Ramp/Soak Controller

PZ400/PZ900
PZ401/PZ901

PLC Communication Instruction Manual

RKC® RKC INSTRUMENT INC.

IMR03B07-E3

NOTICE

This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.

- The figures, diagrams and numeric values used in this manual are only for explanation purpose.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty, expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
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- Windows is a trademark of Microsoft Corporation.
- Modbus is a registered trademark of Schneider Electric.
- The name of each programmable controller (PLC) means the products of each manufacturer.
- Company names and product names used in this manual are the trademarks or registered trademarks of the respective companies.

Safety Precautions

■ Pictorial Symbols (safety symbols)

Various pictorial symbols are used in this manual to ensure safe use of the product, to protect you and other people from harm, and to prevent damage to property. The symbols are described below.
Be sure you thoroughly understand the meaning of the symbols before reading this manual.

⚠ WARNING : This mark indicates precautions that must be taken if there is danger of electric shock, fire, etc., which could result in loss of life or injury.

⚠ CAUTION : This mark indicates that if these precautions and operating procedures are not taken, damage to the instrument may result.

⚠ : This mark indicates that all precautions should be taken for safe usage.

⚠ WARNING

- To prevent injury to persons, damage to the instrument and the equipment, a suitable external protection device shall be required.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to the instrument and the equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to the instrument and the equipment.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Do not touch high-voltage connections such as power supply terminals, etc. to avoid electric shock.
- RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction may occur and warranty is void under these conditions.

⚠ CAUTION

- This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy plant.)
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take additional measures.
- This instrument is protected from electric shock by reinforced insulation. Provide reinforced insulation between the wire for the input signal and the wires for instrument power supply, source of power and loads.
- Be sure to provide an appropriate surge control circuit respectively for the following:
  - If input/output or signal lines within the building are longer than 30 meters.
  - If input/output or signal lines leave the building, regardless the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock to operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- All wiring must be in accordance with local codes and regulations.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as a fuse, circuit breaker, etc.
- A malfunction in this product may occasionally make control operations impossible or prevent alarm outputs, resulting in a possible hazard. Take appropriate measures in the end use to prevent hazards in the event of malfunction.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dissipation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the instrument.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration may occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to the instrument display, do not rub with an abrasive material or push the front panel with a hard object.

For Proper Disposal

When disposing of each part used for this instrument, always follows the procedure for disposing of industrial wastes stipulated by the respective local community.

Symbols

■ Pictorial Symbols (safety symbols)

NOTE : This mark indicates important information on installation, handling and operating procedures.

: This mark indicates supplemental information on installation, handling and operating procedures.

: This mark indicates where additional information may be located.

■ Character Symbols

11-segment character

0	1	2	3	4	5	6	7	8	9	Minus	Period
											

A	B (b)	C	c	D (d)	E	F	G	H	I	J	K
											

L	M	N	n	O (o)	P	Q	R	S	T	t	U
											

u	V	W	X	Y	Z	Degree	／	Prime	✱ (Asterisk)	→
										

7-segment character

0	1	2	3	4	5	6	7	8	9	Minus	Period

A	B (b)	C	c	D (d)	E	F	G	H	I	J	K

L	M	N (n)	O (o)	P	Q	R	S	T	t	U	u

V	W	X	Y	Z	Degree	／	Prime	✱ (Asterisk)

■ Abbreviation symbols

These abbreviations are used in this manual:

Abbreviation symbols	Name	Abbreviation symbols	Name
PV	Measured value	TC (input)	Thermocouple (input)
SV	Set value	RTD (input)	Resistance temperature detector (input)
MV	Manipulated output value	V (input)	Voltage (input)
AT	Autotuning	I (input)	Current (input)
ST	Startup tuning	HBA (1, 2)	Heater break alarm (1, 2)
OUT (1 to 3)	Output (1 to 3)	CT (1, 2)	Current transformer (1, 2)
DI (1 to 6)	Digital input (1 to 6)	LBA	Control loop break alarm
DO (1 to 4)	Digital output (1 to 4)	LBD	LBA deadband
FBR	Feedback resistance		

Document Configuration

There are six manuals pertaining to this product. Please be sure to read all manuals specific to your application requirements.

The following manuals can be downloaded from the official RKC website:
https://www.rkcinst.co.jp/english/download-center/

Manual	Manual Number	Remarks
PZ400/PZ900/PZ401/PZ901 Installation Manual	IMR03B01-E☐	This manual is enclosed with instrument. This manual explains the mounting and wiring.
PZ400/PZ900/PZ401/PZ901 Quick Operation Manual	IMR03B02-E☐	This manual is enclosed with instrument. This manual explains the basic key operation, mode menu, and data setting.
PZ400/PZ900/PZ401/PZ901 Parameter List	IMR03B03-E☐	This manual is enclosed with instrument. This list is a compilation of the parameter data of each mode.
PZ400/PZ900/PZ401/PZ901 Instruction Manual	IMR03B05-E☐	This manual describes installation, wiring, operation of each function, and troubleshooting.
PZ400/PZ900/PZ401/PZ901 Host Communication Instruction Manual	IMR03B06-E☐	This manual explains RKC communication protocol (ANSI X3.28-1976) and Modbus relating to communication parameters setting.
PZ400/PZ900/PZ401/PZ901 PLC Communication Instruction Manual	**IMR03B07-E3**	This manual you are reading now. This manual describes how to set up the instrument for communication with a programmable controller (PLC).

Read this manual carefully before operating the instrument. Please place the manual in a convenient location for easy reference.

About This Manual

This manual describes how to connect the instrument to a programmable logic controller (PLC) after it has been installed and how to set up the instrument to transfer the data between the instrument and the PLC.

This manual consists of 8 chapters.
Chapter 7 describes how to make wiring between the instrument and the PLC and how to set up for the data transfer after the installation of the instrument giving an example.
In other chapters, detailed and supplementary explanations are provided.

	What do you want to do?	See the following section for more details
☐	I want to know the features of the PLC communication	1. OUTLINE
☐	I want to know the operation flow to establish PLC communication	1. OUTLINE 7. USAGE EXAMPLE
☐	I want to know the specification of the PLC communication	2. COMMUNICATION SPECIFICATIONS
☐	I want to setting the device address and the communication speed of the instrument	3. COMMUNICATION SETTING 7. USAGE EXAMPLE
☐	I want to check the communication speed and the data bit configuration of the PLC	3. COMMUNICATION SETTING
☐	I want to know how to wiring between the instrument and the PLC	4. CONNECTION TO THE PLC
☐	I want to check the PLC communication environment items	5. PLC COMMUNICATION ENVIRONMENT SETTING
☐	I want to know the communication data transfer method	6. COMMUNICATION DATA
☐	I want to know the communication data processing time	6. COMMUNICATION DATA
☐	I want to know the register address and the communication data range	6. COMMUNICATION DATA
☐	I want to reduce the amount of the communication data for the data transfer.	6. COMMUNICATION DATA
☐	I want to know what actions I should take in case of errors	8. TROUBLESHOOTING

Contents

MEMO

1 OUTLINE

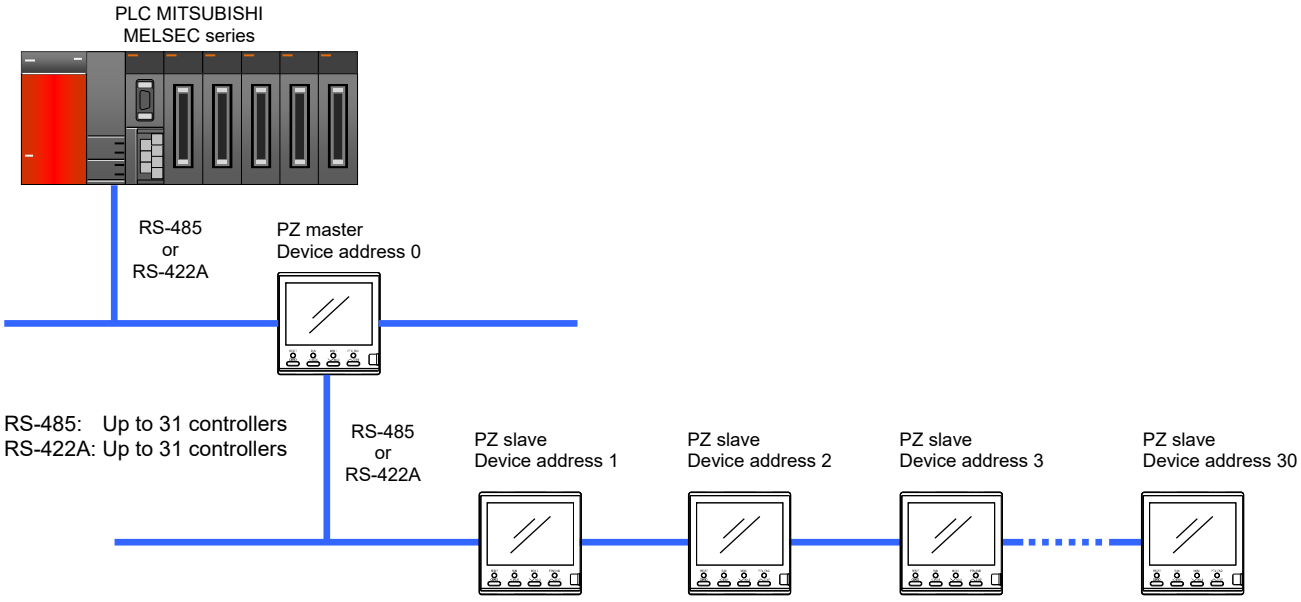
This manual describes the PLC communication.

☞ Refer to **PZ400/PZ900/PZ401/PZ901 Host Communication Instruction Manual (IMR03B06-E□)** for the Host communication (RKC communication and Modbus).

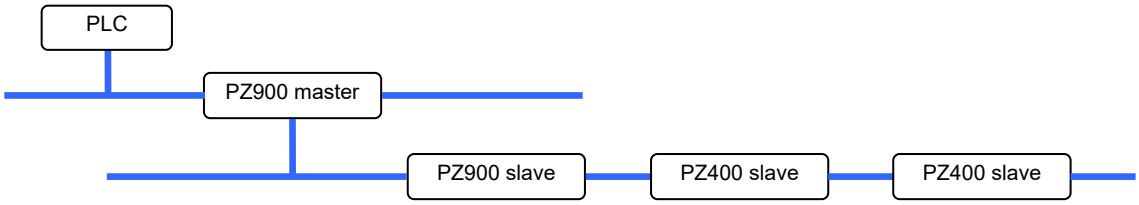
☞ Refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)** for wiring power supply, inputs/outputs, and descriptions of communication data (parameter) and functions.

1.1 Features

The PLC communication function is used to exchange the data between a programmable logic controller (hereafter called “PLC”) and a PZ400/900/401/901 (hereafter called “PZ”) and to set the PZ.
Up to 31 controllers can be connected to one PLC.



Different types of the PZ can be used in the same network as shown below.



■ Program free connection to a PLC (MAPMAN function)

Users do not need to develop a program for communication between the PLC and the PZ controller. Users only have to set up the communication data that allows the communication with the PLC to be established.

Data required to establish the communication

Setting of PZ

- Communication protocol, Device address and Communication speed, etc.
  ➔ Refer to "**3. COMMUNICATION SETTING**"
- PLC communication environment items
  ➔ Refer to "**5. PLC COMMUNICATION ENVIRONMENT SETTING**"

Setting of PLC

- Protocol, Station number and Communication rate, etc.
  ➔ Refer to "**3.2 Communication Setting of PLC**" or **PLC instruction manual**

■ PLC communication data map editing is possible

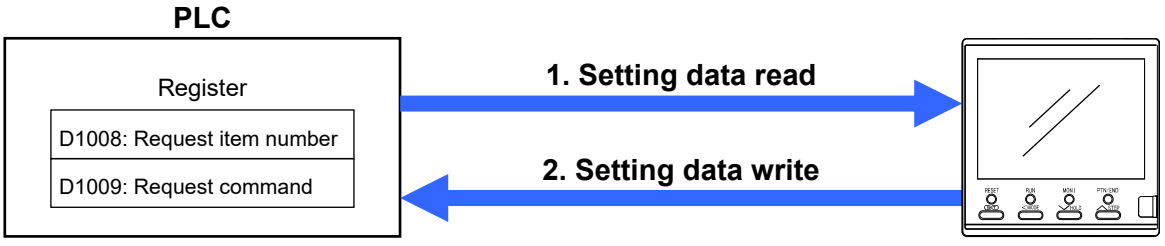
Communication data of a PLC communication data map can be edited by loader communication or host communication. For example, the amount of PLC register space that is used can be reduced by setting unnecessary communication data to "unused."
Editing the PLC communication data map can be set in the PLC communication environment items.

To set the PLC communication environment items, it is recommended to use the loader communication.
This is because the host and the PLC communication share the same communication terminals. When you edit the data map through the host communication, you have to make changes to the communication setup and the wiring to the PLC communication.

To use a loader communication, you will need a USB communication converter COM-K2 (or COM-KG) and loader communication cable (W-BV-05-1500) for the PZ.

■ Execute the data transfer using "Request item number" and "Request command"

The setting data can be transferred by setting values in "Request item number" and "Request command" available in the register of the PLC.



Refer to **6.1.1 Data group (P. 6-3)** for the "Request item number" and "Request command."

■ Communication data type

There are such data as shown below for the communication with the PLC.

- Double word
- Single word

Communication data type can be selected at Input data type (*I NdT*).

For the Input data type, refer to **■ Input data type [Engineering mode: Function block No. 21] (P. 3-7).**

1.2 Usable PLC Modules

The PZ can be connected to MITSUBISHI MELSEC series module.

Check the website of Mitsubishi Electric for discontinued PLC modules.

■ Usable PLC modules

MELSEC Q series

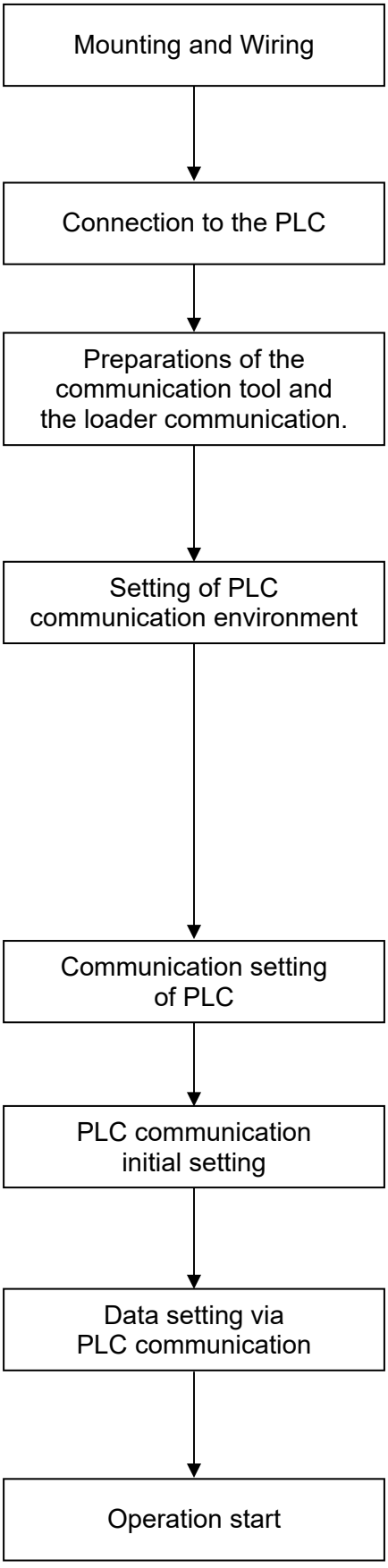
Name	Type
Serial communication modules	● QJ71C24 ● QJ71C24N ● QJ71C24N-R4, etc. The QnA compatible 3C frame (Format 4) can use.

MELSEC iQ-F series

Name	Type
FX5U CPU Module	● FX5U-32MR/ES ● FX5U-64MR/ES ● FX5U-80MR/ES The QnA compatible 3C frame (Format 4) can use.
FX5UC CPU Module	● FX5UC-32MT/D ● FX5UC-64MT/D ● FX5UC-96MT/D The QnA compatible 3C frame (Format 4) can use.
Expansion board for RS-485 communication	● FX5-485-BD
Expansion adapter for RS-485 communication	● FX5-485ADP

1.3 Handling Procedure to Operation

Proceed as follows to establish communication and operate the system.



Install the PZ and wire for input/output and power supply.

☞ Refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

Connect PLC to PZ.

☞ Refer to **4. CONNECTION TO THE PLC (P. 4-1).**

To establish PLC communication, the initial setting is required on the PZ controller. You have to arrange for the communication software and the loader communication to do the initial setting.

☞ Refer to **5.1 Preparations of The Loader Communication (P. 5-2)**.

☞ Refer to **7.4 Setting of PZ900 (P. 7-5)**.

Set up the necessary items required for the PLC communication (PLC communication environment items) through the loader communication. PLC communication environment item means the data necessary to be set up to exchange the data between the PZ and the PLC. You have to set up the register type occupied by the data of the PZ and the register address.
You can also configure communication parameters such as Device address, Communication speed, Data bit configuration and so on in the PLC communication environment items.

☞ Refer to **5.2 PLC Communication Environment Items List (P. 5-3)**.

Use the programming tool from the PLC manufacturer to set the protocol, station number, communication rate, etc. of the PLC.

☞ Refer to **3.2 Communication Setting of PLC (P. 3-11)**.

☞ Refer to **7.5 Communication Setting of PLC (P. 7-26)**.

Before changing the PZ data from PLC, always read it into the PLC once.

☞ Refer to **6.1.2 Data transfer procedures (P. 6-13)**.

☞ Refer to **7.6 Initial Setting (P. 7-27)**.

Change the set value of each PZ data from the PLC.

☞ Refer to "**Read out all communication data of PLC setting group to the PZ. (P. 6-5)**."

☞ Refer to **7.7 Data Setting (P. 7-29)**.

MEMO

COMMUNICATION SPECIFICATIONS

2

2.1 PLC Communication

Interface: Based on RS-422A, EIA standard
Based on RS-485, EIA standard

Connection method: RS-422A: 4-wire system, half-duplex multi-drop connection
RS-485: 2-wire system, half-duplex multi-drop connection

Synchronous method: Start/Stop synchronous type

Communication speed: 2400 bps
4800 bps
9600 bps
19200 bps
38400 bps
57600 bps

Data bit configuration: Start bit: 1
Data bit: 7 or 8
Parity bit: None, Odd or Even
Stop bit: 1 or 2

Protocol: MELSEC Communication Protocol
QnA compatible 3C frame (Format 4)
[Manufactured by Mitsubishi Electric Corporation.]
Commands used
- 1401: Write to word device in word units
- 0401: Read from word device in word units

Termination resistor: Externally terminal connected (120 Ω 1/2 W)

Xon/Xoff control: None

Maximum connections: RS-422A: Up to 31 controllers
RS-485: Up to 31 controllers
Maximum connection quantity of the PZ to a single PLC

Signal logic: RS-422A, RS-485

Signal voltage	Logic
V (A) − V (B) ≥ 1.5 V	0 (SPACE)
V (A) − V (B) ≤ −1.5 V	1 (MARK)

Transmission distance: RS-422A: 1.2 km
RS-485: 1.2 km
The transmission distance is a theoretically maximum distance of the standard and may depend on the product specification.

☞ Refer to **PZ400/PZ900/PZ401/PZ901 Host Communication Instruction Manual (IMR03B06-E□)** for the host communication and loader communication specifications.

2.2 Loader Communication

Protocol:	For RKC communication protocol only (ANSI X3.28-1976 subcategories 2.5 and A4)
Synchronous method:	Start/Stop synchronous type
Communication speed:	38400 bps
Data bit configuration:	Start bit: 1 Data bit: 8 Parity bit: None Stop bit: 1 Number of communication data digits: 7 (fixed)
Maximum connections:	1 point
Connection method:	Exclusive cable (W-BV-05)
Interval time:	10 ms

When the instrument is powered off, power can be supplied to the instrument from COM-K2 or COM-KG. This function is exclusive for parameter setting, and the instrument functions as follows.

- Control is stopped (Output is off, relay remains open).
- Host communication is stopped.
- The PV/SV monitor shows "LoAd" for the PV display and "----" for the SV display. The LCD backlight is partially turned off.

While the instrument is powered by COM-K2 or COM-KG, if power is applied to the instrument, the instrument will be reset and starts for normal operation.

When the instrument is normally powered, the host communication can be used simultaneously.

When the instrument is normally powered, the PLC communication can be used simultaneously.

MEMO

COMMUNICATION SETTING

3

3.1 Communication Setting of PZ

The following communication data of the PZ needs to be set to establish communication to the PLC. Use the front keypad or the loader communication to set.

- Communication protocol
- Device Address
- Communication speed
- Data bit configuration
- Interval time
- Decimal point position *
- Input range low/Input range high *
- Input data type *

* These items are to be set when the communication data type (Double word [signed 32 bit integer]/Single word [signed 16 bit integer]) is changed. The exclusive register allocation of the PLC varies with communication data types. (Refer to **P. 6-27** and **P. 6-35**)
The communication data type can be selected at Input data type. The factory set value of the Input data type depends on the input range code specified at the time of ordering. (Refer to **P. 3-8**)

NOTE

After all the communications parameters are set, perform one of the following steps to make settings valid:

- **The power is turned on again after turning it off once.**
- **The Operation mode is changed to Program control mode (RUN), the Fixed set point control mode (FIX) or the Manual control mode (MAN) from Reset mode (RESET) again after changing it to Reset mode (RESET) once.**

3.1.1 Contents of the communication data

■ Communication protocol [Engineering mode: Function block No. 60]

The table below shows a list of available communication protocols. Select the PLC communication. If two or more PZ are connected to the PLC, set "3: PLC communication" on all of the PZ connected to the PLC.

NOTE

To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).

If you have ordered your controllers with the preset initial code specifying "(MITSUBISHI MELSEC series special protocol QnA-compatible 3C frame [format 4])," your controllers are delivered with this configuration.

Screen number	Symbol	Name	Data range	Factory set value
236	CMPS	Communication protocol	0: RKC communication 1: Modbus (Order of data transfer: upper word to lower word) 2: Modbus (Order of data transfer: lower word to upper word) 3: PLC communication (MITSUBISHI MELSEC series special protocol QnA-compatible 3C frame [format 4])	When the communication protocol is specified at the time of order, the specified communication protocol will be the factory preset value. With communication, communication protocol not specified: 0

■ Device address [Engineering mode: Function block No. 60]

This is a device address of the PZ. Select a device address between 0 and 30 for the PLC communication.
It is recommended to assign continuous values to the device address. Setting noncontinuous device address may need longer time before the PZ master recognizes the total number of connected PZ slaves (device address 1 to 30).

NOTE

- **To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).**
- **A master PZ with a device address "0" (zero) must exist in the line. (PLC communication)**
- **To avoid problems or malfunction, do not duplicate an address on the same communication line.**

Screen number	Symbol	Name	Data range	Factory set value
237	Add	Device address	PLC communication: 0 to 30 0: Master 1 to 30: Slave	0
			RKC communication: 0 to 99	0
			Modbus: 1 to 99	1

The device address of the PZ slave must be continuous starting from 1.

■ Communication speed [Engineering mode: Function block No. 60]

Select a communication speed for the data communication between the PZ and the PLC.
The communication speed must be set to the same value for the PZ and the PLC. When two or more PZ are connected, set the same communication speed for all of them.

NOTE

To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).

Screen number	Symbol	Name	Data range	Factory set value
238	bPS	Communication speed	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: 57600 bps	3

■ Data bit configuration [Engineering mode: Function block No. 60]

Set a bit configuration for the data communication with the PLC.
The data bit configuration must be set to the same value for the PZ and the PLC. When two or more PZ are connected, set the same data bit configuration for all of them.

NOTE

To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).

Screen number	Symbol	Name	Data range	Factory set value
239	bIT	Data bit configuration	0 to 11 Refer to Data bit configuration table	0

Data bit configuration table

Set value	Data bit	Parity bit	Stop bit
0	8	None	1
1	8	None	2
2	8	Even	1
3	8	Even	2
4	8	Odd	1
5	8	Odd	2

Set value	Data bit	Parity bit	Stop bit
6	7	None	1
7	7	None	2
8	7	Even	1
9	7	Even	2
10	7	Odd	1
11	7	Odd	2

: Not settable for Modbus

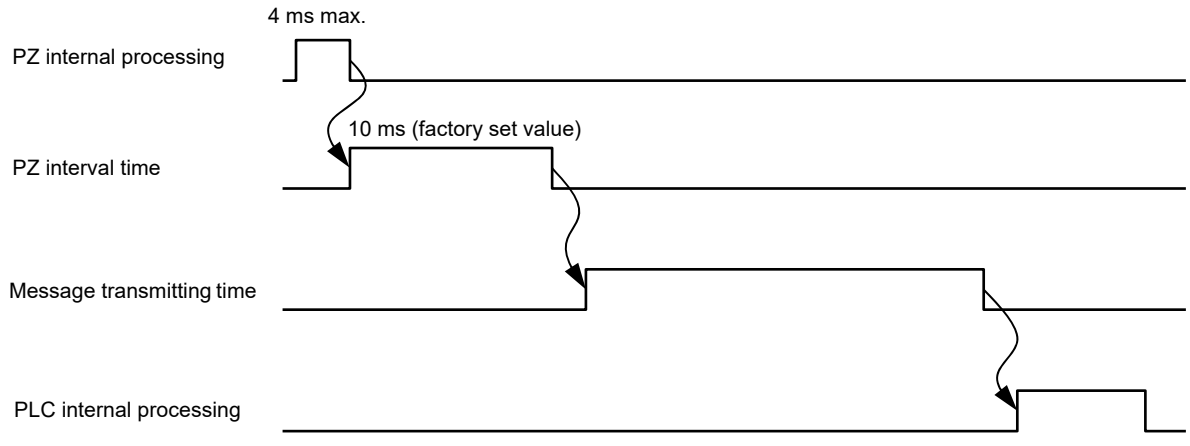
■ Interval time [Engineering mode: Function block No. 60]

Set an interval time which is the latency between the data reception from the PLC and the data transmission from the PZ. The PZ sends the data to the PLC after the elapse of the time (PZ internal processing time + interval time).

NOTE

To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).

Screen number	Symbol	Name	Data range	Factory set value
240	INT	Interval time	0 to 250 ms	10



■ Decimal point position [Engineering mode: Function block No. 21]

When changing the input data type from double word to single word, the input range may need to be changed to cope with the 4-digit display of the measured value. Move the decimal point position to an appropriate position.

☞ For the input range of 4-digit measured value, refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

Refer to "**■ Input range table**" of "**8.1 Changing Input**"

NOTE

- **To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).**
- **Some communication data (parameters) may be initialized or automatically converted when a decimal point position is changed. It is recommended to record settings before changing the decimal point position.**

☞ For the communication data (parameters) that are initialized or automatically converted, refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

Engineering mode: Function block No. 21

Screen number	Symbol	Name	Data range	Factory set value
136	PGdP	Decimal point position	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places TC input: W5Re/W26Re, PR40-20: 0 (fixed) Thermocouples other than those shown above: 0 or 1 RTD input: 0 to 2 Voltage (V)/Current (I) input: In case of Input data type 0: 0 to 4 In case of Input data type 1: 0 to 3	Same as the decimal point position of the input range code specified at the time of order. For V/I inputs: 1

■ Input range high/Input range low [Engineering mode: Function block No. 21]

When changing the input data type from double word to single word, the input range may need to be changed to cope with the 4-digit display of the measured value. Adjust the input range narrower as required.

☞ For the input range of 4-digit measured value, refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

Refer to "■ **Input range table**" of "**8.1 Changing Input**"

NOTE

- **To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).**
- **Some communication data (parameters) may be automatically converted when the input range high (or low) is changed. It is recommended to record settings before changing the input range high (or low).**

☞ For the communication data (parameters) that are automatically converted, refer to **PZ400/ PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

Engineering mode: Function block No. 21

Screen number	Symbol	Name	Data range	Factory set value
137	PGSH	Input range high	(Input range low + 1digit) to Maximum value of input range Varies with the setting of the Decimal point position.	High limit value of the input range code specified at the time of order. For V/I inputs: 100.0
138	PGSL	Input range low	Minimum value of input range to (Input range high − 1digit) Varies with the setting of the Decimal point position.	Low limit value of the input range code specified at the time of order. For V/I inputs: 0.0

■ Input data type [Engineering mode: Function block No. 21]

Select a single or a double world for the communication data. Changeable communication data can be found in Monitor group and Setting group.
When changing to a single word system from a double word system, the input range may need to be changed to cope with the 4-digit display of the measured value. If the input data type cannot be changed to "1" (single word) from "0" (double word), select the input range which supports 4-digit display of the measured value.

☞ For the input range of 4-digit measured value, refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.
Refer to "**■ Input range table**" of "**8.1 Changing Input.**"

NOTE

- **To set up the parameters in the Engineering mode, the operation mode must be switched to the Reset mode (RESET).**
- **Some communication data (parameters) may be automatically converted when the input data type is changed. It is recommended to record settings before changing the input data type.**

☞ For the communication data (parameters) that are automatically converted, refer to **PZ400/ PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

Screen number	Symbol	Name	Data range	Factory set value
145	INdT	Input data type	0: Number of measured value digits: 5 Number of RKC communication data digits: 7 Modbus: Double word PLC communication data: Double word (System data: Single word) 1: Number of measured value digits: 4 Number of RKC communication data digits: 6 Modbus: Single word PLC communication data: Single word When changing the Input data type from 0 to 1 and when the present Input range has 5 digits (example: Input range high: 1372.0), you need to configure the Input range to have 4 digits beforehand.	Depends on the input range code specified at the time of order. (Refer to P. 3-8)

• Input range code table

The factory set value of the communication data type depends on the input range code specified at the time of ordering. See the following table to check if the communication data type of your PZ is a double word or a single word.

- When the input range code for a double word has been specified, the factory set value of the Input data type is set to 0 (double word).
- When the input range code for a single word has been specified, the factory set value of the Input data type is set to 1 (single word).

●TC input

Type	Code	Range	Communication data type
K	K01	0 to 200 °C	Single word
	K02	0 to 400 °C	
	K03	0 to 600 °C	
	K04	0 to 800 °C	
	K06	0 to 1200 °C	
	K07	0 to 1372 °C	
	K08	−199.9 to +300.0 °C	
	K09	0.0 to 400.0 °C	
	K10	0.0 to 800.0 °C	
	K14	0 to 300 °C	
	K41	−200 to +1372 °C	
	K42	−200.0 to +1372.0 °C	Double word
	KA1	0 to 800 °F	Single word
	KA2	0 to 1600 °F	
	KA3	0 to 2502 °F	
J	J01	0 to 200 °C	
	J02	0 to 400 °C	
	J03	0 to 600 °C	
	J04	0 to 800 °C	
	J08	0.0 to 400.0 °C	
	J29	−200.0 to +1200.0 °C	Double word
	JA1	0 to 800 °F	Single word
	JA3	0 to 2192 °F	
	JA6	0 to 400 °F	

Type	Code	Range	Communication data type
T	T01	−199.9 to +400.0 °C	Single word
	T02	−199.9 to +100.0 °C	
	T03	−100.0 to +200.0 °C	
	T19	−200.0 to +400.0 °C	Double word
R	R01	0 to 1600 °C	Single word
	R07	−50 to +1768 °C	
	R08	−50.0 to +1768.0 °C	Double word
	R09	0.0 to 1600.0 °C	
S	S06	−50 to +1768 °C	Single word
	S07	−50.0 to +1768.0 °C	Double word
B	B03	0 to 1800 °C	Single word
	B04	0.0 to 1800.0 °C	Double word
E	E01	0 to 800 °C	Single word
	E23	0.0 to 800.0 °C	
N	N02	0 to 1300 °C	Single word
	N05	0.0 to 1300.0 °C	Double word
W5Re/ W26Re	W03	0 to 2300 °C	Single word
PL II	A01	0 to 1300 °C	
	A05	0.0 to 1300.0 °C	Double word
U	U01	−199.9 to +600.0 °C	Single word
L	L04	0.0 to 900.0 °C	
PR40-20	F02	0 to 1800 °C	Double word
	FA2	0 to 3200 °F	

●RTD input

Type	Code	Range	Communication data type
Pt100	D01	−199.9 to +649.0 °C	Single word
	D04	−100.0 to +100.0 °C	
	D05	−100.0 to +200.0 °C	
	D06	0.0 to 50.0 °C	
	D07	0.0 to 100.0 °C	
	D08	0.0 to 200.0 °C	
	D09	0.0 to 300.0 °C	
	D10	0.0 to 500.0 °C	
	D12	−199.9 to +600.0 °C	

Type	Code	Range	Communication data type
Pt100	D21	−200.0 to +200.0 °C	Double word
	D27	0.00 to 50.00 °C	Single word
	D34	−100.00 to +100.00 °C	Double word
	D35	−200.0 to +850.0 °C	
	DA1	−199.9 to +999.9 °F	Single word
	DA9	0.0 to 500.0 °F	
JPt100	P08	0.0 to 200.0 °C	
	P29	−100.00 to +100.00 °C	Double word
	P30	−200.0 to +640.0 °C	

●Voltage/Current input

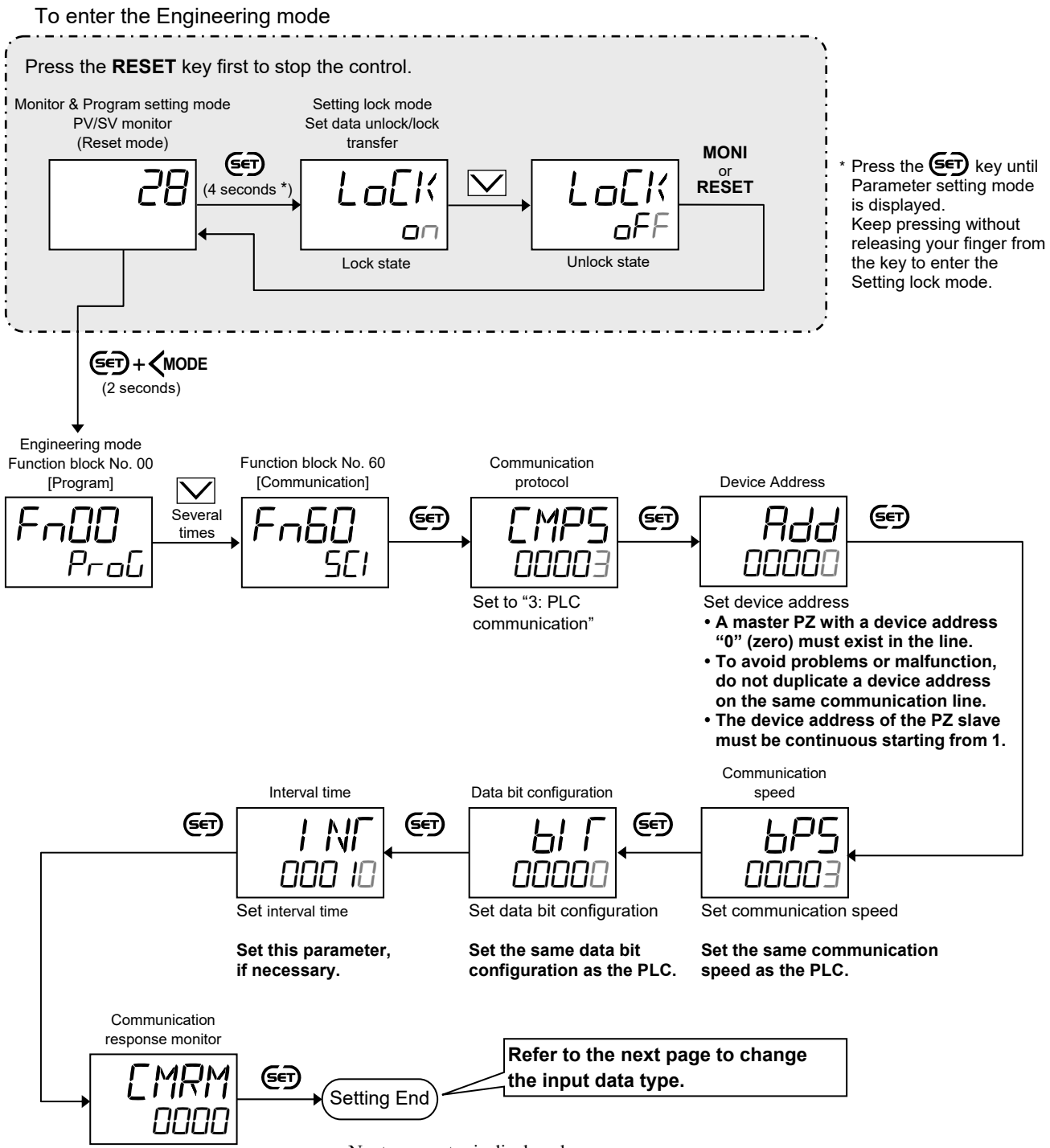
Type	Code	Range	Communication data type
0 to 10 mV DC	101	Programmable range −19999 to +99999 (Factory set value 0.0 to 100.0)	Double word
0 to 100 mV DC	201		
0 to 1 V DC	301		
0 to 5 V DC	401		
0 to 10 V DC	501		

Type	Code	Range	Communication data type
1 to 5 V DC	601	Programmable range −19999 to +99999 (Factory set value 0.0 to 100.0)	Double word
0 to 20 mA DC	701		
4 to 20 mA DC	801		
−10 to +10 V DC	904		
−5 to +5 V DC	905		

3.1.2 Setting via front keys

The communication data on pages **3-2** to **3-4** can be set in Function block No.60 in the Engineering mode.

■ Setting procedure



- Next parameter is displayed.
- Press **MONI** key or **RESET** key to return to the PV/SV monitor screen.
- Select lock on the Set data unlock/lock transfer.
- To start the operation, switch the mode to the operation mode [Program control mode (RUN), Fixed set point control mode (FIX), or Manual control mode (MAN)].

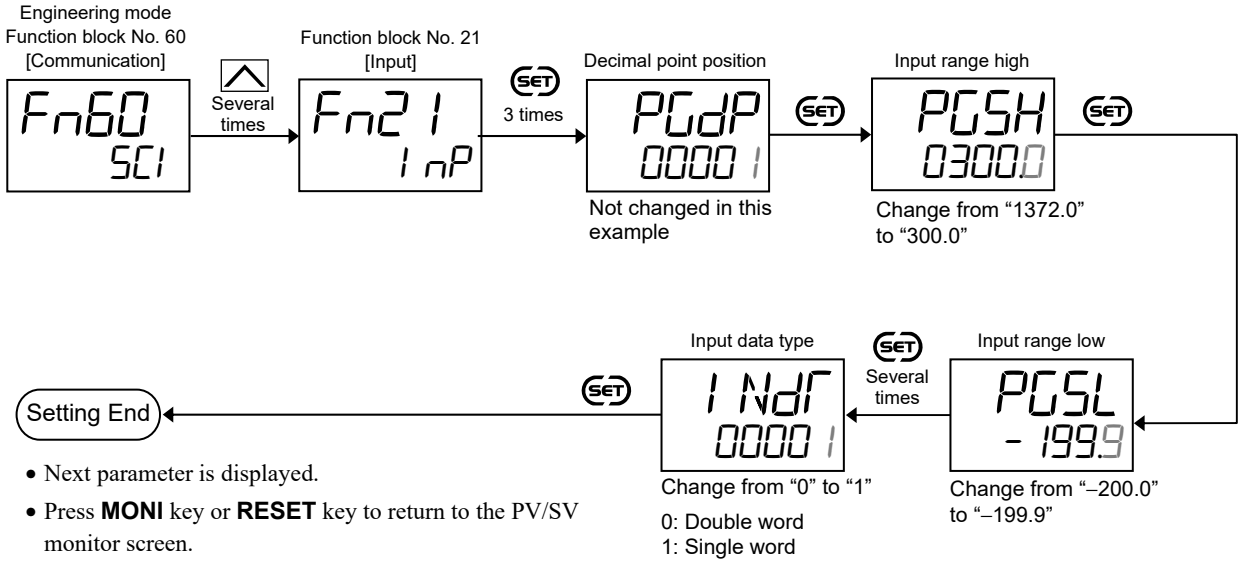
Changing example of Input data type

The Input data type can be set in Function block No.21 in the Engineering mode.

☞ Refer to the previous page to switch the mode to Engineering mode.

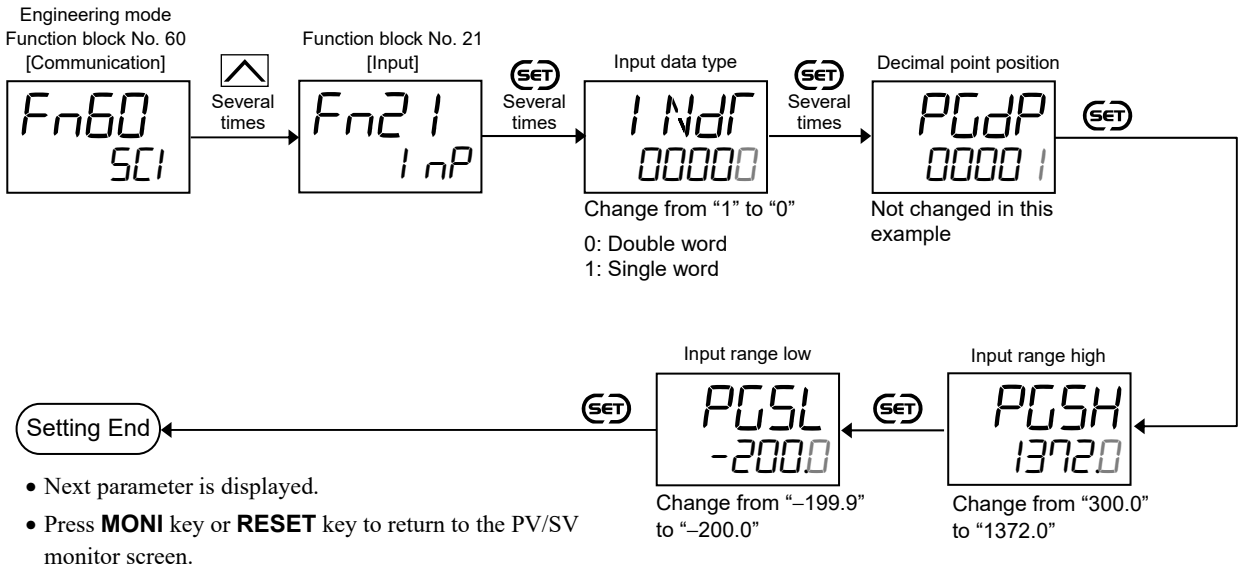
Conditions: Input type: Thermocouple K
Input range: –200.0 to +1372.0 °C (Double word) –199.9 to +300.0 °C (Single word)

• Changing from the Double word to the Single word



- Next parameter is displayed.
- Press **MONI** key or **RESET** key to return to the PV/SV monitor screen.
- Select lock on the Set data unlock/lock transfer.
- To start the operation, switch the mode to the operation mode [Program control mode (RUN), Fixed set point control mode (FIX), or Manual control mode (MAN)].

• Changing from the Single word to the Double word



- Next parameter is displayed.
- Press **MONI** key or **RESET** key to return to the PV/SV monitor screen.
- Select lock on the Set data unlock/lock transfer.
- To start the operation, switch the mode to the operation mode [Program control mode (RUN), Fixed set point control mode (FIX), or Manual control mode (MAN)].

3.1.3 Setting by the loader communication

When you try to set the communication parameters (communication protocol, device address, data bit configuration, communication speed, and interval time) via the loader communication, refer to the following pages.

☞ **5. PLC PLC COMMUNICATION ENVIRONMENT SETTING (P. 5-1)**

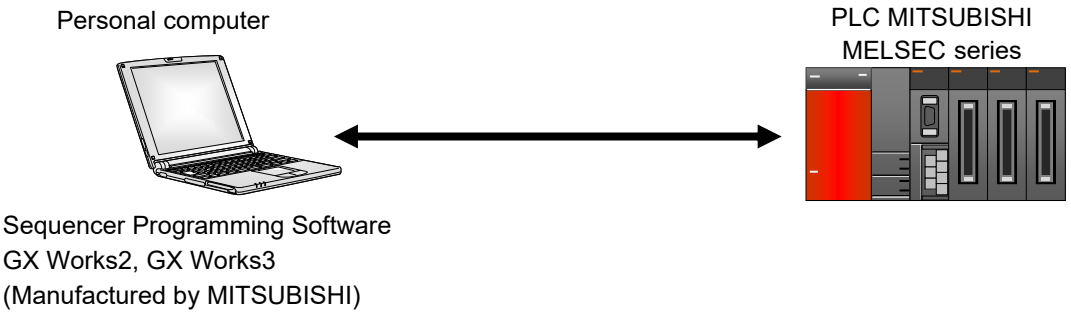
☞ **7.4 Setting of PZ900 (P. 7-5)**

3.2 Communication Setting of PLC

Sets the communication items of PLC side. Set the PLC as follows. (Recommend setting example)

☞ The setting item varies depending on the PLC. The details of the setting procedure for the PLC, see the instruction manual for the PLC being used.

Recommend setting example



Item	Details	
	MELSEC Q series	**MELSEC iQ-F series**
Protocol	MC protocol (Format 4)	MC protocol (Format 4)
Station number	0	0
Communication rate	Set the same as PZ (PZ factory set value: 19200 bps)	Set the same as PZ (PZ factory set value: 19200 bps)
Operation setting	Independent	—
Data bit	8 bits	8 bits
Parity bit	None	None
Stop bit	1 bit	1 bit
Sum check code	Exist	Added
Online Change	Enable	—
Setting modifications	Enable	—
Termination resistor	Connect the termination resistor attached to the PLC	Refer to PLC instruction Manual

MEMO

CONNECTION TO THE PLC

4

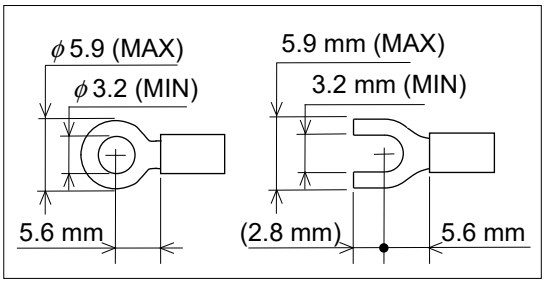
⚠ WARNING

To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.

4.1 Wiring Cautions

- To avoid noise induction, keep communication wire away from instrument power line, load lines and power lines of other electric equipment.

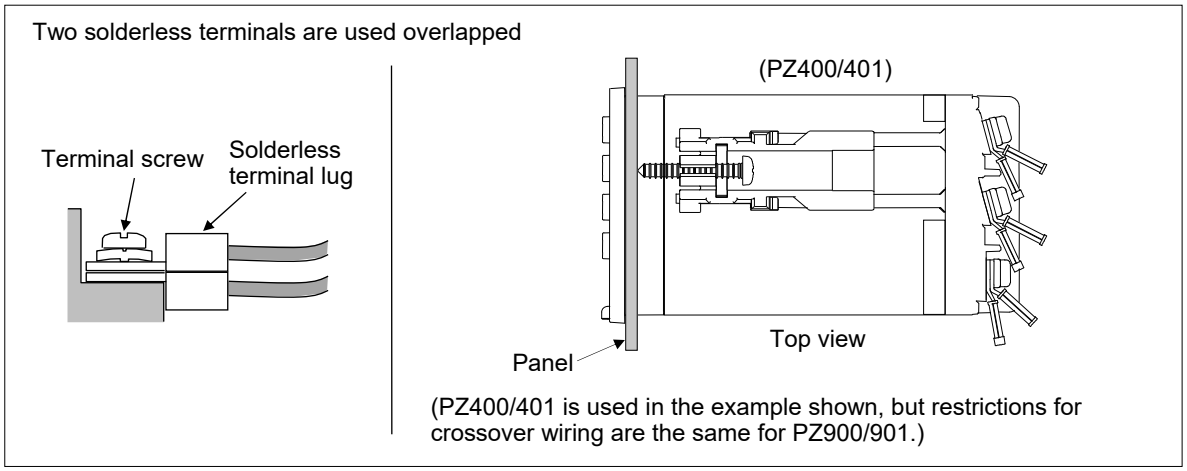
- Use the solderless terminal appropriate to the screw size.
  Screw size: M3×7 (with 5.8×5.8 square washer)
  Recommended tightening torque:
  0.4 N·m [4 kgf·cm]
  Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm^2
  Specified dimension: Refer to Fig. at the right
  Specified solderless terminal:
  Manufactured by J.S.T MFG CO., LTD.
  Circular terminal with isolation V1.25-MS3



☞ For the solderless terminal of PLC, refer to instruction manual of PLC.

- Make sure that during field wiring parts of conductors cannot come into contact with adjacent conductive parts.

- Up to two solderless terminal lugs can be connected to one terminal screw. **The requirements of reinforced insulation can be still complied with in this condition.** When actually doing this, place one solderless terminal lug over the other as illustrated below.



🕮 If solderless terminal lugs other than the recommended dimensions are used, terminal screws may not be tightened. In that case, bend each solderless terminal lug before wiring. If the terminal screw is forcibly tightened, it may be damaged.

Continued on the next page.

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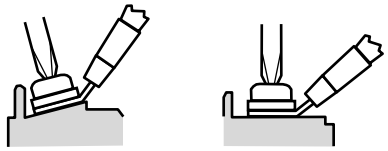
When tightening a screw of the instrument, make sure to fit the screwdriver properly into the screw head mounted tilted or flat as shown in the right figure. Tightening the screw with excessive torque may damage the screw thread.



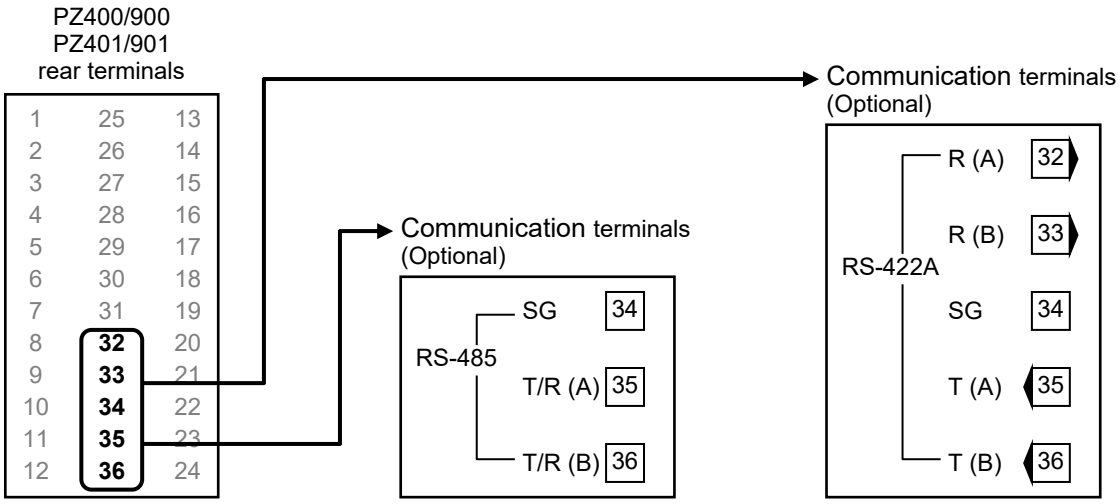
- The symbol of signal polarity A and B may be reversed between the MITSUBISHI MELSEC series and the PZ. Normally signal A of a certain device is connected to signal A of the other device, and so for B to B. However, in this case, signal polarity A should be connected to B and the polarity B to A.
- If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors. Install a termination resistor on the PZ (between communication terminals) at the furthest ends from the PLC.

  ☞ For the termination resistor of PLC, refer to instruction manual of PLC.

4.2 Communication Terminal Number and Signal Details

The PZ uses RS-485 or RS-422A as a communication interface for a connection to the PLC. Below is an explanation about the communication terminals and the signal function when the PZ is linked with a PLC.

■ Terminal configuration



■ Signal details

• RS-485

PZ400/900/401/901 terminal No.	Symbol	Signal name
34	SG	Signal ground
35	T/R (A)	Send data/Receive data
36	T/R (B)	Send data/Receive data

• RS-422A

PZ400/900/401/901 terminal No.	Symbol	Signal name
32	R (A)	Receive data
33	R (B)	Receive data
34	SG	Signal ground
35	T (A)	Send data
36	T (B)	Send data

4.3 Wiring Method

Below is an explanation about how to connect the PZ to the PLC. The connection described in this manual is just an example. When connecting the PZ to an actual PLC, consult the instruction manual of the PLC carefully and make a proper wiring between them.

The communication cable must be provided by the customer.

