



Temperature Controller

GZ400/GZ900

Instruction Manual
[PLC Communication]

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.
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- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.


- 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
0	1	2	3	4	5	6	7	8	9	-	.
A	B (b)	C	c	D (d)	E	F	G	H	I	J	K
A	b	C	c	d	E	F	G	H	I	J	K
L	M	N	n	O (o)	P	Q	R	S	T	t	U
L	M	N	n	o	P	Q	R	S	T	t	U
u	V	W	X	Y	Z	Degree	/	Prime	* (Asterisk)	→	
u	V	W	X	Y	Z	°	/	'	*	→	

7-segment character

0	1	2	3	4	5	6	7	8	9	Minus	Period
0	1	2	3	4	5	6	7	8	9	-	.
A	B (b)	C	c	D (d)	E	F	G	H	I	J	K
A	b	C	c	d	E	F	G	H	I	J	K
L	M	N (n)	O (o)	P	Q	R	S	T	t	U	u
L	M	N	O	P	Q	R	S	T	t	U	u
V	W	X	Y	Z	Degree	/	Prime	* (Asterisk)			
V	W	X	Y	Z	°	/	'	*			

■ 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

Document Configuration

There are seven 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
GZ400/GZ900 Installation Manual	IMR03D01-E□	This manual is enclosed with instrument. This manual explains the mounting and wiring.
GZ400/GZ900 Quick Operation Manual	IMR03D02-E□	This manual is enclosed with instrument. This manual explains the basic key operation, mode menu, and data setting.
GZ400/GZ900 Parameter List	IMR03D03-E□	This manual is enclosed with instrument. This list is a compilation of the parameter data of each mode.
GZ400/GZ900 Instruction Manual [Part 1: Hardware]	IMR03D04-E□	This manual describes installation, wiring, troubleshooting and product specification.
GZ400/GZ900 Instruction Manual [Part 2: Parameters/Functions]	IMR03D05-E□	Parameters: This manual describes how to switch the operation modes and parameters, the range of parameters, and initialization/automatic conversion associated with the change of settings. Functions: This manual describes how to set up and each function.
GZ400/GZ900 Instruction Manual [Host Communication]	IMR03D07-E□	This manual explains RKC communication protocol (ANSI X3.28-1976) and Modbus relating to communication parameters setting.
GZ400/GZ900 Instruction Manual [PLC Communication]	IMR03D08-E2	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
<input type="checkbox"/>	I want to know the features of the PLC communication	1. OUTLINE
<input type="checkbox"/>	I want to know the operation flow to establish PLC communication	1. OUTLINE 7. USAGE EXAMPLE
<input type="checkbox"/>	I want to know the specification of the PLC communication	2. COMMUNICATION SPECIFICATIONS
<input type="checkbox"/>	I want to setting the device address and the communication speed of the instrument	3. COMMUNICATION SETTING 7. USAGE EXAMPLE
<input type="checkbox"/>	I want to check the communication speed and the data bit configuration of the PLC	3. COMMUNICATION SETTING
<input type="checkbox"/>	I want to know how to wiring between the instrument and the PLC	4. CONNECTION TO THE PLC
<input type="checkbox"/>	I want to check the PLC communication environment items	5. PLC COMMUNICATION ENVIRONMENT SETTING
<input type="checkbox"/>	I want to know the communication data transfer method	6. COMMUNICATION DATA
<input type="checkbox"/>	I want to know the communication data processing time	6. COMMUNICATION DATA
<input type="checkbox"/>	I want to know the register address and the communication data range	6. COMMUNICATION DATA
<input type="checkbox"/>	I want to reduce the amount of the communication data for the data transfer.	6. COMMUNICATION DATA
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Chapter 8 describes how to cope with errors during the communication.




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OUTLINE



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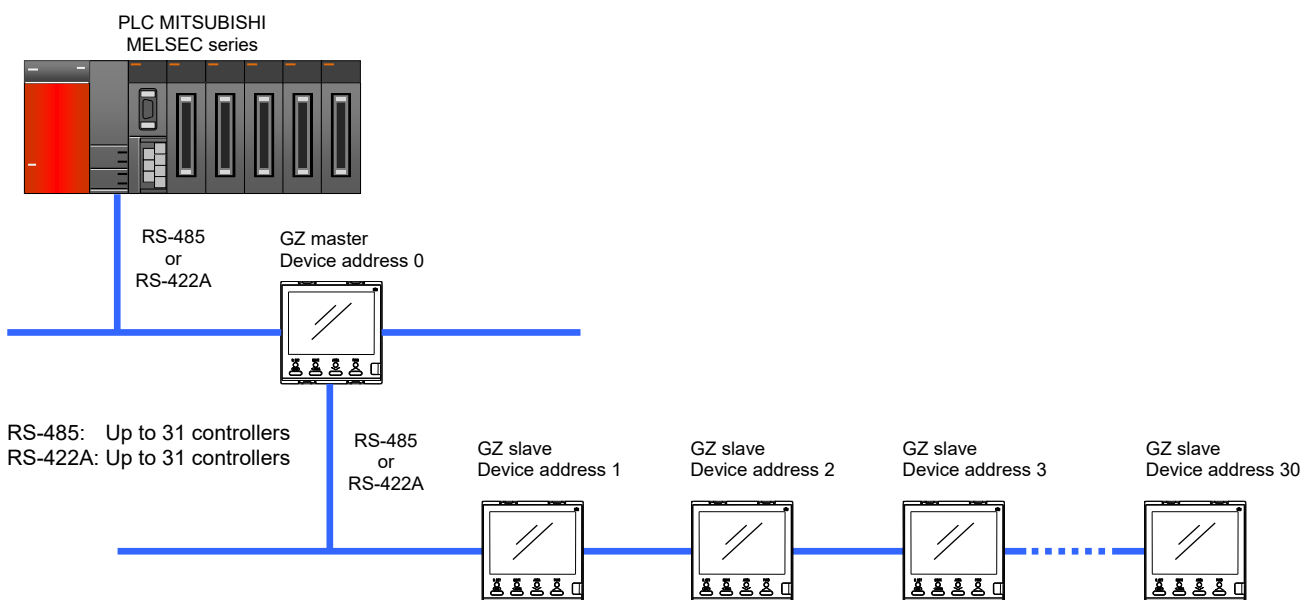
This manual describes the PLC communication.


-  Refer to **GZ400/GZ900 Instruction Manual [Host Communication] (IMR03D07-E□)** for the Host communication (RKC communication and Modbus).
-  Refer to **GZ400/GZ900 Instruction Manual [Part1: Hardware] (IMR03D04-E□)** for wiring power supply and inputs/outputs.
-  Refer to **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)** for descriptions of communication data (parameter) and functions.

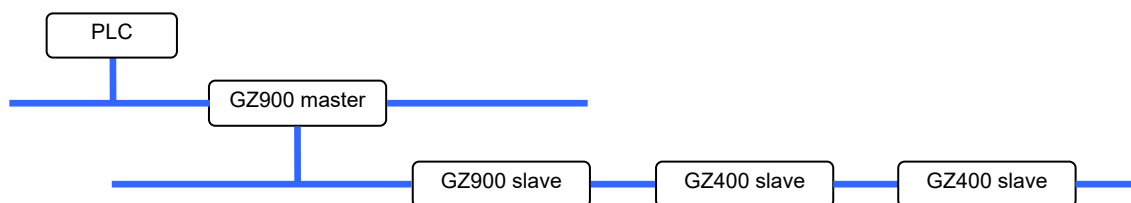
1.1 Features

The PLC communication function is used to exchange the data between a programmable logic controller (hereafter called “PLC”) and a GZ400/900 (hereafter called “GZ”) and to set the controller.

Up to 31 controllers can be connected to one PLC.



 Different types of the GZ 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 GZ 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 GZ

- 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.

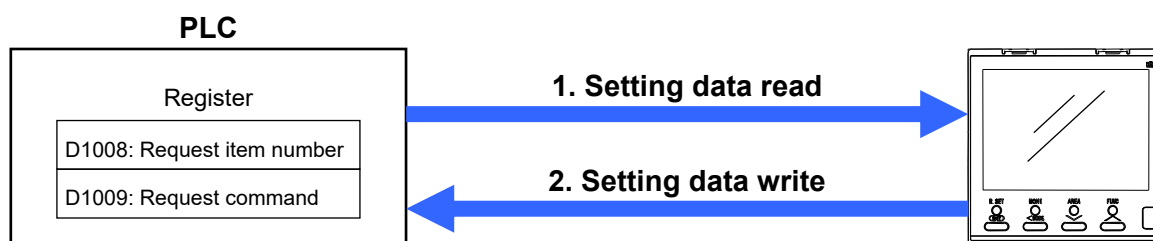
This is because the host and the PLC communication share the same communication terminals. When you edit the data map through the host communication, you have to make changes to the communication setup and the wiring to the PLC communication.



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 GZ.

■ 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 Ndf).



For the Input data type, refer to ■ **Input data type [Engineering mode: Function block No. 21] (P. 3-9).**

1.2 Usable PLC Modules

The GZ can be connected to MITSUBISHI MELSEC series module.



Check the website of Mitsubishi Electric for discontinued PLC modules.

■ Usable PLC modules

MELSEC Q series

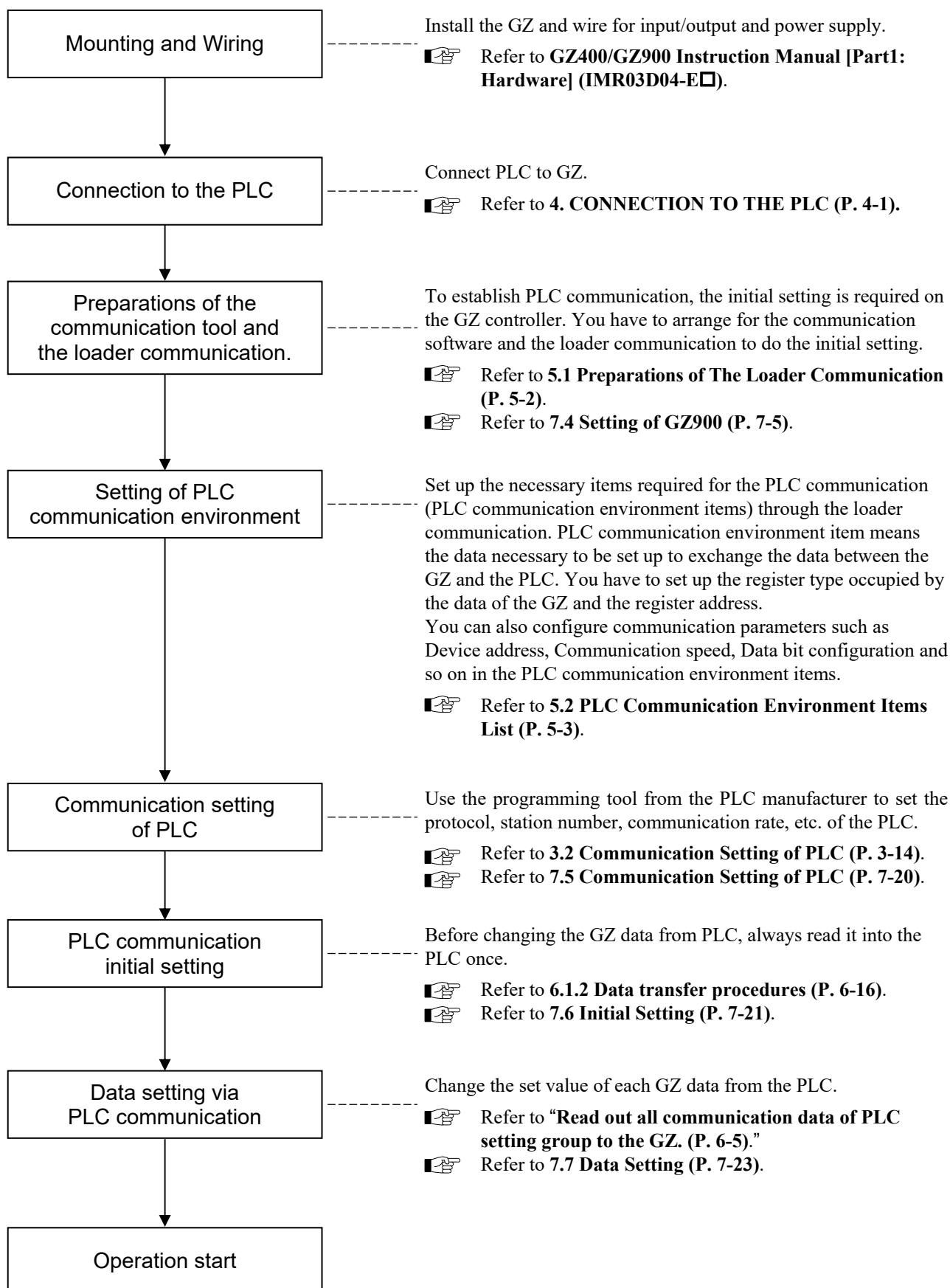
Name	Type
Serial communication modules	<ul style="list-style-type: none"> ● QJ71C24 ● QJ71C24N ● QJ71C24N-R4, etc. The QnA compatible 3C frame (Format 4) can use.

MELSEC iQ-F series

Name	Type
FX5U CPU Module	<ul style="list-style-type: none"> ● FX5U-32MR/ES ● FX5U-64MR/ES ● FX5U-80MR/ES The QnA compatible 3C frame (Format 4) can use.
FX5UC CPU Module	<ul style="list-style-type: none"> ● FX5UC-32MT/D ● FX5UC-64MT/D ● FX5UC-96MT/D The QnA compatible 3C frame (Format 4) can use.
Expansion board for RS-485 communication	<ul style="list-style-type: none"> ● FX5-485-BD
Expansion adapter for RS-485 communication	<ul style="list-style-type: none"> ● FX5-485ADP

1.3 Handling Procedure to Operation

Proceed as follows to establish communication and operate the system.



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COMMUNICATION SPECIFICATIONS

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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
115200 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 ($120\ \Omega$ 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 GZ to a single PLC

Signal logic: RS-422A, RS-485

Signal voltage	Logic
$V(A) - V(B) \geq 1.5\text{ V}$	0 (SPACE)
$V(A) - V(B) \leq -1.5\text{ V}$	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 **GZ400/GZ900 Instruction Manual [Host Communication] (IMR03D07-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 “LdRd” for the Measured value (PV) display and “----” for the Set value (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.

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COMMUNICATION SETTING

3

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3.1 Communication Setting of GZ

The following communication data of the GZ 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 *
- Soak time unit *

* 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. 6-30** and **P. 6-37**)

The communication data type can be selected at Input data type. (Refer to **P. 3-9**)

3.1.1 Contents of the communication data

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

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



NOTE

To set up the parameters in the Engineering mode, the control must be stopped (STOP).



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
292	<i>CMPS</i>	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 GZ. 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 GZ master recognizes the total number of connected GZ slaves (device address 1 to 30).



NOTE

- To set up the parameters in the Engineering mode, the control must be stopped (STOP).
- A master GZ 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
293	<i>Add</i>	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 GZ 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 GZ and the PLC.

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



NOTE

To set up the parameters in the Engineering mode, the control must be stopped (STOP).

Screen number	Symbol	Name	Data range	Factory set value
294	<i>bPS</i>	Communication speed	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: 57600 bps 6: 115200 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 GZ and the PLC. When two or more GZ are connected, set the same data bit configuration for all of them.



NOTE


To set up the parameters in the Engineering mode, the control must be stopped (STOP).

Screen number	Symbol	Name	Data range	Factory set value
295	<i>blf</i>	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]

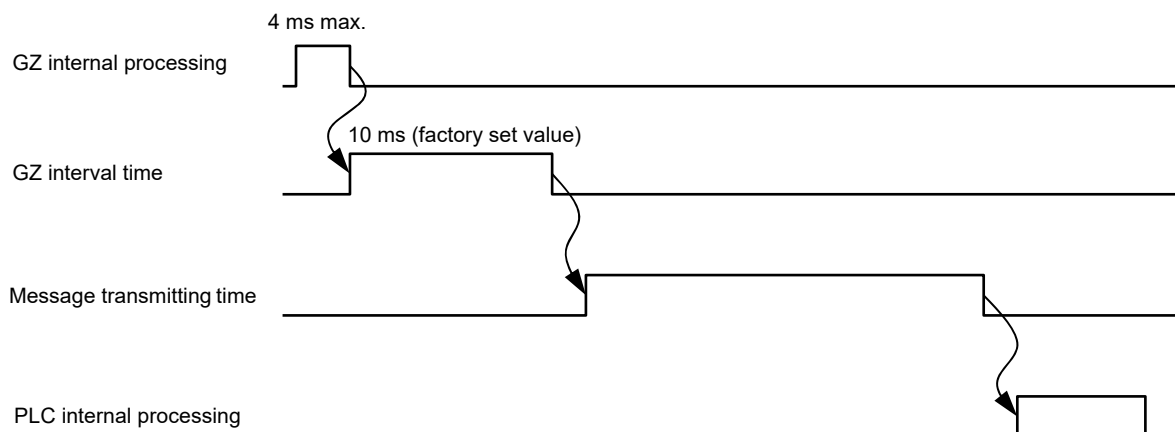
Set an interval time which is the latency between the data reception from the PLC and the data transmission from the GZ. The GZ sends the data to the PLC after the elapse of the time (GZ internal processing time + interval time).



NOTE


To set up the parameters in the Engineering mode, the control must be stopped (STOP).

Screen number	Symbol	Name	Data range	Factory set value
296	<i>INT</i>	Interval time	0 to 250 ms	10



■ Decimal point position [Engineering mode: Function block No. 21, No. 22]


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 **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)**.

Refer to “**■ Input range table**” of “**5.1 Changing Input**”

NOTE

- To set up the parameters in the Engineering mode, the control must be stopped (STOP).
- 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 **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)**.

Engineering mode: Function block No. 21

Screen number	Symbol	Name	Data range	Factory set value
167	<i>1.PCdP</i>	Input 1_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 or 2: 0 to 4 In case of Input data type 1: 0 to 3 (When Control with PV select: Decimal point position setting of Input 1 and Input 2 is compared and the smaller will be used.)	Same as the decimal point position of the input range code specified at the time of order. For V/I inputs: 1

Continued on the next page.


IMR03D08-E2

Screen number	Symbol	Name	Data range	Factory set value
183	<i>2.PGdP</i>	Input 2_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 is 0 or 2: 0 to 4 In case of Input data type is 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, No. 22]


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 **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)**.

Refer to “■ Input range table” of “5.1 Changing Input”

NOTE

- To set up the parameters in the Engineering mode, the control must be stopped (STOP).
- 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 **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)**.

Engineering mode: Function block No. 21

Screen number	Symbol	Name	Data range	Factory set value
168	<i>I.PC5H</i>	Input 1_Input range high	(Input 1_Input range low + 1digit) to Input 1_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
169	<i>I.PC5L</i>	Input 1_Input range low	Input 1_Minimum value of input range to (Input 1_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

Continued on the next page.

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Engineering mode: Function block No. 22

Screen number	Symbol	Name	Data range	Factory set value
184	<i>2.PGSH</i>	Input 2_Input range high	<ul style="list-style-type: none"> • TC/RTD inputs and Voltage (V)/Current (I) Inputs (For other than Remote setting input): (Input 2_Input range low + 1digit) to Input 2_Maximum value of input range Varies with the setting of the Decimal point position. • Voltage (V)/Current (I) Inputs (For Remote setting input): (Input 2_Input range low + 1digit) to Input 1_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
185	<i>2.PGSL</i>	Input 2_Input range low	<ul style="list-style-type: none"> • TC/RTD inputs and Voltage (V)/Current (I) Inputs (For other than Remote setting input): Input 2_Minimum value of input range to (Input 2_Input range high – 1digit) Varies with the setting of the Decimal point position. • Voltage (V)/Current (I) Inputs (For Remote setting input): Input 1_Minimum value of input range to (Input 2_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 word 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 **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)**.

Refer to “**■ Input range table**” of “**5.1 Changing Input.**”

NOTE

- To set up the parameters in the Engineering mode, the control must be stopped (STOP).
- 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 **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)**.

 In case of a dual input type, the input range of both Input 1 and Input 2 must be changed to a 4-digit display, otherwise changing to a single word system from a double word system is not possible.

Screen number	Symbol	Name	Data range	Factory set value
179	<i>I N d f</i>	Input data type	<p>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)</p> <p>1: Number of measured value digits: 4 Number of RKC communication data digits: 6 Modbus: Single word PLC communication data: Single word</p> <p>2: HA series equivalent (Communication identifiers of RKC communication and register address of Modbus switch to the HA series equivalent data.) Number of measured value digits: 5 Number of RKC communication digits: 7 Modbus: Double word PLC communication: Double word (System data: Single word)</p> <p>When changing the Input data type from 0 (or 2) 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.</p> <p>The unit of time depends on the Input data type. In case of Input data type 0 or 2 hour/minute/second, hour/minute, minute/second, second In case of Input data type 1 hour/minute, minute/second, second</p>	0

■ Soak time unit [Engineering mode: Function block No. 70]

The time unit of the Area soak time of the GZ is set here.

Available time unit may be restricted depending on the Input data type (Double word/Single word), whereas the Input data type may be restricted by the Soak time unit setting.

For example, when the Soak time unit is “2,” the Input data type cannot be changed from the double word to the single word. To change the type to the Single word, enter “0” or “1” in the Soak time unit.



NOTE

To set up the parameters in the Engineering mode, the control must be stopped (STOP).

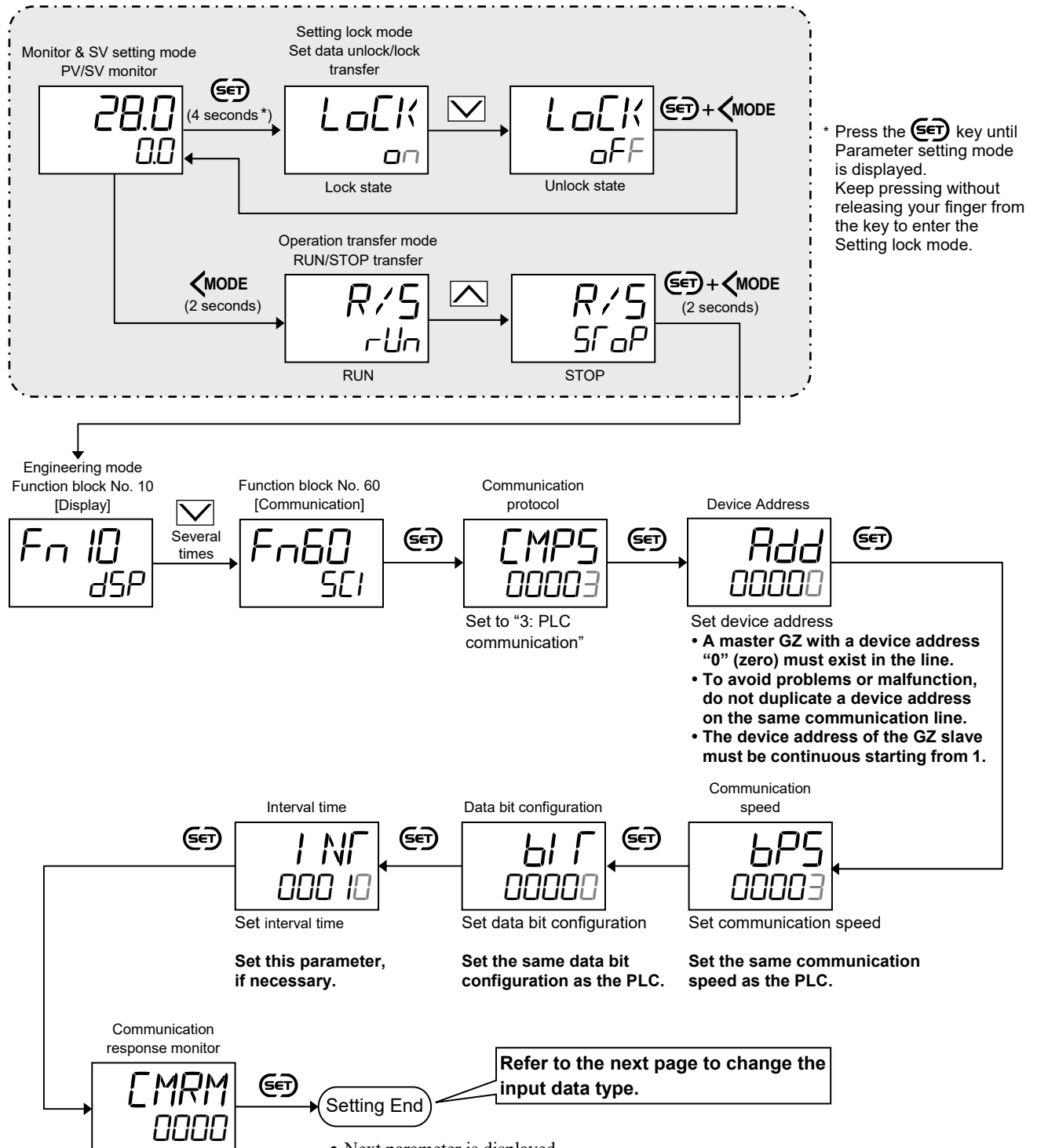
Screen number	Symbol	Name	Data range	Factory set value
309	<i>STDP</i>	Soak time unit	0: 0 hours 00 minutes to 99 hours 59 minutes 1: 0 minutes 00 seconds to 199 minutes 59 seconds 2: 0 hours 0 minutes 0 seconds to 9 hours 59 minutes 59 seconds 3: 0.00 seconds to 59.99 seconds In case of Input data type 0 or 2: 0 to 3 In case of Input data type 1: 0, 1 or 3	3

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


To enter the Engineering mode



- Next parameter is displayed.
- Press **SET** and **<MODE** keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor. (The **MONI** key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

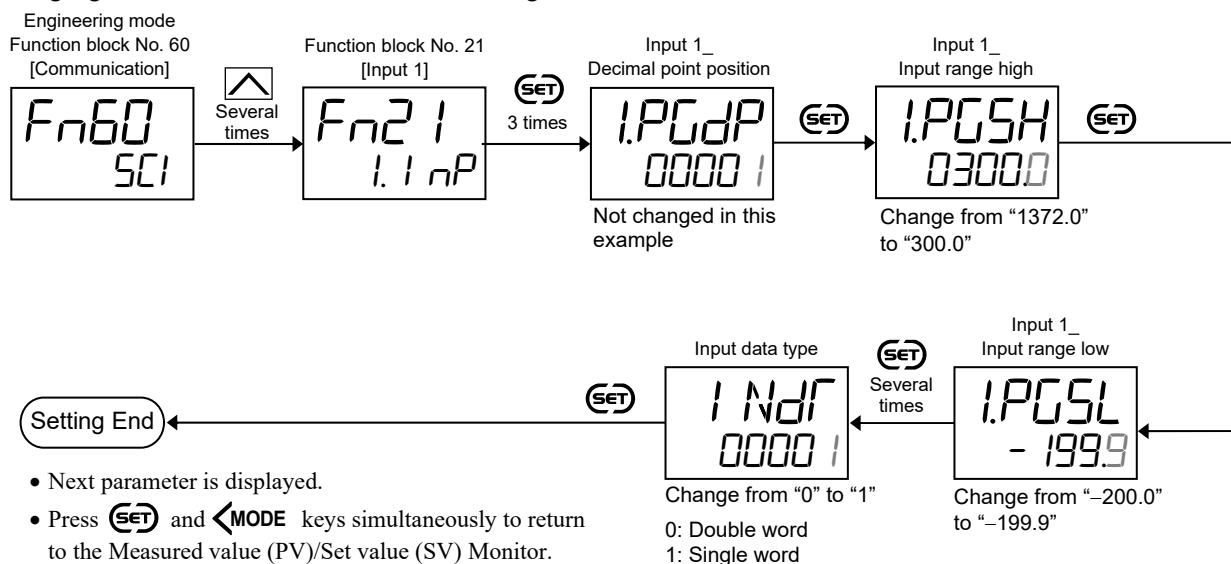
Changing example of Input data type

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.

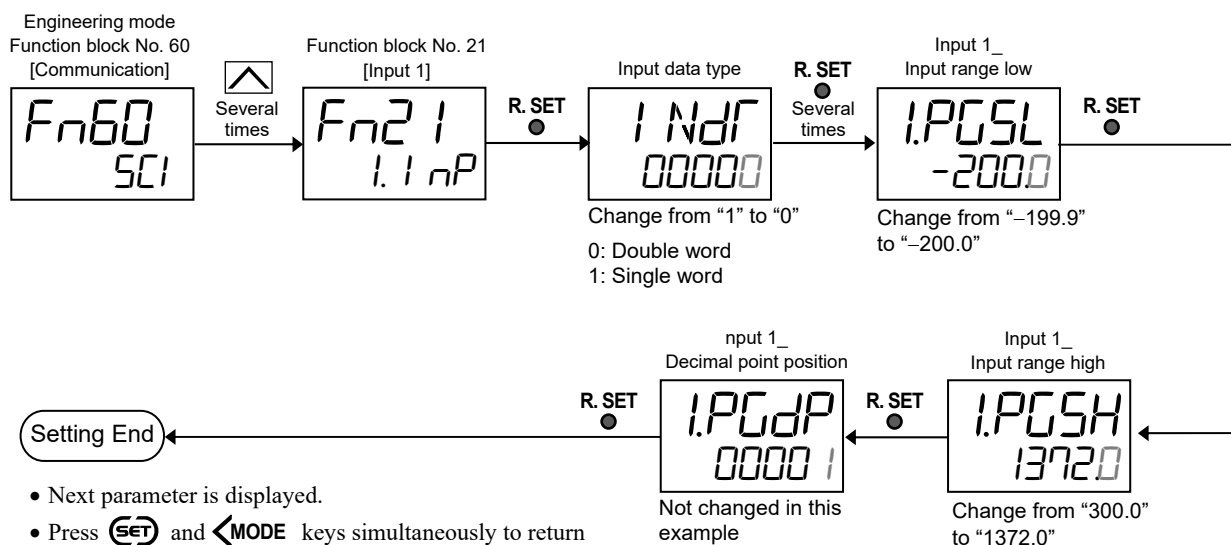
Conditions: Input type: Thermocouple K
 Input range: -200.0 to +1372.0 °C (Double word) -199.9 to +300.0 °C (Single word)
 Number of input: 1-input specification

- Changing from the Double word to the Single word



- Next parameter is displayed.
- Press **SET** and **◀MODE** keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
(The **MONI** key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

- Changing from the Single word to the Double word




- Next parameter is displayed.
- Press **SET** and **◀MODE** keys simultaneously to return to the Measured value (PV)/Set value (SV) Monitor.
(The **MONI** key may be pressed to return to the Measured value (PV)/Set value (SV) Monitor)
- Select RUN on the RUN/STOP transfer.
- Select lock on the Set data unlock/lock transfer.

