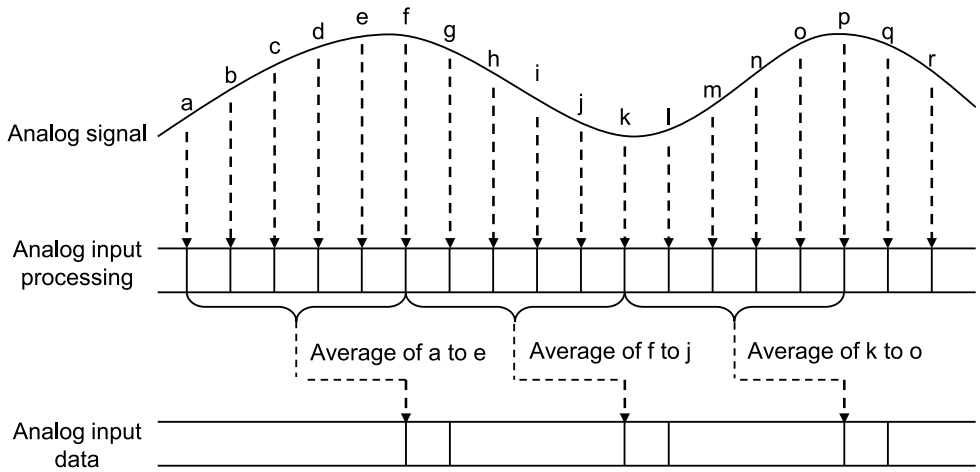
Operation	Timing chart
Analog input value Read timing	
Internal processing of CH0	
Digital input value	

(Note 1) The above figure shows the processing when the number of input channels is two.

Number of averaging times: (64 times / 128 times)

■ Processing when the number of averaging times is selected

- Converted values retrieved from sampling are averaged and stored.
- When the number of retrieved analog input data has reached the set number of averaging times (64 times or 128 times), averaging is performed for the number of times and the results are stored as digital values.
- If the number of retrieved data is less than the set number of averaging times, the data retrieved for the first time is stored in the external input area (WX).



(Note 1) To make the explanation simple, the above figure shows the processing which averages five points. In the actual processing, calculation is carried out with the average of data for 64 times or 128 times.

■ Method for setting the number of averaging times

The number of averaging times can be changed by being written to the output relay area (WY) in a user program.

Enabling averaging processing setting

The averaging method can be specified for each channel by changing WY114 (averaging processing setting) using a user program.

Channel	I/O allocation	Averaging processing setting
CH0	Y1140 to Y1143	H0: Do not use H1: Moving average 10 times (Maximum and minimum values are deleted.) H2: No. of averaging times: 64 times H3: No. of averaging times: 128 times H4 to F: Do not use
CH1	Y1144 to Y1147	
CH2	Y1148 to Y114B	
CH3	Y114C to Y114F	

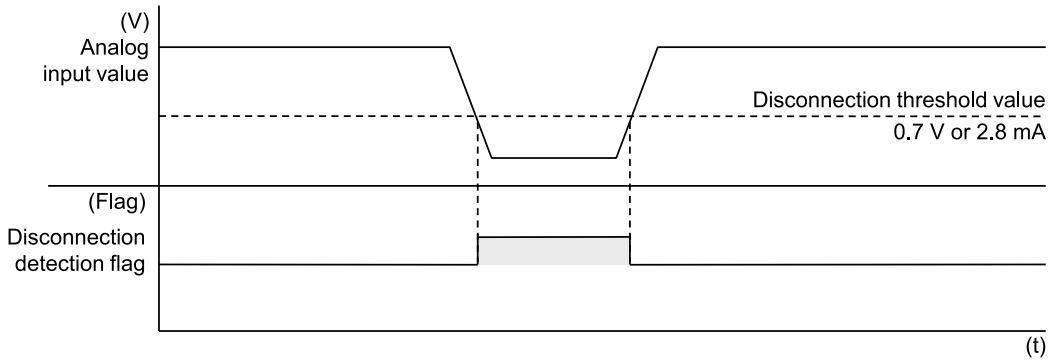
9.6.2 Disconnection Detection

■ Overview of Functions

Turns ON the disconnection detection flag when input is disconnected or unconnected, and warns of the error state.

Range	Detection level
4 to 20 mA	2.8 mA or less
1 to 5 V	0.7 V or less

■ Disconnection detection operation



■ I/O allocation

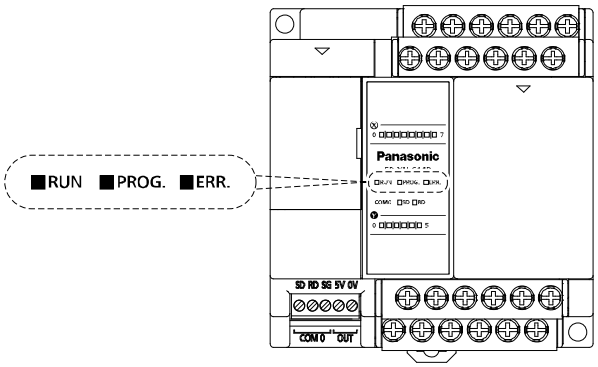
	CH0	CH1	CH2	CH3
Disconnection detection flag	X1170	X1171	X1172	X1173

- Not executed if the voltage range is set to a range other than “+1 to ＋ 5 V” or the current input range is set to a range other than “+4 to ＋ 20 mA”.

10 Troubleshooting

10.1 Self-diagnosis function

10.1.1 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.

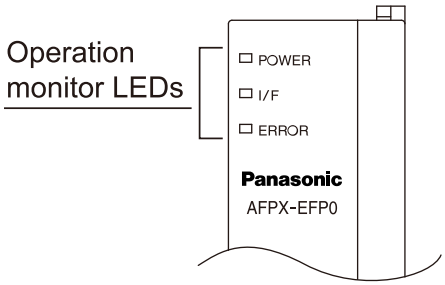
■ LEDs related to self-diagnostic errors

	LED display			Description	Operation status
	RUN (Green)	PROG. (Green)	ERR/ ALM (Red)		
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
	Flashing (Note 1)	Flashing (Note 1)	OFF	Forced input/output in RUN mode The "RUN" and "PROG." LEDs flash alternately.	Operating
	Flashing	Flashing	OFF	Version upgrade in progress (C38AT, C40ET, C60ET only) The "RUN" and "PROG." LEDs flash alternately. (Note 2)	Stop
In abnormal condition	ON	OFF	Flashing	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

(Note 1) The flashing is repeated every 1 second. (Lights on for 0.5 sec. and lights off for 0.5 sec.)

(Note 2) The LEDs flash when the firmware of the Control Unit is upgraded using the version upgrading tool.

10.1.2 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

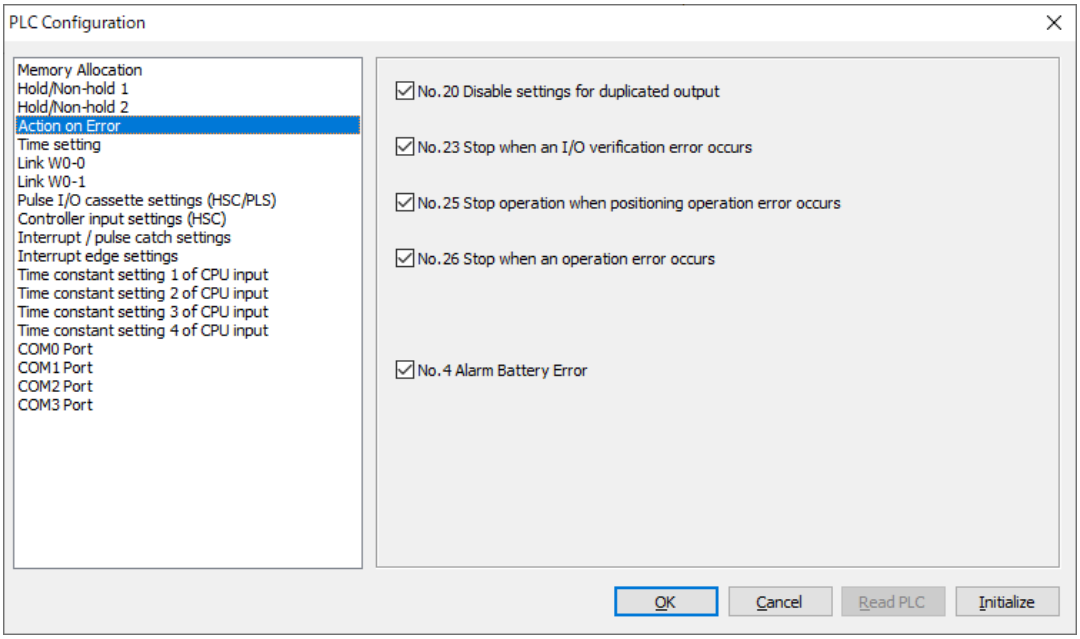
	LED display			Description
	POWER	I/F	ERR.	
Normal operation	○	○	×	Normal operation
Error	○	△	×	FP0 / FP0R Expansion Unit is not connected.
	○	○	△	The FP0 Expansion Unit, that had been connected when the power supply for the Control Unit was turned ON, was disconnected. An error has occurred when data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

10.1.3 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

10.2 What to Do If an Error Occurs

10.2.1 ERR. LED Flashes

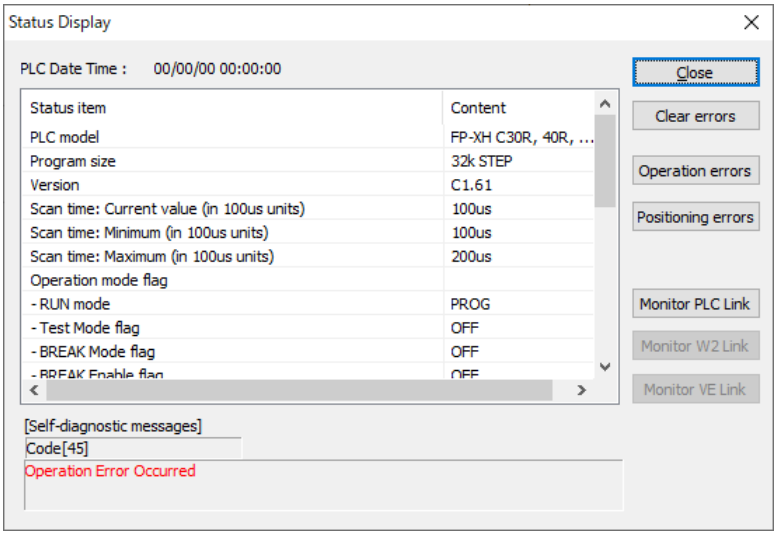
■ **Situation**

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 clicking 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. Click 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.
- For details of how to handle errors, refer to the "List of Error Codes".
- In the case of the C40ET and C60ET models, when a self-diagnosis error occurs, the "Self-diagnosis error code details" will be displayed so that the cause of the error can be determined.

REFERENCE

12.9 List of Error Codes
12.10 Self-diagnosis error code details (C40ET and C60ET only)

10.2.2 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.

10.2.3 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.

10.2.4 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.

10.2.5 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.

10.2.6 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.

10.2.7 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.

10.2.8 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			•		•

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	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.

10.2.9 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.

10.2.10 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.

10.2.11 Communication Error Occurs (Ethernet Cassette)

■ 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.

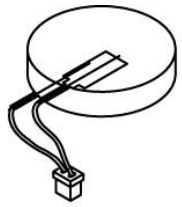
11 Maintenance and Inspection

11.1 Handling of Backup Battery

11.1.1 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.
	FP-XH Backup Battery	With a connector	AFPXHBATT

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. If the built-in capacitor has not been sufficiently charged, calendar timer data may become indefinite.
2. Turn OFF the power.
3. Open the cover.
4. Remove the used battery.
5. Install a new battery within two minutes (within 30 seconds for the C38AT) after turning OFF the power.
   These times apply when the ambient temperature is 25 °C.
6. Close the cover.
   Make sure that the battery connector cable is not pinched by the cover.

Info.

- For the FP-XH Control Unit, the battery can be replaced while power is ON.

11.1.2 Lifetime and Time for Replacement of Backup Battery

■ Lifetime of backup battery

Master memory cassette	Type of Control Unit	Lifetime of backup battery	Remarks
When installed	C14 / C30 / C40 / C60 / C38AT	5 years or more	When operating 8 hours a day
When not installed	C14 / C30 / C40 / C60 / C38AT		

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

■ Detection of backup battery error and time for replacement

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

- If a week has passed without power after the special internal relays R9005 and R9006 turned ON or the "ERR.LED" flashed, retained memory data may be lost.
- 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.
- 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.

11.2 Inspection

To always use the unit in optimal conditions, carry out routine or periodic inspections.

■ Inspection items

Inspection item	Description	Criterion	Related page
Power supply	Check the lighting states of the "RUN", "PROG.", and "POWER LEDs" of the Control Unit.	Normal when LED is lit.	"P.2-5" "P.2-6"
Display of the status indicator LEDs	Check the RUN mode indicator LED. Check the "ERR.LED".	Lit in RUN mode. Normal if unlit	"P.2-5" "P.2-6"
Installation status	State of installation to the DIN rail, including looseness Loose or wobbly unit	The unit should be securely installed.	"P.4-12"
Connection state	Loose terminal screw Proximity to a solderless terminal Loose connector	There should be no looseness. They should be tightened in parallel. They should be locked. There should be no looseness in the connector part.	"P.4-6"to"P.4-25"
Power supply voltage of the unit	Voltage between terminals	100 to 240 V AC Or 24 V DC (by type)	"P.2-8"
Power supply voltage of the I/O circuit	Supplied voltage	100 to 240 V AC Or 24 V DC (by type)	"P.2-10"to"P.2-10"
Surrounding environment	Ambient temperature / temperature inside the control panel Ambient humidity / humidity inside the control panel Atmosphere	0 to +55°C 10 to 95% RH Free from excessive dust and corrosive gases	"P.4-3"
Backup battery	Backup battery for the Control Unit	Periodic replacement	"P.4-5" "P.11-2"

12 Specifications

12.1 Control Unit Specifications

12.1.1 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
Insulation resistance (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
C30R	330 mA or less	200 mA or less
C30T	310 mA or less	190 mA or less
C40R	345 mA or less	215 mA or less
C40T	320 mA or less	195 mA or less
C40ET	380 mA or less	245 mA or less
C60R	380 mA or less	235 mA or less
C60T	335 mA or less	205 mA or less
C60ET	395 mA or less	250 mA or less
C38AT	360 mA or less	225 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
C30RD	160 mA or less
C30TD	115 mA or less
C40RD	185 mA or less
C40TD	130 mA or less
C60RD	275 mA or less
C60TD	170 mA or less

■ Weight

Model	Weight
C14R	320 g
C14RD	280 g
C14T	300 g
C14TD	265 g
C30R	510 g
C30RD	440 g
C30T	475 g
C30TD	405 g
C38AT	540 g
C40R	590 g
C40RD	515 g

Model	Weight
C40T	545 g
C40TD	470 g
C40ET	555 g
C60R	785 g
C60RD	715 g
C60T	710 g
C60TD	635 g
C60ET	735 g

12.1.2 Performance Specifications (C14, C30, C40, C60, C38AT)

Item		Specifications				
		C14	C30	C40	C60	C38AT
No. of controllable I/O points		14 points Input: 8 points Output: 6 points	30 points Input: 16 points Output: 14 points	40 points Input: 24 points Output: 16 points	60 points Input: 32 points Output: 28 points	38 points Input: 24 points Output: 14 points
Programming method / Control method		Relay symbol / Cyclic operation				
Program memory		Built-in Flash ROM (Backup battery is not required.)				
Comment storage		I/O comments, explanatory notes, and 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 (switchover)(Note 1)			24k / 32k / 40k / 64k steps (switchover)(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				

Item			Specifications				
			C14	C30	C40	C60	C38AT
Operation memory	Link relay	External input (X)	1760 points (X0 to X109F)(Note 2)				2016 points (X0 to X125F)(Note 2)
		External output (Y)	1760 points (Y0 to Y109F)(Note 2)				2016 points (Y0 to Y125F)(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)				
	Memory area	Data register (DT)	12k words	64k, 32k, 12k words (DT0 to DT32764)(Note 1)			64k, 32k, 24k, 12k words (DT0 to DT65532)(Note 1)
		Link data register (LD)	256 words (LD0 to LD255)				
		Index register (I)	14 words (I0 to ID)				

(Note 1) When the system register no.0 (sequence program capacity setting) is changed, the data register (DT) capacity also changes.

(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 combination.

(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 / C40 / C60 is earlier than 1.30, the operation speed becomes faster up to 5K steps. If the version of the C38AT is 1.00 or later, the operation speed becomes faster up to 7K steps. (Basic instruction: 0.04 μs/step or faster, high-level instruction: 0.22 μs/step or faster)

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 timing: At the time of instruction execution or at regular time intervals; Amount of data that can be collected per sampling: 16 bits + 3 words; Sample size: 1,000 samples	
PLC link function	Max. 16 units, link relay: 1024 points, link register: 128 words	

<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">Constant scan</td><td colspan="2">Available</td></tr>
<tr><td colspan="2">Security function</td><td colspan="2">Password (4-digit, 8-digit, 32-digit), program upload protection</td></tr>
<tr><td colspan="2">Self-diagnostic function</td><td colspan="2">Watchdog timer, program syntax check</td></tr>
<tr><td colspan="2">Rewriting in RUN mode</td><td colspan="2">Available (downloading in RUN mode, program rewriting in RUN mode (512 steps max.)</td></tr>
<tr><td rowspan="2">High-speed counter (Note 2)(Note 3)</td><td>Control Unit input</td><td>Single-phase 8 channels or 2-phase 4 channels
Single-phase 8 channels: 10 kHz each
2-phase 4 channels: 5 kHz each</td><td>Single-phase 8 channels or 2-phase 4 channels
High-speed single-phase (4 channels): 100 kHz each
Medium-speed single-phase (4 channels): 10 kHz each
High-speed 2-phase (2 channels): 50 kHz each
Medium-speed 2-phase (2 channels): 10 kHz each</td></tr>
<tr><td>Pulse I/O
With cassette installed</td><td>C14: Single-phase 2 channels or 2-phase 1 channel
C30 / C40 / 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 / C40 / C38AT: 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 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 / C40 / C60: 2 channels when 2 cassettes are installed.
Max. output frequency: 100 kHz each
PWM output: 2 channels
1 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), C38AT (FP-X mode): 1 channel (K0 to K1000)</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</td></tr>
</table>

Item	Specifications	
	Relay output type	Transistor output type
	With the C38AT, it is available only when the battery is installed. (Note 4)	
Flash ROM backup	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.	
Battery backup	Hold areas or non-hold areas can be specified by setting the system registers.	
Battery lifetime	5 years or more in the actual use condition (operating 8 hours a day)	

(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.

12.1.3 Performance Specifications (C40ET, C60ET)

Item		Specifications	
		C40ET	C60ET
No. of controllable I/O points		40 points Input: 24 points Output: 16 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		I/O comments, explanatory notes, and interlinear comments can be stored. (Backup battery is not necessary: 1M bytes)	
No. of instructions	Basic instructions	Approx. 110	
	High-level instructions	Approx. 251	
Program capacity		24, 32, 40, 64k steps (selected with system register no. 0)(Note 1)	
Operation speed		Up to 10k steps: Basic instruction: Approx. 40 ns/step, high-level instruction: Approx. 0.14 µs/step	
		10k steps or more: Basic instruction: Approx. 0.60 µs/step, high-level instruction: Approx. 1.5 µs/step	
I/O refresh + base time		CPU alone: 0.12 ms or less With Expansion Unit E16: 0.36 ms × number of units With Expansion Unit E30: 0.45 ms × number of units	

Item			Specifications	
			C40ET	C60ET
			With 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)	
	Memory area	Data register (DT)	64k, 32k, 24k, 12k words (DT0 to DT65532)(Note 1)	
		Link data register (LD)	256 words (LD0 to LD255)	
		Index register (I)	14 words (I0 to ID)	
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 5)	
Sampling trace			Sampling timing: At the time of instruction execution or at regular time intervals; Amount of data that can be collected per sampling: 16 bits + 3 words; Sample size: 1,000 samples	
PLC link function			Max. 16 units, link relay: 1024 points, link register: 128 words	
Constant scan			Available	
Security function			Password (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 6)(Note 7)			Single-phase 8 channels or 2-phase 4 channels High-speed single-phase (4 channels): 100 kHz each Medium-speed single-phase (4 channels): 10 kHz each High-speed 2-phase (2 channels): 50 kHz each Medium-speed 2-phase (2 channels): 10 kHz each	
Pulse output(Note 6)(Note 7)			4 channels Max. output frequency: 100 kHz	6ch Max. output frequency: 100 kHz
PWM output(Note 6)(Note 7)				4 channels Max. output frequency: 100 kHz

Item	Specifications	
	C40ET	C60ET
Pulse catch input Interrupt input(Note 7)	8 points (Control Unit input: 8 points)	
Periodical interrupt	0.5 ms to 1.5 s (0.5 ms unit), 10 ms to 30 s (10 ms unit)	
Potentiometer input	1ch (K0 to K4000)	
Clock / calendar	Year (Last two numbers), month, day, hour (24-hour), minute, second and day of the week. Supports up to year 2099. Supports leap years. The Control Unit incorporates the clock / calendar. (Note 8)	
Flash ROM backup	Guaranteed number of times of writing: Up to 10000 times Automatic backup when power is cut off: Counter: 16 points, Internal relay: 128 points, Data register: 315 words EtherNet/IP parameter (session timer) Backup can be performed in units of 2K words in data registers by using the tool software or by the F-ROM read/write (F12 / P13) instruction.	
Battery backup	Hold areas or non-hold areas can be specified by setting the system registers.	
Battery lifetime	5 years or more in the actual use condition (operating 8 hours a day)	

(Note 1) When the system register no.0 (sequence program capacity setting) is changed, the data register (DT) capacity also changes.