4.3.1 Connecting through RS-485

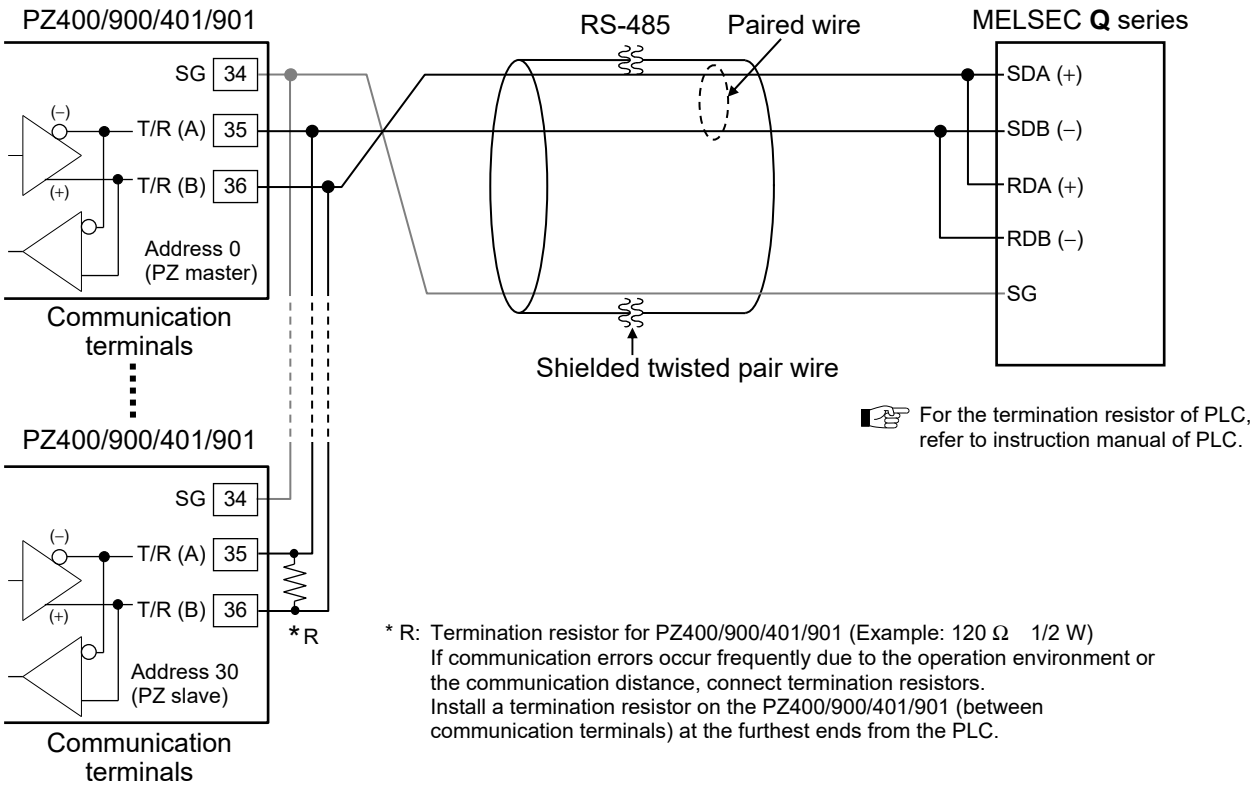
NOTE

The symbol of signal polarity A and B may be reversed between the MITSUBISHI MELSEC series and the PZ. Normally signal A of a certain device is connected to signal A of the other device, and so for B to B. However, in this case, signal polarity A should be connected to B and the polarity B to A.

PZ	
Signal ground	SG
Send data/Receive data (–)	T/R (A)
Send data/Receive data (+)	T/R (B)

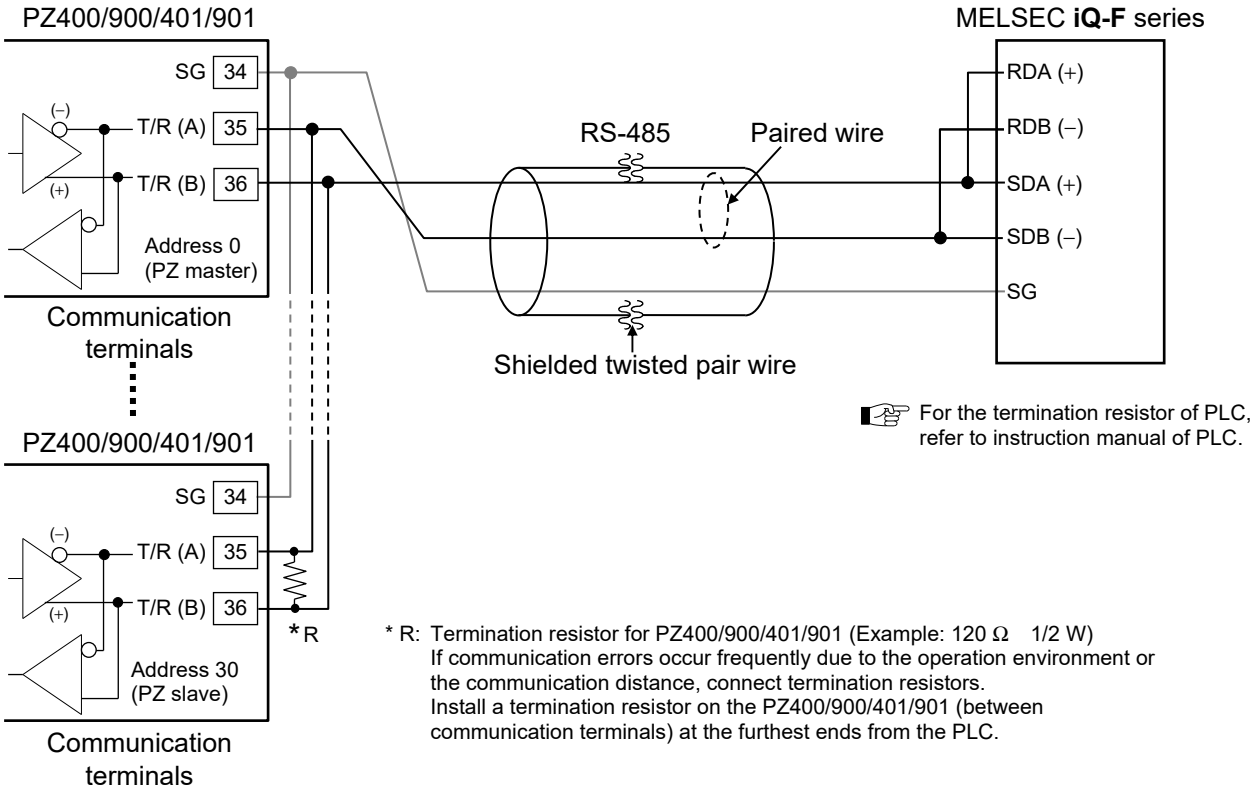
PLC MELSEC series	
SDA	Transmitted data (+)
SDB	Transmitted data (–)
RDA	Received data (+)
RDB	Received data (–)
SG	Signal ground

■ Connection example of PZ400/900/401/901 (RS-485)



* R: Termination resistor for PZ400/900/401/901 (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.
Install a termination resistor on the PZ400/900/401/901 (between communication terminals) at the furthest ends from the PLC.

Maximum connections: Up to 31 PZ400/900/401/901s



* R: Termination resistor for PZ400/900/401/901 (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.
Install a termination resistor on the PZ400/900/401/901 (between communication terminals) at the furthest ends from the PLC.

Maximum connections: Up to 31 PZ400/900/401/901s

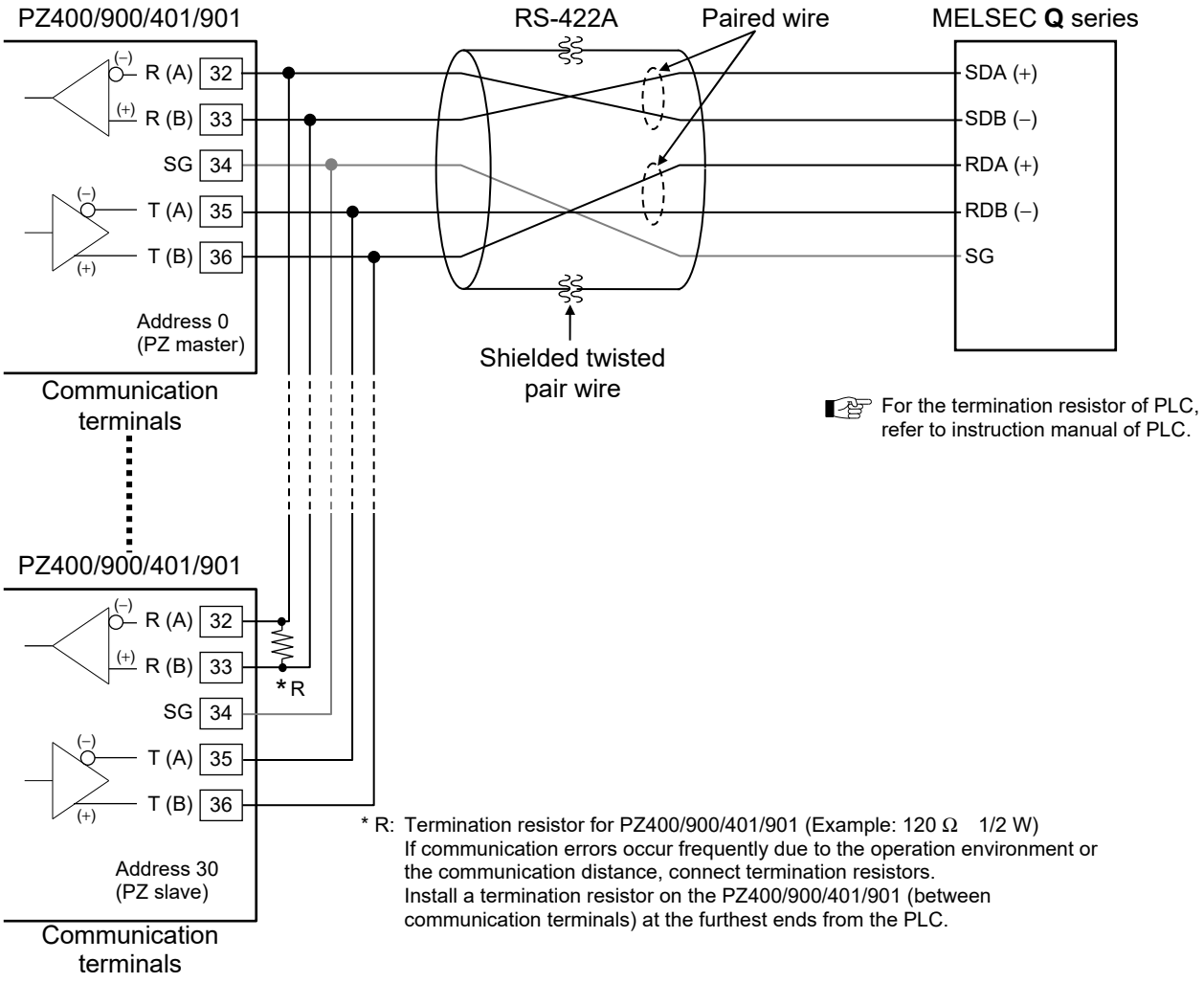
4.3.2 Connecting through RS-422A

NOTE

The symbol of signal polarity A and B may be reversed between the MITSUBISHI MELSEC series and the PZ. Normally signal A of a certain device is connected to signal A of the other device, and so for B to B. However, in this case, signal polarity A should be connected to B and the polarity B to A.

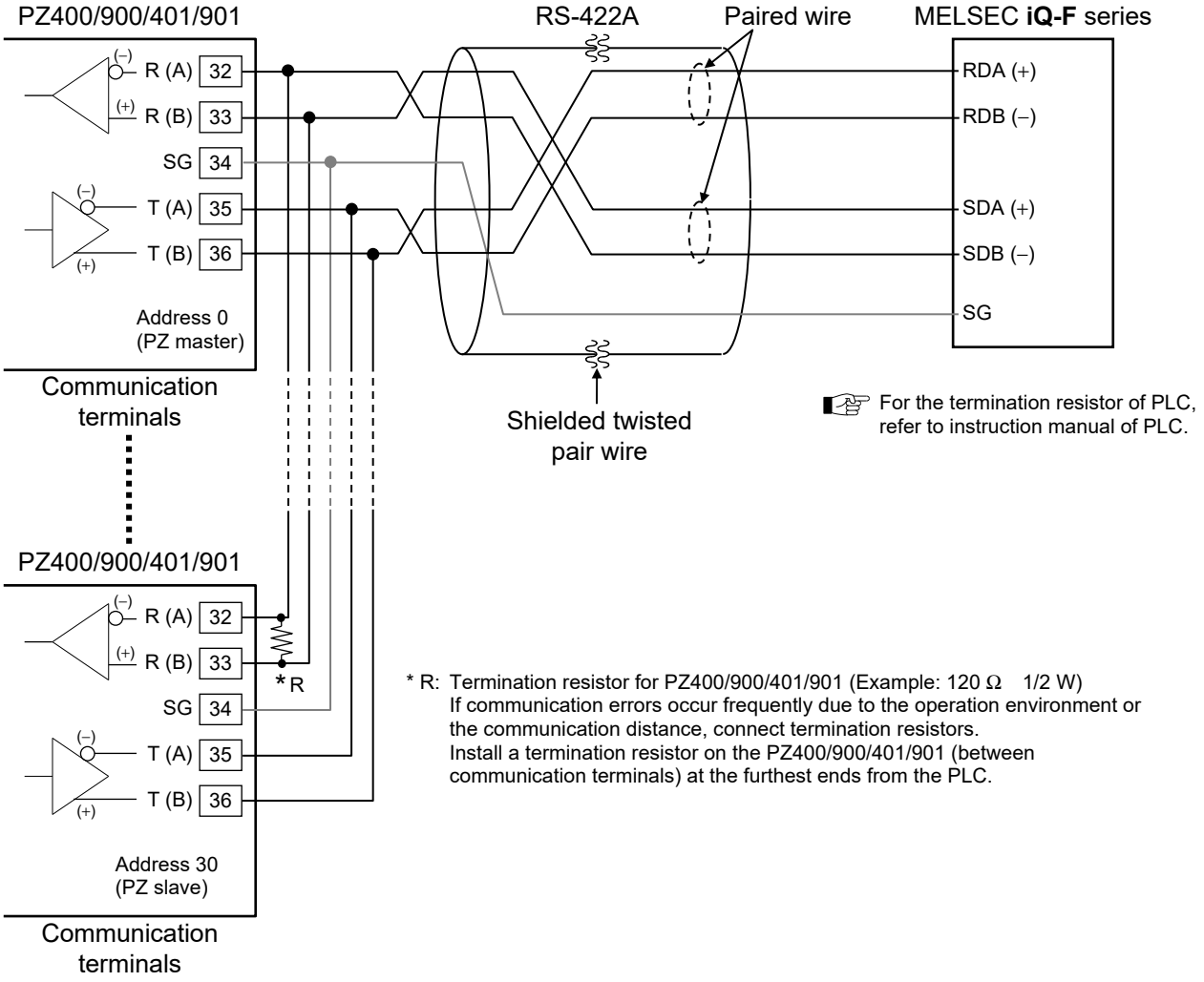
PZ		PLC MELSEC series	
Receive data (–)	R (A)	SDA	Transmitted data (+)
Receive data (+)	R (B)	SDB	Transmitted data (–)
Signal ground	SG	RDA	Received data (+)
Send data (–)	T (A)	RDB	Received data (–)
Send data (+)	T (B)	SG	Signal ground

■ Connection example of PZ400/900/401/901 (RS-422A)



* R: Termination resistor for PZ400/900/401/901 (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.
Install a termination resistor on the PZ400/900/401/901 (between communication terminals) at the furthest ends from the PLC.

Maximum connections: Up to 31 PZ400/900/401/901s



* R: Termination resistor for PZ400/900/401/901 (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.
Install a termination resistor on the PZ400/900/401/901 (between communication terminals) at the furthest ends from the PLC.

Maximum connections: Up to 31 PZ400/900/401/901s

PLC COMMUNICATION ENVIRONMENT SETTING

5

To perform PLC communication, PLC communication environment settings must be configured in the PZ. The system data settings are made by the loader communication.
(Some communication data can be set via the front keypad of the PZ)

5.1 Preparations of the Loader Communication

■ Communication converter

To perform loader communication, our converter and a communication cable are required.

- USB communication converter COM-K2 or COM-KG (With USB cable)
- Loader communication cable W-BV-05-1500 [COM-K2 or COM-KG optional] *

* W-BV-05-1500 cable can be purchased as an individual part.

■ Communication program

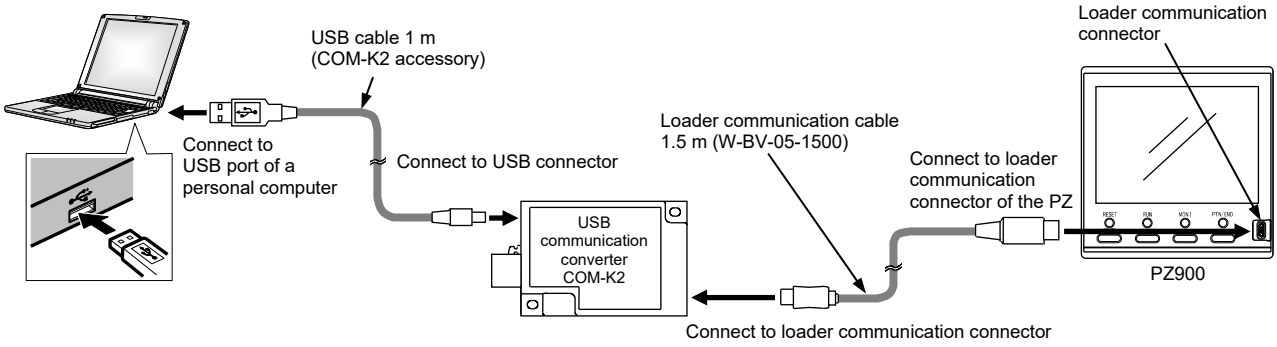
Download our communication tool PROTEM2 from our web.

■ Wiring method

Connect the PZ400/900/401/901, COM-K2 (or COM-KG), and personal computer using a USB cable and a loader communication cable. Make sure the connectors are oriented correctly when connecting.

NOTE

The Loader port is only for parameter setup. Not used for data logging during operation.



Connection example of loader communication

Communication Tool
PROTEM2
Software operation environment: Consult the manual that you downloaded

Communication port of personal computer
USB port: Based on USB Ver. 2.0

Communication settings on the personal computer
(The following values are all fixed)

Communication speed:	38400 bps
Start bit:	1
Data bit:	8
Parity bit:	None
Stop bit:	1

- The device address of the loader communication is fixed at “0.”
- The setting of the device address is disregarded.
- The loader communication corresponds to the RKC communication protocol “Based on ANSI X3.28-1976 subcategories 2.5 and A4.”

When using the loader communication, USB driver for COM-K2 must be installed on the personal computer. The USB driver can be downloaded the official RKC website. Installation of the USB driver is not necessary when the COM-KG is used on Windows 10.

5.2 PLC Communication Environment Items List

The following items are set to the PZ.

5.2.1 Setting items list

NOTE

The following items become valid by turning off the power of the PZ once, and then turning it on again after the settings are changed. These items also become valid* by switching the operation mode to other modes (RUN, FIX, or MAN) from Reset mode. The PLC communication is restarted (excluding the PLC communication start time).

* Only the PZ master can enable setting of the modified PLC communication environment items by executing "instrument recognition request command."

All of the following PLC communication environment items can be read and written (R/W).

For the "Communication identifier" and "Modbus register address" of the PLC communication environment items, refer to **P. 5-26**.

Name	Data range	Factory set value
Station number	0 to 31 Set the PLC station number to the PZ. Set it to the same number as the PLC.	0
PC number	0 to 255 Set the PLC PC number to PZ. (Refer to **P. 5-29**) Set it to the same number as the PLC. When connecting multiple PZ controllers to a PLC, set the same PC number to all of the PZ. When connecting the PZ to the connected station (host station) of the Mitsubishi PLC, there is no need of changing the factory set values.	255
Register type (D, R, W, ZR) * ⍁	0: D register (data register) 1: R register (file register) 2: W register (link register) 3: ZR register (Method of specifying consecutive numbers when 32767 of R register is exceeded.) Set the register types used in PLC communication.	0
Register start number (High-order 4-bit) * ⍁	0 to 15 Set the start number of the register of system data used in PLC communication. Set this if the register address 65535 is exceeded. (For the setting procedure, refer to **P. 5-32**)	0

⍁: Communication data settable via the front keypad. (Parameter of Function block No. 62 of Engineering mode)
For the parameter of function block No. 62, refer to **PZ400/PZ900/PZ401/PZ901 Parameter List (IMR03B03-E□)** [Enclosed with instrument].

* Usable register ranges and types vary depending on used CPU types. For register ranges and types that can actually be used, refer to the PLC instruction manual.
If you set a register address larger than a million (1,000,000) to D and R registers, "PLC register Read/Write error" occurs.

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Name	Data range	Factory set value
Register start number (Low-order 16-bit) [1, 2] 🖂	0 to 65535 Set the start number of the register of system data used in PLC communication. System data is required to perform PLC communication. The system data occupies twelve PLC registers. (For the setting procedure, refer to **P. 5-32**)	1000
Monitor item register bias [1] 🖂	12 to 65535 Set the start number of the register of monitor group communication data. Bias is added to the Register start number in the system data. The factory set value for the register bias is twelve, and thus the register start number of the monitor group starts from D1012. (The Register start number in the system data is factory preset to 1000.) **Equation for calculating:** **Register start number of monitor group =** **Register start number + Monitor item register bias** (Refer to **P. 5-31**)	12
Setting item register bias [1] 🖂	0 to 65535 Set the start number of the register of setting group communication data. When the Setting item register bias is set to 0 to 11: The set bias value becomes invalid. The Register start number of the Setting group is assigned next to the Monitor group. When the Setting item register bias is set to 12 or more (12 to 65535): Bias is added to the Register start number in the system data. The added value will be the Register start number of Setting group. **Note:** If set to 12 or greater (12 to 65535), take care that overlapping of the communication data of the monitor group and the register address does not occur. **Equation for calculating:** **Register start number of setting group =** **Register start number + Setting item register bias** (Refer to **P. 5-31**)	0

🖂: Communication data settable via the front keypad. (Parameter of Function block No. 62 of Engineering mode)
For the parameter of function block No. 62, refer to **PZ400/PZ900/PZ401/PZ901 Parameter List (IMR03B03-E□)** [Enclosed with instrument].

[1] Usable register ranges and types vary depending on used CPU types. For register ranges and types that can actually be used, refer to the PLC instruction manual.

[2] If you set a register address larger than a million (1,000,000) to D and R registers, “PLC register Read/Write error” occurs.

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Name	Data range	Factory set value
Monitor item selection 1 to 3	0 to 65535 Select a communication data of the monitor group for data communication between the PZ and the PLC. The selected communication data only performs PLC communication. Convert binary to decimal and configure the setting. (For communication data of the monitor group, refer to **P. 5-8** and **5-9**)	Monitor item selection 1: 4031 Monitor item selection 2: 1028 Monitor item selection 3: 32
Setting item selection 1 to 27	0 to 65535 Select a communication data of the setting group for data communication between the PZ and the PLC. The selected communication data only performs PLC communication. Convert binary to decimal and configure the setting. (For communication data of the setting group, refer to **P. 5-10** to **5-23**)	Setting item selection 1: 121 Setting item selection 2: 0 Setting item selection 3: 40 Setting item selection 4: 7183 Setting item selection 5 to 11: 0 Setting item selection 12: 3 Setting item selection 13 to 27: 0
Instrument link recognition time ☒	0 to 255 seconds When connecting two or more PZ controllers, set the time required to recognize the second PZ and thereafter. Set this item to the PZ master (device address 0). When many PZ slaves are connected, setting short for the Instrument link recognition time may cause some of the PZ slaves not to be recognized. Set the Instrument link recognition time longer for such a case.	5
PLC response waiting time ☒	0 to 3000 ms Set the time of waiting for a response from the PLC. (Refer to **P. 5-30**) If communication with a PLC is not properly established, adjust the time longer.	255
PLC communication start time ☒	1 to 255 seconds Time until communication with the PLC starts is set after the power is turned on. The PLC communication start time is the time that writing of the system data starts. Actual communication with the PLC by request command can only take place after the system communication state changes to "1."	5
Slave register bias ☒	0 to 65535 (0: Slave register bias is invalid) When connecting two or more PZ, a bias is set for the register addresses of each PZ so that no address duplication occurs. To activate the bias, set a value other than zero. **Equation for calculating:** **Slave register start number =** **Register start number + (Device address × Slave register bias)** (Refer to **P. 5-34**)	140

☒: Communication data settable via the front keypad. (Parameter of Function block No. 62 of Engineering mode)
For the parameter of function block No. 62, refer to **PZ400/PZ900/PZ401/PZ901 Parameter List (IMR03B03-E□)** [Enclosed with instrument].

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Name	Data range	Factory set value
Number of recognizable devices 🖂	0 to 30 Set the quantity of the PZ slaves to be recognized by the PZ master. The recognition processing starts from device address 1. Set the maximum value of the device address of the PZ slaves to be connected. Even if there is any device address that is not used, set the maximum number including such an address. This setting is effective only for the PZ master with a device address of 0.	8
Device address 🖂	PLC communication: 0 to 30 0: Master 1 to 30: Slave This is a device address of the PZ. The PZ master with a device address of 0 must always exist. The device address of the PZ slave must be continuous starting from 1.	0
	RKC communication: 0 to 99	0
	Modbus: 1 to 99	1
Communication speed 🖂	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: 57600 bps Under this parameter, communication speed for data communication with a PLC can be selected. Set the same communication speed for the PZ and the PLC.	3
Data bit configuration 🖂	0 to 11 (Refer to **Data bit configuration table**) Under this parameter, data bit configuration for data communication with a PLC can be selected. Set the same data bit configuration for the PZ and the PLC.	0
Interval time 🖂	0 to 250 ms Set the transmission waiting time until the data is returned after the receipt of the request from the PLC. The PZ sends the data to the PLC after the elapse of time (PZ internal processing time + interval time).	10

🖂: Communication data settable via the front keypad. (Parameters of Function block No. 60 or No. 62 of Engineering mode)
For the parameters of function block No. 60 or No. 62, refer to **PZ400/PZ900/PZ401/PZ901 Parameter List (IMR03B03-E□)** [Enclosed with instrument].

Data bit configuration table

Set value	Data bit	Parity bit	Stop bit
0	8	None	1
1	8	None	2
2	8	Even	1
3	8	Even	2
4	8	Odd	1
5	8	Odd	2

Set value	Data bit	Parity bit	Stop bit
6	7	None	1
7	7	None	2
8	7	Even	1
9	7	Even	2
10	7	Odd	1
11	7	Odd	2

: Not settable for Modbus

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Name	Data range	Factory set value
Input data type * ☒	0: Number of measured value digits: 5 Number of RKC communication data digits: 7 Modbus: Double word PLC communication data: Double word (System data: Single word) 1: Number of measured value digits: 4 Number of RKC communication data digits: 6 Modbus: Single word PLC communication data: Single word Select a single or a double word for the communication data. When changing the Input data type from 0 to 1 and when the present Input range has 5 digits (example: Input range high: 1372.0), you need to configure the Input range to have 4 digits beforehand. (Refer to **P. 3-7**)	Depends on the input range code specified at the time of order.

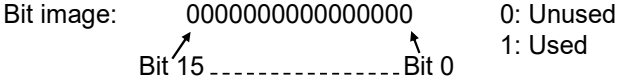
☒: Communication data settable via the front keypad. (Parameter of Function block No. 21 of Engineering mode)
For the parameter of function block No. 21, refer to **PZ400/PZ900/PZ401/PZ901 Parameter List (IMR03B03-E□)** [Enclosed with instrument].

* When changing the input data type, the following communication data may also need to be changed. Make necessary changes to the set value.

Decimal point position	■ **Decimal point position** (Refer to **P. 3-5**)
Input range high	■ **Input range low/Input range high** (Refer to **P. 3-6**)
Input range high	

● Monitor item selection (Communication data of the monitor group)

Communication data of monitor group is assigned as a bit image in binary numbers. Set decimal-converted values.



The selected communication data is justified upward in the PLC register.

When the input data type is a double word, one data occupies two PLC registers.

Table 1 Monitor item selection 1

Bit	Communication data (Monitor item)	Factory set value		Number of data
		Binary	Decimal	
0	Measured value (PV)	1	4031	1
1	Set value (SV) monitor	1		1
2	Manipulated output value monitor [heat-side]	1		1
3	Manipulated output value monitor [cool-side]	1		1
4	Current transformer 1 (CT1) input value monitor	1		1
5	Current transformer 2 (CT2) input value monitor	1		1
6	Feedback resistance (FBR) input value	0		1
7	Pattern number monitor	1		1
8	Segment number monitor	1		1
9	Segment level	1		1
10	Segment time	1		1
11	Segment remaining time monitor	1		1
12	Pattern remaining time monitor	0		1
13	Number of repeating patterns monitor	0		1
14	Time signal state	0		1
15	Pattern end state	0		1

Table 2 Monitor item selection 2

Bit	Communication data (Monitor item)	Factory set value		Number of data
		Binary	Decimal	
0	Wait state	0	1028	1
1	Hold state	0		1
2	Overall operation status	1		1
3	Event 1 state monitor	0		1
4	Event 2 state monitor	0		1
5	Event 3 state monitor	0		1
6	Event 4 state monitor	0		1
7	Heater break alarm 1 (HBA1) state monitor	0		1
8	Heater break alarm 2 (HBA2) state monitor	0		1
9	Control loop break alarm (LBA) state monitor	0		1
10	Comprehensive event state	1		1
11	Burnout state monitor	0		1
12	Feedback resistance (FBR) break monitor	0		1
13	DI state monitor	0		1
14	OUT state monitor	0		1
15	DO state monitor	0		1

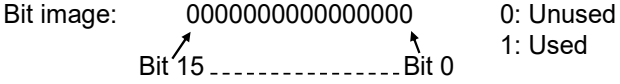
When the input data type is a double word, one data occupies two PLC registers.

Table 3 Monitor item selection 3

Bit	Communication data (Monitor item)	Factory set value		Number of data
		Binary	Decimal	
0	PID group	0	32	1
1	Peak hold monitor	0		1
2	Bottom hold monitor	0		1
3	AT remaining time monitor	0		1
4	AT/ST status monitor	0		1
5	Error code	1		1
6	Integrated operating time	0		1
7	Unused	0		1
8	Unused	0		1
9	Unused	0		1
10	Unused	0		1
11	Unused	0		1
12	Unused	0		1
13	Unused	0		1
14	Unused	0		1
15	Unused	0		1

● Setting item selection (Communication data of Setting group)

Communication data of Setting group is assigned as a bit image in binary numbers. Set decimal-converted values.



The selected communication data is justified upward in the PLC register.

When the input data type is a double word, one data occupies two PLC registers.

Table 1 Setting item selection 1

Bit	Item number	Communication data (Setting item)	Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
			Binary	Decimal		
0	1	Execution pattern selection	1	121	1	Note 1
1	2	Peak/Bottom hold reset	0		1	Note 2
2	3	Bottom suppression start signal	0		1	Note 3
3	4	Operation mode transfer	1		1	Note 4
4	5	Step function	1		1	Note 5, Note 6
5	6	Hold state	1		1	Note 6
6	7	Autotuning (AT)	1		1	Note 7
7	8	Overall level autotuning (AT)	0		1	Note 7
8	9	Startup tuning (ST)	0		1	Note 8
9	10	Interlock release	0		1	Note 9, Note 10
10	11	Set value (SV) in Fixed set point control mode	0		1	—
11	12	Wait zone high	0		1	—
12	13	Wait zone low	0		1	—
13	14	Automatic level PID setting	0		1	Note 11
14	15	Level PID setting 1	0		1	Note 11
15	16	Level PID setting 2	0		1	Note 11

Table 2 Setting item selection 2

Bit	Item number	Communication data (Setting item)	Factory set value		Number of data	Remarks (Refer to P. 5-25)
			Binary	Decimal		
0	17	Level PID setting 3	0	0	1	Note 11
1	18	Level PID setting 4	0		1	Note 11
2	19	Level PID setting 5	0		1	Note 11
3	20	Level PID setting 6	0		1	Note 11
4	21	Level PID setting 7	0		1	Note 11
5	22	SV selection at program start	0		1	—
6	23	Hot/Cold start	0		1	—
7	24	Control action at pattern end	0		1	—
8	25	Output action at pattern end	0		1	—
9	26	PV bias	0		1	—
10	27	PV digital filter	0		1	—
11	28	PV ratio	0		1	—
12	29	PV low input cut-off	0		1	—
13	30	OUT1 proportional cycle time	0		1	—
14	31	OUT2 proportional cycle time	0		1	—
15	32	OUT3 proportional cycle time	0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 3 Setting item selection 3

Bit	Item number	Communication data (Setting item)	Factory set value		Number of data	Remarks (Refer to P. 5-25)
			Binary	Decimal		
0	33	OUT1 minimum ON/OFF time of proportional cycle	0		1	—
1	34	OUT2 minimum ON/OFF time of proportional cycle	0		1	—
2	35	OUT3 minimum ON/OFF time of proportional cycle	0		1	—
3	36	Heater break alarm 1 (HBA1) set value	1		1	—
4	37	Number of heater break alarm 1 (HBA1) delay times	0		1	—
5	38	Heater break alarm 2 (HBA2) set value	1		1	—
6	39	Number of heater break alarm 2 (HBA2) delay times	0		1	—
7	40	Manual manipulated output value	0	40	1	—
8	41	ON/OFF action differential gap (upper)	0		1	—
9	42	ON/OFF action differential gap (lower)	0		1	—
10	43	AT bias	0		1	—
11	44	Open/Close output neutral zone	0		1	—
12	45	Open/Close output differential gap	0		1	—
13	46	FF amount learning	0		1	Note 12
14	47	Determination point of external disturbance	0		1	—
15	48	Display update cycle	0		1	—

Table 4 Setting item selection 4

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	49	PID group 1	Proportional band [heat-side]	1		1	Note 7, Note 13
1	50	PID group 1	Integral time [heat-side]	1		1	Note 7, Note 13
2	51	PID group 1	Derivative time [heat-side]	1		1	Note 7, Note 13
3	52	PID group 1	Control response parameter	1		1	—
4	53	PID group 1	Proactive intensity	0		1	—
5	54	PID group 1	Manual reset	0		1	—
6	55	PID group 1	FF amount	0		1	Note 12
7	56	PID group 1	Output limiter high [heat-side], Output limiter low [heat-side]	0	7183	2	Note 14
8	57	PID group 1	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	58	PID group 1	LBA deadband (LBD)	0		1	—
10	59	PID group 1	Proportional band [cool-side]	1		1	Note 7
11	60	PID group 1	Integral time [cool-side]	1		1	Note 7
12	61	PID group 1	Derivative time [cool-side]	1		1	Note 7
13	62	PID group 1	Overlap/Deadband	0		1	—
14	63	PID group 1	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	64	PID group 1	Unused	0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 5 Setting item selection 5

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	65	PID group 2	Proportional band [heat-side]	0	0	1	Note 7, Note 13
1	66	PID group 2	Integral time [heat-side]	0		1	Note 7, Note 13
2	67	PID group 2	Derivative time [heat-side]	0		1	Note 7, Note 13
3	68	PID group 2	Control response parameter	0		1	—
4	69	PID group 2	Proactive intensity	0		1	—
5	70	PID group 2	Manual reset	0		1	—
6	71	PID group 2	FF amount	0		1	Note 12
7	72	PID group 2	Output limiter high [heat-side], Output limiter low [heat-side]	0		2	Note 14
8	73	PID group 2	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	74	PID group 2	LBA deadband (LBD)	0		1	—
10	75	PID group 2	Proportional band [cool-side]	0		1	Note 7
11	76	PID group 2	Integral time [cool-side]	0		1	Note 7
12	77	PID group 2	Derivative time [cool-side]	0		1	Note 7
13	78	PID group 2	Overlap/Deadband	0		1	—
14	79	PID group 2	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	80	PID group 2	Unused	0		1	—

Table 6 Setting item selection 6

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	81	PID group 3	Proportional band [heat-side]	0	0	1	Note 7, Note 13
1	82	PID group 3	Integral time [heat-side]	0		1	Note 7, Note 13
2	83	PID group 3	Derivative time [heat-side]	0		1	Note 7, Note 13
3	84	PID group 3	Control response parameter	0		1	—
4	85	PID group 3	Proactive intensity	0		1	—
5	86	PID group 3	Manual reset	0		1	—
6	87	PID group 3	FF amount	0		1	Note 12
7	88	PID group 3	Output limiter high [heat-side], Output limiter low [heat-side]	0		2	Note 14
8	89	PID group 3	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	90	PID group 3	LBA deadband (LBD)	0		1	—
10	91	PID group 3	Proportional band [cool-side]	0		1	Note 7
11	92	PID group 3	Integral time [cool-side]	0		1	Note 7
12	93	PID group 3	Derivative time [cool-side]	0		1	Note 7
13	94	PID group 3	Overlap/Deadband	0		1	—
14	95	PID group 3	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	96	PID group 3	Unused	0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 7 Setting item selection 7

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	97	PID group 4	Proportional band [heat-side]	0		1	Note 7, Note 13
1	98	PID group 4	Integral time [heat-side]	0		1	Note 7, Note 13
2	99	PID group 4	Derivative time [heat-side]	0		1	Note 7, Note 13
3	100	PID group 4	Control response parameter	0		1	—
4	101	PID group 4	Proactive intensity	0		1	—
5	102	PID group 4	Manual reset	0		1	—
6	103	PID group 4	FF amount	0		1	Note 12
7	104	PID group 4	Output limiter high [heat-side], Output limiter low [heat-side]	0	0	2	Note 14
8	105	PID group 4	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	106	PID group 4	LBA deadband (LBD)	0		1	—
10	107	PID group 4	Proportional band [cool-side]	0		1	Note 7
11	108	PID group 4	Integral time [cool-side]	0		1	Note 7
12	109	PID group 4	Derivative time [cool-side]	0		1	Note 7
13	110	PID group 4	Overlap/Deadband	0		1	—
14	111	PID group 4	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	112	PID group 4	Unused	0		1	—

Table 8 Setting item selection 8

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	113	PID group 5	Proportional band [heat-side]	0		1	Note 7, Note 13
1	114	PID group 5	Integral time [heat-side]	0		1	Note 7, Note 13
2	115	PID group 5	Derivative time [heat-side]	0		1	Note 7, Note 13
3	116	PID group 5	Control response parameter	0		1	—
4	117	PID group 5	Proactive intensity	0		1	—
5	118	PID group 5	Manual reset	0		1	—
6	119	PID group 5	FF amount	0		1	Note 12
7	120	PID group 5	Output limiter high [heat-side], Output limiter low [heat-side]	0	0	2	Note 14
8	121	PID group 5	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	122	PID group 5	LBA deadband (LBD)	0		1	—
10	123	PID group 5	Proportional band [cool-side]	0		1	Note 7
11	124	PID group 5	Integral time [cool-side]	0		1	Note 7
12	125	PID group 5	Derivative time [cool-side]	0		1	Note 7
13	126	PID group 5	Overlap/Deadband	0		1	—
14	127	PID group 5	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	128	PID group 5	Unused	0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 9 Setting item selection 9

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	129	PID group 6	Proportional band [heat-side]	0	0	1	Note 7, Note 13
1	130	PID group 6	Integral time [heat-side]	0		1	Note 7, Note 13
2	131	PID group 6	Derivative time [heat-side]	0		1	Note 7, Note 13
3	132	PID group 6	Control response parameter	0		1	—
4	133	PID group 6	Proactive intensity	0		1	—
5	134	PID group 6	Manual reset	0		1	—
6	135	PID group 6	FF amount	0		1	Note 12
7	136	PID group 6	Output limiter high [heat-side], Output limiter low [heat-side]	0		2	Note 14
8	137	PID group 6	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	138	PID group 6	LBA deadband (LBD)	0		1	—
10	139	PID group 6	Proportional band [cool-side]	0		1	Note 7
11	140	PID group 6	Integral time [cool-side]	0		1	Note 7
12	141	PID group 6	Derivative time [cool-side]	0		1	Note 7
13	142	PID group 6	Overlap/Deadband	0		1	—
14	143	PID group 6	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	144	PID group 6	Unused	0		1	—

Table10 Setting item selection 10

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	145	PID group 7	Proportional band [heat-side]	0	0	1	Note 7, Note 13
1	146	PID group 7	Integral time [heat-side]	0		1	Note 7, Note 13
2	147	PID group 7	Derivative time [heat-side]	0		1	Note 7, Note 13
3	148	PID group 7	Control response parameter	0		1	—
4	149	PID group 7	Proactive intensity	0		1	—
5	150	PID group 7	Manual reset	0		1	—
6	151	PID group 7	FF amount	0		1	Note 12
7	152	PID group 7	Output limiter high [heat-side], Output limiter low [heat-side]	0		2	Note 14
8	153	PID group 7	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	154	PID group 7	LBA deadband (LBD)	0		1	—
10	155	PID group 7	Proportional band [cool-side]	0		1	Note 7
11	156	PID group 7	Integral time [cool-side]	0		1	Note 7
12	157	PID group 7	Derivative time [cool-side]	0		1	Note 7
13	158	PID group 7	Overlap/Deadband	0		1	—
14	159	PID group 7	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	160	PID group 7	Unused	0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 11 Setting item selection 11

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-24, 5-25)
				Binary	Decimal		
0	161	PID group 8	Proportional band [heat-side]	0	0	1	Note 7, Note 13
1	162	PID group 8	Integral time [heat-side]	0		1	Note 7, Note 13
2	163	PID group 8	Derivative time [heat-side]	0		1	Note 7, Note 13
3	164	PID group 8	Control response parameter	0		1	—
4	165	PID group 8	Proactive intensity	0		1	—
5	166	PID group 8	Manual reset	0		1	—
6	167	PID group 8	FF amount	0		1	Note 12
7	168	PID group 8	Output limiter high [heat-side], Output limiter low [heat-side]	0		2	Note 14
8	169	PID group 8	Control loop break alarm (LBA) time	0		1	Note 7, Note 13
9	170	PID group 8	LBA deadband (LBD)	0		1	—
10	171	PID group 8	Proportional band [cool-side]	0		1	Note 7
11	172	PID group 8	Integral time [cool-side]	0		1	Note 7
12	173	PID group 8	Derivative time [cool-side]	0		1	Note 7
13	174	PID group 8	Overlap/Deadband	0		1	—
14	175	PID group 8	Output limiter high [cool-side] Output limiter low [cool-side]	0		2	Note 14
15	176	PID group 8	Unused	0		1	—

Table 12 Setting item selection 12

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	177	Pattern 1	Segment level Segment time	1	3	32	Note 15
1	178	Pattern 1	Pattern end number	1		1	—
2	179	Pattern 1	Number of repeating patterns	0		1	—
3	180	Pattern 1	Pattern link number	0		1	—
4	181	Pattern 1	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	182	Pattern 1	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	183	Pattern 1	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	184	Pattern 1	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0		2	Note 16
8	185	Pattern 1	Setting related to Time signal 1	0		4	Note 17
9	186	Pattern 1	Setting related to Time signal 2	0		4	Note 17
10	187	Pattern 1	Setting related to Time signal 3	0		4	Note 17
11	188	Pattern 1	Setting related to Time signal 4	0		4	Note 17
12	189	Pattern 1	Pattern end output time	0		1	—
13	190	Pattern 1	Event selection of the Segment	0		16	Note 18
14	191	Unused		0		1	—
15	192	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 13 Setting item selection 13

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	193	Pattern 2	Segment level Segment time	0		32	Note 15
1	194	Pattern 2	Pattern end number	0		1	—
2	195	Pattern 2	Number of repeating patterns	0		1	—
3	196	Pattern 2	Pattern link number	0		1	—
4	197	Pattern 2	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	198	Pattern 2	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	199	Pattern 2	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	200	Pattern 2	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	201	Pattern 2	Setting related to Time signal 1	0		4	Note 17
9	202	Pattern 2	Setting related to Time signal 2	0		4	Note 17
10	203	Pattern 2	Setting related to Time signal 3	0		4	Note 17
11	204	Pattern 2	Setting related to Time signal 4	0		4	Note 17
12	205	Pattern 2	Pattern end output time	0		1	—
13	206	Pattern 2	Event selection of the Segment	0		16	Note 18
14	207	Unused		0		1	—
15	208	Unused		0		1	—

Table 14 Setting item selection 14

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	209	Pattern 3	Segment level Segment time	0		32	Note 15
1	210	Pattern 3	Pattern end number	0		1	—
2	211	Pattern 3	Number of repeating patterns	0		1	—
3	212	Pattern 3	Pattern link number	0		1	—
4	213	Pattern 3	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	214	Pattern 3	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	215	Pattern 3	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	216	Pattern 3	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	217	Pattern 3	Setting related to Time signal 1	0		4	Note 17
9	218	Pattern 3	Setting related to Time signal 2	0		4	Note 17
10	219	Pattern 3	Setting related to Time signal 3	0		4	Note 17
11	220	Pattern 3	Setting related to Time signal 4	0		4	Note 17
12	221	Pattern 3	Pattern end output time	0		1	—
13	222	Pattern 3	Event selection of the Segment	0		16	Note 18
14	223	Unused		0		1	—
15	224	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 15 Setting item selection 15

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	225	Pattern 4	Segment level Segment time	0		32	Note 15
1	226	Pattern 4	Pattern end number	0		1	—
2	227	Pattern 4	Number of repeating patterns	0		1	—
3	228	Pattern 4	Pattern link number	0		1	—
4	229	Pattern 4	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	230	Pattern 4	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	231	Pattern 4	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	232	Pattern 4	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	233	Pattern 4	Setting related to Time signal 1	0		4	Note 17
9	234	Pattern 4	Setting related to Time signal 2	0		4	Note 17
10	235	Pattern 4	Setting related to Time signal 3	0		4	Note 17
11	236	Pattern 4	Setting related to Time signal 4	0		4	Note 17
12	237	Pattern 4	Pattern end output time	0		1	—
13	238	Pattern 4	Event selection of the Segment	0		16	Note 18
14	239	Unused		0		1	—
15	240	Unused		0		1	—

Table 16 Setting item selection 16

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	241	Pattern 5	Segment level Segment time	0		32	Note 15
1	242	Pattern 5	Pattern end number	0		1	—
2	243	Pattern 5	Number of repeating patterns	0		1	—
3	244	Pattern 5	Pattern link number	0		1	—
4	245	Pattern 5	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	246	Pattern 5	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	247	Pattern 5	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	248	Pattern 5	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	249	Pattern 5	Setting related to Time signal 1	0		4	Note 17
9	250	Pattern 5	Setting related to Time signal 2	0		4	Note 17
10	251	Pattern 5	Setting related to Time signal 3	0		4	Note 17
11	252	Pattern 5	Setting related to Time signal 4	0		4	Note 17
12	253	Pattern 5	Pattern end output time	0		1	—
13	254	Pattern 5	Event selection of the Segment	0		16	Note 18
14	255	Unused		0		1	—
15	256	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 17 Setting item selection 17

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	257	Pattern 6	Segment level Segment time	0		32	Note 15
1	258	Pattern 6	Pattern end number	0		1	—
2	259	Pattern 6	Number of repeating patterns	0		1	—
3	260	Pattern 6	Pattern link number	0		1	—
4	261	Pattern 6	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	262	Pattern 6	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	263	Pattern 6	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	264	Pattern 6	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	265	Pattern 6	Setting related to Time signal 1	0		4	Note 17
9	266	Pattern 6	Setting related to Time signal 2	0		4	Note 17
10	267	Pattern 6	Setting related to Time signal 3	0		4	Note 17
11	268	Pattern 6	Setting related to Time signal 4	0		4	Note 17
12	269	Pattern 6	Pattern end output time	0		1	—
13	270	Pattern 6	Event selection of the Segment	0		16	Note 18
14	271	Unused		0		1	—
15	272	Unused		0		1	—

Table 18 Setting item selection 18

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	273	Pattern 7	Segment level Segment time	0		32	Note 15
1	274	Pattern 7	Pattern end number	0		1	—
2	275	Pattern 7	Number of repeating patterns	0		1	—
3	276	Pattern 7	Pattern link number	0		1	—
4	277	Pattern 7	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	278	Pattern 7	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	279	Pattern 7	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	280	Pattern 7	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	281	Pattern 7	Setting related to Time signal 1	0		4	Note 17
9	282	Pattern 7	Setting related to Time signal 2	0		4	Note 17
10	283	Pattern 7	Setting related to Time signal 3	0		4	Note 17
11	284	Pattern 7	Setting related to Time signal 4	0		4	Note 17
12	285	Pattern 7	Pattern end output time	0		1	—
13	286	Pattern 7	Event selection of the Segment	0		16	Note 18
14	287	Unused		0		1	—
15	288	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 19 Setting item selection 19

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	289	Pattern 8	Segment level Segment time	0		32	Note 15
1	290	Pattern 8	Pattern end number	0		1	—
2	291	Pattern 8	Number of repeating patterns	0		1	—
3	292	Pattern 8	Pattern link number	0		1	—
4	293	Pattern 8	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	294	Pattern 8	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	295	Pattern 8	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	296	Pattern 8	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	297	Pattern 8	Setting related to Time signal 1	0		4	Note 17
9	298	Pattern 8	Setting related to Time signal 2	0		4	Note 17
10	299	Pattern 8	Setting related to Time signal 3	0		4	Note 17
11	300	Pattern 8	Setting related to Time signal 4	0		4	Note 17
12	301	Pattern 8	Pattern end output time	0		1	—
13	302	Pattern 8	Event selection of the Segment	0		16	Note 18
14	303	Unused		0		1	—
15	304	Unused		0		1	—

Table 20 Setting item selection 20

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	305	Pattern 9	Segment level Segment time	0		32	Note 15
1	306	Pattern 9	Pattern end number	0		1	—
2	307	Pattern 9	Number of repeating patterns	0		1	—
3	308	Pattern 9	Pattern link number	0		1	—
4	309	Pattern 9	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	310	Pattern 9	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	311	Pattern 9	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	312	Pattern 9	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	313	Pattern 9	Setting related to Time signal 1	0		4	Note 17
9	314	Pattern 9	Setting related to Time signal 2	0		4	Note 17
10	315	Pattern 9	Setting related to Time signal 3	0		4	Note 17
11	316	Pattern 9	Setting related to Time signal 4	0		4	Note 17
12	317	Pattern 9	Pattern end output time	0		1	—
13	318	Pattern 9	Event selection of the Segment	0		16	Note 18
14	319	Unused		0		1	—
15	320	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 21 Setting item selection 21

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	321	Pattern 10	Segment level Segment time	0		32	Note 15
1	322	Pattern 10	Pattern end number	0		1	—
2	323	Pattern 10	Number of repeating patterns	0		1	—
3	324	Pattern 10	Pattern link number	0		1	—
4	325	Pattern 10	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	326	Pattern 10	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	327	Pattern 10	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	328	Pattern 10	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	329	Pattern 10	Setting related to Time signal 1	0		4	Note 17
9	330	Pattern 10	Setting related to Time signal 2	0		4	Note 17
10	331	Pattern 10	Setting related to Time signal 3	0		4	Note 17
11	332	Pattern 10	Setting related to Time signal 4	0		4	Note 17
12	333	Pattern 10	Pattern end output time	0		1	—
13	334	Pattern 10	Event selection of the Segment	0		16	Note 18
14	335	Unused		0		1	—
15	336	Unused		0		1	—

Table 22 Setting item selection 22

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	337	Pattern 11	Segment level Segment time	0		32	Note 15
1	338	Pattern 11	Pattern end number	0		1	—
2	339	Pattern 11	Number of repeating patterns	0		1	—
3	340	Pattern 11	Pattern link number	0		1	—
4	341	Pattern 11	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	342	Pattern 11	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	343	Pattern 11	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	344	Pattern 11	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	345	Pattern 11	Setting related to Time signal 1	0		4	Note 17
9	346	Pattern 11	Setting related to Time signal 2	0		4	Note 17
10	347	Pattern 11	Setting related to Time signal 3	0		4	Note 17
11	348	Pattern 11	Setting related to Time signal 4	0		4	Note 17
12	349	Pattern 11	Pattern end output time	0		1	—
13	350	Pattern 11	Event selection of the Segment	0		16	Note 18
14	351	Unused		0		1	—
15	352	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 23 Setting item selection 23

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	353	Pattern 12	Segment level Segment time	0		32	Note 15
1	354	Pattern 12	Pattern end number	0		1	—
2	355	Pattern 12	Number of repeating patterns	0		1	—
3	356	Pattern 12	Pattern link number	0		1	—
4	357	Pattern 12	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	358	Pattern 12	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	359	Pattern 12	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	360	Pattern 12	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	361	Pattern 12	Setting related to Time signal 1	0		4	Note 17
9	362	Pattern 12	Setting related to Time signal 2	0		4	Note 17
10	363	Pattern 12	Setting related to Time signal 3	0		4	Note 17
11	364	Pattern 12	Setting related to Time signal 4	0		4	Note 17
12	365	Pattern 12	Pattern end output time	0		1	—
13	366	Pattern 12	Event selection of the Segment	0		16	Note 18
14	367	Unused		0		1	—
15	368	Unused		0		1	—

Table 24 Setting item selection 24

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	369	Pattern 13	Segment level Segment time	0		32	Note 15
1	370	Pattern 13	Pattern end number	0		1	—
2	371	Pattern 13	Number of repeating patterns	0		1	—
3	372	Pattern 13	Pattern link number	0		1	—
4	373	Pattern 13	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	374	Pattern 13	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	375	Pattern 13	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	376	Pattern 13	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	377	Pattern 13	Setting related to Time signal 1	0		4	Note 17
9	378	Pattern 13	Setting related to Time signal 2	0		4	Note 17
10	379	Pattern 13	Setting related to Time signal 3	0		4	Note 17
11	380	Pattern 13	Setting related to Time signal 4	0		4	Note 17
12	381	Pattern 13	Pattern end output time	0		1	—
13	382	Pattern 13	Event selection of the Segment	0		16	Note 18
14	383	Unused		0		1	—
15	384	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 25 Setting item selection 25

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	385	Pattern 14	Segment level Segment time	0		32	Note 15
1	386	Pattern 14	Pattern end number	0		1	—
2	387	Pattern 14	Number of repeating patterns	0		1	—
3	388	Pattern 14	Pattern link number	0		1	—
4	389	Pattern 14	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	390	Pattern 14	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	391	Pattern 14	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	392	Pattern 14	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	393	Pattern 14	Setting related to Time signal 1	0		4	Note 17
9	394	Pattern 14	Setting related to Time signal 2	0		4	Note 17
10	395	Pattern 14	Setting related to Time signal 3	0		4	Note 17
11	396	Pattern 14	Setting related to Time signal 4	0		4	Note 17
12	397	Pattern 14	Pattern end output time	0		1	—
13	398	Pattern 14	Event selection of the Segment	0		16	Note 18
14	399	Unused		0		1	—
15	400	Unused		0		1	—

Table 26 Setting item selection 26

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	401	Pattern 15	Segment level Segment time	0		32	Note 15
1	402	Pattern 15	Pattern end number	0		1	—
2	403	Pattern 15	Number of repeating patterns	0		1	—
3	404	Pattern 15	Pattern link number	0		1	—
4	405	Pattern 15	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	406	Pattern 15	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	407	Pattern 15	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	408	Pattern 15	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	409	Pattern 15	Setting related to Time signal 1	0		4	Note 17
9	410	Pattern 15	Setting related to Time signal 2	0		4	Note 17
10	411	Pattern 15	Setting related to Time signal 3	0		4	Note 17
11	412	Pattern 15	Setting related to Time signal 4	0		4	Note 17
12	413	Pattern 15	Pattern end output time	0		1	—
13	414	Pattern 15	Event selection of the Segment	0		16	Note 18
14	415	Unused		0		1	—
15	416	Unused		0		1	—

When the input data type is a double word, one data occupies two PLC registers.