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)**

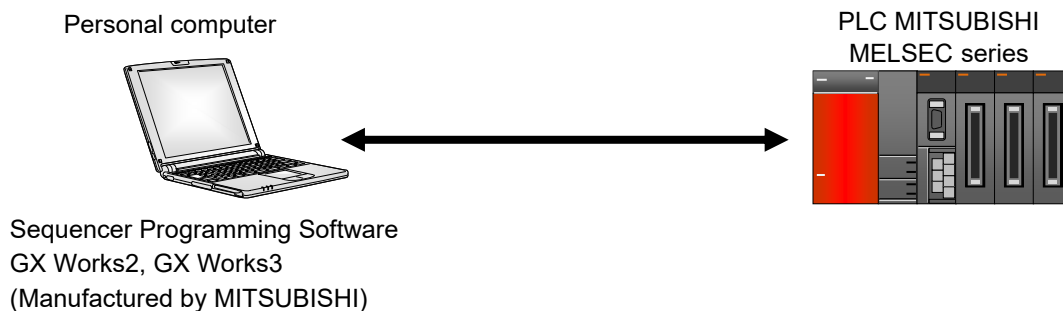
 **7.4 Setting of GZ900 (P. 7-5)**

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 GZ (GZ factory set value: 19200 bps)	Set the same as GZ (GZ 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

CONNECTION TO THE PLC

4

4.1 Wiring Cautions.....	4-2
4.2 Communication Terminal Number and Signal Details.....	4-4
4.3 Wiring Method.....	4-5

⚠ 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]

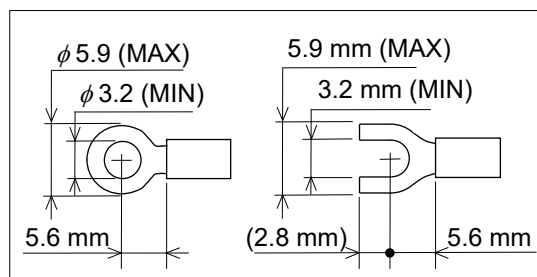
Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm²

Specified dimension: Refer to Fig. at the right

Specified solderless terminal:

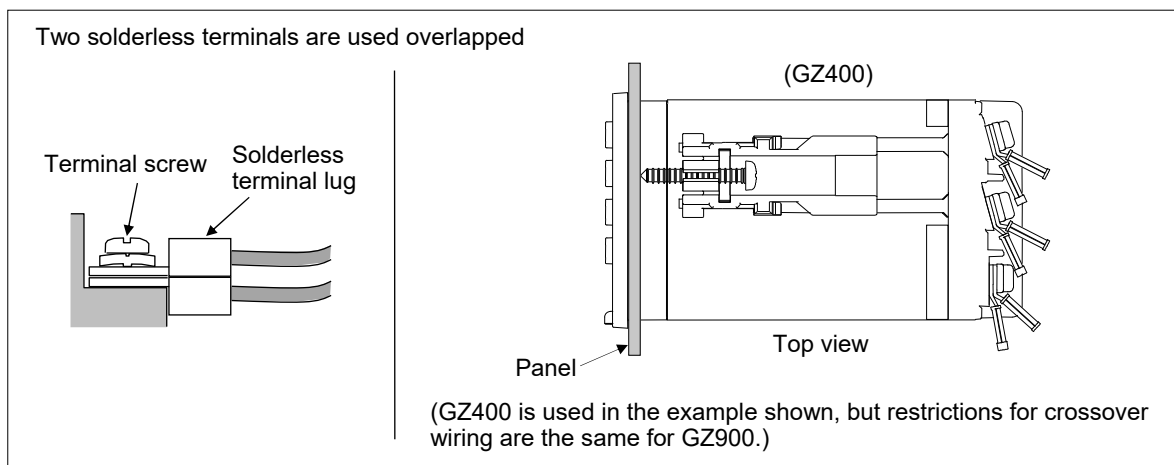
Manufactured by J.S.T MFG CO., LTD.

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.

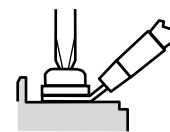
Continued from the previous page.



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.



Tilted terminal



Flat terminal

- The symbol of signal polarity A and B may be reversed between the MITSUBISHI MELSEC series and the GZ. 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 GZ (between communication terminals) at the furthest ends from the PLC.

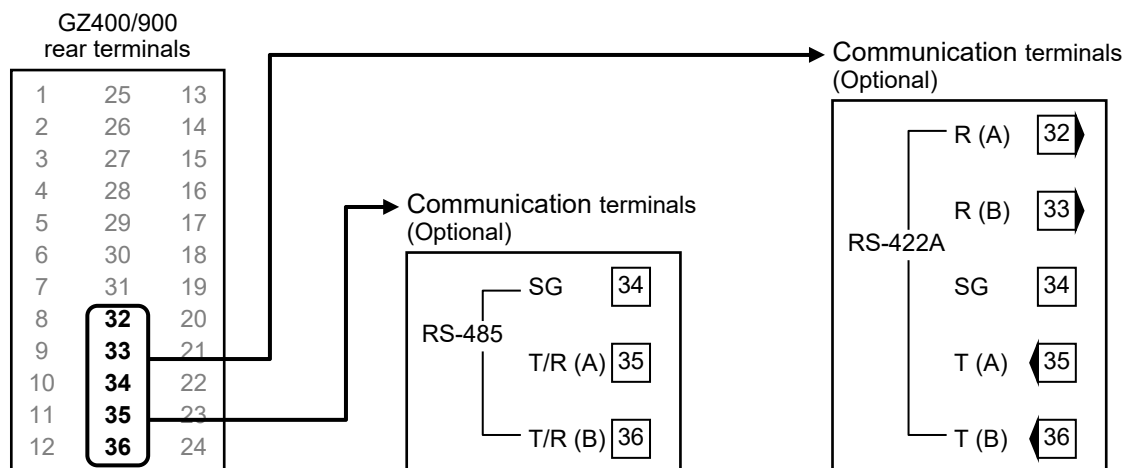


For the termination resistor of PLC, refer to instruction manual of PLC.

4.2 Communication Terminal Number and Signal Details

The GZ 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 GZ is linked with a PLC.

■ Terminal configuration



■ Signal details

• RS-485

GZ400/900 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

GZ400/900 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 GZ to the PLC. The connection described in this manual is just an example. When connecting the GZ to an actual PLC, consult the instruction manual of the PLC carefully and make a proper wiring between them.



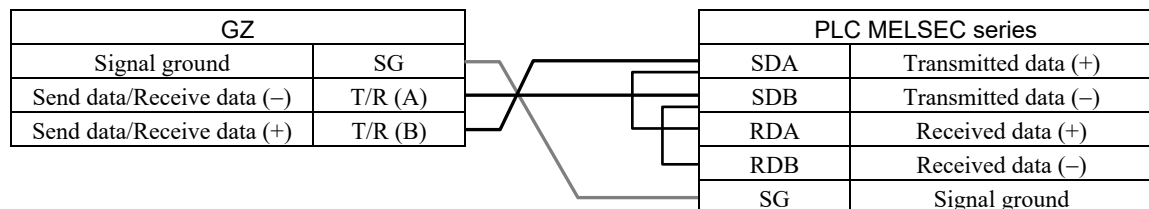
The communication cable must be provided by the customer.

4.3.1 Connecting through RS-485

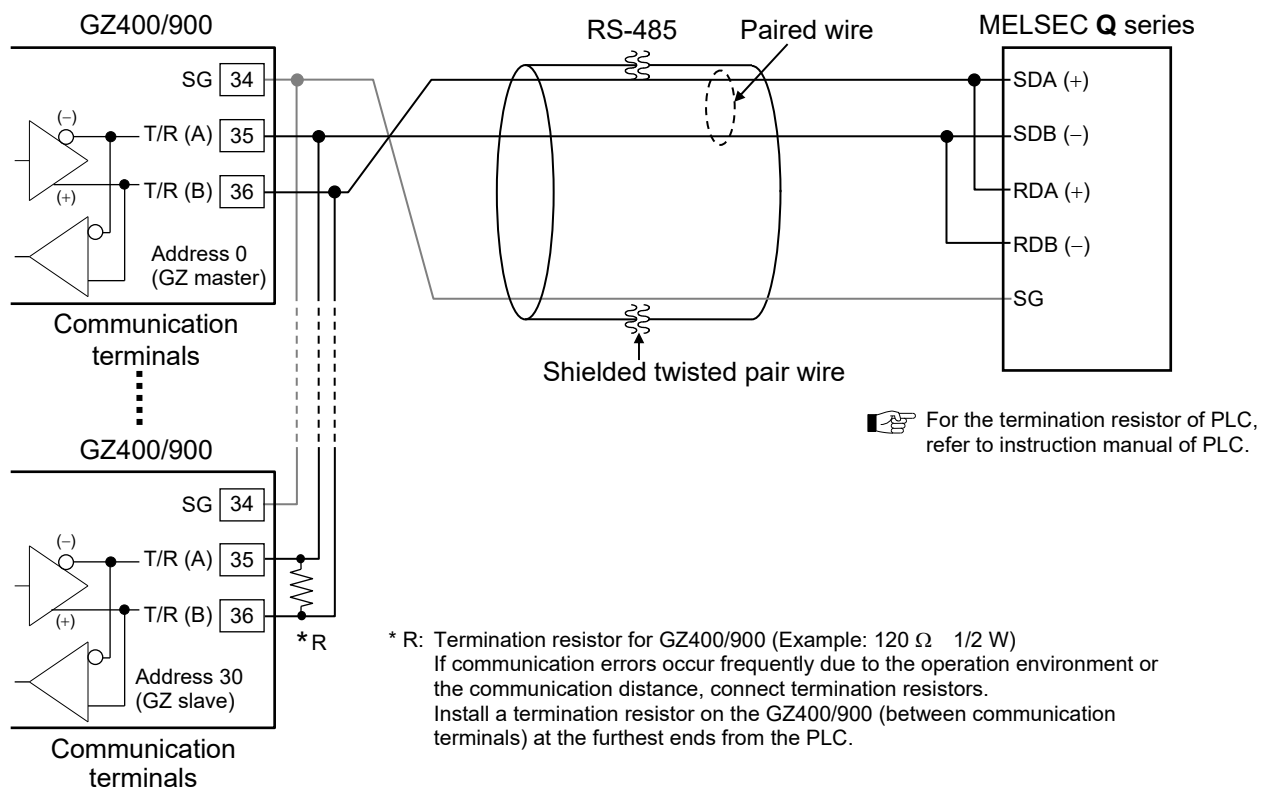


NOTE

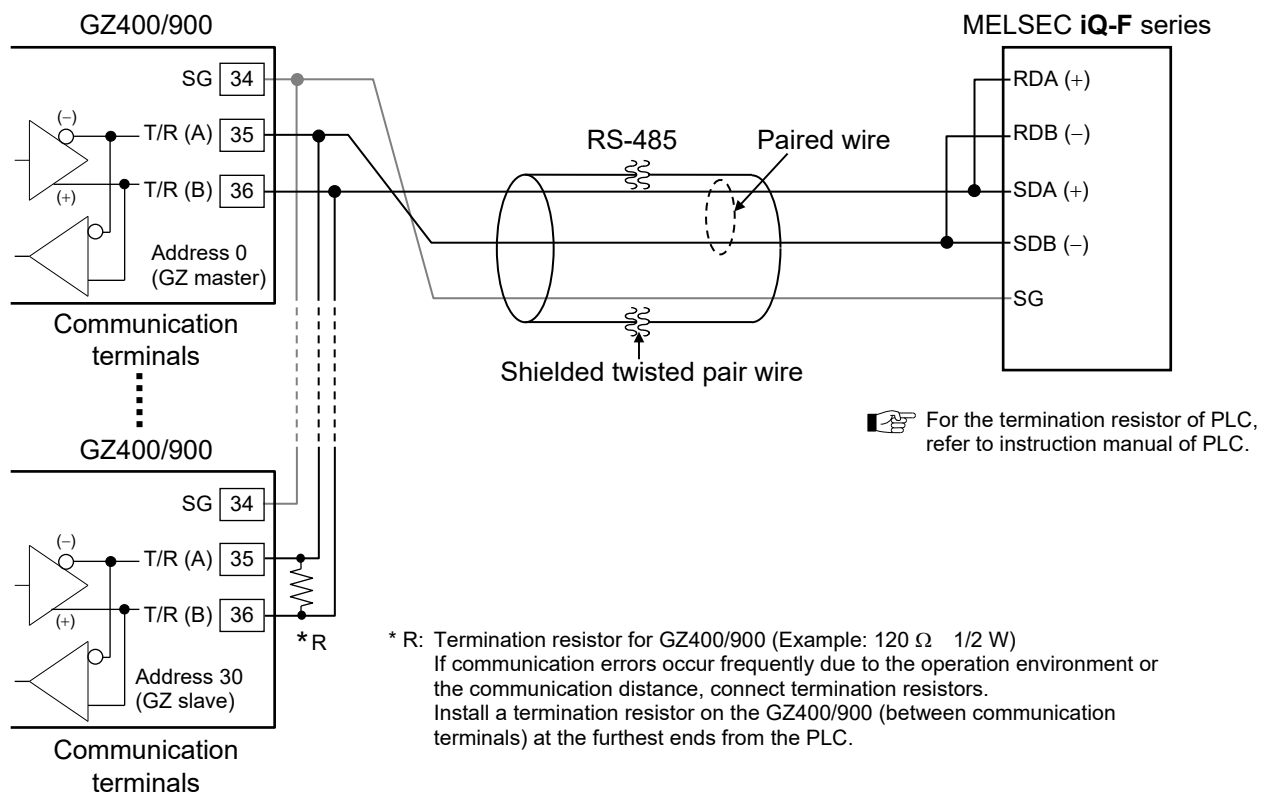
The symbol of signal polarity A and B may be reversed between the MITSUBISHI MELSEC series and the GZ. Normally signal A of a certain device is connected to signal A of the other device, and so for B to B. However, in this case, signal polarity A should be connected to B and the polarity B to A.



■ Connection example of GZ400/900 (RS-485)



Maximum connections: Up to 31 GZ400/900s



Maximum connections: Up to 31 GZ400/900s

4.3.2 Connecting through RS-422A

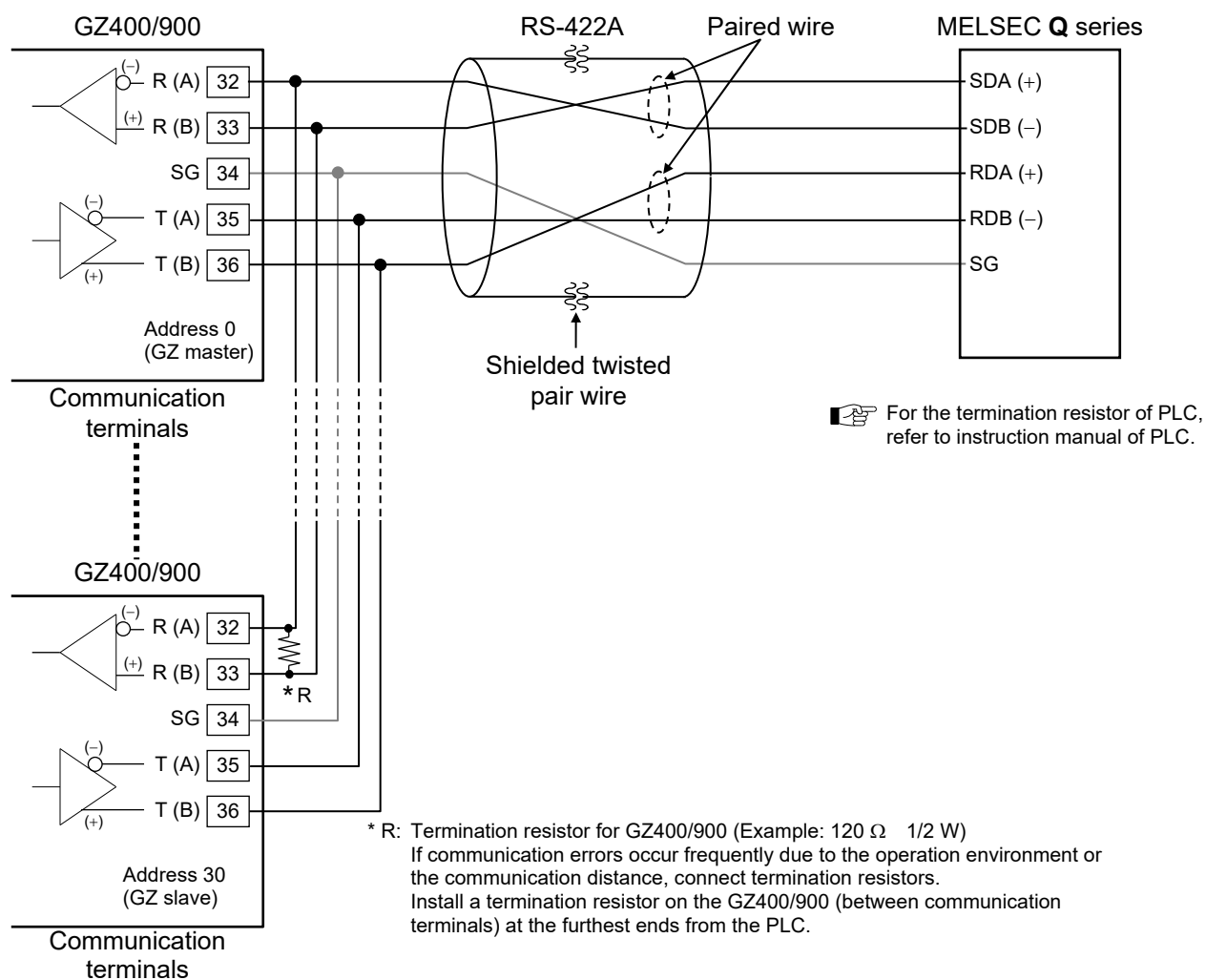


NOTE

The symbol of signal polarity A and B may be reversed between the MITSUBISHI MELSEC series and the GZ. 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.

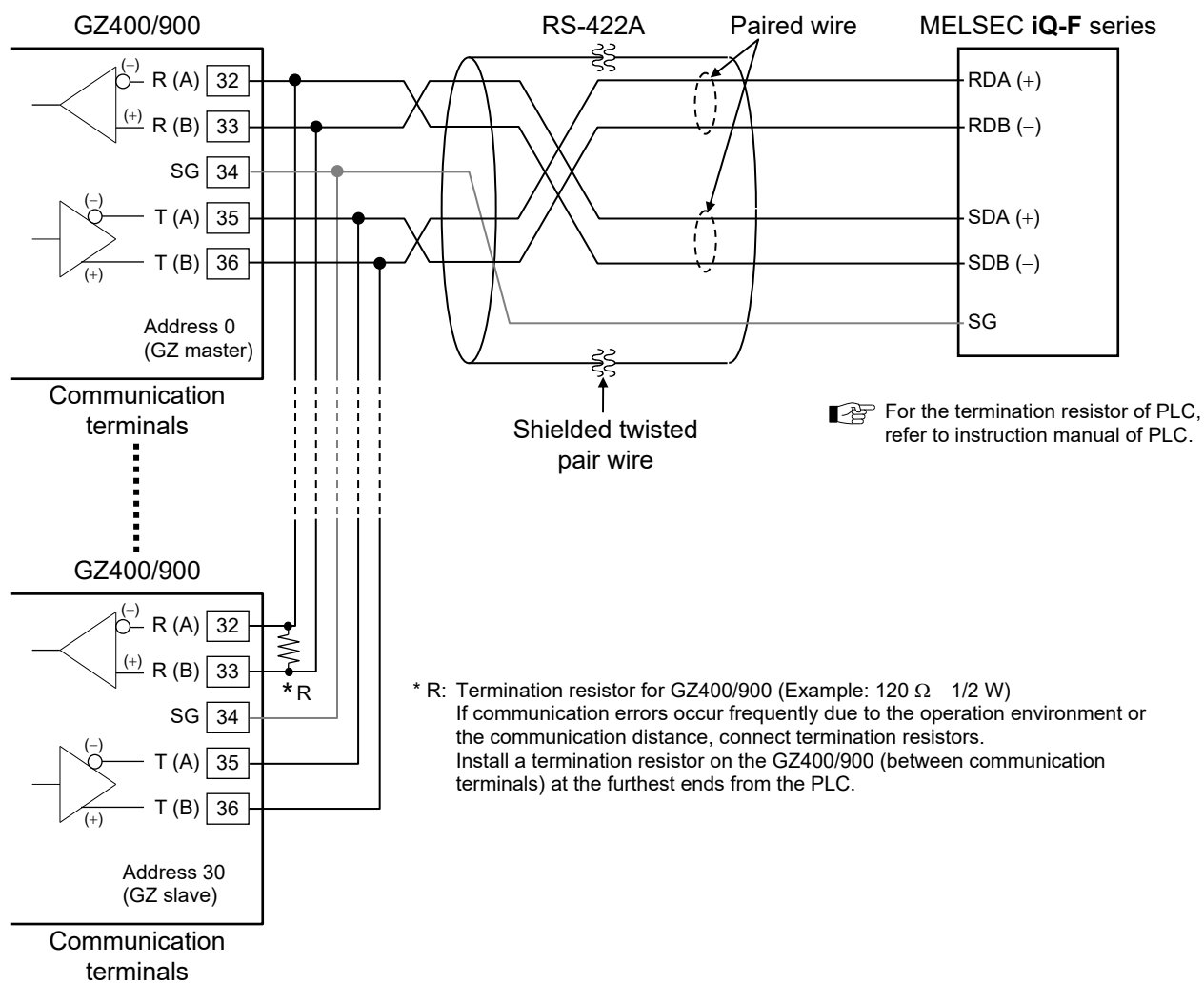
GZ		PLC MELSEC series	
Receive data (-)	R (A)	SDA	Transmitted data (+)
Receive data (+)	R (B)	SDB	Transmitted data (-)
Signal ground	SG	RDA	Received data (+)
Send data (-)	T (A)	RDB	Received data (-)
Send data (+)	T (B)	SG	Signal ground

■ Connection example of GZ400/900 (RS-422A)



Maximum connections: Up to 31GZ400/900s

4. CONNECTION TO THE PLC



Maximum connections: Up to 31 GZ400/900s

PLC COMMUNICATION ENVIRONMENT SETTING

5

5.1 Preparations of The Loader Communication	5-2
5.2 PLC Communication Environment Items List.....	5-3

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

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 PROTEM 2 from our web.

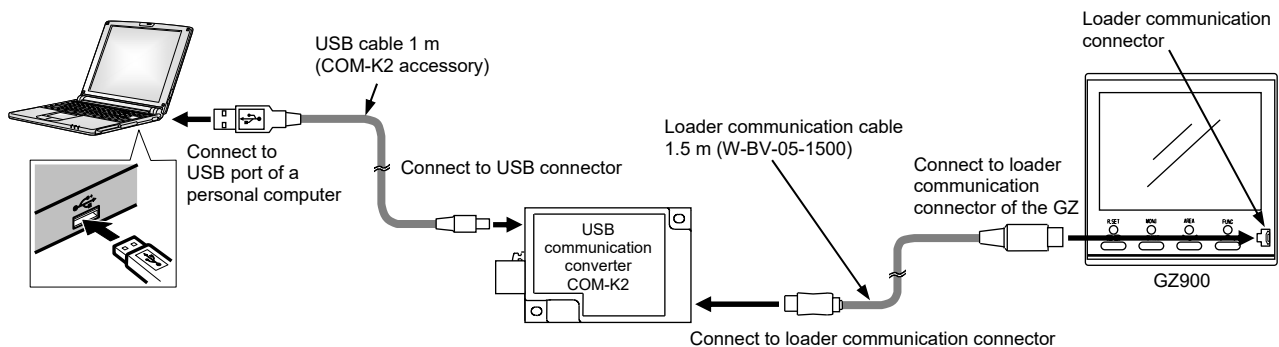
■ Wiring method

Connect the GZ400/900, 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
PROTEM 2

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 GZ.

5.2.1 Setting items list



NOTE

The following items become valid by turning off the power of the GZ once, and then turning it on again after the settings are changed. These items also become valid* by switching the control to RUN from STOP. The PLC communication is restarted (excluding the PLC communication start time).




* Only the GZ 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. 5-14**.

Name	Data range	Factory set value
Station number	0 to 31 Set the PLC station number to the GZ. Set it to the same number as the PLC.	0
PC number	0 to 255 Set the PLC PC number to GZ. (Refer to P. 5-16) Set it to the same number as the PLC. When connecting multiple GZ controllers to a PLC, set the same PC number to all of the GZ. When connecting the GZ 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. 5-19)	0
Register start number (Low-order 16-bit) * 	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. 5-19)	1000

: 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 **GZ400/GZ900 Parameter List (IMR03D03-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.

Continued on the next page.

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Name	Data range	Factory set value
Monitor item register bias * <input type="checkbox"/>	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. 5-18)	12
Setting item register bias * <input type="checkbox"/>	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. 5-18)	0
Monitor item selection 1 Monitor item selection 2 Monitor item selection 3	0 to 65535 Select a communication data of the monitor group for data communication between the GZ 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: 3459 Monitor item selection 2: 16512 Monitor item selection 3: 1024

☐: 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 **GZ400/GZ900 Parameter List (IMR03D03-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.

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Continued from the previous page.

Name	Data range	Factory set value
Setting item selection 1 Setting item selection 2 Setting item selection 3 Setting item selection 4 Setting item selection 5 Setting item selection 6 Setting item selection 7 Setting item selection 8	0 to 65535 Select a communication data of the setting group for data communication between the GZ 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 5-13)	Setting item selection 1: 16480 Setting item selection 2: 7850 Setting item selection 3: 32768 Setting item selection 4: 771 Setting item selection 5: 0 Setting item selection 6: 5 Setting item selection 7: 0 Setting item selection 8: 0
Instrument link recognition time <input type="checkbox"/>	0 to 255 seconds When connecting two or more GZ controllers, set the time required to recognize the second GZ and thereafter. Set this item to the GZ master (device address 0). When many GZ slaves are connected, setting short for the Instrument link recognition time may cause some of the GZ slaves not to be recognized. Set the Instrument link recognition time longer for such a case.	5
PLC response waiting time <input type="checkbox"/>	0 to 3000 ms Set the time of waiting for a response from the PLC. (Refer to P. 5-17) If communication with a PLC is not properly established, adjust the time longer.	255
PLC communication start time <input type="checkbox"/>	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 <input type="checkbox"/>	0 to 65535 (0: Slave register bias is invalid) When connecting two or more GZ, a bias is set for the register addresses of each GZ 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. 5-21)	80

☐: 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 **GZ400/GZ900 Parameter List (IMR03D03-E□)** [Enclosed with instrument].

Continued on the next page.

Continued from the previous page.

Name	Data range	Factory set value
Number of recognizable devices <input type="checkbox"/>	0 to 30 Set the quantity of the GZ slaves to be recognized by the GZ master. The recognition processing starts from device address 1. Set the maximum value of the device address of the GZ 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 GZ master with a device address of 0.	8
Device address <input type="checkbox"/>	PLC communication: 0 to 30 0: Master 1 to 30: Slave This is a device address of the GZ. The GZ master with a device address of 0 must always exist. The device address of the GZ slave must be continuous starting from 1. ----- RKC communication: 0 to 99 ----- Modbus: 1 to 99	0 ----- 0 ----- 1
Communication speed <input type="checkbox"/>	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: 57600 bps 6: 115200 bps Under this parameter, communication speed for data communication with a PLC can be selected. Set the same communication speed for the GZ and the PLC.	3
Data bit configuration <input type="checkbox"/>	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 GZ and the PLC.	0
Interval time <input type="checkbox"/>	0 to 250 ms Set the transmission waiting time until the data is returned after the receipt of the request from the PLC. The GZ sends the data to the PLC after the elapse of time (GZ internal processing time + interval time).	10

☐: Communication data settable via the front keypad. (Parameter of Function block No. 60 or No. 62 of Engineering mode)

For the parameter of function block No. 60 or No. 62, refer to **GZ400/GZ900 Parameter List (IMR03D03-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 	<p>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)</p> <p>1: Number of measured value digits: 4 Number of RKC communication data digits: 6 Modbus: Single word PLC communication data: Single word</p> <p>2: HA series equivalent (Communication identifiers of RKC communication and register address of Modbus switch to the HA series equivalent data.) Number of measured value digits: 5 Number of RKC communication digits: 7 Modbus: Double word PLC communication: Double word (System data: Single word)</p> <p>Select a single or a double word for the communication data. When changing the Input data type from 0 (or 2) 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.</p> <p>The unit of time depends on the Input data type. In case of Input data type 0 or 2 hour/minute/second, hour/minute, minute/second, second In case of Input data type 1 hour/minute, minute/second, second</p> <p>(Refer to P. 3-9)</p>	0

: 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 **GZ400/GZ900 Parameter List (IMR03D03-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.