System register no. 0: Program capacity	Data register capacity
24	65533 words
32	32765 words
40	24573 words
64	12285 words

(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 combination.

(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) There are following three types of interval settings of interrupt periodical programs.

0.1 ms unit / 0.5 ms unit / 10 ms unit

(Note 6) 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 7) 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 8) 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.

12.2 Communication Function Specifications

12.2.1 Communication Specifications of Control Unit

■ USB port (for tool software)

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

■ COM0 port

Item	Specifications
Interface	RS-232C (3-wire type) x 1 channel
Transmission distance	15 m(Note 1)
Baud rate	1200(Note 2), 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 307200 bit/s
Communication method	Half-duplex transmission
Synchronization scheme	Start-stop synchronous communication
Transmission format	Data length: 7 bits / 8 bits; Stop bit: 1 bit / 2 bits; Parity: None / Yes (Odd / Even) Header: No STX / STX; Terminator: CR / CR+LF / None / ETX
Data transmission order	Transmits from bit 0 character by character.
Communication function	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 bits/s or higher, use a cable not longer than 3 m. For RS-232C cables, shielded cables must be used to enhance the noise resistance.

(Note 2) Can be set for C40ET and C60ET only. Settings can be specified using the SYS1 instruction.

■ LAN port

C40ET and C60ET Control Units are equipped with a LAN port.

Item	Specifications
Interface	100BASE-TX / 10BASE-T
Baud rate	100 Mbps / 10 Mbps automatic negotiation(Note 1)
Total cable length	100 m (500 m when using a repeater)(Note 2)
No. of simultaneous connections	User connection: 9 connections
	System connection: 1 connection(Note 3)
Communication method	Full-duplex / half-duplex transmission

Item	Specifications
Communication protocol	TCP/IP, UDP
DNS	Name server supported
DHCP	IP address automatic acquisition
SNTP	Time adjustment function
General-purpose communication	4 kilobytes per connection (Transmission: 2 kilobytes, Reception: 4 kilobytes)
Communication function	MEWTOCOL-COM (master / slave) (Computer link) MODBUS TCP (master / slave) MEWTOCOL-DAT (master / slave) General-purpose communication MC protocol (master / slave)(Note 4) EtherNet/IP

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

(Note 2) The standard maximum length is 100 m, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. We recommend that the cable length be made no more than 10 m by installing a hub near the control panel.

(Note 3) This is used when the tool software is connected via LAN.

(Note 4) MC protocol is an abbreviation for MELSEC Communication Protocol and MELSEC is a registered trademark of Mitsubishi Electric Corporation. Only QnA compatible 3E frame and binary (bulk read and bulk write) can be used.

12.2.2 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 x1 channel (Note 2)(Note 3)	RS-485 x 1 channel, RS-232C (3-wire type) x 1 channel (Note 3)	RS-485 x 2 channels (Note 3)
Transmission distance	When using 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	1200(Note 7), 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 307200 bit/s				
Communication method	Half-duplex transmission				
Synchronization scheme	Start-stop synchronous communication				

Item	Specifications				
	AFPX-COM1 AFPX-COM5	AFPX-COM2	AFPX-COM3	AFPX-COM4	AFPX-COM6
Transmission format	Data length: 7 bits / 8 bits; Stop bit: 1 bit / 2 bits; Parity: None / Yes (Odd / Even) Header: No STX / STX; Terminator: CR / CR+LF / None / ETX				
Data transmission order	Transmits from bit 0 character by character.				
Communication function and number 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				

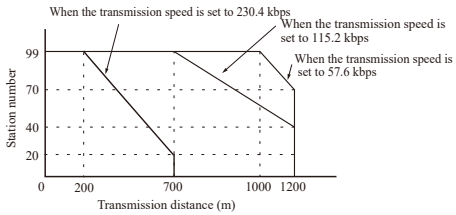
(Note 1) The AFPX-COM1 is a 5-wire type. When using it as a 3-wire type, short-circuit the RS-CS terminal.

(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 bits/s or higher, use a cable not longer than 3 m. For RS-232C cables, shielded cables must be used to enhance the noise resistance.

(Note 5) The transmission distance is limited by the transmission speed and the number of connected units at the time of RS-485 setup, as below. For the transmission speed of 38400 bits/s or lower, the maximum transmission distance is 1200 m and the maximum number of connected units is 99. When the units are used in combination with C-NET adapters, the maximum number of connected units is limited to 32, and the transmission speed is limited to 19200 bits/s or lower.



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(Note 6) The SI-35 converter manufactured by Lineeye Co., Ltd. is recommendable as the RS-485 converter on the PC side.

(Note 7) Can be set for C40ET and C60ET only. Settings can be specified using the SYS1 instruction.

■ 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)

Item	Specifications	
	AFPX-COM5	
Communication protocol	TCP/IP, UDP/IP, ICMP, ARP, DHCP	
Function	Auto-negotiation function MDI / MDI-X Auto-crossover function	
Communication function	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 standard maximum length is 100 m, but noise resistance measures such as attaching a ferrite core may be necessary in some cases, depending on the usage environment. We recommend that the cable length be made no more than 10 m by installing a hub near the control panel.

12.3 Operation Memory Area

■ List of operation memory areas

Item		Specifications			
		C14	C30 / C40 / C60	C40ET / C60ET	C38AT
Relay	External input (X) (Note 1)	1760 points (X0 to X109F)			2016 points (X0 to X125F)
	External output (Y) (Note 1)	1760 points (Y0 to Y109F)			2016 points (Y0 to Y125F)
	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)		800 points (R9000 to R951F)	
Memory area	External input (WX)	110 words (WX0 to WX109)			126 words (WX0 to WX125)
	External output (WY)	110 words (WY0 to WY109)			126 words (WY0 to WY125)
	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)	12285 words (DT0 to DT12284) 24573 words (DT0 to DT24572) 32765 words (DT0 to DT32764) 65533 words (DT0 to DT65532)	
	Special data register (DT)	500 words (DT90000 to DT90499)		1000 words (DT90000 to DT90999)	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)			

Item		Specifications			
		C14	C30 / C40 / C60	C40ET / C60ET	C38AT
Constants	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 combination.

(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 the system register no.0 (sequence program capacity setting) is changed, the data register (DT) capacity also changes.

Program capacity		24K	32K	40K	64K
Data register capacity	C30 / C40 / C60	65533 words	32765 words	12285 words	No setting
	C38AT / C40ET / C60ET	65533 words	32765 words	24573 words	12285 words

(Note 5) For details on retention and non-retention areas, refer to “"6.1 Memory Backup"”.

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

12.4 List of System Registers

12.4.1 List of System Registers (C14, C30, C40, C60)

	No.	Name	Default	Setting range and description	
Memory allocation	0	Setting of sequence program area size	16	C14: 16k words (fixed)	
			32	C30 / C40 / 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	Starting word No. of internal relay hold area	504	0 to 512	
	8	Hold type area starting address for data registers	C14: 12230 C30 / C40 / 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 address setting for link relays for PC (PLC) link W0-0	64	0 to 64	
	11	Hold type area starting address setting for link relays for PC (PLC) link W0-1	128	64 to 128	
	12	Hold type area starting address setting for link data registers for PC (PLC) link W0-0	128	0 to 128	
	13	Hold type area starting 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 retain 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 an optional 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)	Normal	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 address setting 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 address setting 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" in the system register No. 37 (Task time priority setting), 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 as 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
			CH:1 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 settings 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 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 settings of CH1, CH3, CH5 and CH7 are invalid.

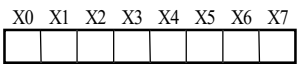
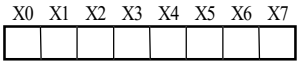
(Note 2) The hard reset input of the high-speed counter is available only for CH0 and CH2. X6 can be allocated to CH0 and X7 can be allocated to CH2.

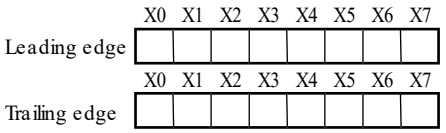
(Note 3) If the same input is set to the high-speed counter, pulse catch, and interrupt input, the priority order is as follows: 1. High-speed counter, 2. Pulse catch, 3. Interrupt input.

<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.

	No.	Name	Default	Setting range and description
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

	No.	Name	Default	Setting range and description
			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 (Y100 to Y101)	CH0: Normal output	Normal output (Y100, 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 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)

	No.	Name	Default	Setting range and description
				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) 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

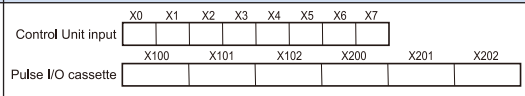
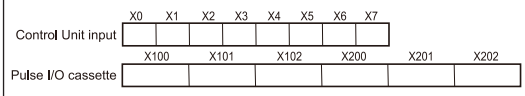
	No.	Name	Default	Setting range and description
Control Unit input settings (HSC)	402	High-speed counter setting (X0 to X7)	CH0: Not Set X0 as High Speed Counter	Not Set X0 as High Speed Counter Addition input (X0) Subtraction input (X0) 2 phase input (X0, X1)
			CH:1 Not Set X1 as High Speed Counter	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 Addition input (X2) Subtraction input (X2)

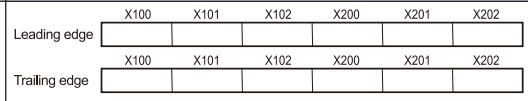
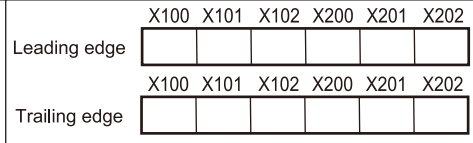
	No.	Name	Default	Setting range and description
			Not Set X2 as High Speed Counter	2 phase input (X2, X3)
			CH3: Not Set X3 as High Speed Counter	Not Set X3 as High Speed Counter Addition input (X3) Subtraction input (X3) 2 phase input (X2, X3)
			CH4: Not Set X4 as High Speed Counter	Not Set X4 as High Speed Counter Addition input (X4) Subtraction input (X4) 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.

	No.	Name	Default	Setting range and description
Interrupt edge settings	405	Control Unit input interrupt edge settings	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: 7 bits / 8 bits Parity check: None / Odd / Even Stop bit: 1 / 2 Terminator selection: Code / Time Terminator: CR / CR+LF / None Header: No STX / STX
	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 number during general-purpose communication	0	0 to 65532
	417	(COM1) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	418	(COM2)	2048	0 to 65532

	No.	Name	Default	Setting range and description
		Receive buffer starting number during general-purpose communication		
	419	(COM2) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	420	(COM0) Receive buffer starting number during general-purpose communication	4096	0 to 65532
	421	(COM0) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	422	(COM3) Receive buffer starting number during general-purpose communication	6144	0 to 65532
	423	(COM3) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	424	(COM0) Terminator judgment time (x 0.01 ms)	0	0 or 1 to 10000 (0.01 ms to 100 ms) When terminator judgment time is 0, transmission time is that for approx. 4 bytes.
	425	(COM1) Terminator judgment time (x 0.01 ms)	0	
	426	(COM2) Terminator judgment time (x 0.01 ms)	0	
	427	(COM3) Terminator judgment 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) "Terminator selection", "Terminator", and "Header" can be set in "Transmission format" (No. 413) only when "General-purpose communication" is selected in "Communication mode" (No. 412). Moreover, No. 424 to No. 427 can be set only when "Terminator selection" is set to "Time" in No. 413.

(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 system register No. 48 in "PC link W0-0 setting".

	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		
	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		

12.4.2 List of System Registers (C38AT)

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
Memory allocation	0	Setting of sequence program area size	32	24, 32, 40, 64K words (Note 1)(Note 2)	
	1	Internal relay area size	8192	4096, 8192(Note 3)	
	3	Compatible mode setting	0	0: FP-XH Mode, 1: FP-X Mode(Note 5)	
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 10244(Note 2)(Note 4)	
	7	Starting word No. of internal relay hold area	FP-XH Mode: 248,504 FP-X Mode: 248	0 to 512(Note 2)(Note 4)	0 to 256(Note 2)(Note 4)
	8	Hold type area starting address for data registers	FP-XH Mode: 11970,	0 to 65533(Note 2)(Note 4)	0 to 32765(Note 2)(Note 4)

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
			24258, 32450, 65218 FP-X Mode: 32710		
	14	Holding the step ladder	Non-hold	Hold / Non-hold(Note 2)(Note 4)	
	4	Leading edge detection of the differential instruction during MC holds the previous value	Hold	Hold / Non-hold(Note 2)(Note 4)	
Hold / Non-hold 2	10	Hold type area starting address setting for link relays for PLC link W0-0	64	0 to 64	
	11	Hold type area starting address setting for link relays for PLC link W0-1	128	64 to 128	
	12	Hold type area starting address for link data registers for PLC link W0-0	128	0 to 128	
	13	Hold type area starting address for link data registers for PLC link W0-1	256	128 to 256	

(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.

(Note 5) Values cannot by changed to other values through online rewriting (WR: system register rewriting, 0F: system register initializing). When changing the system register no. 3, use ROM data writing (02 command). In the FP-X mode, system register no.0 (Setting of sequence program area size) cannot be set to a value larger than 32.

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
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	
				FP-XH Mode	FP-X Mode
				Yes The self-diagnostic error is notified in case of battery error, and the "ERR.LED" flashes.	
	39	Stop operation when output circuit overcurrent is detected	Stop	Stop / Run	
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	
	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.

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
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	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	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)	
			CH3: Not Set X3 as High Speed Counter	Not Set X3 as High Speed Counter Addition input (X3) Subtraction input (X3)	

(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.

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
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.

(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.

	No.	Name		Default	Setting range and description	
					FP-XH Mode	FP-X Mode
Control Unit output settings (PLS / PWM)	407	Positioning control mode setting		Table setting mode(Note 4)	Table setting mode FP-X compatible instruction mode	
	402	Pulse / PWM output setting (Y0 to Y7)	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)	
Interrupt / pulse catch settings	403	Pulse catch input setting		Not set	X0 X1 X2 X3 X4 X5 X6 X7 Controller input The pressed contact is set as pulse catch input.	
	404	Interrupt input settings		Not set	X0 X1 X2 X3 X4 X5 X6 X7 Controller input The pressed contact is set as pulse catch input.	
Interrupt edge setting	405	Control Unit input interrupt Edge settings		Leading edge	X0 X1 X2 X3 X4 X5 X6 X7 Leading edge X0 X1 X2 X3 X4 X5 X6 X7 Trailing 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.

(Note 4) If the FP-X Mode is selected in system register no. 3, the table setting mode cannot be used.

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
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 number during general-purpose communication	0	0 to 65532(Note 4)	
	417	(COM1) Receive buffer capacity during general-purpose communication	2048	0 to 2048	
	418	(COM2) Receive buffer starting number during general-purpose communication	2048	0 to 65532(Note 4)	
	419	(COM2) Receive buffer capacity during general-purpose communication	2048	0 to 2048	
	420	(COM0) Receive buffer starting number during general-purpose communication	4096	0 to 65532(Note 4)	
	421	(COM0) Receive buffer capacity during general-purpose communication	2048	0 to 2048	
	422	(COM3) Receive buffer starting number during general-purpose communication	6144	0 to 65532(Note 4)	
	423	(COM3)	2048	0 to 2048	

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
		Receive buffer capacity during general-purpose communication			
	424	(COM0) Terminator judgment 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 judgment time (x 0.01 ms)	0		
	426	(COM2) Terminator judgment time (x 0.01 ms)	0		
	427	(COM3) Terminator judgment 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.

(Note 4) The set value range varies as follows according to the value of the system register no. 0.

24Kstep: 0 to 65532, 32Kstep: 0 to 32764, 40Kstep: 0 to 24572, 64Kstep: 0 to 12284

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
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			
	435	Time constant setting of Control Unit input 3 X14 to X17			

	No.	Name	Default	Setting range and description	
				FP-XH Mode	FP-X Mode
Analog input range setting	450	Analog input range CH0	0 to 10 V	Do not use 0 to 10 V 0 to 5 V 0 to 20 mA -10 V to +10 V -5 V to +5 V 1 V to 5 V 4 to 20 mA	Invalid
		Analog input range CH1			
		Analog input range CH2			
		Analog input range CH3			
Analog output range setting	451	Analog input range CH0	0 to 10 V	Do not use 0 to 10 V 0 to 5 V 0 to 20 mA -10 V to +10 V -5 V to +5 V 1 V to 5 V 4 to 20 mA	Invalid
		Analog input range CH1			
Compatible mode	3	Compatible mode setting	FP-XH Mode	FP-XH Mode FP-X Mode	

12.4.3 List of System Registers (C40ET, C60ET)

	No.	Name	Default	Setting range and description	
Memory allocation	0	Setting of sequence program area size	32	24, 32, 40, 64k 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	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	

	No.	Name	Default	Setting range and description	
Hold / Non-hold 2	10	Hold type area starting address setting for link relays for PC (PLC) link W0-0	64	0 to 64	
	11	Hold type area starting address setting for link relays for PC (PLC) link W0-1	128	64 to 128	
	12	Hold type area starting address setting for link data registers for PC (PLC) link W0-0	128	0 to 128	
	13	Hold type area starting 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	
	24	Stop operation when configuration data error / initialization request 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	
	27	Stop operation when network 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.
				Yes:	The self-diagnostic error is notified in case of battery error, and the "ERR.LED" flashes.
	39	Stop operation when output circuit overcurrent is detected	Stop	Stop / Run	

(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) System register No.1: Select "4096" points if the internal relay capacity is required to be compatible with the hold area when the power supply to the conventional FP-X Control Unit is turned off.

(Note 4) The data in the range set by the system register is retained only when an optional 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 600 ms: Scan at a specified time interval

	No.	Name	Default	Setting range and description
	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)	Normal	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 address setting 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 address setting 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
	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" in the system register No. 37 (Task time priority setting), 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 as for the COM0 port and COM1 port settings.

	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
			CH:1 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 settings 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 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 settings 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.

	No.	Name		Default	Setting range and description
Control Unit output settings (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	X0 X1 X2 X3 X4 X5 X6 X7 Controller input The pressed contact is set as pulse catch input.
	404	Interrupt input settings		Not set	X0 X1 X2 X3 X4 X5 X6 X7 Controller input The pressed contact is set as pulse catch input.
Interrupt edge setting	405	Control Unit input interrupt Edge settings		Leading edge	X0 X1 X2 X3 X4 X5 X6 X7 Leading edge X0 X1 X2 X3 X4 X5 X6 X7 Trailing 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.

	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: 7 bits / 8 bits Parity check: None / Odd / Even Stop bit: 1 / 2 Terminator selection: Code / Time Terminator: CR / CR+LF / None Header: No STX / STX
	415 (Note 1)	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 number during general-purpose communication	0	0 to 65532
	417	(COM1) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	418	(COM2) Receive buffer starting number during general-purpose communication	2048	0 to 65532
	419	(COM2) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	420	(COM0) Receive buffer starting number during general-purpose communication	4096	0 to 65532
	421	(COM0) Receive buffer capacity during general-purpose communication	2048	0 to 2048
	422	(COM3)	6144	0 to 65532

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

(Note 1) System register no. 415 cannot be used to set the baud rate to 1200 bps. To set the baud rate to 1200 bps, use the SYS1 instruction.