Table 27 Setting item selection 27

Bit	Item number	Communication data (Setting item)		Factory set value		Number of data	Remarks (Refer to P. 5-25)
				Binary	Decimal		
0	417	Pattern 16	Segment level Segment time	0		32	Note 15
1	418	Pattern 16	Pattern end number	0		1	—
2	419	Pattern 16	Number of repeating patterns	0		1	—
3	420	Pattern 16	Pattern link number	0		1	—
4	421	Pattern 16	Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	0		2	Note 16
5	422	Pattern 16	Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	0		2	Note 16
6	423	Pattern 16	Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	0		2	Note 16
7	424	Pattern 16	Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	0	0	2	Note 16
8	425	Pattern 16	Setting related to Time signal 1	0		4	Note 17
9	426	Pattern 16	Setting related to Time signal 2	0		4	Note 17
10	427	Pattern 16	Setting related to Time signal 3	0		4	Note 17
11	428	Pattern 16	Setting related to Time signal 4	0		4	Note 17
12	429	Pattern 16	Pattern end output time	0		1	—
13	430	Pattern 16	Event selection of the Segment	0		16	Note 18
14	431	Unused		0		1	—
15	432	Unused		0		1	—

Note 1:
If setting request of “Execution pattern selection” is conducted via request command during program control, fixed set point control, or manual control, this setting will be ignored. No setting error occurs.

Note 2:
When the data of “Peak/Bottom hold reset” of the PZ changes from “1: Reset” to “0: Hold,” the PLC data will be automatically updated to “0: Hold.”

Note 3:
When the “Bottom suppression start signal” data of the PZ is changed, the “Bottom suppression start signal” data of the PLC will be automatically updated.

Note 4:
If setting request for operation mode is executed when all of the following conditions are met, “1: ON” will be set to Bit 0 (Setting error bit) of the “Setting group communication state” of the PLC.
- “1: Reset mode (RESET) setting” is selected for “DI1 function selection.”
- The contact of the relevant digital input (DI) terminal is in closed state.

Note 5:
When the “Step function” data of the PZ is changed from “1: Step” to “0: Normal state,” the “Step function” data of the PLC will be automatically updated.

Note 6:
If setting request for operation mode is executed when all of the following conditions are met, “1: ON” will be set to Bit 0 (Setting error bit) of the “Setting group communication state” of the PLC.
- “1: Reset mode (RESET) setting” or “4: Hold (HOLD) function” is set for “DI function selection.”
- Digital input (DI) terminal contact is closed.

Note 7:
When the “Autotuning (AT)” data of the PZ is changed from “1: Start Autotuning” to “0: PID control,” the PLC data will be automatically updated to “0: PID control.”

Note 8:
When the “Startup tuning (ST)” data of the PZ is changed from “1: Execute once” to “0: ST unused,” the PLC data will be automatically updated to “0: ST unused.”

Note 9:
When the “Interlock release” of the PZ is changed from “0: Interlock release” to “1: Interlock state,” the PLC data will be automatically updated to “1: Interlock state.”

Note 10:
If setting request of “1: Interlock state” is conducted to the PZ by request command, this setting will be ignored. No setting error occurs.

Note 11:
When the “Automatic level PID setting” data of the PZ is changed from “–1: Restore setting before change” or “1: Automatic setting ON” to “0: Automatic setting OFF,” the PLC data will be automatically updated to “0: Automatic setting OFF.”

Note 12:
When the “PID group □ FF amount” value of the PZ is changed, the PLC data of the “PID group □ FF amount” will be automatically updated.

Note 13:
When the Startup tuning (ST) of the PZ is finished normally, the PLC data will be automatically updated.

Note 14:
When “PID group □ Output limiter high and low [heat-side]” are set, each of the following communication data (2 data) will be assigned to different PLC registers.
(Occupied registers: Double word: 4 registers, Single word: 2 registers)
- Output limiter high [heat-side]
- Output limiter low [heat-side]

Note 15:
When “Pattern □ Segment level and Segment time” are set, each of the following communication data (32 data) will be assigned to different PLC registers.
(Occupied registers: Double word: 64 registers, Single word: 32 registers)
- Segment level 1 to 16
- Segment time 1 to 16

Note 16:
When “Pattern □ Event □ set value [high] and [low]” are set, each of the following communication data (2 data) will be assigned to different PLC registers.
(Occupied registers: Double word: 4 registers, Single word: 2 registers)
- Event □ set value [high]
- Event □ set value [low]

Note 17:
When “Pattern □ Time signal □ related setting” are set, each of the following communication data (4 data) will be assigned to different PLC registers.
(Occupied registers: Double word: 8 registers, Single word: 4 registers)
- Time signal □ start segment number
- Time signal □ start time
- Time signal □ end segment number
- Time signal □ end time

Note 18:
When “Pattern □ Event selection of the segment” is set, each of the following communication data (16 data) will be assigned to different PLC registers.
(Occupied registers: Double word: 32 registers, Single word: 16 registers)
- Event selection of the segment 1 to 16

● "Communication identifier" and "Modbus register address" of PLC communication environment items

Communication identifier (RKC communication) (R/W: Read and Write)

Name	Extended identifier	Identifier	Digits	Attribute
Station number		**QV**	7 or 6	R/W
PC number		**QW**		
Register type (D, R, W, ZR)		**QZ**		
Register start number (High-order 4-bit)		**QS**		
Register start number (Low-order 16-bit)		**QX**		
Monitor item register bias		**R3**		
Setting item register bias		**R4**		
Monitor item selection 1 to 3	**M**	**R6**		
Setting item selection 1 to 27	**M**	**RE**		
Instrument link recognition time		**QT**		
PLC response waiting time		**VT**		
PLC communication start time		**R5**		
Slave register bias		**R8**		
Number of recognizable devices		**QU**		
Device address		**IP**		
Communication speed		**IR**		
Data bit configuration		**IQ**		
Interval time		**IT**		

Modbus register address (Double word) (R/W: Read and Write)

Name	Register address				Attribute
	HEX (Hexadecimal)		DEC (Decimal)		
	Low-order	High-order	Low-order	High-order	
Device address	01F6	01F7	502	503	R/W
Communication speed	01F8	01F9	504	505	
Data bit configuration	01FA	01FB	506	507	
Interval time	01FC	01FD	508	509	
Register type (D, R, W, ZR)	01FE	01FF	510	511	
Register start number (High-order 4-bit)	0200	0201	512	513	
Register start number (Low-order 16-bit)	0202	0203	514	515	
Monitor item register bias	0204	0205	516	517	
Setting item register bias	0206	0207	518	519	
Instrument link recognition time	0208	0209	520	521	
PLC response waiting time	020A	020B	522	523	
PLC communication start time	020C	020D	524	525	
Slave register bias	020E	020F	526	527	
Number of recognizable devices	0210	0211	528	529	
Station number	0212	0213	530	531	
PC number	0214	0215	532	533	
Monitor item selection 1	0216	0217	534	535	
Monitor item selection 2	0218	0219	536	537	
Monitor item selection 3	021A	021B	538	539	
Setting item selection 1	021C	021D	540	541	
Setting item selection 2	021E	021F	542	543	
Setting item selection 3	0220	0221	544	545	
Setting item selection 4	0222	0223	546	547	
Setting item selection 5	0224	0225	548	549	
Setting item selection 6	0226	0227	550	551	
Setting item selection 7	0228	0229	552	553	
Setting item selection 8	022A	022B	554	555	
Setting item selection 9	022C	022D	556	557	
Setting item selection 10	022E	022F	558	559	

Modbus register address (Double word) (R/W: Read and Write)

Name	Register address				Attribute
	HEX (Hexadecimal)		DEC (Decimal)		
	Low-order	High-order	Low-order	High-order	
Setting item selection 11	0230	0231	560	561	R/W
Setting item selection 12	0232	0233	562	563	
Setting item selection 13	0234	0235	564	565	
Setting item selection 14	0236	0237	566	567	
Setting item selection 15	0238	0239	568	569	
Setting item selection 16	023A	023B	570	571	
Setting item selection 17	023C	023D	572	573	
Setting item selection 18	023E	023F	574	575	
Setting item selection 19	0240	0241	576	577	
Setting item selection 20	0242	0243	578	579	
Setting item selection 21	0244	0245	580	581	
Setting item selection 22	0246	0247	582	583	
Setting item selection 23	0248	0249	584	585	
Setting item selection 24	024A	024B	586	587	
Setting item selection 25	024C	024D	588	589	
Setting item selection 26	024E	024F	590	591	
Setting item selection 27	0250	0251	592	593	

Modbus register address (Single word) (R/W: Read and Write)

Name	Register address		Attribute
	HEX (Hexadecimal)	DEC (Decimal)	
Device address	00FB	251	R/W
Communication speed	00FC	252	
Data bit configuration	00FD	253	
Interval time	00FE	254	
Register type (D, R, W, ZR)	00FF	255	
Register start number (High-order 4-bit)	0100	256	
Register start number (Low-order 16-bit)	0101	257	
Monitor item register bias	0102	258	
Setting item register bias	0103	259	
Instrument link recognition time	0104	260	
PLC response waiting time	0105	261	
PLC communication start time	0106	262	
Slave register bias	0107	263	
Number of recognizable devices	0108	264	
Station number	0109	265	
PC number	010A	266	
Monitor item selection 1	010B	267	
Monitor item selection 2	010C	268	
Monitor item selection 3	010D	269	
Setting item selection 1	010E	270	
Setting item selection 2	010F	271	
Setting item selection 3	0110	272	
Setting item selection 4	0111	273	
Setting item selection 5	0112	274	
Setting item selection 6	0113	275	
Setting item selection 7	0114	276	
Setting item selection 8	0115	277	
Setting item selection 9	0116	278	
Setting item selection 10	0117	279	

Modbus register address (Single word) (R/W: Read and Write)

Name	Register address		Attribute
	HEX (Hexadecimal)	DEC (Decimal)	
Setting item selection 11	0118	280	R/W
Setting item selection 12	0119	281	
Setting item selection 13	011A	282	
Setting item selection 14	011B	283	
Setting item selection 15	011C	284	
Setting item selection 16	011D	285	
Setting item selection 17	011E	286	
Setting item selection 18	011F	287	
Setting item selection 19	0120	288	
Setting item selection 20	0121	289	
Setting item selection 21	0122	290	
Setting item selection 22	0123	291	
Setting item selection 23	0124	292	
Setting item selection 24	0125	293	
Setting item selection 25	0126	294	
Setting item selection 26	0127	295	
Setting item selection 27	0128	296	

● Monitor data related to PLC communication

Communication identifier (RKC communication) (RO: Read only)

Name	Identifier	No. of digits	Attribute
PLC communication error code	**ES**	7 or 6	RO
PLC communication instrument recognition flag 1	**QN**		
PLC communication instrument recognition flag 2	**QO**		

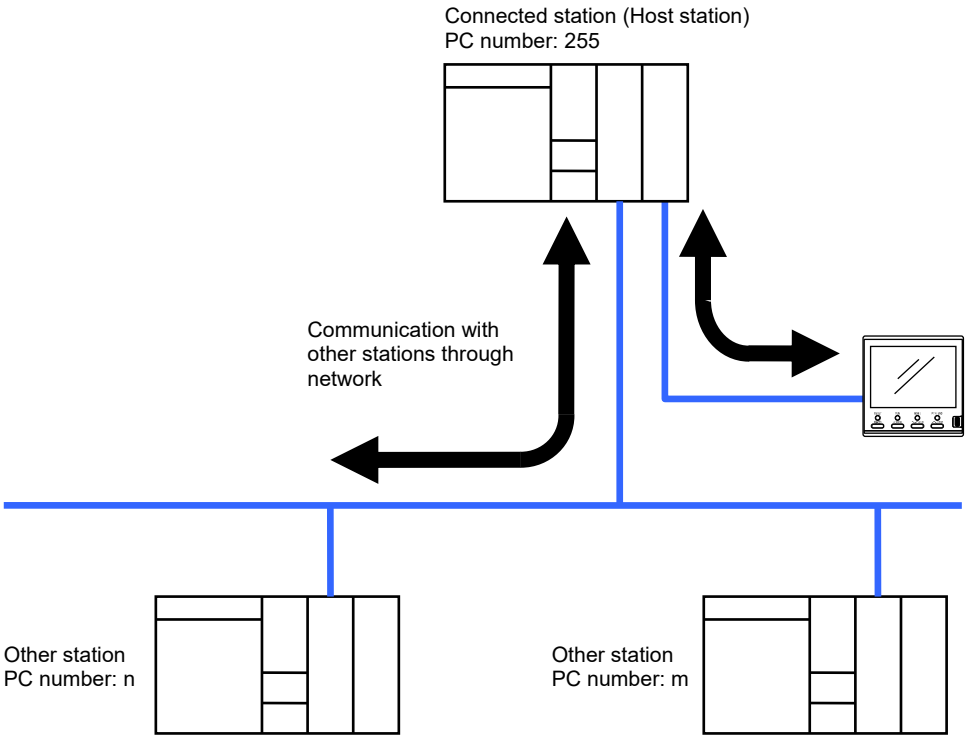
For the data contents, refer to **P. 6-23** and **P. 6-24**.

5.2.2 Explanation of PLC communication environment setting function

■ PC number

This is a communication data to set a station number of the PLC that communicates with the PZ.
Set the PC number of the connected station (host station) of the PLC, because the connected station (host station) is usually connected to the PZ. (Example: PC number of PLC by Mitsubishi PLC: 255)
In the network where multiple PLCs are connected, to communicate with the other PLC over the network, set the PC number of the target PLC to the PZ.

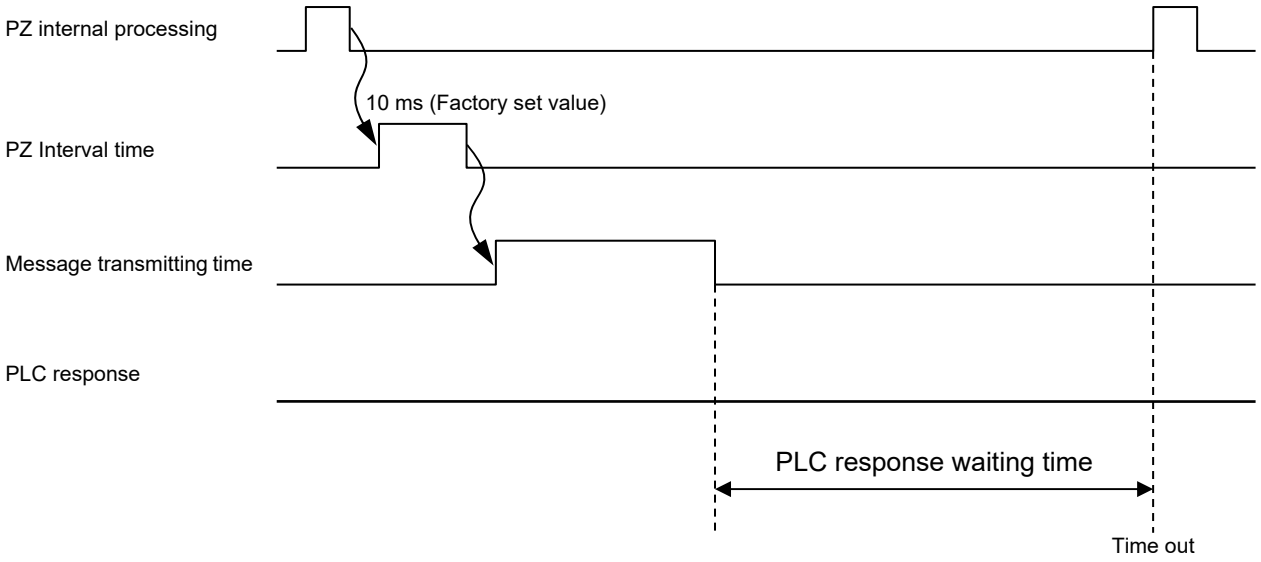
Example: PLC by Mitsubishi Electric



PC number, name, and data range of a PLC and PC number of a connected station (host station) may vary by the PLC. Consult the manual of the PLC for details.

■ PLC response waiting time

The PZ waits for a response for a certain period of time after the data has been sent to the PLC. If there is no response within the preset time, the PZ determines that there was a timeout and sends the next data. This preset time is defined as a PLC response waiting time.



■ Changing the register type

The register type used for PLC communication can be changed. The factory set value is set to D register (data register).

■ Register start number, Monitor item register bias, Setting item register bias

The area to be used in the PLC register address can be set. Data that can be communicated by PLC communication is arranged in the order "system data," "monitor group" and "setting group."

- In "Register start number (High-order 4-bit)" and "Register start number (Low-order 16-bit)," set the start number (start number of system data) of the register used for PLC communication. (factory set value: 1000)
- In "Monitor item register bias," set the start number of the monitor group. The bias will be applied to the register start number (start number of system data). (factory set value: 12)

  Equation for calculating:
  Register start number of monitor group = Register start number + Monitor item register bias

- In "Setting item register bias," set the start number of the setting group.
  If the Setting item register bias set from 0 to 11, the set bias value becomes invalid.
  The setting group register start number will be assigned following the register that has the last number in the monitor group. (factory set value: 0)
  If set to 12 or more (12 to 65535), a bias is added to the start number of the register (start number of system data). If set to 12 or greater, take care that overlapping data of the monitor group and the register address does not occur.

  Equation for calculating (When set to 12 or more):
  Register start number of setting group = Register start number + Setting item register bias

Register address example of PLC communication data (factory set value)

Communication data type	Register address		Contents
	Double word	Single word	
System data	D1000 ⋮ D1011	D1000 ⋮ D1011	Start number [Register start number (Low-order 16-bit)] ⋮ Last number
Communication data of monitor group	D1012 ⋮ D1039	D1012 ⋮ D1025	Start number [Monitor item register bias factory set value: 12] ⋮ Last number
Communication data of setting group	D1040 ⋮ D1133	D1026 ⋮ D1072	Start number [Setting item register bias Factory set value: 0] ⋮ Last number

☞ For register address of PLC communication data, refer to **6.2 PLC Communication Data Map (P. 6-20)**.

● Setting method of the register start number

When any numbers from 0 to 65535 are set to the register start number:

1. Set the register start number (High-order 4-bit) to 0.

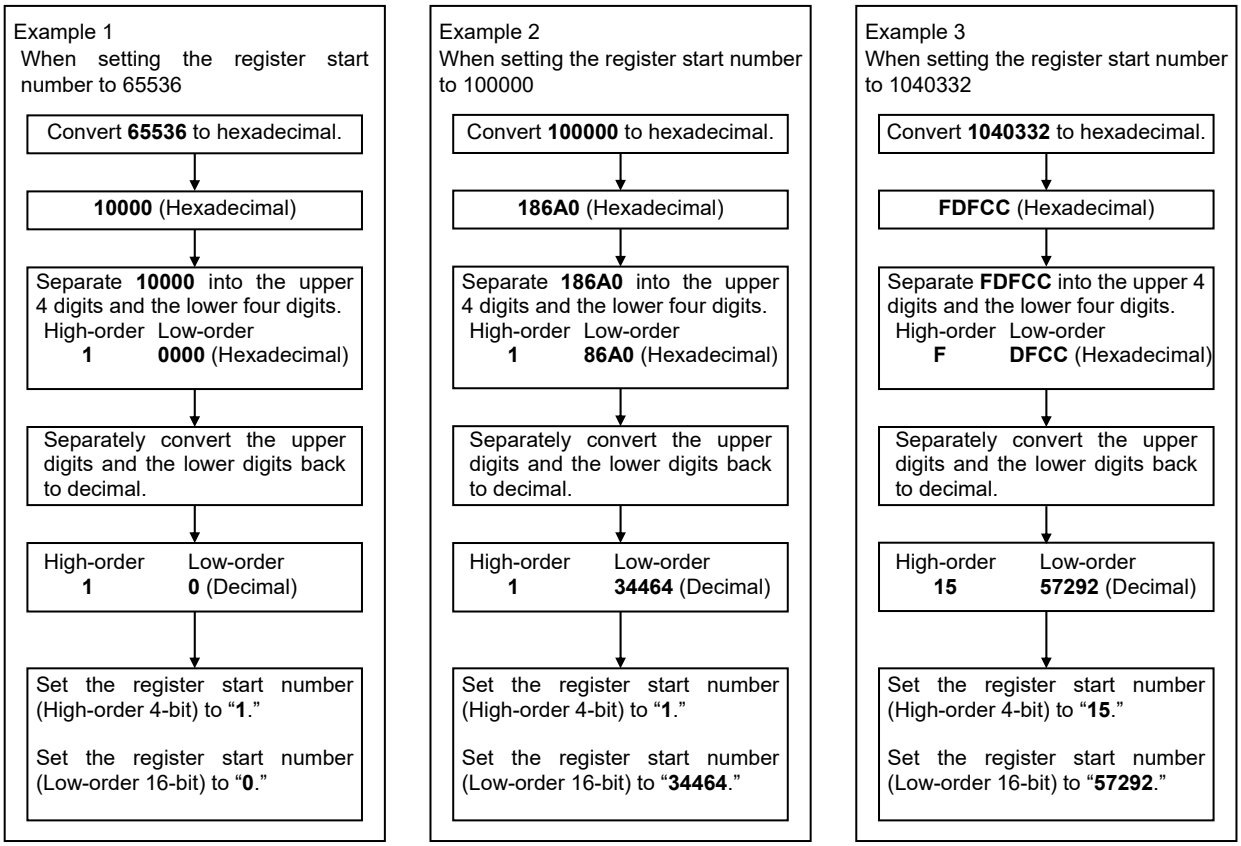
2. In the register start number (low-order 16-bit), set the register address to a value from 0 to 65535.

Example: When setting the register start number to “10188”

Register start number (High-order 4-bit)	Register start number (Low-order16-bit)
Set “0.”	Set “10188.”

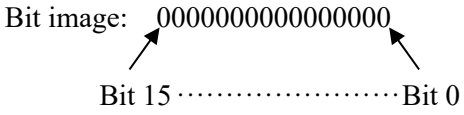
When any numbers from 65536 to 1048575 are set to the register start number:

If set within the range from 65536 to 1048575, the register address must be converted. The converted register address is set in two parts in the register start number (high-order 4-bit) and the register start number (low-order 16-bit). Set the value as shown in the example below.



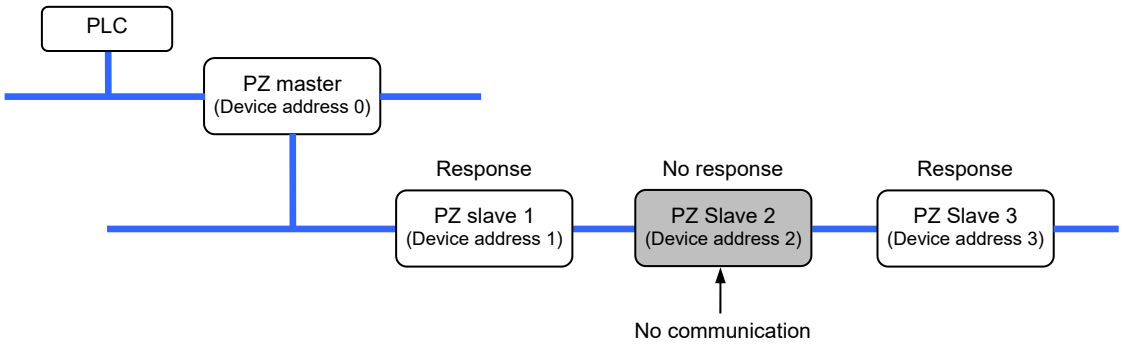
■ Monitor item selection and Setting item selection

This setting is used to shorten the data update period by eliminating unneeded items from the data communicated to the PLC. Only communication data selected using this setting is written to the PLC.
(The amount of the PLC register that is used can also be reduced.)
Monitor item selection or setting item selection state is assigned as a bit image in binary numbers.



■ Instrument link recognition time

This is defined as the time until the PZ master (with a device address of 0) recognizes the connected PZ slaves (with a device address 1 to 30). The timing of recognition processing is when power is supplied or when the Instrument recognition request command is executed.
When the PZ master is powered on, after the elapse of PLC communication start time, the PZ master searches for any PZ slaves within the instrument link recognition time; when the Instrument recognition request command is executed, the PZ master searches for any PZ slaves within the instrument link recognition time after the command has been accepted.
The PZ slaves which have not responded at all to the PZ master within the instrument link recognition time are determined to be nonexistent. After this recognition processing, the PZ master only communicates with the existing PZ slaves.



NOTE

This setting item must be used only on the PZ with a device address of 0.

● To calculate Instrument link recognition time

The times shown are the processing times when the interval time is set to 10 milliseconds (factory set value).

Instrument link recognition time (seconds)
= PZ master processing time + (PZ slave processing time × Number of instrument recognition)

Communication speed	PZ processing time (Per one controller)
19200 bps	0.35 seconds
57600 bps	0.21 seconds

[Example]
The set value of the number of the instrument recognition = 10 and Communication speed = 19200 bps

PZ master processing time + (PZ slave processing time × Number of instrument recognition)
= 0.35 seconds + (0.35 seconds × 10)
= 3.85 seconds

Since the time unit of Instrument link recognition time is one second, the set value is 4 seconds.

■ Slave register bias

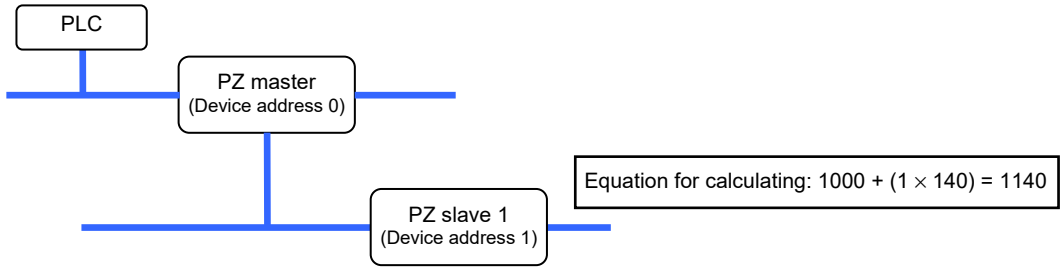
When two or more PZ are connected, a bias can be set to prevent duplication of register addresses.
Setting the slave register bias prevents duplication of register addresses of each PZ by the address setting switch.

Equation for calculating:
Slave register start number = Register start number + (Device address × Slave register bias)

Register address example of PLC communication data (double word)

- Using two PZ
- Register start number of PZ master: 1000 (factory set value)
- Register start number of PZ slave: 1000 (factory set value)
- Slave register bias value of PZ slave: 140 (factory set value)
- Monitor item register bias: 12 (factory set value)
- Setting item register bias: 0 (factory set value)

When the address of PZ slave is set to 1, the data is assigned to the register addresses indicated in the table below.



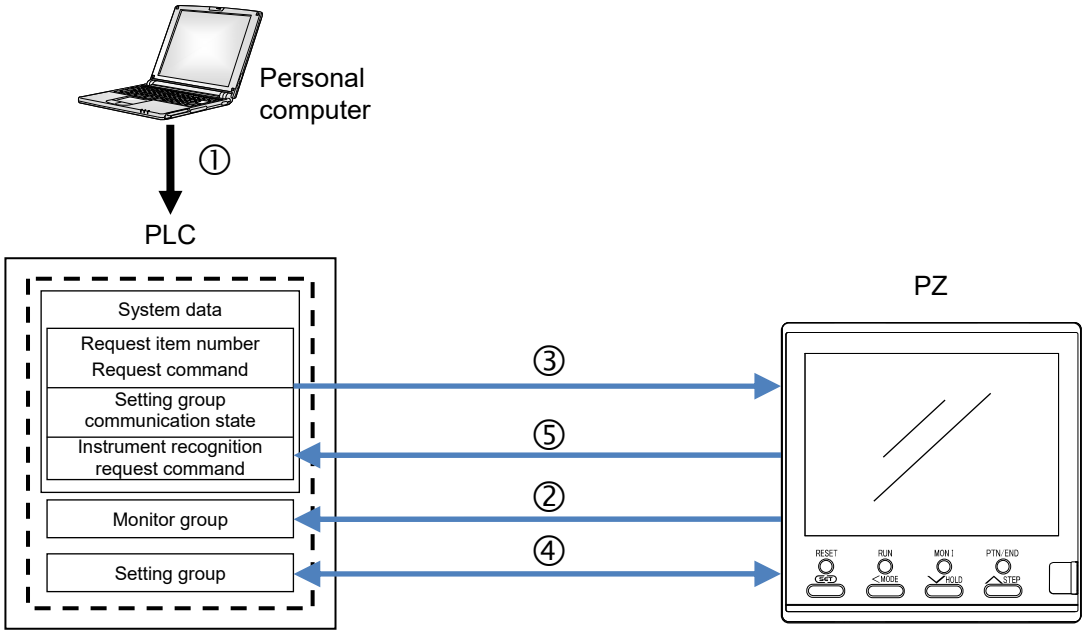
Communication data type	PLC register address	Contents	
System data	D1000 ⋮ D1011	Start number [Register start number (Low-order 16-bit)] Last number	Register numbers in the PLC occupied with the communication data of the PZ master (with a device address of 0).
Communication data of monitor group	D1012 ⋮ D1039	Start number [Monitor item register bias] Last number	
Communication data of setting group	D1040 ⋮ D1139	Start number [Setting item register bias] Last number	
System data	D1140 ⋮ D1151	Start number [Register start number (Low-order 16-bit)] Last number	Register numbers in the PLC occupied with the communication data of the PZ slave (with a device address of 1).
Communication data of monitor group	D1152 ⋮ D1179	Start number [Monitor item register bias] Last number	
Communication data of setting group	D1180 ⋮ D1279	Start number [Setting item register bias] Last number	

COMMUNICATION DATA

6

6.1 Data Transfer

The communication data transmitted between the PLC and the PZ is compiled in the PLC communication data map (hereafter, called data map). In the PLC communication data map the communication data is classified into system data, monitor group, and setting group.

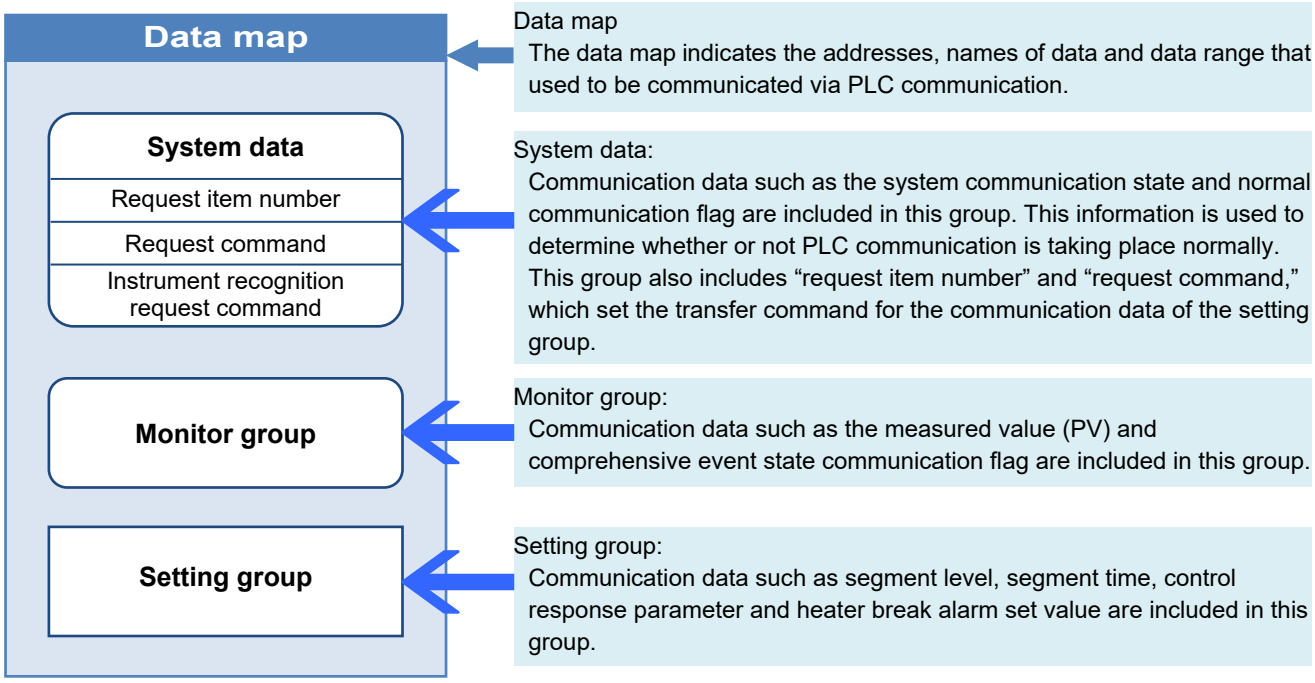


Communication procedures:

① Enter Request item number and Request command into the PLC register.
② Communication data in the Monitor group is constantly written into the PLC.
③ Request item number, Request command, and Instrument recognition request command are read out by the PZ.
④ The PZ implements read or write of the communication data in the Setting group in accordance with the Request item number, Request command, and Instrument recognition request command.
⑤ The PZ writes communication status (such as setting error and setting completed) into the PLC registers.

6.1.1 Data group

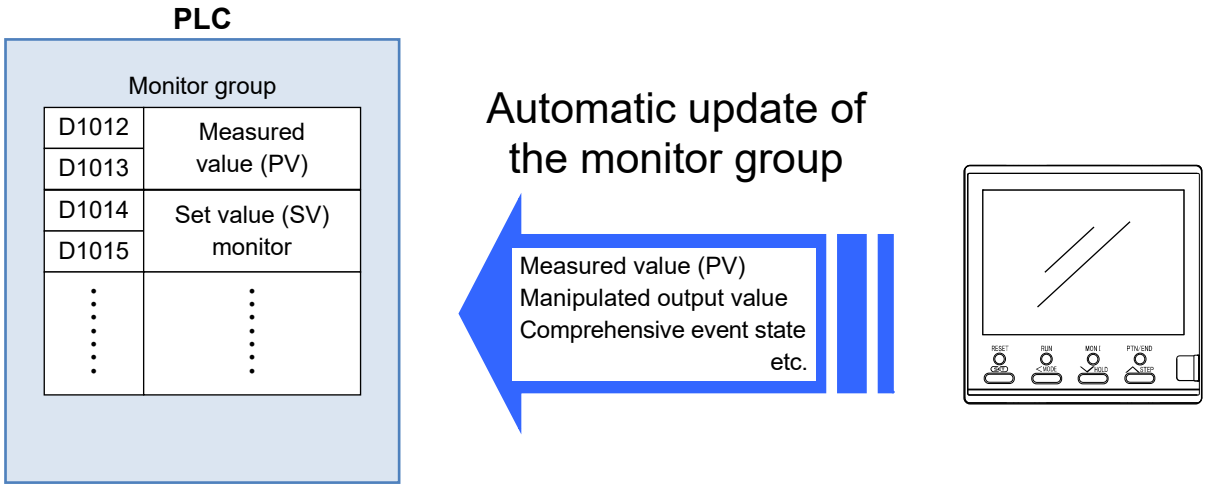
Communication data in the data map is categorized into groups: System data, Monitor group, and Setting group as shown below.



In the following explanation, an operation example is described showing factory preset register address (double word for Input data type).

■ Monitor group (PLC ← PZ)

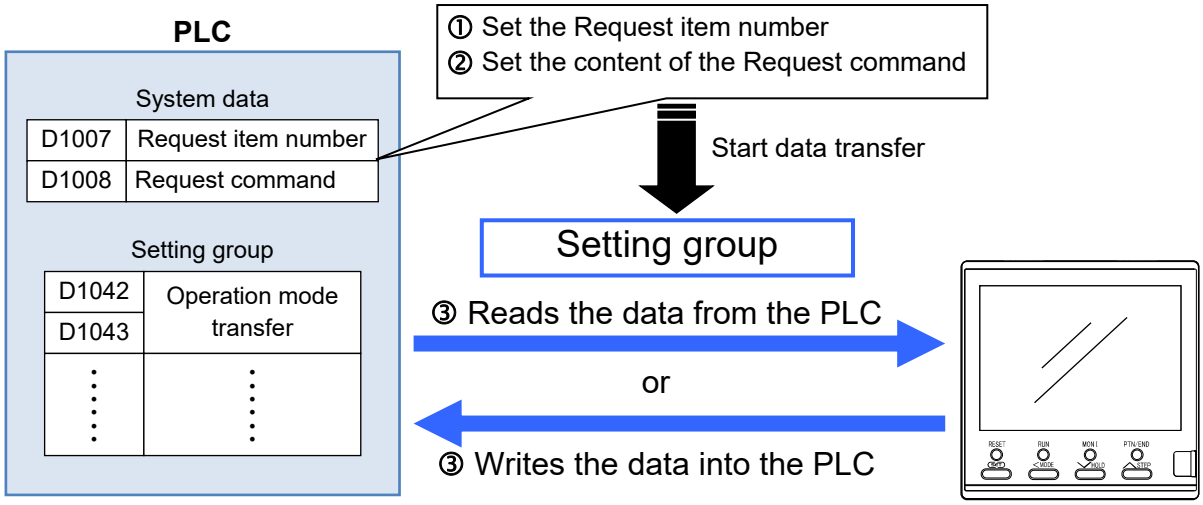
The communication data of the monitor group does not have a request command setting.



For the communication data of monitor group, refer to **6.2 PLC Communication Data Map (P. 6-20)**.

■ Request item number, and Request command (system data)

Request item number and Request command are commands for transferring the communication data of the setting group. When set values are set into the registers of Request item number register and Request command register in the PLC, communication data in the setting group will be transferred.

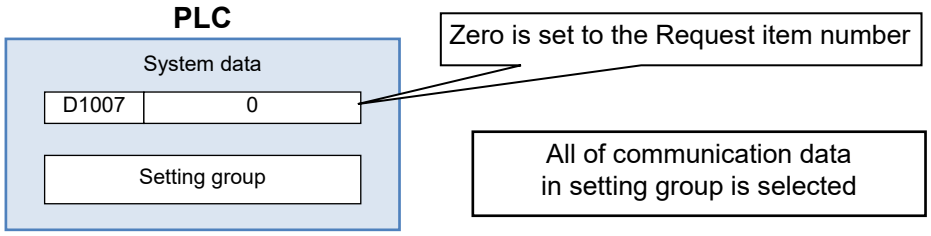


(1) Request item number

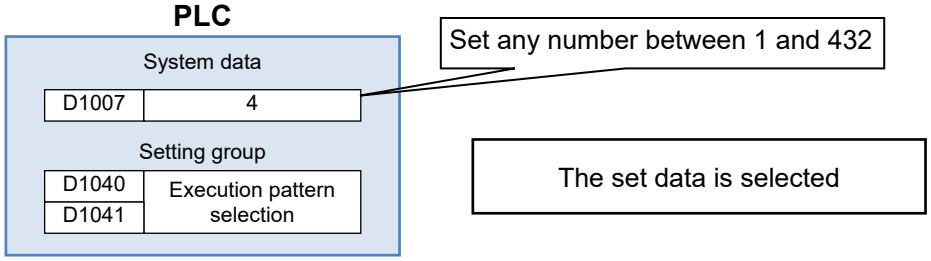
This command sets the communication data of the setting group that is transferred.
Set transfer of all communication data of the setting group, or transfer by one data item.
[Register address: D1007 (factory set value)]

Setting range: 0 or 1 to 432

- When set to 0, all communication data of the setting group is transferred.



- When set to a number from 1 to 432 (item number), only the set communication data item is transferred (transfer by one data item).



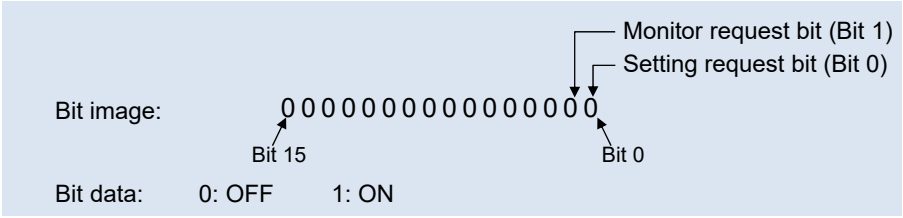
Communication data that has been set to "unused" (binary: 0) in the setting item selection of the PLC communication environment will not be transferred.

When set to a number from 1 to 432 (item number), the value of request item number will not return to 0 even after setting request or monitor request processing is completed.

For item numbers 1 to 432, refer to **"● Setting item selection (Communication data of Setting group)" (P. 5-10)**.

(2) Request command

Request command is a command to transfer the communication data of the setting group selected in the Request item number.
For the request command, both "Setting request bit" and "Monitor request bit" are available.
The Setting request bit and Monitor request bit of the request command are assigned to each bit datum as a binary number.
[Register address: D1008 (Factory set value)]

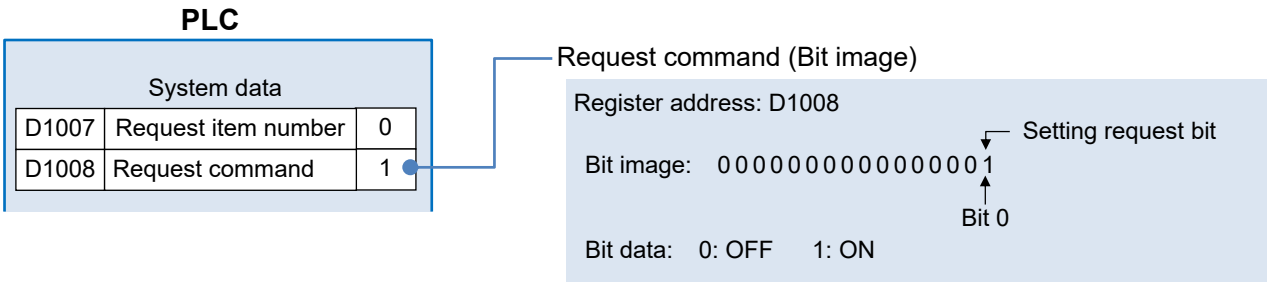


- **Setting request bit (PLC ➔ PZ)**……Set the PLC communication data on to the PZ.

  This command requests that the PZ read the communication data of the setting group on the PLC side.

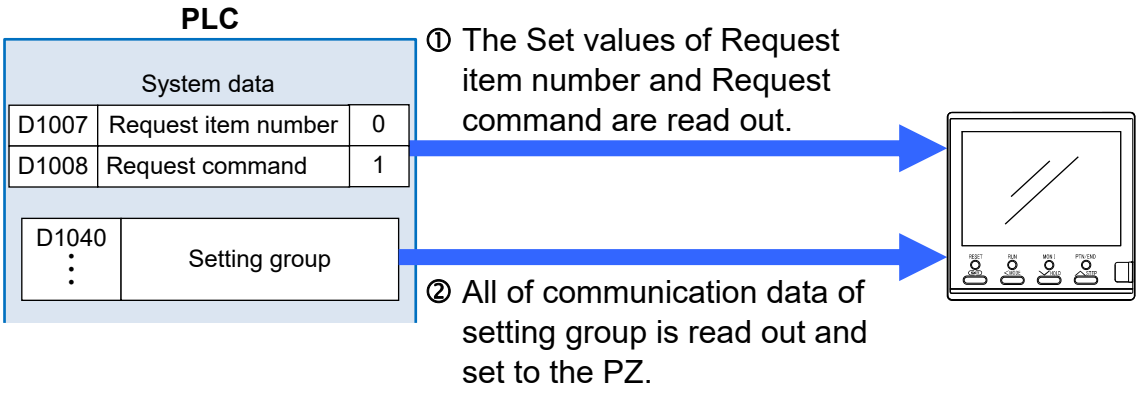
  Processing example: Read out all communication data of PLC setting group to the PZ.

  1. Set "0" to Request item number (D1007) and "1" to Request command (D1008).

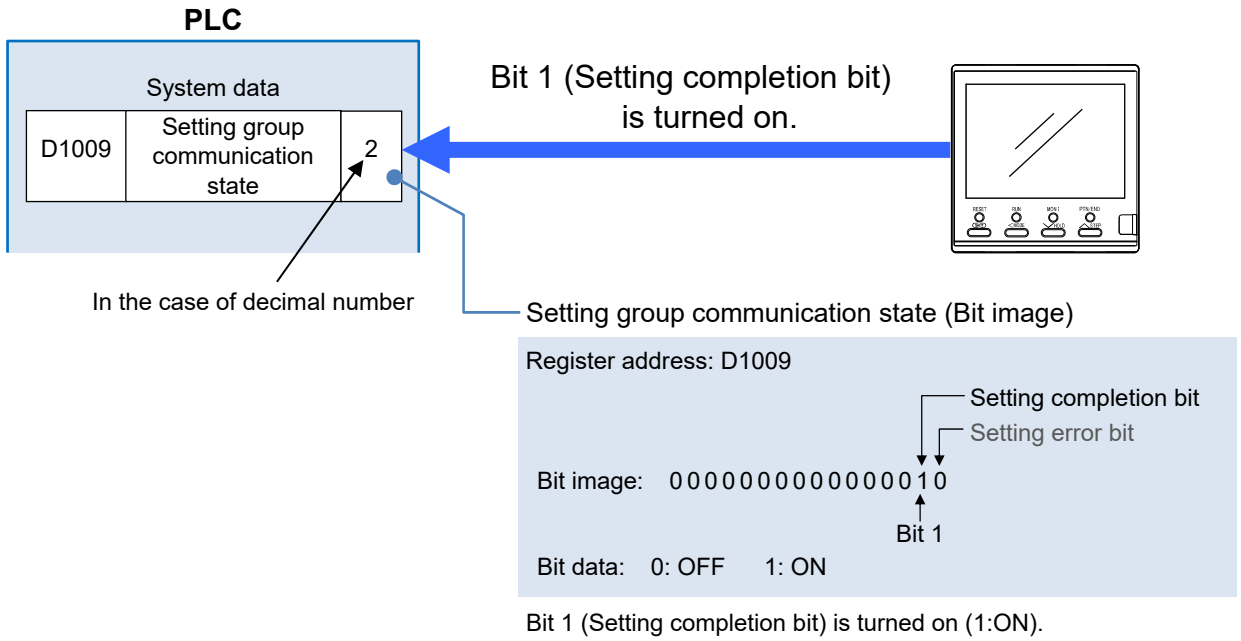


For a bit image, set "1" to the Bit 0 (Setting request bit).

  2. The PZ checks the content set at Request item number and Request command, and reads out the communication data of the setting group from the PLC register.

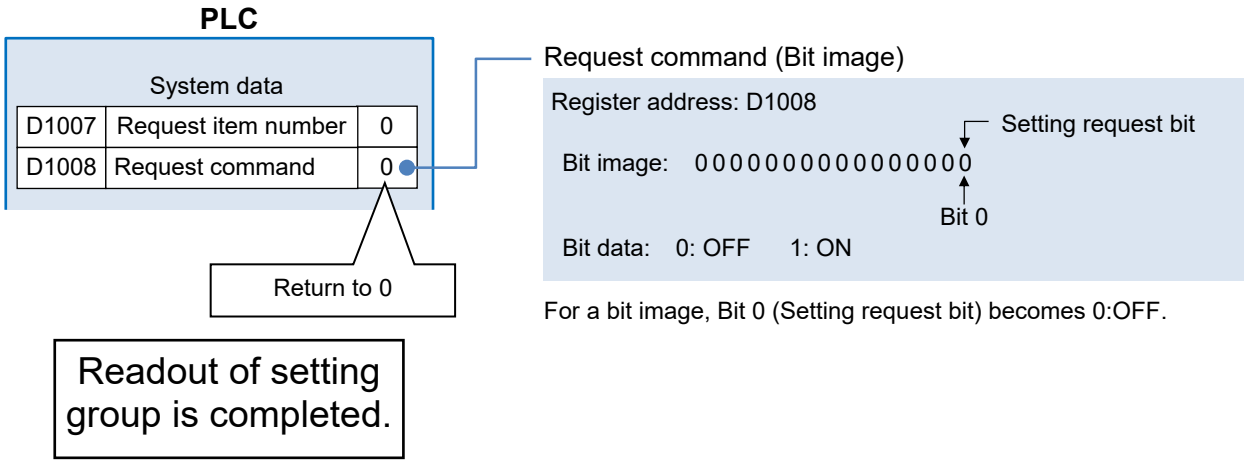


3. When the readout is completed, the PZ writes the communication state of setting group to the Setting completion bit (Bit 1) of the Setting group communication state (D1009).



If there is an error in the setting range of the data, the setting error bit (Bit 0) will change to "1." Check and see if there is an error in the values set in the PLC register.

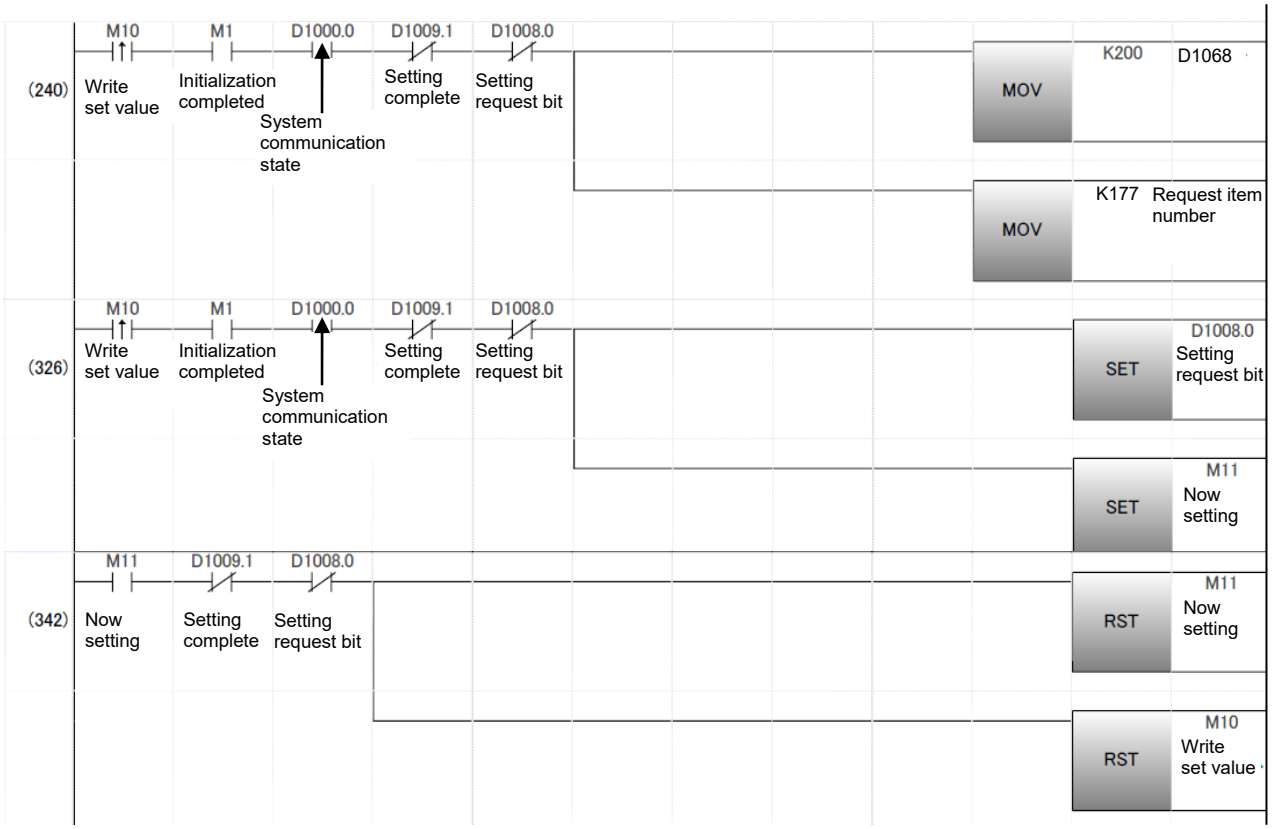
4. The Request command (D1008) will change to "0" to indicate that reading of data from the PLC is finished.