Input 1 Decimal point position	■ Decimal point position (Refer to P. 3-5)
Input 2 Decimal point position	
Input 1 Input range high	■ Input range low/Input range high (Refer to P. 3-7)
Input 1 Input range low	
Input 2 Input range high	■ Input range low/Input range high (Refer to P. 3-8)
Input 2 Input range low	
Soak time unit	■ Soak time unit (Refer to P. 3-10)

● 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.

Bit image: 0000000000000000 0: Unused
 Bit 15 ----- Bit 0 1: Used



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



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

Table 1 Monitor item selection 1

Bit	Communication data (Monitor item)	Factory set value	
		Binary	Decimal
0	Input 1_Measured value (PV)	1	3459
1	Input 1_Set value (SV) monitor	1	
2	Input 2_Measured value (PV)	0	
3	Input 2_Set value (SV) monitor	0	
4	PV select Measured value (PV)	0	
5	Measured value (PV) of differential temperature input	0	
6	Set value (SV) monitor of differential temperature input	0	
7	Input 1_Manipulated output value monitor [heat-side]	1	
8	Input 1_Manipulated output value monitor [cool-side]	1	
9	Input 2_Manipulated output value monitor	0	
10	Current transformer 1 (CT1) input value monitor	1	
11	Current transformer 2 (CT2) input value monitor	1	
12	Memory area soak time monitor	0	
13	Remote setting input value monitor	0	
14	Unused	0	
15	Event 1 state monitor	0	

Table 2 Monitor item selection 2

Bit	Communication data (Monitor item)	Factory set value	
		Binary	Decimal
0	Event 2 state monitor	0	16512
1	Event 3 state monitor	0	
2	Event 4 state monitor	0	
3	Heater break alarm 1 (HBA1) state monitor	0	
4	Heater break alarm 2 (HBA2) state monitor	0	
5	Control loop break alarm 1 (LBA1) state monitor	0	
6	Control loop break alarm 2 (LBA2) state monitor	0	
7	Comprehensive event state	1	
8	Input 1_Burnout state monitor	0	
9	Input 2_Burnout state monitor	0	
10	Unused	0	
11	DI state monitor	0	
12	OUT state monitor	0	
13	DO state monitor	0	
14	Overall operation status	1	
15	Memory area number monitor	0	

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

Table 3 Monitor item selection 3

Bit	Communication data (Monitor item)	Factory set value	
		Binary	Decimal
0	Input 1 PID memory	0	1024
1	Input 2 PID memory	0	
2	Input 1 Peak hold monitor	0	
3	Input 1 Bottom hold monitor	0	
4	Input 2 Peak hold monitor	0	
5	Input 2 Bottom hold monitor	0	
6	Input 1 AT remaining time monitor	0	
7	Input 2 AT remaining time monitor	0	
8	Input 1 AT/ST status monitor	0	
9	Input 2 AT/ST status monitor	0	
10	Error code	1	
11	Integrated operating time	0	
12	Unused	0	
13	Unused	0	
14	Unused	0	
15	Unused	0	

● 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.

Bit image: 0000000000000000 0: Unused
 Bit 15 ----- Bit 0 1: Used



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



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

Table 1 Setting item selection 1

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	1	Interlock release	0	16480
1	2	Memory area transfer	0	
2	3	Input 1 Hold reset	0	
3	4	Input 2 Hold reset	0	
4	5	Bottom suppression start signal	0	
5	6	RUN/STOP transfer	1	
6	7	Input 1 Autotuning (AT)	1	
7	8	Input 2 Autotuning (AT)	0	
8	9	Input 1 Startup tuning (ST)	0	
9	10	Input 2 Startup tuning (ST)	0	
10	11	Input 1 Auto/Manual transfer	0	
11	12	Input 2 Auto/Manual transfer	0	
12	13	Remote/Local transfer	0	
13	14	Control area Local/External transfer	0	
14	15	Input 1 Set value (SV)	1	
15	16	Input 2 Set value (SV)	0	

Table 2 Setting item selection 2

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	17	Set value (SV) of differential temperature	0	7850
1	18	Event 1 set value (EV1) Event 1 set value (EV1) [high]	1	
2	19	Event 1 set value (EV1') [low]	0	
3	20	Event 2 set value (EV2) Event 2 set value (EV2) [high]	1	
4	21	Event 2 set value (EV2') [low]	0	
5	22	Event 3 set value (EV3) Event 3 set value (EV3) [high]	1	
6	23	Event 3 set value (EV3') [low]	0	
7	24	Event 4 set value (EV4) Event 4 set value (EV4) [high]	1	
8	25	Event 4 set value (EV4') [low]	0	
9	26	Input 1 Proportional band [heat-side]	1	
10	27	Input 1 Integral time [heat-side]	1	
11	28	Input 1 Derivative time [heat-side]	1	
12	29	Input 1 Control response parameter	1	
13	30	Input 1 Proactive intensity	0	
14	31	Input 1 Manual reset	0	
15	32	Input 1 FF amount	0	

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

Table 3 Setting item selection 3

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	33	Input 1 Output limiter high [heat-side]	0	32768
1	34	Input 1 Output limiter low [heat-side]	0	
2	35	Input 1 Control loop break alarm (LBA) time	0	
3	36	Input 1 LBA deadband (LBD)	0	
4	37	Input 2 Proportional band	0	
5	38	Input 2 Integral time	0	
6	39	Input 2 Derivative time	0	
7	40	Input 2 Control response parameter	0	
8	41	Input 2 Proactive intensity	0	
9	42	Input 2 Manual reset	0	
10	43	Input 2 FF amount	0	
11	44	Input 2 Output limiter high	0	
12	45	Input 2 Output limiter low	0	
13	46	Input 2 Control loop break alarm (LBA) time	0	
14	47	Input 2 LBA deadband (LBD)	0	
15	48	Input 1 Proportional band [cool-side]	1	

Table 4 Setting item selection 4

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	49	Input 1 Integral time [cool-side]	1	771
1	50	Input 1 Derivative time [cool-side]	1	
2	51	Input 1 Overlap/Deadband	0	
3	52	Input 1 Output limiter high [cool-side]	0	
4	53	Input 1 Output limiter low [cool -side]	0	
5	54	Select Trigger type for Memory area transfer	0	
6	55	Area soak time	0	
7	56	Link area number	0	
8	57	Input 1 Setting change rate limiter (up)	1	
9	58	Input 1 Setting change rate limiter (down)	1	
10	59	Input 1 Auto/Manual transfer selection (Area)	0	
11	60	Input 1 Manipulated output value (Area)	0	
12	61	Input 2 Setting change rate limiter (up)	0	
13	62	Input 2 Setting change rate limiter (down)	0	
14	63	Input 2 Auto/Manual transfer selection (Area)	0	
15	64	Input 2 Manipulated output value (Area)	0	

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

Table 5 Setting item selection 5

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	65	Remote/Local transfer selection (Area)	0	0
1	66	Display update cycle	0	
2	67	Input 1_PV bias	0	
3	68	Input 1_PV digital filter	0	
4	69	Input 1_PV ratio	0	
5	70	Input 1_PV low input cut-off	0	
6	71	Input 2_PV bias (RS bias)	0	
7	72	Input 2_PV digital filter (RS digital filter)	0	
8	73	Input 2_PV ratio (RS ratio)	0	
9	74	Input 2_PV low input cut-off	0	
10	75	OUT1 proportional cycle time	0	
11	76	OUT2 proportional cycle time	0	
12	77	OUT3 proportional cycle time	0	
13	78	OUT1 minimum ON/OFF time of proportional cycle	0	
14	79	OUT2 minimum ON/OFF time of proportional cycle	0	
15	80	OUT3 minimum ON/OFF time of proportional cycle	0	

Table 6 Setting item selection 6

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	81	Heater break alarm 1 (HBA1) set value	1	5
1	82	Number of heater break alarm 1 (HBA1) delay times	0	
2	83	Heater break alarm 2 (HBA2) set value	1	
3	84	Number of heater break alarm 2 (HBA2) delay times	0	
4	85	Input 1_Manual manipulated output value	0	
5	86	Input 1_Level PID setting 1	0	
6	87	Input 1_Level PID setting 2	0	
7	88	Input 1_Level PID setting 3	0	
8	89	Input 1_Level PID setting 4	0	
9	90	Input 1_Level PID setting 5	0	
10	91	Input 1_Level PID setting 6	0	
11	92	Input 1_Level PID setting 7	0	
12	93	For system use	0	
13	94	Input 1_ON/OFF action differential gap (upper)	0	
14	95	Input 1_ON/OFF action differential gap (lower)	0	
15	96	Input 2_Manual manipulated output value	0	

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

Table 7 Setting item selection 7

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	97	Input 2_Level PID setting 1	0	0
1	98	Input 2_Level PID setting 2	0	
2	99	Input 2_Level PID setting 3	0	
3	100	Input 2_Level PID setting 4	0	
4	101	Input 2_Level PID setting 5	0	
5	102	Input 2_Level PID setting 6	0	
6	103	Input 2_Level PID setting 7	0	
7	104	For system use	0	
8	105	Input 2_ON/OFF action differential gap (upper)	0	
9	106	Input 2_ON/OFF action differential gap (lower)	0	
10	107	Input 1_AT bias	0	
11	108	Input 2_AT bias	0	
12	109	Unused	0	
13	110	Unused	0	
14	111	FF amount learning	0	
15	112	Input 1_Determination point of external disturbance	0	

Table 8 Setting item selection 8

Bit	Item number	Communication data (Setting item)	Factory set value	
			Binary	Decimal
0	113	Input 2_Determination point of external disturbance	0	0
1	114	Unused	0	
2	115	Unused	0	
3	116	Unused	0	
4	117	Unused	0	
5	118	Unused	0	
6	119	Unused	0	
7	120	Unused	0	
8	121	Unused	0	
9	122	Unused	0	
10	123	PV select transfer level	0	
11	124	PV select transfer time	0	
12	125	Unused	0	
13	126	Unused	0	
14	127	Unused	0	
15	128	Unused	0	

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

Communication identifier (RKC communication)

(R/W: Read and Write)

Name	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	R6		
Monitor item selection 2	R7		
Monitor item selection 3	R9		
Setting item selection 1	RE		
Setting item selection 2	RF		
Setting item selection 3	RG		
Setting item selection 4	RH		
Setting item selection 5	RI		
Setting item selection 6	RJ		
Setting item selection 7	RK		
Setting item selection 8	RL		
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	0278	0279	632	633	R/W
Communication speed	027A	027B	634	635	
Data bit configuration	027C	027D	636	637	
Interval time	027E	027F	638	639	
Register type (D, R, W, ZR)	0280	0281	640	641	
Register start number (High-order 4-bit)	0282	0283	642	643	
Register start number (Low-order 16-bit)	0284	0285	644	645	
Monitor item register bias	0286	0287	646	647	
Setting item register bias	0288	0289	648	649	
Instrument link recognition time	028A	028B	650	651	
PLC response waiting time	028C	028D	652	653	
PLC communication start time	028E	028F	654	655	
Slave register bias	0290	0291	656	657	
Number of recognizable devices	0292	0293	658	659	
Station number	0294	0295	660	661	
PC number	0296	0297	662	663	
Monitor item selection 1	0298	0299	664	665	
Monitor item selection 2	029A	029B	666	667	
Monitor item selection 3	029C	029D	668	669	
Setting item selection 1	029E	029F	670	671	
Setting item selection 2	02A0	02A1	672	673	
Setting item selection 3	02A2	02A3	674	675	
Setting item selection 4	02A4	02A5	676	677	
Setting item selection 5	02A6	02A7	678	679	
Setting item selection 6	02A8	02A9	680	681	
Setting item selection 7	02AA	02AB	682	683	
Setting item selection 8	02AC	02AD	684	685	

Modbus register address (Single word)

(R/W: Read and Write)

Name	Register address		Attribute
	HEX (Hexadecimal)	DEC (Decimal)	
Device address	213C	8508	R/W
Communication speed	213D	8509	
Data bit configuration	213E	8510	
Interval time	213F	8511	
Register type (D, R, W, ZR)	2140	8512	
Register start number (High-order 4-bit)	2141	8513	
Register start number (Low-order 16-bit)	2142	8514	
Monitor item register bias	2143	8515	
Setting item register bias	2144	8516	
Instrument link recognition time	2145	8517	
PLC response waiting time	2146	8518	
PLC communication start time	2147	8519	
Slave register bias	2148	8520	
Number of recognizable devices	2149	8521	
Station number	214A	8522	
PC number	214B	8523	
Monitor item selection 1	214C	8524	
Monitor item selection 2	214D	8525	
Monitor item selection 3	214E	8526	
Setting item selection 1	214F	8527	
Setting item selection 2	2150	8528	
Setting item selection 3	2151	8529	
Setting item selection 4	2152	8530	
Setting item selection 5	2153	8531	
Setting item selection 6	2154	8532	
Setting item selection 7	2155	8533	
Setting item selection 8	2156	8534	

● 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. 6-26** and **P. 6-27**.

5.2.2 Explanation of PLC communication environment setting function

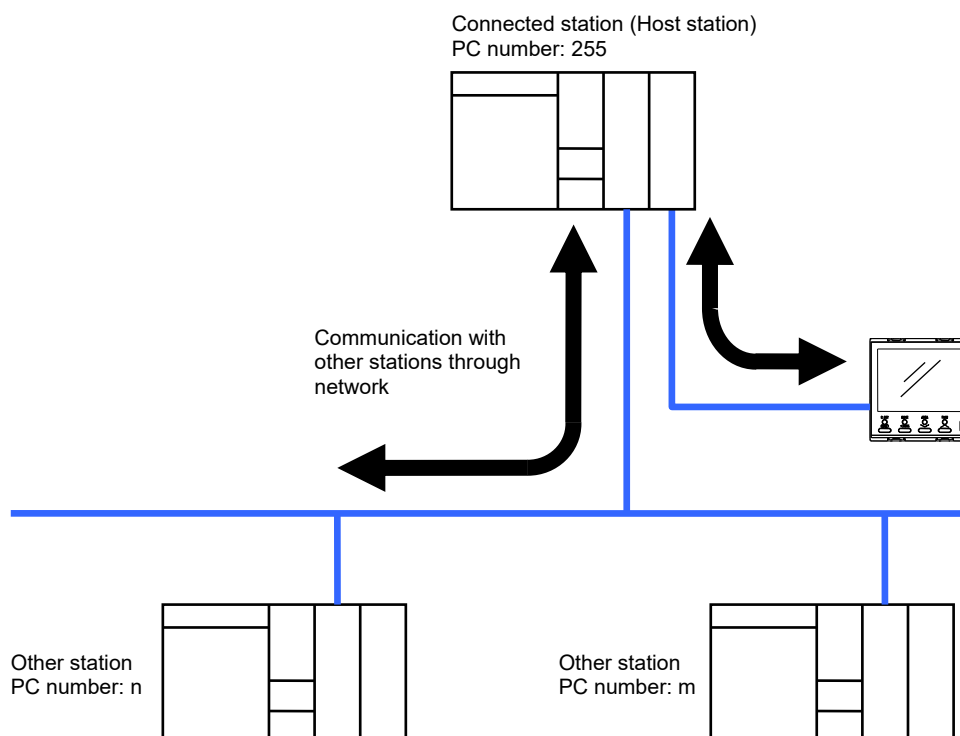
■ PC number

This is a communication data to set a station number of the PLC that communicates with the GZ.

Set the PC number of the connected station (host station) of the PLC, because the connected station (host station) is usually connected to the GZ. (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 GZ.

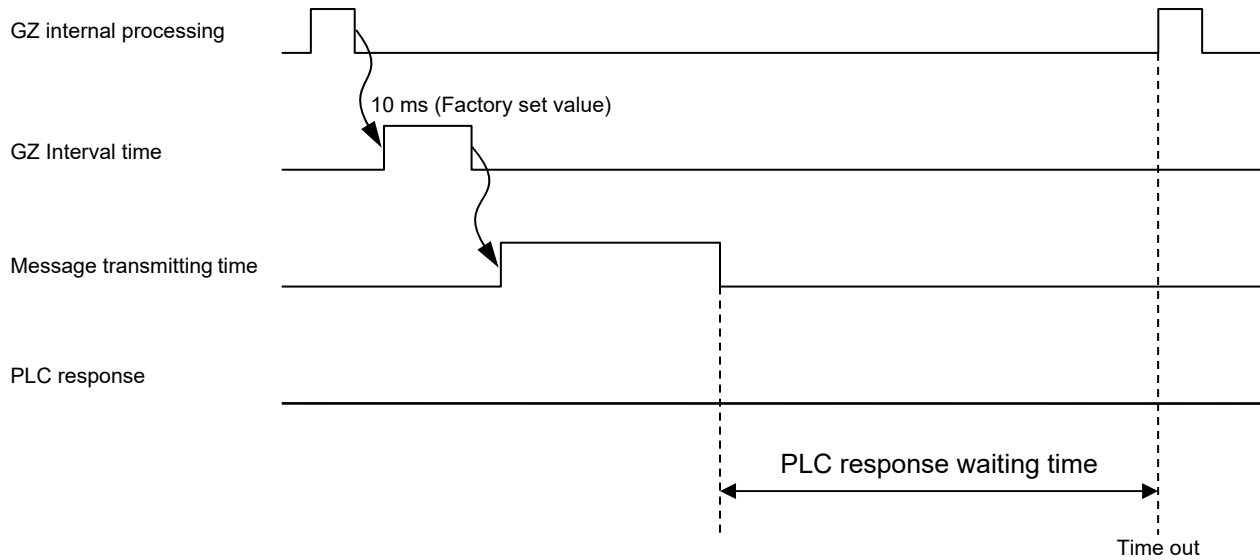
Example: PLC by Mitsubishi Electric



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 GZ 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 GZ 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	D1000	Start number [Register start number (Low-order 16-bit)]
	⋮	⋮	⋮
	D1011	D1011	Last number
Communication data of monitor group	D1012	D1012	Start number [Monitor item register bias factory set value: 12]
	⋮	⋮	⋮
	D1029	D1020	Last number
Communication data of setting group	D1030	D1021	Start number [Setting item register bias Factory set value: 0]
	⋮	⋮	⋮
	D1065	D1038	Last number



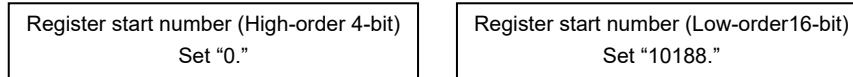
For register address of PLC communication data, refer to **6.2 PLC Communication Data Map (P. 6-23)**.

● Setting method of the register start number

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

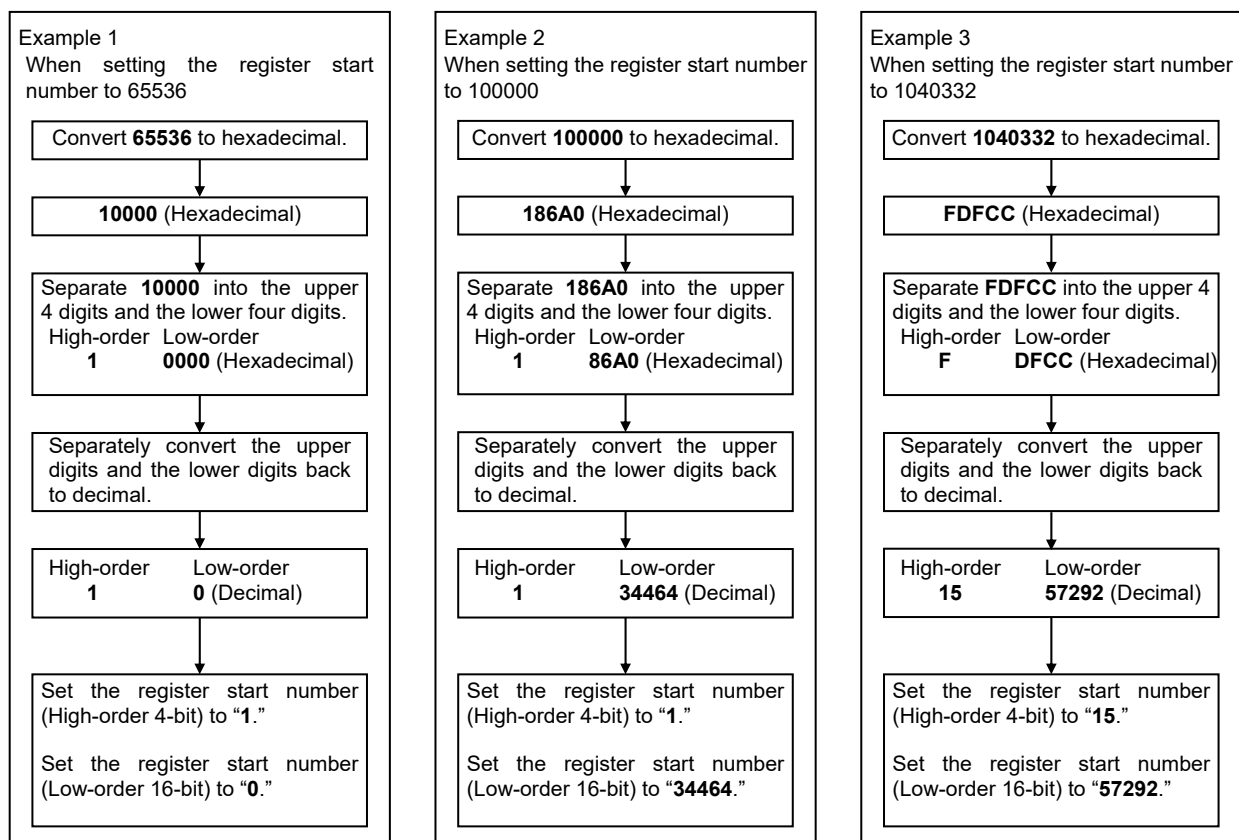
1. Set the register start number (High-order 4-bit) to 0.
2. In the register start number (low-order 16-bit), set the register address to a value from 0 to 65535.

Example: When setting the register start number to "10188"



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.

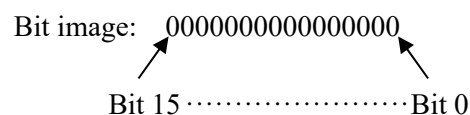


■ Monitor item selection and Setting item selection

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.

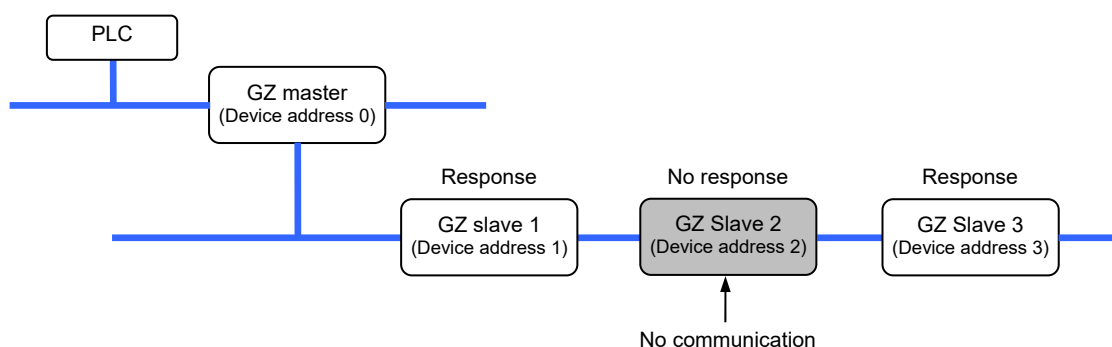


■ Instrument link recognition time

This is defined as the time until the GZ master (with a device address of 0) recognizes the connected GZ 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 GZ master is powered on, after the elapse of PLC communication start time, the GZ master searches for any GZ slaves within the instrument link recognition time; when the Instrument recognition request command is executed, the GZ master searches for any GZ slaves within the instrument link recognition time after the command has been accepted.

The GZ slaves which have not responded at all to the GZ master within the instrument link recognition time are determined to be nonexistent. After this recognition processing, the GZ master only communicates with the existing GZ slaves.



NOTE

This setting item must be used only on the GZ 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)

= GZ master processing time + (GZ slave processing time × Number of instrument recognition)

Communication speed	GZ 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

GZ master processing time + (GZ 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 GZ 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 GZ by the address setting switch.

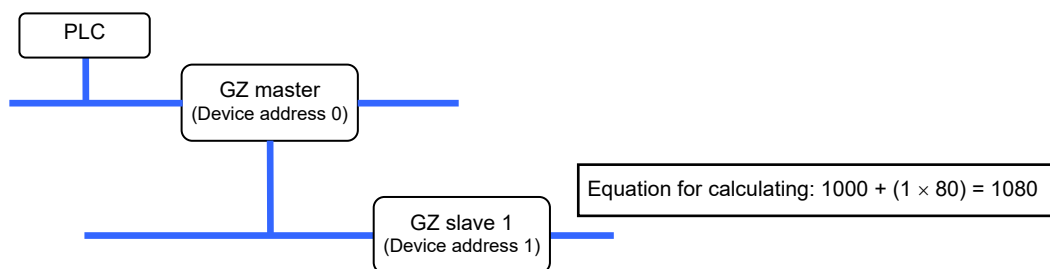
Equation for calculating:

$$\text{Slave register start number} = \text{Register start number} + (\text{Device address} \times \text{Slave register bias})$$

Register address example of PLC communication data (double word)

- Using two GZ
- Register start number of GZ master: 1000 (factory set value)
- Register start number of GZ slave: 1000 (factory set value)
- Slave register bias value of GZ slave: 80 (factory set value)
- Monitor item register bias: 12 (factory set value)
- Setting item register bias: 0 (factory set value)

When the address of GZ 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	Start number [Register start number (Low-order 16-bit)]	Register numbers in the PLC occupied with the communication data of the GZ master (with a device address of 0).
	⋮		
	D1011	Last number	
Communication data of monitor group	D1012	Start number [Monitor item register bias]	
	⋮		
	D1029	Last number	
Communication data of setting group	D1030	Start number [Setting item register bias]	
	⋮		
	D1079	Last number	
System data	D1080	Start number [Register start number (Low-order 16-bit)]	Register numbers in the PLC occupied with the communication data of the GZ slave (with a device address of 1).
	⋮		
	D1091	Last number	
Communication data of monitor group	D1092	Start number [Monitor item register bias]	
	⋮		
	D1109	Last number	
Communication data of setting group	D1110	Start number [Setting item register bias]	
	⋮		
	D1159	Last number	

MEMO

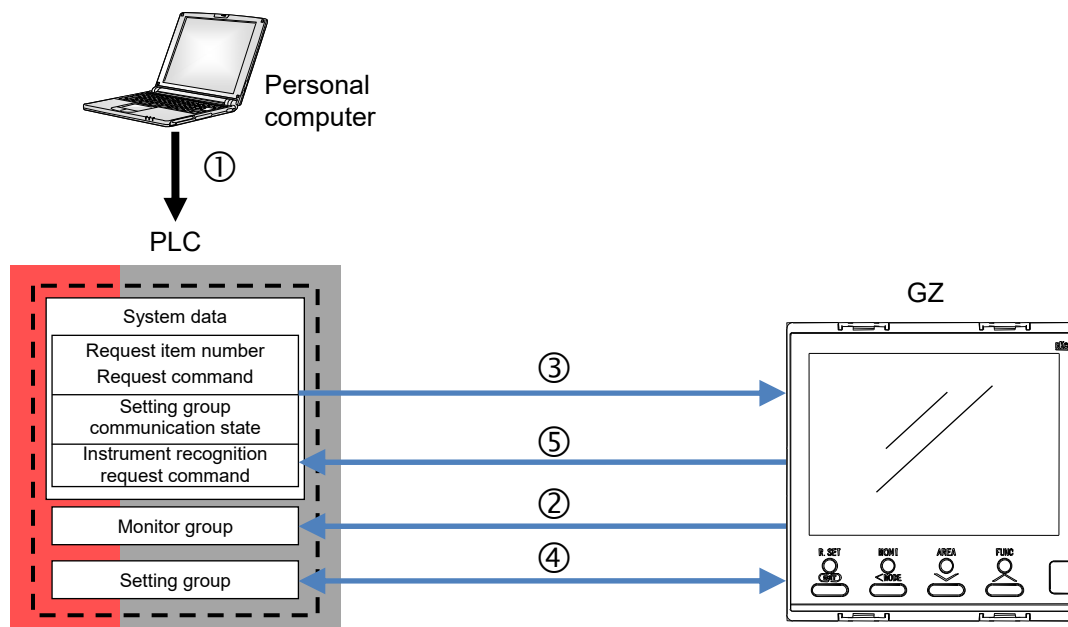
COMMUNICATION DATA

6

6.1 Data Transfer	6-2
6.2 PLC Communication Data Map	6-23
6.3 Example of PLC Communication Data Map Editing.....	6-59

6.1 Data Transfer

The communication data transmitted between the PLC and the GZ 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.