(Note 2) When computer link or MODBUS RTU is selected by no. 412 (Communication mode), no. 413 (Transmission format) and no. 415 (Baud rate) can be set.

(Note 3) "Terminator selection", "Terminator", and "Header" can be set in "Transmission format" (No. 413) only when "General-purpose communication" is selected in "Communication mode" (No. 412). Moreover, No. 424 to No. 427 can be set only when "Terminator selection" is set to "Time" in No. 413.

(Note 4) 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 system register No. 48 in "PC link W0-0 setting".

	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 0.1 ms 0.2 ms 0.5 ms 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		
	435	Time constant setting of Control Unit input 3		

	No.	Name	Default	Setting range and description
		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		

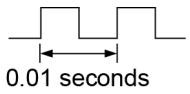
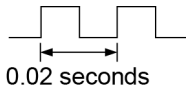
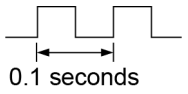
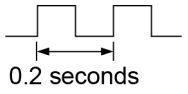
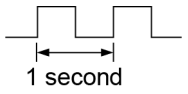
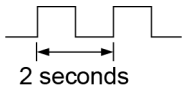
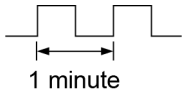
12.5 List of Special Relays

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. → Turns 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 underflow occurs or when a shift system instruction is executed.
R900A	> flag	Turns ON if the execution result of a comparison instruction is "greater than the compared value".
R900B	= flag	Turns ON if the execution result of a comparison instruction is "equal to the compared value". Turns ON if the execution result of an operation instruction is "0".
R900C	< flag	Turns ON if the execution result of a comparison instruction is "less than the compared value".
R900D	Auxiliary timer contact	Turns ON when the specified time elapses after the auxiliary timer instruction (F137 / F138) is executed. This flag turns OFF when the execution condition becomes unmatched.
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 the constant scan is executed. 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, timer / counter contacts, etc.
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 operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R9033	Print instruction execution flag	OFF: Instruction not active ON: Instruction in progress
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 when a transmission error occurs during data communication. Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9038 (R913A)	COM1 port reception done flag during general-purpose communication	Turns ON when the terminator (end code) is received during general-purpose communication.
R9039 (R913B)	COM1 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication. Turns OFF when transmission is requested during 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 terminator (end code) is received during general-purpose communication.
R903F (R9133)	COM0 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication. Turns OFF when transmission is requested during 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 operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R9041 (R913E)	COM1 port PC (PLC) link flag	Turns ON when the PC (PLC) link function is used.
R9042 (R9141)	COM2 port operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R9043	Not used	
R9044 (R913C)	COM1 port SEND / RECV instruction executable 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 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 when a transmission error occurs during data communication. Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9048 (R9142)	COM2 port reception done flag during general-purpose communication	Turns ON when the terminator (end code) is received during general-purpose communication.
R9049 (R9143)	COM2 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication.

Relay no.	Name	Description
		Turns OFF when transmission is requested during general-purpose communication.
R904A (R9144)	COM2 port SEND / RECV instruction executable 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 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) link area.
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 the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9061		Unit No. 2	Unit No. 2: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9062		Unit No. 3	Unit No. 3: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9063		Unit No. 4	Unit No. 4: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF

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

Relay no.	Name		Description
R906E		Unit No. 15	Unit No. 15: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R906F		Unit No. 16	Unit No. 16: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: 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 Unit No. 1 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9071		Unit No. 2	Turns ON when Unit No. 2 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9072		Unit No. 3	Turns ON when Unit No. 3 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9073		Unit No. 4	Turns ON when Unit No. 4 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9074		Unit No. 5	Turns ON when Unit No. 5 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9075		Unit No. 6	Turns ON when Unit No. 6 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9076		Unit No. 7	Turns ON when Unit No. 7 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9077		Unit No. 8	Turns ON when Unit No. 8 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9078		Unit No. 9	Turns ON when Unit No. 9 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9079		Unit No. 10	Turns ON when Unit No. 10 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907A		Unit No. 11	Turns ON when Unit No. 11 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907B		Unit No. 12	Turns ON when Unit No. 12 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907C		Unit No. 13	Turns ON when Unit No. 13 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907D		Unit No. 14	Turns ON when Unit No. 14 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R907E		Unit No. 15	Turns ON when 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 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 the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9081		Unit No. 2	Unit No. 2: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9082		Unit No. 3	Unit No. 3: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9083		Unit No. 4	Unit No. 4: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9084		Unit No. 5	Unit No. 5: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9085		Unit No. 6	Unit No. 6: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9086		Unit No. 7	Unit No. 7: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9087		Unit No. 8	Unit No. 8: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9088		Unit No. 9	Unit No. 9: When the unit is normally communicating in the PC (PLC) link mode: ON

Relay no.	Name		Description
			When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R9089		Unit No. 10	Unit No. 10: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R908A		Unit No. 11	Unit No. 11: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R908B		Unit No. 12	Unit No. 12: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R908C		Unit No. 13	Unit No. 13: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R908D		Unit No. 14	Unit No. 14: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R908E		Unit No. 15	Unit No. 15: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: OFF
R908F		Unit No. 16	Unit No. 16: When the unit is normally communicating in the PC (PLC) link mode: ON When the unit is stopped, an error has occurred, or the PC (PLC) link has not been established: 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 Unit No. 1 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9091		Unit No. 2	Turns ON when Unit No. 2 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9092		Unit No. 3	Turns ON when Unit No. 3 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9093		Unit No. 4	Turns ON when 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 Unit No. 5 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9095		Unit No. 6	Turns ON when Unit No. 6 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9096		Unit No. 7	Turns ON when Unit No. 7 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9097		Unit No. 8	Turns ON when Unit No. 8 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9098		Unit No. 9	Turns ON when Unit No. 9 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R9099		Unit No. 10	Turns ON when Unit No. 10 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909A		Unit No. 11	Turns ON when Unit No. 11 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909B		Unit No. 12	Turns ON when Unit No. 12 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909C		Unit No. 13	Turns ON when Unit No. 13 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909D		Unit No. 14	Turns ON when Unit No. 14 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909E		Unit No. 15	Turns ON when Unit No. 15 is in RUN mode. Turns OFF when the unit is in PROG. mode.
R909F		Unit No. 16	Turns ON when 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 R9107	Not used	
R9108	Hold area data error flag (C40ET and C60ET only)	Turns ON when a battery runs out and data cannot be held, and turns OFF when the power supply turns OFF. ON: When an error occurs OFF: When no error exists
R9109	Memory configuration mismatch detection flag (C40ET and C60ET only)	Turns ON when a memory configuration inconsistency is detected. This flag is OFF when memory configuration is normal. ON: When an error occurs OFF: When no error exists
R9110 to R910B	Not used	
R910C	Overcurrent detection state (C38AT, C40ET, C60ET only)	ON: Overcurrent detection OFF: Normal state
R910D to	Not used	

Relay no.	Name		Description
R910F			
R9110	High-speed counter control flag	HSC-CH0	Turns ON while the F166 (HC1S) or F167 (HC1R) instruction is being executed when the high-speed counter function is used. This flag 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	
R911C	Pulse output control flag	PLS-CH0	When the pulse output function or PWM output function is used with the F17x instruction, these flags turn ON while pulses are being output after the F171 (SPDH), F172 (PLSH), F173 (PWMH), F174 (SP0H) or F175 (SPSH) instruction is executed. They turn OFF when the operation is 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. Not used for C38AT.

WR913 (Specified in units of words)

Relay no.	Name	Description
R9130 (R900E)	COM0 port communication error flag	Turns ON when a transmission error occurs during data communication. Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9131 (R9040)	COM0 port operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R9132 (R903E)	COM0 port reception done flag during general-purpose communication	Turns ON when the terminator (end code) is received during general-purpose communication.
R9133 (R903F)	COM0 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication. Turns OFF when transmission is requested during general-purpose communication.

Relay no.	Name	Description
R9134	COM0 port SEND / RECV instruction executable 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 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 the PC (PLC) link function is used.
R9137	Not used	
R9138 (R9037)	COM1 port communication error flag	Turns ON when a transmission error occurs during data communication. Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9139 (R9032)	COM1 port operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R913A (R9038)	COM1 port reception done flag during general-purpose communication	Turns ON when the terminator (end code) is received during general-purpose communication.
R913B (R9039)	COM1 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication. Turns OFF when transmission is requested during general-purpose communication.
R913C (R9044)	COM1 port SEND / RECV instruction executable 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 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 the PC (PLC) link function is used.
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 when a transmission error occurs during data communication.

Relay no.	Name	Description
		Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9141 (R9042)	COM2 port operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R9142 (R9048)	COM2 port reception done flag during general-purpose communication	Turns ON when the terminator (end code) is received during general-purpose communication.
R9143 (R9049)	COM2 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication. Turns OFF when transmission is requested during general-purpose communication.
R9144 (R904A)	COM2 port SEND / RECV instruction executable 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
R9145 (R904B)	COM2 port SEND / RECV instruction 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 when a transmission error occurs during data communication. Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9149	COM3 port operation mode flag	Turns ON when the general-purpose communication function is used. Turns OFF when functions other than general-purpose communication are used.
R914A	COM3 port reception done flag during general-purpose communication	Turns ON when the terminator (end code) is received during general-purpose communication.
R914B	COM3 port transmission done flag during general-purpose communication	Turns ON when transmission is done during general-purpose communication. Turns OFF when transmission is requested during general-purpose communication.
R914C	COM3 port SEND / RECV instruction executable 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 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	

Relay no.	Name	Description
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 when a transmission error occurs during data communication. Turns OFF when transmission is requested using an F159 (MTRN) instruction.
R9151 to R9153	Not used	
R9154	COM4 port SEND / RECV instruction executable flag	Indicates whether the F145 (SEND) or F146 (RECV) instruction can be executed or not for the COM4 port. OFF: Not executable (Instruction is being executed) ON: Executable
R9155	COM4 port SEND / RECV instruction 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	

WR916 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name	Description
R9162	RTC error	Turns on if an error is detected in calendar timer data when the unit is powered on. Also, it turns on when inappropriate date and time are written during the operation. ON: When an error occurs OFF: When normal
R9166	SNTP time updating failure	Turns ON when acquisition of time data has failed during time synch via LAN port. This flag turns OFF when acquisition of time data is successful. ON: When acquisition of time data fails OFF: When acquisition of time data is successful (This error is cleared by error clearing processing.)
R9167	SNTP time update completed	Turns OFF while time is being updated via SNTP, and turns ON when the update is completed. ON: When update is completed OFF: While update is in progress

WR934 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name	Description
R9340	Ethernet cable disconnection detection	ON: Disconnected OFF: Connected
R9341	Ethernet initialization active	ON: Initialization in progress OFF: Initialization completed
R9342	IP address initialization	ON: Determined OFF: Undetermined
R9343 to R934F	Not used	-

WR935 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name	Description
R9350	EtherNet/IP Ready state completion flag	ON: ESDK online OFF: ESDK offline
R9351	EtherNet/IP All nodes normal communication active relay	ON: When normal OFF: When an error occurs
R9352	EtherNet/IP All nodes stop relay	ON: Stopped OFF: Not stopped
R9353	EtherNet/IP Abnormal node exists	ON: Exists OFF: Not exist
R9354	EtherNet/IP Start / stop control enabled	ON: Controllable OFF: Not controllable
R9355 to R935F	Not used	-

WR936 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name		Description
R9360	User connection 1	Communication error flag	Completion code: DT90840 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9361		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R9362		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R9363		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable

Relay no.	Name		Description
R9364		SEND / RECV instruction end flag	Completion code: DT90840 ON: Abnormal end (Communication error occurs) OFF: Normal end
R9365		Connection status flag	ON: Connected OFF: Not connected
R9366 to R9367	Not used		-
R9368	User connection 2	Communication error flag	Completion code: DT90841 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9369		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R936A		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R936B		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R936C		SEND / RECV instruction end flag	Completion code: DT90841 ON: Abnormal end (Communication error occurs) OFF: Normal end
R936D		Connection status flag	ON: Connected OFF: Not connected
R936E to R936F	Not used		-

WR937 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name		Description
R9370	User connection 3	Communication error flag	Completion code: DT90842 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9371		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R9372		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication

Relay no.	Name		Description
R9373		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R9374		SEND / RECV instruction end flag	Completion code: DT90842 ON: Abnormal end (Communication error occurs) OFF: Normal end
R9375		Connection status flag	ON: Connected OFF: Not connected
R9376 to R9377	Not used		-
R9378	User connection 4	Communication error flag	Completion code: DT90843 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9379		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R937A		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R937B		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R937C		SEND / RECV instruction end flag	Completion code: DT90843 ON: Abnormal end (Communication error occurs) OFF: Normal end
R937D		Connection status flag	ON: Connected OFF: Not connected
R937E to R937F	Not used		-

WR938 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name		Description
R9380	User connection 5	Communication error flag	Completion code: DT90844 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9381		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R9382		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication

Relay no.	Name		Description
			OFF: When transmission is requested during general-purpose communication
R9383		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R9384		SEND / RECV instruction end flag	Completion code: DT90844 ON: Abnormal end (Communication error occurs) OFF: Normal end
R9385		Connection status flag	ON: Connected OFF: Not connected
R9386 to R9387	Not used		-
R9388	User connection 6	Communication error flag	Completion code: DT90845 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9389		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R938A		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R938B		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R938C		SEND / RECV instruction end flag	Completion code: DT90845 ON: Abnormal end (Communication error occurs) OFF: Normal end
R938D		Connection status flag	ON: Connected OFF: Not connected
R938E to R938F	Not used		-

WR939 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name		Description
R9390	User connection 7	Communication error flag	Completion code: DT90846 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9391		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication

Relay no.	Name		Description
R9392		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R9393		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R9394		SEND / RECV instruction end flag	Completion code: DT90846 ON: Abnormal end (Communication error occurs) OFF: Normal end
R9395		Connection status flag	ON: Connected OFF: Not connected
R9396 to R9397	Not used		-
R9398	User connection 8	Communication error flag	Completion code: DT90847 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9399		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication OFF: When transmission is requested during general-purpose communication
R939A		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R939B		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R939C		SEND / RECV instruction end flag	Completion code: DT90847 ON: Abnormal end (Communication error occurs) OFF: Normal end
R939D		Connection status flag	ON: Connected OFF: Not connected
R939E to R939F	Not used		-

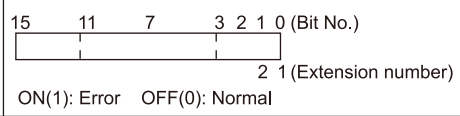
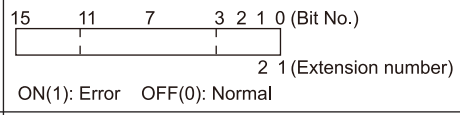
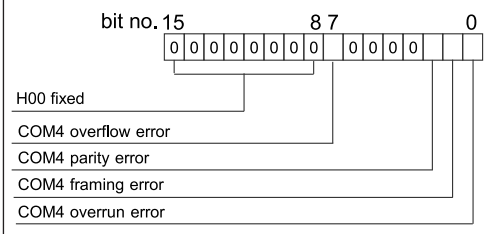
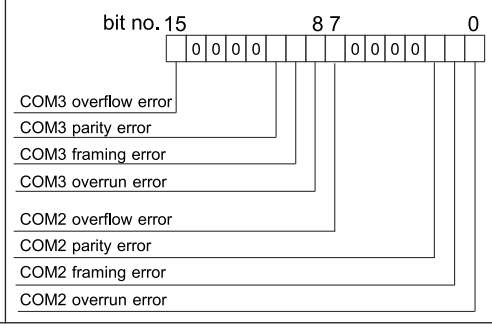
WR940 (Specified in units of words)

- C40ET and C60ET only

Relay no.	Name		Description
R9400	User connection 9	Communication error flag	Completion code: DT90848 ON: When a communication error occurs OFF: When transmission is requested using an F159 (MTRN) instruction
R9401		Reception done flag during general-purpose communication	ON: When the terminator (end code) is received during general-purpose communication

Relay no.	Name		Description
			OFF: When transmission is requested during general-purpose communication
R9402		Transmission done flag during general-purpose communication	ON: When transmission is completed during general-purpose communication OFF: When transmission is requested during general-purpose communication
R9403		SEND / RECV instruction executable flag	ON: Executable OFF: Not executable
R9404		SEND / RECV instruction end flag	Completion code: DT90848 ON: Abnormal end (Communication error occurs) OFF: Normal end
R9405		Connection status flag	ON: Connected OFF: Not connected
R9406 to R940F	Not used		-

12.6 List of Special Data Registers

Register no.	Name	Description	Read	Write
DT90000	Self-diagnosis error code	When a self-diagnostic error occurs, the error code is stored.	○	×
DT90001	Self-diagnosis error code details	When a self-diagnostic error occurs, the error code details are stored. (Supported errors only) (C40ET and C60ET only)	○	×
DT90002	Position where the Function Cassette I/O error occurred	When an error occurs in the Function Cassette, the corresponding bit turns ON.  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.  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 content of error during the use of COM4 port is stored. ON (1): Error, OFF (0): Normal 	○	×
DT90009	Communication error flag COM2 port / COM3 port	The content of error during the use of COM2 / COM3 port is stored. ON (1): Error, OFF (0): Normal 	○	×

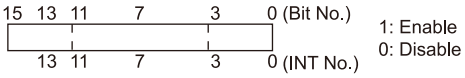
Register no.	Name	Description	Read	Write
DT90010	FP-X Expansion I/O verification mismatched unit position	When the installation state of FP-X Expansion I/O Unit changes from the state that it was in when the power was turned ON, the bit corresponding to the unit number turns ON (1). Monitor using binary 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 verification mismatched unit position	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 using binary 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. The value can be read and written by executing 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. The value can be read and written by executing the F1 (DMV) instruction.	○	○
DT90017	Address with operation error (Hold)	The address where the first operation error occurred after startup of 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		×	×

Register no.	Name	Description	Read	Write
DT90022	Scan time (Current value) (Note 1)	The current value of scan time is stored. [Stored value (decimal)] x 0.1 ms 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.

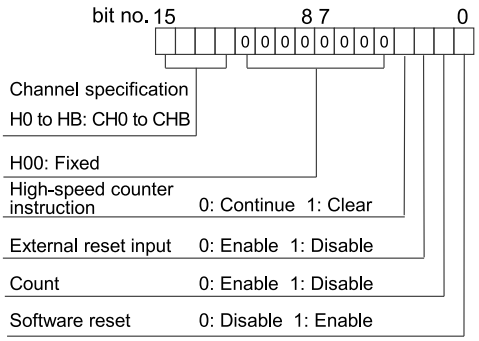
(Note 2) It is updated once at the beginning of every scan.

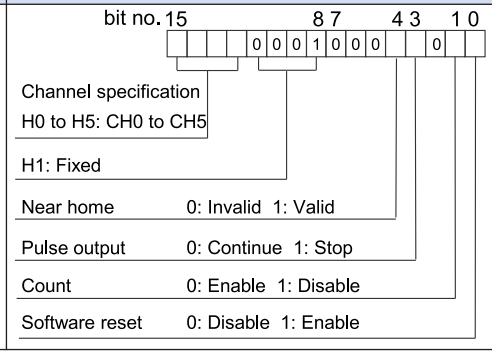
(Note 3) DT90020 is also updated when executing the F0 (MV), DT90020 and D instructions, therefore, it can be used for measuring a block time.

Register no.	Name	Description	Read	Write
DT90025	Interrupt enable (mask) status (INT0 to 13)	The content set by the ICTL instruction is stored. Monitor using binary 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. Characters are stored.	○	×
DT90031				
DT90032				
DT90033				
DT90034				
DT90035				

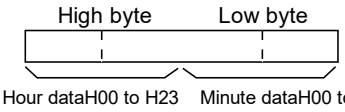
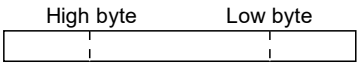
Register no.	Name	Description	Read	Write
DT90036	Not used		×	×
DT90037	Work 1 for search instruction	When executing the F96 (SRC) instruction, the number that matches the search data is stored.	○	×
DT90038	Work 2 for search instruction	When executing the F96 (SRC) instruction, the relative position that matches the search data is stored.	○	×
DT90039	Not used		×	×
DT90040	Potentiometer input	The value of potentiometer input (K0 to K4000) is stored.(Note 1) It can be applied to an analog timer, etc. by loading it into the data register using a user program.	○	×
DT90041 to DT90043	Not used		×	×
DT90044	System work	Used by the system.	○	×
DT90045 to DT90051	Not used		×	×

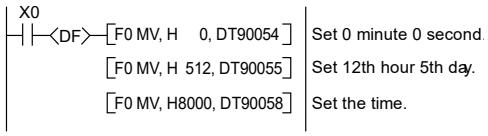
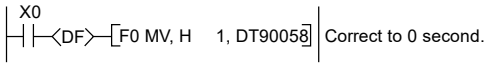
(Note 1) In the C38AT FP-XH mode, the range is K0 to K4000. In the FP-X mode, the range is K0 to K1000.