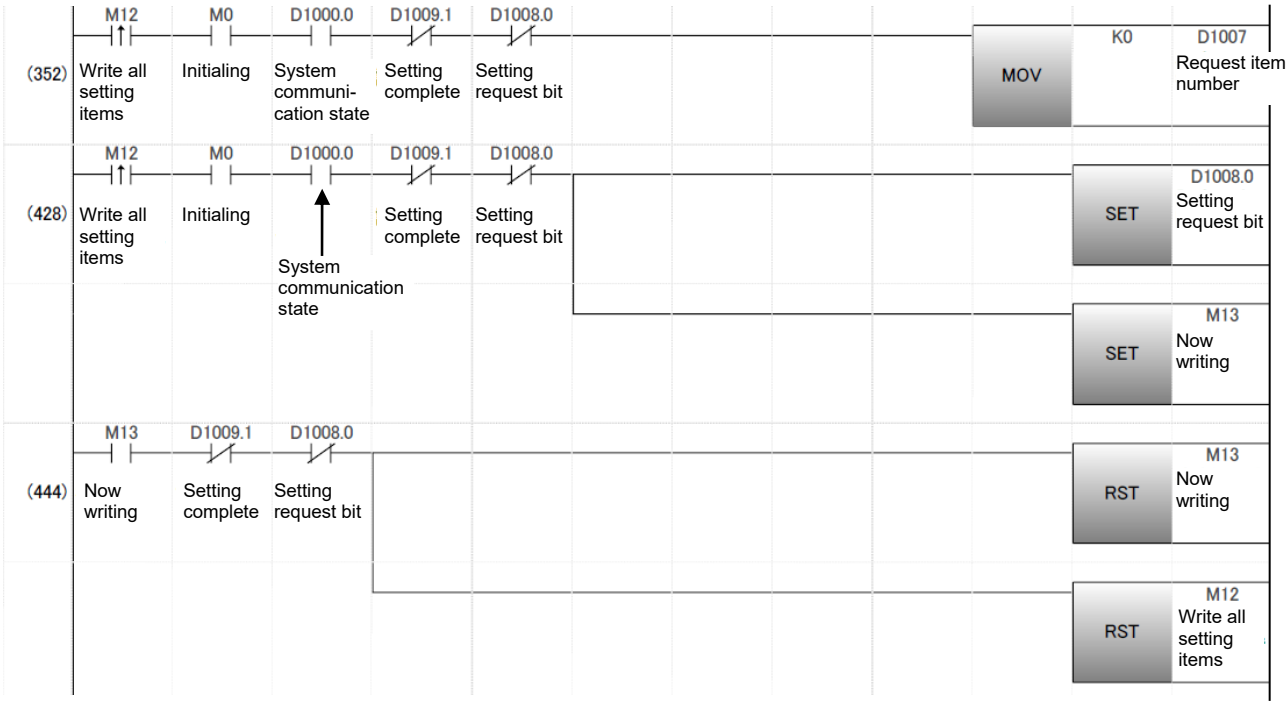
Refer to **P. 6-7** for a programming example.

Program example:

Read out a segment 1 level in pattern 1 of PLC to the PZ.
Before starting the following execution pattern, users must perform initial setting (Refer to P.6-13).



Read out all communication data of PLC setting group to the PZ.



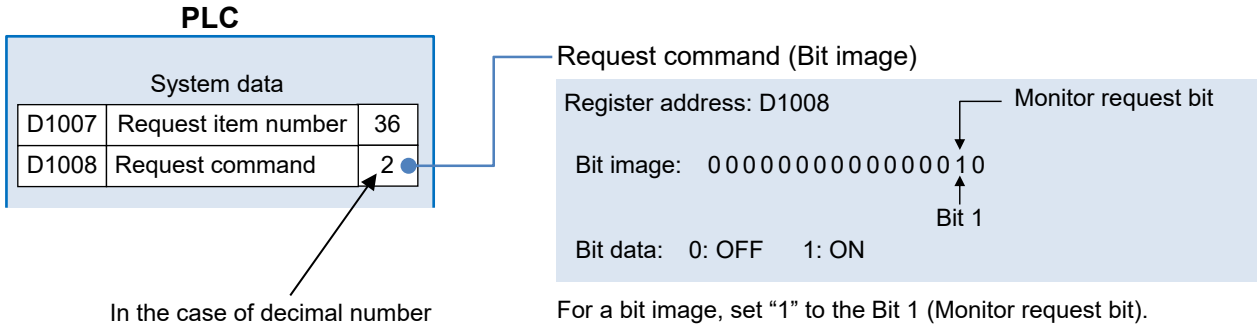
The sample program is intended solely for purposes of example and the operation is not guaranteed. When you create a program using the sample program, check the operation of the program and use it on your own responsibility.

- **Monitor request bit (PLC ← PZ)**……Set the communication data of the PZ to the PLC.

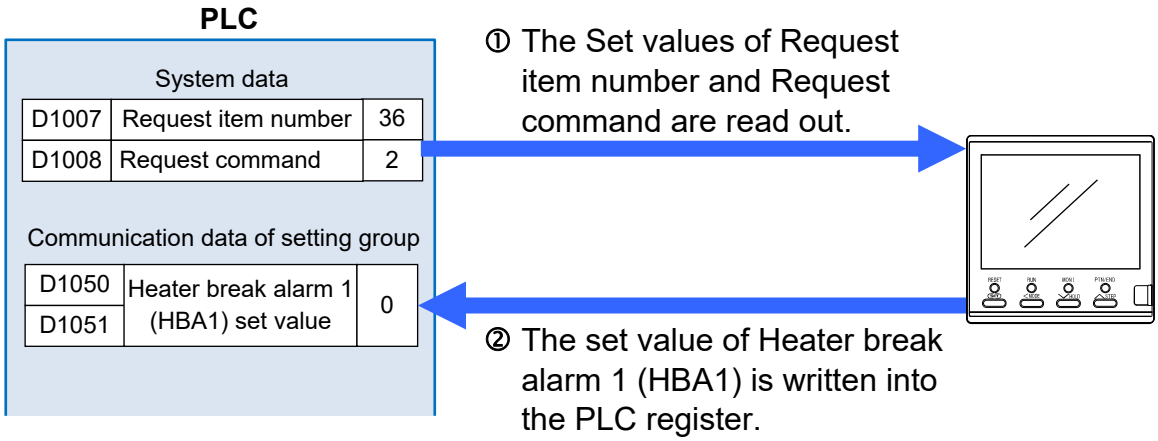
  Monitor request bit is a command to request the communication data of the PZ setting group to be written into the PLC register.

  Processing example: Writing a Set value of Heater break alarm 1 (HBA1) of the PZ into the PLC.

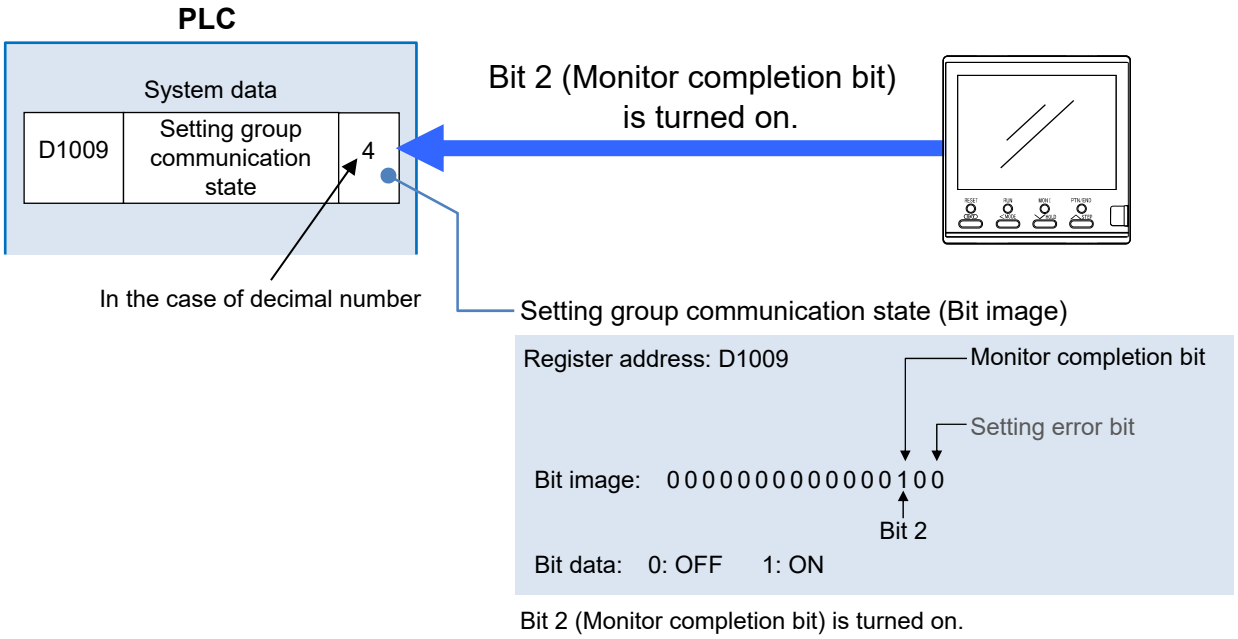
  1. Set "36" to Request item number (D1007) and "2" to Request command (D1008).



  2. The PZ checks the content set at Request item number and Request command and writes the set value of Heater break alarm 1 (HBA1) into the PLC register.

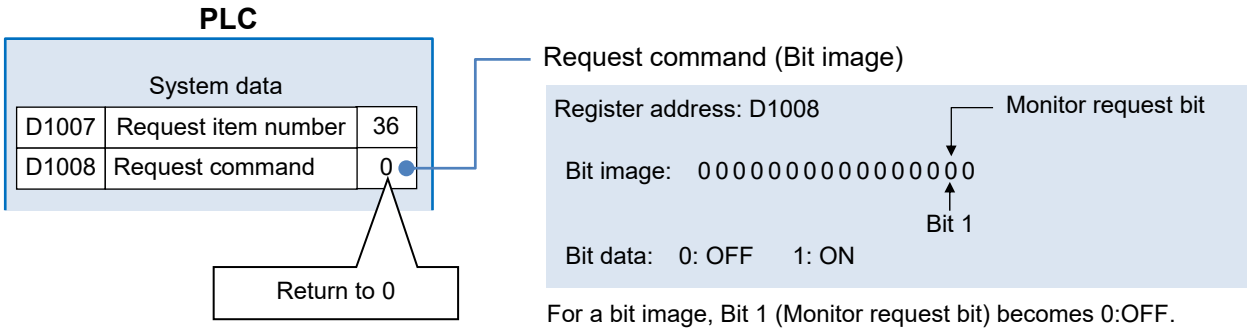


3. When writing is finished, the PZ writes the communication state of the setting group to the Monitor completion bit (Bit 2) of setting group communication state (D1009).



Bit 2 (Monitor completion bit) is turned on.

4. The request command (D1008) will change to "0" to indicate that reading of data from the PLC is finished.

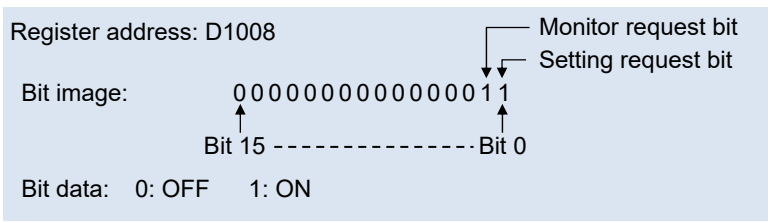


For a bit image, Bit 1 (Monitor request bit) becomes 0:OFF.

Writing the set value of Heater break alarm 1 (HBA1) is completed.

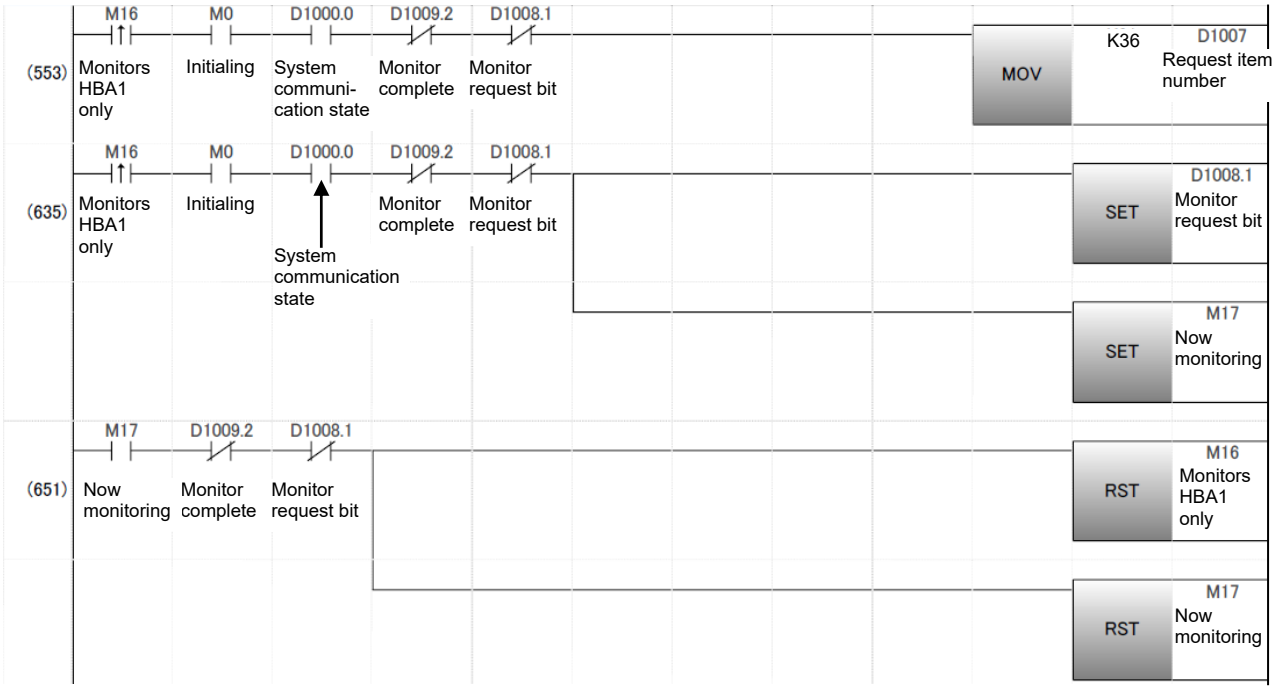
☞ Refer to **P. 6-10** for a programming example.

When setting both the setting request bit (Bit 0) and the monitor request bit (Bit 1) to "1," set the bits simultaneously. If set separately, the bit set later may be disregarded.

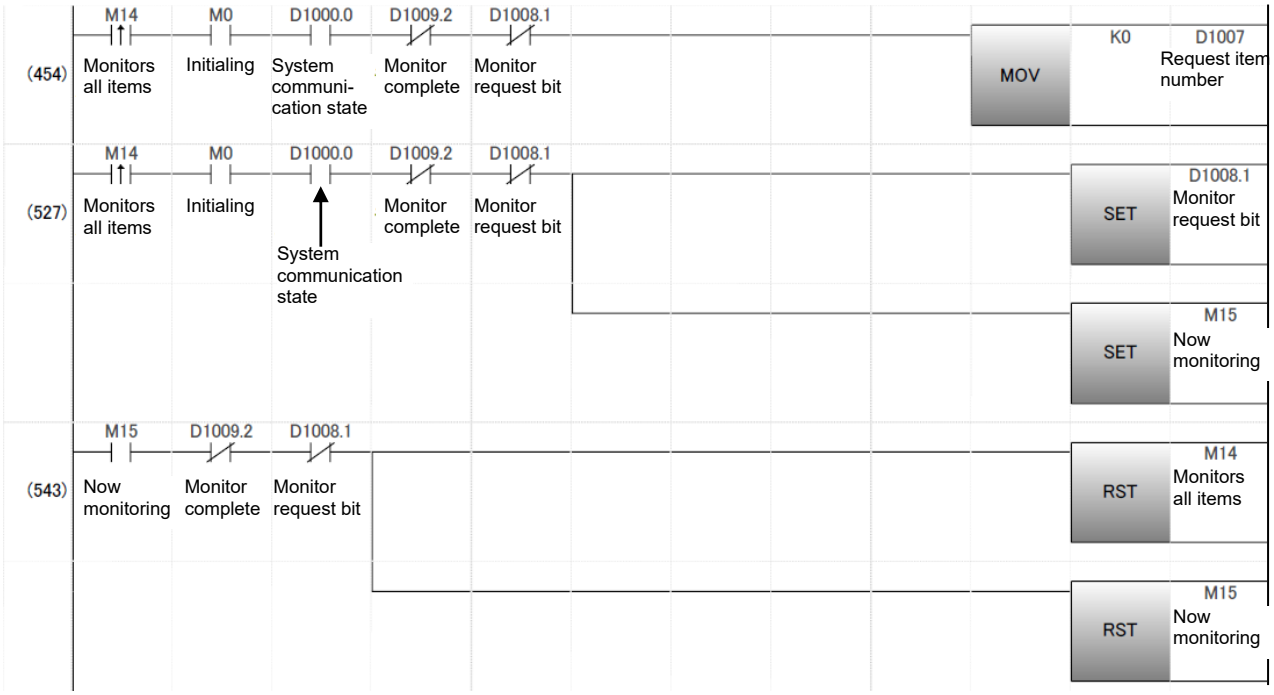


Program example:

Writing a Set value of Heater break alarm 1 (HBA1) of the PZ into the PLC.



Writing an all communication data of PZ setting group to the PLC.



The sample program is intended solely for purposes of example and the operation is not guaranteed. When you create a program using the sample program, check the operation of the program and use it on your own responsibility.

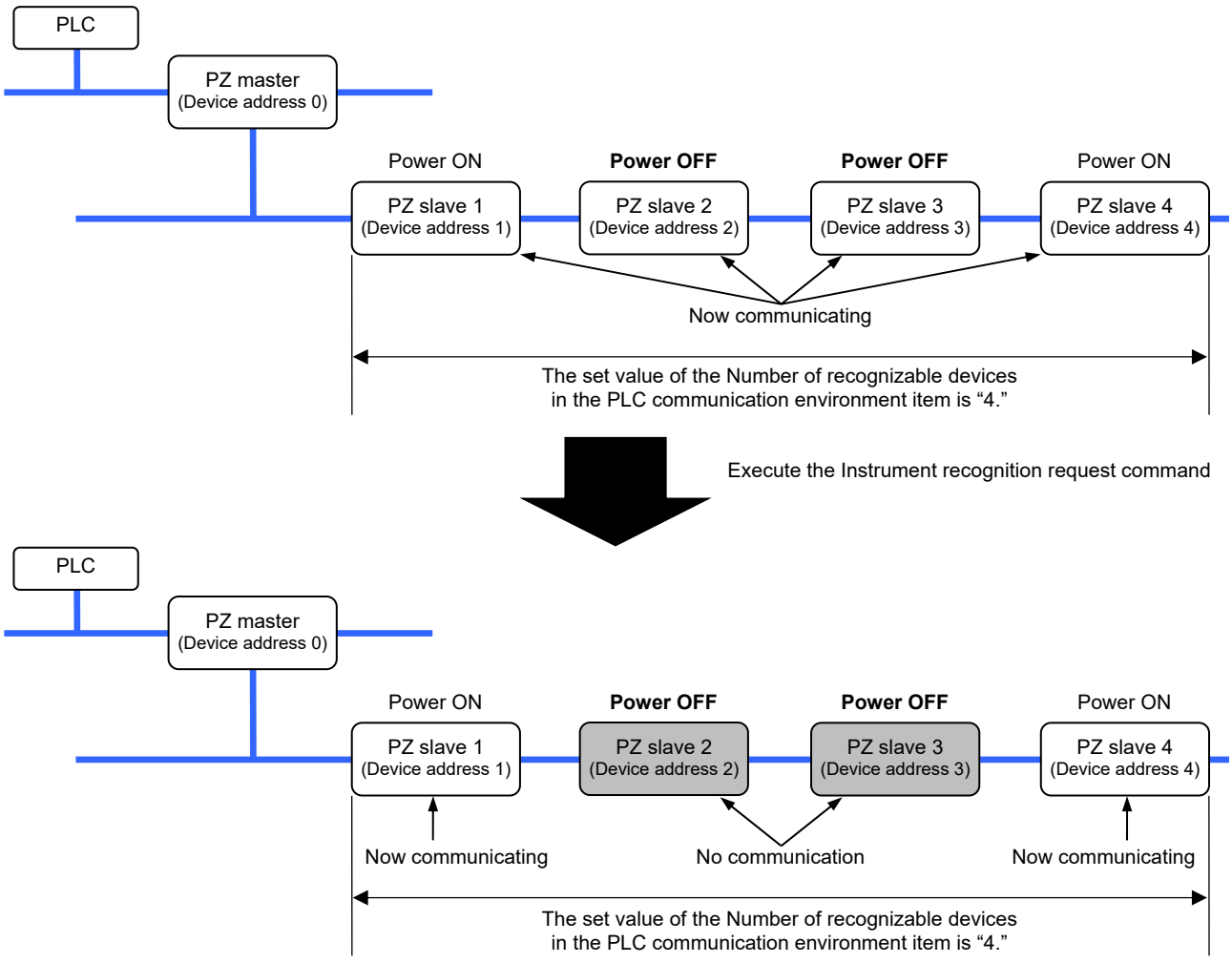
■ Instrument recognition request command (system data)

This is a request command to update the number of the PZ slaves (device address 1 to 30) recognized by the PZ master (device address 0). Recognition processing is conducted for the quantity of the instrument registered in the Number of recognizable devices (maximum value of device address) of the PLC communication environment items.
When some PZ slaves are not required and need to be turned off in a certain work process, perform the Instrument recognition request command to update the number of PZ slaves recognized by the PZ master.
Then the PZ master will not perform the communication request and as a result the communication cycle will be made faster.

Setting range: 0: Waiting for a request
1: Execute instrument recognition processing
(After the recognition, the command state returns to “0”)

NOTE

While Recognition processing is being implemented, do not operate the Request command.
The Instrument recognition request command must be used only on the PZ with a device address of 0.



Executing the Instrument recognition request command will not change the set value of Number of recognizable devices in the PLC communication environment items.

Execution example of the Instrument recognition request command:

- When some PZ slaves are turned off depending on the working process

  If any of the PZ slaves recognized by the PZ master is turned off, the PZ master must wait for a reply from the PZ slave until timeout is reached. This may lead to a longer communication cycle.

  In such a case, execute the Instrument recognition request command. The PZ master will not request communication with the PZ slaves which gave no response to the PZ master. This will quicken the communication cycle.

- When there are any PZ slaves which need to be turned on after the PZ master has been turned on

  If the PZ slaves that were off when the PZ master made a recognition processing of the PZ slaves (power-on of the PZ master or execution of the Instrument recognition request command) have been turned on, perform the Instrument recognition request command.

  Communication will be established with the PZ slave which was off in the last recognition process.

When the quantity of the PZ slave has been increased, some PZ slaves may not be recognized if the Instrument link recognition time is set short. Set the Instrument link recognition time longer for such a case. (Refer to **P. 5-5**)

When the quantity of the PZ slave is increased, make sure the Number of recognizable devices is properly set, otherwise, some PZ slaves may not be recognized.

In this case, change the set value of the Number of recognizable devices. (Refer to **P. 5-6**)

Program example:

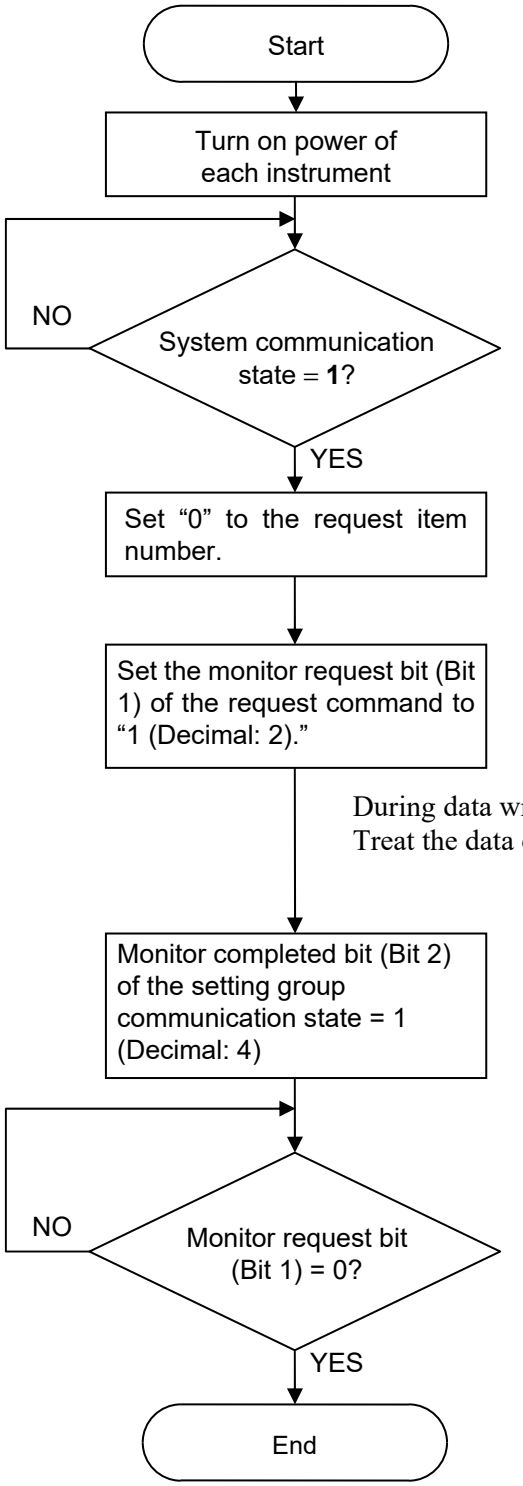
The sample program is intended solely for purposes of example and the operation is not guaranteed. When you create a program using the sample program, check the operation of the program and use it on your own responsibility.

6.1.2 Data transfer procedures

NOTE

Change each set value of the PZ from the PLC after the initial settings are made. If each set value of the PZ is changed from the PLC without setting the initial values, it is re-written to "0" with each set value of the PLC at that time set to "0."

■ Initial setting



Turn on the power of the PZ, and the PLC. When the PLC communication start time (factory setting: 5 seconds) elapses, writing of the system data begins.

After the system data is written, the PZ begins writing the communication data of the monitor group to the PLC. When monitor group writing starts, "system communication state" changes to "**1**."
When the system communication condition becomes "**1**," PLC communication can be performed.

Because all communication data of the setting group is written to the PLC, the request item number of the PLC register is set to "**0**."

When the monitor request bit (Bit 1) of request command of the PLC register is set to "**1** (Decimal: **2**),"
the PZ begins writing the setting group to the PLC.

During data write:
Treat the data of all items as inconsistent during the data write.

When writing is finished, the PZ writes the communication state of the setting group to the monitor completed bit (Bit 2) of the setting group communication state of the PLC.

If the monitor request bit (Bit 1) of the request command of the PLC register is "**0**," this indicates that writing of data to the PLC is finished.

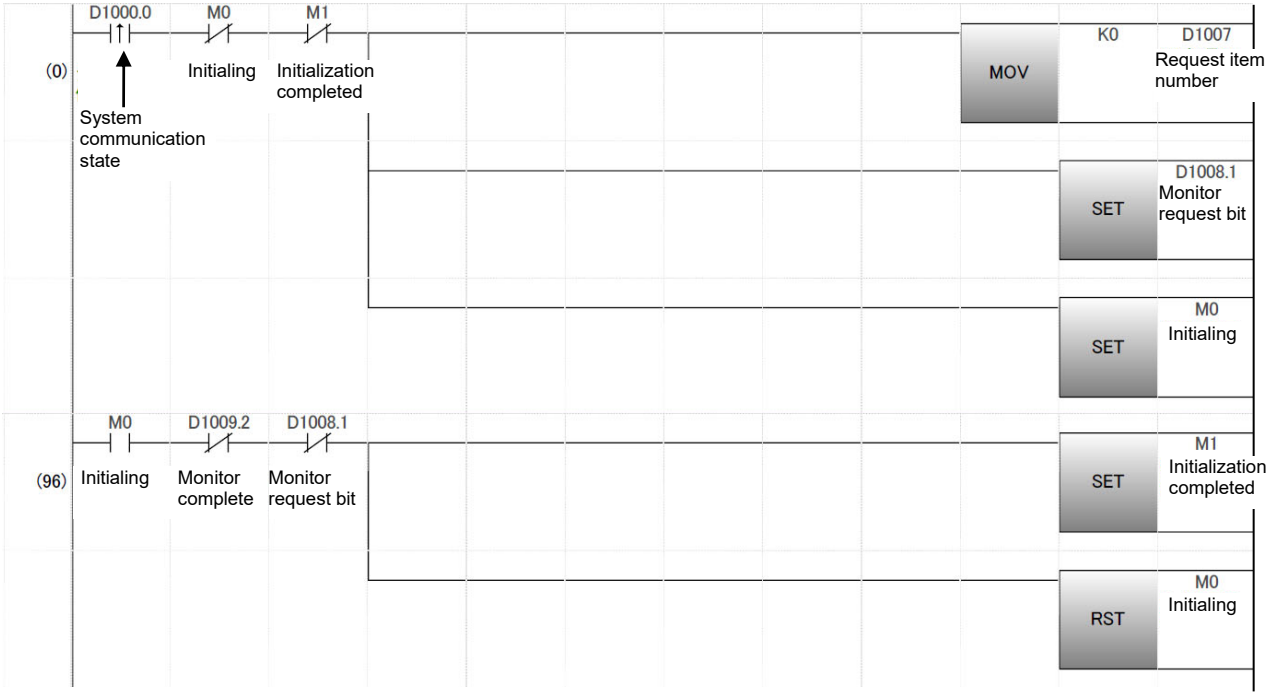
NOTE

When multiple PZ are connected, write the communication data of all PZ to the PLC.

☞ Refer to **P. 6-14** for a programming example.

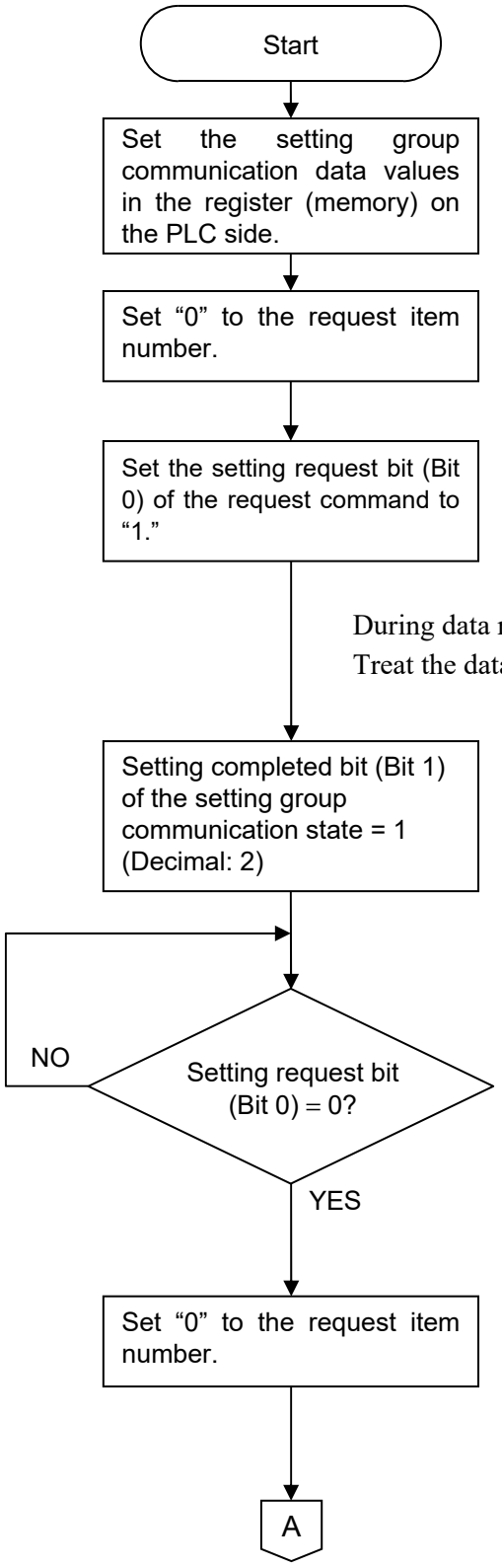
Program example:

Initial setting



The sample program is intended solely for purposes of example and the operation is not guaranteed. When you create a program using the sample program, check the operation of the program and use it on your own responsibility.

■ When the setting group communication data is transferred from PLC to the PZ.



[Data setting]
Set "0" to the request item number of PLC register.

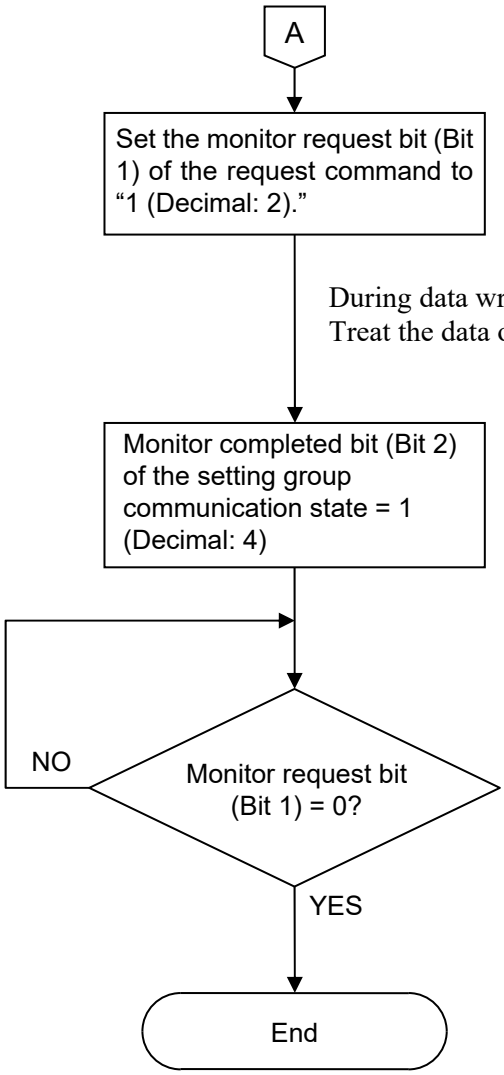
When the setting request bit (Bit 0) of request command of the PLC register is set to "**1**," the PZ begins reading the data set in the PLC register (memory).

During data read:
Treat the data of all items as inconsistent during the data read.

When reading of the data ends, the PZ writes the setting group communication state to the setting completed bit (Bit 1) of PLC setting group communication state.

If the setting request bit (Bit 0) of the request command of the PLC register is "**0**," this indicates that reading of data from the PLC is finished.

[Confirmation of setting data]
The request item number of the PLC register is set to "**0**" for verification of the data read from the PCL by the PZ.



When the monitor request bit (Bit 1) of request command of the PLC register is set to "**1** (Decimal: **2**),"the PZ begins writing the setting group data to the PLC.

During data write:
Treat the data of all items as inconsistent during the data write.

When writing is finished, the PZ writes the communication state of the setting group to the monitor completed bit (Bit 2) of the setting group communication state of the PLC.

If the monitor request bit (Bit 1) of the request command of the PLC register is "**0**," this indicates that writing of data to the PLC is finished.

☞ Refer to **P. 6-7** for a programming example.

6.1.3 Data processing precautions

(1) Automatic update of communication data
Some of the PLC data in the communication data of the setting group will be automatically updated.
To activate the automatic update, "Monitor request" must be performed at least once, after starting the PLC communication.

Communication data automatically updated

Group	Item Number	Communication data (setting item)
Setting item selection 1	2	Peak/Bottom hold reset
	3	Bottom suppression start signal
	5	Step function
	7	Autotuning (AT)
	8	Overall level autotuning (AT)
	9	Startup tuning (ST)
	10	Interlock release
	14	Automatic level PID setting
	15	Level PID setting 1
	16	Level PID setting 2
Setting item selection 2	17	Level PID setting 3
	18	Level PID setting 4
	19	Level PID setting 5
	20	Level PID setting 6
	21	Level PID setting 7
Setting item selection 3	46	FF amount learning
Setting item selection 4	49	PID group 1 Proportional band [heat-side]
	50	PID group 1 Integral time [heat-side]
	51	PID group 1 Derivative time [heat-side]
	55	PID group 1 FF amount
	57	PID group 1 Control loop break alarm (LBA) time
	59	PID group 1 Proportional band [cool-side]
	60	PID group 1 Integral time [cool-side]
	61	PID group 1 Derivative time [cool-side]
Setting item selection 5	65	PID group 2 Proportional band [heat-side]
	66	PID group 2 Integral time [heat-side]
	67	PID group 2 Derivative time [heat-side]
	71	PID group 2 FF amount
	73	PID group 2 Control loop break alarm (LBA) time
	75	PID group 2 Proportional band [cool-side]
	76	PID group 2 Integral time [cool-side]
	77	PID group 2 Derivative time [cool-side]
Setting item selection 6	81	PID group 3 Proportional band [heat-side]
	82	PID group 3 Integral time [heat-side]
	83	PID group 3 Derivative time [heat-side]
	87	PID group 3 FF amount
	89	PID group 3 Control loop break alarm (LBA) time
	91	PID group 3 Proportional band [cool-side]
	92	PID group 3 Integral time [cool-side]
	93	PID group 3 Derivative time [cool-side]

Group	Item Number	Communication data (setting item)
Setting item selection 7	97	PID group 4 Proportional band [heat-side]
	98	PID group 4 Integral time [heat-side]
	99	PID group 4 Derivative time [heat-side]
	103	PID group 4 FF amount
	105	PID group 4 Control loop break alarm (LBA) time
	107	PID group 4 Proportional band [cool-side]
	108	PID group 4 Integral time [cool-side]
	109	PID group 4 Derivative time [cool-side]
Setting item selection 8	113	PID group 5 Proportional band [heat-side]
	114	PID group 5 Integral time [heat-side]
	115	PID group 5 Derivative time [heat-side]
	119	PID group 5 FF amount
	121	PID group 5 Control loop break alarm (LBA) time
	123	PID group 5 Proportional band [cool-side]
	124	PID group 5 Integral time [cool-side]
	125	PID group 5 Derivative time [cool-time]
Setting item selection 9	129	PID group 6 Proportional band [heat-side]
	130	PID group 6 Integral time [heat-side]
	131	PID group 6 Derivative time [heat-side]
	135	PID group 6 FF amount
	137	PID group 6 Control loop break alarm (LBA) time
	139	PID group 6 Proportional band [cool-side]
	140	PID group 6 Integral time [cool-side]
	141	PID group 6 Derivative time [cool-side]
Setting item selection 10	145	PID group 7 Proportional band [heat-side]
	146	PID group 7 Integral time [heat-side]
	147	PID group 7 Derivative time [heat-side]
	151	PID group 7 FF amount
	153	PID group 7 Control loop break alarm (LBA) time
	155	PID group 7 Proportional band [cool-side]
	156	PID group 7 Integral time [cool-side]
	157	PID group 7 Derivative time [cool-side]
Setting item selection 11	161	PID group 8 Proportional band [heat-side]
	162	PID group 8 Integral time [heat-side]
	163	PID group 8 Derivative time [heat-side]
	167	PID group 8 FF amount
	169	PID group 8 Control loop break alarm (LBA) time
	171	PID group 8 Proportional band [cool-side]
	172	PID group 8 Integral time [cool-side]
	173	PID group 8 Derivative time [cool-side]

(2) The data type is treated as binary data with a sign and without a decimal point. For this reason, carefully express and set the data.

[Example] Setting of Proportional band (heat-side)
Initial value of internal data: 3.0
Communication data: 30

(3) Invalid or disabled items
Concerning the items made invalid or disabled because of the following conditions, the actions in the case of Setting request or Monitor request are shown below.

Condition:

- Items made invalid on the PZ side
- Items disabled in Setting item selection 1 through 27

Actions taken by Setting request or Monitor request:

Request command	PZ operation
Setting request bit (PZ←PLC)	The data from the PLC is ignored and is not read into the PZ. The setting error bit is not turned on either.
Monitor request bit (PZ→PLC)	The PZ writes “0” into the PLC register.

6.1.4 Processing time of communication data

The processing times for communication data monitor and setting are shown below. (This is just an example)

The times shown are the processing times when the interval time is set to 10 milliseconds (factory set value).

■ Communication data processing time of monitor group

Communication speed	Number of communication data items	Monitor processing time [Unit: seconds]					
		When there are 31 PZ		When there are 9 PZ		When there are one PZ	
		Double word	Single word	Double word	Single word	Double word	Single word
19200 bps	1	12.2	12.1	3.6	3.4	0.2	0.2
	9 *	13.5	12.6	3.8	3.7	0.3	0.2
	48	19.2	15.3	5.8	4.4	0.6	0.3
57600 bps	1	7.4	7.4	2.3	2.0	0.1	0.1
	9 *	7.7	7.5	2.3	2.0	0.2	0.1
	48	10.3	8.3	3.0	2.6	0.2	0.2

* Factory set value

■ Communication data processing time of setting group

Reading PLC communication data (setting request bit)

Communication speed	Number of communication data items	Setting processing time when there is one PZ [Unit: ms]	
		Double word	Single word
19200 bps	1	110	110
	18 *	170	140
	128	760	440
57600 bps	1	70	70
	18 *	90	80
	128	320	210

* Factory set value

Writing PLC communication data (monitor request bit)

Communication speed	Number of communication data items	Set value monitor processing time when there is one PZ [Unit: ms]	
		Double word	Single word
19200 bps	1	110	110
	18 *	170	140
	128	730	440
57600 bps	1	70	70
	18 *	80	80
	128	310	210

* Factory set value

6.2 PLC Communication Data Map

The data map summarizes communication data name, register addresses, and data range which enable PLC communication.

6.2.1 Reference to data map

(1) (2) (3) (4) (5)

No.	Name	Register address	Attri-bute	Data range	Factory set value
System data					
1	System communication state [1]	D1000	RO	Bit data Bit 0: Data collection condition Bit 1 to Bit 15: Unused Data 0: Before data collection is completed 1: Data collection is completed [Decimal number: 0, 1]	—

(1) Name: Name of communication data
For setting group communication data, the item number is indicated.

(2) Register address: A register address of communication data in PLC communication
(A register address of MITSUBISHI MELSEC series)
Register addresses in this manual are those assigned when the PLC communication environment setting is set as follows. (factory set values)

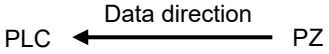
- Register type: 0 (D register)
- Register start number (High-order 4-bit): 0
- Register start number (Low-order 16-bit): 1000
- Monitor item register bias: 12
- Setting item register bias: 0
- Monitor item selection 1: 4031
- Monitor item selection 2: 1028
- Monitor item selection 3: 32
- Setting item selection 1: 121
- Setting item selection 2: 0
- Setting item selection 3: 40
- Setting item selection 4: 7183
- Setting item selection 5 to 11: 0
- Setting item selection 12: 3
- Setting item selection 13 to 27: 0

📖 Assignment of register addresses varies depending on the communication data of the PLC communication environment indicated below.

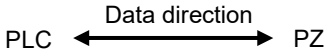
- Register type
- Register start number (High-order 4-bit)
- Register start number (Low-order 16-bit)
- Monitor item register bias
- Setting item register bias
- Monitor item selection 1 to 3
- Setting item selection 1 to 27
- Slave register bias
- Input data type

☞ For PLC communication environment setting, refer to **5.2 PLC Communication Environment Items List (P. 5-3)**.

(3) Attribute: RO: Read only data



R/W: Read and Write data



(4) Data range: Read or write range of communication data

(5) Factory set value: Factory set value of communication data

When there is one PZ, the number of communication data is 73 (factory set value). When the maximum of 31 PZ are connected to the PLC communication port, the number of communication data is 2263.
When there is one PZ, the total number of communication data is 1491. When the maximum of 31 PZ are connected to the PLC communication port, the total number of communication data is 46221.

The data map classifications of the communication data are shown below. (factory set value)
System data is a single word and occupies one register address of the PLC.
Monitor group and Setting group are either double word * or single word.
(It depends on the input range specified at the time of order.)

* Occupies two PLC register addresses.
In the data transfer of double word, data is sent from the lower word.

System data	D1000 [system communication state] to D1011 [Internal processing]
Monitor group	Double word: D1012 [Measured value (PV)] to D1039 [Error code] Single word: D1012 [Measured value (PV)] to D1025 [Error code]
Setting group	Double word: D1040 [Execution pattern selection] to D1133 [Pattern 1_Pattern end number] Single word: D1026 [Execution pattern selection] to D1072 [Pattern 1_Pattern end number]

The indicated communication data of the PLC communication data map are the communication data of factory set value. The number of communication data of factory set value is limited by monitor item selection and setting item selection.

Some communication data may be invalid or disabled depending on the type and the specification of the PZ. Check the following manual for detailed information of communication data that may be invalid or disabled.

☞ Refer to the **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□).**

6.2.2 Data map list (Factory setting)

■ Common items (System data) to Double word and Single word

No.	Name	Register address	Attri-bute	Data range	Factory set value
System data					
1	System communication state [1]	D1000	RO	Data collection condition 0: Before data collection is completed 1: Data collection is completed	—
2	Communication flag [2]	D1001	RO	0/1 transfer (For communication checking) "0" and "1" are repeated for each communication period.	—
3	—	D1002	RO	Internal processing Do not use the register address	—
4	—	D1003	RO	Internal processing Do not use the register address	—

[1] When system communication state becomes "1," PLC communication can be performed.

[2] The PZ writes alternating zeros and ones (0→1→0) to this area each communication period. By periodically monitoring this area in the PLC program, it can be determined whether or not the PZ has stopped communicating.

Programming example for determination of a communication error:

Determination of an error when the Communication flag has not been updated for 30 seconds.

The sample program is intended solely for purposes of example and the operation is not guaranteed. When you create a program using the sample program, check the operation of the program and use it on your own responsibility.

No.	Name	Register address	Attri-bute	Data range	Factory set value
System data					
5	PLC communication error code *	D1004	RO	Bit data Bit 0: PLC register read/write error Bit 1: Slave communication timeout Bit 2: Unused Bit 3: Unused Bit 4: Master communication timeout Bit 5 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 31]	—

* PLC communication error occurrence condition differ between the PZ master and the PZ slave.

		PZ master		PZ slave	
		PLC register	Loader communication	PLC register	Loader communication
Bit 0: PLC register read/write error	Error occurred on the PZ master	Bit 0: ON	Bit 0: ON	Bit 0: OFF	Bit 0: OFF
	Error occurred on the PZ slave	Bit 0: OFF	Bit 0: OFF	Bit 0: ON	Bit 0: ON
Bit 1: Slave communication timeout occurred		Bit 1: ON	Bit 1: ON	Value not updated [1]	Bit 1: ON
Bit 4: Master communication timeout occurred		Value not updated [1]	Bit 4: ON	Value not updated [1]	Bit 4: OFF

[1] Because a timeout error already occurred on the instrument (master or slave), writing to the PLC register will not be implemented.

Bit 0:PLC register read/write error

[PZ master]

An error is recognized when read/write is not available and error response has been received five times in series.

[PZ slave]

An error is recognized when read/write is not available and error response has been received five times in series.

Bit 1:Slave communication timeout

[PZ master]

- A timeout is detected when the PLC response waiting time has been exceeded after the PZ slave sent the request message. (The PZ slave is monitored)
- A timeout is detected when the PZ slave, to which Access right [2] is given, remains non responding and the preset PLC response waiting time has elapsed.

[PZ slave]

- A timeout is detected when the PLC response waiting time has been exceeded after the PZ slave sent the request message.
- If Access right [2] is not transferred from the PZ master within 10 minutes after the last response of the PZ slave, the error is recognized.

Bit 4:Master communication timeout

[PZ master]

A timeout is detected when the PLC response waiting time has been exceeded after the PZ master sent the request message.

[PZ slave]

Timeout is not detected.

[2] Access right

The PLC and the PZ perform 1:1 communication. When multiple PZs are connected, communication to the PLC is switched from one device to the other. This condition under which communication can be established is defined as Access right. The Access right is given to the PZ slaves (and the PZ master itself) by the PZ master in the order of the device address.

Each error state is assigned as a bit image in binary numbers

Bit image: 0000000000000000

Bit 15 ---------- Bit 0

No.	Name	Register address	Attri-bute	Data range	Factory set value
System data					
6	PLC communication instrument recognition flag 1 *	D1005	RO	Bit data Bit 0: PZ 1 (PZ master) Bit 1: PZ 2 Bit 2: PZ 3 Bit 3: PZ 4 Bit 4: PZ 5 Bit 5: PZ 6 Bit 6: PZ 7 Bit 7: PZ 8 Bit 8: PZ 9 Bit 9: PZ 10 Bit 10: PZ 11 Bit 11: PZ 12 Bit 12: PZ 13 Bit 13: PZ 14 Bit 14: PZ 15 Bit 15: PZ 16 Data 0: No instrument exists 1: Instrument exists [Decimal number: 0 to 65535]	—
7	PLC communication instrument recognition flag 2 *	D1006	RO	Bit data Bit 0: PZ 17 Bit 1: PZ 18 Bit 2: PZ 19 Bit 3: PZ 20 Bit 4: PZ 21 Bit 5: PZ 22 Bit 6: PZ 23 Bit 7: PZ 24 Bit 8: PZ 25 Bit 9: PZ 26 Bit 10: PZ 27 Bit 11: PZ 28 Bit 12: PZ 29 Bit 13: PZ 30 Bit 14: PZ 31 Bit 15: Unused Data 0: No instrument exists 1: Instrument exists [Decimal number: 0 to 16383]	—

* The connection state of the PZ slaves is displayed. PZ slaves (device address 1 to 30) can only recognize itself. Only the PZ master (device address 0) can recognize the whole system.

The state of the PLC communication instrument recognition flag is assigned to each bit in the binary number.

Bit image: 0000000000000000

Bit 15 ---------- Bit 0

No.	Name	Register address	Attri-bute	Data range	Factory set value
System data					
8	Request item number [1]	D1007	R/W	0, 1 to 432 0: Transfer all communication data of the setting group. 1 to 432: Transfer only the communication data of the selected item number.	—
9	Request command [2]	D1008	R/W	Bit data Bit 0: Setting request bit Bit 1: Monitor request bit Data 0: OFF 1: ON [Decimal number: 0 to 3]	0
10	Setting group communication state [3]	D1009	R/W	Bit data Bit 0: Setting error bit Bit 1: Setting completed bit Bit 2: Monitor completed bit Data 0: OFF 1: ON [Decimal number: 0 to 7]	—

[1] Request item number

This command sets the communication data of the setting group that is transferred. Set transfer of all communication data of the setting group, or transfer by one data item.

Communication data that has been set to "unused" (binary: 0) in the setting item selection of the PLC communication environment will not be transferred.

[2] Request command

Bit 0: Setting request bit

This command requests that the PZ read the communication data of the setting group on the PLC side.

Bit 1: Monitor request bit

This command requests that the PZ write the communication data of the setting group on the PLC side.

The setting request bit and monitor request bit is assigned as a bit image in binary numbers.

Bit image: 0000000000000000

Bit 15 ---------- Bit 0

[3] This is the communication state of setting group.

Bit 0: Setting error bit

Turns ON when the PLC data and PZ data do not agree due to a setting range error or other error. Also turns ON when data cannot be set.

When setting error is "1" (ON), it will return to "0" (OFF) the next time data is set normally.

Bit 1: Setting completed bit

When there is a request by setting request bit for a PLC setting data read, this will turn ON when the PLC data read is finished.

At the next communication period with the setting request bit set to 0, the setting completed bit turns OFF.

Bit 2: Monitor completed bit

When there is a request by monitor request bit for a PZ setting data write, this will turn ON when the PZ setting data write is finished.

At the next communication period with the monitor request bit set to 0, the monitor completed bit turns OFF.

The setting error bit, setting completed bit, and monitor completed bit is assigned as a bit image in binary numbers.