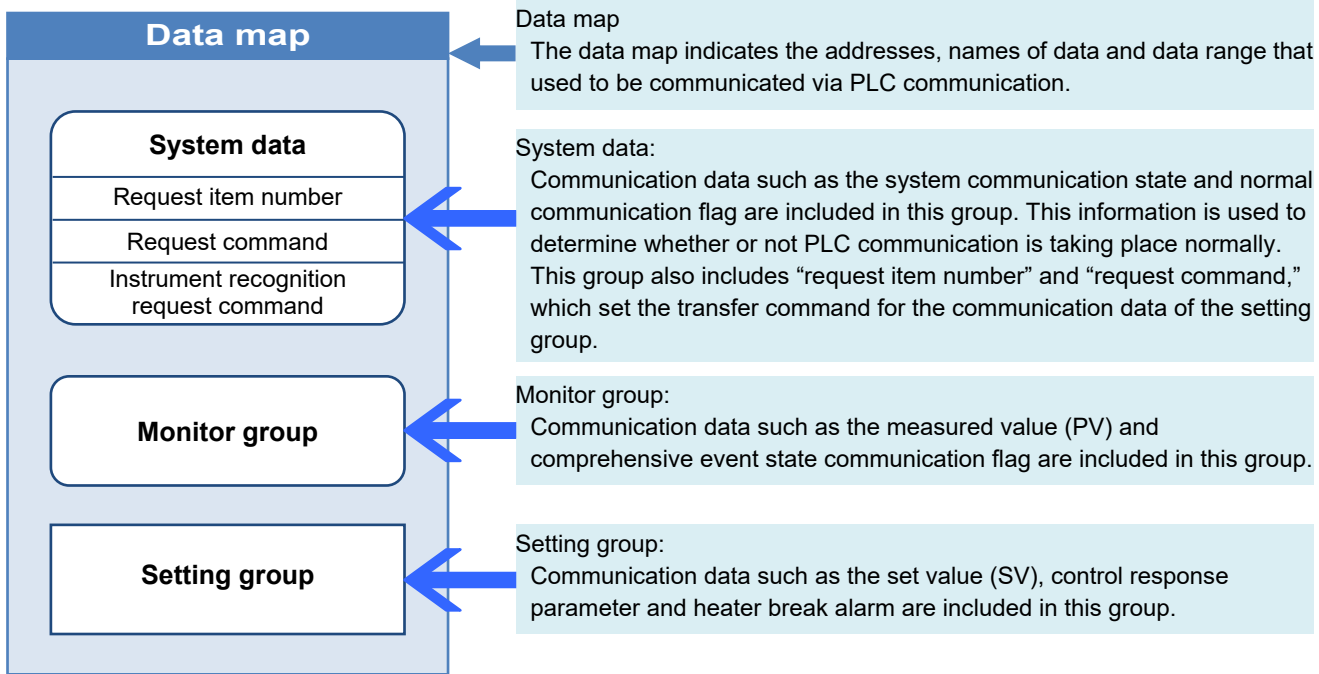


Communication procedures:

- 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 GZ.
- ④ The GZ 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 GZ writes communication status (such as setting error and setting completed) into the PLC registers.

6.1.1 Data group

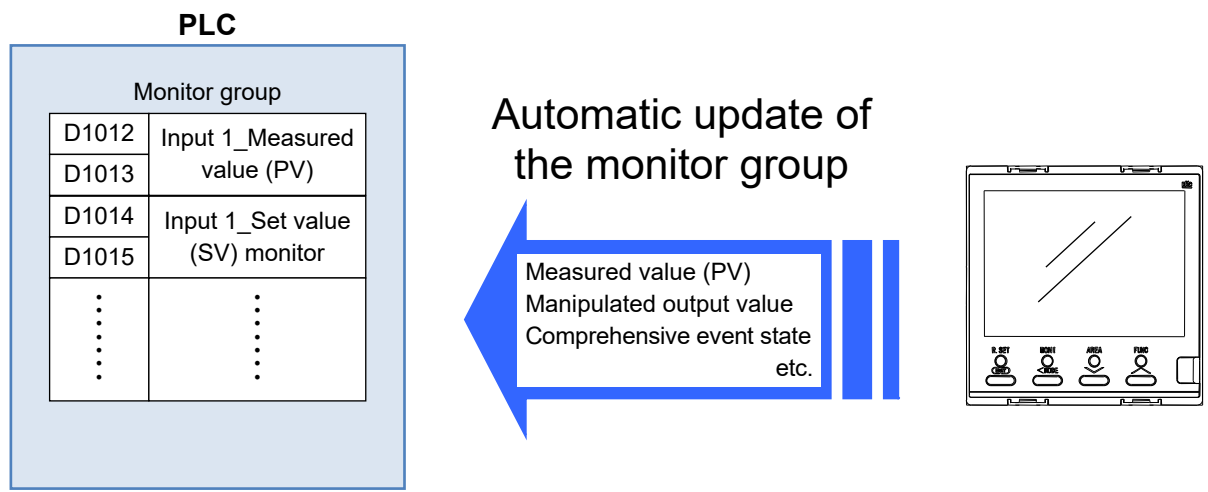
Communication data in the data map is categorized into groups: System data, Monitor group, and Setting group as shown below.



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

■ Monitor group (PLC ← GZ)

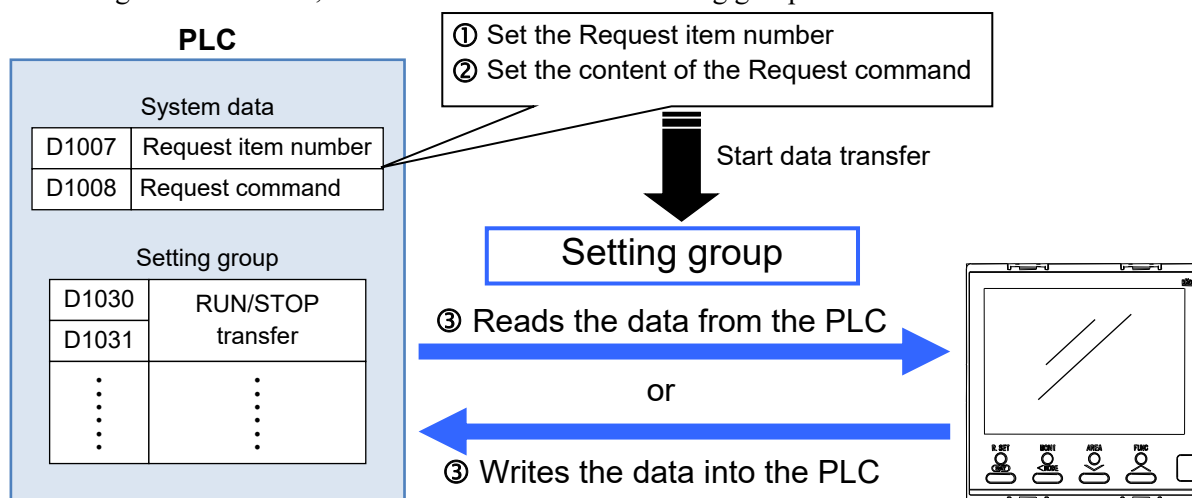
The communication data of the monitor group does not have a request command setting.



For the communication data of monitor group, refer to **6.2 PLC Communication Data Map (P. 6-23)**.

■ 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.

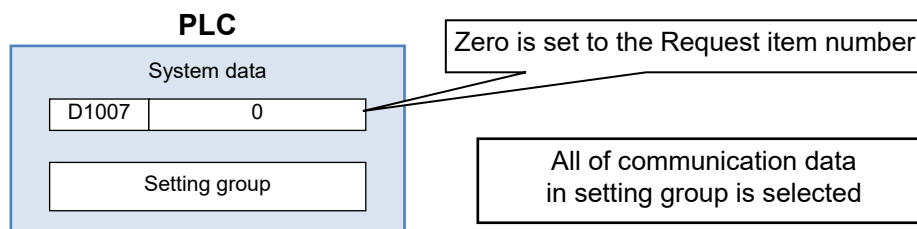


(1) Request item number

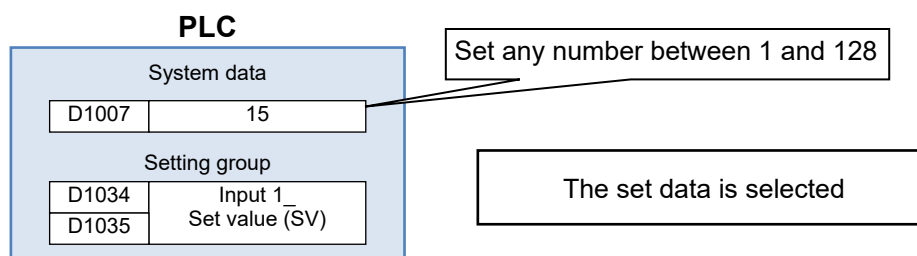
This command sets the communication data of the setting group that is transferred.
Set transfer of all communication data of the setting group, or transfer by one data item.
[Register address: D1007 (factory set value)]

Setting range: 0 or 1 to 128

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



- When set to a number from 1 to 128 (item number), only the set communication data item is transferred (transfer by one data item).



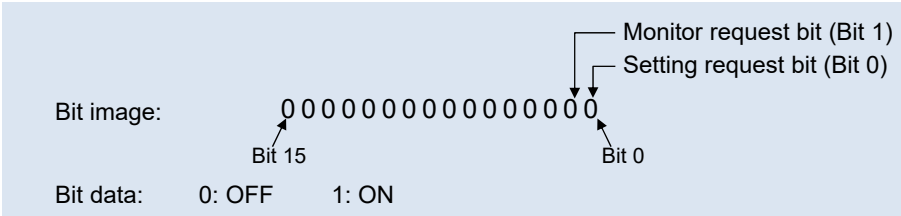
- 📖 Communication data that has been set to “unused” (binary: 0) in the setting item selection of the PLC communication environment will not be transferred.
- 📖 When set to a number from 1 to 128 (item number), the value of request item number will not return to 0 even after setting request or monitor request processing is completed.
- 👉 For item numbers 1 to 128, 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)]

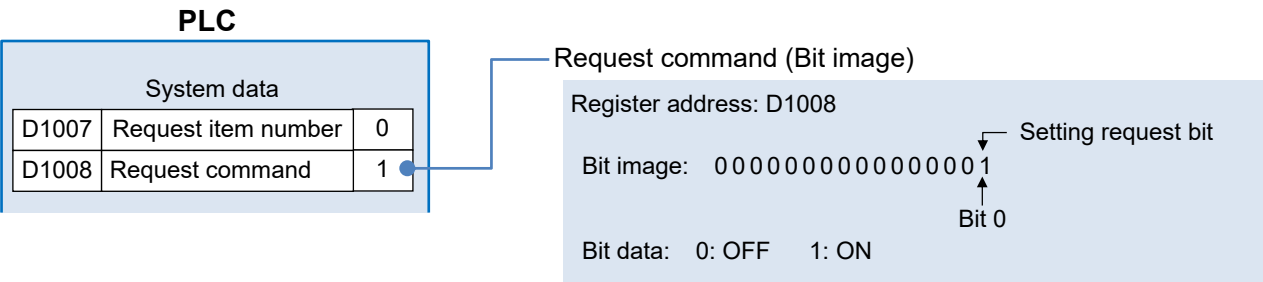


● **Setting request bit (PLC → GZ)**.....Set the PLC communication data on to the GZ.

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

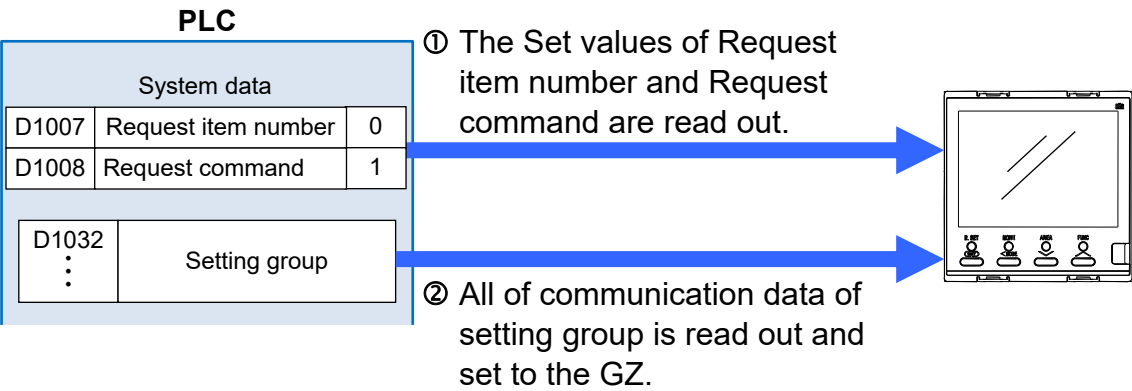
Processing example: Read out all communication data of PLC setting group to the GZ.

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

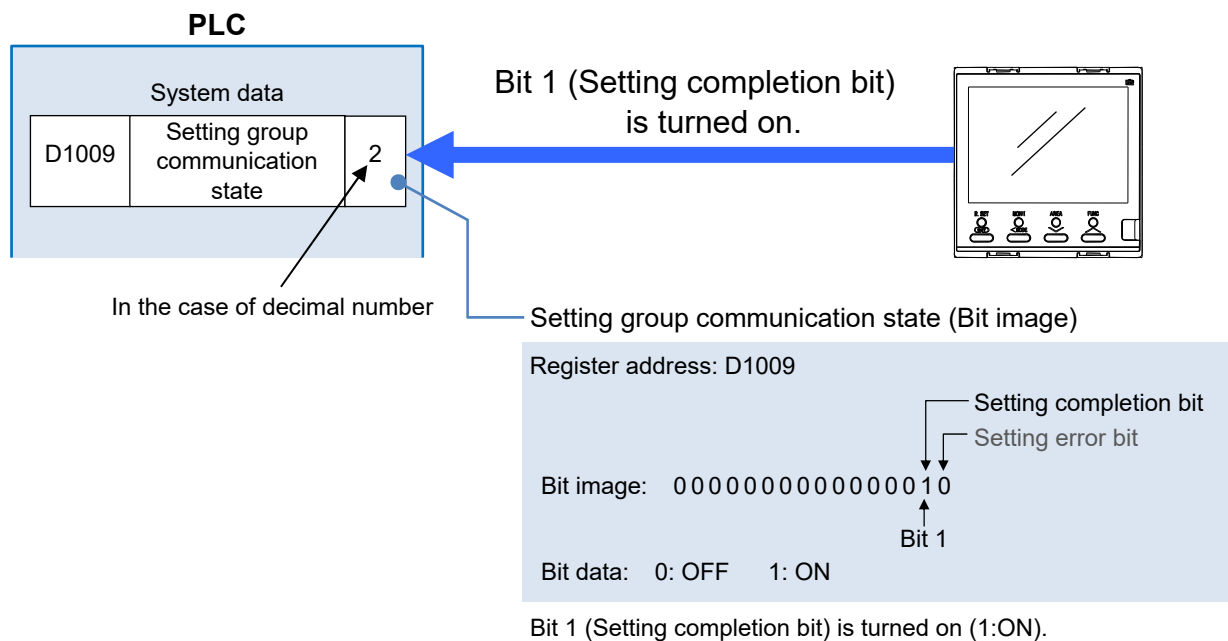


For a bit image, set “1” to the Bit 0 (Setting request bit).

2. The GZ 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.

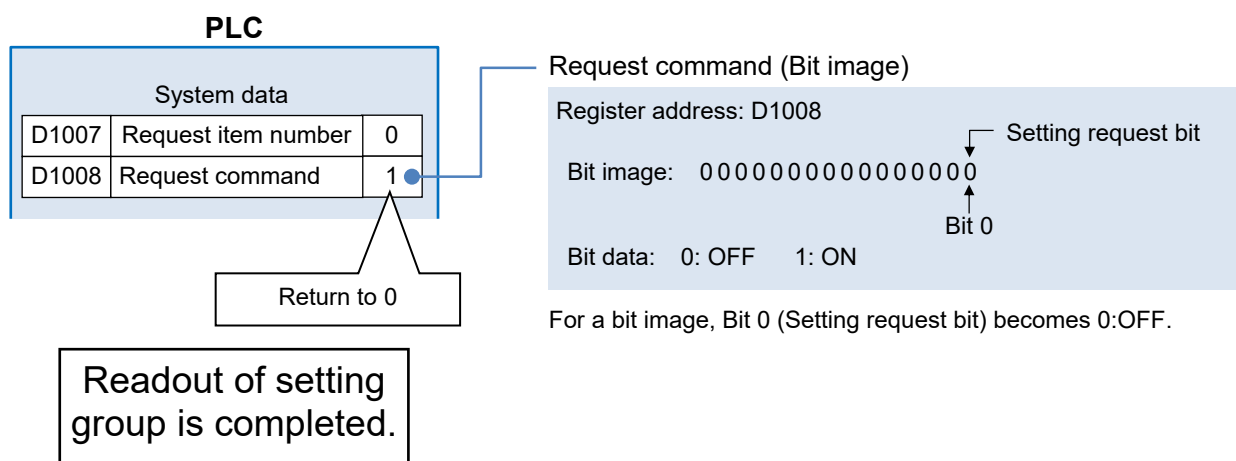


3. When the readout is completed, the GZ writes the communication state of setting group to the Setting completion bit (Bit 1) of the Setting group communication state (D1009).



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.

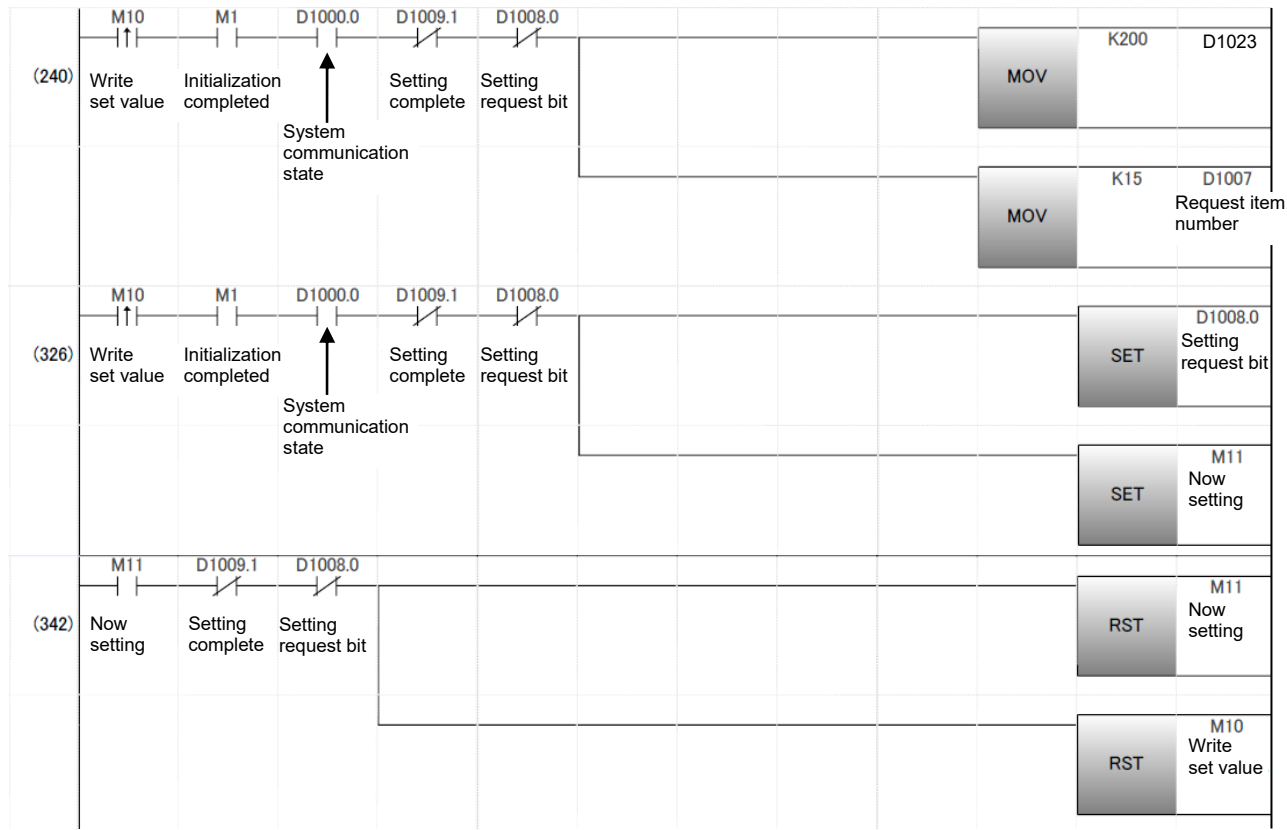
4. The Request command (D1008) will change to “0” to indicate that reading of data from the PLC is finished.



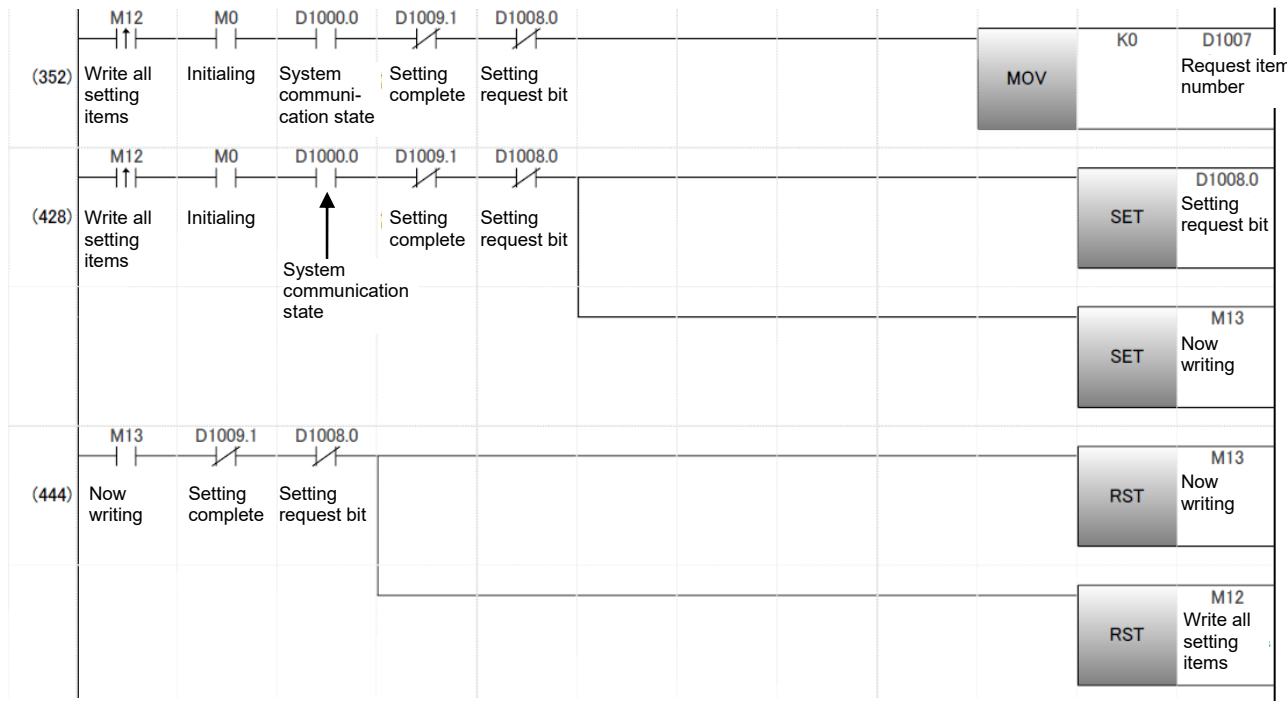
Refer to P. 6-7 for a programming example.

Program example:

Read out a Input 1_Set value (SV) of PLC to the GZ.



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



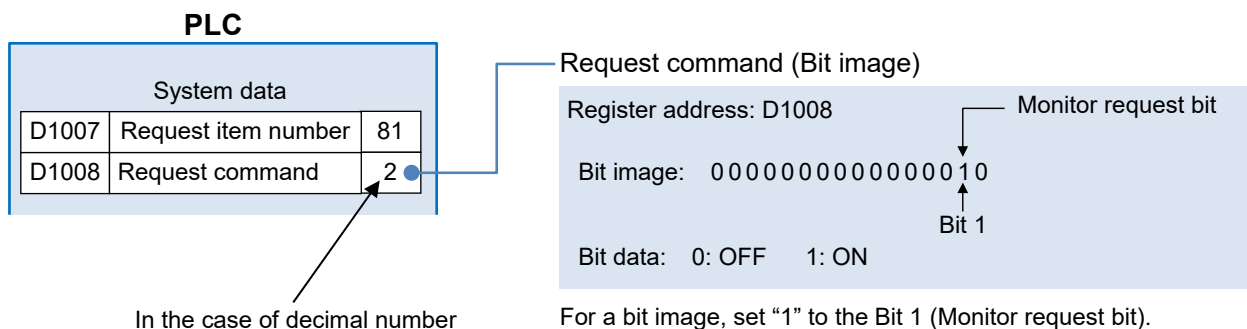
The sample program is intended solely for purposes of example and the operation is not guaranteed. When you create a program using the sample program, check the operation of the program and use it on your own responsibility.

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

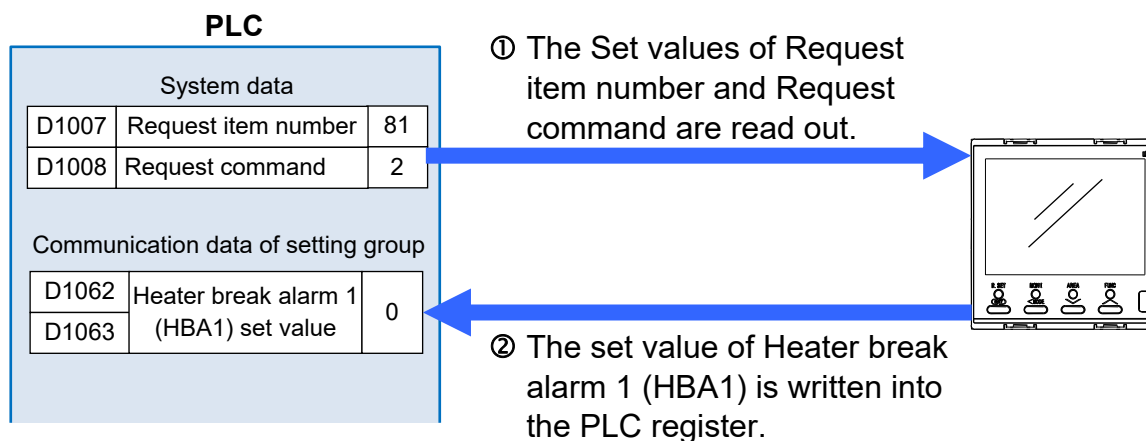
Monitor request bit is a command to request the communication data of the GZ setting group to be written into the PLC register.

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

1. Set “81” to Request item number (D1007) and “2” to Request command (D1008).



2. The GZ 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.



-
- Bit 2 (Monitor completion bit) is turned on.
- System data
- D1009
- Setting group communication state
- 4
- In the case of decimal number
- Setting group communication state (Bit image)
- Register address: D1009
- Monitor completion bit
- Setting error bit
- Bit image: 0000000000000100
- Bit 2
- Bit data: 0: OFF 1: ON
- Bit 2 (Monitor completion bit) is turned on.

-
- The diagram illustrates the state of a PLC system data table and its corresponding bit image. The PLC system data table contains the following information:
- | System data | | |
|-------------|---------------------|----|
| D1007 | Request item number | 81 |
| D1008 | Request command | 0 |
- The value 0 in the Request command field is highlighted with a blue dot. A callout box labeled "Return to 0" points to this value. A line connects the Request command field to the bit image section.
- The bit image section shows the Register address: D1008. The Bit image is represented as a sequence of 16 zeros: 0000000000000000. The Monitor request bit is indicated by a downward arrow pointing to the 16th bit (the last zero). The Bit data is defined as 0: OFF and 1: ON.
- For a bit image, Bit 1 (Monitor request bit) becomes 0:OFF.