Register no.	Name	Description	Read	Write
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).	○	○

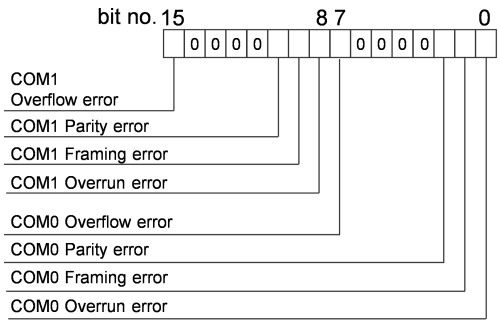
Register no.	Name	Description	Read	Write
				

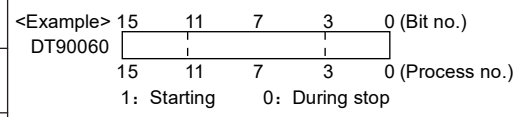
(Note 1) When selecting the positioning function in the table setting mode, the control using the pulse output control flag based on DT90052 cannot be performed.

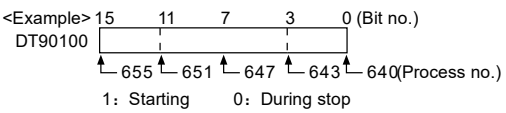
Register no.	Name	Description	Read	Write
DT90053	Real-time clock monitoring (hour and minute)	The hour and minute data of the real-time clock is stored. You can only read and cannot write. 	○	×
DT90054	Real-time clock (minute and second)	The year, month, day, hour, minute, second and day-of-the-week 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	Read	Write
		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.

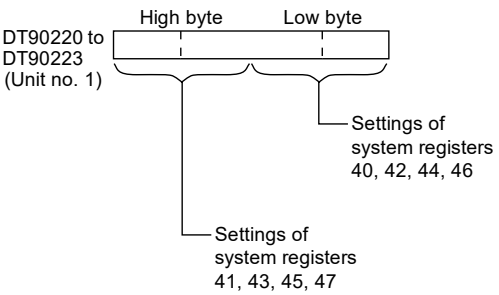
Register no.	Name	Description	Read	Write
DT90059	Communication error code COM0 port / COM1 port	When a communication error occurs, the error code is stored. ON (1): Error, OFF (0): Normal 	○	×
DT90060	Step ladder process (0 to 15)	Indicates the starting status of the step ladder process. When the process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

Register no.	Name	Description	Read	Write
DT90063	Step ladder process (48 to 63)	 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	Read	Write
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 using binary display. <Example>  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	Read	Write
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-order byte is not used.)			
DT90123	COM0 SEND / RECV instruction end code	When an error occurs during the execution of 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 I/O in-process unit number	Used by the system.	○	×
DT90127	COM3 SEND / RECV instruction end code	When an error occurs during the execution of the SEND / RECV instruction, the error code is stored.	○	×
DT90127	COM4 SEND / RECV instruction end code		○	×

Register no.	Name	Description	Read	Write
DT90128 to DT90139	Not used		×	×
DT90140	MEWNET-W0 PC (PLC) link 0 status	Number of times of reception via PC (PLC) link 0	○	×
DT90141		PC (PLC) link 0 reception interval (current value) (x2.5 ms)		
DT90142		PC (PLC) link 0 reception interval (minimum value) (x2.5ms)		
DT90143		PC (PLC) link 0 reception interval (maximum value) (x2.5ms)		
DT90144		Number of times of transmission via PC (PLC) link 0		
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	Number of times of reception via PC (PLC) link 1	○	×
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		Number of times of transmission via PC (PLC) link 1		
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	Work for measuring PC (PLC) link 0 reception interval	○	×
DT90157		Work for measuring PC (PLC) link 0 transmission interval		
DT90158	MEWNET-W0 PC (PLC) link 1 status	Work for measuring PC (PLC) link 1 reception interval	○	×
DT90159		Work for measuring PC (PLC) link 1 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>Read</th><th>Write</th></tr>
<tr><td>DT90171</td><td colspan="2" rowspan="9">PC (PLC) link 0 status</td><td>Number of lost tokens</td><td rowspan="9"></td><td rowspan="9"></td></tr>
<tr><td>DT90172</td><td>Number of duplicate tokens</td></tr>
<tr><td>DT90173</td><td>Number of no-signal states</td></tr>
<tr><td>DT90174</td><td>Number of times of reception of undefined commands</td></tr>
<tr><td>DT90175</td><td>Number of reception checksum errors</td></tr>
<tr><td>DT90176</td><td>Number of received data format errors</td></tr>
<tr><td>DT90177</td><td>Number of transmission errors</td></tr>
<tr><td>DT90178</td><td>Number of procedure errors</td></tr>
<tr><td>DT90179</td><td>Number 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 switching for 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="13">The settings of the system register related to the PC (PLC) function of each unit number are stored as below.
<Example>
When the content of DT90219 is 0:
 

If the content of the system register no. 46 of the master unit is the standard setting, the values in the master unit will be copied for system register nos. 46 and 47.
If the content of the system register no. 46 of the master unit is the reverse setting, the nos. 40 to 45 and 47 corresponding to those of the master unit will be 50 to 55 and 57, and 46 will be set as it is.
Also, the contents of the system register nos. 40 to 45 corresponding to those of other units will be the values obtained by correcting the received values, and the contents of nos. 46 and 57 of the master unit will be set for nos. 46 and 47.</td><td rowspan="13">○</td><td rowspan="13">×</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	Read	Write
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	Read	Write
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 DT90279	Not used			×	×
DT90280	Reading main CPU version		Valid only for the C38AT	○	×
DT90281	Reading sub CPU version		Valid only for the C38AT (Analog CPU version)	○	×
DT90282 to DT90298	Not used			×	×
DT90299	Memory configuration mismatch detail (C40ET and C60ET only)		Turns ON the bit corresponding to the function where a memory configuration inconsistency occurred. Bit 0: Logging trace Bit 1: FTP client Bit 4: EtherNet/IP	○	×

FP-XH relay type / transistor type (common)

Register no.	Name			Description	Read	Write
DT90300	Elapsed value area	Low-order word	HSC-CH0	The counting area of the high-speed counter Control Unit input CH0 (X0) or (X0, X1)	○	○
DT90301		High-order word			○	○
DT90302	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90303		High-order word			○	○
DT90304	Elapsed value area	Low-order word	HSC-CH1	The counting area of the high-speed counter Control Unit input (X1).	○	○
DT90305		High-order word			○	○

Register no.	Name			Description	Read	Write
DT90306	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90307		High-order word			○	○
DT90308	Elapsed value area	Low-order word	HSC-CH2	The counting area of the high-speed counter Control Unit input (X2) or (X2, X3).	○	○
DT90309		High-order word			○	○
DT90310	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90311		High-order word			○	○
DT90312	Elapsed value area	Low-order word	HSC-CH3	The counting area of the high-speed counter Control Unit input (X3).	○	○
DT90313		High-order word			○	○
DT90314	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90315		High-order word			○	○
DT90316	Elapsed value area	Low-order word	HSC-CH4	The counting area of the high-speed counter Control Unit input (X4) or (X4, X5).	○	○
DT90317		High-order word			○	○
DT90318	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90319		High-order word			○	○
DT90320	Elapsed value area	Low-order word	HSC-CH5	The counting area of the high-speed counter Control Unit input (X5).	○	○
DT90321		High-order word			○	○
DT90322	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○

Register no.	Name			Description	Read	Write
DT90323		High-order word			○	○
DT90324	Elapsed value area	Low-order word	HSC-CH6	The counting area of the high-speed counter Control Unit input (X6) or (X6, X7).	○	○
DT90325		High-order word			○	○
DT90326	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90327		High-order word			○	○
DT90328	Elapsed value area	Low-order word	HSC-CH7	The counting area of the high-speed counter Control Unit input (X7).	○	○
DT90329		High-order word			○	○
DT90330	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90331		High-order 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	Read	Write
DT90332	Elapsed value area	Low-order word	HSC-CH8	The counting area of the high-speed counter input (X100) or (X100, X101) of the pulse I/O cassette .	○	○
DT90333		High-order word			○	○
DT90334	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90335		High-order word			○	○
DT90336	Elapsed value area	Low-order word	HSC-CH9	The counting area of the high-speed counter input (X101) of the pulse I/O cassette .	○	○

Register no.	Name			Description	Read	Write
DT90337		High-order word			○	○
DT90338	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90339		High-order word			○	○
DT90340	Elapsed value area	Low-order word	HSC-CHA	The counting area of the high-speed counter input (X200) or (X200, X201) of the pulse I/O cassette .	○	○
DT90341		High-order word			○	○
DT90342	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90343		High-order word			○	○
DT90344	Elapsed value area	Low-order word	HSC-CHB	The counting area of the high-speed counter input (X201) of the pulse I/O cassette .	○	○
DT90345		High-order word			○	○
DT90346	Target value area	Low-order word		When executing the F166 (HC1S) or F167 (HC1R) instruction, the target value is set.	○	○
DT90347		High-order 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 used on the relay type Control Unit.

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

Register no.	Name			Description	Read	Write
DT90348	Elapsed value area	Low-order word	PLS-CH0	The counting area of the pulse output (Y100, Y101) of the pulse I/O cassette.	○	○
DT90349		High-order word			○	○

Register no.	Name			Description	Read	Write
DT90350	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90351		High-order word			○	○
DT90352	Elapsed value area	Low-order word	PLS-CH1	The counting area of the pulse output (Y200, Y201) of the pulse I/O cassette.	○	○
DT90353		High-order word			○	○
DT90354	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90355		High-order 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	Read	Write
DT90348	Elapsed value area	Low-order word	PLS-CH0	The counting area of the pulse output CH0 (Y0, Y1).	○	○
DT90349		High-order word			○	○
DT90350	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90351		High-order word			○	○
DT90352	Elapsed value area	Low-order word	PLS-CH1	The counting area of the pulse output CH1 (Y2, Y3)	○	○
DT90353		High-order word			○	○
DT90354	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90355		High-order word			○	○
DT90356	Elapsed value area	Low-order word	PLS-CH2	The counting area of the pulse output CH2 (Y4, Y5)	○	○
DT90357		High-order word			○	○

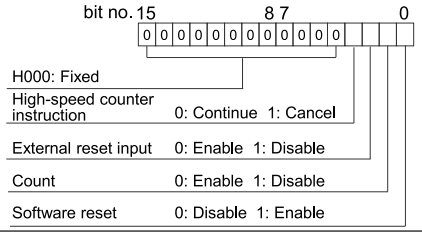
Register no.	Name			Description	Read	Write
DT90358	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90359		High-order word			○	○
DT90360	Elapsed value area	Low-order word	PLS-CH3	The counting area of the pulse output CH3 (Y6, Y7)	○	○
DT90361		High-order word			○	○
DT90362	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90363		High-order word			○	○
DT90364	Elapsed value area	Low-order word	PLS-CH4	The counting area of the pulse output CH4 (Y8, Y9)	○	○
DT90365		High-order word			○	○
DT90366	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90367		High-order word			○	○
DT90368	Elapsed value area	Low-order word	PLS-CH5	The counting area of the pulse output CH5 (YA, YB).	○	○
DT90369		High-order word			○	○
DT90370	Target value area	Low-order word		When executing the pulse output instruction (F17x), the target value is set.	○	○
DT90371		High-order 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.

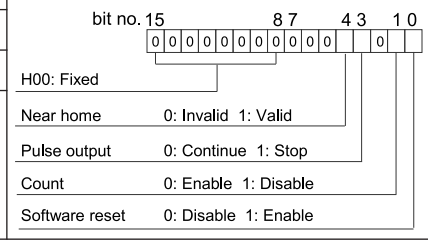
(Note 3) The target value area is set when the pulse output instruction F171(SPDH), F172(PLSH), F174(SP0H), or F175(SPSH) is executed. It cannot be written by a user program.

FP-XH relay type / transistor type (common)

Register no.	Name		Description	Read	Write
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		○	×

Register no.	Name		Description	Read	Write
DT90388		HSC-CH8		○	×
DT90389		HSC-CH9		○	×
DT90390		HSC-CHA		○	×
DT90391		HSC-CHB		○	×

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

Register no.	Name		Description	Read	Write
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).

C40ET and C60ET only

Register No.	Name	Description	Read	Write
DT90500 to DT90528	Not used	-	-	-
DT90529	Ethernet communication error code	Saves the error code when the Ethernet communication instruction is executed.	○	×
DT90530 to DT90589	Not used	-	-	-
DT90590	Details of network errors	**Error code** / **Details** 0x0001 Hardware fault 0x0002 Memory usage fault 0x0003 Bus fault 0x0004 Usage fault 0x1001 Startup initialization timeout 0x2001 SSL / TLS initialization failed (API) 0x2002 SSL / TLS initialization failed (FTP server) 0x2003 SSL / TLS session generation failed (FTP server)	○	×

<table>
<tr><th>Register No.</th><th>Name</th><th>Description</th><th>Read</th><th>Write</th></tr>
<tr><td></td><td></td><td><table><tr><th>Error code</th><th>Details</th></tr><tr><td>0x2004</td><td>SSL / TLS certificate reading failed (FTP server)</td></tr><tr><td>0x2006</td><td>SSL / TLS initialization failed (FTP client)</td></tr><tr><td>0x2007</td><td>SSL / TLS session generation failed (FTP client)</td></tr></table></td><td></td><td></td></tr>
<tr><td>DT90591 to DT90799</td><td>Not used</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>DT90800</td><td>User connection 1
Operation mode</td><td rowspan="10">The same value as that in the "Operation mode setting" of the user connection setting in the Ethernet configuration is stored. (When the power turns on, the same value as that in the configuration is set.)
When changing data by executing the F461 (CONSET) instruction, this area will also be updated.
00h: MEWTOCOL-COM
02h: MODBUS-TCP
03h: MEWTOCOL-DAT
08h: General-purpose communication
10h: MC protocol (QnA compatible 3E frame, binary)</td><td>○</td><td>×</td></tr>
<tr><td>DT90801</td><td>User connection 2
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90802</td><td>User connection 3
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90803</td><td>User connection 4
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90804</td><td>User connection 5
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90805</td><td>User connection 6
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90806</td><td>User connection 7
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90807</td><td>User connection 8
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90808</td><td>User connection 9
Operation mode</td><td>○</td><td>×</td></tr>
<tr><td>DT90809 to DT90839</td><td>Not used</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>DT90840</td><td>User connection 1
SEND / RECV / MTRN done code</td><td rowspan="5">When specifying the user connection for the F145 (SEND) / F146 (RECV) / F159 (MTRN) instruction, FFFFh is set when the connection is not established or disrupted. When the connection is completed normally, 0000h is set. All other values differ according to the protocol.</td><td>○</td><td>×</td></tr>
<tr><td>DT90841</td><td>User connection 2
SEND / RECV / MTRN done code</td><td>○</td><td>×</td></tr>
<tr><td>DT90842</td><td>User connection 3
SEND / RECV / MTRN done code</td><td>○</td><td>×</td></tr>
<tr><td>DT90843</td><td>User connection 4
SEND / RECV / MTRN done code</td><td>○</td><td>×</td></tr>
<tr><td>DT90844</td><td>User connection 5</td><td>○</td><td>×</td></tr>
</table>

Register No.	Name	Description	Read	Write
	SEND / RECV / MTRN done code			
DT90845	User connection 6 SEND / RECV / MTRN done code		○	×
DT90846	User connection 7 SEND / RECV / MTRN done code		○	×
DT90847	User connection 8 SEND / RECV / MTRN done code		○	×
DT90848	User connection 9 SEND / RECV / MTRN done code		○	×
DT90849 to DT90879	Not used	-	-	-
DT90890	Slot No.	The slot number specified by the F469 (UNITSEL) instruction is stored. Internal serial: K0 Internal Ethernet: K100 (64h)	○	×
DT90891	Channel No.	The channel number specified by the F469 (UNITSEL) instruction is stored. Internal serial: K0 to K2 (COM0 to COM2) Internal Ethernet: K1 to K9 (User connections 1 to 9)	○	×
DT90892 to DT90899	Not used	-	-	-
DT90900	Master unit MAC address	It is the same as the value read by the F465 (ETSTAT) instruction. (4 words) Example: When the MAC address is "00-C0-8F-64-09-18", "00-C0-8F" is vendor ID. It is stored as below. DT90900: 0918h DT90901: 8F64h DT90902: 00C0h	○	×
DT90901			○	×
DT90902			○	×
DT90903	Not used	-	-	-
DT90904	Master unit IPv4 address	It is the same as the value read by the F465 (ETSTAT) instruction. (3 words) Example: When the IPv4 address is "192.168.1.5", it is stored as below. DT90904: 192 DT90905: 168 DT90906: 1 DT90907: 5	○	×
DT90905			○	×
DT90906			○	×
DT90907			○	×
DT90908 to DT90999	Not used	-	-	-

12.7 List of Basic Instructions

■ Seq. basic inst.

Boolean	Name	Step	Remark
ST	Starting logic operation with Form A (normally open) contact(Note 1)	1(2)	
DST	Starting logic operation with Form A (normally open) contact: Direct input(Note 1)	2	
ST/	Starting logic operation with Form B (normally closed) contact(Note 1)	1(2)	
DST/	Starting logic operation with Form B (normally closed) contact: Direct input(Note 1)	2	
OT	Outputs operation result(Note 1)	1(2)	
DOT	Outputs operation result: Direct input(Note 1)	2	
/	Inversion	1	
AN	Serial connection of Form A (normally open) contact(Note 3)	1(2)	
DAN	Serial connection of Form A (normally open) contact: Direct input(Note 1)	2	
AN/	Serial connection of Form B (normally closed) contact(Note 3)	1(2)	
DAN/	Serial connection of Form B (normally closed) contact: Direct input(Note 1)	2	
OR	Parallel connection of Form A (normally open) contact(Note 3)	1(2)	
DOR	Parallel connection of Form A (normally open) contact: Direct input(Note 1)	2	
OR/	Parallel connection of Form B (normally closed) contact(Note 3)	1(2)	
DOR/	Parallel connection of Form B (normally closed) contact: Direct input(Note 1)	2	
ST ↑	Starting leading contact logic operation	2	
ST ↓	Starting trailing contact logic operation	2	
AN ↑	Leading contact serial connection	2	
AN ↓	Trailing edge serial connection	2	
OR ↑	Leading contact parallel connection	2	
OR ↓	Trailing contact parallel connection	2	
ALT	Alternative out	3	
ANS	Serial connection of multiple instruction blocks	1	
ORS	Parallel connection of multiple instruction blocks	1	
PSHS	Stores operation result	1	
RDS	Reads the operation result stored by the PSHS instruction.	1	
POPS	Reads and clears the operation result stored by the PSHS instruction.	1	

Boolean	Name	Step	Remark
DF	Leading edge detection	1	
DF/	Trailing edge detection	1	
DFI	Leading edge detection (First scan possible	1	
SET	Turning output ON and holding(Note 1)	3	
DSET	Turning output ON and holding: Direct output(Note 1)	3	
RST	Turning output OFF and holding(Note 1)	3	
DRST	Turning output Off and holding: Direct output(Note 1)	3	
KP	Output accompanied by set/reset input	1	
DKP	Output accompanied by set/reset input: Direct output	2	
NOP	No operation	1	

(Note 1) The instructions that enable the bit index modification.

(Note 2) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

(Note 3) The values in parentheses listed in the column of Step indicate the number of steps when the index modification is performed, or the device numbers are large (more than R1120, T256 or C256).

■ Basic function instructions

Boolean	Name	Step	Remark
TML	On-delay timer (0.001 sec)	3(4)	
TMR	On-delay timer (0.01 sec)	3(4)	
TMX	On-delay timer (0.1 sec)	3(4)	
TMY	On-delay timer (1 sec)	4(5)	
F137 STMR	Auxiliary timer (0.01 sec)	5	
F183 DSTM	Auxiliary timer (32-bit, 0.01 sec)	7	
CT	Down counter	3(4)	
F118 UDC	Up/Down counter	5	
SR	Shift register	1	
F119 LRSR	Left/Right shift register	5	
F182 FILTR	Time constant processing instruction S1, S2, S3, D	9	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

(Note 2) The values in parentheses listed in the column of Step indicate the number of steps when the index modification is performed, or the device numbers are large (more than R1120, T256 or C256).