Bit image: 0000000000000000

Bit 15 ---------- Bit 0

No.	Name	Register address	Attri-bute	Data range	Factory set value
System data					
11	Instrument recognition request command	D1010	R/W	Bit data Bit 0: Instrument recognition request Bit 1 to Bit 15: Unused Data 0: Wait for a request 1: Execute instrument recognition processing (After the recognition, the command state returns to "0") This setting is effective only for the PZ master with a device address of 0.	—
12	—	D1011	RO	Internal processing Do not use the register address	—

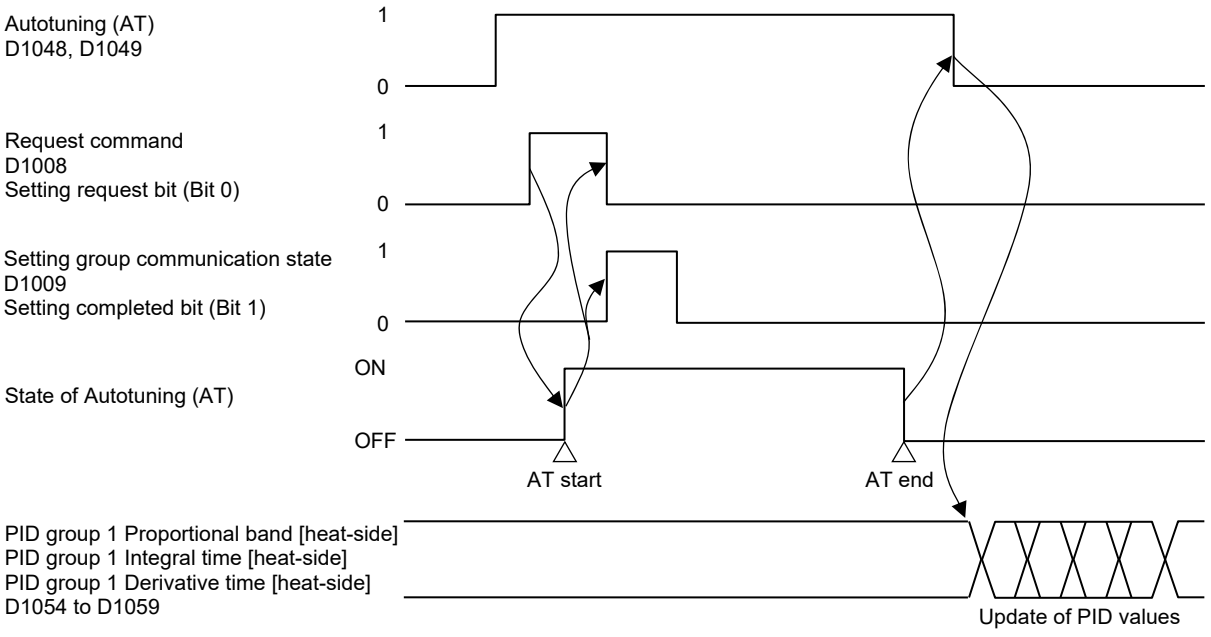
■ Double word items (Monitor group and Setting group)

No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 1)					
13	Measured value (PV)	D1012 D1013	RO	Input range low – (5 % or more of input span) to Input range high + (5 % or more of input span) Varies with the setting of the Decimal point position.	—
14	Set value (SV) monitor	D1014 D1015	RO	Setting limiter low to Setting limiter high Varies with the setting of the Decimal point position.	—
15	Manipulated output value monitor [heat-side]	D1016 D1017	RO	–5.0 to +105.0 %	—
16	Manipulated output value monitor [cool-side]	D1018 D1019	RO	–5.0 to +105.0 %	—
17	Current transformer 1 (CT1) input value monitor	D1020 D1021	RO	0.0 to 100.0 A	—
18	Current transformer 2 (CT2) input value monitor	D1022 D1023	RO	0.0 to 100.0 A	—
19	Pattern number monitor	D1024 D1025	RO	1 to 16	—
20	Segment number monitor	D1026 D1027	RO	1 to 16	—
21	Segment level	D1028 D1029	RO	Setting limiter low to Setting limiter high [Varies with the setting of the Decimal point position.]	—
22	Segment time	D1030 D1031	RO	0 to 11999 minutes or 0 to 11999 seconds 12000: Continuous [Time unit depends on the time unit of the setting]	—
23	Segment remaining time monitor	D1032 D1033	RO	0 to 11999 minutes or 0 to 11999 seconds 12000: Continuous When the Pattern end signal is valid in the Pattern end mode, the remaining time of the Pattern end output will be displayed. [Time unit depends on the time unit of the setting]	—
Monitor group (Monitor item selection 2)					
24	Overall operation status	D1034 D1035	RO	0 to 63 0: OFF +1: Program control mode (RUN) state, Fixed set point control mode (FIX) state or Manual control mode (MAN) state +2: Hold state +4: Wait state +8: Pattern end state +16: Autotuning (AT) state or Overall level autotuning (AT) state +32: Communication monitoring result When multiple items are applicable, they are summed up.	—

No.	Name	Register address	Attri-bute	Data range	Factory set value
Monitor group (Monitor item selection 2)					
25	Comprehensive event state	D1036 D1037	RO	0 to 511 0: OFF +1: Event 1 +2: Event 2 +4: Event 3 +8: Event 4 +16: Heater break alarm 1 (HBA1) +32: Heater break alarm 2 (HBA2) +64: Control loop break alarm (LBA) +128: Input error high +256: Input error low When multiple items are applicable, they are summed up.	—
Monitor group (Monitor item selection 3)					
26	Error code	D1038 D1039	RO	0 to 71 0: Normal +1: Adjustment data error +2: Data back-up error +4: A/D conversion error (Temperature compensation error included) +64: Display units error When multiple items are applicable, they are summed up.	—
Setting group (Setting item selection 1)					
27	Execution pattern selection Item number: 1	D1040 D1041	R/W	1 to 16 Settable only in the RESET mode (RESET) If setting request is conducted when the Operation transfer mode is other than 0 (RESET), this setting will be ignored and no setting error occurs.	1
28	Operation mode transfer Item number: 4	D1042 D1043	R/W	0: Reset mode (RESET) 1: Program control mode (RUN) 2: Fixed set point control mode (FIX) 3: Manual control mode (MAN) If setting request is conducted when "1: Reset mode (RESET) setting" is selected for DI function selection and the related contact is closed, "Bit 0: Setting error bit" of "Setting item group communication state" will be ON.	0

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 1)					
29	Step function Item number: 5	D1044 D1045	R/W	0: Normal state 1: Step When the Step function in the PZ has been changed to “0” from “1,” the corresponding data in the PLC will be also automatically updated. If setting request is conducted when “1: Reset mode (RESET) setting” or “4: Hold (HOLD) function” is selected for DI function selection and when the related contact is in closed state, “Bit 0: Setting error bit” of “Setting item group communication state” will be ON.	0
30	Hold state Item number: 6	D1044 D1045	R/W	0: OFF 1: ON (Hold state) If setting request is conducted when “1: Reset mode (RESET) setting” or “4: Hold (HOLD) function” is selected for DI function selection and when the related contact is in closed state, “Bit 0: Setting error bit” of “Setting item group communication state” will be ON.	0
31	Autotuning (AT) Item number: 7	D1048 D1049	R/W	0: PID control 1: Start Autotuning When the Autotuning (AT) in the PZ has been changed to “0” from “1,” the corresponding data in the PLC will be also automatically updated. (Refer to a Time chart)	0

Time chart



No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 3)					
32	Heater break alarm 1 (HBA1) set value Item number: 36	D1050 D1051	R/W	0.0 to 100.0 A 0.0: HBA function OFF	0.0
33	Heater break alarm 2 (HBA2) set value Item number: 38	D1052 D1053	R/W	0.0 to 100.0 A 0.0: HBA function OFF	0.0
Setting group (Setting item selection 4)					
34	PID group 1 Proportional band [heat-side] Item number: 49	D1054 D1055	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input span 0 (0.0, 0.00): ON/OFF action In the following cases, Proportional band [heat-side] of the PLC will be automatically updated. • The Autotuning (AT) of the PZ has changed to zero from one. • When Startup tuning (ST) of the PZ has been normally completed	TC/RTD inputs: 30.0 V/I inputs: 3.0
35	PID group 1 Integral time [heat-side] Item number: 50	D1056 D1057	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action Position proportioning PID control: 1 to 3600 seconds, 0.1 to 3600.0 seconds or 0.01 to 360.00 seconds [Varies with the setting of the Integral/ Derivative time decimal point position.] In the following cases, Integral time [heat-side] of the PLC will be automatically updated. • The Autotuning (AT) of the PZ has changed to zero from one. • When Startup tuning (ST) of the PZ has been normally completed	240

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 4)					
36	PID group 1 Derivative time [heat-side] Item number: 51	D1058 D1059	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Decimal point position.] In the following cases, Derivative time [heat-side] of the PLC will be automatically updated. • The Autotuning (AT) of the PZ has changed to zero from one. • When Startup tuning (ST) of the PZ has been normally completed	60
37	PID group 1 Control response parameter Item number: 52	D1060 D1061	R/W	0: Slow 1: Medium 2: Fast When the P or PD action is selected, this setting becomes invalid.	2
38	PID group 1 Proportional band [cool-side] Item number: 59	D1062 D1063	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of Input span When the Autotuning (AT) in the PZ has been changed to “0” from “1,” Proportional band [cool-side] of the PLC will be automatically updated.	TC/RTD inputs: 30 V/I inputs: 3.0
39	PID group 1 Integral time [cool-side] Item number: 60	D1064 D1065	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action [Varies with the setting of the Integral/ Derivative time decimal point position.] When the Autotuning (AT) in the PZ has been changed to “0” from “1,” Integral time [cool-side] of the PLC will be automatically updated.	240
40	PID group 1 Derivative time [cool-side] Item number: 61	D1066 D1067	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action [Varies with the setting of the Integral/ Derivative time decimal point position.] When the Autotuning (AT) in the PZ has been changed to “0” from “1,” Derivative time [cool-side] of the PLC will be automatically updated.	60

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
41	Pattern 1 Segment 1 level Item number: 177	D1068 D1069	R/W	Setting limiter low to Setting limiter high [Varies with the setting of the Decimal point position.]	0
42	Pattern 1 Segment 1 time Item number: 177	D1070 D1071	R/W	0 to 11999 minutes or 0 to 11999 seconds [Time unit depends on the time unit of the setting]	0
43	Pattern 1 Segment 2 level Item number: 177	D1072 D1073	R/W	Same as Segment 1 level	
44	Pattern 1 Segment 2 time Item number: 177	D1074 D1075	R/W	0 to 11999 minutes or 0 to 11999 seconds 12000: Continuous (Settable only in Soak segments. *) * When the segment that is set to continuous becomes no longer a soak segment, the Segment time is automatically set to 11999 minutes or 11999 seconds. [Time unit depends on the time unit of the setting]	0
45	Pattern 1 Segment 3 level Item number: 177	D1076 D1077	R/W	Same as Segment 1 level	
46	Pattern 1 Segment 3 time Item number: 177	D1078 D1079	R/W	Same as Segment 2 time	
47	Pattern 1 Segment 4 level Item number: 177	D1080 D1081	R/W	Same as Segment 1 level	
48	Pattern 1 Segment 4 time Item number: 177	D1082 D1083	R/W	Same as Segment 2 time	
49	Pattern 1 Segment 5 level Item number: 177	D1084 D1085	R/W	Same as Segment 1 level	
50	Pattern 1 Segment 5 time Item number: 177	D1086 D1087	R/W	Same as Segment 2 time	
51	Pattern 1 Segment 6 level Item number: 177	D1088 D1089	R/W	Same as Segment 1 level	
52	Pattern 1 Segment 6 time Item number: 177	D1090 D1091	R/W	Same as Segment 2 time	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
53	Pattern 1 Segment 7 level Item number: 177	D1092 D1093	R/W	Same as Segment 1 level	
54	Pattern 1 Segment 7 time Item number: 177	D1094 D1095	R/W	Same as Segment 2 time	
55	Pattern 1 Segment 8 level Item number: 177	D1096 D1097	R/W	Same as Segment 1 level	
56	Pattern 1 Segment 8 time Item number: 177	D1098 D1099	R/W	Same as Segment 2 time	
57	Pattern 1 Segment 9 level Item number: 177	D1100 D1101	R/W	Same as Segment 1 level	
58	Pattern 1 Segment 9 time Item number: 177	D1102 D1103	R/W	Same as Segment 2 time	
59	Pattern 1 Segment 10 level Item number: 177	D1104 D1105	R/W	Same as Segment 1 level	
60	Pattern 1 Segment 10 time Item number: 177	D1106 D1107	R/W	Same as Segment 2 time	
61	Pattern 1 Segment 11 level Item number: 177	D1108 D1109	R/W	Same as Segment 1 level	
62	Pattern 1 Segment 11 time Item number: 177	D1110 D1111	R/W	Same as Segment 2 time	
63	Pattern 1 Segment 12 level Item number: 177	D1112 D1113	R/W	Same as Segment 1 level	
64	Pattern 1 Segment 12 time Item number: 177	D1114 D1115	R/W	Same as Segment 2 time	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
65	Pattern 1 Segment 13 level Item number: 177	D1116 D1117	R/W	Same as Segment 1 level	
66	Pattern 1 Segment 13 time Item number: 177	D1118 D1119	R/W	Same as Segment 2 time	
67	Pattern 1 Segment 14 level Item number: 177	D1120 D1121	R/W	Same as Segment 1 level	
68	Pattern 1 Segment 14 time Item number: 177	D1122 D1123	R/W	Same as Segment 2 time	
69	Pattern 1 Segment 15 level Item number: 177	D1124 D1125	R/W	Same as Segment 1 level	
70	Pattern 1 Segment 15 time Item number: 177	D1126 D1127	R/W	Same as Segment 2 time	
71	Pattern 1 Segment 16 level Item number: 177	D1128 D1129	R/W	Same as Segment 1 level	
72	Pattern 1 Segment 16 time Item number: 177	D1130 D1131	R/W	Same as Segment 2 time	
73	Pattern 1 Pattern end number Item number: 178	D1132 D1133	R/W	1 to 16	16

■ Single word items (Monitor group and Setting group)

☞ Refer to **P. 6-27** to **6-34** for the data range and the factory set value.

No.	Name	Register address
Monitor group (Monitor item selection 1)		
13	Measured value (PV)	D1012
14	Set value (SV) monitor	D1013
15	Manipulated output value monitor [heat-side]	D1014
16	Manipulated output value monitor [cool-side]	D1015
17	Current transformer 1 (CT1) input value monitor	D1016
18	Current transformer 2 (CT2) input value monitor	D1017
19	Pattern number monitor	D1018
20	Segment number monitor	D1019
21	Segment level	D1020
22	Segment time	D1021
23	Segment remaining time monitor	D1022
Monitor group (Monitor item selection 2)		
24	Overall operation status	D1023
25	Comprehensive event state	D1024
Monitor group (Monitor item selection 3)		
26	Error code	D1025
Setting group (Setting item selection 1)		
27	Execution pattern selection Item number: 1	D1026
28	Operation mode transfer Item number: 4	D1027
29	Step function Item number: 5	D1028
30	Hold state Item number: 6	D1029
31	Autotuning (AT) Item number: 7	D1030
Setting group (Setting item selection 3)		
32	Heater break alarm 1 (HBA1) set value Item number: 36	D1031
33	Heater break alarm 2 (HBA2) set value Item number: 38	D1032

No.	Name	Register address
Setting group (Setting item selection 4)		
34	PID group 1 Proportional band [heat-side] Item number: 49	D1033
35	PID group 1 Integral time [heat-side] Item number: 50	D1034
36	PID group 1 Derivative time [heat-side] Item number: 51	D1035
37	PID group 1 Control response parameter Item number: 52	D1036
38	PID group 1 Proportional band [cool-side] Item number: 59	D1037
39	PID group 1 Integral time [cool-side] Item number: 60	D1038
40	PID group 1 Derivative time [cool-side] Item number: 61	D1039
Setting group (Setting item selection 12)		
41	Pattern 1 Segment 1 level Item number: 177	D1040
42	Pattern 1 Segment 1 time Item number: 177	D1041
43	Pattern 1 Segment 2 level Item number: 177	D1042
44	Pattern 1 Segment 2 time Item number: 177	D1043
45	Pattern 1 Segment 3 level Item number: 177	D1044
46	Pattern 1 Segment 3 time Item number: 177	D1045
47	Pattern 1 Segment 4 level Item number: 177	D1046
48	Pattern 1 Segment 4 time Item number: 177	D1047

No.	Name	Register address
Setting group (Setting item selection 12)		
49	Pattern 1 Segment 5 level Item number: 177	D1048
50	Pattern 1 Segment 5 time Item number: 177	D1049
51	Pattern 1 Segment 6 level Item number: 177	D1050
52	Pattern 1 Segment 6 time Item number: 177	D1051
53	Pattern 1 Segment 7 level Item number: 177	D1052
54	Pattern 1 Segment 7 time Item number: 177	D1053
55	Pattern 1 Segment 8 level Item number: 177	D1054
56	Pattern 1 Segment 8 time Item number: 177	D1055
57	Pattern 1 Segment 9 level Item number: 177	D1056
58	Pattern 1 Segment 9 time Item number: 177	D1057
59	Pattern 1 Segment 10 level Item number: 177	D1058
60	Pattern 1 Segment 10 time Item number: 177	D1059
61	Pattern 1 Segment 11 level Item number: 177	D1060
62	Pattern 1 Segment 11 time Item number: 177	D1061
63	Pattern 1 Segment 12 level Item number: 177	D1062
64	Pattern 1 Segment 12 time Item number: 177	D1063
65	Pattern 1 Segment 13 level Item number: 177	D1064
66	Pattern 1 Segment 13 time Item number: 177	D1065
67	Pattern 1 Segment 14 level Item number: 177	D1066
68	Pattern 1 Segment 14 time Item number: 177	D1067
69	Pattern 1 Segment 15 level Item number: 177	D1068
70	Pattern 1 Segment 15 time Item number: 177	D1069
71	Pattern 1 Segment 16 level Item number: 177	D1070
72	Pattern 1 Segment 16 time Item number: 177	D1071
73	Pattern 1 Pattern end number Item number: 178	D1072

6.2.3 Communication data set to “unused” at the factory

These are communication data items that are set to “unused” when the product is shipped from the factory. The “use” or “unused” setting is configured in monitor item selection or setting item selection.

☞ For the setting procedures, refer to **6.3 Example of PLC Communication Data Map Editing (P. 6-67)**. To configure the settings, reverse the procedure used to reduce communication data.

■ Monitor group

No.	Name	Register address	Attri-bute	Data range	Factory set value
Monitor group (Monitor item selection 1)					
1	Feedback resistance (FBR) break monitor	—	RO	0.0 to 100.0 %	—
2	Pattern remaining time monitor	—	RO	0 to 59999 minutes or 0 to 59999 seconds [Time unit depends on the time unit of the setting]	—
3	Number of repeating patterns monitor	—	RO	1 to 1000 times 1000: Continuous operation	—
4	Time signal state	—	RO	0 to 15 0: OFF +1: Time signal 1 ON +2: Time signal 2 ON +4: Time signal 3 ON +8: Time signal 4 ON When multiple items are applicable, they are summed up.	—
Monitor group (Monitor item selection 2)					
6	Wait state	—	RO	0: OFF 1: ON (Wait state)	—
7	Hold state	—	RO	0: OFF 1: ON (Hold state)	—
8	Event 1 state monitor	—	RO	0: OFF 1: ON	—
9	Event 2 state monitor	—	RO	0: OFF 1: ON	—
10	Event 3 state monitor	—	RO	0: OFF 1: ON	—
11	Event 4 state monitor	—	RO	0: OFF 1: ON	—
12	Heater break alarm 1 (HBA1) state monitor	—	RO	0: OFF 1: ON	—
13	Heater break alarm 2 (HBA2) state monitor	—	RO	0: OFF 1: ON	—
14	Control loop break alarm (LBA) state monitor	—	RO	0: OFF 1: ON	—
15	Burnout state monitor	—	RO	0: OFF 1: ON	—
16	Feedback resistance (FBR) break monitor	—	RO	0: OFF 1: ON	—

No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 2)					
17	DI state monitor	—	RO	0 to 63 0: Open +1: DI1 Closed +2: DI2 Closed +4: DI3 Closed +8: DI4 Closed +16: DI5 Closed +32: DI6 Closed When multiple items are applicable, they are summed up.	—
18	OUT state monitor	—	RO	0 to 7 0: OFF +1: OUT1 ON +2: OUT2 ON +4: OUT3 ON When multiple items are applicable, they are summed up.	—
19	DO state monitor	—	RO	0 to 15 0: OFF +1: DO1 ON +2: DO2 ON +4: DO3 ON +8: DO4 ON When multiple items are applicable, they are summed up.	—
Monitor group (Monitor item selection 3)					
20	PID group	—	RO	Switching by Set value (SV): 1 to 8 Switching by Measured value (PV): 1 to 8 Which one of the above settings is set is dependent on the setting of Level PID action selection.	—
21	Peak hold monitor	—	RO	Input range low − (5 % of input span) to Input range high + (5 % of input span) [Varies with the setting of the Decimal point position.]	—
22	Bottom hold monitor	—	RO	Input range low − (5 % of input span) to Input range high + (5 % of input span) [Varies with the setting of the Decimal point position.]	—
23	AT remaining time monitor	—	RO	0 to 2880 minutes	—
24	AT/ST status monitor	—	RO	−4 to +2 0: AT/ST complete +1: AT running now +2: ST running now −1: Aborted. Setting changed. −2: Aborted. Abnormal input. −3: Aborted. Timeout. −4: Aborted. Abnormal calculated values.	—
25	Integrated operating time	—	RO	0 to 65535 hours	—

■ Setting group (Setting item selection 1 to 3)

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 1)					
26	Peak/Bottom hold reset Item number: 2	—	R/W	0: Hold 1: Reset When the Peak/Bottom reset of the PZ has changed to “0” from “1,” the data in the PLC will be also automatically updated to “0.”	0
27	Bottom suppression start signal Item number: 3	—	R/W	0 to 1 0: No forced ON +1: Bottom suppression action_Forced ON When the Bottom suppression start signal of the PZ has been switched, the data in the PLC will be also automatically updated.	0
28	Overall level autotuning (AT) Item number: 8	—	R/W	0: Overall level autotuning (AT) OFF 1: Overall level autotuning (AT) ON When the Overall level autotuning (AT) in the PZ has been changed to “0” from “1,” the corresponding data in the PLC will be also automatically updated.	0
29	Startup tuning (ST) Item number: 9	—	R/W	0: ST unused 1: Execute once * 2: Execute always * When the ST is finished, the control will automatically return to “0.” When the Startup tuning (ST) signal in the PZ has been changed to “0” from a value other than zero, the data in the PLC will be also automatically updated.	0
30	Interlock release Item number: 10	—	R/W	0: Interlock release 1: Interlock state “1: Interlock state” is for monitoring the interlocked state. Do not write “1.” When the Interlock release of the PZ has changed to “1” from “0,” the data in the PLC will be also automatically updated to “1.” When “1: Interlock state” is set for the PZ by setting request, this setting will be ignored and no setting error occurs.	0
31	Set value (SV) in Fixed set point control mode Item number: 11	—	R/W	Setting limiter low to Setting limiter high [Varies with the setting of the Decimal point position.]	0
32	Wait zone high Item number: 12	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of Input span 0 (0.0, 0.00): Wait zone high OFF	0

No.	Name	Register address	Attri-bute	Data range	Factory set value
33	Wait zone low Item number: 13	—	R/W	TC/RTD inputs: −Input span to 0 (0.0, 0.00) (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: −100.0 to 0.0 % of Input span 0 (0.0, 0.00): Wait zone low OFF	0
34	Automatic level PID setting Item number: 14	—	R/W	−1: Restore setting before change 0: Automatic setting OFF 1: Automatic setting ON When the Automatic level PID setting of the PZ has changed to "0" from "1 (or −1)," the data in the PLC will be also automatically updated to "0."	0
35	Level PID setting 1 * Item number: 15	—	R/W	Input range low to Input range high [Varies with the setting of the Decimal point position.] When the Automatic level PID setting of the PZ has changed to "0" from "1 (or −1)," the data in the PLC will be also automatically updated to "0."	Input range high
36	Level PID setting 2 * Item number: 16	—	R/W	Same as Level PID setting 1	
Setting group (Setting item selection 2)					
37	Level PID setting 3 * Item number: 17	—	R/W	Same as Level PID setting 1	
38	Level PID setting 4 * Item number: 18	—	R/W	Same as Level PID setting 1	
39	Level PID setting 5 * Item number: 19	—	R/W	Same as Level PID setting 1	
40	Level PID setting 6 * Item number: 20	—	R/W	Same as Level PID setting 1	
41	Level PID setting 7 * Item number: 21	—	R/W	Same as Level PID setting 1	
42	SV selection at program start Item number: 22	—	R/W	0: Zero start 1: PV start 2: PV start (time saving)	0
43	Hot/Cold start Item number : 23	—	R/W	0: Hot start 1 1: Hot start 2 2: Cold start 3: Reset start	0

* Level PID settings 1 to 7 of Input 1 always maintain the following relation.
(Level PID setting 1) ≤ (Level PID setting 2) ≤ (Level PID setting 3) ≤ (Level PID setting 4) ≤ (Level PID setting 5) ≤ (Level PID setting 6) ≤ (Level PID setting 7)

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 2)					
44	Control action at pattern end Item number : 24	—	R/W	PID control, Heat/Cool PID control or Position proportioning PID control (With FBR input): 0: Control continued 1: Control stop Position proportioning PID control (When there is no FBR input or the FBR input is break): 0: Control continued 1: Open-side output OFF, Close-side output OFF 2: Open-side output OFF, Close-side output ON 3: Open-side output ON, Close-side output OFF	0
45	Output action at pattern end Item number : 25	—	R/W	0 to 7 0: OFF +1: Logic calculation output: Action continues +2: Retransmission output: Action continues +4: Instrument status output: Action continues To select two or more functions, sum each value.	7
46	PV bias Item number : 26	—	R/W	–Input span to +Input span [Varies with the setting of the Decimal point position.]	0
47	PV digital filter Item number : 27	—	R/W	0.0 to 100.0 seconds 0.0: Filter OFF	0.0
48	PV ratio Item number : 28	—	R/W	0.500 to 1.500	1.000
49	PV low input cut-off Item number : 29	—	R/W	0.00 to 25.00 % of Input span	0.00
50	OUT1 proportional cycle time Item number : 30	—	R/W	0.1 to 100.0 seconds	Relay contact output: 20.0 Voltage pulse output, Transistor output: Note 1
51	OUT2 proportional cycle time Item number : 31	—	R/W	0.1 to 100.0 seconds	Relay contact output: 20.0 Voltage pulse output, Transistor output: Note 2

Note 1: In case OUT1 function selection is “Control output [cool-side]” AND Control action is “Heat/Cool PID control [air cooling] or [water cooling]”: 20.0,
Other cases: 2.0

Note2: In case OUT2 function selection is “Control output [cool-side]” AND Control action is “Heat/Cool PID control [air cooling] or [water cooling]”: 20.0,
Other cases: 2.0

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 2)					
52	OUT3 proportional cycle time Item number : 32	—	R/W	0.1 to 100.0 seconds	Voltage pulse output: Note 3
Setting group (Setting item selection 3)					
53	OUT1 minimum ON/OFF time of proportional cycle Item number : 33	—	R/W	0 to 1000 ms	0
54	OUT2 minimum ON/OFF time of proportional cycle Item number : 34	—	R/W	0 to 1000 ms	0
55	OUT3 minimum ON/OFF time of proportional cycle Item number : 35	—	R/W	0 to 1000 ms	0
56	Number of heater break alarm 1 (HBA1) delay times Item number : 37	—	R/W	0 to 255 times	5
57	Number of heater break alarm 2 (HBA2) delay times Item number : 39	—	R/W	0 to 255 times	5
58	Manual manipulated output value Item number : 40	—	R/W	PID control, Position proportioning PID control: Output limiter low [heat-side] to Output limiter high [heat-side] Heat/Cool PID control *: –(Output limiter high [cool-side]) to +(Output limiter high [heat-side])	PID control, Position proportioning PID control: –5.0 Heat/Cool PID control: 0.0

Note3: In case OUT3 function selection is “Control output [cool-side]” AND Control action is “Heat/Cool PID control [air cooling] or [water cooling]”: 20.0,
Other cases: 2.0

* In case of Heat/Cool PID control, the data range has such exceptional conditions as shown below.

(1) Output limiter high [cool-side] is ≤ 0.0 %
- Output limiter low [heat-side] is ≤ 0.0 %: 0.0 % to +(Output limiter high [heat-side])
- Output limiter low [heat-side] is > 0.0 %: Output limiter low [heat-side] to Output limiter high [heat-side]

(2) Output limiter high [heat-side] is ≤ 0.0 %
- Output limiter low [cool-side] is ≤ 0.0 %: –(Output limiter high [cool-side]) to 0.0 %
- Output limiter low [cool-side] is > 0.0 %: –(Output limiter high [cool-side]) to –(Output limiter low [cool-side])

(3) Output limiter high [cool-side] ≤ 0.0 %, AND Output limiter high [heat-side] ≤ 0.0 %: 0.0 % (Fixed)

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 3)					
59	ON/OFF action differential gap (upper) Item number : 41	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of Input span	TC/RTD inputs: 1 V/I inputs: 0.1
60	ON/OFF action differential gap (lower) Item number : 42	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) [Varies with the setting of the Decimal point position.] Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of Input span	TC/RTD inputs: 1 V/I inputs: 0.1
61	AT bias Item number : 43	—	R/W	–Input span to +Input span [Varies with the setting of the Decimal point position.]	0
62	Open/Close output neutral zone Item number : 44	—	R/W	0.1 to 10.0 % of output	2.0
63	Open/Close output differential gap Item number : 45	—	R/W	0.1 to 5.0 % of output	1.0
64	FF amount learning Item number : 46	—	R/W	0 to 1 0: No learning +1: Learn Input When the FF amount learning of the PZ has been switched, the data in the PLC will be also automatically updated.	0
65	Determination point of external disturbance Item number : 47	—	R/W	–Input span to +Input span [Varies with the setting of the Decimal point position.]	–1
66	Display update cycle Item number : 48	—	R/W	1: 50 ms 2: 100 ms 3: 150 ms 4: 200 ms 5: 250 ms 6: 300 ms 7: 350 ms 8: 400 ms 9: 450 ms 10: 500 ms Changing the Display update cycle will not affect the updating cycle of the communication.	1

■ Setting group (Setting item selection 4 to 11)

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 4)					
67	PID group 1 Proactive intensity Item number: 53	—	R/W	0 to 4 0: No function	2
68	PID group 1 Manual reset Item number: 54	—	R/W	–100.0 to +100.0 %	0.0
69	PID group 1 FF amount Item number: 55	—	R/W	–100.0 to +100.0 % When the state of PZ's FF amount learning has changed, PLC's FF mount data will be automatically updated.	0.0
70	PID group 1 Output limiter high [heat-side] Item number: 56	—	R/W	Output limiter low [heat-side] to 105.0 %	105.0
71	PID group 1 Output limiter low [heat-side] Item number: 56	—	R/W	–5.0 % to Output limiter high [heat-side]	–5.0
72	PID group 1 Control loop break alarm (LBA) time Item number: 57	—	R/W	0 to 7200 seconds 0: No function PLC's control loop break alarm (LBA) time will be automatically updated in the following case. • When PZ's Autotuning (AT) has changed from 1 to 0. • When PZ's Startup tuning (ST) has finished normally.	With LBA: 480 Without LBA: 0
73	PID group 1 LBAdeadband (LBD) Item number: 58	—	R/W	0 to Input span Varies with the setting of the Decimal point position selection.	0
74	PID group 1 Overlap/Deadband Item number: 62	—	R/W	TC/RTD inputs: –Input span to +Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: –100.0 to +100.0 % of Input span Minus (–) setting results in Overlap. However, the overlapping range is within the proportional range.	TC/RTD inputs: 0 V/I inputs: 0.0
75	PID group 1 Output limiter high [cool-side] Item number: 63	—	R/W	Output limiter low [cool-side] to 105.0 %	105.0

No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 4)					
76	PID group 1 Output limiter low [cool-side] Item number: 63	—	R/W	–5.0 % to Output limiter high [cool-side]	–5.0
77	System reserved Item number : 64	—	—	Do not use.	—
Setting group (Setting item selection 5)					
78	PID group 2 Proportional band [heat-side] Item number: 65	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position. Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input span 0 (0.0, 0.00): ON/OFF action PLC's proportional band (heat-side) will be automatically updated in the following case. • When PZ's Autotuning (AT) has changed from 1 to 0. • When PZ's Startup tuning (ST) has finished normally.	TC/RTD inputs: 30.0 V/I inputs: 3.0
79	PID group 2 Integral time [heat-side] Item number: 66	—	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds, 0.0 to 3600.0 seconds, or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action Position proportioning PID control: 1 to 3600 seconds, 0.1 to 3600.0 seconds or 0.01 to 360.00 seconds. Varies with the setting of the Integral/Derivative time decimal point position selection. PLC's integral time (heat-side) will be automatically updated in the following case. • When PZ's Autotuning (AT) has changed from 1 to 0. • When PZ's Startup tuning (ST) has finished normally.	240

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 5)					
80	PID group 2 Derivative time[heat-side] Item number: 67	—	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds, or 0.00 to 360.00 seconds. 0 (0.0, 0.00): PI action Varies with the setting of the Integral/Derivative time decimal point position selection. PLC's derivative time (heat-side) will be automatically updated in the following case. • When PZ's Autotuning (AT) has changed from 1 to 0. • When PZ's Startup tuning (ST) has finished normally.	60
81	PID group 2 Control response parameter Item number: 68	—	R/W	0: Slow 1: Medium 2: Fast [When the P or PD action is selected, this setting becomes invalid]	2
82	PID group 2 Proactive intensity Item number: 69	—	R/W	0 to 4 0: No function	2
83	PID group 2 Manual reset Item number: 70	—	R/W	–100.0 to +100.0 %	0.0
84	PID group 2 FF amount Item number: 71	—	R/W	–100.0 to +100.0 % When PZ's FF amount has changed, PLC's data will be automatically updated.	0.0
85	PID group 2 Output limiter high [heat-side] Item number: 72	—	R/W	Output limiter low [heat-side] to 105.0 %	105.0
86	PID group 2 Output limiter low [heat-side] Item number: 72	—	R/W	–5.0 % to Output limiter high [heat-side]	–5.0
87	PID group 2 Control loop break alarm (LBA) time Item number: 73	—	R/W	0 to 7200 seconds 0: No function When PZ's Autotuning (AT) has changed from 1 to 0, PLC's control loop break alarm (LBA) time will be automatically updated. When PZ's Startup tuning (ST) has finished normally, PLC's control loop break alarm (LBA) time will be automatically updated.	With LBA: 480 Without LBA: 0

No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 5)					
88	PID group 2 LBA deadband (LBD) Item number: 74	—	R/W	0 to Input span Varies with the setting of the Decimal point position.	0
89	PID group 2 Proportional band [cool-side] Item number: 75	—	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of Input span When PZ's Autotuning (AT) has changed 1 to 0, PLC's proportional band [cool-side] will be automatically updated.	TC/RTD inputs: 30 V/I inputs: 3.0
90	PID group 2 Integral time [cool-side] Item number: 76	—	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds, or 0.00 to 360.00 seconds 0 (0.0, 0.00): PD action Varies with the setting of the Integral/Derivative time decimal point position selection. When PZ's Autotuning (AT) has changed 1 to 0, PLC's integral time [cool-side] will be automatically updated.	240
91	PID group 2 Derivative time [cool-side] Item number: 77	—	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds, or 0.00 to 360.00 seconds 0 (0.0, 0.00): PI action Varies with the setting of the Integral/Derivative time decimal point position selection. When PZ's Autotuning (AT) has changed 1 to 0, PLC's derivative time [cool-side] will be automatically updated.	60
92	PID group 2 Overlap/Deadband Item number: 78	—	R/W	TC/RTD inputs: −Input span to +Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: −100.0 to +100.0 % of Input span Minus (−) setting results in Overlap. However, the overlapping range is within the proportional range.	TC/RTD inputs: 0 V/I inputs: 0.0
93	PID group 2 Output limiter high [cool-side] Item number: 79	—	R/W	Output limiter low [cool-side] to 105.0 %	105.0

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 5)					
94	PID group 2 Output limiter low [cool-side] Item number: 79	—	R/W	–5.0 % to Output limiter high [cool-side]	–5.0
95	System reserved Item number: 80	—	—	Do not use.	—
Setting group (Setting item selection 6)					
96 ⋮ 113	PID group 3 Contents of setting items are same as PID group 2 (setting item selection 5). (P. 6-45 to 6-48) Item number: 81 to 96 (Refer to P. 6-49 for item number of each setting item)				
Setting group (Setting item selection 7)					
114 ⋮ 131	PID group 4 Contents of setting items are same as PID group 2 (setting item selection 5). (P. 6-45 to 6-48) Item number: 97 to 112 (Refer to P. 6-49 for item number of each setting item)				
Setting group (Setting item selection 8)					
132 ⋮ 149	PID group 5 Contents of setting items are same as PID group 2 (setting item selection 5). (P. 6-45 to 6-48) Item number: 113 to 128 (Refer to P. 6-49 for item number of each setting item)				
Setting group (Setting item selection 9)					
150 ⋮ 167	PID group 6 Contents of setting items are same as PID group 2 (setting item selection 5). (P. 6-45 to 6-48) Item number: 129 to 144 (Refer to P. 6-49 for item number of each setting item)				
Setting group (Setting item selection 10)					
168 ⋮ 185	PID group 7 Contents of setting items are same as PID group 2 (setting item selection 5). (P. 6-45 to 6-48) Item number: 145 to 160 (Refer to P. 6-49 for item number of each setting item)				
Setting group (Setting item selection 11)					
186 ⋮ 203	PID group 8 Contents of setting items are same as PID group 2 (setting item selection 5). (P. 6-45 to 6-48) Item number: 161 to 176 (Refer to P. 6-49 for item number of each setting item)				

●Setting item selection 4 to 11's item number

Setting item selection 4 to 11's setting items are same except for PID group number. The following chart shows each setting item and item number for each PIG group number.
For details, please refer to PID group2 (setting item selection 5) [P. 6-45 to 6-48].

Item number list

Setting item selection number (PID group number) / Setting item	4 (1)	5 (2)	6 (3)	7 (4)	8 (5)	9 (6)	10 (7)	11 (8)
Proportional band [heat-side]	49	65	81	97	113	129	145	161
Integral time [heat-side]	50	66	82	98	114	130	146	162
Derivative time [heat-side]	51	67	83	99	115	131	147	163
Control response parameter	52	68	84	100	116	132	148	164
Proactive intensity	53	69	85	101	117	133	149	165
Manual reset	54	70	86	102	118	134	150	166
FF amount	55	71	87	103	119	135	151	167
Output limiter high [heat-side] / Output limiter low [heat-side]	56	72	88	104	120	136	152	168
Control loop break alarm (LBA) time	57	73	89	105	121	137	153	169
LBA deadband (LBD)	58	74	90	106	122	138	154	170
Proportional band [cool-side]	59	75	91	107	123	139	155	171
Integral time [cool-side]	60	76	92	108	124	140	156	172
Derivative time [cool-side]	61	77	93	109	125	141	157	173
Overlap/Deadband	62	78	94	110	126	142	158	174
Output limiter high [cool-side] / Output limiter low [cool-side]	63	79	95	111	127	143	159	175
System reserved	64	80	96	112	128	144	160	176

■ Setting group (Setting item selection 12 to 27)

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
204	Pattern 1 Number of repeating patterns (Repeat) Item number: 179	—	R/W	1 to 1000 times 1000: No limit setting	1
205	Pattern 1 Pattern link number Item number: 180	—	R/W	0 to 16 0: No link	0
206	Pattern 1 Event 1 set value (EV1) Event 1 set value (EV1) [high] Item number: 181	—	R/W	Deviation: −Input span to +Input span Varies with the setting of the Decimal point position. Input value or Set value: Input range low to Input range high Varies with the setting of the Decimal point position. Manipulated output value: −5.0 to +105.0 %	TC/RTD inputs: 10 V/I inputs: 5 % of Input span Manipulated output value: 50.0
207	Pattern 1 Event 1 set value (EV1') [low] Item number: 181	—	R/W	Deviation: −Input span to +Input span Varies with the setting of the Decimal point position. Input value: Input range low to Input range high Varies with the setting of the Decimal point position.	TC/RTD inputs: −10 V/I inputs: 5 % of −Input span
208	Pattern 1 Event 2 set value (EV2) Event 2 set value (EV2) [high] Item number: 182	—	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
209	Pattern 1 Event 2 set value (EV2') [low] Item number: 182	—	R/W	Same as Event 1 set value (EV1') [low]	
210	Pattern 1 Event 3 set value (EV3) Event 3 set value (EV3) [high] Item number: 183	—	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
211	Pattern 1 Event 3 set value (EV3') [low] Item number: 183	—	R/W	Same as Event 1 set value (EV1') [low]	
212	Pattern 1 Event 4 set value (EV4) Event 4 set value (EV4) [high] Item number: 184	—	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
213	Pattern 1 Event 4 set value (EV4') [low] Item number: 184	—	R/W	Same as Event 1 set value (EV1') [low]	
214	Pattern 1 Time signal 1 start segment number Item number: 185	—	R/W	1 to 16	1
215	Pattern 1 Time signal 1 start time Item number: 185	—	R/W	0 to 11999 minutes or 0 to 11999 seconds Time unit depends on the time unit of the setting.	0
216	Pattern 1 Time signal 1 end segment number Item number: 185	—	R/W	1 to 16	1
217	Pattern 1 Time signal 1 end time Item number: 185	—	R/W	0 to 11999 minutes or 0 to 11999 seconds Time unit depends on the time unit of the setting.	0
218	Pattern 1 Time signal 2 start segment number Item number: 186	—	R/W	Same as Time signal 1 start segment number	
219	Pattern 1 Time signal 2 start time Item number: 186	—	R/W	Same as Time signal 1 start time	
220	Pattern 1 Time signal 2 end segment number Item number: 186	—	R/W	Same as Time signal 1 end segment number	
221	Pattern 1 Time signal 2 end time Item number: 186	—	R/W	Same as Time signal 1 end time	
222	Pattern 1 Time signal 3 start segment number Item number: 187	—	R/W	Same as Time signal 1 start segment number	
223	Pattern 1 Time signal 3 start time Item number: 187	—	R/W	Same as Time signal 1 start time	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
224	Pattern 1 Time signal 3 end segment time Item number: 187	—	R/W	Same as Time signal 1 end segment number	
225	Pattern 1 Time signal 3 end time Item number: 187	—	R/W	Same as Time signal 1 end time	
226	Pattern 1 Time signal 4 start segment number Item number: 188	—	R/W	Same as Time signal 1 start segment number	
227	Pattern 1 Time signal 4 start time Item number: 188	—	R/W	Same as Time signal 1 start time	
228	Pattern 1 Time signal 4 end segment number Item number: 188	—	R/W	Same as Time signal 1 end segment number	
229	Pattern 1 Time signal 4 end time Item number: 188	—	R/W	Same as Time signal 1 end time	
230	Pattern 1 Pattern end output time Item number: 189	—	R/W	0 to 11999 minutes or 0 to 11999 seconds 0: Output remains on Time unit depends on the time unit of the setting.	0
231	Pattern 1 Event selection of the Segment 1 Item number: 190	—	R/W	0 to 15 0: OFF +1: Event 1 +2: Event 2 +4: Event 3 +8: Event 4 To select two or more functions, sum each value.	15
232	Pattern 1 Event selection of the Segment 2 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
233	Pattern 1 Event selection of the Segment 3 Item number: 190	—	R/W	Same as Event selection of the Segment 1	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
234	Pattern 1 Event selection of the Segment 4 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
235	Pattern 1 Event selection of the Segment 5 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
236	Pattern 1 Event selection of the Segment 6 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
237	Pattern 1 Event selection of the Segment 7 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
238	Pattern 1 Event selection of the Segment 8 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
239	Pattern 1 Event selection of the Segment 9 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
240	Pattern 1 Event selection of the Segment 10 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
241	Pattern 1 Event selection of the Segment 11 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
242	Pattern 1 Event selection of the Segment 12 Item number: 190	—	R/W	Same as Event selection of the Segment1	
243	Pattern 1 Event selection of the Segment 13 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
244	Pattern 1 Event selection of the Segment 14 Item number: 190	—	R/W	Same as Event selection of the Segment 1	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 12)					
245	Pattern 1 Event selection of the Segment 15 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
246	Pattern 1 Event selection of the Segment 16 Item number: 190	—	R/W	Same as Event selection of the Segment 1	
247	System reserved Item number: 191	—	—	Do not use.	—
248	System reserved Item number: 192	—	—	Do not use.	—
Setting group (Setting item selection 13)					
249	Pattern 2 Segment 1 level Item number: 193	—	R/W	Setting limiter low to Setting limiter high Varies with the setting of the Decimal point position.	0
250	Pattern 2 Segment 1 time Item number: 193	—	R/W	0 to 11999 minutes or 0 to 11999 seconds Time unit depends on the time unit of the setting.	0
251	Pattern 2 Segment 2 level Item number: 193	—	R/W	Same as Segment 1 level	
252	Pattern 2 Segment 2 time Item number: 193	—	R/W	0 to 11999 minutes or 0 to 11999 seconds 12000: No limit setting (Settable only in Soak segments*) *When the soak segment was switched and it is no longer a soak segment, the Segment time is automatically set to 11999 minutes or 11999 seconds. Time unit depends on the time unit of the setting.	0
253	Pattern 2 Segment 3 level Item number: 193	—	R/W	Same as Segment 1 level	
254	Pattern 2 Segment 3 time Item number: 193	—	R/W	Same as Segment 2 time	
255	Pattern 2 Segment 4 level Item number: 193	—	R/W	Same as Segment 1 level	
256	Pattern 2 Segment 4 time Item number: 193	—	R/W	Same as Segment 2 time	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
257	Pattern 2 Segment 5 level Item number: 193	—	R/W	Same as Segment 1 level	
258	Pattern 2 Segment 5 time Item number: 193	—	R/W	Same as Segment 2 time	
259	Pattern 2 Segment 6 level Item number: 193	—	R/W	Same as Segment 1 level	
260	Pattern 2 Segment 6 time Item number: 193	—	R/W	Same as Segment 2 time	
261	Pattern 2 Segment 7 level Item number: 193	—	R/W	Same as Segment 1 level	
262	Pattern 2 Segment 7 time Item number: 193	—	R/W	Same as Segment 2 time	
263	Pattern 2 Segment 8 level Item number: 193	—	R/W	Same as Segment 1 level	
264	Pattern 2 Segment 8 time Item number: 193	—	R/W	Same as Segment 2 time	
265	Pattern 2 Segment 9 level Item number: 193	—	R/W	Same as Segment 1 level	
266	Pattern 2 Segment 9 time Item number: 193	—	R/W	Same as Segment 2 time	
267	Pattern 2 Segment 10 level Item number: 193	—	R/W	Same as Segment 1 level	
268	Pattern 2 Segment 10 time Item number: 193	—	R/W	Same as Segment 2 time	
269	Pattern 2 Segment 11 level Item number: 193	—	R/W	Same as Segment 1 level	
270	Pattern 2 Segment 11 time Item number: 193	—	R/W	Same as Segment 2 time	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
271	Pattern 2 Segment 12 level Item number: 193	—	R/W	Same as Segment 1 level	
272	Pattern 2 Segment 12 time Item number: 193	—	R/W	Same as Segment 2 time	
273	Pattern 2 Segment 13 level Item number: 193	—	R/W	Same as Segment 1 level	
274	Pattern 2 Segment 13 time Item number: 193	—	R/W	Same as Segment 2 time	
275	Pattern 2 Segment 14 level Item number: 193	—	R/W	Same as Segment 1 level	
276	Pattern 2 Segment 14 time Item number: 193	—	R/W	Same as Segment 2 time	
277	Pattern 2 Segment 15 level Item number: 193	—	R/W	Same as Segment 1 level	
278	Pattern 2 Segment 15 time Item number: 193	—	R/W	Same as Segment 2 time	
279	Pattern 2 Segment 16 level Item number: 193	—	R/W	Same as Segment 1 level	
280	Pattern 2 Segment 16 time Item number: 193	—	R/W	Same as Segment 2 time	
281	Pattern 2 Pattern end number Item number: 194	—	R/W	1 to 16	16
282	Pattern 2 Number of repeating patterns (Repeat) Item number: 195	—	R/W	1 to 1000 times 1000: No limit setting	1
283	Pattern 2 Pattern link number Item number: 196	—	R/W	0 to 16 0: No link	0

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
284	Pattern 2 Event 1 set value (EV1) Event 1 set value (EV1) [high] Item number: 197	—	R/W	Deviation: −Input span to +Input span Varies with the setting of the Decimal point position. Input value or Set value: Input range low to Input range high Varies with the setting of the Decimal point position. Manipulated output value: −5.0 to +105.0 %	TC/RTD inputs: 10 V/I inputs: 5 % of Input span Manipulated output value: 50.0
285	Pattern 2 Event 1 set value (EV1') [low] Item number: 197	—	R/W	Deviation: −Input span to +Input span Varies with the setting of the Decimal point position. Input value: Input range low to Input range high Varies with the setting of the Decimal point position.	TC/RTD inputs: −10 V/I inputs: 5 % of −Input span
286	Pattern 2 Event 2 set value (EV2) Event 2 set value (EV2) [high] Item number: 198	—	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
287	Pattern 2 Event 2 set value (EV2') [low] Item number: 198	—	R/W	Same as Event 1 set value (EV1') [low]	
288	Pattern 2 Event 3 set value (EV3) Event 3 set value (EV3) [high] Item number: 199	—	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
289	Pattern 2 Event 3 set value (EV3') [low] Item number: 199	—	R/W	Same as Event 1 set value (EV1') [low]	
290	Pattern 2 Event 4 set value (EV4) Event 4 set value (EV4) [high] Item number: 200	—	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
291	Pattern 2 Event 4 set value (EV4') [low] Item number: 200	—	R/W	Same as Event 1 set value (EV1') [low]	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
292	Pattern 2 Time signal 1 start segment number Item number: 201	—	R/W	1 to 16	1
293	Pattern 2 Time signal 1 start time Item number: 201	—	R/W	0 to 11999 minutes or 0 to 11999 seconds Time unit depends on the time unit of the setting.	0
294	Pattern 2 Time signal 1 end segment number Item number: 201	—	R/W	1 to 16	1
295	Pattern 2 Time signal 1 end time Item number: 201	—	R/W	0 to 11999 minutes or 0 to 11999 seconds Time unit depends on the time unit of the setting.	0
296	Pattern 2 Time signal 2 start segment number Item number: 202	—	R/W	Same as Time signal 1 start segment number	
297	Pattern 2 Time signal 2 start time Item number: 202	—	R/W	Same as Time signal 1 start time	
298	Pattern 2 Time signal 2 end segment number Item number: 202	—	R/W	Same as Time signal 1 end segment number	
299	Pattern 2 Time signal 2 end time Item number: 202	—	R/W	Same as Time signal 1 end time	
300	Pattern 2 Time signal 3 start segment number Item number: 203	—	R/W	Same as Time signal 1 start segment number	
301	Pattern 2 Time signal 3 start time Item number: 203	—	R/W	Same as Time signal 1 start time	
302	Pattern 2 Time signal 3 end segment number Item number: 203	—	R/W	Same as Time signal 1 end segment number	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
303	Pattern 2 Time signal 3 end time Item number: 203	—	R/W	Same as Time signal 1 end time	
304	Pattern 2 Time signal 4 start segment number Item number: 204	—	R/W	Same as Time signal 1 start segment number	
305	Pattern 2 Time signal 4 start time Item number: 204	—	R/W	Same as Time signal 1 start time	
306	Pattern 2 Time signal 4 end segment number Item number: 204	—	R/W	Same as Time signal 1 end segment number	
307	Pattern 2 Time signal 4 end time Item number: 204	—	R/W	Same as Time signal 1 end time	
308	Pattern 2 Pattern end output time Item number: 205	—	R/W	0 to 11999 minutes or 0 to 11999 seconds 0: Output remains on Time unit depends on the time unit of the setting.	0
309	Pattern 2 Event selection of the Segment 1 Item number: 206	—	R/W	0 to 15 0: OFF +1: Event 1 +2: Event 2 +4: Event 3 +8: Event 4 To select two or more functions, sum each value.	15
310	Pattern 2 Event selection of the Segment 2 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
311	Pattern 2 Event selection of the Segment 3 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
312	Pattern 2 Event selection of the Segment 4 Item number: 206	—	R/W	Same as Event selection of the Segment 1	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
313	Pattern 2 Event selection of the Segment 5 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
314	Pattern 2 Event selection of the Segment 6 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
315	Pattern 2 Event selection of the Segment 7 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
316	Pattern 2 Event selection of the Segment 8 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
317	Pattern 2 Event selection of the Segment 9 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
318	Pattern 2 Event selection of the Segment 10 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
319	Pattern 2 Event selection of the Segment 11 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
320	Pattern 2 Event selection of the Segment 12 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
321	Pattern 2 Event selection of the Segment 13 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
322	Pattern 2 Event selection of the Segment 14 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
323	Pattern 2 Event selection of the Segment 15 Item number: 206	—	R/W	Same as Event selection of the Segment 1	

No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 13)					
324	Pattern 2 Event selection of the Segment 16 Item number: 206	—	R/W	Same as Event selection of the Segment 1	
325	System reserved Item number: 207	—	—	Do not use.	—
326	System reserved Item number: 208	—	—	Do not use.	—
Setting group (Setting item selection 14)					
327 ⋮ 404	Pattern 3 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 209 to 224 (Refer to P. 6-63 for item number of each setting item)				
Setting group (Setting item selection 15)					
405 ⋮ 482	Pattern 4 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 225 to 240 (Refer to P. 6-63 for item number of each setting item)				
Setting group (Setting item selection 16)					
483 ⋮ 560	Pattern 5 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 241 to 256 (Refer to P. 6-63 for item number of each setting item)				
Setting group (Setting item selection 17)					
561 ⋮ 638	Pattern 6 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 257 to 272 (Refer to P. 6-63 for item number of each setting item)				
Setting group (Setting item selection 18)					
639 ⋮ 716	Pattern 7 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 273 to 288 (Refer to P. 6-63 for item number of each setting item)				
Setting group (Setting item selection 19)					
717 ⋮ 794	Pattern 8 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 289 to 304 (Refer to P. 6-63 for item number of each setting item)				
Setting group (Setting item selection 20)					
795 ⋮ 872	Pattern 9 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 305 to 320 (Refer to P. 6-65 for item number of each setting item)				
Setting group (Setting item selection 21)					
873 ⋮ 950	Pattern 10 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 321 to 336 (Refer to P. 6-65 for item number of each setting item)				

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No.	Name	Register address	Attri-bute	Data range	Factory set value
Setting group (Setting item selection 22)					
951 ⋮ 1028	Pattern 11 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 337 to 352 (Refer to P. 6-65 for item number of each setting item)				
Setting group (Setting item selection 23)					
1029 ⋮ 1106	Pattern 12 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 353 to 368 (Refer to P. 6-65 for item number of each setting item)				
Setting group (Setting item selection 24)					
1107 ⋮ 1184	Pattern 13 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 369 to 384 (Refer to P. 6-65 for item number of each setting item)				
Setting group (Setting item selection 25)					
1185 ⋮ 1262	Pattern 14 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 385 to 400 (Refer to P. 6-65 for item number of each setting item)				
Setting group (Setting item selection 26)					
1263 ⋮ 1340	Pattern 15 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 401 to 416 (Refer to P. 6-65 for item number of each setting item)				
Setting group (Setting item selection 27)					
1341 ⋮ 1418	Pattern 16 Contents of setting items are same as Pattern 2 (setting item selection 13). (P. 6-54 to 6-61) Item number: 417 to 432 (Refer to P. 6-65 for item number of each setting item)				

● Setting item selection 12 to 27's item number

Setting item selection 12 to 27's setting items are same except for Pattern number. The following chart shows each setting item and item number for each Pattern number.
For details, please refer to Patten 2 (setting item selection 13) [P. 6-54 to 6-61].