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

Register address: D1008

Bit image: 00000000000000011

Bit 15 ----- Bit 0

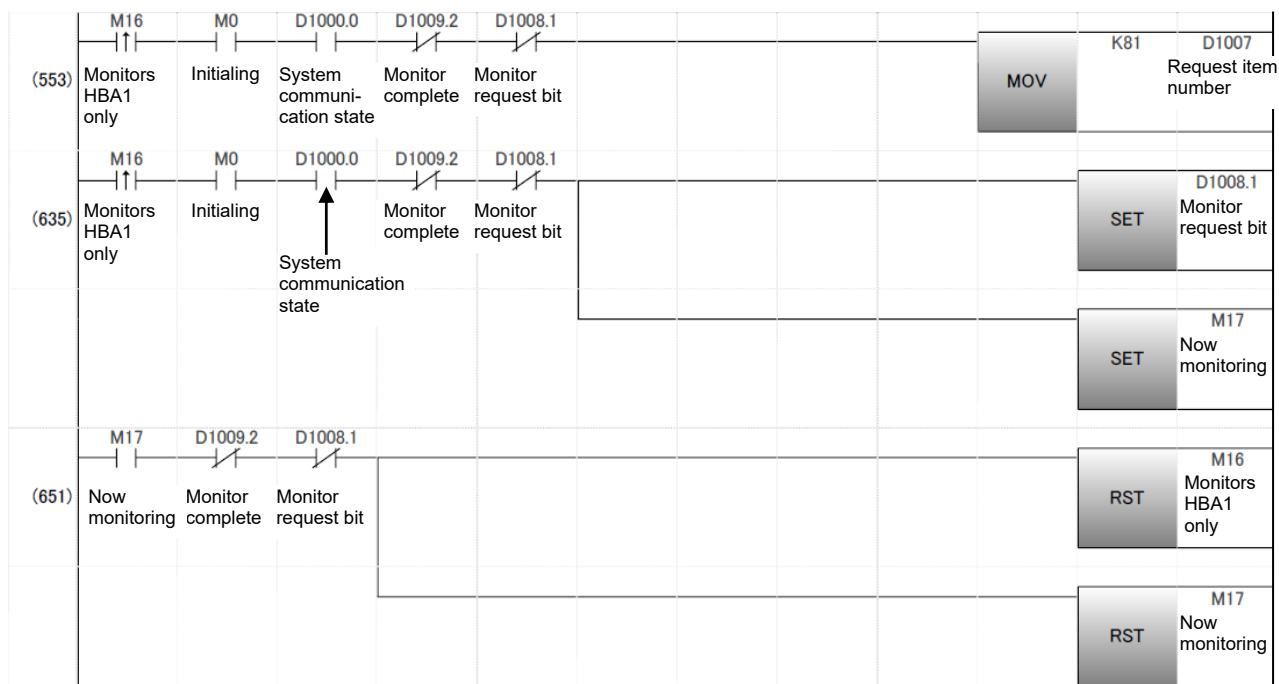
Bit data: 0: OFF 1: ON

Monitor request bit

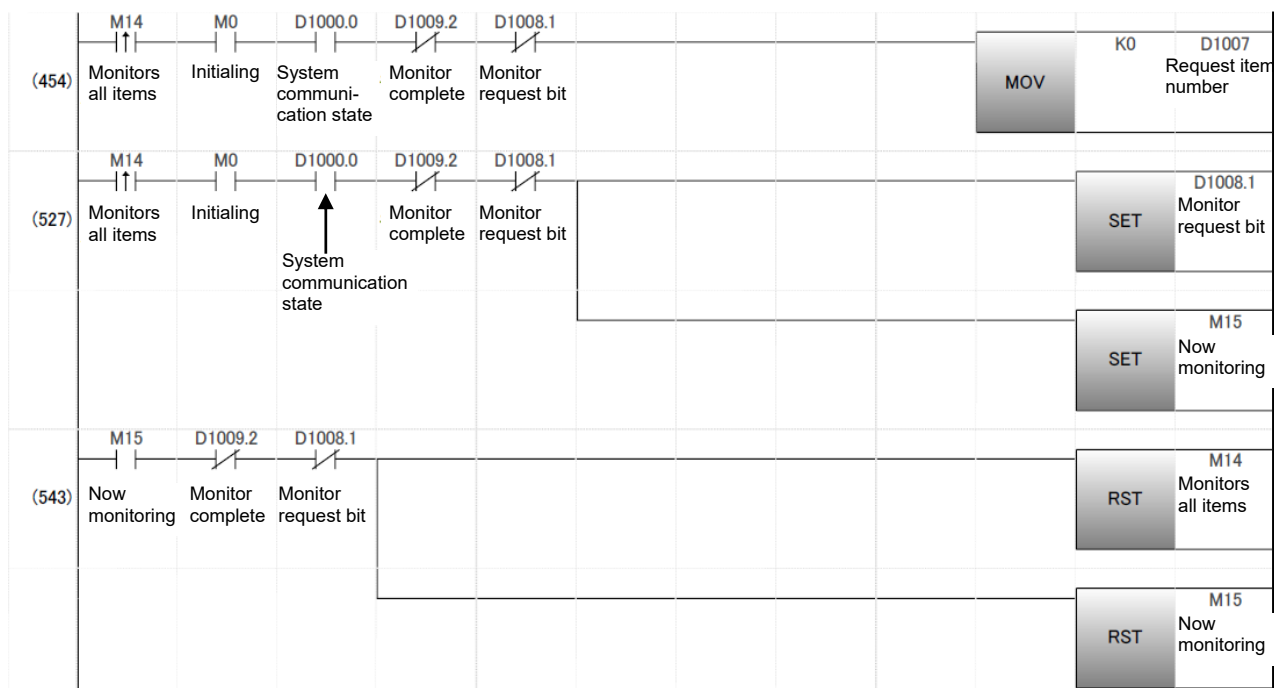
Setting request bit

Program example:

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



Writing an all communication data of GZ 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 GZ slaves (device address 1 to 30) recognized by the GZ 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 GZ 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 GZ slaves recognized by the GZ master.

Then the GZ 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

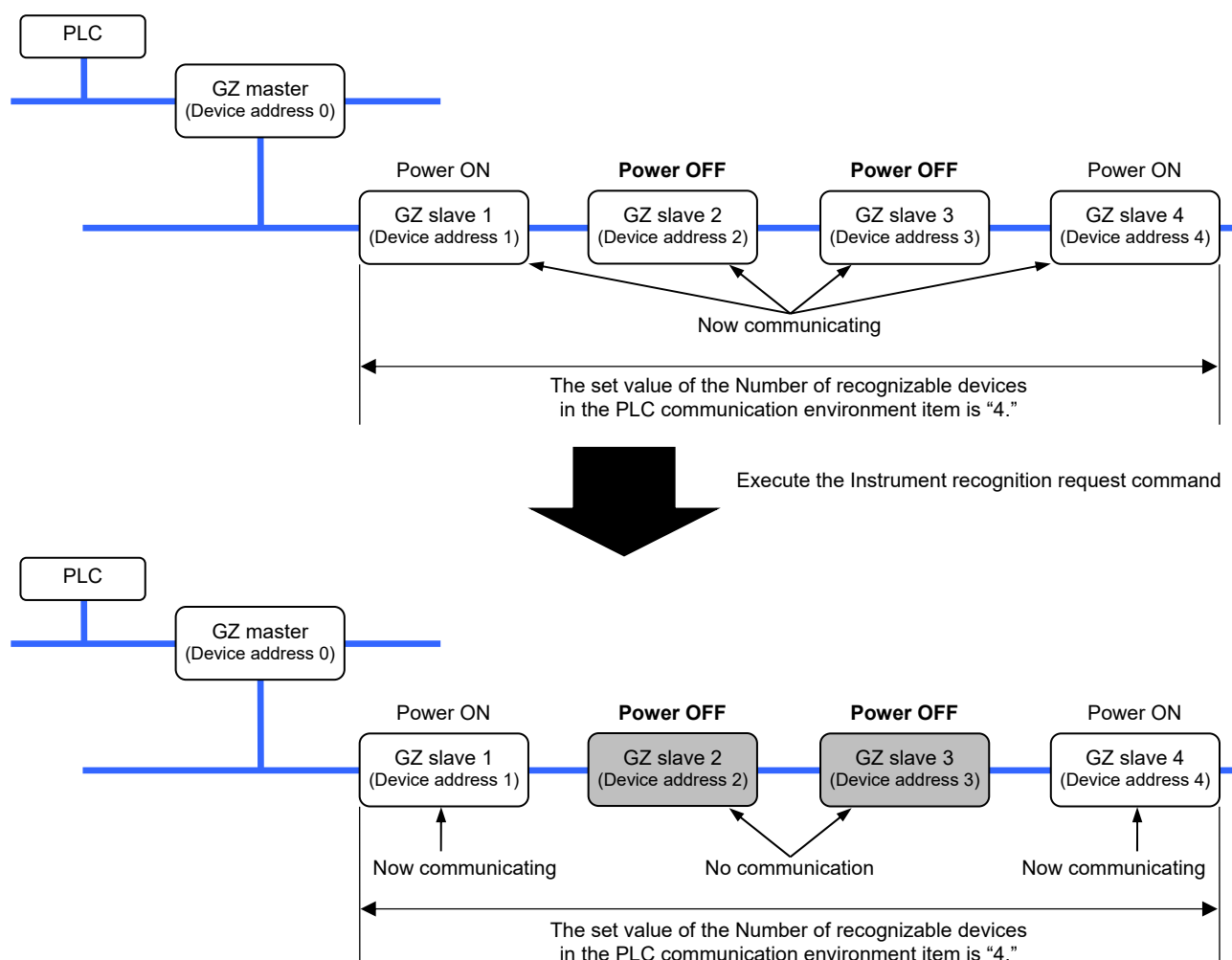
(After the recognition, the command state returns to "0")



NOTE

While Recognition processing is being implemented, do not operate the Request command.



The Instrument recognition request command must be used only on the GZ with a device address of 0.



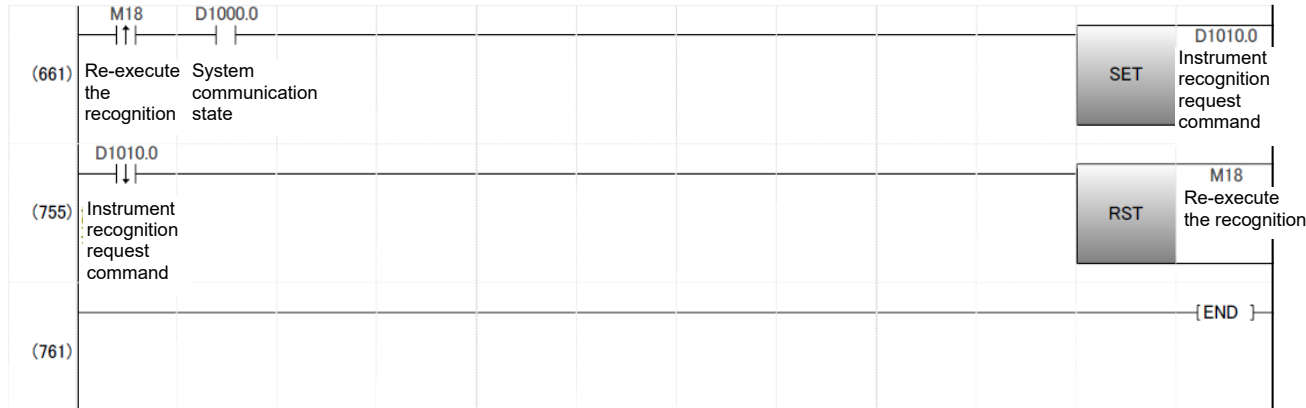
Executing the Instrument recognition request command will not change the set value of Number of recognizable devices in the PLC communication environment items.


Execution example of the Instrument recognition request command:

- When some GZ slaves are turned off depending on the working process
If any of the GZ slaves recognized by the GZ master is turned off, the GZ master must wait for a reply from the GZ slave until timeout is reached. This may lead to a longer communication cycle.
In such a case, execute the Instrument recognition request command. The GZ master will not request communication with the GZ slaves which gave no response to the GZ master. This will quicken the communication cycle.
- When there are any GZ slaves which need to be turned on after the GZ master has been turned on
If the GZ slaves that were off when the GZ master made a recognition processing of the GZ slaves (power-on of the GZ 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 GZ slave which was off in the last recognition process.

-  When the quantity of the GZ slave has been increased, some GZ 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 GZ slave is increased, make sure the Number of recognizable devices is properly set, otherwise, some GZ 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.

■ Communication data that works with the Memory area

The memory area data inside the setting group will not be automatically updated by switching the Memory area from the PLC side.

Use either (1) or (2) below to do the update processing.

 For the communication data that works with the Memory area, refer to **6.2 PLC Communication Data Map (P. 6-23)**.

(1) Update the memory area data one after another using Request item number and Request command

After having switched the memory area, write Memory area data one after another into the PLC register using Request item number and Request command.

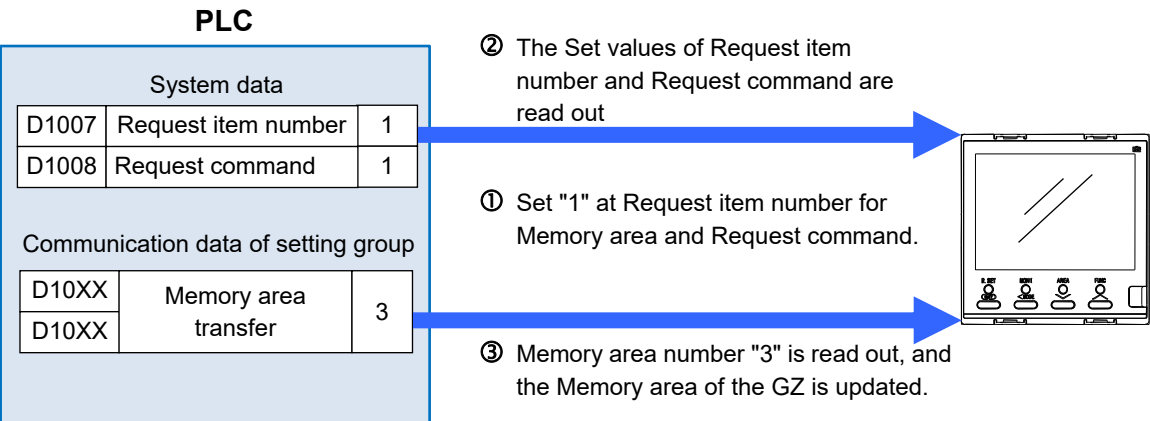
1. Set the Memory area number to change into the PLC register.

PLC

Communication data of setting group		
D10XX	Memory area transfer	3
D10XX		

Example:
Change the Memory area number from 1 to 3.

2. Set commands of Request item number and Request command into the PLC register, then the Memory area of the GZ will be changed.



3. Set Request item number of the Memory area data to be updated into the PLC register.

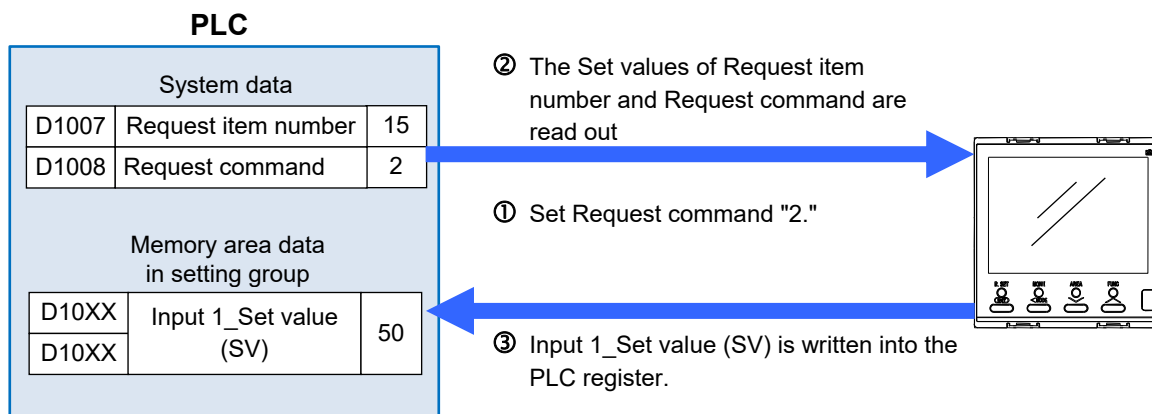
PLC

System data		
D1007	Request item number	15
D1008	Request command	0

Example: Update the memory area data "Input 1_Set value (SV)."

Set "15" as the Request item number of Input 1_Set value (SV).

- Set Request command into the PLC register. The Input 1_Set value (SV) of is written into the PLC register.

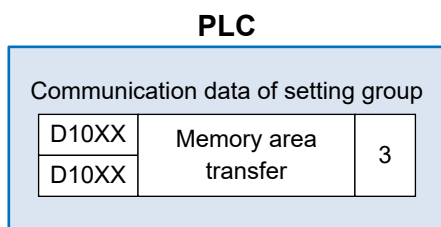


- Repeat this procedure for all of the Memory area data that needs to be changed.

(2) Transfer all of communication data in setting group for update

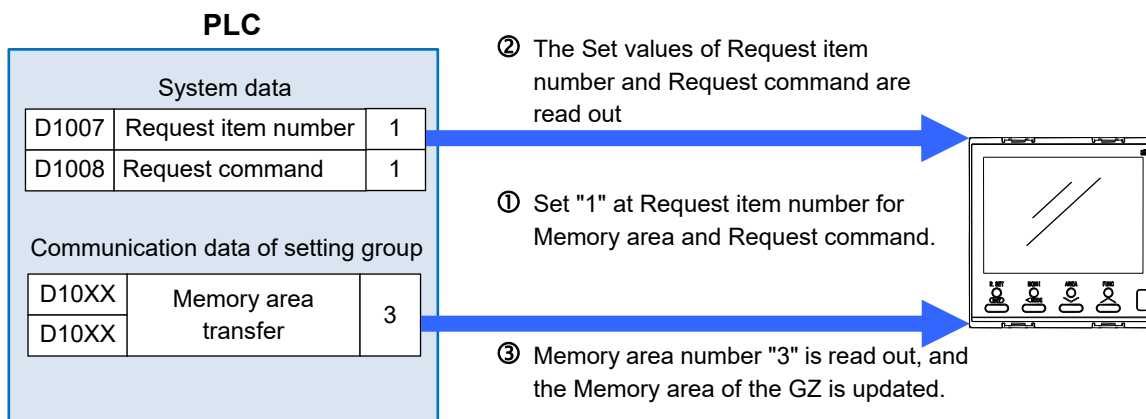
After having switched the Memory area, write all of the communication data into the PLC register using Request item number and Request command.

- Set the Memory area number to change into the PLC register.



Example:
Change the Memory area number from 1 to 3.

- Set commands of Request item number and Request command into the PLC register, then the Memory area of the GZ will be changed.



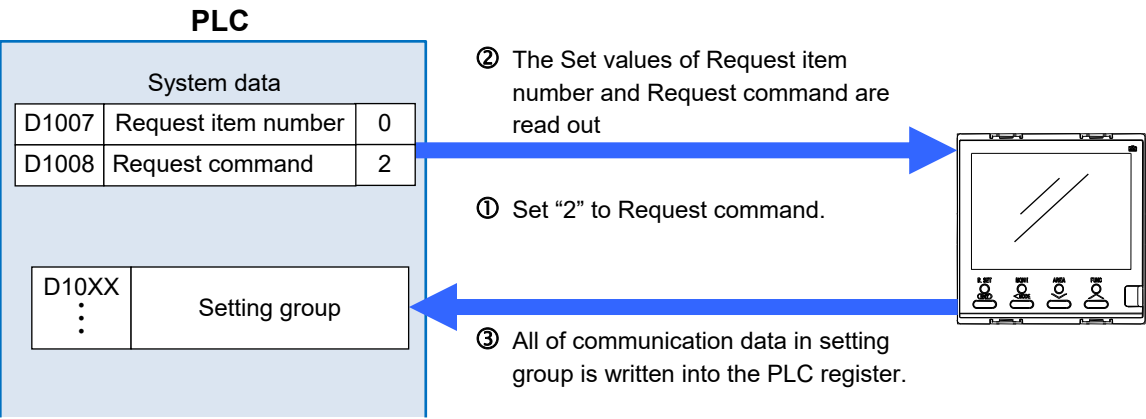
3. Set Request item number into the PLC register to write all of communication data in Setting group into the PLC register.

PLC

System data		
D1007	Request item number	0
D1008	Request command	0

Set "0" to Request item number.

4. Set Request command into the PLC register. Then, all of communication data in Setting group are written into the PLC register, and Memory area data is updated.



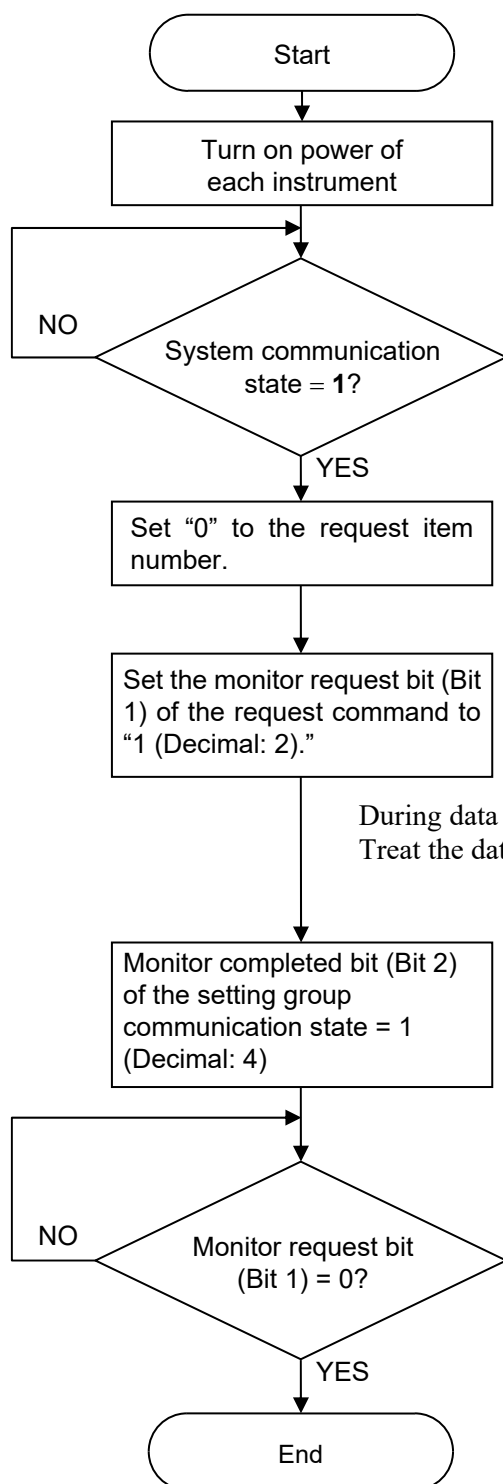
6.1.2 Data transfer procedures



NOTE

Change each set value of the GZ from the PLC after the initial settings are made. If each set value of the GZ 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 GZ, 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 GZ 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 GZ 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 GZ 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

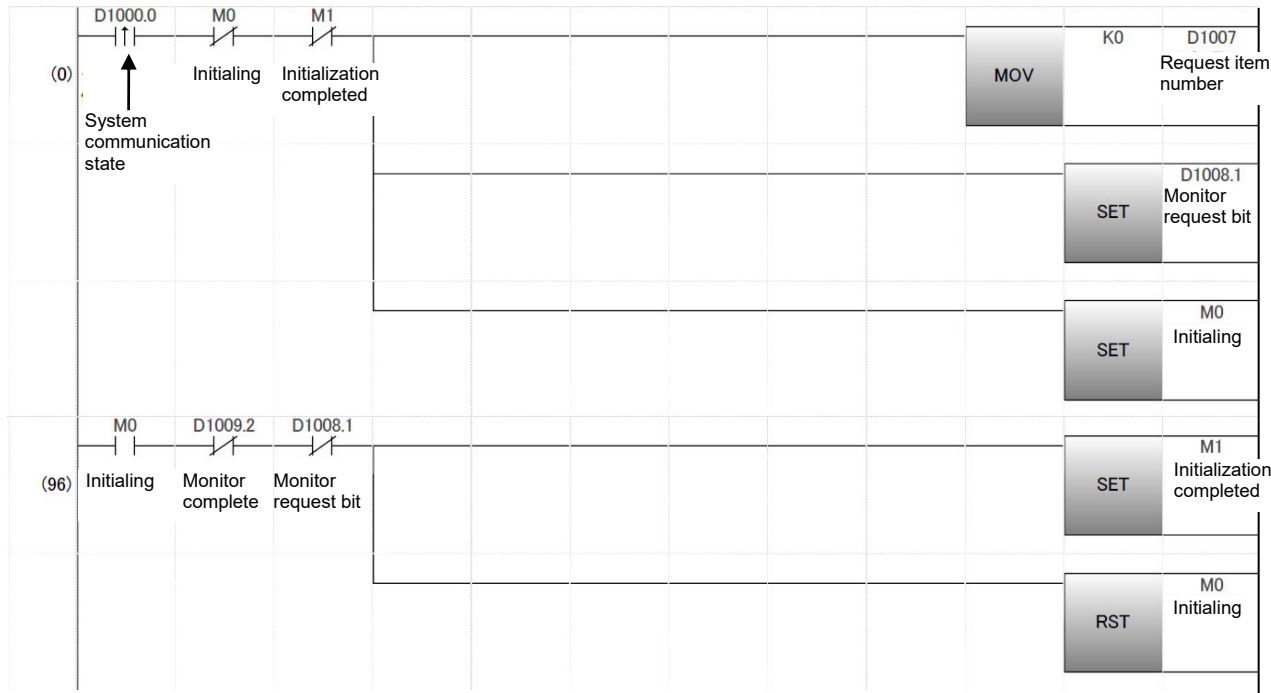
When multiple GZ are connected, write the communication data of all GZ to the PLC.



Refer to P. 6-17 for a programming example.

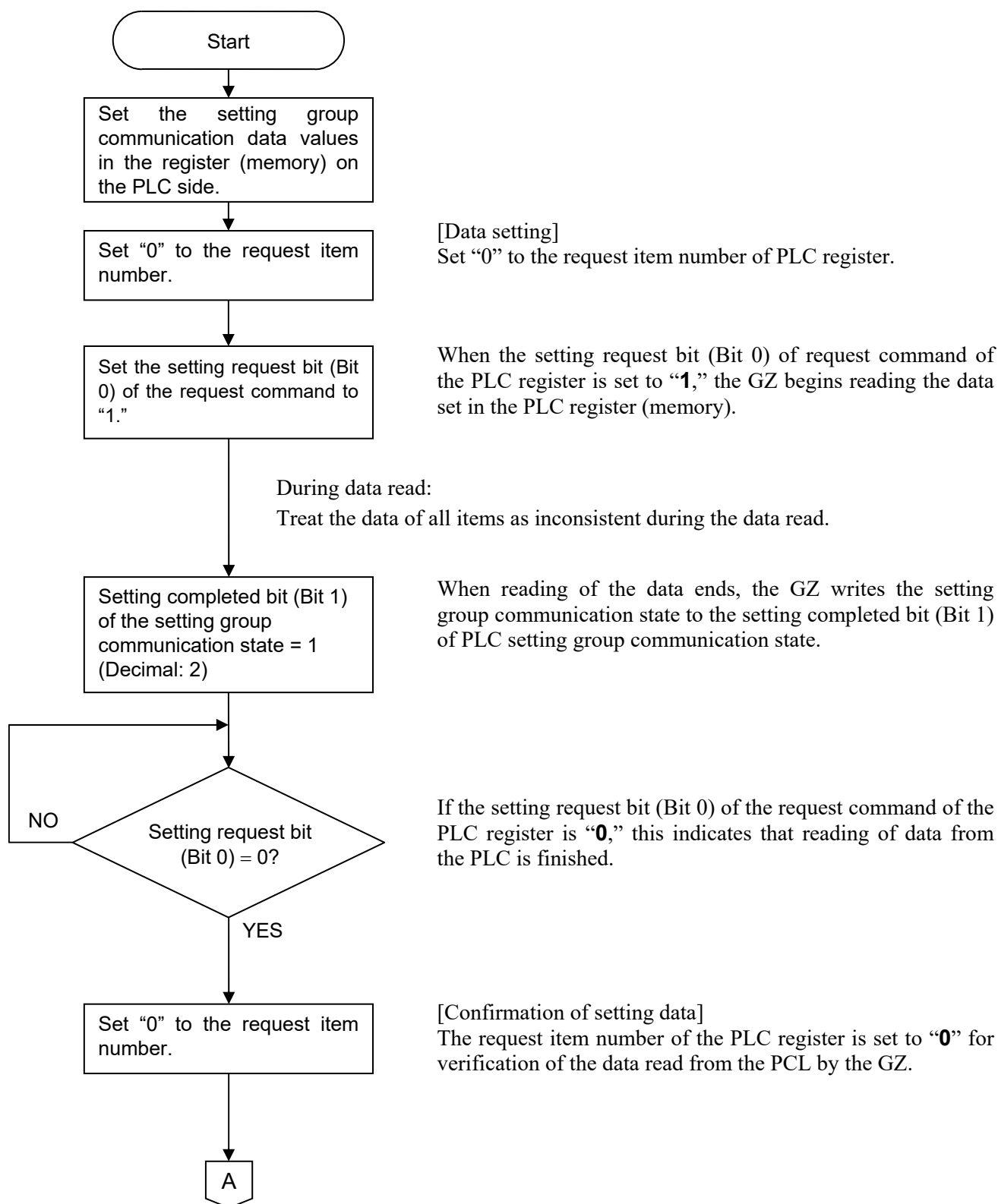
Program example:

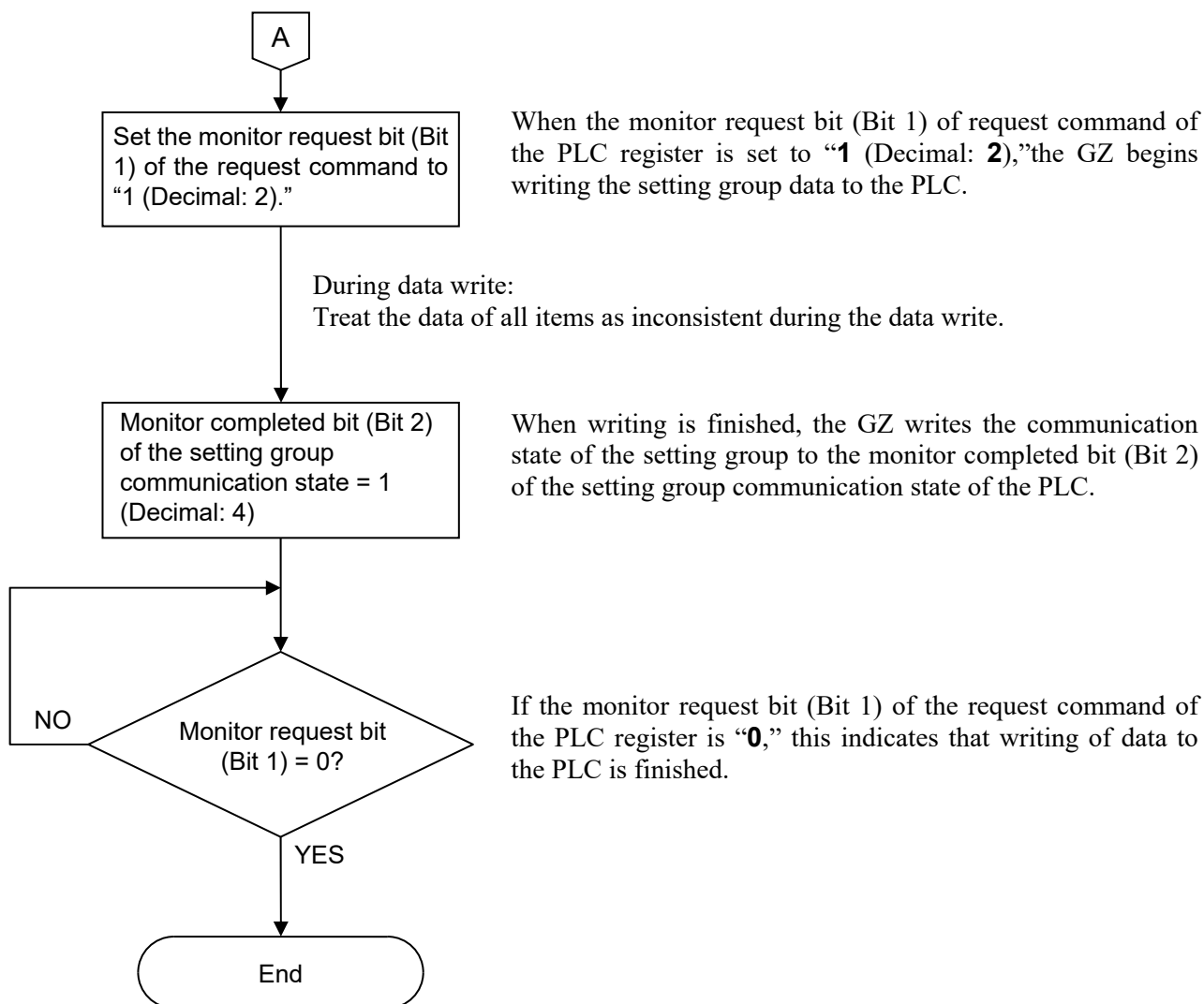
Initial setting



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 GZ.