■ Control instruction

Boolean	Name	Step	Remark
MC	Master control relay	2	
MCE	Master control relay end	2	

Boolean	Name	Step	Remark
JP	Jumping to a specified label	2	
LOOP	Jumping to a specified label for the number of times set to [D]	4	
LBL	Label for processing JP and LOOP instructions	1	
ED	End of main program area	1	
CNDE	Conditional end	1	
EJECT	NOP operation: Label for page break	2	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

(Note 2) The values in parentheses listed in the column of Step indicate the number of steps when the index modification is performed, or the device numbers are large (more than R1120, T256 or C256).

■ Step ladder instructions

Boolean	Name	Step	Remark
SSTP	Definition of process	3	
NSTL	Opens a step ladder process. (scan execution type)	3	
NSTP	Transition of process (Pulse type)	3	
CSTP	Clearance of process	3	
STPE	Step ladder area end	1	
SCLR	Clearance of multiple processes	5	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

■ Subroutine instructions

Boolean	Name	Step	Remark
CALL	Calling specified subroutine	2	
SUB	Definition of subroutine	1(2)	
RET	Exiting subroutine program and returning to main program	1	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

■ Interrupt instructions

Boolean	Name	Step	Remark
INT	Interrupt program definition	1	
IRET	Ending interrupt program and returning to main program	1	
ICTL	Specifies interrupt control.	5	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

■ Program block control instruction

Boolean	Name	Step	Remark
EDPB	End of the program of PBn.	1	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

■ Special setting instructions

Boolean	Name	Step	Remark
SYS1	Communication parameters, Time setting of end code of communication parameters, Password setting, Interrupt setting, PLC link setting, MEWTOCOL-COM response control, Changing high-speed counter operation mode, Direct unit number setting, Indirect unit number setting, Reading firmware version number	13	
SYS2	System register change instruction	7	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

■ Comparison contact instructions

Boolean	Name	Step	Remark
ST=	Starting 16-bit data comparison logic operation	5	
ST<>	Starting 16-bit data comparison logic operation	5	
ST>	Starting 16-bit data comparison logic operation	5	
ST>=	Starting 16-bit data comparison logic operation	5	
ST<	Starting 16-bit data comparison logic operation	5	
ST<=	Starting 16-bit data comparison logic operation	5	
AN=	16-bit data comparison serial connection	5	
AN<>	16-bit data comparison serial connection	5	
AN>	16-bit data comparison serial connection	5	
AN>=	16-bit data comparison serial connection	5	
AN<	16-bit data comparison serial connection	5	
AN<=	16-bit data comparison serial connection	5	
OR=	16-bit data comparison parallel connection	5	
OR<>	16-bit data comparison parallel connection	5	
OR>	16-bit data comparison parallel connection	5	
OR>=	16-bit data comparison parallel connection	5	
OR>	16-bit data comparison parallel connection	5	
OR<=	16-bit data comparison parallel connection	5	
STD=	Starting 32-bit data comparison logic operation	9	
STD<>	Starting 32-bit data comparison logic operation	9	

Boolean	Name	Step	Remark
STD>	Starting 32-bit data comparison logic operation	9	
STD>=	Starting 32-bit data comparison logic operation	9	
STD<	Starting 32-bit data comparison logic operation	9	
STD<=	Starting 32-bit data comparison logic operation	9	
AND=	32-bit data comparison serial connection	9	
AND<>	32-bit data comparison serial connection	9	
AND>	32-bit data comparison serial connection	9	
AND>=	32-bit data comparison serial connection	9	
AND<	32-bit data comparison serial connection	9	
AND<=	32-bit data comparison serial connection	9	
ORD=	32-bit data comparison parallel connection	9	
ORD<>	32-bit data comparison parallel connection	9	
ORD>	32-bit data comparison parallel connection	9	
ORD>=	32-bit data comparison parallel connection	9	
ORD<	32-bit data comparison parallel connection	9	
ORD<=	32-bit data comparison parallel connection	9	
STF=	Starting single-precision floating point data comparison logic operation	10	
STF<>	Starting single-precision floating point data comparison logic operation	10	
STF>	Starting single-precision floating point data comparison logic operation	10	
STF>=	Starting single-precision floating point data comparison logic operation	10	
STF<	Starting single-precision floating point data comparison logic operation	10	
STF<=	Starting single-precision floating point data comparison logic operation	10	
ANF=	Single-precision floating-point data comparison serial connection	10	
ANF<>	Single-precision floating-point data comparison serial connection	10	
ANF>	Single-precision floating-point data comparison serial connection	10	
ANF>=	Single-precision floating-point data comparison serial connection	10	
ANF<	Single-precision floating-point data comparison serial connection	10	
ANF<	Single-precision floating-point data comparison serial connection	10	
ORF=	Single-precision floating-point data comparison parallel connection	10	

Boolean	Name	Step	Remark
ORF<>	Single-precision floating-point data comparison parallel connection	10	
ORF>	Single-precision floating-point data comparison parallel connection	10	
ORF>=	Single-precision floating-point data comparison parallel connection	10	
ORF<	Single-precision floating-point data comparison parallel connection	10	
ORF<=	Single-precision floating-point data comparison parallel connection	10	

(Note 1) For the details of the instructions, refer to *FP0H Series Programming Manual (manual no. WUME-FP0HPGR)*.

12.8 List of High-level Instructions

■ Data transfer instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F0	MV	S, D	16-bit data transfer	5	
F0	MV	DT90020, D	10 μsec ring counter read	5	
F1	DMV	S, D	32-bit data transfer	7	
F2	MV/	S, D	16-bit data reverse and transfer	5	
F3	DMV/	S, D	32-bit data reverse and transfer	7	
F5	BTM	S, n, D	Bit data transfer	7	
F6	DGT	S, n, D	Digit data transfer	7	
F7	MV2	S1, S2, D	Two 16-bit data transfer to a single area	7	
F8	DMV2	S1, S2, D	Two 32-bit data transfer to a single area	11	
F10	BKMV	S1, S2, D	Data block transfer	7	
F11	COPY	S, D1, D2	16-bit data block copy	7	
F12	ICRD	S1, S2, D	Read FROM	11	
P13	PICWT	S1, S2, D	Write to FROM	11	
F15	XCH	D1, D2	16-bit data exchange	5	
F16	DXCH	D1, D2	32-bit data exchange	5	
F17	SWAP	D	Higher and lower byte exchange	3	
F18	BXCH	D1, D2, D3	Data block exchange	7	
F190	MV3	S1, S2, S3, D	Three 16-bit data transfer to a single area	10	
F191	DMV3	S1, S2, S3, D	Three 32-bit data transfer to a single area	16	

(Note 1) For details on the instructions, refer to the *FP-XH Programming Manual*.

■ Binary arithmetic operation instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F20	+	S, D	16-bit data addition [D+S=D]	5	
F21	D+	S, D	32-bit data addition [D+S=D]	7	
F22	+	S1, S2, D	16-bit data addition [S1+S2=D]	7	
F23	D+	S1, S2, D	32-bit data addition [S1+S2=D]	11	
F25	-	S, D	16-bit data subtraction [D-S=D]	5	
F26	D-	S, D	32-bit data subtraction [D-S=D]	7	
F27	-	S1, S2, D	16-bit data subtraction [S1-S2=D]	7	
F28	D-	S1, S2, D	32-bit data subtraction [S1-S2=D]	11	
F30	*	S1, S2, D	16-bit data multiplication [S1*S2=D+1,D]	7	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F31	D*	S1, S2, D	32-bit data multiplication [S1*S2=D+3,D+2,D+1,D]	11	
F32	%	S1, S2, D	16-bit data division [S1/S2=D]	7	
F33	D%	S1, S2, D	32-bit data division [S1/S2=D+1,D]	11	
F34	*W	S1, S2, D	16-bit data multiplication [S1*S2=D]	7	
F35	+1	D	16-digit data increment	3	
F36	D+1	D	32-digit data increment	3	
F37	-1	D	16-digit data decrement	3	
F38	D-1	D	32-digit data decrement	3	
F39	D*D	S1, S2, D	32-bit data multiplication [S1*S2=D+1,D]	11	

(Note 1) For details on the instructions, refer to the *FP-XH Programming Manual*.

■ BCD data arithmetic operation instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F40	B+	S, D	4-digit BCD data addition [D+S=D]	5	
F41	DB+	S, D	8-digit BCD data addition [D+S=D]	7	
F42	B+	S1, S2, D	4-digit BCD data addition [S1+S2=D]	7	
F43	DB+	S1, S2, D	8-digit BCD data addition [S1+S2=D]	11	
F45	B-	S, D	4-digit BCD data subtraction [D-S=D]	5	
F46	DB-	S, D	8-digit BCD data subtraction [D-S=D]	7	
F47	B-	S1, S2, D	4-digit BCD data subtraction [S1-S2=D]	7	
F48	DB-	S1, S2, D	8-digit BCD data subtraction [S1-S2=D]	11	
F50	B*	S1, S2, D	4-digit BCD data multiplication [S1*S2=D+1,D]	7	
F51	DB*	S1, S2, D	8-digit BCD data multiplication [S1*S2=D+3,D+2,D+1,D]	11	
F52	B%	S1, S2, D	4-digit BCD data division [S1/S2=D]	7	
F53	DB%	S1, S2, D	8-digit BCD data division [S1/S2=D+1,D]	11	
F55	B+1	D	4-digit BCD data increment	3	
F56	DB+1	D	8-digit BCD data increment	3	
F57	B-1	D	4-digit BCD data decrement	3	
F58	DB-1	D	8-digit BCD data decrement	3	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Data comparison instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F60	CMP	S1, S2	16-bit data comparison	5	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F61	DCMP	S1, S2	32-bit data comparison	9	
F62	WIN	S1, S2, S3	16-bit data band comparison	7	
F63	DWIN	S1, S2, S3	32-bit data band comparison	13	
F64	BCMP	S1, S2, S3	Block data comparison	7	
F373	DTR	S, D	16-bit data change detection	6	
F374	DDTR	S, D	32-bit data change detection	6	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Logic operation instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F65	WAN	S1, S2, D	16-bit data AND	7	
F66	WOR	S1, S2, D	16-bit data OR	7	
F67	XOR	S1, S2, D	16-bit data XOR	7	
F68	XNR	S1, S2, D	16-bit data XNOR	7	
F69	WUNI	S1, S2, S3, D	[(S1 AND S3) OR (S2 AND S3)=D](16-bit)	9	
F215	DAND	S1, S2, D	32-bit data AND	12	
F216	DOR	S1, S2, D	32-bit data OR	12	
F217	DXOR	S1, S2, D	32-bit data XOR	12	
F218	DXNR	S1, S2, D	32-bit data XNOR	12	
F219	DUNI	S1, S2, S3, D	[(S1 AND S3) OR (S2 AND S3)=D](32-bit)	16	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Data conversion instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F70	BCC	S1, S2, S3, D	Block check code (ADD.SUB, XOR, CRC)	9	
F71	HEXA	S1, S2, D	Hexadecimal data -> ASCII code	7	
F72	AHEX	S1, S2, D	ASCII code -> Hexadecimal data	7	
F73	BCDA	S1, S2, D	BCD data -> ASCII code	7	
F74	ABCD	S1, S2, D	ASCII code -> BCD data	7	
F75	BINA	S1, S2, D	16-bit binary data -> ASCII code	7	
F76	ABIN	S1, S2, D	ASCII code -> 16-bit binary data	7	
F77	DBIA	S1, S2, D	32-bit binary data -> ASCII code	11	
F78	DABI	S1, S2, D	ASCII code -> 32-bit binary data	11	
F80	BCD	S, D	16-bit binary data -> BCD data	5	
F81	BIN	S, D	BCD data -> 16-bit binary data	5	
F82	DBCD	S, D	32-bit binary data -> BCD data	7	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F83	DBIN	S, D	BCD data -> 32-bit binary data	7	
F84	INV	D	16-bit data inversion	3	
F85	NEG	D	16-bit data sign inversion	3	
F86	DNEG	D	32-bit data sign inversion	3	
F87	ABS	D	16-bit data absolute value	3	
F88	DABS	D	32-bit data absolute value	3	
F89	EXT	D	Sign extension	3	
F90	DECO	S, n, D	Decode	7	
F91	SEGT	S, D	7-segment decode	5	
F92	ENCO	S, n, D	Encode	7	
F93	UNIT	S, n, D	Digit combine	7	
F94	DIST	S, n, D	Digit split	7	
F96	SRC	S1, S2, S3	16-bit data search	7	
F97	DSRC	S1, S2, S3, S4	32-bit data search	9	
F230	TMSEC	S, D	Time data -> Seconds data conversion	6	
F231	SECTM	S, D	Seconds data -> Time data conversion	6	
F235	GRY	S, D	16-bit data -> Gray code	6	
F236	DGRY	S, D	32-bit data -> Gray code	8	
F237	GBIN	S, D	Gray code -> 16-bit data	6	
F238	DGBIN	S, D	Gray code -> 32-bit data	8	
F240	COLM	S1, S2, D	Bit line to bit column conversion	8	
F241	LINE	S1, S2, D	Bit column to bit line conversion	8	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Data shift instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F100	SHR	D, n	Right shift in 16-bit data	5	
F101	SHL	D, n	Left shift in 16-bit data	5	
F102	DSHR	D, n	Right shift in 32-bit data	5	
F103	DSHL	D, n	Left shift in 32-bit data	5	
F105	BSR	D	Right shift by one digit in 16-bit data	3	
F106	BSL	D	Left shift by one digit in 16-bit data	3	
F108	BITR	D1, D2, n	Bitwise right shift in block area	7	
F109	BITL	D1, D2, n	Bitwise left shift in block area	7	
F110	WSHR	D1, D2	Right shift by one word in block area	5	
F111	WSHL	D1, D2	Left shift by one word in block area	5	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F112	WBSR	D1, D2	Right shift by one digit in block area	5	
F113	WBSL	D1, D2	Left shift by one digit in block area	5	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Data rotate instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F120	ROR	D, n	16-bit data right rotation	5	
F121	ROL	D, n	16-bit data left rotation	5	
F122	RCR	D, n	16-bit data right rotation with carry flag data	5	
F123	RCL	D, n	16-bit data left rotation with carry flag data	5	
F125	DROR	D, n	32-bit data right rotation	5	
F126	DROL	D, n	32-bit data left rotation	5	
F127	DRCR	D, n	32-bit data right rotation with carry flag data	5	
F128	DRCL	D, n	32-bit data left rotation with carry flag data	5	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Data buffer instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F98	CMPR	D1, D2, D3	Data table shift-out and compress	7	
F99	CMPW	S1, D, S2	Data table shift-in and compress	7	
F115	FIFT	n, D	FIFO buffer definition	5	
F116	FIFR	S, D	Data read from FIFO buffer	5	
F117	FIFW	S, D	Data write to FIFO buffer	5	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Bit manipulation instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F130	BTS	D, n	Specified bit set	5	
F131	BTR	D, n	Specified bit reset	5	
F132	BTI	D, n	Specified bit inversion	5	
F133	BTT	D, n	Specified bit test	5	
F135	BCU	S, D	Counting of ON bits in 16-bit data	5	
F136	DBCU	S, D	Counting of ON bits in 32-bit data	7	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Special instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F138	HMSS	S, D	Hours, minutes, and seconds data to seconds data	5	
F139	SHMS	S, D	Seconds data to hours, minutes, and seconds data	5	
F140	STC		Carry flag set	1	
F141	CLC		Carry flag reset	1	
F143	IORF	D1, D2	Partial I/O refresh	5	
F145	SEND	S1, S2, D, N	Data send	9	
F146	RECV	S1, S2, N, D	Data receive	9	
F147	PR	S, D	Printout	5	
F148	ERR	n	Self-diagnostic error code set	3	
F149	MSG	S	Send characters to programming tool	13	
F150	READ	S1, S2, n, D	Read shared memory	9	
F151	WRT	S1, S2, n, D	Write data to shared memory	9	
F155	SMPL		Set data sampling	1	
F156	STRG		Sampling stop trigger	1	
F157	CADD	S1, S2, D	Calendar data addition	9	
F158	CSUB	S1, S2, D	Calendar data subtraction	9	
F159	MTRN	S, n, D	Serial port send instruction	7	
F160	DSQR	S, D	32-bit data square root	7	

(Note 1) Refer to the *FP-XH Programming Manual*.

(Note 2) For details on the F145 (SEND), F146 (RECV), and F159 (MTRN) instructions, refer to the *FP-XH User's Manual (COM Communication)* and *FP-XH User's Manual (Ethernet Communication)*.

■ High-speed counter / Pulse output / PWM output instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F0	MV	S, DT90052	High-speed counter control and pulse output control	5	
F1	DMV	S, DT90300	High-speed counter elapsed value read	7	
F1	DMV	DT90300, D	High-speed counter elapsed value write	7	
F1	DMV	S, DT90348	Pulse output elapsed value read	7	
F1	DMV	DT90348, D	Pulse output elapsed value write	7	
F165	CAM0	S	Cam control	3	
F166	HC1S	n, S, D	Target value match ON (with channel specification)	11	
F167	HC1R	n, S, D	Target value match OFF (with channel specification)	11	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F171	SPDH	S, n	Pulse output (with channel specification)	5	
F172	PLSH	S, n	Pulse output (with channel specification)	5	
F173	PWMH	S, n	PWM output (with channel specification)	5	
F174	SP0H	S, n	Pulse output (with channel specification)	5	
F175	SPSH	S, n	Pulse output (Linear interpolation)	5	

(Note 1) Refer to the *FP- XH User's Manual (Positioning/PWM Output/High-speed Counter)*.

■ Character string instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F95	ASC	M,D	Character constant -> ASCII code conversion	15	
F250	BTOA	S1, S2, S3, D	Multiple binary data -> ASCII data string conversion	12	
F251	ATOB	S1, S2, S3, D	Multiple ASCII data strings -> Binary data	12	
F252	ACHK	S1, S2, S3	ASCII code check of multiple ASCII data strings	10	
F253	SSET	S1, S2, D	Character constant -> ASCII code conversion (with storage area size)(C40ET and C60ET only)	8 to 264	
F254	PRINT	S1, S2, S3, D	Create document (C40ET and C60ET only)	10 to 266	
F257	SCMP	S1, S2, D	Compare character strings	10	
F258	SADD	S1, S2, D	Add character string	12	
F259	LEN	S, D	Length of a character string	6	
F260	SSRC	S1, S2, D	Search for a character string	10	
F261	RIGHT	S1, S2, D	Retrieve from the right side of a character string	8	
F262	LEFT	S1, S2, D	Retrieve from the left side of a character string	8	
F263	MIDR	S1, S2, S3, D	Read from arbitrary position in a character string	10	
F264	MIDW	S1, S2, S3, D	Rewrite a character string from arbitrary position	12	
F265	SREP	S, D, P, n	Replace a character string	12	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Data manipulation instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F270	MAX	S1, S2, D	Maximum value search in 16-bit data block	8	
F271	DMAX	S1, S2, D	Maximum value search in 32-bit data block	8	
F272	MIN	S1, S2, D	Minimum value search in 16-bit data block	8	
F273	DMIN	S1, S2, D	Minimum value search in 32-bit data block	8	
F275	MEAN	S1, S2, D	Total and mean value calculation in 16-bit data	8	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F276	DMEAN	S1, S2, D	Total and mean value calculation in 32-bit data	8	
F277	SORT	S1, S2, S3	Sort data in 16-bit data block	8	
F278	DSORT	S1, S2, S3	Sort data in 32-bit data block	8	
F282	SCAL	S1, S2, D	Linearization of 16-bit data	8	
F283	DSCAL	S1, S2, D	Linearization of 32-bit data	10	
F284	RAMP	S1, S2, S3, D	Inclination output of 16-bit data	10	
F285	LIMT	S1, S2, S3, D	16-bit data upper and lower limit control	10	
F286	DLIMT	S1, S2, S3, D	32-bit data upper and lower limit control	16	
F287	BAND	S1, S2, S3, D	16-bit data deadband control	10	
F288	DBAND	S1, S2, S3, D	32-bit data deadband control	16	
F289	ZONE	S1, S2, S3, D	16-bit data zone control	10	
F290	DZONE	S1, S2, S3, D	32-bit data zone control	16	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Floating-point data instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F309	FMV	S, D	Floating-point data transfer	8	
F310	F+	S1, S2, D	Floating-point data addition	14	
F311	F-	S1, S2, D	Floating-point data subtraction	14	
F312	F*	S1, S2, D	Floating-point data multiplication	14	
F313	F%	S1, S2, D	Floating-point data division	14	
F314	SIN	S, D	Floating-point data sine calculation	10	
F315	COS	S, D	Floating-point data cosine calculation	10	
F316	TAN	S, D	Floating-point data tangent calculation	10	
F317	ASIN	S, D	Floating-point data arcsine calculation	10	
F318	ACOS	S, D	Floating-point data arccosine calculation	10	
F319	ATAN	S, D	Floating-point data arctangent calculation	10	
F320	LN	S, D	Floating-point data natural logarithm calculation	10	
F321	EXP	S, D	Floating-point data exponent calculation	10	
F322	LOG	S, D	Floating-point data logarithm calculation	10	
F323	PWR	S1, S2, D	Floating-point data power calculation	14	
F324	FSQR	S, D	Floating-point data square root calculation	10	
F325	FLT	S, D	16-bit integer data -> Floating-point data	6	
F326	DFLT	S, D	32-bit integer data -> Floating-point data	8	
F327	INT	S, D	Floating-point data -> 16-bit integer data (largest integer not exceeding the floating-point data)	8	

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F328	DINT	S, D	Floating-point data -> 32-bit integer data (largest integer not exceeding the floating-point data)	8	
F329	FIX	S, D	Floating-point data -> 16-bit integer data (rounding the first decimal point down to integer)	8	
F330	DFIX	S, D	Floating-point data -> 32-bit integer data (rounding the first decimal point down to integer)	8	
F331	ROFF	S, D	Floating-point data -> 16-bit integer data (rounding the first decimal point to integer)	8	
F332	DROFF	S, D	Floating-point data -> 32-bit integer data (rounding the first decimal point to integer)	8	
F333	FINT	S, D	Floating-point data rounding the first decimal point down	8	
F334	FRINT	S, D	Floating-point data rounding the first decimal point off	8	
F335	F+/-	S, D	Floating-point data sign inversion	8	
F336	FABS	S, D	Floating-point data conversion to absolute value	8	
F337	RAD	S, D	Conversion of angle units (Degrees -> Radians)	8	
F338	DEG	S, D	Conversion of angle units (Radians -> Degrees)	8	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Real number data processing instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F345	FCMP	S1, S2	Floating-point data comparison	10	
F346	FWIN	S1, S2, S3	Floating-point data band comparison	14	
F347	FLIMT	S1, S2, S3, D	Floating-point data upper and lower limit control	18	
F348	FBAND	S1, S2, S3, D	Floating-point data deadband control	18	
F349	FZONE	S1, S2, S3, D	Floating-point data zone control	18	
F354	FSCAL	S1, S2, D	Scaling of real number data	12	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Process control instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F355	PID	S	PID operation	4	
F356	EZPID	S1, S2, S3, S4	PID calculation: PWM output enabled	10	

(Note 1) Refer to the *FP-XH Programming Manual*.