Setting item selection 12 to 19's item number list

Setting item selection number (Pattern number) / Setting item	12 (1)	13 (2)	14 (3)	15 (4)	16 (5)	17 (6)	18 (7)	19 (8)
Segment 1 level Segment 1 time Segment 2 level Segment 2 time Segment 3 level Segment 3 time Segment 4 level Segment 4 time Segment 5 level Segment 5 time Segment 6 level Segment 6 time Segment 7 level Segment 7 time Segment 8 level Segment 8 time Segment 9 level Segment 9 time Segment 10 level Segment 10 time Segment 11 level Segment 11 time Segment 12 level Segment 12 time Segment 13 level Segment 13 time Segment 14 level Segment 14 time Segment 15 level Segment 15 time Segment 16 level Segment 16 time	177	193	209	225	241	257	273	289
Pattern end number	178	194	210	226	242	258	274	290
Number of repeating patterns (Repeat)	179	195	211	227	243	259	275	291
Pattern link number	180	196	212	228	244	260	276	292
Event 1 set value (EV1) Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	181	197	213	229	245	261	277	293
Event 2 set value (EV2) Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	182	198	214	230	246	262	278	294
Event 3 set value (EV3) Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	183	199	215	231	247	263	279	295
Event 4 set value (EV4) Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	184	200	216	232	248	264	280	296
Time signal 1 start segment number Time signal 1 start time Time signal 1 end segment number Time signal 1 end time	185	201	217	233	249	265	281	297

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Setting item selection number (Pattern number) / Setting item	12 (1)	13 (2)	14 (3)	15 (4)	16 (5)	17 (6)	18 (7)	19 (8)
Time signal 2 start segment number	186	202	218	234	250	266	282	298
Time signal 2 start time								
Time signal 2 end segment number								
Time signal 2 end time								
Time signal 3 start segment number	187	203	219	235	251	267	283	299
Time signal 3 start time								
Time signal 3 end segment number								
Time signal 3 end time								
Time signal 4 start segment number	188	204	220	236	252	268	284	300
Time signal 4 start time								
Time signal 4 end segment number								
Time signal 4 end time								
Pattern end output time	189	205	221	237	253	269	285	301
Event selection of Segment 1	190	206	222	238	254	270	286	302
Event selection of Segment 2								
Event selection of Segment 3								
Event selection of Segment 4								
Event selection of Segment 5								
Event selection of Segment 6								
Event selection of Segment 7								
Event selection of Segment 8								
Event selection of Segment 9								
Event selection of Segment 10								
Event selection of Segment 11								
Event selection of Segment 12								
Event selection of Segment 13								
Event selection of Segment 14								
Event selection of Segment 15								
Event selection of Segment 16								
System reserved	191	207	223	239	255	271	287	303
System reserved	192	208	224	240	256	272	288	304

Setting item selection 20 to 27's item number list

Setting item selection number (Pattern number) / Setting item	20 (9)	21 (10)	22 (11)	23 (12)	24 (13)	25 (14)	26 (15)	27 (16)
Segment 1 level Segment 1 time Segment 2level Segment 2 time Segment 3 level Segment 3 time Segment 4 level Segment 4 time Segment 5 level Segment 5 time Segment 6 level Segment 6 time Segment 7 level Segment 7 time Segment 8 level Segment 8 time Segment 9 level Segment 9 time Segment 10 level Segment 10 time Segment 11 level Segment 11 time Segment 12 level Segment 12 time Segment 13 level Segment 13 time Segment 14 level Segment 14 time Segment 15 level Segment 15 time Segment 16 level Segment 16 time	305	321	337	353	369	385	401	417
Pattern end number	306	322	338	354	370	386	402	418
Number of repeating patterns (Repeat)	307	323	339	355	371	387	403	419
Pattern link number	308	324	340	356	372	388	404	420
Event 1 set value (EV1) Event 1 set value (EV1) [high] Event 1 set value (EV1') [low]	309	325	341	357	373	389	405	421
Event 2 set value (EV2) Event 2 set value (EV2) [high] Event 2 set value (EV2') [low]	310	326	342	358	374	390	406	422
Event 3 set value (EV3) Event 3 set value (EV3) [high] Event 3 set value (EV3') [low]	311	327	343	359	375	391	407	423
Event 4 set value (EV4) Event 4 set value (EV4) [high] Event 4 set value (EV4') [low]	312	328	344	360	376	392	408	424
Time signal 1 start segment number Time signal 1 start time Time signal 1 end segment number Time signal 1 end time	313	329	345	361	377	393	409	425
Time signal 2 start segment number Time signal 2 start time Time signal 2 end segment number Time signal 2 end time	314	330	346	362	378	394	410	426

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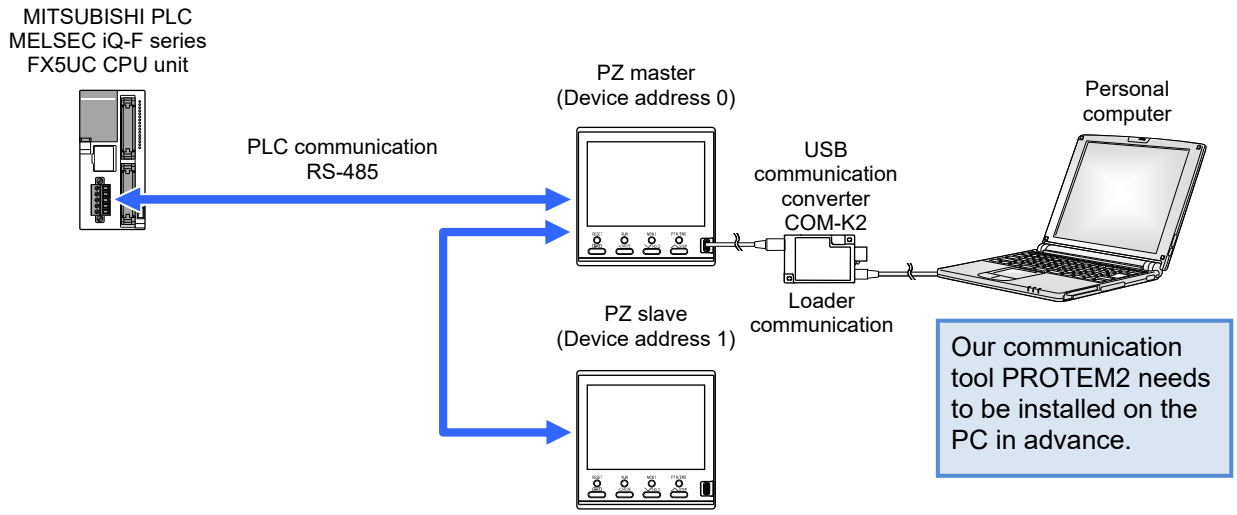
Setting item selection number (Pattern number) / Setting item	20 (9)	21 (10)	22 (11)	23 (12)	24 (13)	25 (14)	26 (15)	27 (16)
Time signal 3 start segment number	315	331	347	363	379	395	411	427
Time signal 3 start time								
Time signal 3 end segment number								
Time signal 3 end time								
Time signal 4 start segment number	316	332	348	364	380	396	412	428
Time signal 4 start time								
Time signal 4 end segment number								
Time signal 4 end time								
Pattern end output time	317	333	349	365	381	397	413	429
Event selection of Segment 1	318	334	350	366	382	398	414	430
Event selection of Segment 2								
Event selection of Segment 3								
Event selection of Segment 4								
Event selection of Segment 5								
Event selection of Segment 6								
Event selection of Segment 7								
Event selection of Segment 8								
Event selection of Segment 9								
Event selection of Segment 10								
Event selection of Segment 11								
Event selection of Segment 12								
Event selection of Segment 13								
Event selection of Segment 14								
Event selection of Segment 15								
Event selection of Segment 16								
System reserved	319	335	351	367	383	399	415	431
System reserved	320	336	352	368	384	400	416	432

6.3 Example of PLC Communication Data Map Editing

Example: Add/delete the communication data of the PZ master, and change the register start number of the PZ slave. (In case of a double word)

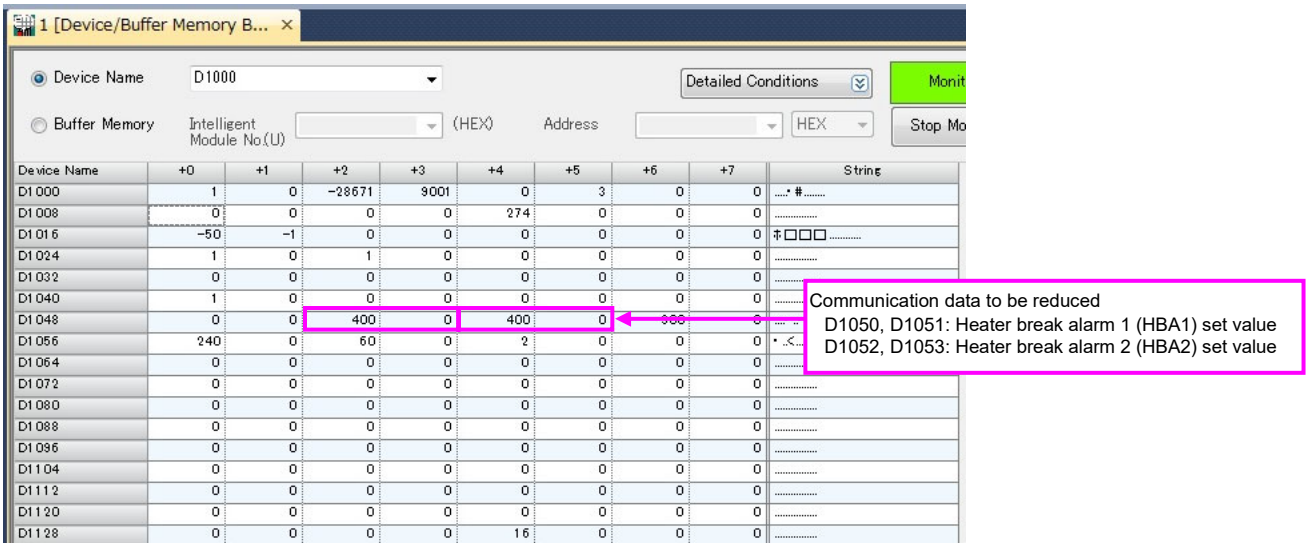


■ Communication data to be added/deleted

Add/delete the following items of the PZ master communication data.

Group	Item	Name	Register address assigned as a factory set value		Add/delete
Setting group	Setting item selection 1	Startup tuning (ST)	No allocation at the time of shipment		Add
Setting group	Setting item selection 1	Interlock release	No allocation at the time of shipment		Add
Setting group	Setting item selection 3	Heater break alarm 1 (HBA1) set value	D1050	D1051	Delete
Setting group	Setting item selection 3	Heater break alarm 2 (HBA2) set value	D1052	D1053	Delete

Display example of GX Works3



When communication data is added, the position of the added data will be according to the tables of Monitor item selection and Setting item selection on P. 5-8 to 5-23.

[Example]
At the time of shipment, register addresses of setting item selection 4 are assigned as in the following table. When "Output limiter high and low [heat-side]" on item number 56 is added, change the binary number of item 56 to "1." When item number 56 becomes valid, register address(es) are assigned. Register address(es) will be shifted by the number of the added address(es). In case of a double word, four register addresses are used since the number of data for "Output limiter high and low [heat-side]" is two.

Setting item selection 4

Bit	Item number	Communication data (Setting items)		Factory set value		Number of data	Register address (Double word)	
				Binary	Decimal			
0	49	PID group 1	Proportional band [heat-side]	1	7183	1	D1054	D1055
1	50	PID group 1	Integral time [heat-side]	1		1	D1056	D1057
2	51	PID group 1	Derivative time [heat-side]	1		1	D1058	D1059
3	52	PID group 1	Control response parameter	1		1	D1060	D1061
4	53	PID group 1	Proactive intensity	0		1	—	—
5	54	PID group 1	Manual reset	0		1	—	—
Add 6	55	PID group 1	FF amount	0		1	—	—
7	56	PID group 1	Output limiter high [heat-side], Output limiter low [heat-side]	0		2	—	—
8	57	PID group 1	Control loop break alarm (LBA) time	0		1	—	—
9	58	PID group 1	LBA deadband (LBD)	0		1	—	—
10	59	PID group 1	Proportional band [cool-side]	1		1	D1062	D1063
11	60	PID group 1	Integral time [cool-side]	1		1	D1064	D1065
12	61	PID group 1	Derivative time [cool-side]	1		1	D1066	D1067
13	62	PID group 1	Overlap/Deadband	0		1	—	—
14	63	PID group 1	Output limiter high [cool-side], Output limiter low [cool-side]	0		2	—	—
15	64	PID group 1	Unused	0		1	—	—

Setting item selection 4

Bit	Item number	Communication data (Setting items)		Factory set value		Number of data	Register address (Double word)	
				Binary	Decimal			
0	49	PID group 1	Proportional band [heat-side]	1	7311	1	D1054	D1055
1	50	PID group 1	Integral time [heat-side]	1		1	D1056	D1057
2	51	PID group 1	Derivative time [heat-side]	1		1	D1058	D1059
3	52	PID group 1	Control response parameter	1		1	D1060	D1061
4	53	PID group 1	Proactive intensity	0		1	—	—
5	54	PID group 1	Manual reset	0		1	—	—
6	55	PID group 1	FF amount	0		1	—	—
7	56	PID group 1	Output limiter high [heat-side], Output limiter low [heat-side]	1		2	D1062 D1064	D1063 D1065
8	57	PID group 1	Control loop break alarm (LBA) time	0		1	—	—
9	58	PID group 1	LBA deadband (LBD)	0		1	—	—
10	59	PID group 1	Proportional band [cool-side]	1		1	D1066	D1067
11	60	PID group 1	Integral time [cool-side]	1		1	D1068	D1069
12	61	PID group 1	Derivative time [cool-side]	1		1	D1070	D1071
13	62	PID group 1	Overlap/Deadband	0		1	—	—
14	63	PID group 1	Output limiter high [cool-side], Output limiter low [cool-side]	0		2	—	—
15	64	PID group 1	Unused	0		1	—	—

Add two data *

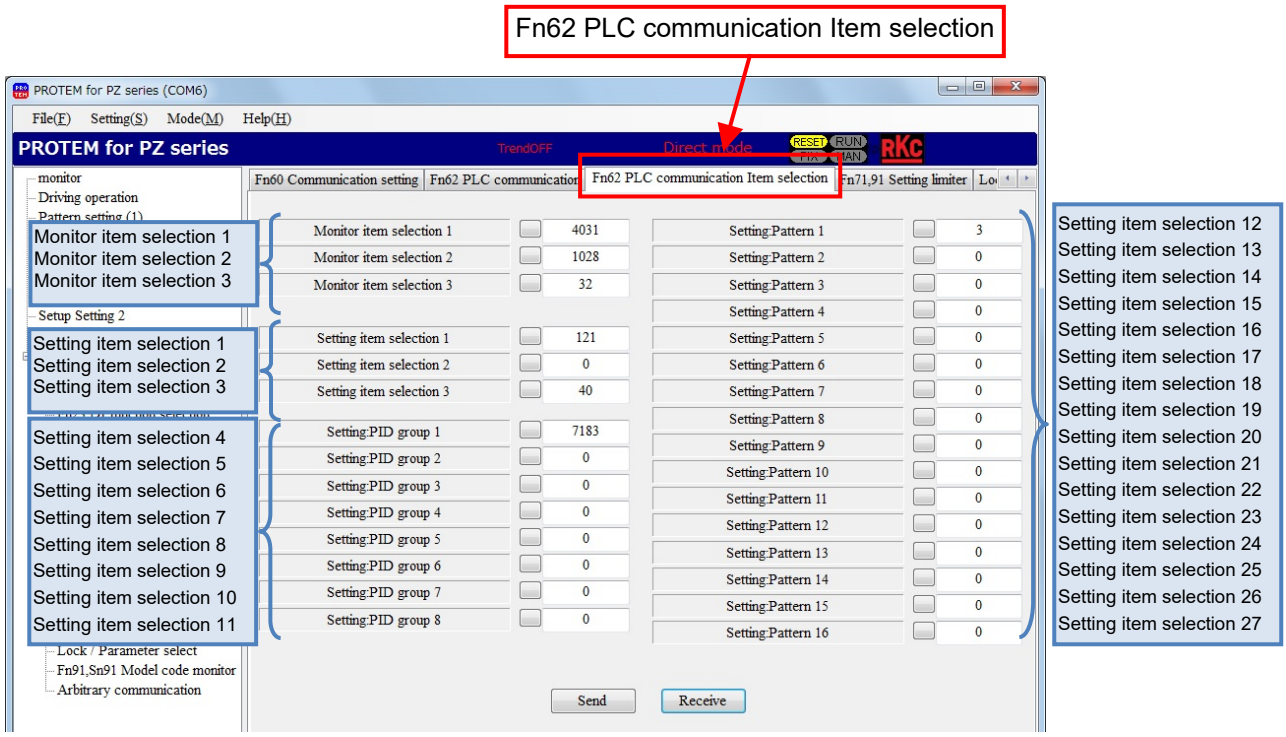
* Data D1062/1063 are for "Output limiter high [heat-side]," and Data D1064/1065 are for "Output limiter low [heat-side]." For allocation order of multiple data, refer to **6.2.3 Communication data set to "unused" at the factory (P.6-37)**.

(1) Adding and deleting communication data of the PZ master

Add communication data of the PZ master setting item selection 1 by using the PROTEM2. Then, delete communication data in setting item selection 3.

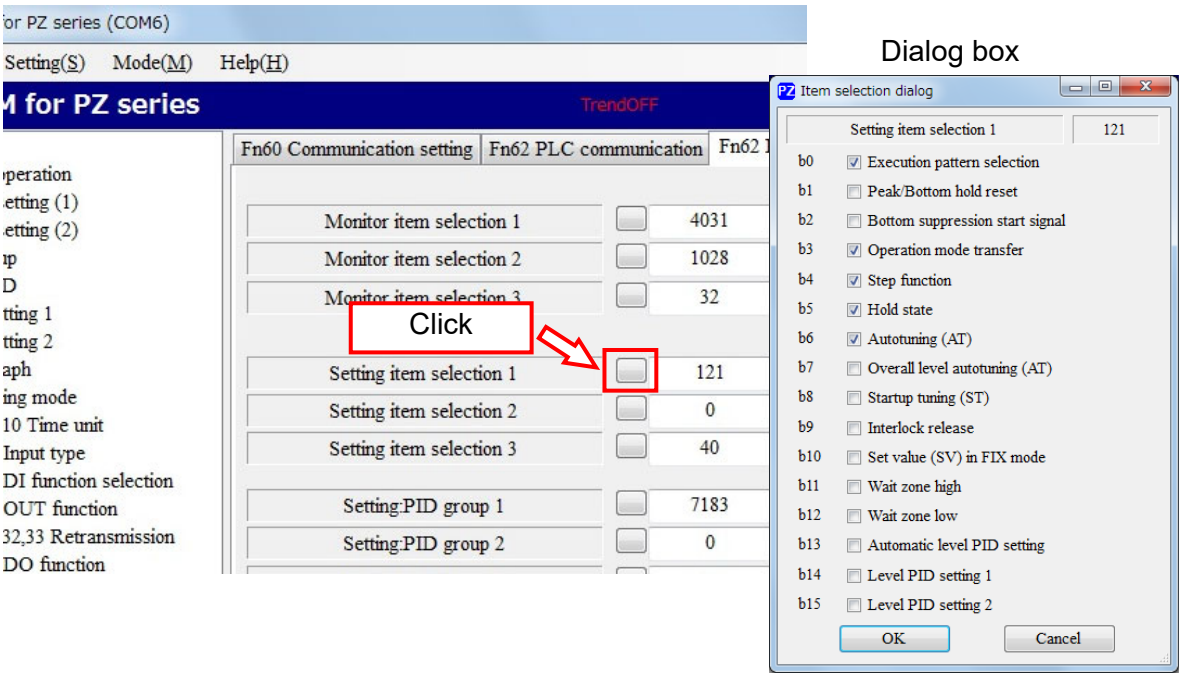
● How to set

1. Go to the "Fn62 PLC communication Item selection" screen of the PROTEM2.

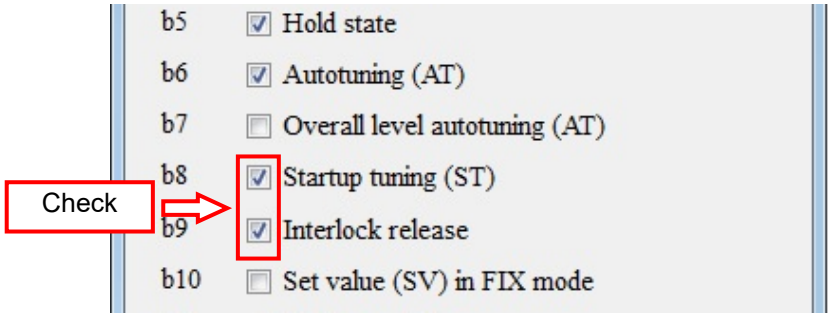


Fn62 PLC communication Item selection screen

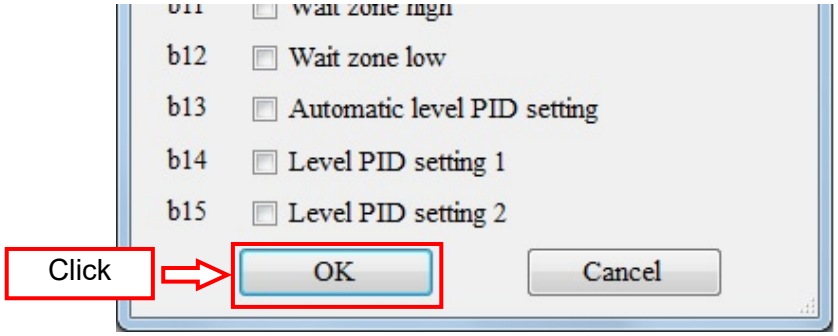
2. Click the button on the setting item selection 1. The "Item selection dialog" is displayed.



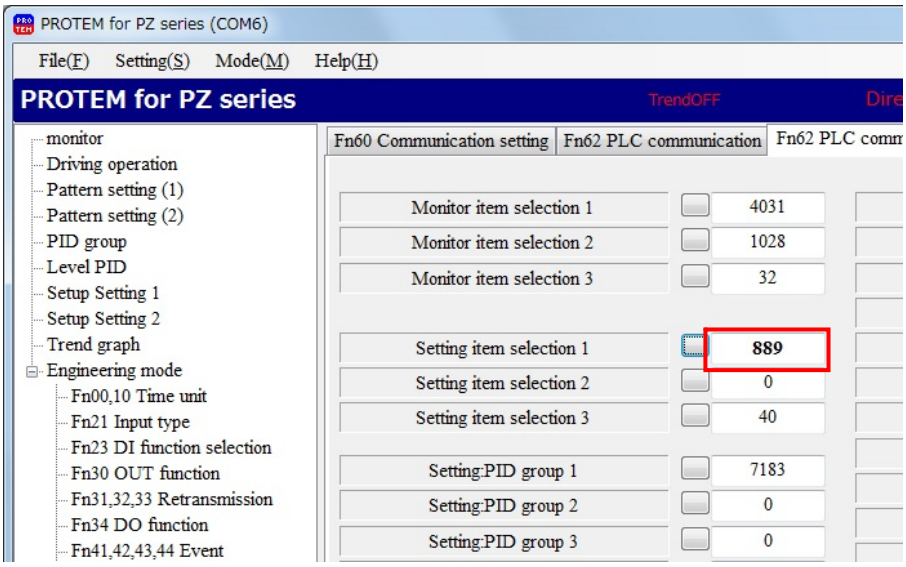
3. Check the check box for “Startup tuning (ST)” and “Interlock release.” (Communication data marked with “✓” can communicate with the PLC.)



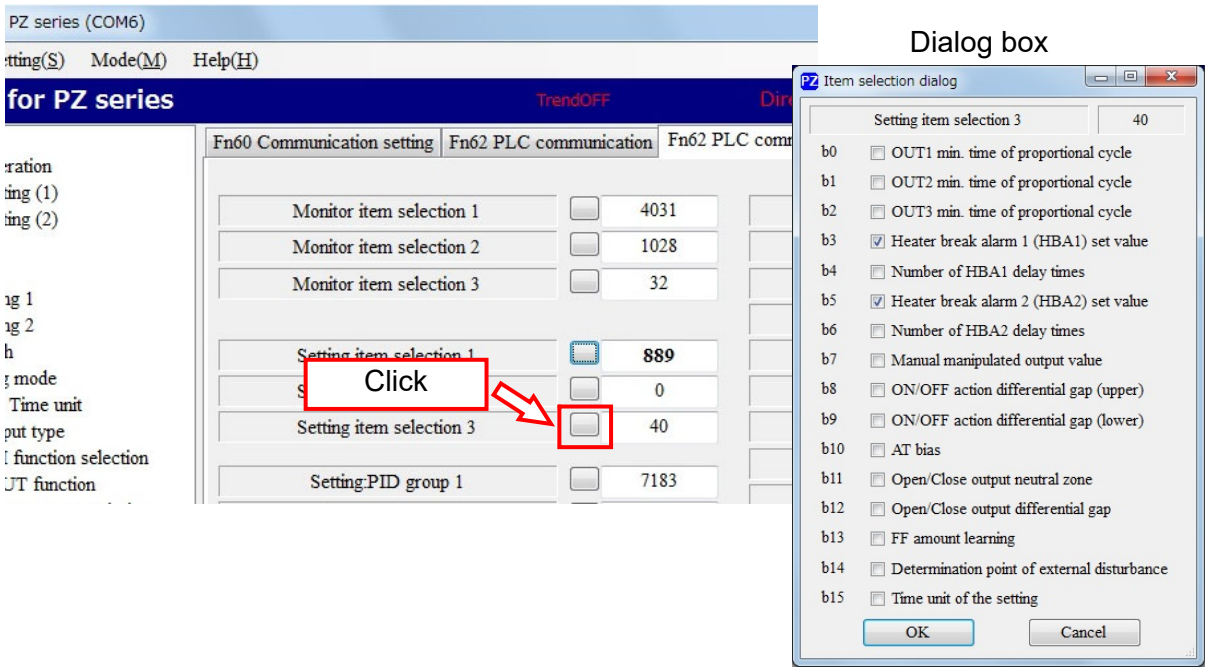
4. Click the “OK” button.



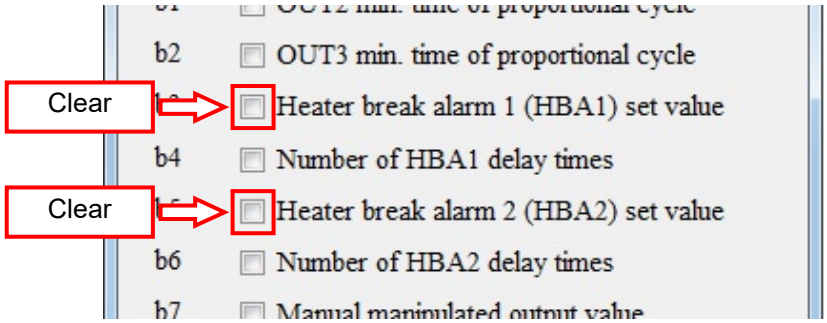
5. Set value (decimal) of setting item selection 1 will be changed to “889.”



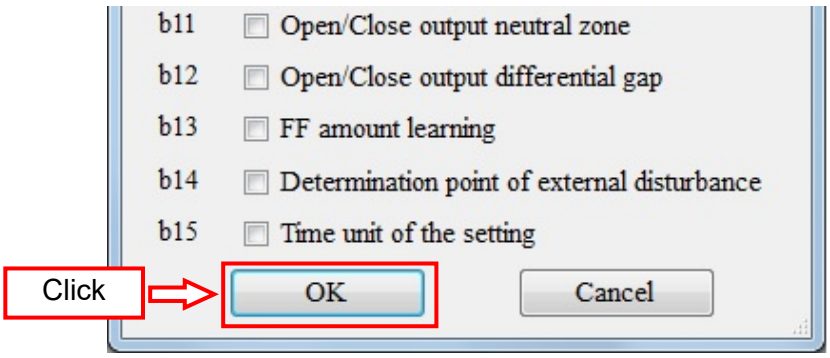
6. Click the button on the setting item selection 3. The "Item selection dialog" is displayed.



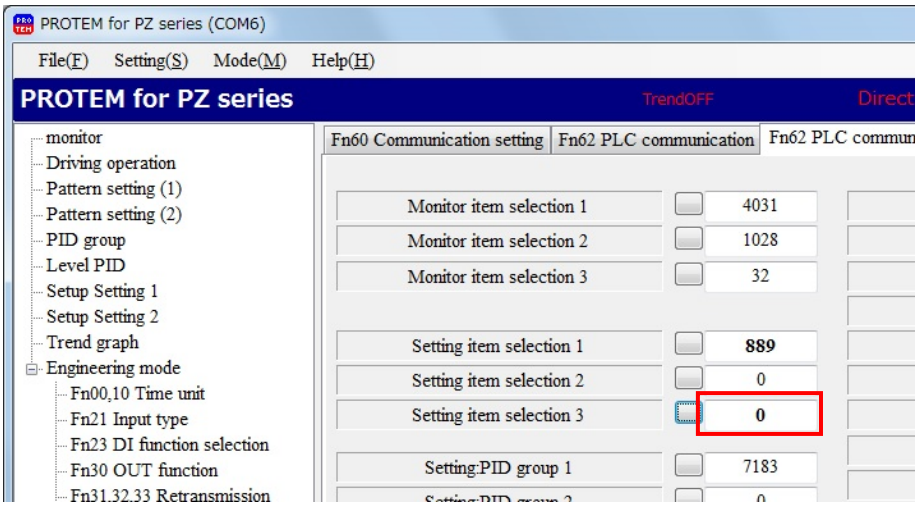
7. Clear the check boxes for "Heater break alarm 1 (HBA1) set value" and "Heater break alarm 2 (HBA2) set value."



8. Click the "OK" button.



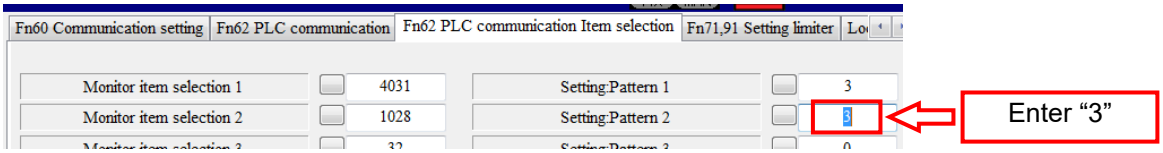
9. Set value (decimal) of setting item selection 3 will be changed to “0.”



Set value modification is also possible by inputting a value converted from binary to decimal.

Example: Adding communication data "Pattern 2 Segment level and Segment time" and "Pattern 2 Pattern end number" on setting item selection 13.

Set “1” (Use) for “Bit 0: Patten 2 Segment level and Segment time” and “Bit 1: Pattern 2 Pattern end number” on setting item selection 13, and convert binary to decimal. Set value is “3.”



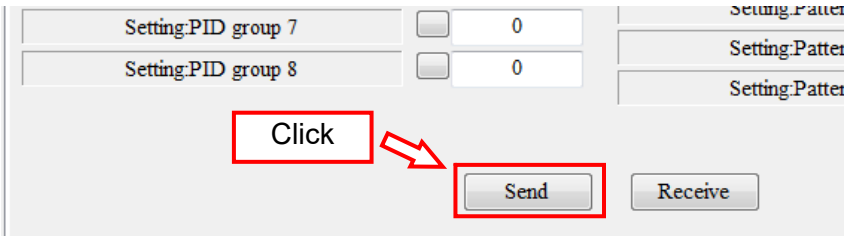
Bit image (binary number): 0000000000000011 (Bit 15 ---------- Bit 0)

0: Unused
1: Used

Setting item selection 13

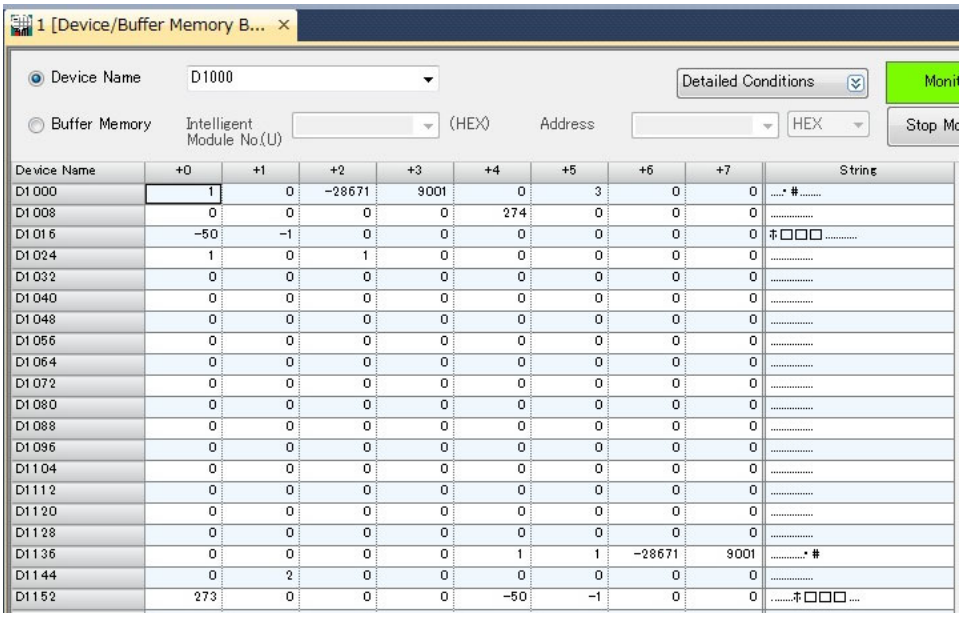
Bit	Item number	Communication data (Setting items)	Factory set value	
			Binary number	Decimal number
0	193	Pattern 2 Segment level and Segment time	**1**	
1	194	Pattern 2 Pattern end number	**1**	
2	195	Pattern 2 Number of repeating patterns	0	
3	196	Pattern 2 Pattern link number	0	
4	197	Pattern 2 Event 1 set value [high] and [low]	0	
5	198	Pattern 2 Event 2 set value [high] and [low]	0	
6	199	Pattern 2 Event 3 set value [high] and [low]	0	
7	200	Pattern 2 Event 4 set value [high] and [low]	0	**3**
8	201	Pattern 2 Time signal 1 related settings	0	
9	202	Pattern 2 Time signal 2 related settings	0	
10	203	Pattern 2 Time signal 3 related settings	0	
11	204	Pattern 2 Time signal 4 related settings	0	
12	205	Pattern 2 Pattern end output time	0	
13	206	Pattern 2 Event selection of the Segment	0	
14	207	Unused	0	
15	208	Unused	0	

10. Click “Send” button and send the modified set value of communication data to the PZ master.



11. Turn off the power of the PZ master and then turn it back on. When the power is turned on, the new values will take effect.

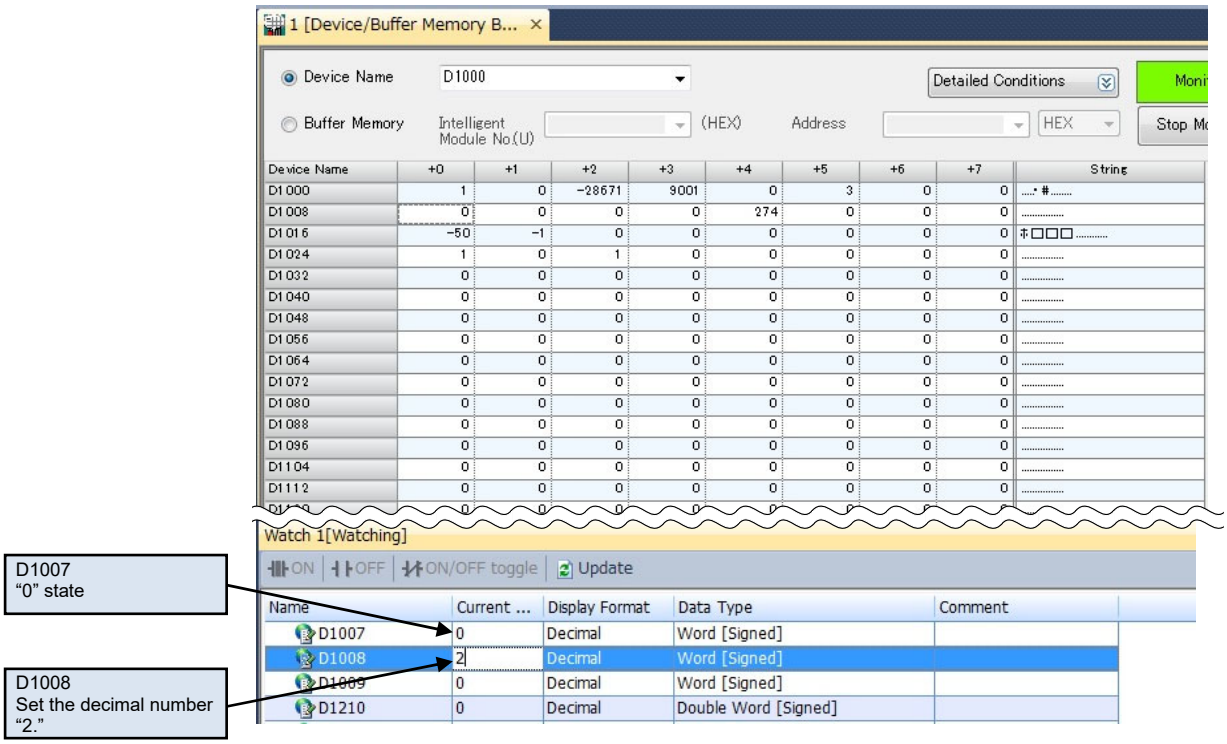
12. Check the edited PLC communication data map with “GX Works3.”
Initialize CPU memory of PLC by the “GX Works3.”



Device Name	+0	+1	+2	+3	+4	+5	+6	+7	String
D1000	1	0	-28671	9001	0	3	0	0	....* #.....
D1008	0	0	0	0	274	0	0	0	.....
D1016	-50	-1	0	0	0	0	0	0	ｷ□□□.....
D1024	1	0	1	0	0	0	0	0	.....
D1032	0	0	0	0	0	0	0	0	.....
D1040	0	0	0	0	0	0	0	0	.....
D1048	0	0	0	0	0	0	0	0	.....
D1056	0	0	0	0	0	0	0	0	.....
D1064	0	0	0	0	0	0	0	0	.....
D1072	0	0	0	0	0	0	0	0	.....
D1080	0	0	0	0	0	0	0	0	.....
D1088	0	0	0	0	0	0	0	0	.....
D1096	0	0	0	0	0	0	0	0	.....
D1104	0	0	0	0	0	0	0	0	.....
D1112	0	0	0	0	0	0	0	0	.....
D1120	0	0	0	0	0	0	0	0	.....
D1128	0	0	0	0	0	0	0	0	.....
D1136	0	0	0	0	1	1	-28671	9001	.....* #
D1144	0	2	0	0	0	0	0	0	.....
D1152	273	0	0	0	-50	-1	0	0	.....ｷ□□□....

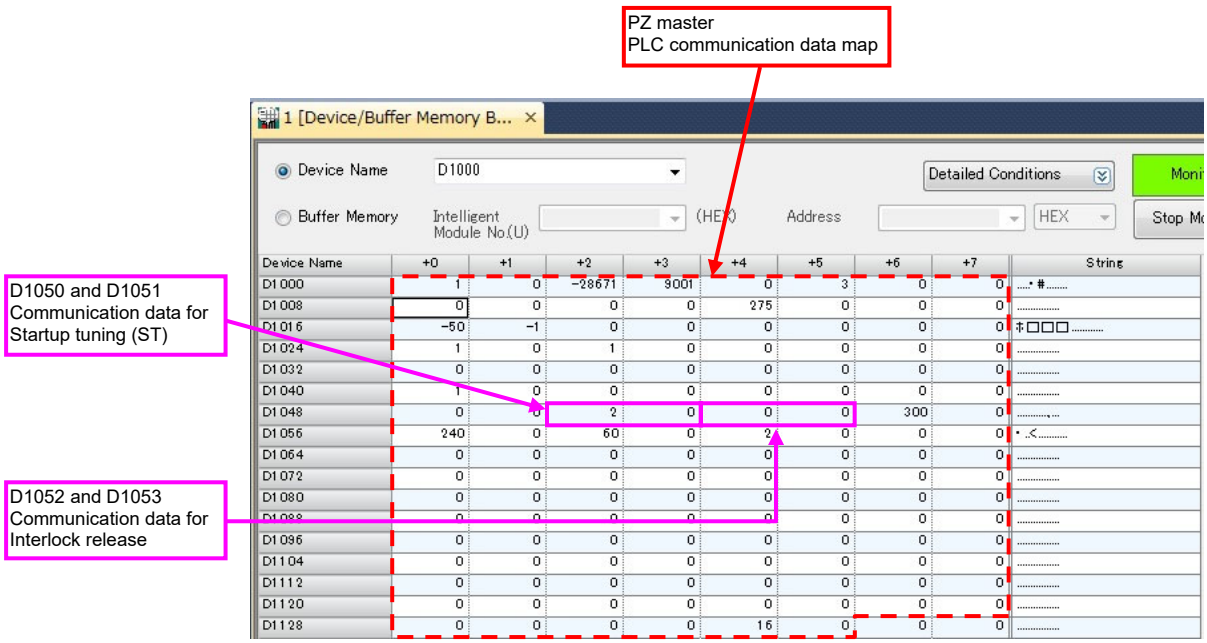
Initialized CPU memory

13. Configure the initial settings. With request item number (D1007) set to "0," set the monitor request bit (Bit 1) of request command (D1008) to "1" (decimal number: 2), and write the setting group communication data of PZ master to the PLC.



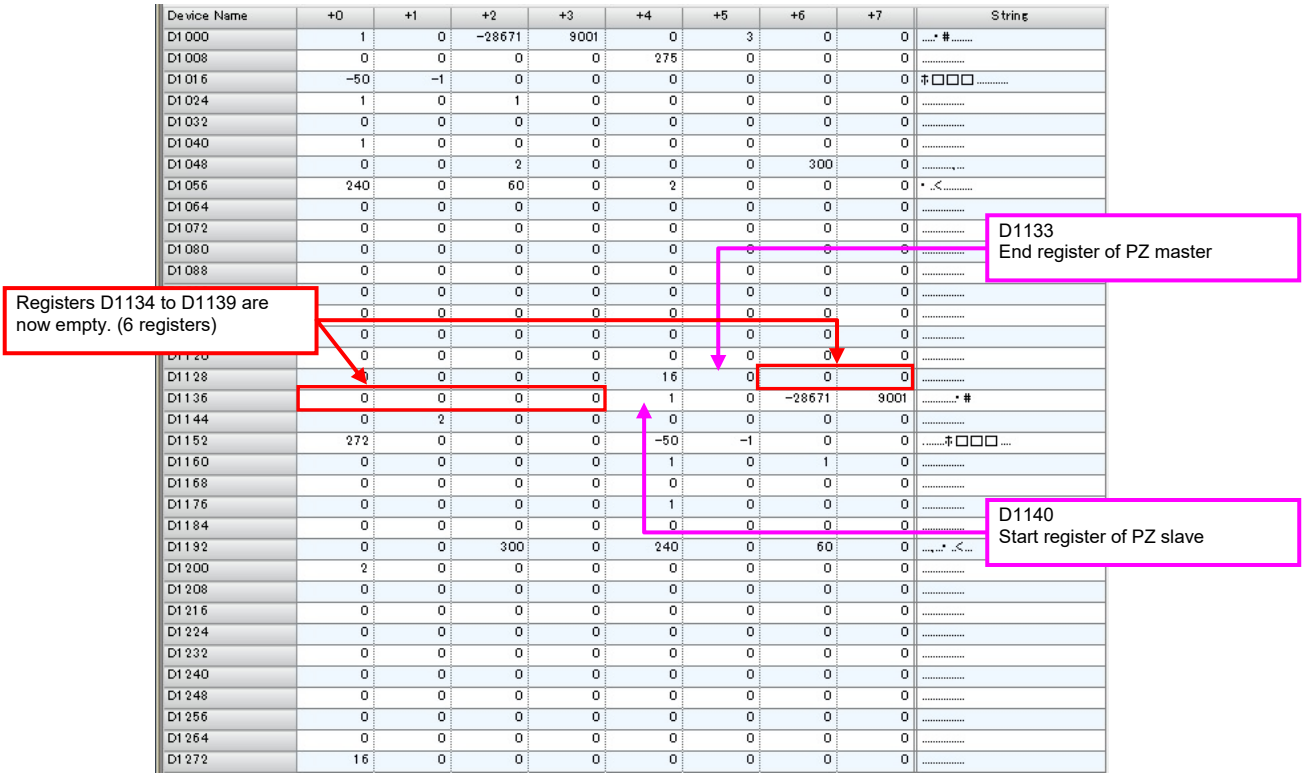
14. The PLC communication data map of the PZ master has been modified as below.

- D1050 and D1051 were communication data for Heater break alarm 1 (HBA1) set value, and they have been modified to communication data for Startup tuning (ST).
- D1052 and D1053 were communication data for Heater break alarm 2 (HBA2) set value, and they have been modified to communication data for Interlock release.



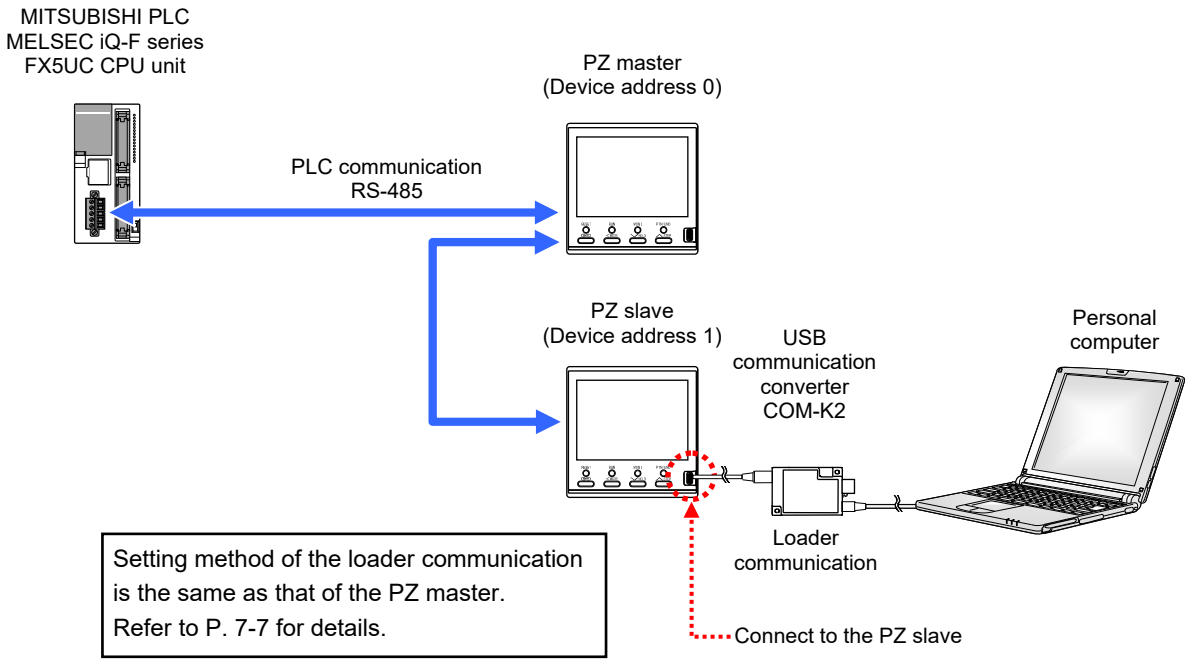
(2) Change the register start number of a PZ slave 1

There are unused registers between the end register of the PZ master and the start register of PZ slave 1.
By modifying the “Start register number” of the PZ slave 1, unused registers are deleted and addresses can be shifted.
Registers D1134 to D1139 (6 registers) are unused.



Device Name	+0	+1	+2	+3	+4	+5	+6	+7	String
D1000	1	0	−28671	9001	0	3	0	0	
D1008	0	0	0	0	275	0	0	0	
D1016	−50	−1	0	0	0	0	0	0	
D1024	1	0	1	0	0	0	0	0	
D1032	0	0	0	0	0	0	0	0	
D1040	1	0	0	0	0	0	0	0	
D1048	0	0	2	0	0	0	300	0	
D1056	240	0	60	0	2	0	0	0	
D1064	0	0	0	0	0	0	0	0	
D1072	0	0	0	0	0	0	0	0	
D1080	0	0	0	0	0	0	0	0	
D1088	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	0	
D1128	0	0	0	0	16	0	0	0	
D1136	0	0	0	0	1	0	−28671	9001	
D1144	0	2	0	0	0	0	0	0	
D1152	272	0	0	0	−50	−1	0	0	
D1160	0	0	0	0	1	0	1	0	
D1168	0	0	0	0	0	0	0	0	
D1176	0	0	0	0	1	0	0	0	
D1184	0	0	0	0	0	0	0	0	
D1192	0	0	300	0	240	0	60	0	
D1200	2	0	0	0	0	0	0	0	
D1208	0	0	0	0	0	0	0	0	
D1216	0	0	0	0	0	0	0	0	
D1224	0	0	0	0	0	0	0	0	
D1232	0	0	0	0	0	0	0	0	
D1240	0	0	0	0	0	0	0	0	
D1248	0	0	0	0	0	0	0	0	
D1256	0	0	0	0	0	0	0	0	
D1264	0	0	0	0	0	0	0	0	
D1272	16	0	0	0	0	0	0	0	

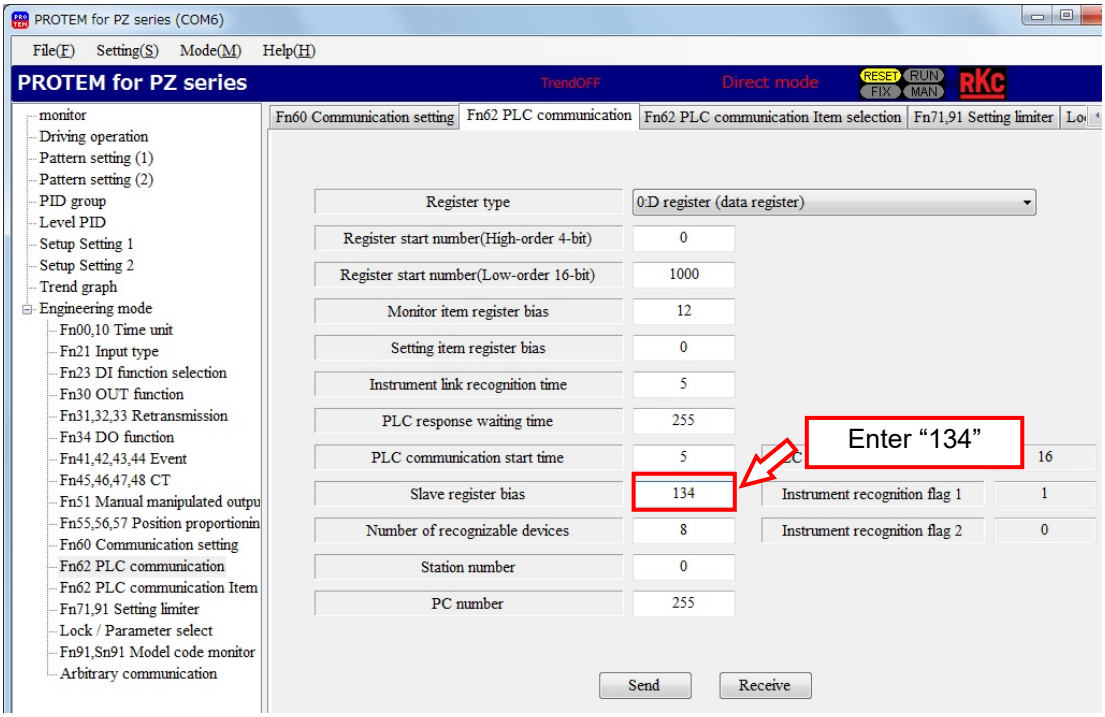
1. Connect a loader communication cable to PZ slave.