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 items)
Setting item selection 1	1	Interlock release
	3	Input 1_Hold reset
	4	Input 2_Hold reset
	5	Bottom suppression start signal
	7	Input 1_Autotuning (AT)
	8	Input 2_Autotuning (AT)
	9	Input 1_Startup tuning (ST)
	10	Input 2_Startup tuning (ST)
	13	Remote/Local transfer
Setting item selection 2	26	Input 1_Proportional band [heat-side]
	27	Input 1_Integral time [heat-side]
	28	Input 1_Derivative time [heat-side]
	32	Input 1_FF amount
Setting item selection 3	35	Input 1_Control loop break alarm (LBA) time
	37	Input 2_Proportional band
	38	Input 2_Integral time
	39	Input 2_Derivative time
	43	Input 2_FF amount
	46	Input 2_Control loop break alarm (LBA) time
	48	Input 1_Proportional band [cool-side]
Setting item selection 4	49	Input 1_Integral time [cool-side]
	50	Input 1_Derivative time [cool-side]
Setting item selection 7	111	FF amount learning

- (2) Communication data that works with Memory area will not be automatically updated even if the Memory area has been changed. Check the Memory area number after switching, and read out the communication data using the Request command.



For the communication data that works with the Memory area, refer to

6.2 PLC Communication Data Map (P. 6-23).

- (3) 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 Input 1_Proportional band

Initial value of internal data: 3.0

Communication data: 30

Continued on the next page.

Continued from the previous page.

- (4) 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 Input 1_Proportional band

Initial value of internal data: 3.0

Communication data: 30

- (5) 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 GZ side
- Items disabled in Setting item selection 1 through 8

Actions taken by Setting request or Monitor request:

Request command	GZ operation
Setting request bit (GZ←PLC)	The data from the PLC is ignored and is not read into the GZ. The setting error bit is not turned on either.
Monitor request bit (GZ→PLC)	The GZ 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 GZ		When there are 9 GZ		When there are one GZ	
		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 GZ [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 GZ [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

No.	Name	Register address	Attribute	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: 3459
- Monitor item selection 2: 16512
- Monitor item selection 3: 1024
- Setting item selection 1: 16480
- Setting item selection 2: 7850
- Setting item selection 3: 32768
- Setting item selection 4: 771
- Setting item selection 5: 0
- Setting item selection 6: 5
- Setting item selection 7: 0
- Setting item selection 8: 0



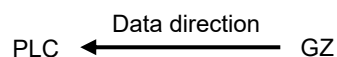
Assignment of register addresses varies depending on the communication data of the PLC communication environment indicated below.

- | | |
|--|---------------------------------|
| • Register type | • Monitor item selection 1 to 3 |
| • Register start number (High-order 4-bit) | • Setting item selection 1 to 8 |
| • Register start number (Low-order 16-bit) | • Slave register bias |
| • Monitor item register bias | • Input data type |
| • Setting item register bias | |

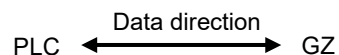


For PLC communication environment setting, refer to **5.2 PLC Communication Environment Items List (P. 5-3)**.

(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 GZ, the number of communication data is 39 (factory set value). When the maximum of 31 GZ are connected to the PLC communication port, the number of communication data is 1209.

When there is one GZ, the total number of communication data is 188. When the maximum of 31 GZ are connected to the PLC communication port, the total number of communication data is 5828.



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 [Input 1_Measured value (PV)] to D1029 [Error code] Single word: D1012 [Input 1_Measured value (PV)] to D1020 [Error code]
Setting group	Double word: D1030 [RUN/STOP transfer] to D1065 [Heater break alarm 2 (HBA2) set value] Single word: D1021 [RUN/STOP transfer] to D1038 [Heater break alarm 2 (HBA2) set value]



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 GZ. Check the following manual for detailed information of communication data that may be invalid or disabled.



GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)

6.2.2 Data map list (Factory setting)

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

No.	Name	Register address	Attribute	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]	—
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.



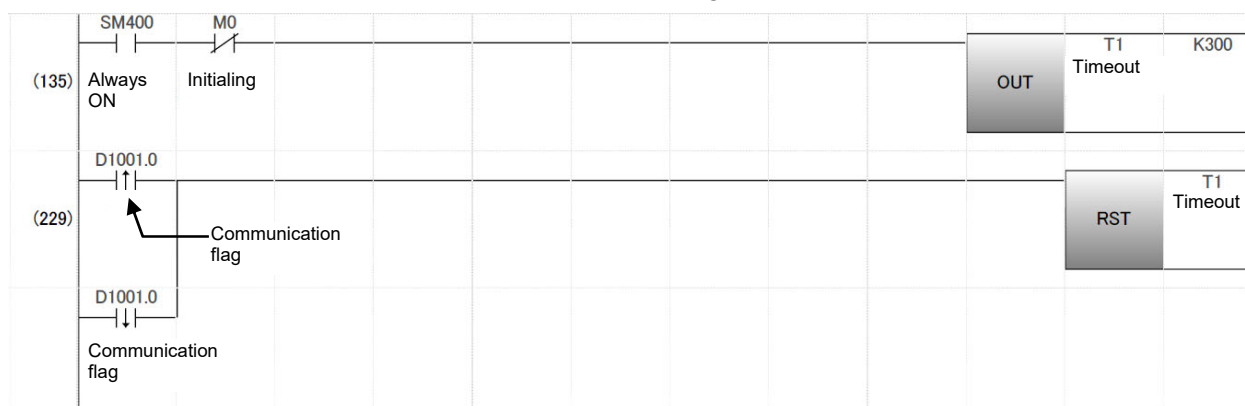
Data collection condition is assigned as a bit image in binary numbers.

Bit image: 0000000000000000
 Bit 15 ----- Bit 0

² The GZ 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 GZ 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.

Continued on the next page.

[illegible]

No.	Name	Register address	Attribute	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]	—

		GZ master		GZ slave	
		PLC register	Loader communication	PLC register	Loader communication
Bit 0: PLC register read/write error	Error occurred on the GZ master	Bit 0: ON	Bit 0: ON	—	—
	Error occurred on the GZ slave	—	—	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	—	—

[G7 master]

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

[67 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

[G7_master]

- A timeout is detected when the PLC response waiting time has been exceeded after the GZ slave sent the request message

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

- A timeout is detected when the PLC response waiting time has been exceeded after the G7 slave sent the request message

- If Access right ² is not transferred from the GZ master within 10 minutes after the last response of the GZ slave, the error is recognized.

[G7_master]

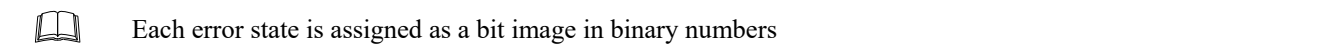
A timeout is detected when the PLC response waiting time has been exceeded after the G7 master sent the request message.

[*G7 slave*]

Timeout is not detected

The PLC and the GZ perform 1:1 communication. When multiple GZs are connected, communication to the PLC is switched

The FLC and the GZ perform 1:1 communication. When multiple GZs are connected, communication to the FLC 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 GZ slaves (and the GZ master itself) by the GZ master in the order of the device address.



Bit image: 0000000000000000

Bit 15 ----- Bit 0

Continued on the next page.

[illegible]

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

 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

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No.	Name	Register address	Attribute	Data range	Factory set value
System data					
8	Request item number ¹	D1007	R/W	0, 1 to 128 0: Transfer all communication data of the setting group. 1 to 128: 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 GZ read the communication data of the setting group on the PLC side.

Bit 1: Monitor request bit

This command requests that the GZ 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 GZ 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 GZ setting data write, this will turn ON when the GZ 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

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No.	Name	Register address	Attribute	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 GZ 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	Input 1_Measured value (PV)	D1012 D1013	RO	Input 1_Input range low – (Input 1_5 % or more of input span) to Input 1_Input range high + (Input 1_5 % or more of input span) Varies with the setting of the Decimal point position.	—
14	Input 1_Set value (SV) monitor	D1014 D1015	RO	Input 1_Setting limiter low to Input 1_Setting limiter high Varies with the setting of the Decimal point position.	—
15	Input 1_Manipulated output value monitor [heat-side]	D1016 D1017	RO	–5.0 to +105.0 %	—
16	Input 1_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	—
Monitor group (Monitor item selection 2)					
19	Comprehensive event state	D1024 D1025	RO	0 to 4095 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 1 (LBA1) +128: Control loop break alarm 2 (LBA2) +256: Input 1_Input error high +512: Input 1_Input error low +1024: Input 2_Input error high +2048: Input 2_Input error low When multiple items are applicable, they are summed up.	—
20	Overall operation status	D1026 D1027	RO	0 to 511 0: OFF +1: STOP state +2: Input 1_Manual mode state +4: Input 2_Manual mode state +8: Remote mode state (Differential temperature control state, Input 2 state of Control with PV select) +16: Input 1_Autotuning (AT) state +32: Input 2_Autotuning (AT) state +64: Set value of Input 1 is now changing +128: Set value of Input 2 is now changing +256: Communication monitoring result When multiple items are applicable, they are summed up.	—

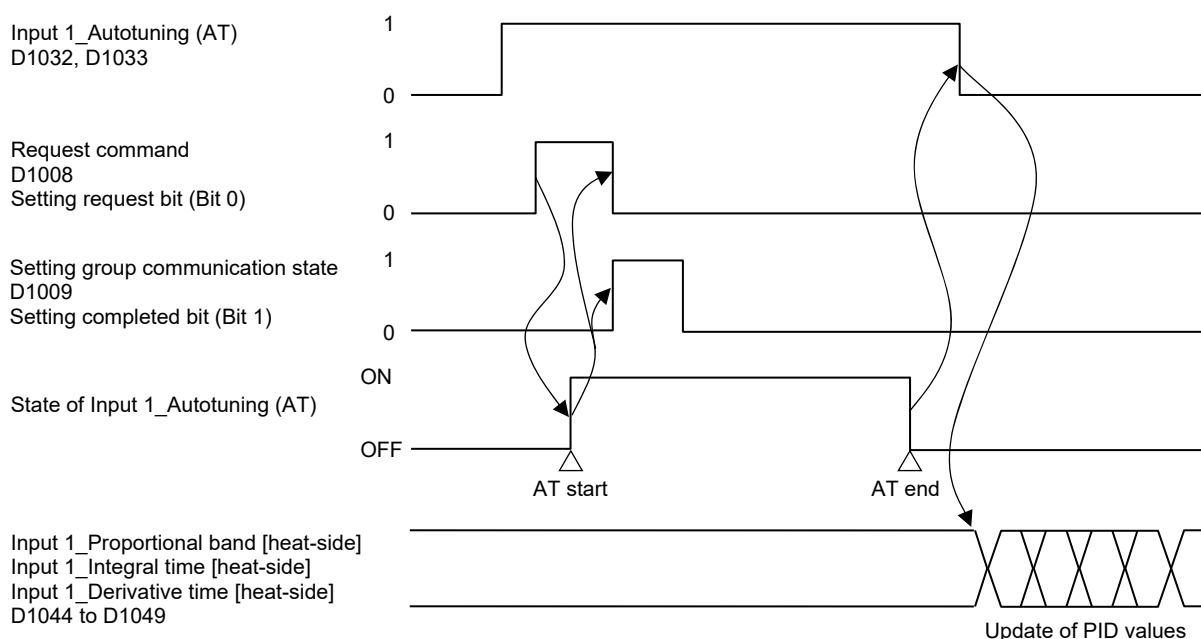
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No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 3)					
21	Error code	D1028 D1029	RO	0 to 71 0: Normal +1: Adjustment data error +2: Data back-up error +4: A/D conversion error (Temperature compensation error included) +64: Display units error When multiple items are applicable, they are summed up.	—
Setting group (Setting item selection 1)					
22	RUN/STOP transfer Item number: 6	D1030 D1031	R/W	0: RUN (Control start) 1: STOP (Control stop)	0
23	Input 1_Autotuning (AT) Item number: 7	D1032 D1033	R/W	0: PID control 1: Start Autotuning When the Input 1_Autotuning (AT) in the GZ has been changed to “0” from “1,” the corresponding data in the PLC will be also automatically updated. (Refer to a Time chart)	0
24	Input 1_Set value (SV) ★ Item number: 15	D1034 D1035	R/W	Input 1_Setting limiter low to Input 1_Setting limiter high Varies with the setting of the Decimal point position.	0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

Time chart



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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 2)					
25	Event 1 set value (EV1) Event 1 set value (EV1) [high] ★ Item number: 18	D1036 D1037	R/W	<u>Deviation</u> <ul style="list-style-type: none"> When assigned to Input 1 or Differential temperature input –(Input 1_Input span) to +(Input 1_Input span) When assigned to Input 2 –(Input 2_Input span) to +(Input 2_Input span) When Control with PV select is selected –(PV select input span) to +(PV select input span) <p>Varies with the setting of the Decimal point position.</p> <u>Input value or Set value</u> <ul style="list-style-type: none"> When assigned to Input 1 Input 1_Input range low to Input 1_Input range high When assigned to Input 2 Input 2_Input range low to Input 2_Input range high When assigned to Differential temperature input –(Input 1_Input span) to +(Input 1_Input span) When Control with PV select is selected PV select input range low to PV select input range high <p>Varies with the setting of the Decimal point position.</p> <u>Manipulated output value</u> –5.0 to +105.0 %	For Deviation, Input value and Set value TC/RTD inputs: 10.0 V/I inputs: 5 % of input span For Manipulated output value 50.0
26	Event 2 set value (EV2) Event 2 set value (EV2) [high] ★ Item number: 20	D1038 D1039	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 2)					
27	Event 3 set value (EV3) Event 3 set value (EV3) [high] ★ Item number: 22	D1040 D1041	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
28	Event 4 set value (EV4) Event 4 set value (EV4) [high] ★ Item number: 24	D1042 D1043	R/W	Same as Event 1 set value (EV1)/Event 1 set value (EV1) [high]	
29	Input 1_Proportional band [heat-side] ★ Item number: 26	D1044 D1045	R/W	<p>TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span)</p> <p>Varies with the setting of the Decimal point position.</p> <p>Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input 1_Input span (When Control with PV select: 0.0 to 1000.0 % of PV select input span)</p> <p>0 (0.0, 0.00): ON/OFF action</p> <p>In the following cases, Input 1_Proportional band [heat-side] of the PLC will be automatically updated.</p> <ul style="list-style-type: none"> • The Input 1_Autotuning (AT) of the GZ has changed to zero from one. • When Input 1_Startup tuning (ST) of the GZ has been normally completed 	<p>TC/RTD inputs: 30.0</p> <p>V/I inputs: 3.0</p>

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 2)					
30	Input 1_Integral time [heat-side] ★ Item number: 27	D1046 D1047	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds, 0.0 to 3600.0 seconds, 0.00 to 360.00 seconds or 0.000 to 36.000 seconds 0 (0.0, 0.00, 0.000): PD action Varies with the setting of the Integral/ Derivative time decimal point position. In the following cases, Input 1_Integral time [heat-side] of the PLC will be automatically updated. • The Input 1_Autotuning (AT) of the GZ has changed to zero from one. • When Input 1_Startup tuning (ST) of the GZ has been normally completed	240.00
31	Input 1_Derivative time [heat-side] ★ Item number: 28	D1048 D1049	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds, 0.00 to 360.00 seconds or 0.000 to 36.000 seconds 0 (0.0, 0.00, 0.000): PI action Varies with the setting of the Integral/ Derivative time decimal point position. In the following cases, Input 1_Derivative time [heat-side] of the PLC will be automatically updated. • The Input 1_Autotuning (AT) of the GZ has changed to zero from one. • When Input 1_Startup tuning (ST) of the GZ has been normally completed	60.00
32	Input 1_Control response parameter ★ Item number: 29	D1050 D1051	R/W	0: Slow 1: Medium 2: Fast When the P or PD action is selected, this setting becomes invalid	PID control: 0 Heat/Cool PID control: 2

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 3)					
33	Input 1_Proportional band [cool-side] ★ Item number: 48	D1052 D1053	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 1 to PV select input span) Varies with the setting of the Decimal point position. Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of Input 1_Input span (When Control with PV select: 0.1 to 1000.0 % of PV select input span) When the Input 1_Autotuning (AT) in the GZ has been changed to "0" from "1," Input 1_Proportional band [cool-side] of the PLC will be automatically updated.	TC/RTD inputs: 30 V/I inputs: 3.0
Setting group (Setting item selection 4)					
34	Input 1_Integral time [cool-side] ★ Item number: 49	D1054 D1055	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds or 0.000 to 36.000 seconds 0 (0.0, 0.00, 0.000): PD action Varies with the setting of the Integral/ Derivative time decimal point position. When the Input 1_Autotuning (AT) in the GZ has been changed to "0" from "1," Input 1_Integral time [cool-side] of the PLC will be automatically updated.	240.00
35	Input 1_Derivative time [cool-side] ★ Item number: 50	D1056 D1057	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds or 0.00 to 360.00 seconds or 0.000 to 36.000 seconds 0 (0.0, 0.00, 0.000): PI action Varies with the setting of the Integral/ Derivative time decimal point position. When the Input 1_Autotuning (AT) in the GZ has been changed to "0" from "1," Input 1_Derivative time [cool-side] of the PLC will be automatically updated.	60.00

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 4)					
36	Input 1_Setting change rate limiter (up) ★ Item number: 57	D1058 D1059	R/W	0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) 0: No function Varies with the setting of the Decimal point position.	0
37	Input 1_Setting change rate limiter (down) ★ Item number: 58	D1060 D1061	R/W	0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) 0: No function Varies with the setting of the Decimal point position.	0
Setting group (Setting item selection 6)					
38	Heater break alarm 1 (HBA1) set value Item number: 81	D1062 D1063	R/W	0.0 to 100.0 A 0.0: HBA function OFF	0.0
39	Heater break alarm 2 (HBA2) set value Item number: 83	D1064 D1065	R/W	0.0 to 100.0 A 0.0: HBA function OFF	0.0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

■ Single word items (Monitor group and Setting group)



Refer to P. 6-30 to 6-36 for the data range and the factory set value.

No.	Name	Register address
Monitor group (Monitor item selection 1)		
13	Input 1_Measured value (PV)	D1012
14	Input 1_Set value (SV) monitor	D1013
15	Input 1_Manipulated output value monitor [heat-side]	D1014
16	Input 1_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
Monitor group (Monitor item selection 2)		
19	Comprehensive event state	D1018
20	Overall operation status	D1019
Monitor group (Monitor item selection 3)		
21	Error code	D1020
Setting group (Setting item selection 1)		
22	RUN/STOP transfer Item number: 6	D1021
23	Input 1_Autotuning (AT) Item number: 7	D1022
24	Input 1_Set value (SV) ★ Item number: 15	D1023
Setting group (Setting item selection 2)		
25	Event 1 set value (EV1) Event 1 set value (EV1) [high] ★ Item number: 18	D1024
26	Event 2 set value (EV2) Event 2 set value (EV2) [high] ★ Item number: 20	D1025
27	Event 3 set value (EV3) Event 3 set value (EV3) [high] ★ Item number: 22	D1026
28	Event 4 set value (EV4) Event 4 set value (EV4) [high] ★ Item number: 24	D1027
29	Input 1_Proportional band [heat-side] ★ Item number: 26	D1028

No.	Name	Register address
30	Input 1_Integral time [heat-side] ★ Item number: 27	D1029
31	Input 1_Derivative time [heat-side] ★ Item number: 28	D1030
32	Input 1_Control response parameter ★ Item number: 29	D1031
Setting group (Setting item selection 3)		
33	Input 1_Proportional band [cool-side] ★ Item number: 48	D1032
Setting group (Setting item selection 4)		
34	Input 1_Integral time [cool-side] ★ Item number: 49	D1033
35	Input 1_Derivative time [cool-side] ★ Item number: 50	D1034
36	Input 1_Setting change rate limiter (up) ★ Item number: 57	D1035
37	Input 1_Setting change rate limiter (down) ★ Item number: 58	D1036
Setting group (Setting item selection 6)		
38	Heater break alarm 1 (HBA1) set value Item number: 81	D1037
39	Heater break alarm 2 (HBA2) set value Item number: 83	D1038

★ Data for Memory area:

This is the data of the Control area selected by the Memory area transfer.

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. 6-59)**. To configure the settings, reverse the procedure used to reduce communication data.

No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 1)					
1	Input 2_Measured value (PV)	—	RO	Input 2_Input range low – (Input 2_5 % or more of input span) to Input 2_Input range high + (Input 2_5 % or more of input span) Varies with the setting of the Decimal point position.	—
2	Input 2_Set value (SV) monitor	—	RO	Input 2_Setting limiter low to Input 2_Setting limiter high Varies with the setting of the Decimal point position.	—
3	PV select Measured value (PV)	—	RO	When controlling with Input 1: Input 1_Input range low – (Input 1_5 % or more of input span) to Input 1_Input range high + (Input 1_5 % or more of input span) When controlling with Input 2: Input 2_Input range low – (Input 2_5 % or more of input span) to Input 2_Input range high + (Input 2_5 % or more of input span) Varies with the setting of the Decimal point position.	—
4	Measured value (PV) of differential temperature input	—	RO	In case of Input data type 0 or 2: 1999 to 99999 In case of Input data type 1: 1999 to 9999 Varies with the setting of the Decimal point position.	—
5	Set value (SV) monitor of differential temperature input	—	RO	–(Input 1_Input span) to +(Input 1_Input span) Varies with the setting of the Decimal point position.	—
6	Input 2_Manipulated output value monitor	—	RO	–5.0 to +105.0 %	—

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No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 1)					
7	Memory area soak time monitor	—	RO	In case of Input data type 0 or 2: 0 to 35999 seconds 0 to 11999 seconds 0 to 5999 minutes 0 seconds to 5999 seconds (10 ms) (Calculation is performed every 50ms.) In case of Input data type 1: 0 to 11999 seconds 0 to 5999 minutes 0 seconds to 5999 seconds (10 ms) (Calculation is performed every 50ms.) Data range of Memory area soak time monitor can be selected on the Soak time unit (P. 3-11).	—
8	Remote setting input value monitor	—	RO	Input 1_Setting limiter low to Input 1_Setting limiter high Varies with the setting of the Decimal point position.	—
9	Unused	—	—	Do not use this one	—
10	Event 1 state monitor	—	RO	0: OFF 1: ON	—
Monitor group (Monitor item selection 2)					
11	Event 2 state monitor	—	RO	0: OFF 1: ON	—
12	Event 3 state monitor	—	RO	0: OFF 1: ON	—
13	Event 4 state monitor	—	RO	0: OFF 1: ON	—
14	Heater break alarm 1 (HBA1) state monitor	—	RO	0: OFF 1: ON	—
15	Heater break alarm 2 (HBA2) state monitor	—	RO	0: OFF 1: ON	—
16	Control loop break alarm 1 (LBA1) state monitor	—	RO	0: OFF 1: ON	—
17	Control loop break alarm 2 (LBA2) state monitor	—	RO	0: OFF 1: ON	—
18	Input 1_Burnout state monitor	—	RO	0: OFF 1: ON	—
19	Input 2_Burnout state monitor	—	RO	0: OFF 1: ON	—
20	Unused	—	—	Do not use this one	—

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No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 2)					
21	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.	—
22	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.	—
23	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.	—
24	Memory area number monitor	—	RO	1 to 16	—
Monitor group (Monitor item selection 3)					
25	Input 1_PID memory	—	RO	Switching by Memory area number: 1 to 16 Switching by Set value (SV): 1 to 8 Switching by Measured value (PV): 1 to 8	—
26	Input 2_PID memory	—	RO	Switching by Memory area number: 1 to 16 Switching by Set value (SV): 1 to 8 Switching by Measured value (PV): 1 to 8	—
27	Input 1_Peak hold monitor	—	RO	Input 1_Input range low – (Input 1_5 % of input span) to Input 1_Input range high + (Input 1_5 % of input span) Varies with the setting of the Decimal point position.	—

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No.	Name	Register address	Attribute	Data range	Factory set value
Monitor group (Monitor item selection 3)					
28	Input 1_Bottom hold monitor	—	RO	Input 1_Input range low – (Input 1_5 % of input span) to Input 1_Input range high + (Input 1_5 % of input span) Varies with the setting of the Decimal point position.	—
29	Input 2_Peak hold monitor	—	RO	Input 2_Input range low – (Input 2_5 % of input span) to Input 2_Input range high + (Input 2_5 % of input span) Varies with the setting of the Decimal point position.	—
30	Input 2_Bottom hold monitor	—	RO	Input 2_Input range low – (Input 2_5 % of input span) to Input 2_Input range high + (Input 2_5 % of input span) Varies with the setting of the Decimal point position.	—
31	Input 1_AT remaining time monitor	—	RO	0 to 2880 minutes	—
32	Input 2_AT remaining time monitor	—	RO	0 to 2880 minutes	—
33	Input 1_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.	—
34	Input 2_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.	—
35	Integrated operating time	—	RO	0 to 65535 hours	—

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 1)					
36	Interlock release Item number: 1	—	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 GZ has changed to “1” from “0,” the data in the PLC will be also automatically updated to “1.”	0
37	Memory area transfer Item number: 2	—	R/W	1 to 16 When the DI1 function selection is set to “Memory area transfer (Without area set signal)” and when “External mode” is selected with the Control area Local/External transfer, the data is RO (Read only).	1
38	Input 1_Hold reset Item number: 3	—	R/W	0: Hold 1: Reset When the Input 1_Hold reset of the GZ has changed to “0” from “1,” the data in the PLC will be also automatically updated to “0.”	0
39	Input 2_Hold reset Item number: 4	—	R/W	0: Hold 1: Reset When the Input 2_Hold reset of the GZ has changed to “0” from “1,” the data in the PLC will be also automatically updated to “0.”	0
40	Bottom suppression start signal Item number: 5	—	R/W	0 to 3 0: No forced ON +1: Input 1_Bottom suppression action_Fforced ON +2: Input 2_Bottom suppression action_Fforced ON When the Bottom suppression start signal has been switched, the data in the PLC will be also automatically updated.	0
41	Input 2_Autotuning (AT) Item number: 8	—	R/W	0: PID control 1: Start Autotuning When the Input 2_Autotuning (AT) in the GZ has been changed to “0” from “1,” the corresponding data in the PLC will be also automatically updated.	0
42	Input 1_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 Input 1_Startup tuning (ST) signal has been changed to “0” from a value other than zero, the data in the PLC will be also automatically updated.	0

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 1)					
43	Input 2_Startup tuning (ST) Item number: 10	—	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 Input 2_Startup tuning (ST) signal has been changed to "0" from a value other than zero, the data in the PLC will be also automatically updated.	0
44	Input 1_Auto/Manual transfer Item number: 11	—	R/W	0: Auto mode 1: Manual mode	0
45	Input 2_Auto/Manual transfer Item number: 12	—	R/W	0: Auto mode 1: Manual mode	0
46	Remote/Local transfer Item number: 13	—	R/W	When Select function for input 2 is: "Remote setting input" 0: Local mode 1: Remote mode When Select function for input 2 is: "Control with PV select" 0: Input 1 1: Input 2 When "Switching by level" is selected at "Selection of PV select trigger," the parameter becomes RO (Read only). When Select function for input 2 is: "2-loop control/Differential temperature control" 0: 2-loop control 1: Differential temperature control When the state of Remote/Local transfer of the GZ has been changed, the data in the PLC will be also automatically updated. The values are updated depending on the set values of "Remote/Local transfer selection (Area)."	0
47	Control area Local/External transfer Item number: 14	—	R/W	0: Local mode 1: External mode	0

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 1)					
48	Input 2_Set value (SV) ★ Item number: 16	—	R/W	Input 2_Setting limiter low to Input 2_Setting limiter high Varies with the setting of the Decimal point position.	0
Setting group (Setting item selection 2)					
49	Set value (SV) of differential temperature input ★ Item number: 17	—	R/W	–(Input 1_Input span) to +(Input 1_Input span) Varies with the setting of the Decimal point position.	0
50	Event 1 set value (EV1') [low] ★ Item number: 19	—	R/W	<u>Deviation</u> <ul style="list-style-type: none"> When assigned to Input 1 or Differential temperature input –(Input 1_Input span) to +(Input 1_Input span) When assigned to Input 2 –(Input 2_Input span) to +(Input 2_Input span) When Control with PV select is selected at Select function for input 2. –(PV select input span) to +(PV select input span) Varies with the setting of the Decimal point position. <u>Input value or Set value</u> <ul style="list-style-type: none"> When assigned to Input 1 Input 1_Input range low to Input 1_Input range high When assigned to Input 2 Input 2_Input range low to Input 2_Input range high When assigned to Differential temperature input –(Input 1_Input span) to +(Input 1_Input span) When Control with PV select is selected at Select function for input 2. PV select input range low to PV select input range high Varies with the setting of the Decimal point position.	TC/RTD inputs: –10 V/I inputs: –5 % of input span