■ Positioning control instructions

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F380	POSST	S1, S2, S3	Positioning table start	8	
F381	JOGST	S1, S2	JOG operation start	6	
F382	ORGST	S	Home return start	4	
F383	MPOST	S	Positioning simultaneous start	4	
F384	PTBLR	S1, S2, n, D	Reading positioning parameters	10	
F385	PTBLW	S1, S2, n, D	Writing positioning parameters	10	

(Note 1) Refer to the *FP-XH User's Manual (Positioning / PWM Output / High-speed Counter)*.

■ Ethernet communication instructions (C40ET and C60ET only)

Fun no.	Mnemonic	Operand	Name	Step	Remarks
F460	IPv4SET	S	IPv4 address setting	4 to 260	
F461	CONSET	S1, S2, D1, D2	Connection setting	10 to 522	
F462	OPEN	S	Connection open	4	
F463	CLOSE	S	Connection close	4	
F464	RDET	D	Ethernet status read	4	
F465	ETSTAT	S1, S2, D	Ethernet information acquisition	8 to 520	
F466	NTPcREQ	S1, S2, D	Time adjustment request	8	
F467	NTPcSV	S1, S2, S3	Destination NTP server setting for time adjustment request	8 to 776	
F468	PINGREQ	S, D	PING send request	6	
F469	UNITSEL	S1, S2	Specifying slot port of communication unit	6	

(Note 1) Refer to the *FP-XH User's Manual (Ethernet Communication)*.

(Note 2) For the F460 / F461 / F465 instruction, the number of steps varies according to the content specified for the operand.

12.9 List of Error Codes

12.9.1 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.

12.9.2 Self-diagnostic Errors

Code	Name	Operation	Error contents and steps to take
E19	Analog section operation error	Stop	● There may be an error in the hardware. Please contact your dealer.
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 in 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.
E21	MAC address error (C40ET and C60ET only)	Stop	● There may be an error in the hardware. Please contact your dealer.
E22	Hardware error (C38AT, C40ET, and C60ET only)	Stop	● There may be an error in the hardware. Please contact your dealer.
E25	Master memory model mismatch (C14, C30, C40, C60, C38AT)	Stop	● The models of master memories are different. Use the master memories created with the same model.
E26	User ROM error	Stop	● If a master memory cassette is mounted, the master memory may be damaged. ● Remove the master memory cassette and check whether the error occurs. If the error does not occur, the contents of the master memory are damaged. ● Rewrite the master memory and use it again. When the error does not disappear, 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 check whether the number of the installed units is within the allowable range.
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	Select	● There may be an error in the Function Cassette. Use the special data register DT90002 to check the position where the error occurred and fix the error. ● In the tool software, the error can also be checked by clicking the [I/O Error] button in the status display dialog box.
E41	Special unit out of control	Select	● There may be an error in an intelligent unit. Use the special data register DT90006 to check the position where the error occurred and fix the error. ● In the tool software, the error can also be checked by clicking the [Special Error] button in the status display dialog box.
E42	I/O verification error	Select	● The connection state of the I/O unit (Expansion Unit) has changed from the state that it was in when the power was turned ON. ● Use the special data registers DT90010 and DT90011 to check the I/O unit whose connection state has changed. Alternatively, check the fitting state of the expansion connector.

Code	Name	Operation	Error contents and steps to take
			● In the tool software, the error can also be checked by clicking the [Verification Error] button in the status display dialog box.
E43	Configuration data error / Initial request error	Select	Configuration data is abnormal. An error occurs during the initial operation of the network. Check the Ethernet settings and EtherNet/IP settings.
E44	Positioning operation error occurs	Select	● The error during the use of the table operation function occurs. ● The set parameter value may be incorrect or a limit error may have occurred. ● Check if the parameter value is within the settable range. ● The channel and content where the positioning operation error occurs can be confirmed by clicking the [Positioning errors] button in the status display dialog box.
E45	Operation error occurred	Select	● Inexecutable operation error occurs. ● The address of the operation error can be confirmed using either special data register DT90017 or DT90018. In the tool software, the error can also be checked by clicking the [Operation errors] button in the status display dialog box.
E46	Network error occurred (C40ET and C60ET only)	Select	● An error occurred during the network operation. Check the Ethernet settings and EtherNet/IP settings. ● For details of network errors, check the special data register DT90590.
E48	System register setting error	Operation stops	● The setting in 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 is 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 numbers can be confirmed using 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 than 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 dropped below the specified level or the backup battery is not connected to the Control Unit. Check the backup battery, and replace or connect it if necessary. ● The system register no. 4 can be used to set whether to issue this self-diagnostic error.
E51	RTC error (C40ET and C60ET only)	Operation continues	● An error in the clock data of the clock / calendar function was detected.
E58	Output circuit overcurrent detection (C38AT, C40ET, and C60ET only)	Select	● Overcurrent is detected in the digital output terminal. ● Check the wiring of the digital output terminal.
E59	Memory configuration inconsistency (EtherNet/IP) (C40ET and C60ET only)	Operation continues	● An inconsistency was detected in the memory configuration for EtherNet/IP.

Code	Name	Operation	Error contents and steps to take
E62	SNTP time acquisition failure (C40ET and C60ET only)	Operation continues	● The acquisition of time data has failed during time sync via LAN port.
E64	Incorrect project data (C40ET and C60ET only)	Stop	● An error was detected in checking the project data when the power turned on. All programs and security information will be erased and the PLC will be initialized.
E100 to E199	Self-diagnostic error set by F148	Stop	● An error optionally set by the high-level instruction F148 has occurred. ● Take action according to the specified detection conditions.
E200 to E299		Operation continues	

12.10 Self-diagnosis error code details (C40ET and C60ET only)

In the case of the C40ET and C60ET models, when a self-diagnosis error occurs, the "Self-diagnosis error code details" will be displayed so that the cause of the error can be determined.

"Self-diagnosis error code details" are stored in the special data register (DT90001).

12.10.1 E1 (Syntax error)

To identify the instruction that caused the error, use the total-check function.

Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	The specified number of the external input (X) exceeds the usable range.
00002	The specified number of the external output (Y) exceeds the usable range.
00003	The specified number of the internal relay (R) exceeds the usable range.
00005	The specified number of the special internal relay (R9000-) exceeds the usable range.
00006	The specified number of the timer/counter (T/C) exceeds the usable range.
00007	The specified number of the link relay (L) exceeds the usable range.
00008	The label number of the LBL instruction exceeds the usable range.
00009	The subroutine program number of the SUB instruction exceeds the usable range.
00010	The interrupt program number of the INT instruction exceeds the usable range.
00011	The timer number of the TM instruction or the count number of the CT (counter) instruction exceeds the usable range.
00012	The master control relay number of the MC instruction exceeds the usable range.
00013	The master control relay number of the MCE instruction exceeds the usable range.
00014	The label number of the JP instruction exceeds the usable range.
00015	The step ladder number of the SSTP instruction exceeds the usable range.
00016	The step ladder number of the NSTL/NSTP instruction exceeds the usable range.
00017	The step ladder number of the CSTP instruction exceeds the usable range.
00018	The subroutine program number of the CALL instruction exceeds the usable range.
00019	The label number of the LOOP exceeds the usable range.
00020	Index modification is used for the specified number of the instruction.
00501	The high-level instructions (P13, P466, P468) are specified by the every scan execution type (F13, F466, F468).
00506	An invalid device is specified for the 1st or 2nd operand.
00507	An invalid device is specified for the 2nd or 3rd operand.
01001	An abnormal code instruction was detected.
02001	An unsupported instruction is specified.
02002	The instruction syntax was checked beyond the program area.
10004	The specified number of the internal relay (WR) exceeds the usable range.
10021	An invalid device is specified for the operand. Or index modification is used.

Detail code	Error message
10022	A device that cannot be used as an operand is specified.
10023	A negative value is specified for the K constant of the operand.
10502	An invalid device is specified. (1st operand)
20503	An invalid device is specified. (2nd operand)
30504	An invalid device is specified. (3rd operand)
40505	An invalid device is specified. (4th operand)

12.10.2 E2 (Duplicated output errors)

To identify the instruction that caused the error, use the total-check function.
Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	The link relay (L) is used twice in the OT or KP instruction.
00002	The external output (Y) is used twice in the OT or KP instruction.
00003	The internal relay (R) is used twice in the OT instruction.
00004	The internal relay (R) is used twice in the KP instruction.
00101	The LBL instruction is dually defined.
00102	The SUB instruction is dually defined.
00103	The INT instruction is dually defined.
00104	The TM or CT instruction is dually defined.
00105	The MC instruction is dually defined.
00106	The MCE instruction is dually defined.
00107	The SSTP instruction is dually defined.

12.10.3 E3 (Not paired errors)

To identify the instruction that caused the error, use the total-check function.
Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	The RET instruction corresponding to the SUB instruction does not exist.
00002	The IRET instruction corresponding to the INT instruction does not exist.
00003	The MCE instruction corresponding to the MC instruction does not exist.
00004	The MC instruction corresponding to the MCE instruction does not exist.
00005	The LBL instruction corresponding to the JP instruction does not exist.
00006	The STPE instruction corresponding to the SSTP instruction does not exist.
00007	The SUB instruction corresponding to the CALL instruction does not exist.

Detail code	Error message
00008	The LBL instruction corresponding to the LOOP instruction does not exist.
00101	The MCE instruction corresponding to the MC instruction is dually defined.
00103	The LBL instruction corresponding to the JP instruction is dually defined.
00104	The SUB instruction corresponding to the CALL instruction is dually defined.
00105	The LBL instruction corresponding to the LOOP instruction is dually defined.
00201	The MC instruction is written at a position after the MCE instruction.
00301	The MCE instruction corresponding to the MC instruction in the normal ladder area is written at a position after the ED instruction.
00302	The LBL instruction corresponding to the JP instruction in the normal ladder area is written at a position after the ED instruction.
00303	The LBL instruction corresponding to the LOOP instruction in the normal ladder area is written at a position after the ED instruction.
00401	The MCE instruction corresponding to the MC instruction in the subroutine program is written at a position after the RET instruction.
00403	The LBL instruction corresponding to the JP instruction in the subroutine program is written at a position before the SUB instruction.
00404	The LBL instruction corresponding to the JP instruction in the subroutine program is written at a position after the RET instruction.
00405	The LBL instruction corresponding to the LOOP instruction in the subroutine program is written at a position before the SUB instruction.
00406	The LBL instruction corresponding to the LOOP instruction in the subroutine program is written at a position after the RET instruction.
00501	The MCE instruction corresponding to the MC instruction in the interrupt program is written at a position after the IRET instruction.
00503	The LBL instruction corresponding to the JP instruction in the interrupt program is written at a position before the INT instruction.
00504	The LBL instruction corresponding to the JP instruction in the interrupt program is written at a position after the IRET instruction.
00505	The LBL instruction corresponding to the LOOP instruction in the interrupt program is written at a position before the INT instruction.
00506	The LBL instruction corresponding to the LOOP instruction in the interrupt program is written at a position after the IRET instruction.

12.10.4 E4 (Parameter mismatch errors)

To identify the instruction that caused the error, use the total-check function.
Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	The specified counter number of the CT instruction is smaller than the counter start number (system register number 5).
00002	The specified timer setting value of the TM instruction is larger than the counter start number (system register number 5).

12.10.5 E5 (Program area errors)

To identify the instruction that caused the error, use the total-check function.
Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	The LBL instruction is written outside the executable area. (Step ladder area)
00002	The SUB instruction is written outside the executable area. (Normal ladder area, step ladder area, during interrupt program)
00003	The INT instruction is written outside the executable area. (Normal ladder area, step ladder area, during subroutine program)
00004	The MC instruction is written outside the executable area. (Step ladder area)
00005	The MCE instruction is written outside the executable area. (Step ladder area)
00006	The JP instruction is written outside the executable area. (Step ladder area)
00007	The SSTP instruction is written outside the executable area. (During subroutine program, during interrupt program)
00008	The LOOP instruction is written outside the executable area. (Step ladder area)
00009	The END instruction is written outside the executable area. (Other than normal ladder area)
00010	The CNDE instruction is written outside the executable area. (Other than normal ladder area)
00011	The STPE instruction is written outside the executable area. (Other than step ladder area)
00012	The RET instruction is written outside the executable area. (Other than during subroutine program)
00013	The IRET instruction is written outside the executable area. (Other than during interrupt program)
00101	The SSTP instruction is written at a position after the STPE instruction.

12.10.6 E6 (Compile memory full)

Detail code	Error message
00001	The size of the program execution code has exceeded the upper limit of the compile memory.

12.10.7 E7 (High-level instruction combination errors)

To identify the instruction that caused the error, use the total-check function.
Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	Both the F instruction (every scan execution type) and P instruction (differential execution type) are written in the high-level instructions that are executed consecutively.

12.10.8 E8 (High-level instruction operand combination errors)

To identify the instruction that caused the error, use the total-check function.
Reference: "5.3.3 Totally Checking Project"

Detail code	Error message
00001	Different types of devices are specified for the 1st and 2nd operands.
00002	Different types of devices are specified for the 2nd and 3rd operands.

12.10.9 E27 (Installed unit limit reached)

Identification code	Error message
00001	There is an error in the termination setting of the expansion unit. Or the maximum number of connections for the expansion unit has been exceeded.
00101	An unsupported add-on cassette is installed.
00102	An unsupported add-on cassette is installed. (Master memory cassette)

12.10.10 E43 (Configuration data errors / Initial request errors)

Identification code	Error message
00001	There is an error in the configuration data.
00002	The SSL/TLS function cannot be used for both the FTP server and FTP client.
00101	Ethernet function stop timeout error occurred.
00102	Ethernet function initial request timeout error occurred.
00103	The initial request for the Ethernet function failed.

12.10.11 E45 (Operation error) "Basic instructions"

To identify the instruction that caused the error, click on the [Operation Err] button in the "Status Display" dialog box and confirm the address at which the error occurred.
Reference: "10.2.1 ERR. LED Flashes"

Detail code	Error message
00101	The maximum device number has been exceeded when index modification is used.
00106	A value smaller than process n1 is specified for process n2.
00112	A system register number that cannot be changed is contained.
00131	A value smaller than the first number is specified for the final number.

Detail code	Error message
00146	Failed to save the setting.
00147	Failed to save the password.
00148	Baud rate change limit error occurred. (FROM access)
00161	The interrupt setting is not set in the system register.
00162	It cannot be changed when the high-speed counter operation mode setting of the target channel is other than addition input or subtraction input.
00163	The instruction was executed when the high-speed counter control flag of the target channel was ON.
00164	When there is no periodical interrupt program, the periodical interrupt cannot be specified.
00165	Subroutine nesting has exceeded 10 layers.
00166	I/O devices that are not built in the control unit cannot be specified.
00167	The communication cassette is not installed in the COM1 port.
00168	The communication cassette is not installed in the COM2 port.
00169	The communication cassette is not installed in the COM3 port.
00170	The communication cassette is not installed in the COM4 port.
10108	A negative value is specified for the number of loops. (1st operand)
10109	A value outside the range is specified for the interrupt type. (1st operand)
10111	A value outside the range is specified for the control function. (1st operand)
10113	The specified value is outside the range of the system register setting value. (1st operand)
10141	Non-real data is specified. (1st operand)
10201	The first keyword is incorrect. (1st operand)
10202	A value other than COM0 to COM4 is specified for the first keyword (communication condition setting). (1st operand)
10203	The interrupt number of the first keyword (interrupt setting) is out of range. (1st operand)
10204	The first keyword (PC(PLC) link setting) is incorrect. (1st operand)
10205	The channel of the first keyword (high-speed counter operation mode) is CH8 or higher. (1st operand)
10206	The channel of the first keyword (high-speed counter operation mode) is CH12 or higher. (1st operand)
10221	The format of the second keyword (unit number) is different. (1st operand)
10222	The format of the second keyword (terminal time) is different. (1st operand)
10223	The format of the second keyword (response time) is different. (1st operand)
10224	The format of the second keyword (transmission format) is different. (1st operand)
10225	A character other than “DT” is specified for the second keyword. (1st operand)
10226	A character other than “MS” is specified for the second keyword. (1st operand)
10227	The second keyword is incorrect. (1st operand)
10241	A value (0) outside the range is specified for the second keyword (unit number). (1st operand)
10242	A value (greater than 100) outside the range is specified for the second keyword (unit number). (1st operand)

Detail code	Error message
10243	A value outside the range is specified for the second keyword (unit number). (COM0) (1st operand)
10244	A value outside the range is specified for the second keyword (unit number). (COM1) (1st operand)
10245	A value outside the range is specified for the second keyword (start code). (1st operand)
10246	A value outside the range is specified for the second keyword (end code). (1st operand)
10247	A value outside the range is specified for the second keyword (terminal time). (1st operand)
10248	A value outside the range is specified for the second keyword (transmission format). (1st operand)
10249	A value outside the range is specified for the second keyword (baud rate). (1st operand)
10250	A value outside the range is specified for the second keyword (expansion unit recognition time). (1st operand)
10251	A value outside the range is specified for the second keyword (interrupt setting). (1st operand)
10252	A value outside the range is specified for the second keyword (high-speed counter operation mode). (1st operand)
10253	A value outside the range is specified for the second keyword (RS485 delay). (1st operand)
10254	A value outside the range is specified for the second keyword (link participation wait time). (1st operand)
10255	A value outside the range is specified for the second keyword (error detection time for transmission assurance relay). (1st operand)
10256	A value outside the range is specified for the second keyword (read firmware version number). (1st operand)
10257	Characters other than 0 to 9 and A to F are specified for the second keyword (4-digit password setting). (1st operand)
10258	A value outside the specified range is specified for the second keyword (RS(send request) control). (1st operand)
10271	Failed to convert the value of the first keyword. (1st operand)
10272	Failed to convert the value of the second keyword. (1st operand)
10276	The number of characters of the first keyword is out of the specified range. (1st operand)
10277	The number of characters of the second keyword is out of the specified range. (1st operand)
20107	A value outside the range is specified for process n2. (2nd operand)
20141	Non-real data is specified. (2nd operand)

12.10.12 E45 (Operation errors) "High-level instructions"

To identify the instruction that caused the error, click on the [Operation Err] button in the "Status Display" dialog box and confirm the address at which the error occurred.