2. Set the slave register bias of the PZ slave on the “Fn62 PLC Communication” screen of PROTEM2. Slave register bias value can be calculated with the following formula.

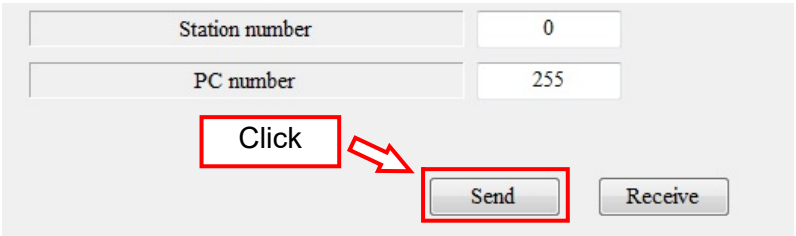
Slave register bias value = Slave register start number – Master register start number

To change the register start number for the communication data of PZ slave to D1134, set the slave register bias value to “134” (D1134 – D1000 = 134).



“Fn62 PLC communication” screen of PROTEM2

3. Click “Send” button to send the modified set value of communication data to the PZ slave(s).



4. Turn off the power of the PZ slave and then turn it back on. When the power is turned on, the new values will take effect.

5. Check the edited PLC communication data map with "GX Works3." The first register for the communication data of PZ slave has been changed from D1140 to D1134.

Device Name	+0	+1	+2	+3	+4	+5	+6	+7	String
D1000	1	0	−28671	9001	0	3	0	0	....• #.....
D1008	0	0	0	0	274	0	0	0	.....
D1016	−50	−1	0	0	0	0	0	0	∓□□□.....
D1024	1	0	1	0	0	0	0	0	.....
D1032	0	0	0	0	0	0	0	0	.....
D1040	0	0	0	0	0	0	0	0	.....
D1048	0	0	0	0	0	0	0	0	.....
D1056	0	0	0	0	0	0	0	0	.....
D1064	0	0	0	0	0	0	0	0	.....
D1072	0	0	0	0	0	0	0	0	.....
D1080	0	0	0	0	0	0	0	0	.....
D1088	0	0	0	0	0	0	0	0	.....
D1096	0	0	0	0	0	0	0	0	.....
D1104	0	0	0	0	0	0	0	0	.....
D1112	0	0	0	0	0	0	0	0	.....
D1120	0	0	0	0	0	0	0	0	.....
D1128	0	0	0	0	0	0	1	0	.....
D1136	−28671	9001	0	2	0	0	0	0	•.#.....
D1144	0	0	277	0	0	0	−50	−1	.....∓□□□
D1152	0	0	0	0	0	0	1	0	.....
D1160	1	0	0	0	0	0	0	0	.....
D1168	0	0	0	0	0	0	0	0	.....
D1176	0	0	0	0	0	0	0	0	.....
D1184	0	0	0	0	0	0	0	0	.....
D1192	0	0	0	0	0	0	0	0	.....
D1200	0	0	0	0	0	0	0	0	.....
D1208	0	0	0	0	0	0	0	0	.....
D1216	0	0	0	0	0	0	0	0	.....
D1224	0	0	0	0	0	0	0	0	.....
D1232	0	0	0	0	0	0	0	0	.....
D1240	0	0	0	0	0	0	0	0	.....
D1248	0	0	0	0	0	0	0	0	.....
D1256	0	0	0	0	0	0	0	0	.....
D1264	0	0	0	0	0	0	0	0	.....
D1272	0	0	0	0	0	0	0	0	.....

D1134
Start register of PZ slave

MEMO

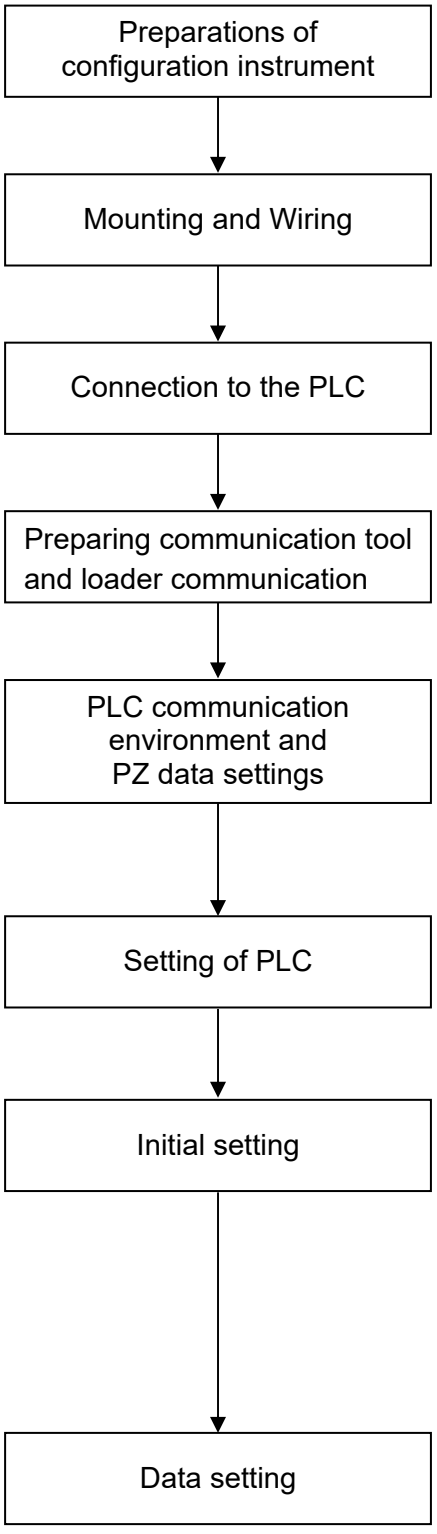
7

USAGE EXAMPLE

7.1 Handling Procedures

This section explains the data setting procedure when two PZ900 are connected to a MELSEC iQ-F series PLC (Mitsubishi Electric).

📖 Numeric values used in the example are just examples. They are different from the values users may use in their actual application.



☞ Refer to **7.2 System Configuration (P. 7-3)**.

☞ For PZ input/output and power wiring, **PZ400/PZ900 /PZ401/PZ901 Instruction Manual (IMR03B05-E□)**.

☞ Refer to **7.3 Connection to the PLC (P. 7-4)**.

☞ Refer to **7.4 Setting of PZ900 (P. 7-5)**.

Settings are made here for device address of PZ900, communication speed, data bit configuration, communication protocol and PLC communication environment items, and operational data.

☞ Refer to **7.4 Setting of PZ900 (P. 7-5)**.

Communication protocol of the PLC, station number, communication speed and so on are set here.

☞ Refer to **7.5 Communication Setting of PLC (P. 7-26)**.

Setting data of the PZ900 are written into the PLC.

📖 **NOTE**

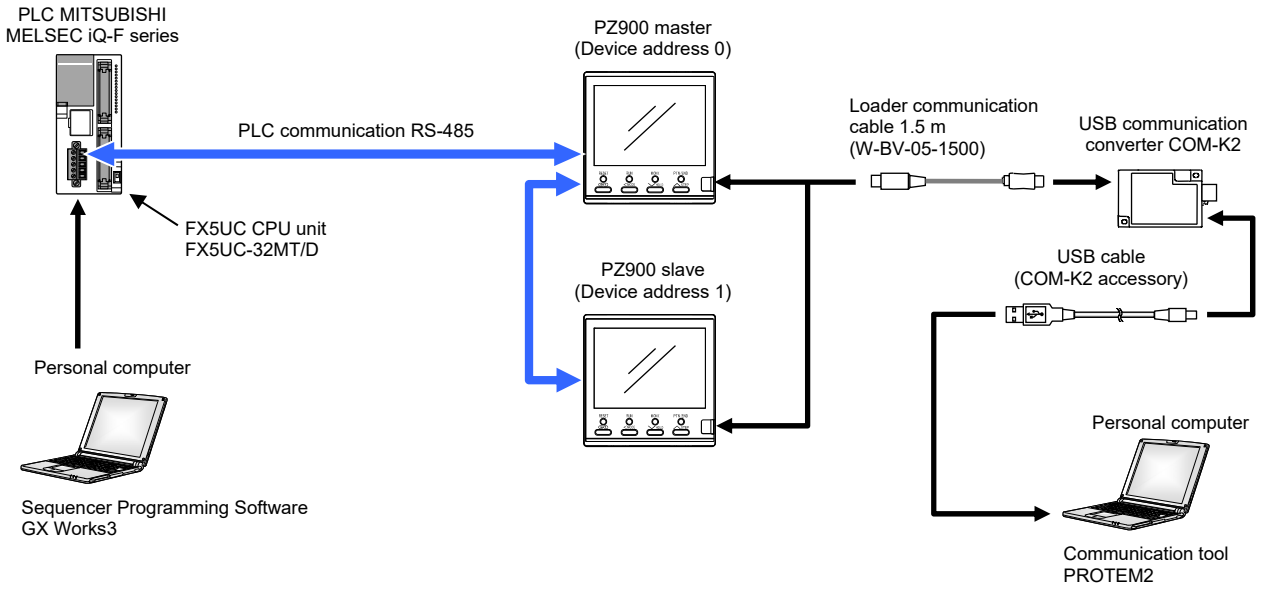
If each set value of the PZ controller is changed from the PLC without setting the initial values, it is re-written to 0 with each set value of the PLC at that time set to 0.

☞ Refer to **7.6 Initial Setting (P. 7-27)**.

Data is set here using Request item number and Request command.

☞ Refer to **7.7 Data Setting (P. 7-29)**.

7.2 System Configuration



■ Use instruments

- **PLC MITSUBISHI MELSEC iQ-F series**
  FX5UC CPU unit FX5UC-32MT/D: 1
  Others (Extension power supply module, Connector conversion module, Powered input/output module, etc.)

- **PZ900**
  PZ900 (Master instrument: Device address 0): 1
  PZ900 (Slave instrument: Device address 1): 1

- **Communication converter**
  USB communication converter COM-K2 (RKC product): 1
  Loader communication cable W-BV-05 [sold separately]: 1

- **Personal computer:** 1
  Windows 10 (64-bit version).

- **Communication programs**
  Communication tool PROTEM2 (Available for download at our website.)
  Sequencer Programming Software GX Works3 [Manufactured by MITSUBISHI ELECTRIC CO., LTD.,] *

  * Consult the instruction manuals of the PLC for how to use GX Works3 and how to wire to the PLC.

■ Other condition (PZ900)

Input data type: Double word

7.3 Connection to the PLC

Connect a PZ to PLC (CPU unit).

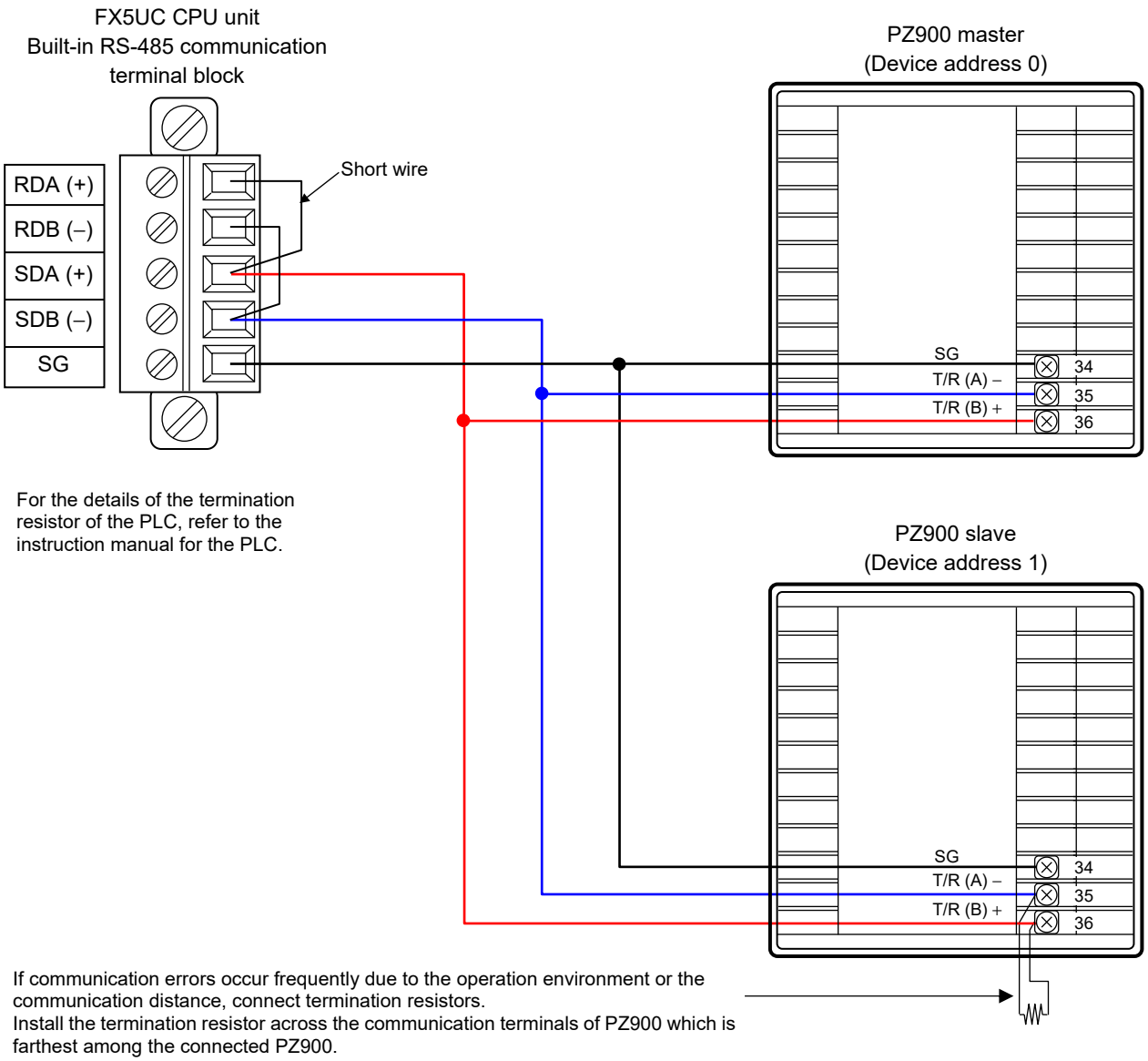
NOTE

Note that the signal polarity symbols (A and B) are opposite to each other between the PLC MELSEC series (CPU unit) and the PZ series controller. Normally A is connected to A and B to B. However, in this case, A must be connected to B, and B must be connected to A.

• PZ900 communication terminal (RS-485)

Terminal No.	Symbol	Signal name
34	SG	Signal ground
35	T/R (A)	Send data/Receive data
36	T/R (B)	Send data/Receive data

■ Wiring example



For the details of the termination resistor of the PLC, refer to the instruction manual for the PLC.

If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.
Install the termination resistor across the communication terminals of PZ900 which is farthest among the connected PZ900.

7.4 Setting of PZ900

First, PLC-communication environment data necessary for communication with a PLC and engineering data and operational data of the PZ900 must be set up. This setting is required on each PZ900.

(1) Installing PROTEM2

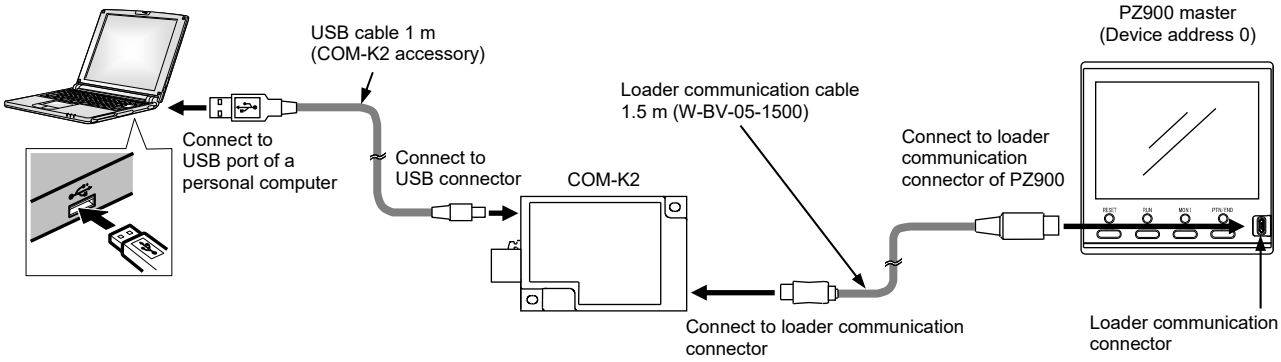
Download PROTEM2 from our website and install it on your personal computer.

(2) Installing COM-K2 driver

If a COM-K2 driver is not yet installed on your personal computer, install the driver now. The driver can be downloaded from the official RKC website.

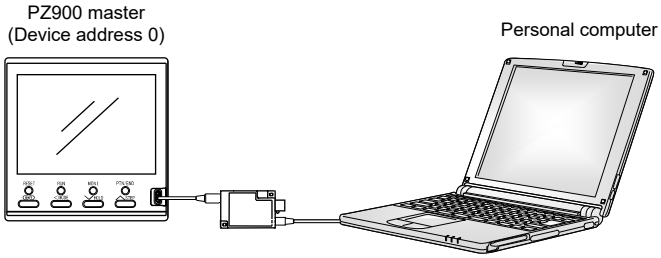
(3) Connection of loader communication

Connect a PZ900 master (device address 0) to converter COM-K2 and personal computer by connection cable.



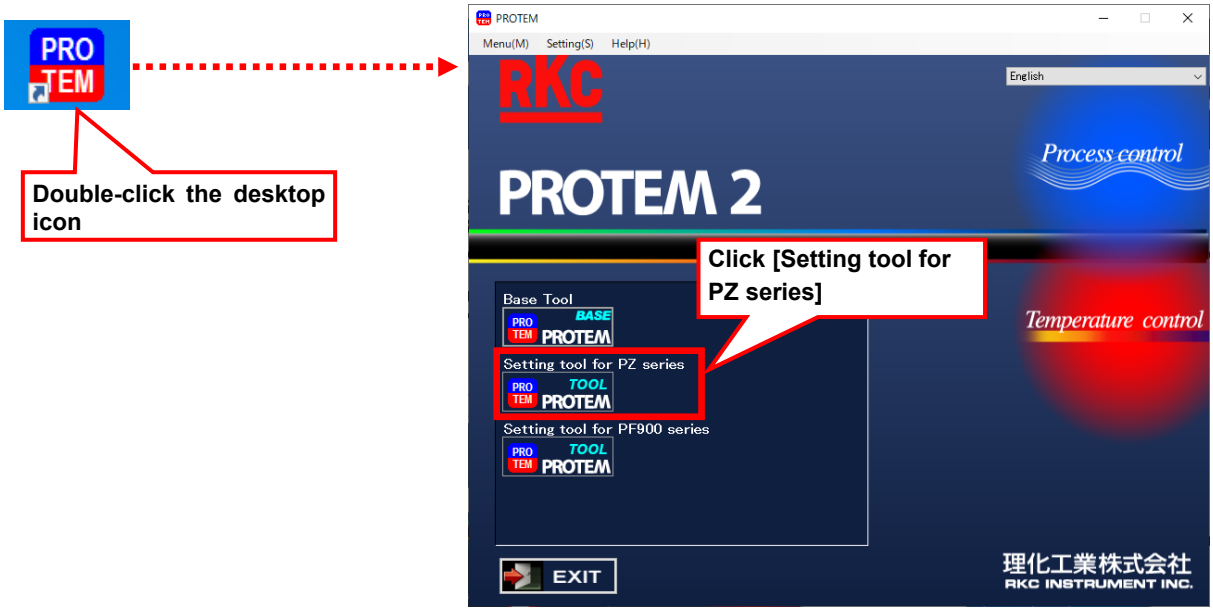
(4) Configuring the PLC communication environment item and PZ setting data of PZ900 master

Configure the PLC communication environment and other data of the PZ900 master (device address 0) on your personal computer.



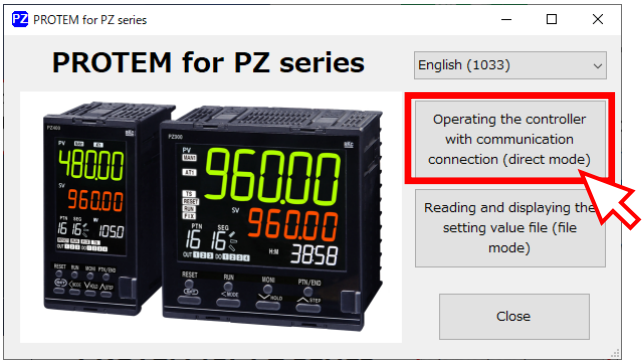
1. Turn on the power of the personal computer

2. Start PROTEM2 and click “Setting tool for PZ series”.



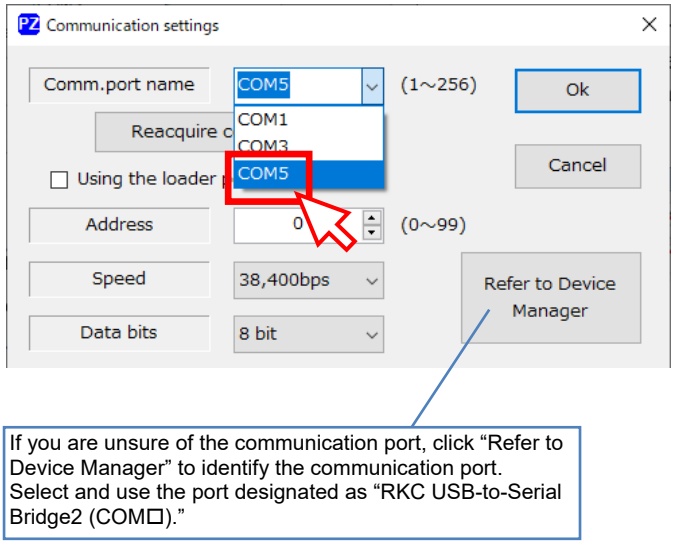
3. The mode selection screen will be displayed.

If you use the PROTEM2 for the first time, click “direct mode.”



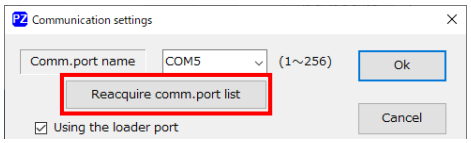
4. The communication parameter screen will be displayed.

Select a communication port name to which the USB cable of the COM-K2 is connected.



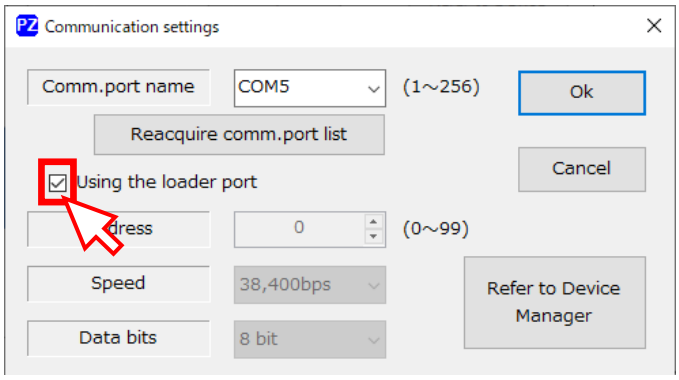
If you are unsure of the communication port, click "Refer to Device Manager" to identify the communication port. Select and use the port designated as "RKC USB-to-Serial Bridge2 (COM☐)."

Click "Reacquire comm.port list" when a USB cable of the COM-K2 is connected to the PC after the PROTEM2 has been started, or when a USB cable is replaced with other cable/reconnected to another port during the operation of the PROTEM2.

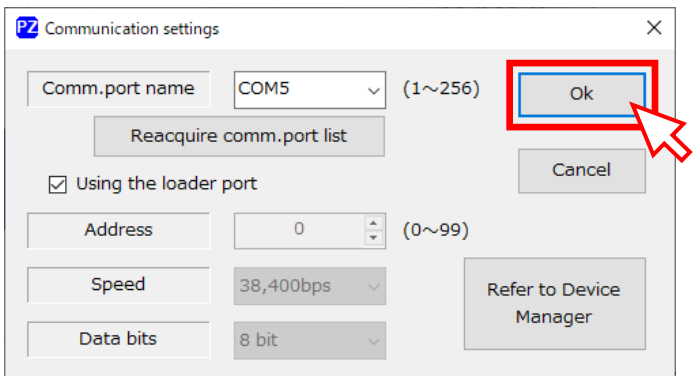


5. Check the check box for "Using the loader port."

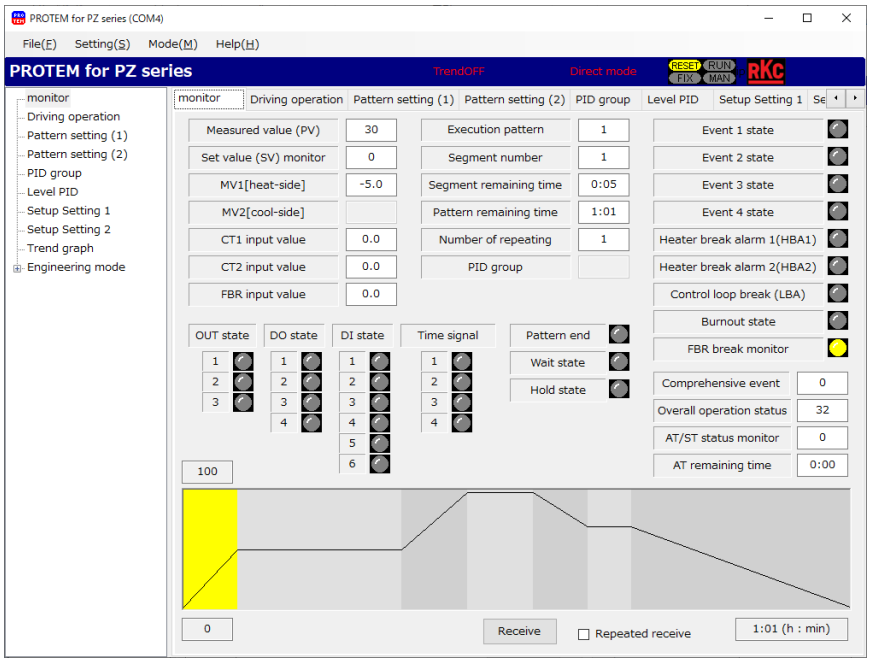
When "Using the loader port" is checked, communication address, communication speed, and data bit configuration are fixed with the values shown on the following screen and cannot be modified.



6. Click "OK"

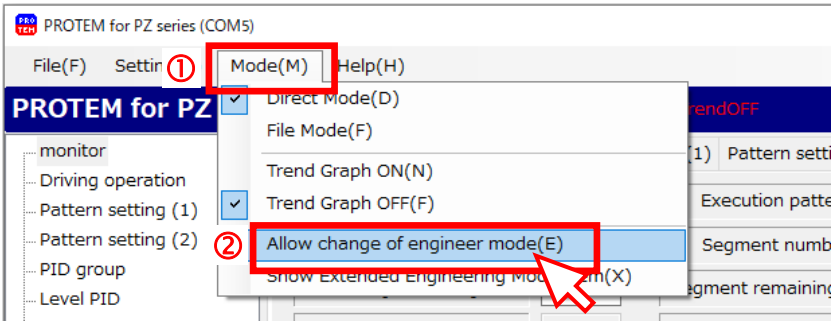


7. PROTEM2 monitor screen will be displayed.

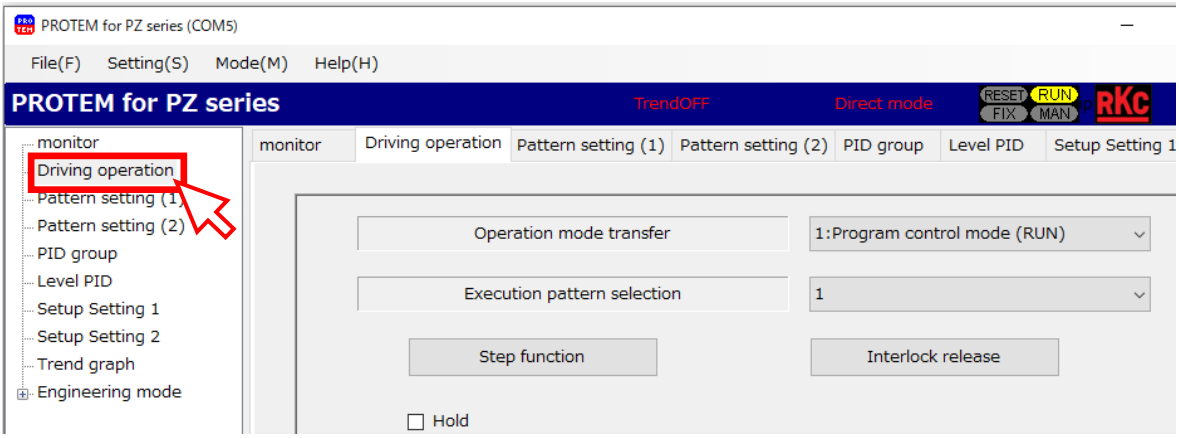


8. Enable setting the set value in the engineering mode.

In order to change the set value in the engineering mode, select “Mode (M)” and click “Allow change of engineer mode (E).”

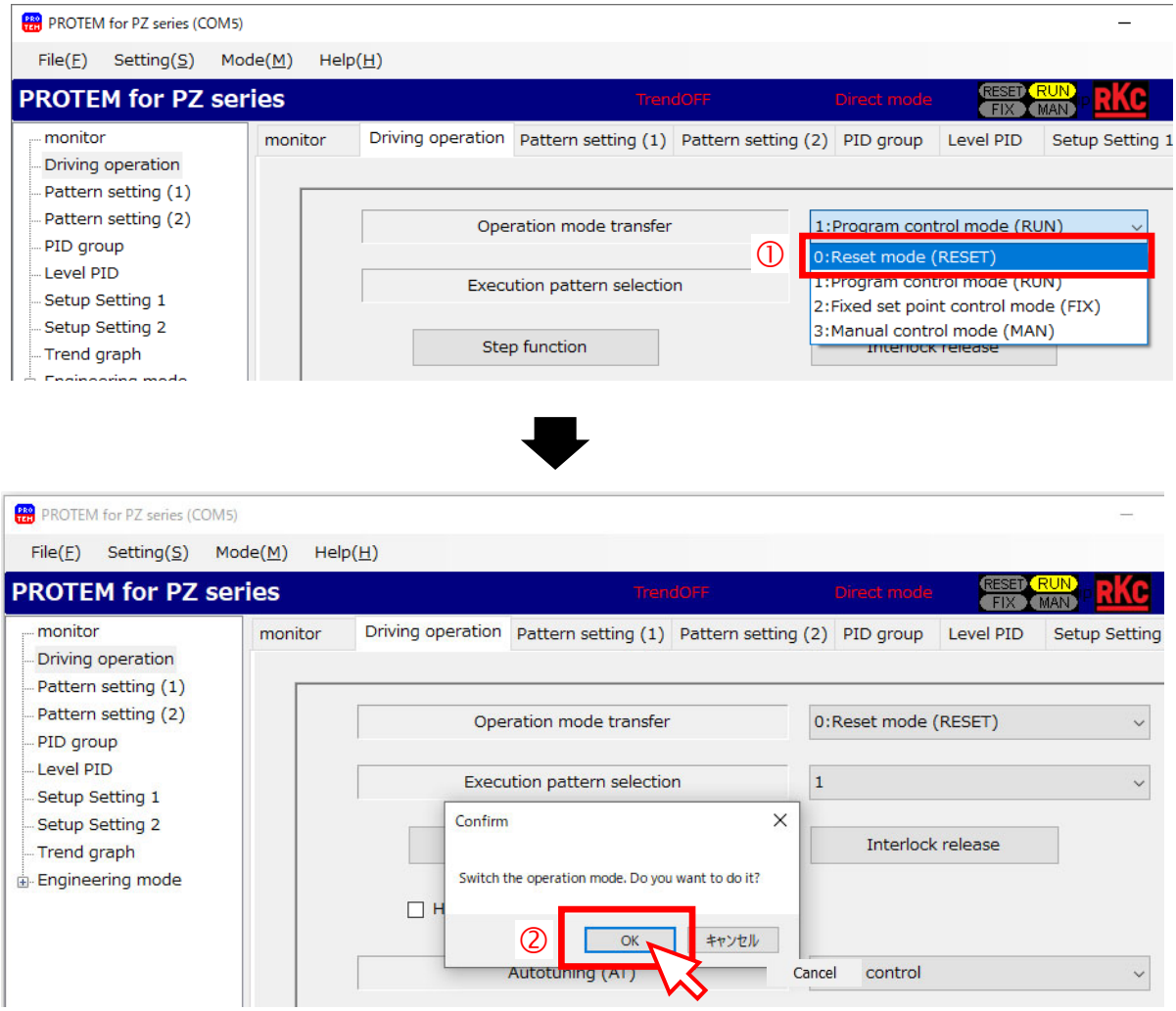


9. Select the “Driving operation” in a TreeView

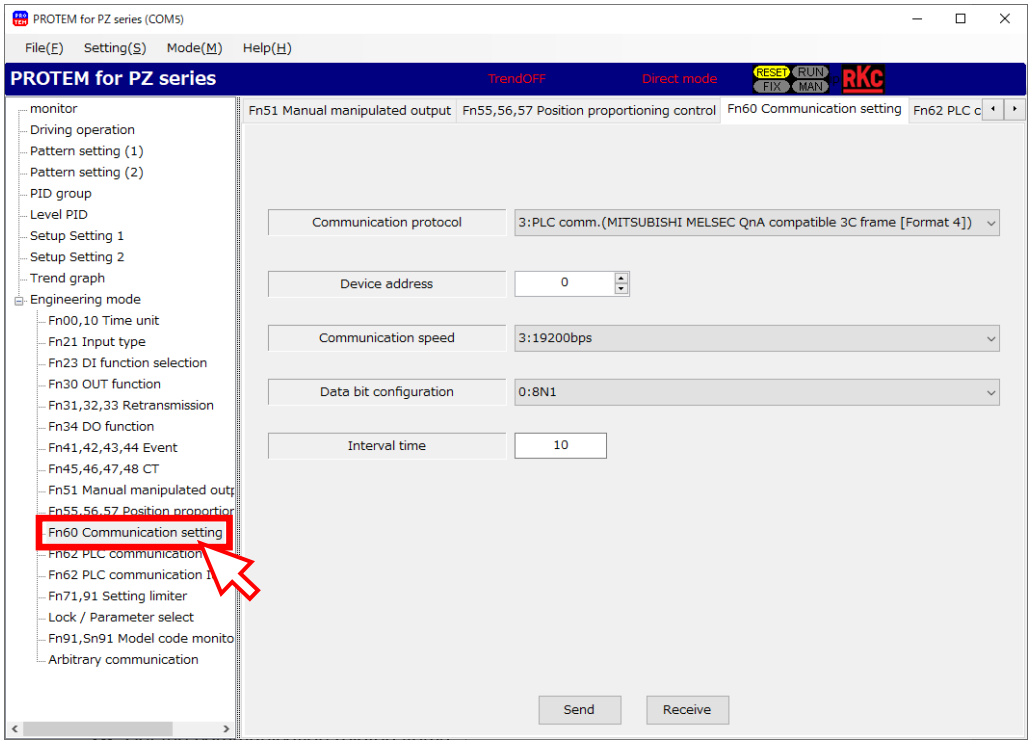


10. Switch to the Reset mode (RESET).

A message will be displayed when "0: Reset mode (RESET)" is selected in the operation transfer mode. Click "OK."



11. Select the “Fn60 Communication setting” in a TreeView



12. Set the communication related items

Set the communication related items such as communication speed at “Fn60 Communication setting.”
Set the data at “Fn60 Communication setting” as follows. (Refer to **Table 1**.)

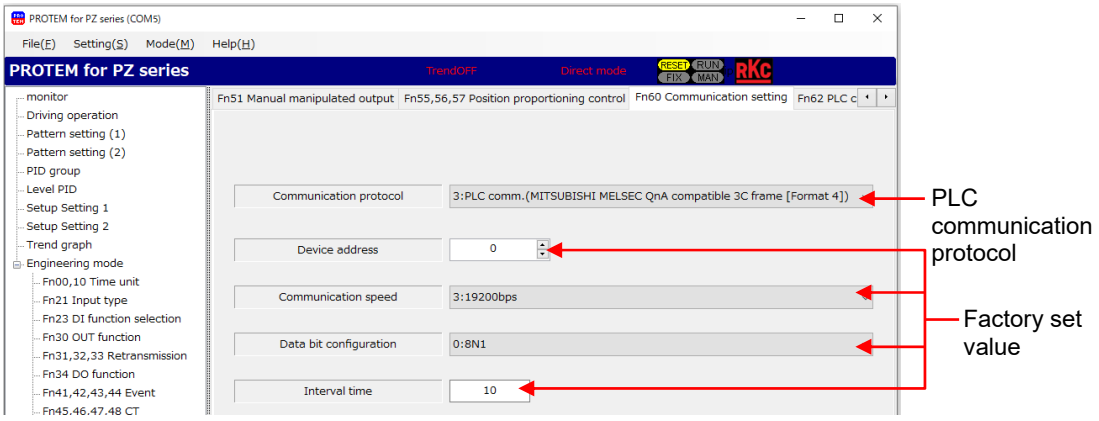
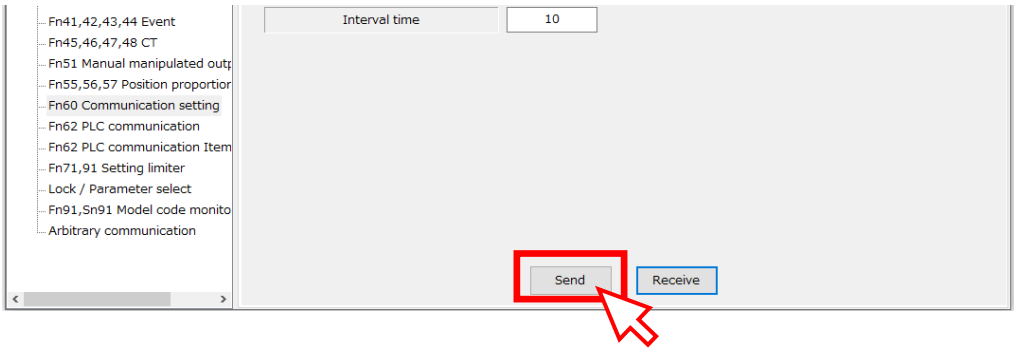


Table 1

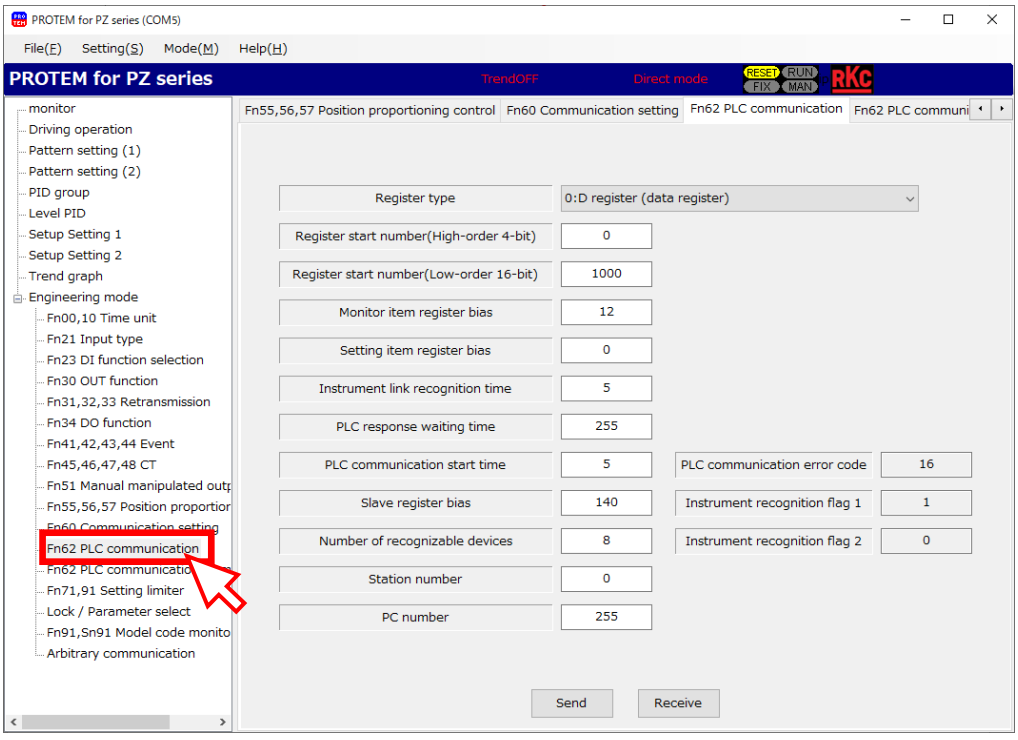
Setting items		Set value	
(1)	Communication protocol	3	
(2)	Device address	0	(Factory set value)
(3)	Communication speed	3 (19200 bps)	(Factory set value)
(4)	Data bit configuration	0	(Factory set value)
(5)	Interval time	10	(Factory set value)

13. Click “Send” to send the modified data from PC to PZ.



When communication data has been modified on the PROTEM2, ensure to click “Send.” If you do not click “Send,” the modified data will not be registered in the PZ.

14. Select the “Fn62 PLC communication” in a TreeView



15. Set the PLC communication environment items

Set the PLC communication environment setting at "Fn62 PLC communication." Set the data at "Fn62 PLC communication" as follows. (Refer to **Table 2**.)

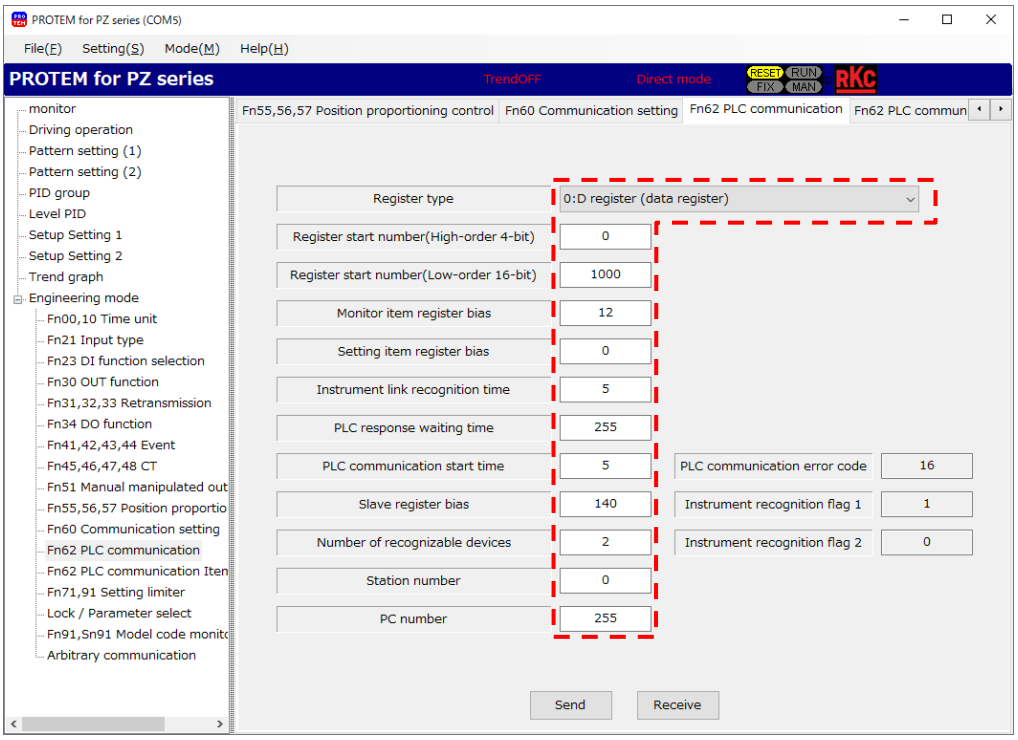


Table 2

Setting items	Set value	
(1) Register type (D, R, W, ZR) [1]	0 (D register)	(Factory set value)
(2) Register start number (High-order 4-bit) [1]	0	(Factory set value)
(3) Register start number (Low-order 16-bit) [1]	1000	(Factory set value)
(4) Monitor item register bias [1]	12	(Factory set value)
(5) Setting item register bias [1]	0	(Factory set value)
(6) Instrument link recognition time	5 seconds	(Factory set value)
(7) PLC response waiting time	255 ms	(Factory set value)
(8) PLC communication start time [2]	5 seconds	(Factory set value)
(9) Slave register bias [1]	140	(Factory set value)
(10) Number of recognizable devices [3]	2	
(11) Station number	0	(Factory set value)
(12) PC number	255	(Factory set value)

These values can be changed to change the starting number of the PLC communication data register.

[1] Usable register ranges and types vary depending on used CPU types. For register ranges and types that can actually be used, refer to the PLC instruction manual.

[2] The PLC communication start time is the time that writing of the system data starts.
Actual communication with the PLC by request command can only take place after the system communication state (D1000) changes to "1."

[3] Only the PZ master device (device address 0) can be set up.

☞ For the Register start number, Monitor item register bias and Setting item register bias, refer to **P. 5-31**.

16. Select the communication data to use.

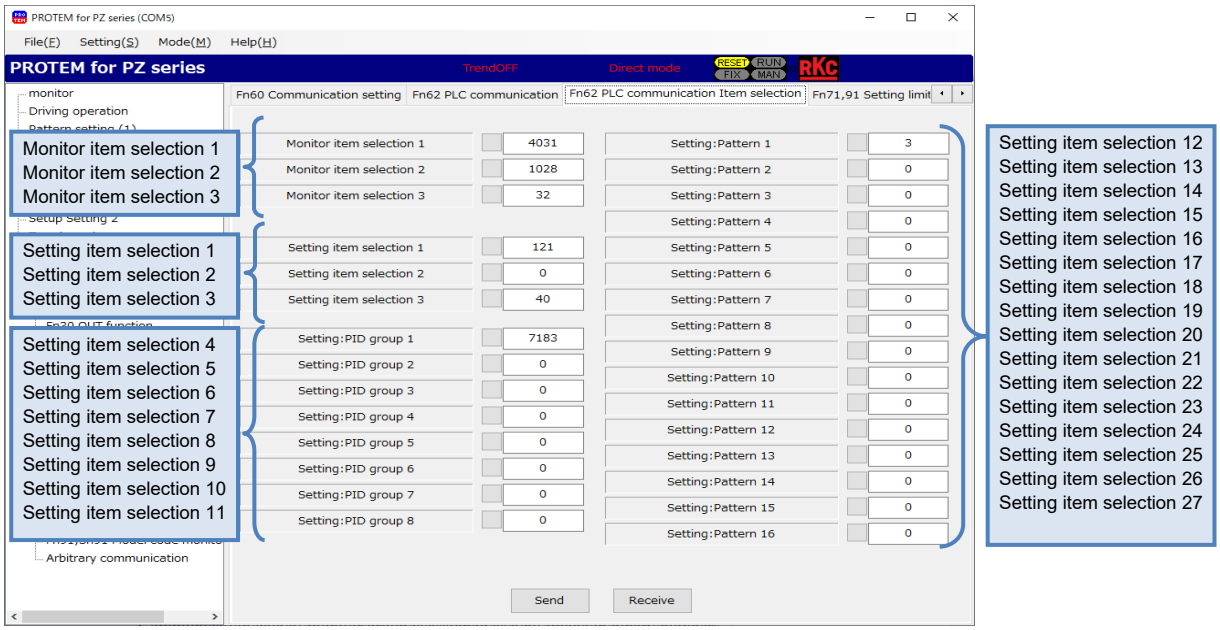
Select the communication data that are sent/received between the PLC and the PZ900 master (device address 0). Selection of the communication data can be done at “Fn62 PLC communication Item selection.”

In this example, factory preset values for “Fn62 PLC communication Item selection” are used. (Refer to **Table 3**)

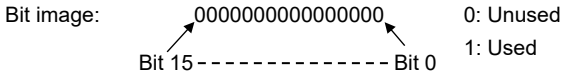
☞ To select communication data, refer to **6.3 Example of PLC Communication Data Map Editing (P. 6-67)**.

☞ For the communication data type and data range, refer to the following sections:

- **P. 5-8 to P. 5-23 of 5.2.1 Setting items list**
- **6.2 PLC Communication Data Map (P. 6-20)**



Communication data of monitor group is assigned as a bit image in binary numbers.



Example:

Communication data of Setting item selection 1

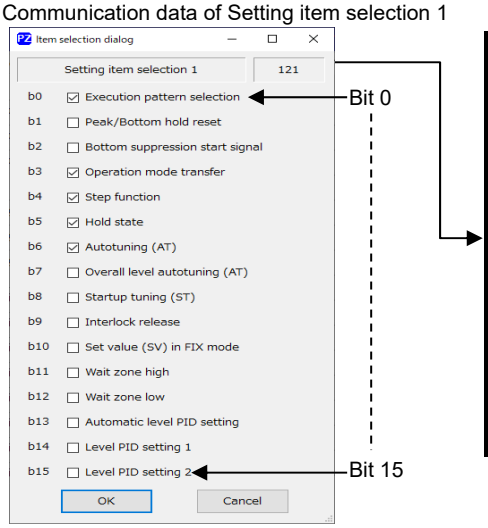


Table 3

Setting item	Set value (factory set value)	
	Bit	Decimal
Monitor item selection 1	0000111110111111	4031
Monitor item selection 2	0000000000100100	1028
Monitor item selection 3	0000000000100000	32
Setting item selection 1	0000000001111001	121
Setting item selection 2	0000000000000000	0
Setting item selection 3	0000000000101000	40
Setting item selection 4	0000000111001111	7183
Setting item selection 5 to 11	0000000000000000	0
Setting item selection 12	0000000000000011	3
Setting item selection 13 to 27	0000000000000000	0

17. Make other initial setting

Following the setting of the PLC communication environment items, set up necessary functions and a set value to operate the PZ900 master (device address 0). This setting can be done using PROTEM2.

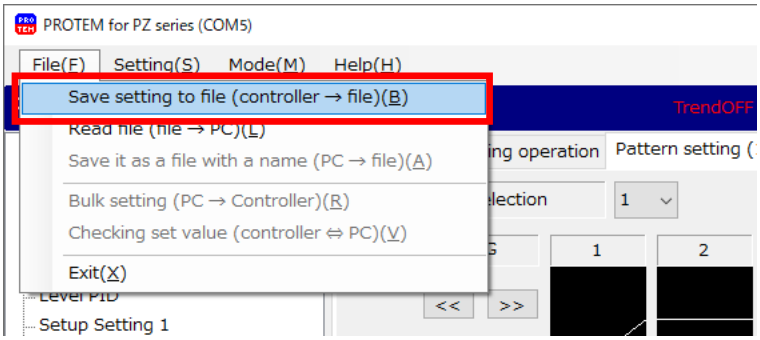
☞ Refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)** for non-PLC communication related functions and parameters.

18. Activate the settings

To activate the settings done so far, shut down the PZ900 master (device address 0) once, and reapply power to the instrument. After power up, the modified values become effective.
If the PZ is running on the power from the COM-K2 without turning on the mains supply, remove the loader communication cable once and reconnect it to the PZ. The same effect can be obtained as powering up the PZ.

19. Save the communication data

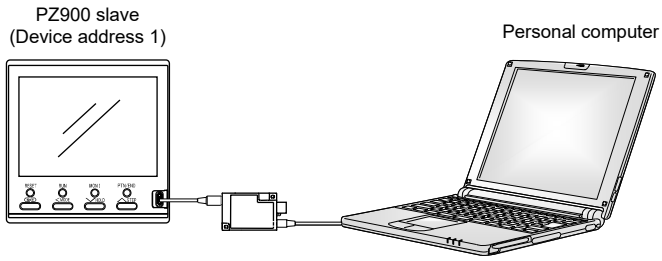
Save the communication data set to PZ900 master (device address 0) to a desired location. Click "Save setting to file (controller → file) (B)" to save the set communication data file.