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 2)					
51	Event 2 set value (EV2') [low] ★ Item number: 21	—	R/W	Same as Event 1 set value (EV1') [low]	
52	Event 3 set value (EV3') [low] ★ Item number: 23	—	R/W	Same as Event 1 set value (EV1') [low]	
53	Event 4 set value (EV4') [low] ★ Item number: 25	—	R/W	Same as Event 1 set value (EV1') [low]	
54	Input 1_Proactive intensity ★ Item number: 30	—	R/W	0 to 4 0: No function	2
55	Input 1_Manual reset ★ Item number: 31	—	R/W	–100.0 to +100.0 %	0.0
56	Input 1_FF amount ★ Item number: 32	—	R/W	–100.0 to +100.0 % When the Input 1_FF amount of the GZ has changed, the data in the PLC will be also automatically updated.	0.0
Setting group (Setting item selection 3)					
57	Input 1_Output limiter high [heat-side] ★ Item number: 33	—	R/W	Input 1_Output limiter low [heat-side] to 105.0 %	105.0
58	Input 1_Output limiter low [heat-side] ★ Item number: 34	—	R/W	–5.0 % to Input 1_Output limiter high [heat-side]	–5.0 %

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 3)					
59	Input 1_Control loop break alarm (LBA) time ★ Item number: 35	—	R/W	0 to 7200 seconds 0: No function When the Input 1_Autotuning (AT) in the GZ has been changed to “0” from “1,” the Input 1_Control loop break alarm (LBA) time in the PLC will be also automatically updated. When Input 1_Startup tuning (ST) of the GZ has been normally completed, the Input 1_Control loop break alarm (LBA) time in the PLC will be also automatically updated.	LBA function is specified: 480 LBA function is not specified: 0
60	Input 1_LBA deadband (LBD) ★ Item number: 36	—	R/W	0 to Input 1_Input span (When Control with PV select: 0 to PV select input span) Varies with the setting of the Decimal point position.	0
61	Input 2_Proportional band ★ Item number: 37	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_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 2_Input span 0 (0.0, 0.00): ON/OFF action In the following cases, Input 2_Proportional band of the PLC will be automatically updated. <ul style="list-style-type: none"> • The Input 2_Autotuning (AT) of the GZ has changed to zero from one. • When Input 2_Startup tuning (ST) of the GZ has been normally completed 	TC/RTD inputs: 30.0 V/I inputs: 3.0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 3)					
62	Input 2_Integral time ★ Item number: 38	—	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds, 0.00 to 360.00 seconds or 0.000 to 36.000 seconds 0 (0.0, 0.00, 0.000): PD action Varies with the setting of the Integral/ Derivative time decimal point position. In the following cases, Input 2_Integral time of the PLC will be automatically updated. <ul style="list-style-type: none"> • The Input 2_Autotuning (AT) of the GZ has changed to zero from one. • When Input 2_Startup tuning (ST) of the GZ has been normally completed 	240.00
63	Input 2_Derivative time ★ Item number: 39	—	R/W	0 to 3600 seconds, 0.0 to 3600.0 seconds, 0.00 to 360.00 seconds or 0.000 to 36.000 seconds 0 (0.0, 0.00, 0.000): PI action Varies with the setting of the Integral/ Derivative time decimal point position. In the following cases, Input 2_Derivative time of the PLC will be automatically updated. <ul style="list-style-type: none"> • The Input 2_Autotuning (AT) of the GZ has changed to zero from one. • When Input 2_Startup tuning (ST) of the GZ has been normally completed 	60.00
64	Input 2_Control response parameter ★ Item number: 40	—	R/W	0: Slow 1: Medium 2: Fast When the P or PD action is selected, this setting becomes invalid	0
65	Input 2_Proactive intensity ★ Item number: 41	—	R/W	0 to 4 0: No function	2
66	Input 2_Manual reset ★ Item number: 42	—	R/W	−100.0 to +100.0 %	0.0
67	Input 2_FF amount ★ Item number: 43	—	R/W	−100.0 to +100.0 % When the Input 2_FF amount of the GZ has changed, the data in the PLC will be also automatically updated.	0.0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 3)					
68	Input 2_Output limiter high ★ Item number: 44	—	R/W	Input 2_Output limiter low to 105.0 %	105.0
69	Input 2_Output limiter low ★ Item number: 45	—	R/W	–5.0 % to Input 2_Output limiter high	–5.0
70	Input 2_Control loop break alarm (LBA) time ★ Item number: 46	—	R/W	0 to 7200 seconds 0: No function When the Input 2_Autotuning (AT) in the GZ has been changed to “0” from “1,” the Input 2_Control loop break alarm (LBA) time in the PLC will be also automatically updated. When Input 2_Startup tuning (ST) of the GZ has been normally completed, the Input 2_Control loop break alarm (LBA) time in the PLC will be also automatically updated.	LBA function is specified: 480 LBA function is not specified: 0
71	Input 2_LBA deadband (LBD) ★ Item number: 47	—	R/W	0 to Input 2_Input span Varies with the setting of the Decimal point position.	0
Setting group (Setting item selection 4)					
72	Input 1_Overlap/Deadband ★ Item number: 51	—	R/W	TC/RTD inputs: –(Input 1_Input span) to +(Input 1_Input span) <div style="display: inline-block; vertical-align: middle;"> { <div style="display: inline-block; vertical-align: middle; text-align: center;"> When Control with PV select: –(PV select input span) to +(PV select input span) </div> } </div> (Unit: °C [°F]) Varies with the setting of the Decimal point position. Voltage (V)/Current (I) inputs: –100.0 to +100.0 % of Input 1_Input span <div style="display: inline-block; vertical-align: middle;"> { <div style="display: inline-block; vertical-align: middle; text-align: center;"> When Control with PV select: –100.0 to +100.0 % of PV select input span </div> } </div> Minus (–) setting results in Overlap. However, the overlapping range is within the proportional range.	TC/RTD inputs: 0 V/I inputs: 0.0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 4)					
73	Input 1_Output limiter high [cool-side] ★ Item number: 52	—	R/W	Input 1_Output limiter low [cool-side] to 105.0 %	105.0
74	Input 1_Output limiter low [cool-side] ★ Item number: 53	—	R/W	–5.0 % to Input 1_Output limiter high [cool-side]	–5.0 %
75	Select Trigger type for Memory area transfer ★ Item number: 54	—	R/W	0 to 63 0: No assignment +1: Event 1 +2: Event 2 +4: Event 3 +8: Event 4 +16: Digital input 1 (DI1) Close edge +32: Digital input 1 (DI1) Open edge To select two or more functions, sum each value.	0
76	Area soak time ★ Item number: 55	—	R/W	In case of Input data type 0 or 2: 0 to 35999 seconds 0 to 5999 minutes 0 to 11999 seconds 0 to 5999 (Calculation is performed every 50ms.) In case of Input data type 1: 0 to 5999 minutes 0 to 11999 seconds 0 to 5999 (Calculation is performed every 50ms.) Data range of Memory area soak time monitor can be selected on the Soak time unit (P. 3-10).	0
77	Link area number ★ Item number: 56	—	R/W	0 to 16 0: No function	0
78	Input 1_Auto/Manual transfer selection (Area) ★ Item number: 59	—	R/W	0: No transfer 1: Auto mode (bumpless) 2: Auto mode (bump) 3: Manual mode (bumpless) 4: Manual mode (bump)	0
79	Input 1_Manipulated output value (Area) ★ Item number: 60	—	R/W	PID control, : –5.0 to +105.0 % Heat/Cool PID control: –105.0 to +105.0 %	PID control: –5.0 Heat/Cool PID control: 0.0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 4)					
80	Input 2_Setting change rate limiter (up) ★ Item number: 61	—	R/W	0 to Input 2_Input span 0: No function Varies with the setting of the Decimal point position.	0
81	Input 2_Setting change rate limiter (down) ★ Item number: 62	—	R/W	0 to Input 2_Input span 0: No function Varies with the setting of the Decimal point position.	0
82	Input 2_Auto/Manual transfer selection (Area) ★ Item number: 63	—	R/W	0: No transfer 1: Auto mode (bumpless) 2: Auto mode (bump) 3: Manual mode (bumpless) 4: Manual mode (bump)	0
83	Input 2_Manipulated output value (Area) ★ Item number: 64	—	R/W	–5.0 to +105.0 %	–5.0
Setting group (Setting item selection 5)					
84	Remote/Local transfer selection (Area) ★ Item number: 65	—	R/W	When Select function for input 2 is: “Remote setting input” 0: Local mode 1: Remote mode When Select function for input 2 is: “Control with PV select” 0: Input 1 1: Input 2 When Select function for input 2 is: “2-loop control/Differential temperature control” 0: 2-loop control 1: Differential temperature control	0

★ Data for Memory area: This is the data of the Control area selected by the Memory area transfer.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 5)					
85	Display update cycle Item number: 66	—	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
86	Input 1_PV bias Item number: 67	—		–(Input 1_Input span) to +(Input 1_Input span) <div style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 10px; margin: 0;"> When Control with PV select: – PV select input span) to +(PV select input span) </div> Varies with the setting of the Decimal point position.	0
87	Input 1_PV digital filter Item number: 68	—	R/W	0.00 to 10.00 seconds 0.00: Filter OFF	0.00
88	Input 1_PV ratio Item number: 69	—	R/W	0.500 to 1.500	1.000
89	Input 1_PV low input cut-off Item number: 70	—	R/W	0.00 to 25.00 % of Input 1_Input span (When Control with PV select: 0.00 to 25.00 % of PV select input span)	0.00
90	Input 2_PV bias (RS bias) Item number: 71	—	R/W	–(Input 2_Input span) to +(Input 2_Input span) Varies with the setting of the Decimal point position. RS bias is selected by selecting “Remote setting input” at Select function for input 2.	0

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 5)					
91	Input 2_PV digital filter (RS digital filter) Item number: 72	—	R/W	0.00 to 10.00 seconds 0.00: Filter OFF RS digital filter is selected by selecting “Remote setting input” at Select function for input 2.	0.00
92	Input 2_PV ratio (RS ratio) Item number: 73	—	R/W	Input 2_PV ratio 0.500 to 1.500 RS ratio 0.001 to 9.999 RS ratio is selected by selecting “Remote setting input” at Select function for input 2.	1.000
93	Input 2_PV low input cut-off Item number: 74	—	R/W	0.00 to 25.00 % of Input 2_Input span	0.00
94	OUT1 proportional cycle time Item number: 75	—	R/W	0.1 to 100.0 seconds	Relay contact output: 20.0 Voltage pulse output, Transistor output: Note1
95	OUT2 proportional cycle time Item number: 76	—	R/W	0.1 to 100.0 seconds	Relay contact output: 20.0 Voltage pulse output, Transistor output: Note2
96	OUT3 proportional cycle time Item number: 77	—	R/W	0.1 to 100.0 seconds	Voltage pulse output: Note 3

Note 1: In case OUT1 function selection is “Input 1_Control output [cool-side]” and Input 1_Control action is “Brilliant II Heat/Cool PID control [air cooling] or [water cooling]”: 20.0
Other cases: 2.0

Note2: In case OUT2 function selection is “Input 1_Control output [cool-side]” and Input 1_Control action is “Brilliant II Heat/Cool PID control [air cooling] or [water cooling]”: 20.0
Other cases: 2.0

Note3: In case OUT3 function selection is “Input 1_Control output [cool-side]” and Input 1_Control action is “Brilliant II Heat/Cool PID control [air cooling] or [water cooling]”: 20.0
Other cases: 2.0

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 5)					
97	OUT1 minimum ON/OFF time of proportional cycle Item number: 78	—	R/W	0 to 1000 ms	0
98	OUT2 minimum ON/OFF time of proportional cycle Item number: 79	—	R/W	0 to 1000 ms	0
99	OUT3 minimum ON/OFF time of proportional cycle Item number: 80	—	R/W	0 to 1000 ms	0
Setting group (Setting item selection 6)					
100	Number of heater break alarm 1 (HBA1) delay times Item number: 82	—	R/W	0 to 255 times	5
101	Number of heater break alarm 2 (HBA2) delay times Item number: 84	—	R/W	0 to 255 times	5
102	Input 1_Manual manipulated output value Item number: 85	—	R/W	PID control: Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side] Heat/Cool PID control *: -(Input 1_Output limiter high [cool-side]) to +(Input 1_Output limiter high [heat-side])	PID control: -5.0 Heat/Cool PID control: 0.0

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

(1) Input 1_Output limiter high [cool-side] is $\leq 0.0\%$

- Input 1_Output limiter low [heat-side] is $\leq 0.0\%$: 0.0% to +(Input 1_Output limiter high [heat-side])
- Input 1_Output limiter low [heat-side] is $> 0.0\%$: Input 1_Output limiter low [heat-side] to Input 1_Output limiter high [heat-side]

(2) Input 1_Output limiter high [heat-side] is $\leq 0.0\%$

- Input 1_Output limiter low [cool-side] is $\leq 0.0\%$: -(Input 1_Output limiter high [cool-side]) to 0.0%
- Input 1_Output limiter low [cool-side] is $> 0.0\%$: -(Input 1_Output limiter high [cool-side]) to -(Input 1_Output limiter low [cool-side])

(3) Fixed at 0.0% in the following cases:Input 1_Output limiter high [cool-side] $\leq 0.0\%$, and Input 1_Output limiter high [heat-side] $\leq 0.0\%$

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 6)					
103	Input 1_ Level PID setting 1 * Item number: 86	—	R/W	Input 1_Input range low to Input 1_Input range high <div> <div>When Control with PV select:</div> <div>PV select input range low to PV select</div> <div>input range high</div> </div> Varies with the setting of the Decimal point position.	Input 1_ Input range high <div> <div>When Control with PV select:</div> <div>PV select</div> <div>input range high</div> </div>
104	Input 1_ Level PID setting 2 * Item number: 87	—	R/W	Same as Input 1_Level PID setting 1	Same as Input 1_ Level PID setting 1
105	Input 1_ Level PID setting 3 * Item number: 88	—	R/W	Same as Input 1_Level PID setting 1	Same as Input 1_ Level PID setting 1
106	Input 1_ Level PID setting 4 * Item number: 89	—	R/W	Same as Input 1_Level PID setting 1	Same as Input 1_ Level PID setting 1
107	Input 1_ Level PID setting 5 * Item number: 90	—	R/W	Same as Input 1_Level PID setting 1	Same as Input 1_ Level PID setting 1
108	Input 1_ Level PID setting 6 * Item number: 91	—	R/W	Same as Input 1_Level PID setting 1	Same as Input 1_ Level PID setting 1
109	Input 1_ Level PID setting 7 * Item number: 92	—	R/W	Same as Input 1_Level PID setting 1	Same as Input 1_ Level PID setting 1
110	For system use Item number: 93	—	—	Internal processing Do not use the register address	—

*Level PID settings 1 to 7 of Input 1 always maintain the following relation.

$$\begin{aligned}
 &(\text{Input 1_Level PID setting 1}) \leq (\text{Input 1_Level PID setting 2}) \leq (\text{Input 1_Level PID setting 3}) \leq \\
 &(\text{Input 1_Level PID setting 4}) \leq (\text{Input 1_Level PID setting 5}) \leq (\text{Input 1_Level PID setting 6}) \leq \\
 &(\text{Input 1_Level PID setting 7})
 \end{aligned}$$

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 6)					
111	Input 1_ON/OFF action differential gap (upper) Item number: 94	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) Varies with the setting of the Decimal point position. Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of Input 1_Input span (When Control with PV select: 0.0 to 100.0 % of PV select input span)	TC/RTD inputs: 1 V/I inputs: 0.1
112	Input 1_ON/OFF action differential gap (lower) Item number: 95	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input 1_Input span (Unit: °C [°F]) (When Control with PV select: 0 to PV select input span) Varies with the setting of the Decimal point position. Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of Input 1_Input span (When Control with PV select: 0.0 to 100.0 % of PV select input span)	TC/RTD inputs: 1 V/I inputs: 0.1
113	Input 2_Manual manipulated output value Item number: 96	D1122 D1123	R/W	Input 2_Output limiter low to Input 2_Output limiter high	−5.0
Setting group (Setting item selection 7)					
114	Input 2_Level PID setting 1 * Item number: 97	—	R/W	Input 2_Input range low to Input 2_Input range high Varies with the setting of the Decimal point position.	Input 2_Input range high
115	Input 2_Level PID setting 2 * Item number: 98	—	R/W	Same as Input 2_Level PID setting 1	Same as Input 2_Level PID setting 1
116	Input 2_Level PID setting 3 * Item number: 99	—	R/W	Same as Input 2_Level PID setting 1	Same as Input 2_Level PID setting 1

*Level PID settings 1 to 7 of Input 2 always maintain the following relation.

(Input 2_Level PID setting 1) ≤ (Input 2_Level PID setting 2) ≤ (Input 2_Level PID setting 3) ≤
 (Input 2_Level PID setting 4) ≤ (Input 2_Level PID setting 5) ≤ (Input 2_Level PID setting 6) ≤
 (Input 2_Level PID setting 7)

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 7)					
117	Input 2_ Level PID setting 4 *	—	R/W	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1
	Item number: 100				
118	Input 2_ Level PID setting 5 *	—	R/W	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1
	Item number: 101				
119	Input 2_ Level PID setting 6 *	—	R/W	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1
	Item number: 102				
120	Input 2_ Level PID setting 7 *	—	R/W	Same as Input 2_Level PID setting 1	Same as Input 2_ Level PID setting 1
	Item number: 103				
121	For system use	—	—	Internal processing Do not use the register address	—
	Item number: 104				
122	Input 2_ON/OFF action differential gap (upper)	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_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 1_Input span	TC/RTD inputs: 1 V/I inputs: 0.1
	Item number: 105				
123	Input 2_ON/OFF action differential gap (lower)	—	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input 2_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 1_Input span	TC/RTD inputs: 1 V/I inputs: 0.1
	Item number: 106				

*Level PID settings 1 to 7 of Input 2 always maintain the following relation.

(Input 2_Level PID setting 1) ≤ (Input 2_Level PID setting 2) ≤ (Input 2_Level PID setting 3) ≤

(Input 2_Level PID setting 4) ≤ (Input 2_Level PID setting 5) ≤ (Input 2_Level PID setting 6) ≤

(Input 2_Level PID setting 7)

Continued on the next page.

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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 7)					
124	Input 1_AT bias Item number: 107	—	R/W	-(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: - (PV select input span) to + (PV select input span)) Varies with the setting of the Decimal point position.	0
125	Input 2_AT bias Item number: 108	—	R/W	-(Input 2_Input span) to +(Input 2_Input span) Varies with the setting of the Decimal point position.	0
126	Unused Item number: 109	—	—	Do not use this one	—
127	Unused Item number: 110	—	—	Do not use this one	—
128	FF amount learning Item number: 111	—	R/W	0 to 3 0: No learning +1: Learn Input 1 +2: Learn Input 2 To select two or more functions, sum each value. When the status of the FF amount learning of the GZ has changed, the learning of the FF amount in the PLC will be also automatically updated.	0
129	Input 1_Determination point of external disturbance Item number: 112	—	R/W	-(Input 1_Input span) to +(Input 1_Input span) (When Control with PV select: - (PV select input span) to + (PV select input span)) Varies with the setting of the Decimal point position.	-1

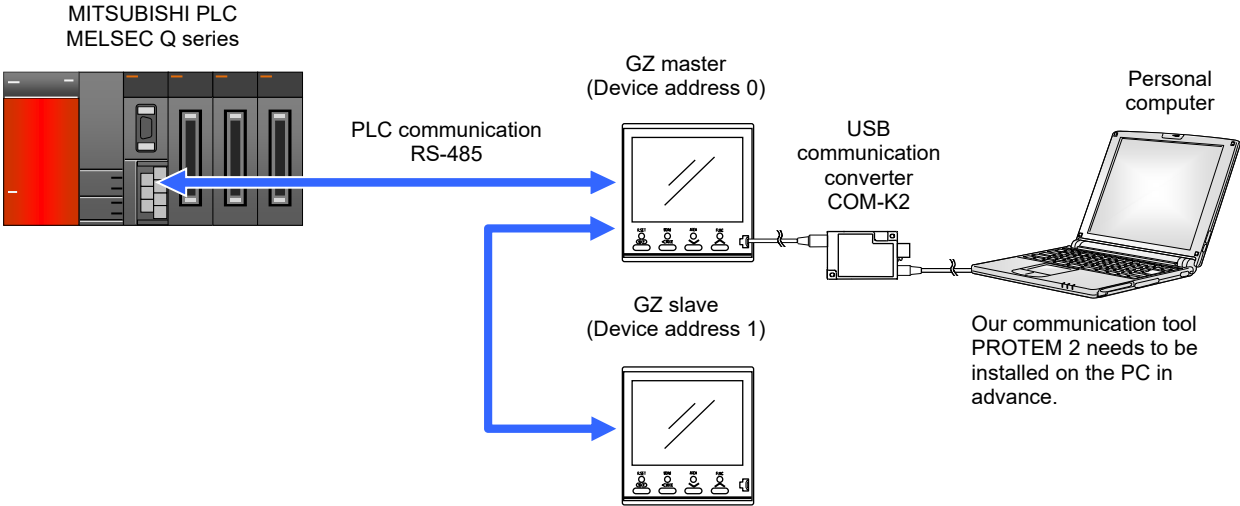
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No.	Name	Register address	Attribute	Data range	Factory set value
Setting group (Setting item selection 8)					
130	Input 2_Determination point of external disturbance Item number: 113	—	R/W	–(Input 2_Input span) to +(Input 2_Input span) Varies with the setting of the Decimal point position.	–1
131	Unused Item number: 114	—	—	Do not use this one	—
132	Unused Item number: 115	—	—	Do not use this one	—
133	Unused Item number: 116	—	—	Do not use this one	—
134	Unused Item number: 117	—	—	Do not use this one	—
135	Unused Item number: 118	—	—	Do not use this one	—
136	Unused Item number: 119	—	—	Do not use this one	—
137	Unused Item number: 120	—	—	Do not use this one	—
138	Unused Item number: 121	—	—	Do not use this one	—
139	Unused Item number: 122	—	—	Do not use this one	—
140	PV select transfer level Item number: 123	—	R/W	Input 1_Input range low to Input 1_Input range high Varies with the setting of the Decimal point position.	Input 1_ Input range high
141	PV select transfer time Item number: 124	—	R/W	0.0 to 100.0 seconds	0.0

6.3 Example of PLC Communication Data Map Editing

Example: Reducing the number of communication data of GZ master (Device address 0) and changing the register start number of GZ slave (Device address 1). (In case of a double word)



■ Communication data to be reduced

In this example, all of communication data in Setting item selections 3 and 4 of the GZ master (Device number 0) will be removed.

Group	Item	Name	Register address assigned as a factory set value	
Setting group	Setting item selection 3	Input 1_Proportional band [cool-side]	D1052	D1053
Setting group	Setting item selection 4	Input 1_Integral time [cool-side]	D1054	D1055
Setting group	Setting item selection 4	Input 1_Derivative time [cool-side]	D1056	D1057
Setting group	Setting item selection 4	Input 1_Setting change rate limiter (up)	D1058	D1059
Setting group	Setting item selection 4	Input 1_Setting change rate limiter (down)	D1060	D1061

Display example of GX Works2

Device/Buffer Memory

Device: D1000

Display format: 2 W 16 32 64 RST 10 16

Device	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
D1000	1	1	-28671	9001	16	3	0	0	0	0
D1010	0	0	334	0	50	0	-50	-1	1050	0
D1020	0	0	0	0	15	0	0	0	0	0
D1030	0	0	0	0	50	0	200	0	200	0
D1040	200	0	200	0	300	0	240	0	60	0
D1050	2	0	300	0	240	0	60	0	50	0
D1060	50	0	50	0	250	0	0	0	0	0
D1070	0	0	0	0	0	0	0	0	0	0
D1080	1	1	-28671	9001	0	2	0	0	0	0
D1090	0	0	302	0	0	0	-50	-1	1050	0
D1100	0	0	0	0	15	0	0	0	0	0
D1110	0	0	0	0	0	0	0	0	0	0
D1120	0	0	0	0	0	0	0	0	0	0
D1130	0	0	0	0	0	0	0	0	0	0
D1140	0	0	0	0	0	0	0	0	0	0
D1150	0	0	0	0	0	0	0	0	0	0
D1160	0	0	0	0	0	0	0	0	0	0
D1170	0	0	0	0	0	0	0	0	0	0

Communication data to be reduced

(1) Reducing the communication data of GZ master

Here in this example, the communication data of Setting item selections 3 and 4 of the GZ master will be removed using PROTEM 2.

- How to set

- 1.** First, calculate the set values of Setting item selections 3 and 4 in decimal format.

Set “0” (unused) to the communication data to be removed (of Setting item selections 3 and 4) and convert the values from binary to decimal. In this example, all items are set to “0: Unused” and therefore the set value is “0.”

Bit image (binary number): 0000000000000000 0: Unused
 Bit 15 ----- Bit 0 1: Used

Decimal number: 0

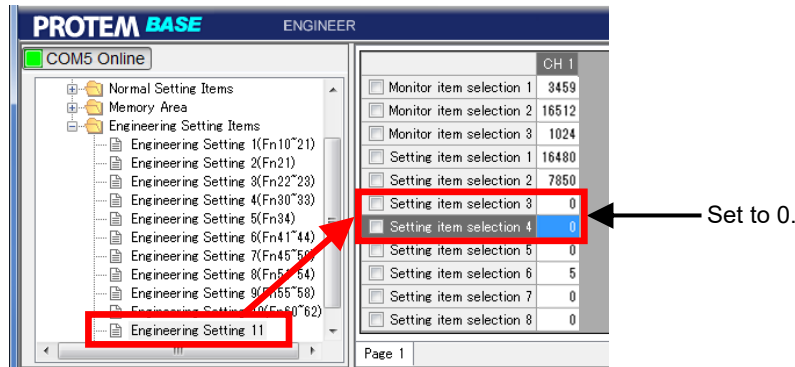
Setting item selection 3

Bit	Item number	Communication data (Setting items)	Factory set value	
			Binary number	Decimal number
0	33	Input 1_Output limiter high [heat-side]	0	0
1	34	Input 1_Output limiter low [heat-side]	0	
2	35	Input 1_Control loop break alarm (LBA) time	0	
3	36	Input 1_LBA deadband (LBD)	0	
4	37	Input 2_Proportional band	0	
5	38	Input 2_Integral time	0	
6	39	Input 2_Derivative time	0	
7	40	Input 2_Control response parameter	0	
8	41	Input 2_Proactive intensity	0	
9	42	Input 2_Manual reset	0	
10	43	Input 2_FF amount	0	
11	44	Input 2_Output limiter high	0	
12	45	Input 2_Output limiter low	0	
13	46	Input 2_Control loop break alarm (LBA) time	0	
14	47	Input 2_LBA deadband (LBD)	0	
15	48	Input 1_Proportional band [cool-side]	0	

Setting item selection 4

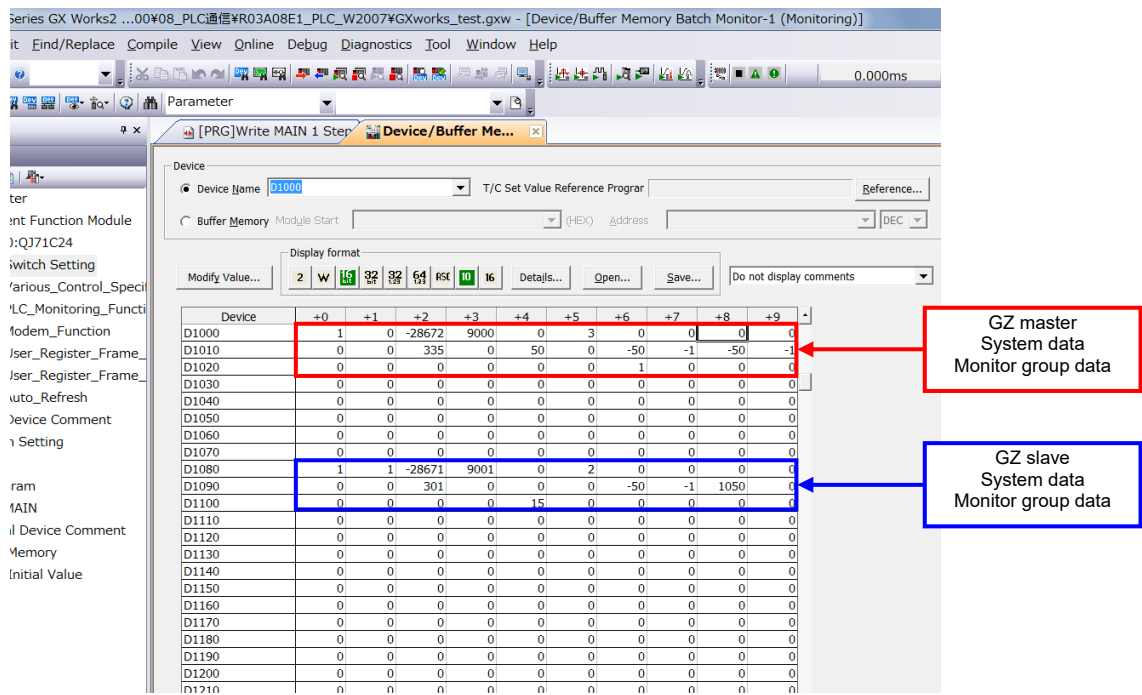
Bit	Item number	Communication data (Setting items)	Factory set value	
			Binary number	Decimal number
0	49	Input 1_Integral time [cool-side]	0	0
1	50	Input 1_Derivative time [cool-side]	0	
2	51	Input 1_Overlap/Deadband	0	
3	52	Input 1_Output limiter high [cool-side]	0	
4	53	Input 1_Output limiter low [cool -side]	0	
5	54	Select Trigger type for Memory area transfer	0	
6	55	Area soak time	0	
7	56	Link area number	0	
8	57	Input 1_Setting change rate limiter (up)	0	
9	58	Input 1_Setting change rate limiter (down)	0	
10	59	Input 1_Auto/Manual transfer selection (Area)	0	
11	60	Input 1_Manipulated output value (Area)	0	
12	61	Input 2_Setting change rate limiter (up)	0	
13	62	Input 2_Setting change rate limiter (down)	0	
14	63	Input 2_Auto/Manual transfer selection (Area)	0	
15	64	Input 2_Manipulated output value (Area)	0	

2. Use PROTEM 2 to set “0” to Setting item selection 3 and 4 of the GZ master.



PLC communication environment setting screen of PROTEM 2

3. Turn off the power of the GZ master and then turn it back on. When the power is turned on, the new values will take effect.
4. Check the edited PLC communication data map with “GX Works2.”
Clear PLC memory by the “GX Works2.”