Reference: "10.2.1 ERR. LED Flashes"

Detail code	Error message
00602	A value outside the range is specified for the F-ROM area.

Detail code	Error message
00621	The total value of the number of sent words and the designation of the destination unit (starting address) is out of range.
00622	The total value of the number of received words and the designation of the destination unit (starting address) is out of range.
01017	A value of 0 is specified for the data to be exponentiated and exponent data.
01301	A value larger than the end address is specified for the starting address.
01302	A value larger than the positioning area is specified for the starting address of the positioning memory.
01306	A value larger than the upper limit data is specified for the lower limit data.
01307	A value larger than the maximum speed is specified for the initial speed.
01308	A value larger than the storage area size is specified for the character constant.
01310	A value larger than the number of characters is specified at the specified position in the character string.
01311	A value larger than the setting end connection number is specified for the setting start connection number.
01401	The calculation result has exceeded the 16-bit range.
01402	The calculation result has exceeded the 32-bit range.
01403	The calculation result has exceeded the 16-bit or 32-bit range.
01404	The calculation result has exceeded the range of BCD.
01405	The calculation result has exceeded the range of floating decimal points.
01406	The calculation result has exceeded the range of integers.
01409	When incrementing, the lower one block of the IP address has exceeded the settable range.
01410	When incrementing, the local port number has exceeded the settable range.
01411	The created text has exceeded 4096 bytes.
01431	A value that cannot be calculated was detected during auto-tuning.
01432	A value outside the range was detected in the degree of progress of auto-tuning.
01433	Non-numeric data was converted.
01434	Non-BCD data was converted.
01461	Overflow (incomputable) occurred during calculation.
01462	The number of characters after conversion of 1 data other than %s and %S has become 0 characters.
01463	The number of characters after conversion of 1 data other than %s and %S has exceeded 32 characters.
01465	The conversion source data was overwritten with the conversion result.
01467	Failed to read multiple contacts.
01601	The communication cassette is not installed in the COM1 port.
01602	The communication cassette is not installed in the COM2 port.
01603	The communication cassette is not installed in the COM3 port.
01604	The communication cassette is not installed in the COM4 port.
01621	The pulse I/O cassette is not installed.

Detail code	Error message
03001	In F469 UNITSEL (communication unit slot port specification), a slot number other than Ethernet communication is specified.
03002	In F469 UNITSEL (communication unit slot port specification), a user connection number outside the valid range is specified.
03003	In F469 UNITSEL (communication unit slot port specification), a slot number other than Ethernet communication or a user connection number outside the valid range is specified.
03004	The instruction is used in an inexecutable area (during an interrupt program).
03099	An unsupported instruction is used.
03151	The communication mode is not set to MODBUS-RTU or Computer Link.
03152	The operation mode is not set to MODBUS-TCP.
03153	The operation mode is not set to MC protocol.
03154	An unsupported protocol is set for the operation mode.
03201	The instruction was executed for more than 2 channels simultaneously.
03202	An error occurred when creating the table.
03203	The instruction failed because the coordinates of the current value are out of the range of -8388608 to +8388607.
03204	The instruction failed because the coordinates of the target value are out of the range of -8388608 to +8388607.
03255	The corresponding channel is not set to the pulse output (table operation).
03401	Failed to execute the instruction because the setting request (start/stop/register logging/trace operation) by the communication command is being accepted.
03402	Failed to execute the instruction because the sampling trace function is being executed.
03403	Failed to execute the instruction because the logging/trace function is activated.
03404	Failed to execute the instruction because the logging/trace function is running or during activation processing.
03405	Failed to execute the instruction because the logging/trace function is during activation processing.
03406	Failed to execute the instruction because the logging trace function is during stop processing.
03501	Failed to execute the instruction because the RAM disk access instruction is being executed.
03601	Failed to execute the instruction because the NTP time is being acquired.
03602	Failed to execute the instruction because the setting request for the target connection is already being accepted.
03654	The specified range of connections includes the connection of the multi-connection server.
03701	Failed to execute the instruction because the transfer request relay of a specified ID is "Request present".
03702	Failed to execute the instruction because FTP client preparation done (R9345) is OFF.
03703	Failed to execute the instruction because the request active relay of the FTP c control relay is “1: Requesting”.
03704	Failed to execute the instruction because the request active relay of the FTP c logging/trace control relay is “1: Requesting”.
03756	The SSL/TLS setting is used for both the FTP server settings and FTP client settings.
10601	A value outside the range is specified for the channel. (1st operand)

Detail code	Error message
10603	A value outside the range is specified for the conversion data. (1st operand)
10604	A value outside the range is specified for the calculation method. (1st operand)
10611	A value outside the range is specified for the size of the FIFO buffer. (1st operand)
10612	A value outside the range is specified for the time data that represents seconds. (1st operand)
10613	A value outside the range is specified for the COM port selection or the Ethernet port (F469 UNITSEL instruction) designation. (1st operand)
10614	A value outside the range is specified for the MODBUS command designation. (1st operand)
10615	A value outside the range is specified for the COM port selection. (1st operand)
10616	A value outside the range is specified for the destination unit number. (1st operand)
10617	A value outside the range is specified for the number of words to be sent. (1st operand)
10618	A value outside the range is specified for the number of words to be received. (1st operand)
10619	A value outside the range is specified for the transfer method (bit unit, word unit). (1st operand)
10620	A value outside the range is specified for the unit number. (1st operand)
10628	A value outside the range is specified for the self-diagnosis error code. (1st operand)
10635	A value outside the range is specified for the data to find the square root. (1st operand)
10636	A value outside the range is specified for the upper limit control. (1st operand)
10637	A value outside the range is specified for the number of target values. (1st operand)
10638	A value outside the range is specified for the output device type. (1st operand)
10639	A value outside the range is specified for the starting word number of the output device. (1st operand)
10640	A value outside the range is specified for the setting of the target value. (1st operand)
10642	A value outside the range is specified for the channel number of the high-speed counter. (1st operand)
10644	A value outside the range is specified for the acceleration/deceleration time. (1st operand)
10645	A value outside the range is specified for the control code (operation mode). (1st operand)
10646	A value outside the range is specified for the control code (duty). (1st operand)
10647	A value outside the range is specified for the initial speed and maximum speed. (1st operand)
10648	A value outside the range is specified for the control code (frequency extension mode). (1st operand)
10649	A value outside the range is specified for the control code (output method). (1st operand)
10651	A value outside the range is specified for the frequency. (1st operand)
10652	A value outside the range is specified for the control code. (1st operand)
10653	A value outside the range is specified for the duty cycle (1st operand).
10654	A value outside the range is specified for the acceleration time. (1st operand)
10655	A value outside the range is specified for the X-axis frequency range. (1st operand)
10656	A value outside the range is specified for the Y-axis frequency range. (1st operand)
10659	A value outside the range is specified for the number of seconds. (1st operand)
10665	Values outside the range are specified for the set value (SP), measured value (PV), output value (MV), output lower limit value, output upper limit value, and control cycle (Ts). (1st operand)

Detail code	Error message
10666	Values outside the range are specified for the proportional gain (KP), integral time (TI), and integral time (TD). (1st operand)
10670	A value outside the range is specified for the channel number. (1st operand)
10671	A value outside the range is specified for the table number. (1st operand)
10672	A value outside the range is specified for the output designation. (1st operand)
10674	Values outside the range are specified for the channel number and positioning memory area designation. (1st operand)
10676	A value outside the range is specified for the file number. (1st operand)
10679	A value outside the range is specified for the number of characters. (1st operand)
10681	A value outside the range is specified for the connection number. (1st operand)
10684	A value outside the range is specified for the slot number. (1st operand)
10694	A value outside the range is specified for the port number. (1st operand)
10699	A value outside the range is specified for the logging/trace number. (1st operand)
10701	A value outside the range is specified for the transfer number. (1st operand)
10702	A value outside the range is specified for the transfer setting number. (1st operand)
10709	A value outside the range is specified for the storage area size. (1st operand)
10716	A negative minimum value is specified for the data to take the absolute value. (1st operand)
10717	A value outside the range is specified for the target value. (1st operand)
11007	All data to be encoded is specified with a value of 0. (1st operand)
11008	A value of 0 is specified for the size of the FIFO buffer. (1st operand)
11009	A value of 0 is specified for the number of stored data. (1st operand)
11016	A value of 0 is specified for the angle data. (1st operand)
11021	A value of 0 is specified for the control cycle (Ts) (1st operand)
11053	A value other than 0 is specified for the part of control data that should be fixed with 0. (1st operand)
11055	A value other than 0 is specified for the conversion data. (1st operand)
11101	Data that is not BCD is specified. (1st operand)
11111	The specified ASCII code contains a character code other than 0 to F. (1st operand)
11112	The specified ASCII code contains a character code other than 0 to 9, signs, and space. (1st operand)
11113	The specified ASCII code contains a character code other than 0 to 9, signs, space, dot, and comma. (1st operand)
11121	Data that is not a real number is specified. (1st operand)
11131	Data that is not time is specified. (1st operand)
11138	Data at non-existent time is specified. (1st operand)
11141	Data different from the IPv4 address format is specified for the first parameter. (1st operand)
11142	Data different from the IPv4 address format is specified for the second parameter. (1st operand)
11143	Data different from the IPv4 address format is specified for the third parameter. (1st operand)
11151	Data that is not time zone (time) is specified. (1st operand)

Detail code	Error message
11152	Data different from the time zone format is specified. (1st operand)
11208	The number of bytes of the conversion source data exceeds the device area of the conversion source data. (1st operand)
11209	The number of characters of the conversion source data exceeds the device area of the conversion source data. (1st operand)
11217	The printout data exceeds the device area where the printout data is output. (1st operand)
11219	The number of bytes of the data to be sent exceeds the device area of the data table. (1st operand)
11220	The data table exceeds the device area of the data table. (1st operand)
11221	The parameter table exceeds the device area of the parameter table. (1st operand)
11222	The time data exceeds the device area of the time data. (1st operand)
11224	The area where the bit string is read exceeds the device area of the area where the bit string is read. (1st operand)
11240	The number of written data exceeds the device area of the storage source. (1st operand)
11242	The path name and number of characters of the file exceeds the device area of the path name and number of characters of the file. (1st operand)
11244	The storage destination device exceeds the device area of the storage destination device. (1st operand)
11245	The character string exceeds the device area of the string data. (1st operand)
11246	The acquired data exceeds the device area of the storage destination. (1st operand)
11248	The string size of the data table exceeds the device area of the data table. (1st operand)
11303	A value larger than the size of the FIFO buffer is specified for the number of stored data. (1st operand)
11304	A value larger than the size of the FIFO buffer is specified for the read pointer of the FIFO. (1st operand)
11309	A value larger than the string size is specified for the number of characters. (1st operand)
11501	A device (K constant, H constant) that cannot be specified for the operand is specified. (1st operand)
11701	The string data is incorrect. (1st operand)
11711	The keyword specified in the 1st parameter is incorrect. (1st operand)
11712	The keyword specified in the 2nd parameter is incorrect. (1st operand)
11713	The keyword specified in the 3rd parameter is incorrect. (1st operand)
11714	The keyword specified in the 4th parameter is incorrect. (1st operand)
11715	The keyword specified in the 5th parameter is incorrect. (1st operand)
11721	The setting value specified in the 1st parameter is incorrect. (1st operand)
11722	The setting value specified in the 2nd parameter is incorrect. (1st operand)
11723	The setting value specified in the 3rd parameter is incorrect. (1st operand)
11724	The setting value specified in the 4th parameter is incorrect. (1st operand)
11725	The setting value specified in the 5th parameter is incorrect. (1st operand)
11731	The keyword/setting value specified in the 1st parameter is incorrect. (1st operand)
11751	The parameter format is not specified by "keyword = setting value". (1st operand)

Detail code	Error message
11761	The format of the 1st parameter is not specified by "keyword = setting value". (1st operand)
11762	The format of the 2nd parameter is not specified by "keyword = setting value". (1st operand)
11763	The format of the 3rd parameter is not specified by "keyword = setting value". (1st operand)
11764	The format of the 4th parameter is not specified by "keyword = setting value". (1st operand)
11772	The format of the 2nd parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (1st operand)
11773	The format of the 3rd parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (1st operand)
11774	The format of the 4th parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (1st operand)
11821	"=" is used in the 1st parameter. Or the delimiter "," is not used. (1st operand)
11822	"=" is used in the 2nd parameter. Or the delimiter "," is not used. (1st operand)
11823	"=" is used in the 3rd parameter. Or the delimiter "," is not used. (1st operand)
11824	"=" is used in the 4th parameter. Or the delimiter "," is not used. (1st operand)
11861	"=" is used twice in the 1st parameter. (1st operand)
11862	"=" is used twice in the 2nd parameter. (1st operand)
11863	"=" is used twice in the 3rd parameter. (1st operand)
11864	"=" is used twice in the 4th parameter. (1st operand)
11901	Failed to convert the setting value to a numerical value. (1st operand)
11913	Failed to convert the setting value specified in the 3rd parameter to a numerical value. (1st operand)
11941	The number of characters in the string data has not reached the specified number. (1st operand)
11942	The number of characters in the 2nd parameter has not reached the specified number. (1st operand)
11943	The number of characters in the 3rd parameter has not reached the specified number. (1st operand)
11971	The number of characters of the string data exceeds the specified number. (1st operand)
12002	The number of characters of the keyword is out of the specified range. (1st operand)
12003	The number of characters of the setting value is out of the specified range. (1st operand)
12041	The keyword of the 1st parameter is specified more than once. (1st operand)
12042	The keyword of the 2nd parameter is specified more than once. (1st operand)
12043	The keyword of the 3rd parameter is specified more than once. (1st operand)
12051	The delimiter "," is used after the last parameter. (1st operand)
12053	Keywords are specified in an incorrect order. (1st operand)
12054	The specified transfer setting number is not left-justified. (1st operand)
13251	A channel for which the high-speed counter is not set is specified. (1st operand)
13252	The output relay (Y) set for the type of the output device is not set to the normal output. (1st operand)
13351	A channel that is not set to the pulse output (table operation) is specified. (1st operand)

Detail code	Error message
13451	A logging/trace number for which “Write after completion of trace” has been set is specified. (1st operand)
13452	A logging/trace number for which the logging/trace setting has not been registered is specified. (1st operand)
13453	A logging/trace number with data logging condition set to something other than "Instruction" is specified. (1st operand)
13651	A connection other than the first connection in the multi-connection server is specified for the connection number. (1st operand)
13751	A logging/trace number for which the logging/trace condition has not been registered is specified. (1st operand)
13753	An unset transfer number is specified. (1st operand)
13754	An unset LOG number is specified. (1st operand)
13755	A value larger than the number set for the FTP client server is specified for the FTP server number. (1st operand)
20605	A value outside the range is specified for the number of bytes. (2nd operand)
20606	A value outside the range is specified for the number of characters. (2nd operand)
20607	A value outside the range is specified for the conversion effective bit length. (2nd operand)
20608	Values outside the range are specified for the conversion start bit and conversion effective bit length. (2nd operand)
20609	A value outside the range is specified for the number of combined data. (2nd operand)
20610	A value outside the range is specified for the number of data to be separated. (2nd operand)
20611	A value outside the range is specified for the size of the FIFO buffer. (2nd operand)
20626	A value outside the range is specified for the device code. (2nd operand)
20633	A value outside the range is specified for the number of bytes of data to be sent. (2nd operand)
20643	A value outside the range is specified for the target channel of pulse output. (2nd operand)
20650	A value outside the range is specified for the control code (acceleration/deceleration steps). (2nd operand)
20657	A value outside the range is specified for the mode designation. (2nd operand)
20660	A value outside the range is specified for the bit position specification. (2nd operand)
20663	A value outside the range is specified for the number of data tables. (2nd operand)
20667	A value outside the range is specified for the measured value (PV). (2nd operand)
20670	A value outside the range is specified for the channel number. (2nd operand)
20671	A value outside the range is specified for the table number. (2nd operand)
20673	A value outside the range is specified for the operating direction. (2nd operand)
20675	A value outside the range is specified for the number of data. (2nd operand)
20677	A value outside the range is specified for the write format designation. (2nd operand)
20678	A value outside the range is specified for the write mode designation. (2nd operand)
20679	A value outside the range is specified for the number of characters. (2nd operand)
20682	A value outside the range is specified for the COM port number. (2nd operand)
20683	A value outside the range is specified for the user connection number. (2nd operand)
20685	A value outside the range is specified for the local port number. (2nd operand)

Detail code	Error message
20686	A value outside the range is specified for the unused connection disconnect time. (2nd operand)
20687	A value outside the range is specified for the starting address of the general-purpose receive buffer. (2nd operand)
20688	A value outside the range is specified for the general-purpose receive buffer size. (2nd operand)
20689	Values outside the range are specified for the general-purpose receive buffer starting address and the general-purpose receive buffer size. (2nd operand)
20690	The number of words in the data to be read exceeds the upper limit. (2nd operand)
20695	A value outside the range is specified for the FTP server designation. (2nd operand)
20699	A value outside the range is specified for the logging/trace number. (2nd operand)
20701	A value outside the range is specified for the transfer number. (2nd operand)
20706	A value outside the range is specified for the number of data to be written. (2nd operand)
20710	The storage area size of the text creation form is out of range. (2nd operand)
20711	The number of characters in the text creation form exceeds 4096 characters. (2nd operand)
20714	A value outside the range is specified for the number of blocks read. (2nd operand)
20715	A value outside the range is specified for the number of blocks written. (2nd operand)
21001	A value of 0 is specified for the divisor data. (2nd operand)
21003	A value of 0 is specified for the length of the number to be converted. (2nd operand)
21004	A value of 0 is specified for the designation of the number of characters. (2nd operand)
21005	A value of 0 is specified for the designation of the number of bytes. (2nd operand)
21008	A value of 0 is specified for the size of the FIFO buffer. (2nd operand)
21052	A value other than 0 is specified for the designation (data area) of the destination unit. (2nd operand)
21054	A value other than 0 is specified for the system area. (2nd operand)
21101	Data that is not BCD is specified. (2nd operand)
21121	Data that is not a real number is specified. (2nd operand)
21131	Data that is not time is specified. (2nd operand)
21132	Data that is not time is specified for the 1st parameter. (2nd operand)
21133	Data that is not time is specified for the 2nd parameter. (2nd operand)
21134	Data that is not time is specified for the 3rd parameter. (2nd operand)
21135	Data different from the time format is specified for the 1st parameter. (2nd operand)
21136	Data different from the time format is specified for the 2nd parameter. (2nd operand)
21137	Data different from the time format is specified for the 3rd parameter. (2nd operand)
21141	Data different from the IPv4 address format is specified for the first parameter. (2nd operand)
21161	The data table is not registered in ascending order with respect to the X axis. (2nd operand)
21203	The data to be written exceeds the device area of the storage destination. (2nd operand)
21205	The size of the specified block exceeds the device area of the comparison block. (2nd operand)
21206	The conversion result exceeds the device area of the storage destination. (2nd operand)