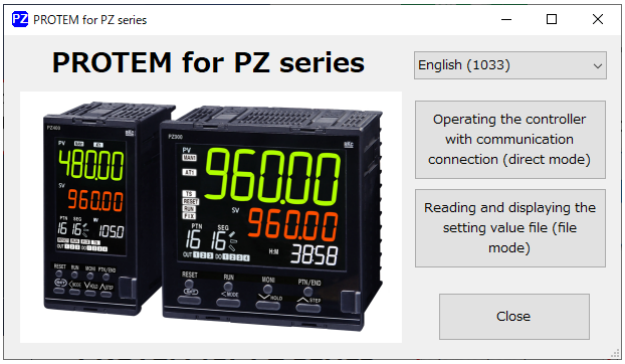
(5) Configuring the PLC communication environment item and PZ setting data of PZ900 slave

Following the setting of the PZ900 master (device address 0), the PZ900 slave (device address 1), set up the personal computer for the PLC communication environment setting and the initial setting.

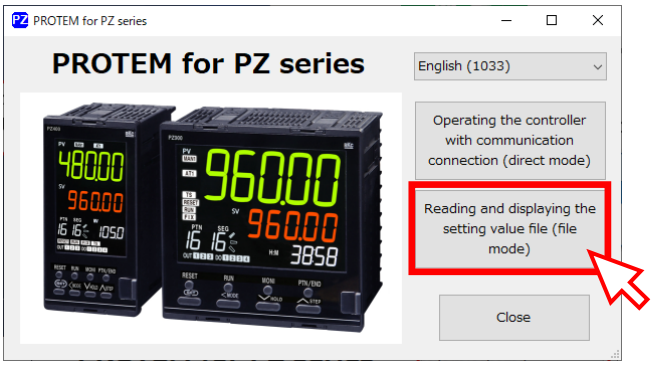
1. Connect the loader communication cable to PZ900 slave (device address 1)



2. Switch to the mode selection screen.



3. Click “file mode”



4. Open the file used for the PZ900 master.

Select a file to use and click “Open (O).”

5. Similar to setting the PZ900 master, follow the procedures 9 through 14 to select the “Fn60 Communication setting” screen.

6. Set the communication related items of PZ900 slave (device address 1)

Set as follows for the data in “Fn60 Communication setting.” (Refer to **Table 4**.)

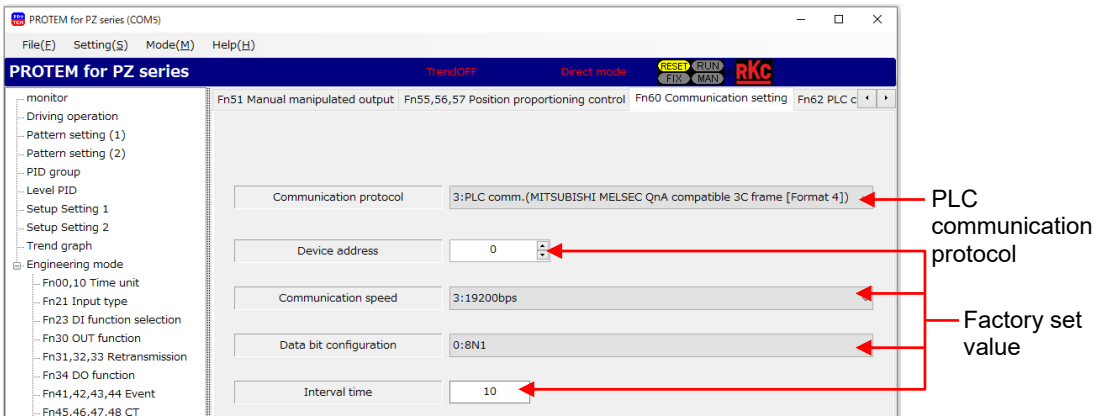
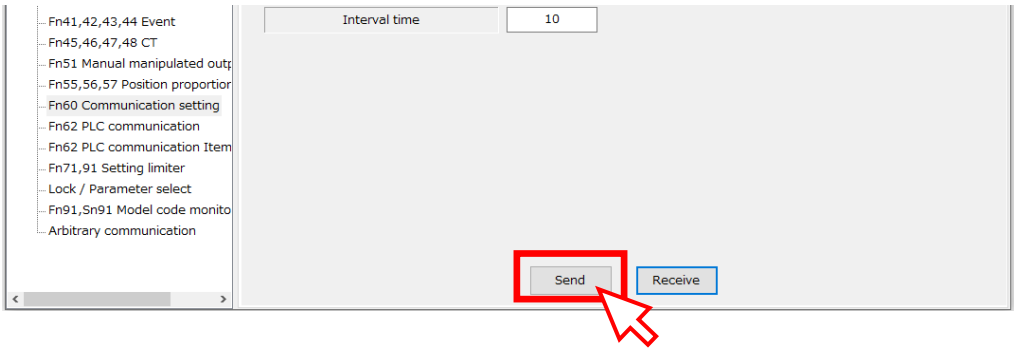


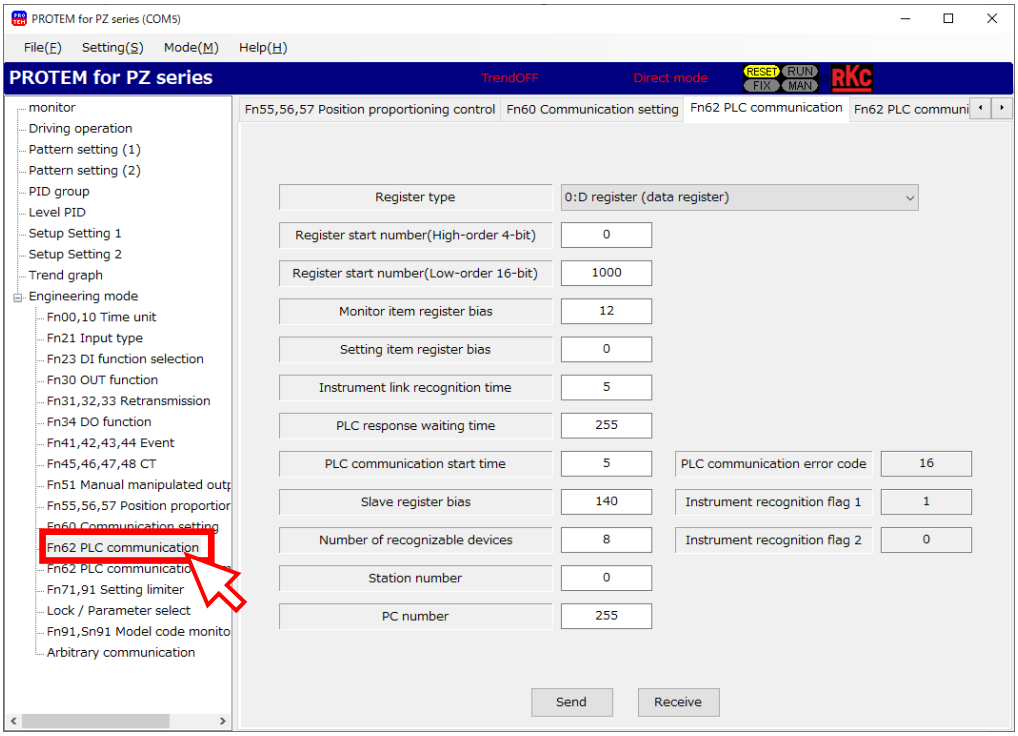
Table 4

Setting items		Set value	
(1)	Communication protocol	3	
(2)	Device address	1	(Factory set value)
(3)	Communication speed	3 (19200 bps)	(Factory set value)
(4)	Data bit configuration	0	(Factory set value)
(5)	Interval time	10	(Factory set value)

7. Click “Send” to send the modified data from PC to PZ.



8. Select the “Fn62 PLC communication” in a Tree View



9. Set the PLC communication environment items

Set the PLC communication environment setting at “Fn62 PLC communication.” Set the data at “Fn62 PLC communication” as follows. (Refer to **Table 5**.)

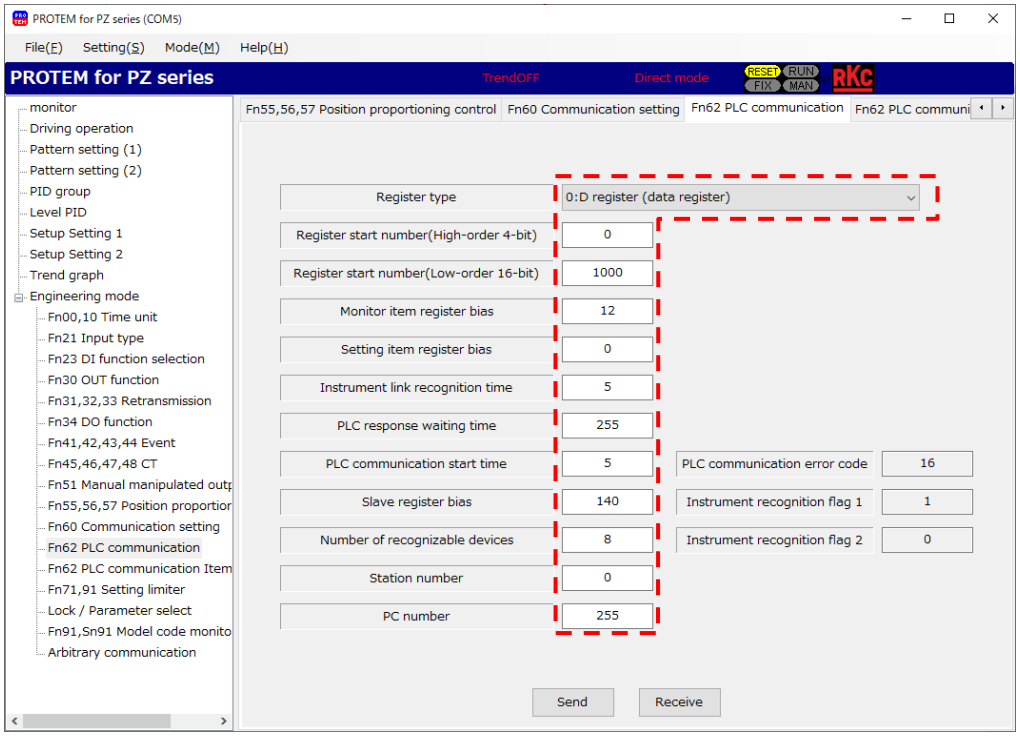


Table 5

Setting items		Set value		
(1)	Register type (D, R, W, ZR) [1]	0 (D register)	(Factory set value)	
(2)	Register start number (High-order 4-bit) [1]	0	(Factory set value)	These values can be changed to change the starting number of the PLC communication data register.
(3)	Register start number (Low-order 16-bit) [1]	1000	(Factory set value)	
(4)	Monitor item register bias [1]	12	(Factory set value)	
(5)	Setting item register bias [1]	0	(Factory set value)	
(6)	Instrument link recognition time	5 seconds	(Factory set value)	
(7)	PLC response waiting time	255 ms	(Factory set value)	
(8)	PLC communication start time [2]	5 seconds	(Factory set value)	
(9)	Slave register bias [1]	140	(Factory set value)	
(10)	Number of recognizable devices [3]	8		
(11)	Station number	0	(Factory set value)	
(12)	PC number	255	(Factory set value)	

[1] Usable register ranges and types vary depending on used CPU types. For register ranges and types that can actually be used, refer to the PLC instruction manual.

[2] The PLC communication start time is the time that writing of the system data starts.
Actual communication with the PLC by request command can only take place after the system communication state (D1140) changes to “1.”

[3] Only the PZ master device (device address 0) can be set up.

☞ For the Register start number, Monitor item register bias and Setting item register bias, refer to **P. 5-31**.

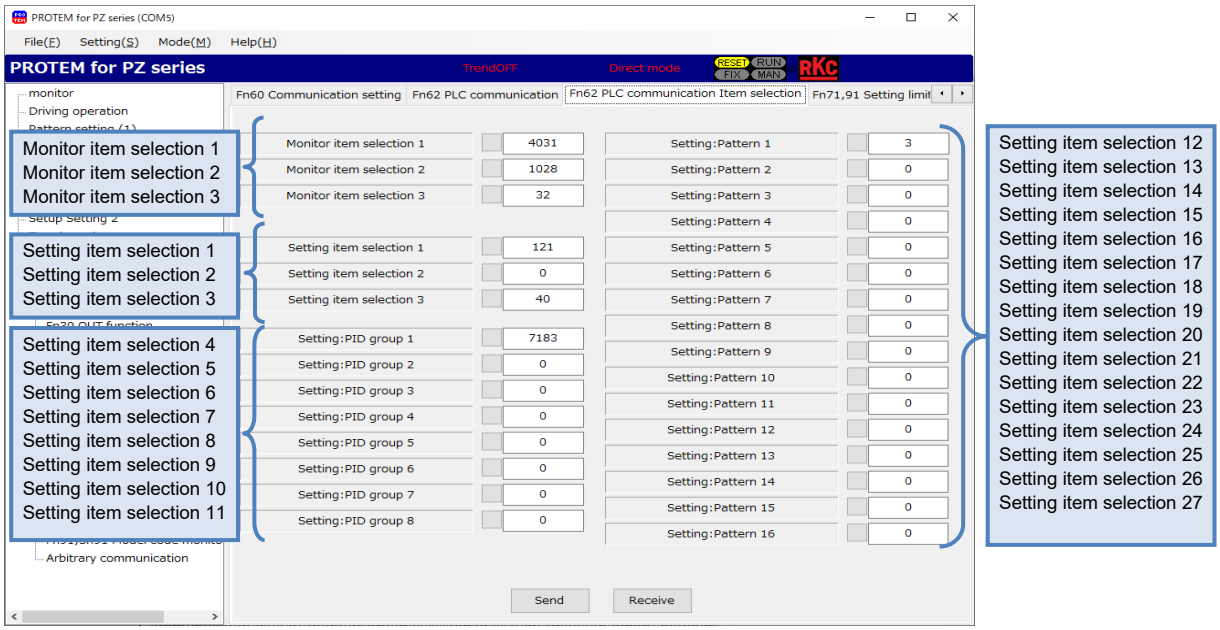
10. Select the communication data to use.

Select the communication data that are sent/received between the PLC and the PZ900 slave (device address 1). Selection of the communication data can be done at “Fn62 PLC communication Item selection.” In this example, factory preset values for “Fn62 PLC communication Item selection” are used. (Refer to **Table 6**)

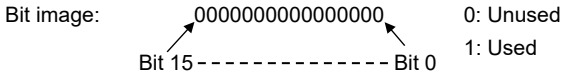
☞ To select communication data, refer to **6.3 Example of PLC Communication Data Map Editing (P. 6-67)**.

☞ For the communication data type and data range, refer to the following sections:

- **P. 5-8 to P. 5-23 of 5.2.1 Setting items list**
- **6.2 PLC Communication Data Map (P. 6-20)**



Communication data of monitor group is assigned as a bit image in binary numbers.



Example:

Communication data of Setting item selection 1

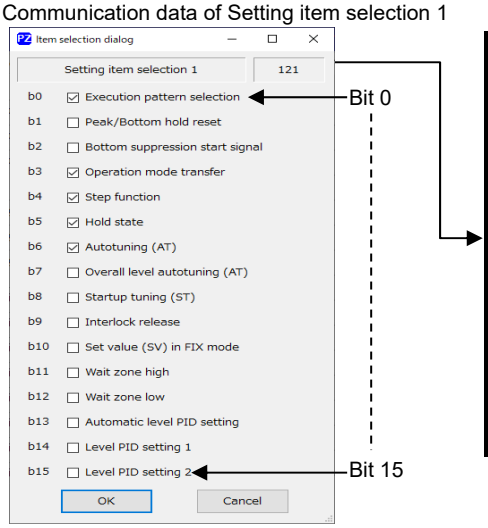


Table 3

Setting item	Set value (factory set value)	
	Bit	Decimal
Monitor item selection 1	0000111110111111	4031
Monitor item selection 2	0000000000100100	1028
Monitor item selection 3	0000000000100000	32
Setting item selection 1	0000000001111001	121
Setting item selection 2	0000000000000000	0
Setting item selection 3	0000000000101000	40
Setting item selection 4	0000000111001111	7183
Setting item selection 5 to 11	0000000000000000	0
Setting item selection 12	0000000000000011	3
Setting item selection 13 to 27	0000000000000000	0

11. Make other initial setting

Following the setting of the PLC communication environment items, set up necessary functions and a set value to operate the PZ900 slave (device address 1). This setting can be done using PROTEM2.

☞ Refer to **PZ400/PZ900/PZ401/PZ901 Instruction Manual (IMR03B05-E□)** for non-PLC communication related functions and parameters.

12. Activate the settings

To activate the settings done so far, shut down the PZ900 slave (device address 1) once, and reapply power to the instrument. After power up, the modified values become effective.
If the PZ is running on the power from the COM-K2 without turning on the mains supply, remove the loader communication cable once and reconnect it to the PZ. The same effect can be obtained as powering up the PZ.

(6) PLC communication register address

In the PLC communication environment, by setting the values shown below for the Register type, Register start number, Monitor item register bias, Setting item register bias, Monitor item selection, Setting item selection, and Slave register bias, the register address of each data item in PLC communication will be as indicated below.

PLC communication environment item	Set value	
	PZ900 master (device address 0)	PZ900 slave (device address 1)
Register type	0 (D register)	0 (D register)
Register start number (Low-order 16-bit)	1000	1000
Monitor item register bias	12	12
Setting item register bias	0	0
Monitor item selection 1	4031	4031
Monitor item selection 2	1028	1028
Monitor item selection 3	32	32
Setting item selection 1	121	121
Setting item selection 2	0	0
Setting item selection 3	40	40
Setting item selection 4	7183	7183
Setting item selection 5 to 11	0	0
Setting item selection 12	3	3
Setting item selection 13 to 27	0	0
Slave register bias	140	140

Occupied registers per data of PZ900
- System data (single word): One register per data
- Monitor group data (double word): Two registers per data
- Setting group data (double word): Two registers per data

The communication data selected at Monitor item selection and Setting item selection are assigned to the PLC register shifted to the left to remove blank.

Data map

Register address		Communication data	Data type
D1000	—	System communication state	PZ900 master (device address 0) System data (Single word)
D1001	—	Communication flag	
D1002	—	Internal processing	
D1003	—	Internal processing	
D1004	—	PLC communication error code	
D1005	—	PLC communication instrument recognition flag 1	
D1006	—	PLC communication instrument recognition flag 2	
D1007	—	Request item number	
D1008	—	Request command	
D1009	—	Setting group communication state	
D1010	—	Instrument recognition request command	
D1011	—	Internal processing	

Continued on the next page.

Continued from the previous page.

Data map

Register address		Communication data	Data type
D1012	D1013	Measured value (PV)	PZ900 master (device address 0) Monitor item selection 1 data (Double word)
D1014	D1015	Set value (SV) monitor	
D1016	D1017	Manipulated output value monitor [heat-side]	
D1018	D1019	Manipulated output value monitor [cool-side]	
D1020	D1021	Current transformer 1 (CT1) input value monitor	
D1022	D1023	Current transformer 2 (CT2) input value monitor	
D1024	D1025	Pattern number monitor	
D1026	D1027	Segment number monitor	
D1028	D1029	Segment level	
D1030	D1031	Segment time	
D1032	D1033	Segment remaining time monitor	
D1034	D1035	Overall operation status	PZ900 master (device address 0) Monitor item selection 2 data (Double word)
D1036	D1037	Comprehensive event state	
D1038	D1039	Error code	PZ900 master (device address 0) Monitor item selection 3 data (Double word)
D1040	D1041	Execution pattern selection	PZ900 master (device address 0) Setting item selection 1 data (Double word)
D1042	D1043	Operation mode transfer	
D1044	D1045	Step function	
D1046	D1047	Hold state	
D1048	D1049	Autotuning (AT)	
D1050	D1051	Heater break alarm 1 (HBA1) set value	PZ900 master (device address 0) Setting item selection 3 data (Double word)
D1052	D1053	Heater break alarm 2 (HBA2) set value	
D1054	D1055	PID group 1 Proportional band [heat-side]	PZ900 master (device address 0) Setting item selection 4 data (Double word)
D1056	D1057	PID group 1 Integral time [heat-side]	
D1058	D1059	PID group 1 Derivative time [heat-side]	
D1060	D1061	PID group 1 Control response parameter	
D1062	D1063	PID group 1 Proportional band [cool-side]	
D1064	D1065	PID group 1 Integral time [cool-side]	
D1066	D1067	PID group 1 Derivative time [cool-side]	
D1068	D1069	Pattern 1 Segment 1 level	PZ900 master (device address 0) Setting item selection 12 data (Double word)
D1070	D1071	Pattern 1 Segment 1 time	
D1072	D1073	Pattern 1 Segment 2 level	
D1074	D1075	Pattern 1 Segment 2 time	
D1076	D1077	Pattern 1 Segment 3 level	
D1078	D1079	Pattern 1 Segment 3 time	
D1080	D1081	Pattern 1 Segment 4 level	
D1082	D1083	Pattern 1 Segment 4 time	
D1084	D1085	Pattern 1 Segment 5 level	
D1086	D1087	Pattern 1 Segment 5 time	
D1088	D1089	Pattern 1 Segment 6 level	
D1090	D1091	Pattern 1 Segment 6 time	
D1092	D1093	Pattern 1 Segment 7 level	
D1094	D1095	Pattern 1 Segment 7 time	

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Data map

Register address		Communication data	Data type
D1096	D1097	Pattern 1 Segment 8 level	PZ900 master (device address 0) Setting item selection 12 data (Double word)
D1098	D1099	Pattern 1 Segment 8 time	
D1100	D1101	Pattern 1 Segment 9 level	
D1102	D1103	Pattern 1 Segment 9 time	
D1104	D1105	Pattern 1 Segment 10 level	
D1106	D1107	Pattern 1 Segment 10 time	
D1108	D1109	Pattern 1 Segment 11 level	
D1110	D1111	Pattern 1 Segment 11 time	
D1112	D1113	Pattern 1 Segment 12 level	
D1114	D1115	Pattern 1 Segment 12 time	
D1116	D1117	Pattern 1 Segment 13 level	
D1118	D1119	Pattern 1 Segment 13 time	
D1120	D1121	Pattern 1 Segment 14 level	
D1122	D1123	Pattern 1 Segment 14 time	
D1124	D1125	Pattern 1 Segment 15 level	
D1126	D1127	Pattern 1 Segment 15 time	
D1128	D1129	Pattern 1 Segment 16 level	
D1130	D1131	Pattern 1 Segment 16 time	
D1132	D1133	Pattern 1 Pattern end number	
D1034 ⋮ D1038	D1035 ⋮ D1039	Blank registers	—
D1140	—	System communication state	PZ900 slave (device address 1) System data (Single word)
D1141	—	Communication flag	
D1142	—	Internal processing	
D1143	—	Internal processing	
D1144	—	PLC communication error code	
D1145	—	PLC communication instrument recognition flag 1	
D1146	—	PLC communication instrument recognition flag 2	
D1147	—	Request item number	
D1148	—	Request command	
D1149	—	Setting group communication state	
D1150	—	Instrument recognition request command	
D1151	—	Internal processing	
D1152	D1153	Measured value (PV)	PZ900 slave (device address 1) Monitor item selection 1 data (Double word)
D1154	D1155	Set value (SV) monitor	
D1156	D1157	Manipulated output value monitor [heat-side]	
D1158	D1159	Manipulated output value monitor [cool-side]	
D1160	D1161	Current transformer 1 (CT1) input value monitor	
D1162	D1163	Current transformer 2 (CT2) input value monitor	
D1164	D1165	Pattern number monitor	
D1166	D1167	Segment number monitor	
D1168	D1169	Segment level	
D1170	D1171	Segment time	
D1172	D1173	Segment remaining time monitor	
D1174	D1175	Overall operation status	PZ900 slave (device address 1) Monitor item selection 2 data (Double word)
D1176	D1177	Comprehensive event state	

Continued on the next page.

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Data map

Register address		Communication data	Data type
D1178	D1179	Error code	PZ900 slave (device address 1) Monitor item selection 3 data (Double word)
D1180	D1181	Execution pattern selection	PZ900 slave (device address 1) Setting item selection 1 data (Double word)
D1182	D1183	Operation mode transfer	
D1184	D1185	Step function	
D1186	D1187	Hold state	
D1188	D1189	Autotuning (AT)	
D1190	D1191	Heater break alarm 1 (HBA1) set value	PZ900 slave (device address 1) Setting item selection 3 data (Double word)
D1192	D1193	Heater break alarm 2 (HBA2) set value	
D1194	D1195	PID group 1 Proportional band [heat-side]	PZ900 slave (device address 1) Setting item selection 4 data (Double word)
D1196	D1197	PID group 1 Integral time [heat-side]	
D1198	D1199	PID group 1 Derivative time [heat-side]	
D1200	D1201	PID group 1 Control response parameter	
D1202	D1203	PID group 1 Proportional band [cool-side]	
D1204	D1205	PID group 1 Integral time [cool-side]	
D1206	D1207	PID group 1 Derivative time [cool-side]	
D1208	D1209	Pattern 1 Segment 1 level	PZ900 slave (device address 1) Setting item selection 12 data (Double word)
D1210	D1211	Pattern 1 Segment 1 time	
D1212	D1213	Pattern 1 Segment 2 level	
D1214	D1215	Pattern 1 Segment 2 time	
D1216	D1217	Pattern 1 Segment 3 level	
D1218	D1219	Pattern 1 Segment 3 time	
D1220	D1221	Pattern 1 Segment 4 level	
D1222	D1223	Pattern 1 Segment 4 time	
D1224	D1225	Pattern 1 Segment 5 level	
D1226	D1227	Pattern 1 Segment 5 time	
D1228	D1229	Pattern 1 Segment 6 level	
D1230	D1231	Pattern 1 Segment 6 time	
D1232	D1233	Pattern 1 Segment 7 level	
D1234	D1235	Pattern 1 Segment 7 time	
D1236	D1237	Pattern 1 Segment 8 level	
D1238	D1239	Pattern 1 Segment 8 time	
D1240	D1241	Pattern 1 Segment 9 level	
D1242	D1243	Pattern 1 Segment 9 time	
D1244	D1245	Pattern 1 Segment 10 level	
D1246	D1247	Pattern 1 Segment 10 time	
D1248	D1249	Pattern 1 Segment 11 level	
D1250	D1251	Pattern 1 Segment 11 time	
D1252	D1253	Pattern 1 Segment 12 level	
D1254	D1255	Pattern 1 Segment 12 time	
D1256	D1257	Pattern 1 Segment 13 level	
D1258	D1259	Pattern 1 Segment 13 time	

Continued on the next page.

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Data map

Register address		Communication data	Data type
D1260	D1261	Pattern 1 Segment 14 level	PZ900 slave (device address 1) Setting item selection 12 data (Double word)
D1262	D1263	Pattern 1 Segment 14 time	
D1264	D1265	Pattern 1 Segment 15 level	
D1266	D1267	Pattern 1 Segment 15 time	
D1268	D1269	Pattern 1 Segment 16 level	
D1270	D1271	Pattern 1 Segment 16 time	
D1272	D1273	Pattern 1 Pattern end number	

7.5 Communication Setting of PLC

Set the CPU unit of MITSUBISHI MELSEC iQ-F series as follows.

Setting item	Description
Data bit	8
Parity bit	None
Stop bit	1
Sum check code	Exist

Setting item	Description
Communication rate setting	19200 bps
Communication protocol setting	MC protocol (Format 4)
Station number setting	0

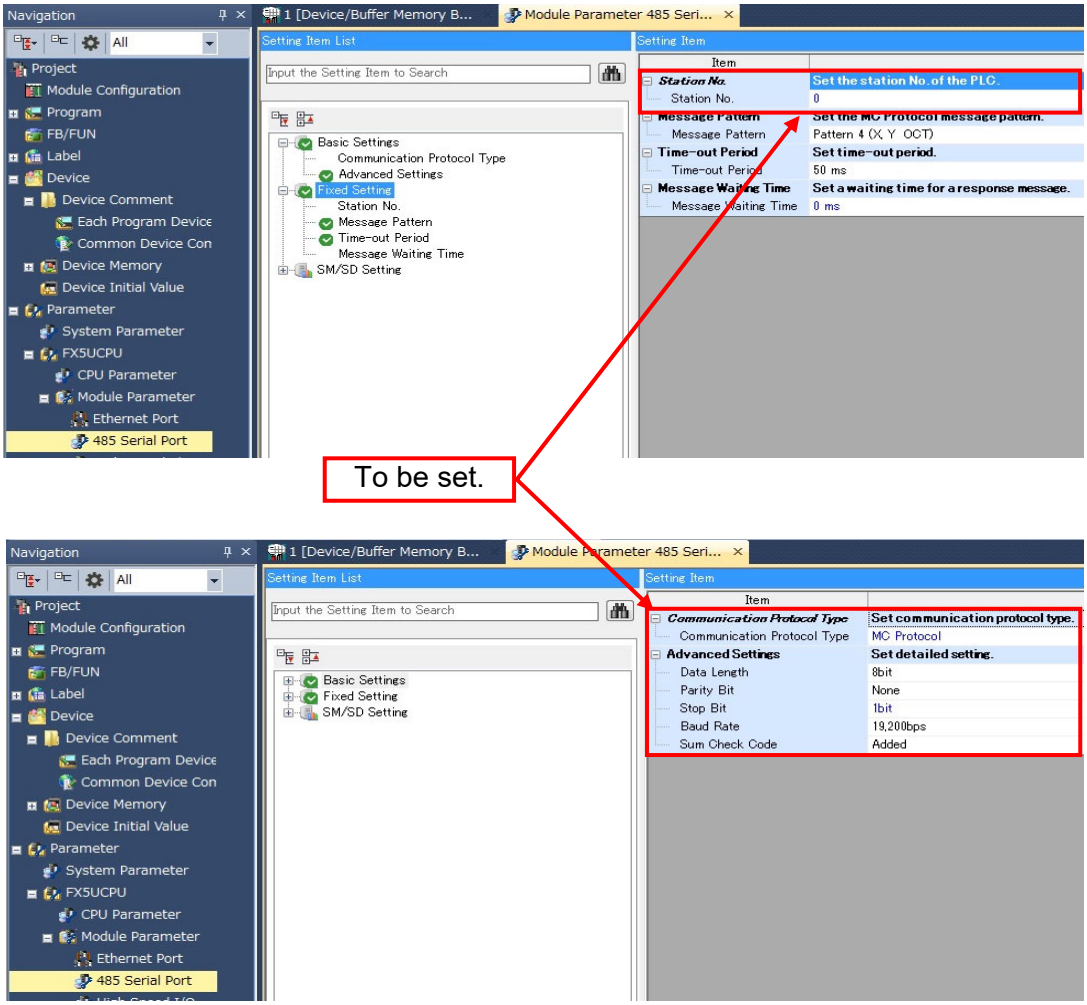
Setting in the FX5UC CPU unit belonging to the MITSUBISHI MELSEC iQ-F series do with the GX Works3 of the MITSUBISHI MELSEC PLC programming software.
Setting set the following set value with 485 serial port.

[Setting procedure]

[Parameter] → [FX5UCPU] → [Unit parameter] → [485 serial port]

[Setting screen]

The screen is a Japanese edition.



The details of the switch setting for the PLC, refer to the instruction manual for the PLC being used.

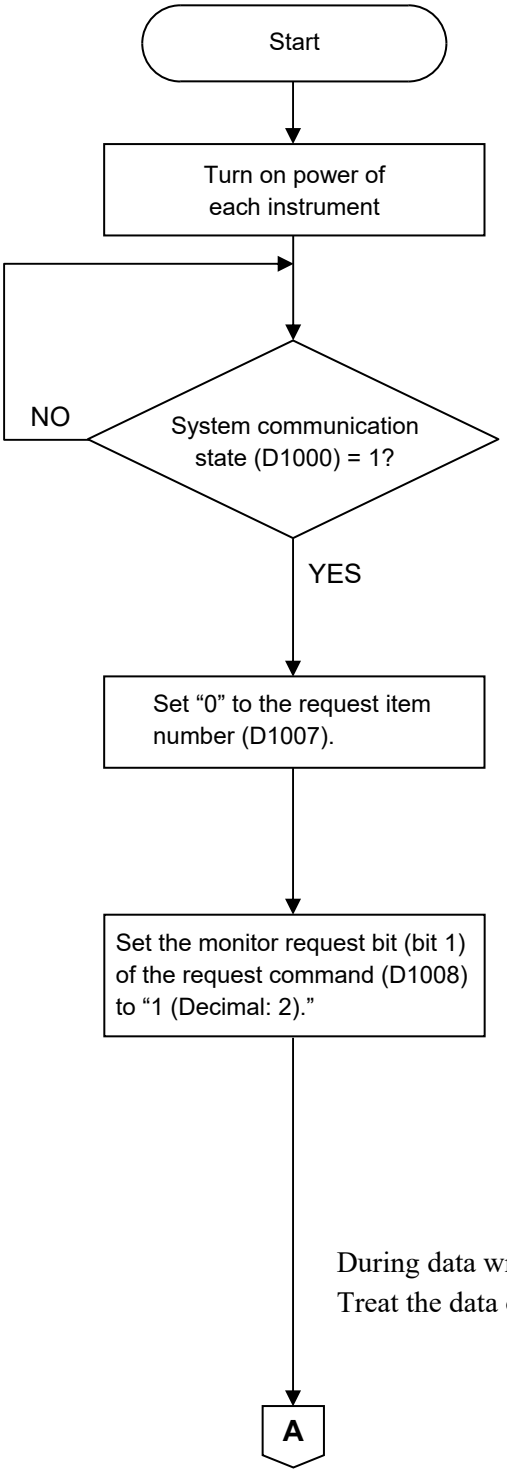
The setting of the communication related items of the PLC and the PZ must be equal. To verify the values of the PZ in this application example, refer to page **P.7-10**.

7.6 Initial Setting

NOTE

Change each set value of PZ900 controller from the PLC after the initial settings are made. Configure initial settings for all of the PZ900 controllers.

■ Initial setting of the PZ900

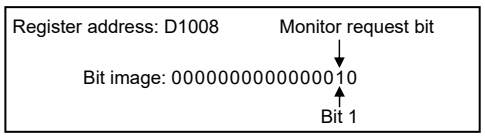


Turn on the power of the PZ900 controllers, and the PLC. When the PLC communication start time (factory setting: 5 seconds) elapses, writing of the system data begins.

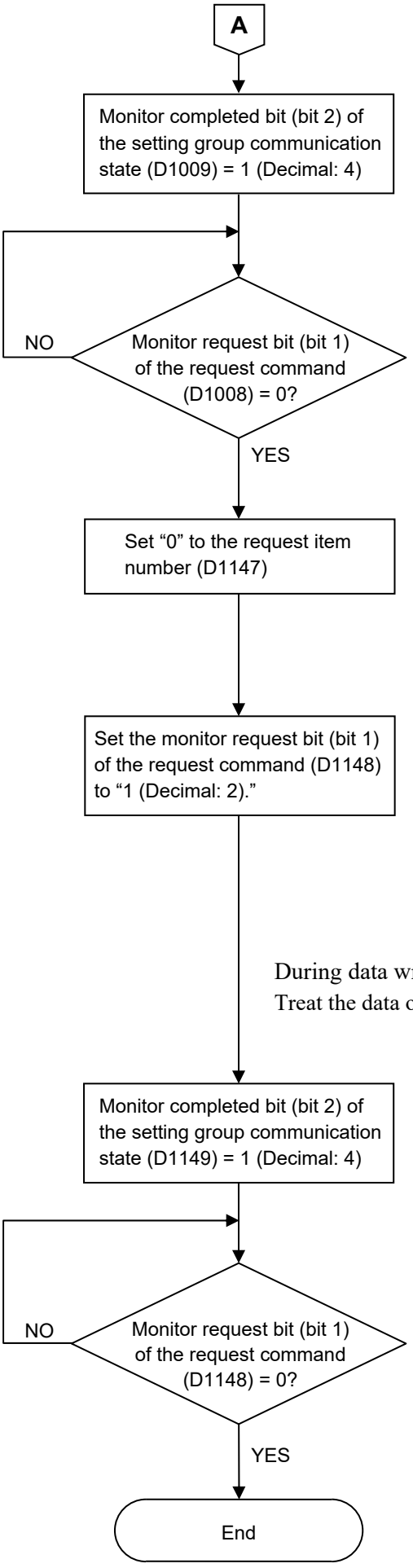
After the system data is written, the PZ900 controller begins writing the communication data of the monitor group to the PLC. When monitor group writing starts, “system communication state” changes to “1.”
When the system communication condition becomes “1,” PLC communication can be performed.

Data of the PZ900 master (device address 0) is transferred.
Because all communication data of the setting group is written to the PLC, the request item number (D1007) of the PLC register is set to “0.”

When the monitor request bit (bit 1) of request command (D1008) of the PLC register is set to “1 (Decimal: 2),” the PZ900 master begins writing the communication data of setting group to the PLC.

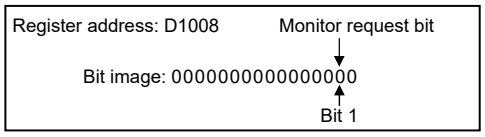


During data write:
Treat the data of all items as inconsistent during the data write.



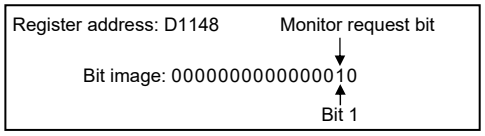
When writing is finished, the PZ900 master writes the communication state of the setting group to the monitor completed bit (bit 2) of the setting group communication state (D1009) of the PLC.

If the monitor request bit (bit 1) of the request command (D1008) of the PLC register is “0,” this indicates that writing of data to the PLC is finished.



Data of the PZ900 slave (device address 1) is transferred.
Because all communication data of the setting group is written to the PLC, the request item number (D1147) of the PLC register is set to “0.”

When the monitor request bit (bit 1) of request command (D1148) of the PLC register is set to “1 (Decimal: 2),” the PZ900 slave begins writing the communication data of setting group to the PLC.



During data write:
Treat the data of all items as inconsistent during the data write.

When writing is finished, the PZ900 slave writes the communication state of the setting group to the monitor completed bit (bit 2) of the setting group communication state (D1149) of the PLC.

If the monitor request bit (bit 1) of the request command (D1148) of the PLC register is “0,” this indicates that writing of data to the PLC is finished.

7.7 Data Setting

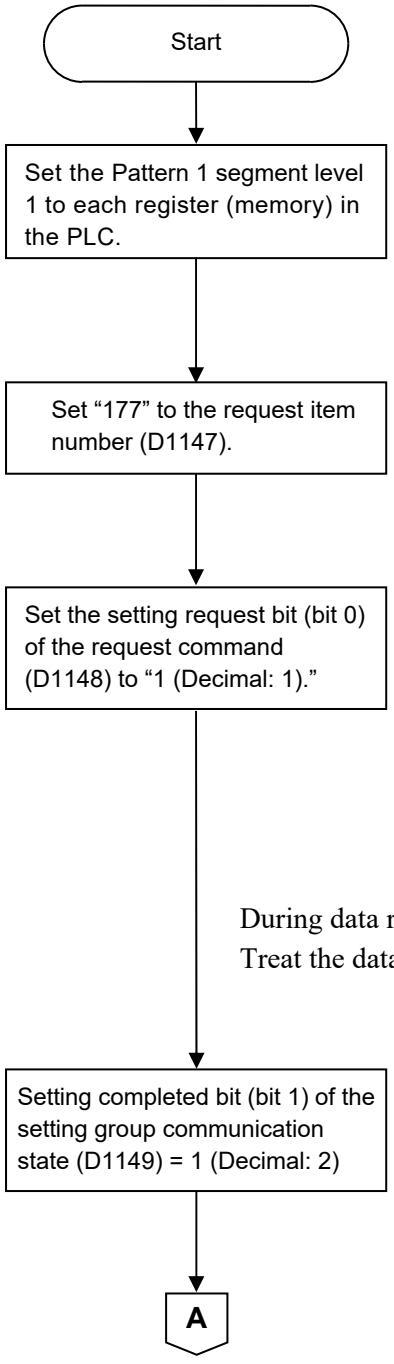
It is assumed that initial setting is finished.

NOTE

If each set value of the PZ900 controller is changed from the PLC without setting the initial values, it is re-written to 0 with each set value of the PLC at that time set to 0.

■ Setting example

When the Pattern 1 segment level 1 of PZ900 slave (device address 1) is set to 100 °C

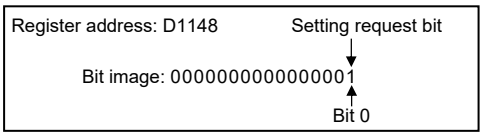


Set "100" as temperature set value to the PLC register D1208*.

* D1208 is the register address to which a Pattern 1 segment level 1 is assigned. (Refer to **P. 7-24**)

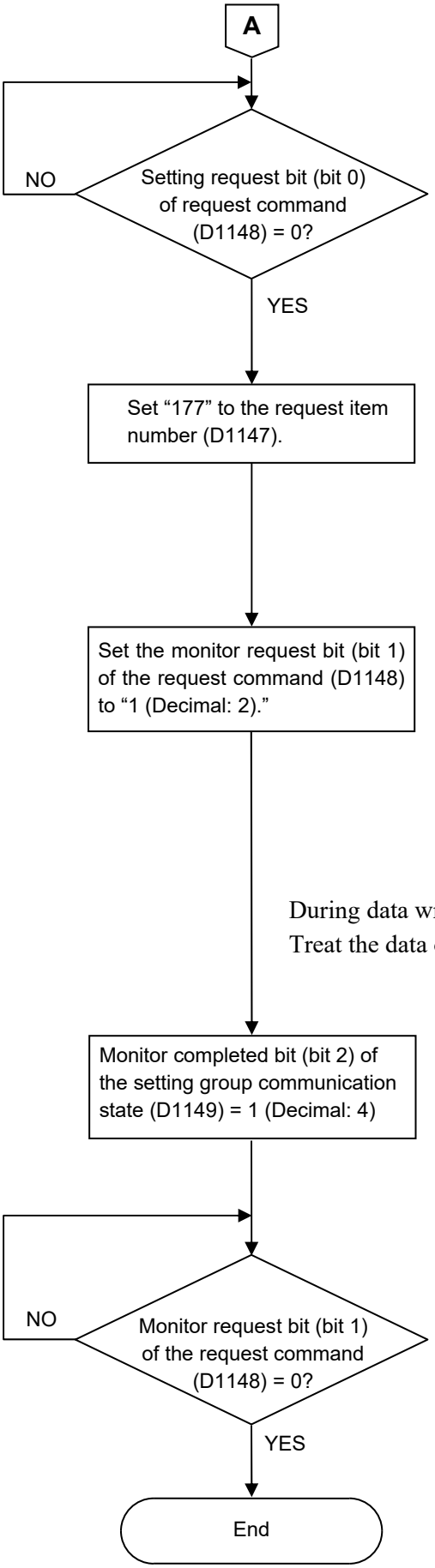
Set "177" (Item number including Pattern 1 Segment level 1) to D1147 (Request item number of the PLC register).

When setting "1 (1 in decimal)" to the setting request bit (Bit 0) of D1148, request command of the PLC register, PZ900 slave will start reading the data of Pattern 1 segment level 1 set to the PLC register (memory).

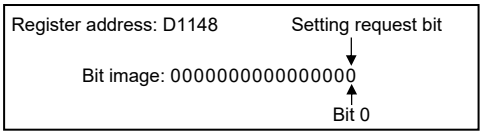


During data read:
Treat the data of all items as inconsistent during the data read.

When readout is completed, PZ900 slave will write the communication state of Pattern 1 segment level 1 to the Setting completed bit (Bit 1) of the PLC Setting group communication state D1149.



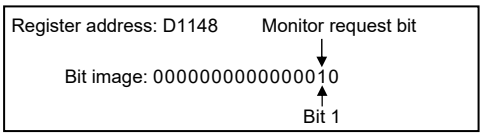
If the setting request bit (bit 0) of the request command (D1148) of the PLC register is “0,” this indicates that reading of data from the PLC is finished.



[Confirmation of setting data]]

Set “177” (Item number including Pattern 1 Segment level 1) to D1147 (Request item number of the PLC register) in order to verify the data that the PZ900 slave has read from the PLC.

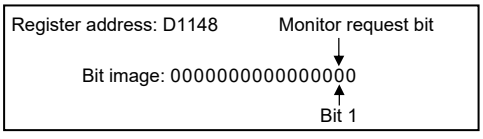
When the monitor request bit (bit 1) of request command (D1148) of the PLC register is set to “1 (Decimal 2),” the PZ900 slave begins writing the data of Pattern 1 segment level 1 to the PLC.



During data write:
Treat the data of all items as inconsistent during the data write.

When writing is finished, the PZ900 slave writes the communication state of the Pattern 1 segment level 1 to the monitor completed bit (bit 2) of the setting group communication state (D1149) of the PLC.

If the monitor request bit (bit 1) of the request command (D1148) of the PLC register is “0,” this indicates that writing of data to the PLC is finished.



TROUBLE SHOOTING

8

This section explains possible causes and treatment procedures if any abnormality occurs in the instrument. For any inquiries, please contact RKC sales office or the agent, to confirm the specifications of the product.

If it is necessary to replace a device, always strictly observe the warnings below.

⚠ WARNING

- To prevent electric shock or instrument failure, always turn off the system power before replacing the instrument.
- To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.
- To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.
- To prevent electric shock or instrument failure, do not touch the inside of the instrument.
- All wiring must be performed by authorized personnel with electrical experience in this type of work.

⚠ CAUTION

All wiring must be completed before power is turned on to prevent electric shock, instrument failure, or incorrect action. The power must be turned off before repairing work for input break and output failure including replacement of sensor, contactor or SSR, and all wiring must be completed before power is turned on again.

NOTE

When replacing the PZ with a new one, always use the module with the same model code. If the PZ is replaced, it is necessary to re-set each data item.

■ Solutions for Problems

Problem	Possible cause	Solution
Unable to communicate		
At "Communication response monitor" (CMRM) (P. 8-5) at Fn60 in the Engineering mode of the PZ: Transmission status monitor does not display 0 and 1 alternately.	Communication protocol of the PZ is not set to "PLC communication"	Select "3: PLC communication" at "Communication protocol" at Fn60.
At "Communication response monitor" (CMRM) (P. 8-5) at Fn60 in the Engineering mode of the PZ. • Transmission status monitor displays 0 and 1 alternately. • Reception status monitor does not display 0 and 1 alternately. RD/SD lamps on the PLC side RD lamp: Unlit SD lamp: Unlit	A communication message from the PZ has not reached the PLC. ↓ • Communication cable is wrongly connected. • Communication cable is not connected to the terminal. • Communication cable may be broken.	• Check terminal number and signal function, and properly connect the cable. • Check connection of communication cable. • Replace communication cable. Caution: Polarity of lines A and B of Mitsubishi PLC is just reversed from ours.
At "Communication response monitor" (CMRM) (P. 8-5) at Fn60 in the Engineering mode of the PZ. • Transmission status monitor displays 0 and 1 alternately. • Reception status monitor does not display 0 and 1 alternately. RD/SD lamps on the PLC side RD lamp: Flashing SD lamp: Unlit	A communication message from the PZ has reached the PLC, but the PLC will not reply. ↓ • Wrong communication wiring • Wrong communication setting No sum check in communication setting of the PLC	• Check terminal number and signal function, and properly connect the cable. Caution: Polarity of lines A and B of Mitsubishi PLC is just reversed from ours. • Use sum check in communication setting of the PLC.
At "Communication response monitor" (CMRM) (P. 8-5) at Fn60 in the Engineering mode of the PZ. • Transmission status monitor displays 0 and 1 alternately. • Reception status monitor displays 0 and 1 alternately. RD/SD lamps on the PLC side RD lamp: Flashing SD lamp: Slow flashing	The PLC sends a response to the communication message from the PZ, but the message is not received by the PZ. ↓ • Wrong communication wiring • Wrong communication setting No sum check in communication setting of the PLC	• Check terminal number and signal function, and properly connect the cable. For RS-422A, make sure RA and RB on the PZ side are properly wired. • Use sum check in communication setting of the PLC.
• Data transmission will not end even if "1" is set to the Setting request bit or Monitor request bit of the request command. The Setting request bit or Monitor request bit will not return to "0." • Communication seems to be working properly, but monitor values are not sent to the PLC. • No response	• Communication cable is wrongly connected. • Communication cable is not connected to the terminal. • Communication cable may be broken.	• Check terminal number and signal function, and properly connect the cable. • Check connection of communication cable. • Replace communication cable.
	Communication speed and data bit configuration are different from the PLC.	Check the communication speed and the data bit configuration of the PZ, and set the communication speed and the data bit configuration to be equal to those of the PLC.
	Communication protocol of the PZ is not set to "PLC communication"	Change the communication protocol of the PZ to the PLC communication.
	Wrong setting of PLC communication data	Confirm the PLC communication settings and set them correctly
		Setting of termination resistor in accordance with PLC or the insertion is done
	Setting of PLC becomes write inhibit	Setting of PLC is turned into write enable (Write enable in RUN, shift to monitor mode, etc.)
	Accesses outside the range of memory address of PLC (wrong setting of address)	Confirm the PLC communication environment setting and set them correctly

Continued on the next page.

Continued from the previous page.

Problem	Possible cause	Solution
An error occurs in the PLC communication error code. Bit 0 may be on. A request command was executed, but set values are updated only halfway through.	Writing to the PLC from the PZ fails. ↓ • PLC response waiting time is short. • Register range is out of available range.	• Extend the PLC response waiting time. • Check the setting of the PLC communication environment and set the values correctly.
To detect communication errors, a normal communication flag is used and a watchdog timer is programmed, yet timeout sometimes occurs.	When all of the set values are written into, the update of the normal communication flag may become slower. ↓ • Timeout time is too short. • PLC response waiting time is short.	• Extend the timeout time. • Extend the PLC response waiting time.
When two or more PZ are connected, some of these may not be recognized.	Instrument link recognition time is short	Lengthen Instrument link recognition time * * Set the Instrument link recognition time only for a PZ master (device address 0).
	The "Number of recognizable devices" may be incorrectly set up.	Check the total quantity of the connected instruments and set a correct value.
	• Turned on power to the PZ now connected. • PZ master, PZ slave, and PLC are powered on at different timing.	Conduct the recognition processing using Instrument recognition request command. When two or more PZ are connected and those that had been switched off are turned on again, the recognition processing of the controller must be performed.
When the setting request command of request command is set in "1," setting error is become (Bit 0 of setting group communication state: ON)	Data range error	Read the data once, and try to re-write the data into the controller. Confirm the setting range of set value and set them correctly

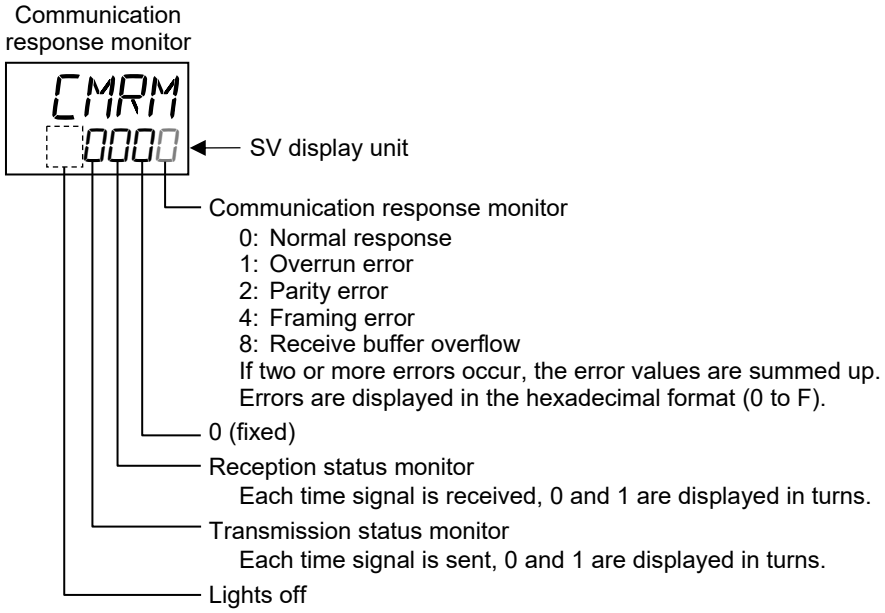
☞ For the communication speed, data bit configuration and communication protocol, refer to the following sections:

3.1 Communication Setting of PZ (P. 3-2)
5.2 PLC Communication Environment Items List (P. 5-3)

☞ For the PLC communication environment setting, Instrument link recognition time or Number of recognizable devices, refer to **5.2 PLC Communication Environment Items List (P. 5-3)**.

☞ For more details of the instrument recognition request command, refer to ■ **Instrument recognition request command (system data) (P. 6-11)**.

Communication response monitor [Engineering mode: Function block No. 60]



☞ For the display method of Communication response monitor, refer to the **3.1.2 Setting via front keys (P. 3-9)**.

MEMO

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RKC INSTRUMENT INC.

HEADQUARTERS: 16-6, KUGAHARA 5-CHOME, OHTA-KU TOKYO 146-8515 JAPAN
PHONE: 03-3751-9799 (+81 3 3751 9799)
E-mail: info@rkcinst.co.jp
Website: https://www.rkcinst.co.jp/english/

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