Detail code	Error message
21207	The number of bytes of the target data exceeds the device area of the target data. (2nd operand)
21211	The size of the FIFO buffer exceeds the device area of the FIFO buffer. (2nd operand)
21212	The number of sent words exceeds the device area of the data to be sent. (2nd operand)
21214	The number of sent data exceeds the device area of the data to be sent. (2nd operand)
21220	The data table exceeds the device area of the data table. (2nd operand)
21222	The time data exceeds the device area of the time data. (2nd operand)
21225	The number of converted data exceeds the device area of binary data. (2nd operand)
21226	The number of converted data exceeds the device area of ASCII data. (2nd operand)
21233	The string length of the text creation form exceeds the device area of the text creation form. (2nd operand)
21239	The number of written words exceeds the device area of the storage destination. (2nd operand)
21242	The path name and number of characters of the file exceeds the device area of the path name and number of characters of the file. (2nd operand)
21243	The parameter exceeds the device area of the parameter. (2nd operand)
21244	The storage destination device exceeds the device area of the storage destination device. (2nd operand)
21245	The character string exceeds the device area of th string data. (2nd operand)
21247	The result of the PING request exceeds the device area of the storage destination. (2nd operand)
21248	The string size of the data table exceeds the device area of the data table. (2nd operand)
21303	A value larger than the size of the FIFO buffer is specified for the number of stored data. (2nd operand)
21305	A value larger than the size of the FIFO buffer is specified for the write pointer of the FIFO. (2nd operand)
21309	A value larger than the string size is specified for the number of characters. (2nd operand)
21312	A value larger than the storage area size of the text creation form is specified for the number of characters in the text creation form. (2nd operand)
21407	The conversion result has exceeded the number of specified bytes in the storage area. (2nd operand)
21433	Non-numeric data was converted. (2nd operand)
21464	Failed to analyze the conversion form. (2nd operand)
21501	A device (K constant, H constant) that cannot be specified for the operand is specified. (2nd operand)
21503	A device (other than WX, WY, WR, WL, DT, and LD) that cannot be specified for the operand is specified. (2nd operand)
21504	A device (other than WX, WY, WR, WL, SV, EV, DT, LD, SWR, and SDT) that cannot be specified for the operand is specified. (2nd operand)
21506	A device (WL, LD, DT) that cannot be specified for the operand is specified when setting bitwise transfer. (2nd operand)
21507	A device (other than WX, WY, WR, and WL) that cannot be specified for the operand is specified when setting bitwise transfer. (2nd operand)
21701	The string data is incorrect. (2nd operand)

Detail code	Error message
21711	The keyword specified in the 1st parameter is incorrect. (2nd operand)
21712	The keyword specified in the 2nd parameter is incorrect. (2nd operand)
21713	The keyword specified in the 3rd parameter is incorrect. (2nd operand)
21714	The keyword specified in the 4th parameter is incorrect. (2nd operand)
21715	The keyword specified in the 5th parameter is incorrect. (2nd operand)
21761	The format of the 1st parameter is not specified by "keyword = setting value". (2nd operand)
21762	The format of the 2nd parameter is not specified by "keyword = setting value". (2nd operand)
21763	The format of the 3rd parameter is not specified by "keyword = setting value". (2nd operand)
21764	The format of the 4th parameter is not specified by "keyword = setting value". (2nd operand)
21765	The format of the 5th parameter is not specified by "keyword = setting value". (2nd operand)
21772	The format of the 2nd parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (2nd operand)
21773	The format of the 3rd parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (2nd operand)
21811	"=" is used in the 1st parameter. (2nd operand)
21821	"=" is used in the 1st parameter. Or the delimiter "," is not used. (2nd operand)
21822	"=" is used in the 2nd parameter. Or the delimiter "," is not used. (2nd operand)
21861	"=" is used twice in the 1st parameter. (2nd operand)
21862	"=" is used twice in the 2nd parameter. (2nd operand)
21871	"=" is used twice in the 1st parameter. Or the delimiter "," is not used. (2nd operand)
21911	Failed to convert the setting value specified in the 1st parameter to a numerical value. (2nd operand)
21912	Failed to convert the setting value specified in the 2nd parameter to a numerical value. (2nd operand)
21913	Failed to convert the setting value specified in the 3rd parameter to a numerical value. (2nd operand)
21914	Failed to convert the setting value specified in the 4th parameter to a numerical value. (2nd operand)
21915	Failed to convert the setting value specified in the 5th parameter to a numerical value. (2nd operand)
21971	The number of characters of the string data exceeds the specified number. (2nd operand)
21991	The number of characters of the setting value specified in the 1st parameter exceeds the specified number. (2nd operand)
21992	The number of characters of the setting value specified in the 2nd parameter exceeds the specified number (2nd operand).
22001	The number of characters of the string data is out of the specified range. (2nd operand)
22011	The number of characters of the keyword specified in the 1st parameter is out of the specified range. (2nd operand)
22012	The number of characters of the keyword specified in the 2nd parameter is out of the specified range. (2nd operand)
22013	The number of characters of the keyword specified in the 3rd parameter is out of the specified range. (2nd operand)

Detail code	Error message
22051	The delimiter "," is used after the last parameter. (2nd operand)
22064	A device that cannot be specified is specified in the 4th parameter. (2nd operand)
23254	The corresponding channel is not set to the normal output. (2nd operand)
23255	The corresponding channel is not set to the pulse output (table operation). (2nd operand)
23256	The corresponding channel is not set to the home return input mode. (2nd operand)
23652	When setting the server connection, the local port number and the connection of another server connection setting are duplicated. (2nd operand)
23653	When setting the client connection, the connection of another client connection setting and local port number, destination IP address, destination port number are duplicated (2nd operand).
23655	An unset transfer setting is specified. (2nd operand)
23752	An unset FTP server is specified. (2nd operand)
23757	The device PUT setting and the transfer source file deletion setting are used together. (2nd operand)
30602	A value outside the range is specified for the F-ROM area. (3rd operand)
30623	A value outside the range is specified for the designation (starting address) of the destination unit. (3rd operand)
30625	A value outside the range is specified for the number of data to be received. (3rd operand)
30626	A value outside the range is specified for the device code. (3rd operand)
30627	A word device is specified for the destination device type of the destination unit. (3rd operand)
30634	A value outside the range is specified for the COM port number that sends data. (3rd operand)
30641	A value outside the range is specified for the output coil. (3rd operand)
30658	A value outside the range is specified for the filtering time. (3rd operand)
30661	A value outside the range is specified for the number of digits of ASCII data in the conversion method. (3rd operand)
30662	A value outside the range is specified for the sort condition. (3rd operand)
30664	A value outside the range is specified for the duration. (3rd operand)
30666	Values outside the range are specified for the proportional gain (KP), integral time (TI), and integral time (TD). (3rd operand)
30668	A value outside the range is specified for the set value (SP) (3rd operand)
30672	A value outside the range is specified for the output designation. (3rd operand)
30676	A value outside the range is specified for the file number. (3rd operand)
30679	A value outside the range is specified for the number of characters. (3rd operand)
30680	A value outside the range is specified for the maximum number of bytes to be read. (3rd operand)
30691	A value outside the range is specified for the timeout period. (3rd operand)
30692	A value outside the range is specified for the number of retries. (3rd operand)
30693	A value outside the range is specified for the retry interval. (3rd operand)
30696	A value outside the range is specified for the transfer source file name. (3rd operand)
30697	A value outside the range is specified for the number of transferred data. (3rd operand)
30698	A value outside the range is specified for the line feed position. (3rd operand)

Detail code	Error message
30703	A value outside the range is specified for the setting start connection number. (3rd operand)
30705	A value outside the range is specified for the device number of the transfer source device. (3rd operand)
30707	A value outside the range is specified for the number of data to be read. (3rd operand)
30708	The device number and the number of transferred data exceed the settable range of the device area. (3rd operand)
30712	The storage area size of the data output as text is out of range. (3rd operand)
30713	The number of characters in the data output as text exceeds 4096 characters. (3rd operand)
31002	A value of 0 is specified for the length (number of bytes) of the target data. (3rd operand)
31012	A value of 0 is specified for the number of data to be received. (3rd operand)
31014	A value of 0 is specified for the number of converted data in the conversion method. (3rd operand)
31015	A value of 0 is specified for the number of digits of ASCII data in the conversion method. (3rd operand)
31018	A value of 0 is specified for the number of words to be read. (3rd operand)
31019	A value of 0 is specified for the number of words to be written. (3rd operand)
31051	A value other than 0 is specified for the designation (area type) of the destination unit. (3rd operand)
31054	A value other than 0 is specified for the system area. (3rd operand)
31121	Data that is not a real number is specified. (3rd operand)
31201	The data to be transferred exceeds the device area of the storage destination. (3rd operand)
31202	The data to be read exceeds the device area of the storage destination. (3rd operand)
31203	The data to be written exceeds the device area of the storage destination. (3rd operand)
31204	Exchange block 1 exceeds the device area of exchange block 2. (3rd operand)
31205	The size of the specified block exceeds the device area of the comparison block. (3rd operand)
31206	The conversion result exceeds the device area of the storage destination. (3rd operand)
31210	The separated data exceeds the device area of the storage destination. (3rd operand)
31218	The time data of the calculation result exceeds the device area of the storage destination. (3rd operand)
31223	The area where the bit string is rewritten exceeds the device area of the area where the bit string is rewritten. (3rd operand)
31227	The storage area size exceeds the device area of the transfer destination. (3rd operand)
31229	The character constant exceeds the device area of the transfer destination. (3rd operand)
31230	The concatenation result exceeds the device area of the storage destination. (3rd operand)
31231	The search results exceed the device area of the storage destination. (3rd operand)
31232	The character string exceeds the device area of the storage destination. (3rd operand)
31234	The storage area size exceeds the device area of the storage destination (3rd operand).
31235	The output data exceeds the device area of the storage destination. (3rd operand)
31236	The PID control parameter exceeds the device area of the PID control parameter. (3rd operand)
31241	The data to be read exceeds the device area of the storage destination. (3rd operand)

Detail code	Error message
31242	The path name and number of characters of the file exceeds the device area of the path name and number of characters of the file. (3rd operand)
31243	The parameter exceeds the device area of the parameter. (3rd operand)
31245	The character string exceeds the device area of th string data. (3rd operand)
31246	The acquired data exceeds the device area of the storage destination. (3rd operand)
31248	The string size of the data table exceeds the device area of the data table. (3rd operand)
31309	A value larger than the string size is specified for the number of characters. (3rd operand)
31313	A value larger than the storage area size of the data to be output as text is specified for the number of characters of the data to be output as text. (3rd operand)
31408	The conversion result has exceeded the specified size of the storage area. (3rd operand)
31501	A device (K constant, H constant) that cannot be specified for the operand is specified. (3rd operand)
31502	A device (other than WY, WR, and DT) that cannot be specified for the operand is specified. (3rd operand)
31504	A device (other than WX, WY, WR, WL, SV, EV, DT, LD, SWR, and SDT) that cannot be specified for the operand is specified. (3rd operand)
31505	A device (DT) that cannot be specified for the operand is specified when setting bitwise transfer. (3rd operand)
31507	A device (other than WX, WY, WR, and WL) that cannot be specified for the operand is specified when setting bitwise transfer. (3rd operand)
31711	The keyword specified in the 1st parameter is incorrect. (3rd operand)
31712	The keyword specified in the 2nd parameter is incorrect. (3rd operand)
31713	The keyword specified in the 3rd parameter is incorrect. (3rd operand)
31761	The format of the 1st parameter is not specified by "keyword = setting value". (3rd operand)
31762	The format of the 2nd parameter is not specified by "keyword = setting value". (3rd operand)
31772	The format of the 2nd parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (3rd operand)
31773	The format of the 3rd parameter is not specified by "keyword = setting value". Or the delimiter "," is used. (3rd operand)
31813	"=" is used in the 3rd parameter. (3rd operand)
31821	"=" is used in the 1st parameter. Or the delimiter "," is not used. (3rd operand)
31861	"=" is used twice in the 1st parameter. (3rd operand)
31862	"=" is used twice in the 2nd parameter. (3rd operand)
31911	Failed to convert the setting value specified in the 1st parameter to a numerical value. (3rd operand)
31912	Failed to convert the setting value specified in the 2nd parameter to a numerical value. (3rd operand)
31913	Failed to convert the setting value specified in the 3rd parameter to a numerical value. (3rd operand)
31914	Failed to convert the setting value specified in the 4th parameter to a numerical value. (3rd operand)
31941	The number of characters in the string data has not reached the specified number. (3rd operand)

Detail code	Error message
31951	The number of characters of the character string specified in the 1st parameter has not reached the specified number. (3rd operand)
31971	The number of characters of the string data exceeds the specified number. (3rd operand)
32001	The number of characters of the string data is out of the specified range. (3rd operand)
32021	The number of characters of the setting value specified in the 1st parameter is out of the specified range. (3rd operand)
32022	The number of characters of the setting value specified in the 2nd parameter is out of the specified range. (3rd operand)
32023	The number of characters of the setting value specified in the 3rd parameter is out of the specified range. (3rd operand)
32024	The number of characters of the setting value specified in the 4th parameter is out of the specified range. (3rd operand)
32051	The delimiter "," is used after the last parameter. (3rd operand)
32061	A device that cannot be specified is specified in the 1st parameter. (3rd operand)
33253	The output coil (Y) is not set to the normal output. (3rd operand)
33758	The device GET setting and the line feed position setting are used together. (3rd operand)
40623	A value outside the range is specified for the designation (starting address) of the destination unit. (4th operand)
40624	A value outside the range is specified for the number of data to be sent. (4th operand)
40669	Values outside the range are specified for the output (MV), control mode area, auto-tuning related area, and work area for calculation. (4th operand)
40677	A value outside the range is specified for the write format designation. (4th operand)
40678	A value outside the range is specified for the write mode designation. (4th operand)
40704	A value outside the range is specified for the setting end connection number. (4th operand)
41020	A value of 0 is specified for the calculation cycle. (4th operand)
41054	A value other than 0 is specified for the system area. (4th operand)
41202	The data to be read exceeds the device area of the storage destination. (4th operand)
41206	The conversion result exceeds the device area of the storage destination. (4th operand)
41213	The number of received words exceeds the device area of the data to be received. (4th operand)
41215	The number of sent data exceeds the device area of the data to be received. (4th operand)
41216	The device starting address of the destination of the other unit exceeds the device area of the storage area of the other unit. (4th operand)
41228	The storage area size exceeds the device area of the storage destination. (4th operand)
41237	The work area for calculation exceeds the device area of the work area for calculation. (4th operand)
41238	The number of read words exceeds the device area of the storage destination. (4th operand)
41243	The parameter exceeds the device area of the parameter. (4th operand)
41245	The character string exceeds the device area of th string data. (4th operand)
41712	The keyword specified in the 2nd parameter is incorrect. (4th operand)
41941	The number of characters in the string data has not reached the specified number. (4th operand)

Detail code	Error message
41971	The number of characters of the string data exceeds the specified number. (4th operand)
41982	The number of characters of the keyword specified in the 2nd parameter exceeds the specified number. (4th operand)
42021	The number of characters of the setting value specified in the 1st parameter is out of the specified range. (4th operand)
42022	The number of characters of the setting value specified in the 2nd parameter is out of the specified range. (4th operand)
42051	The delimiter "," is used after the last parameter. (4th operand)
42052	A wildcard character "*", "?" is used for the transfer file name. (4th operand)

12.10.13 E62 (SNTP time acquisition device errors)

Identification code	Error message
00001	The SNTP client function is stopped.
00003	Name resolution failed. (DNS communication error)
00004	Time acquisition from the SNTP server failed.
00005	Time acquisition was interrupted.

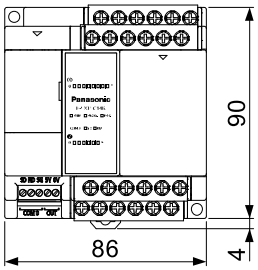
12.11 List of MEWTOCOL-COM Communication Error Codes

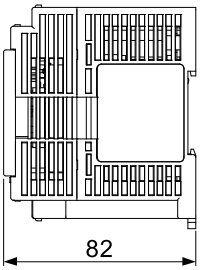
Code	Name	Description
!26	Unit number setting error	A command that cannot be used for global (unit no. FF) was received.
!40	BCC error	Transmission error occurred in received data.
!41	Format error	Command that does not match the format was received.
!42	NOT support error	An unsupported command was received.
!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. At the time of ROM transfer, a specified content exceeds the capacity. A reading / writing error occurred.
!65	Protection error	A write operation of the program or system register was performed under the protection status (password setting) or with the Master Memory Cassette installed.
!66	Address error	The code format of address data is incorrect. If the address is above or below the address range, 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, an attempt was made to read unregistered data.
!68	Rewriting is disabled while in RUN mode	An attempt was made to edit instructions (ED, SUB, RET, INT, IRET, SSTP, STPE) that cannot be rewritten in the RUN mode. 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.
!81	No effective data error (C40ET and C60ET only)	There is no effective data.

12.12 Dimensions

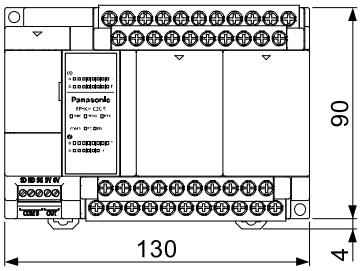
12.12.1 External Dimensions

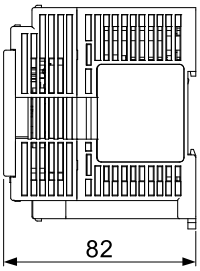
■ FP-XH C14 Control Unit



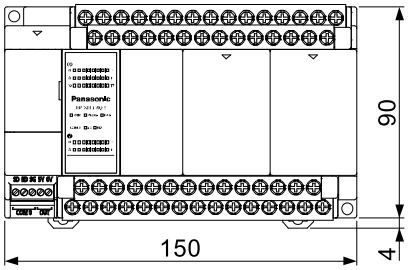


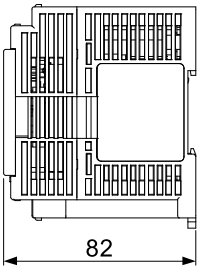
■ FP-XH C30 Control Unit



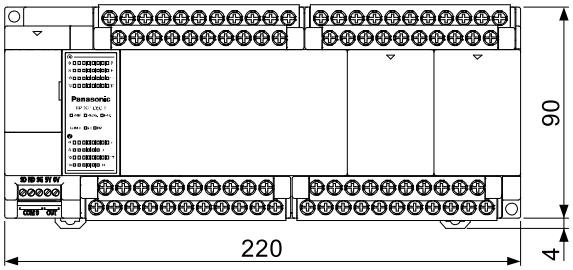


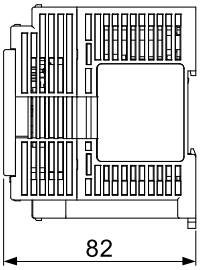
■ FP-XH C40 / C40ET Control Unit



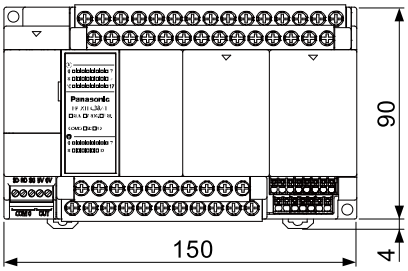


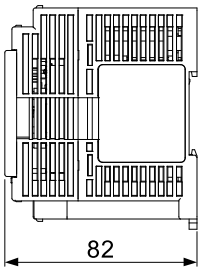
■ FP-XH C60 / C60ET Control Unit





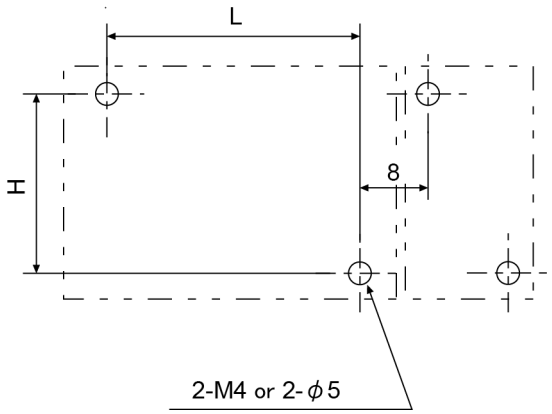
■ **FP-XH C38AT Control Unit**





Unit: mm

12.12.2 Mounting Dimensions



Model	L	H
C14	78	82
C30	122	82
C40 / C38AT / C40ET	142	82
C60 / C60ET	212	82

Unit: mm

Record of changes

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

Date	Manual No.	Record of Changes
May 2014	-	-
Dec. 2014	-	- ● Added functions.
		- ● Corrected errors.
Nov. 2015	-	- ● Added descriptions on the FPWIN GR7. ● Corrected errors.
Nov. 2018	-	- ● Added C38AT model.
Jun. 2020	WUME-FPXHBAS-01	1st Edition ● Changed the manual format.
Feb. 2021	WUME-FPXHBAS-02	2nd Edition ● Added C40ET and C60ET models. ● Corrected errors.
Jun. 2021	WUME-FPXHBAS-03	3rd Edition ● Added C40ET and C60ET functions. "Self-diagnosis error code details" ● Corrected errors.

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 Industrial Devices SUNX 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 Industrial Devices SUNX 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 3 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 Industrial Devices SUNX confirms any failures or defects of the Products by reasons solely attributable to Panasonic Industrial Devices SUNX during the warranty period, Panasonic Industrial Devices SUNX 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.

(MEMO)

Please contact .....

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■ 97, Huoju Road, Suzhou New District, Jiangsu, China
■ Telephone: +86-512-6843-2580
panasonic.net/id/pidsx/global

For our sale network, please visit our website.

June, 2021

WUME-FPXHBAS-03