- 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 GZ master to the PLC.

0#08_PLC通信#R03A08E1_PLC_W2007#GXworks_test.gxw - [Device/Buffer Memory Batch Monitor-1 (Monitoring)]

mpile View Online Debug Diagnostics Tool Window Help

Parameter

[PRG]Write MAIN 1 Step Device/Buffer Me...

Device

Device Name D1000 T/C Set Value Reference Program Reference...

Buffer Memory Module Start (-HEX) Address DEC

Modify Value...

Display format 2 W 16 32 64 128 16 Details... Open... Save...

Device

Device	+0	+1	+2	+3	+4	+5	+6	+7	+8
D1000	1	1	-28671	9001	16	3	0	0	0
D1010	0	0	335	0	50	0	-50	-1	-50
D1020	0	0	0	0	0	0	1	0	0
D1030	0	0	0	0	0	0	0	0	0
D1040	0	0	0	0	0	0	0	0	0
D1050	0	0	0	0	0	0	0	0	0
D1060	0	0	0	0	0	0	0	0	0
D1070	0	0	0	0	0	0	0	0	0
D1080	1	1	-28671	9001	0	2	0	0	0
D1090	0	0	301	0	0	0	-50	-1	1050
D1100	0	0	0	0	15	0	0	0	0
D1110	0	0	0	0	0	0	0	0	0
D1120	0	0	0	0	0	0	0	0	0
D1130	0	0	0	0	0	0	0	0	0
D1140	0	0	0	0	0	0	0	0	0
D1150	0	0	0	0	0	0	0	0	0
D1160	0	0	0	0	0	0	0	0	0
D1170	0	0	0	0	0	0	0	0	0
D1180	0	0	0	0	0	0	0	0	0
D1190	0	0	0	0	0	0	0	0	0
D1200	0	0	0	0	0	0	0	0	0
D1210	0	0	0	0	0	0	0	0	0
D1220	0	0	0	0	0	0	0	0	0

Modify Value

Device/Label D1008

Data Type Word(Signed)

Value 2

Settable Range -32768 to 32767

Execution Result << Close

Execution Result

Device/Label	Data Type	Setting V...
D1008	Word(Signed)	2(D)

Reflect to Input Column Delete(C)

Set the decimal number "2."

- The PLC communication data map of GZ master has been reduced from D1065 to D1055.

Project Edit Find/Replace Compile View Online Debug Diagnostics Tool Window Help

Parameter

[PRG]Write MAIN 1 Step Device/Buffer Me...

Device

Device Name D1000 T/C Set Value Reference Program Reference...

Buffer Memory Module Start (-HEX) Address DEC

Modify Value...

Display format 2 W 16 32 64 128 16 Details... Open... Save... Do not display comments

Device

Device	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
D1000	1	0	-28672	9000	0	3	0	0	0	0
D1010	0	0	335	0	50	0	-50	-1	-50	-1
D1020	0	0	0	0	0	0	1	0	0	0
D1030	1	0	0	0	50	0	200	0	200	0
D1040	200	0	200	0	300	0	240	0	60	0
D1050	2	0	50	0	250	0	0	0	0	0
D1060	0	0	0	0	0	0	0	0	0	0
D1070	0	0	0	0	0	0	0	0	0	0
D1080	1	0	-28671	9001	0	2	0	0	0	0
D1090	0	0	301	0	0	0	-50	-1	1050	0
D1100	0	0	0	0	15	0	0	0	0	0
D1110	0	0	0	0	0	0	0	0	0	0
D1120	0	0	0	0	0	0	0	0	0	0
D1130	0	0	0	0	0	0	0	0	0	0
D1140	0	0	0	0	0	0	0	0	0	0
D1150	0	0	0	0	0	0	0	0	0	0
D1160	0	0	0	0	0	0	0	0	0	0
D1170	0	0	0	0	0	0	0	0	0	0
D1180	0	0	0	0	0	0	0	0	0	0
D1190	0	0	0	0	0	0	0	0	0	0
D1200	0	0	0	0	0	0	0	0	0	0
D1210	0	0	0	0	0	0	0	0	0	0
D1220	0	0	0	0	0	0	0	0	0	0
D1230	0	0	0	0	0	0	0	0	0	0
D1240	0	0	0	0	0	0	0	0	0	0
D1250	0	0	0	0	0	0	0	0	0	0

GZ master PLC communication data map



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 5-13.

[Example]

At the time of shipment, register addresses of setting item selection 1 are assigned as in the following table. When “Input 1_Startup tuning (ST)” on item number 9 is added, change the binary number of item 9 to “1.” When item number 9 becomes valid, register address(es) are assigned. Register address(es) will be shifted by the number of the added address(es).

Setting item selection 1

Bit	Item number	Communication data (Setting items)	Factory set value		Register address (Double word)	
			Binary	Decimal		
0	1	Interlock release	0	16480	—	—
1	2	Memory area transfer	0		—	—
2	3	Input 1_Hold reset	0		—	—
3	4	Input 2_Hold reset	0		—	—
4	5	Bottom suppression start signal	0		—	—
5	6	RUN/STOP transfer	1		D1030	D1031
6	7	Input 1_Autotuning (AT)	1		D1032	D1033
7	8	Input 2_Autotuning (AT)	0		—	—
8	9	Input 1_Startup tuning (ST)	0		—	—
9	10	Input 2_Startup tuning (ST)	0		—	—
10	11	Input 1_Auto/Manual transfer	0		—	—
11	12	Input 2_Auto/Manual transfer	0		—	—
12	13	Remote/Local transfer	0		—	—
13	14	Control area Local/External transfer	0		—	—
14	15	Input 1_Set value (SV)	1		D1034	D1035
15	16	Input 2_Set value (SV)	0		—	—

Add
→



Setting item selection 1

Bit	Item number	Communication data (Setting items)	Factory set value		Register address (Double word)	
			Binary	Decimal		
0	1	Interlock release	0	16480	—	—
1	2	Memory area transfer	0		—	—
2	3	Input 1_Hold reset	0		—	—
3	4	Input 2_Hold reset	0		—	—
4	5	Bottom suppression start signal	0		—	—
5	6	RUN/STOP transfer	1		D1030	D1031
6	7	Input 1_Autotuning (AT)	1		D1032	D1033
7	8	Input 2_Autotuning (AT)	0		—	—
8	9	Input 1_Startup tuning (ST)	1		D1034	D1035
9	10	Input 2_Startup tuning (ST)	0		—	—
10	11	Input 1_Auto/Manual transfer	0		—	—
11	12	Input 2_Auto/Manual transfer	0		—	—
12	13	Remote/Local transfer	0		—	—
13	14	Control area Local/External transfer	0		—	—
14	15	Input 1_Set value (SV)	1		D1036	D1037
15	16	Input 2_Set value (SV)	0		—	—

(2) Change the register start number of a GZ slave

Registers D1052 to D1061 (10 registers) are now empty, and thus to fill in the empty registers, the register start number of GZ slave must be changed.

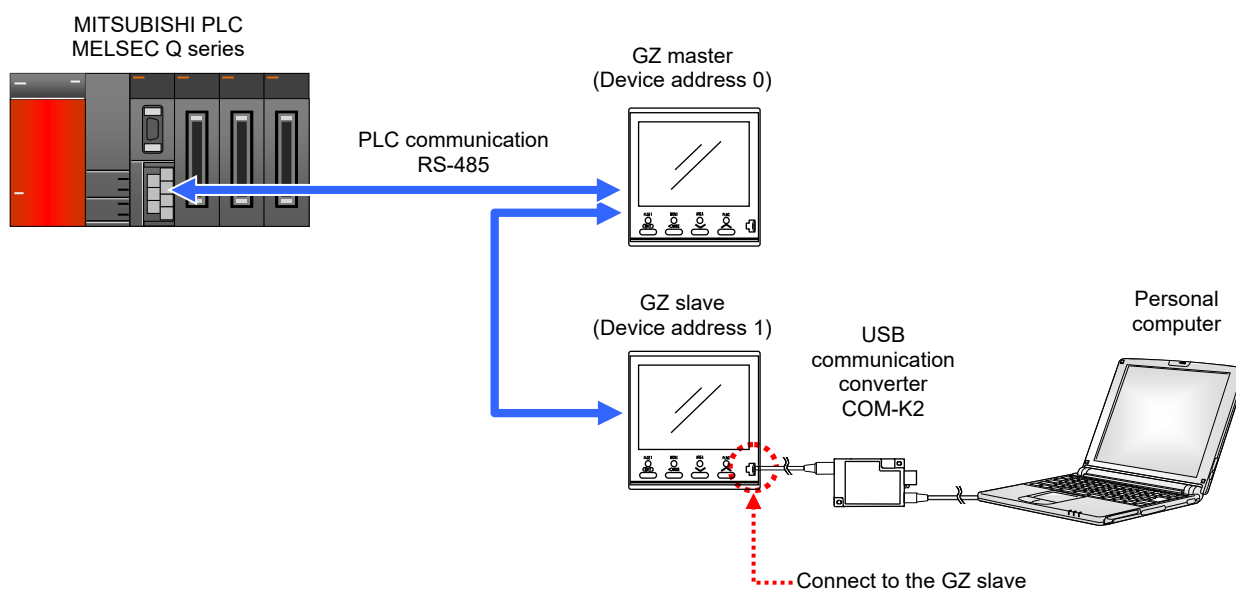
Leave no empty register areas D1066 to D1079 (14 registers) that were not used at the time of shipment.

Registers D1056 to D1079 are now empty. (24 registers)

Start register of GZ slave (D1080)

Device	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
D1000	1	0	-28672	9000	0	3	0	0	0	0
D1010	0	0	335	0	50	0	-50	-1	-50	-1
D1020	0	0	0	0	0	0	1	0	0	0
D1030	1	0	0	0	50	0	200	0	200	0
D1040	200	0	200	0	300	0	240	0	60	0
D1050	2	0	50	0	250	0	0	0	0	0
D1060	0	0	0	0	0	0	0	0	0	0
D1070	0	0	0	0	0	0	0	0	0	0
D1080	1	0	-28671	9001	0	2	0	0	0	0
D1090	0	0	301	0	0	0	-50	-1	1050	0
D1100	0	0	0	0	15	0	0	0	0	0
D1110	0	0	0	0	0	0	0	0	0	0
D1120	0	0	0	0	0	0	0	0	0	0
D1130	0	0	0	0	0	0	0	0	0	0
D1140	0	0	0	0	0	0	0	0	0	0
D1150	0	0	0	0	0	0	0	0	0	0
D1160	0	0	0	0	0	0	0	0	0	0
D1170	0	0	0	0	0	0	0	0	0	0
D1180	0	0	0	0	0	0	0	0	0	0
D1190	0	0	0	0	0	0	0	0	0	0
D1200	0	0	0	0	0	0	0	0	0	0
D1210	0	0	0	0	0	0	0	0	0	0
D1220	0	0	0	0	0	0	0	0	0	0
D1230	0	0	0	0	0	0	0	0	0	0
D1240	0	0	0	0	0	0	0	0	0	0
D1250	0	0	0	0	0	0	0	0	0	0

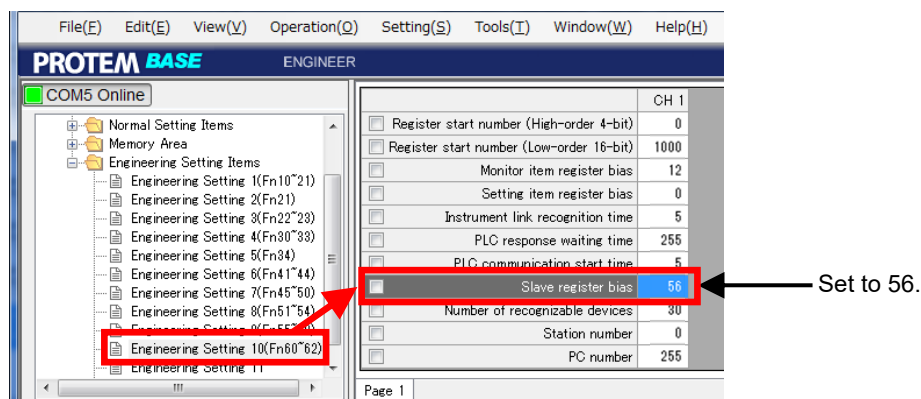
1. Connect a loader communication cable to GZ slave.



- Set the slave register bias of the GZ slave in the PLC communication environment setting item.

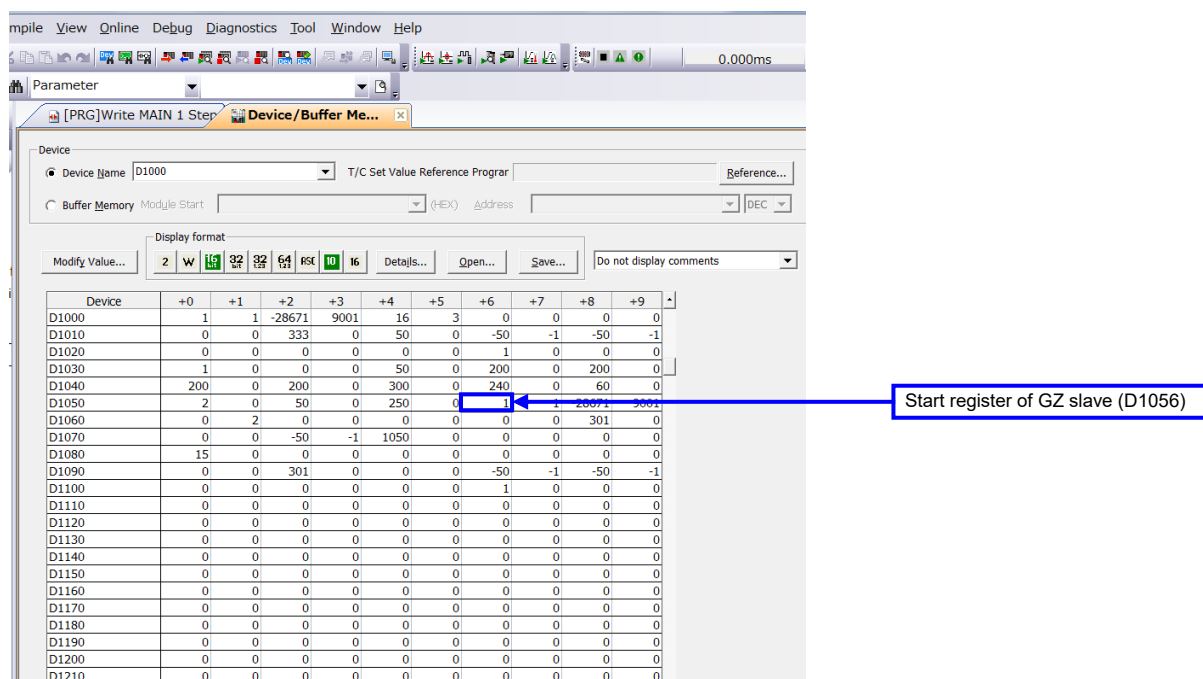
Slave register bias value = Slave register start number – Master register start number

To change the register start number for the communication data of GZ slave to D1056, set the slave register bias value to “56” ($D1056 - D1000 = 56$).



PLC communication environment setting screen of PROTEM 2

- Turn off the power of the GZ slaver and then turn it back on. When the power is turned on, the new values will take effect.
- Check the edited PLC communication data map with “GX Works2.”
The first register for the communication data of GZ slave has been changed from D1080 to D1056.



MEMO

USAGE EXAMPLE

7

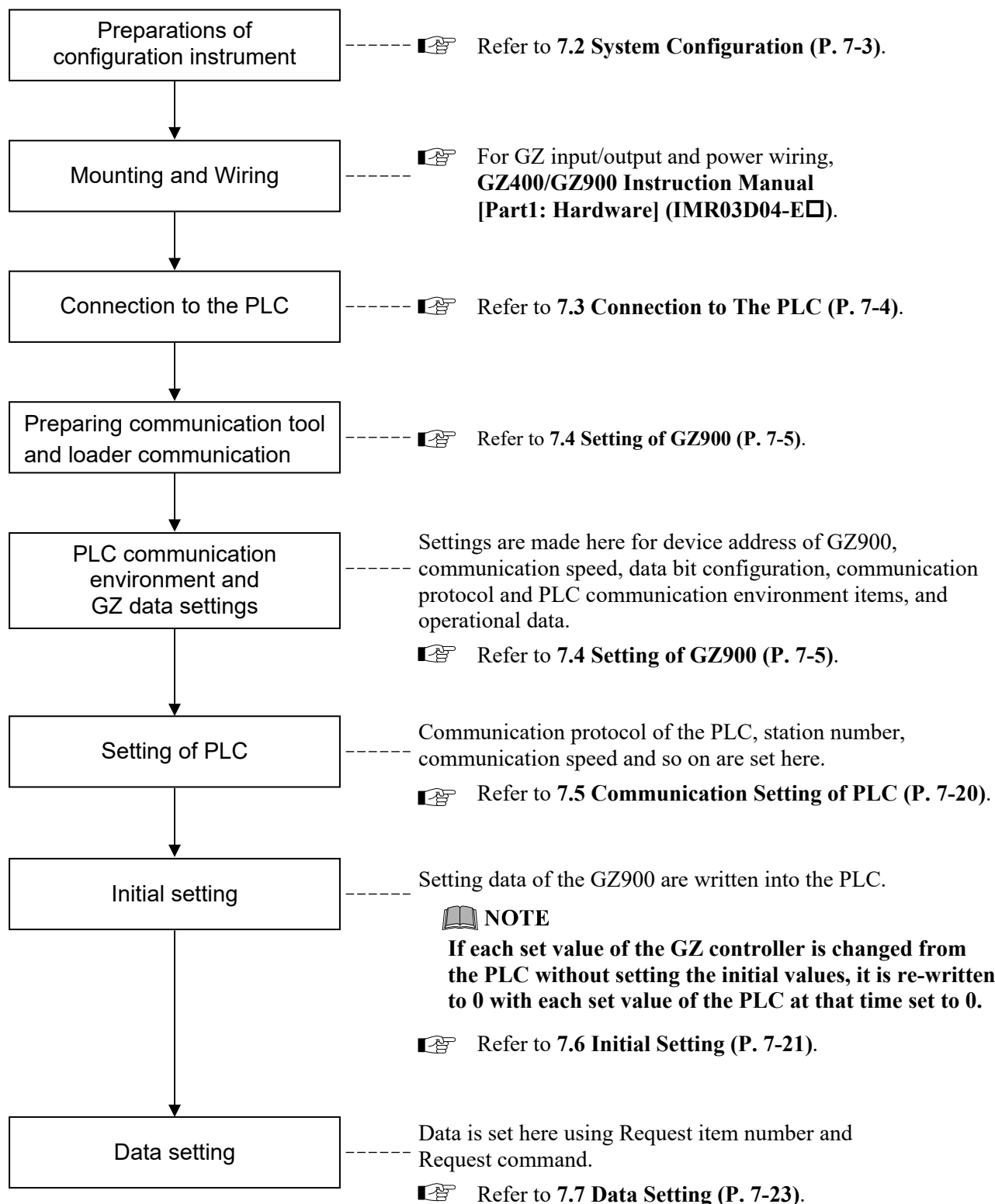
7.1 Handling Procedures	7-2
7.2 System Configuration	7-3
7.3 Connection to The PLC	7-4
7.4 Setting of GZ900.....	7-5
7.5 Communication Setting of PLC.....	7-20
7.6 Initial Setting	7-21
7.7 Data Setting.....	7-23

7.1 Handling Procedures

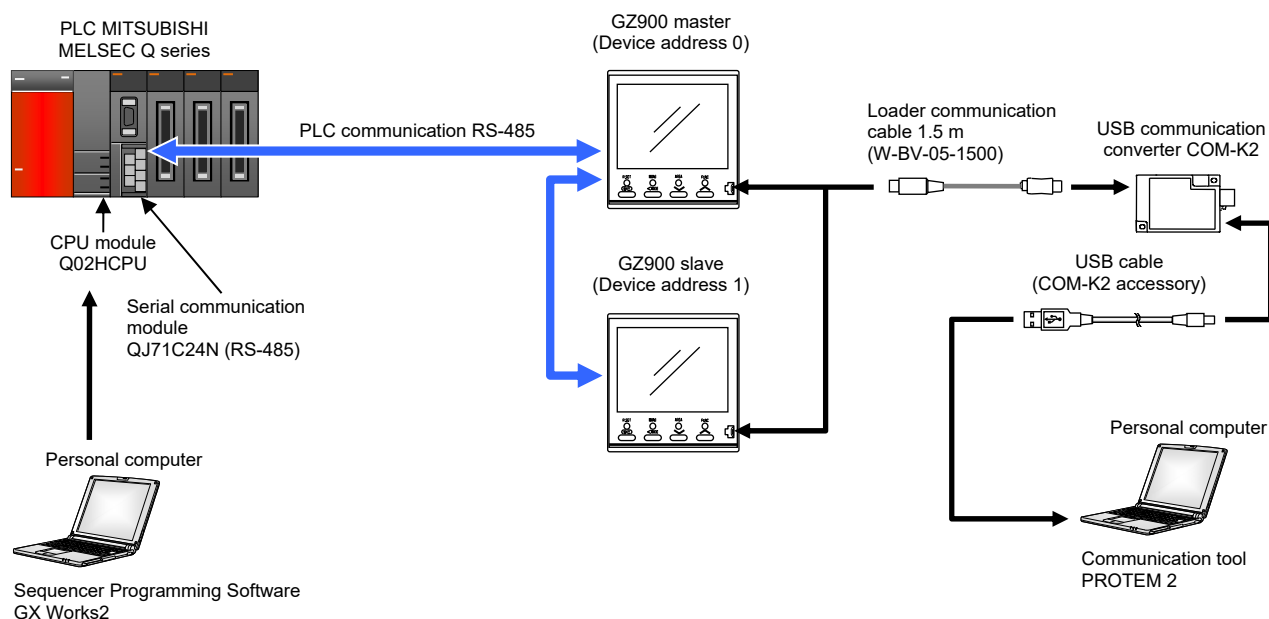
This section explains the data setting procedure when two GZ900 are connected to a MELSEC Q series PLC (Mitsubishi Electric).



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



7.2 System Configuration



■ Use instruments

● PLC MITSUBISHI MELSEC Q series

CPU unit Q02HCPU:	1
Serial communication unit QJ71C24N (RS-485):	1
Power supply, I/O module, etc.	

● GZ900

GZ900 (Master instrument: Device address 0):	1
GZ900 (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:

Windows 10 (64-bit version)	1
-----------------------------	---

● Communication programs

Communication tool PROTEM 2 (Available for download at our website.)

Sequencer Programming Software GX Works2 [Manufactured by MITSUBISHI ELECTRIC CO., LTD.,] *

* Consult the instruction manuals of the PLC for how to use GX Works 2 and how to wire to the PLC.

■ Other condition (GZ900)

Input data type: Double word

7.3 Connection to The PLC

Connect a GZ to PLC (serial communication unit QJ71C24N).

NOTE

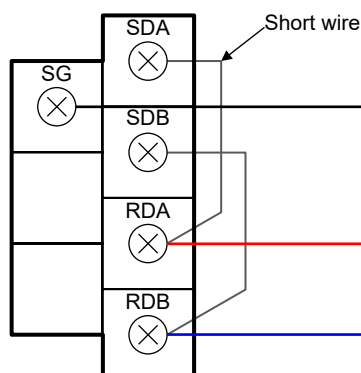
Note that the signal polarity symbols (A and B) are opposite to each other between the PLC (MELSEC series) and the GZ series controller. Normally A is connected to A and B to B. However, in this case, A must be connected to B, and B must be connected to A

• GZ900 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

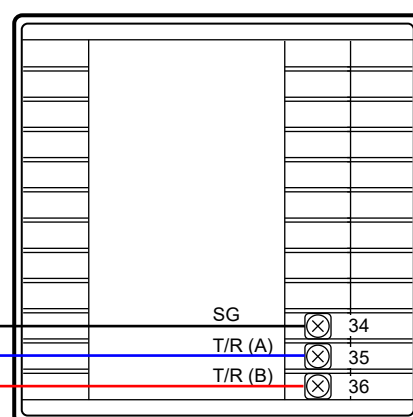
■ Wiring example

PLC MITSUBISHI
MELSEC Q series
Serial communication module
QJ71C24N

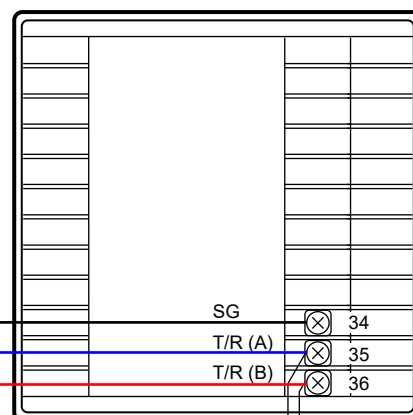


For the details of the termination resistor of the PLC, refer to the instruction manual for the PLC.

GZ900 master
(Device address 0)



GZ900 slave
(Device address 1)



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 GZ900 which is farthest among the connected GZ900.

7.4 Setting of GZ900

First, PLC-communication environment data necessary for communication with a PLC and engineering data and operational data of the GZ900 must be set up. This setting is required on each GZ900.

(1) Installing PROTEM 2

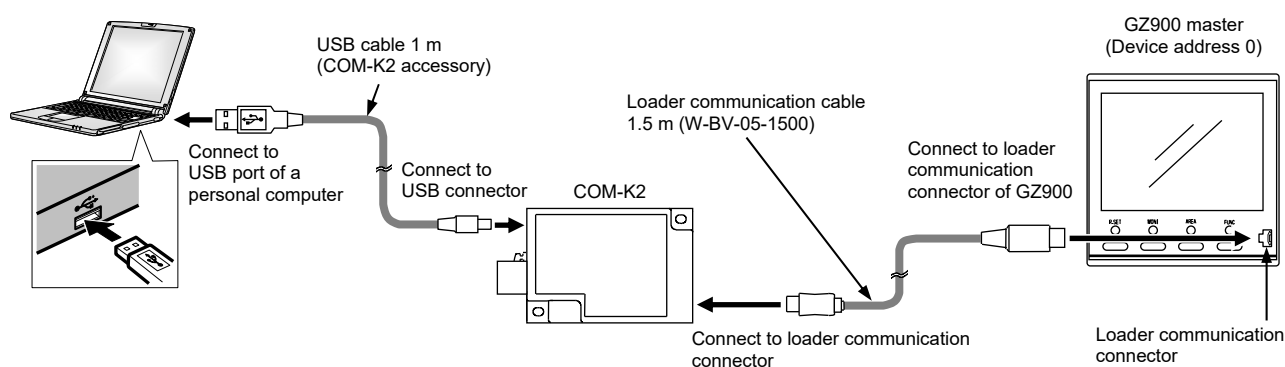
Download PROTEM 2 from our website and install it on your personal computer.

(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.

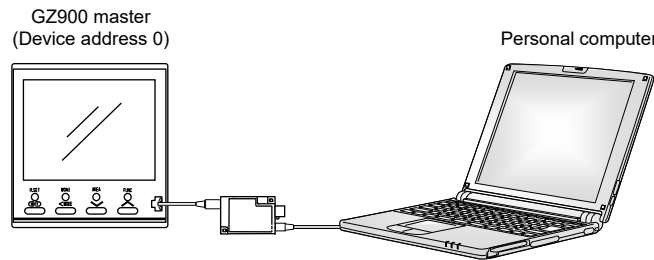
(3) Connection of loader communication

Connect a GZ900 master (device address 0) to converter COM-K2 and personal computer by connection cable.



(4) Configuring the PLC communication environment item and GZ setting data of GZ900 master

Configure the PLC communication environment and other data of the GZ900 master (device address 0) on your personal computer.



1. Turn on the power of the personal computer

2. Start PROTEM2, and set the communication port.

If you use the PROTEM2 for the first time, you have to create a new project and set a communication port.

① Double click the icon on the desktop.

PROTEM2 will start and show the first screen.

② Click "Base Tool"

A dialog box, *Select a model*, appears.

③ Click "Select a model"

④ Select the "GZ900/400" and "Loader Communication"

⑤ Click "OK"

⑥ Set up the communication port *

* Configure the communication port according to the PC you use.

If you are unaware of the port number, click "Device Manager" and check the port number. Set the port number "RKC USB-to-Serial Bridge (COM□)" shown under "Ports (COM & LPT)."

⑦ Check the loader communication setting *

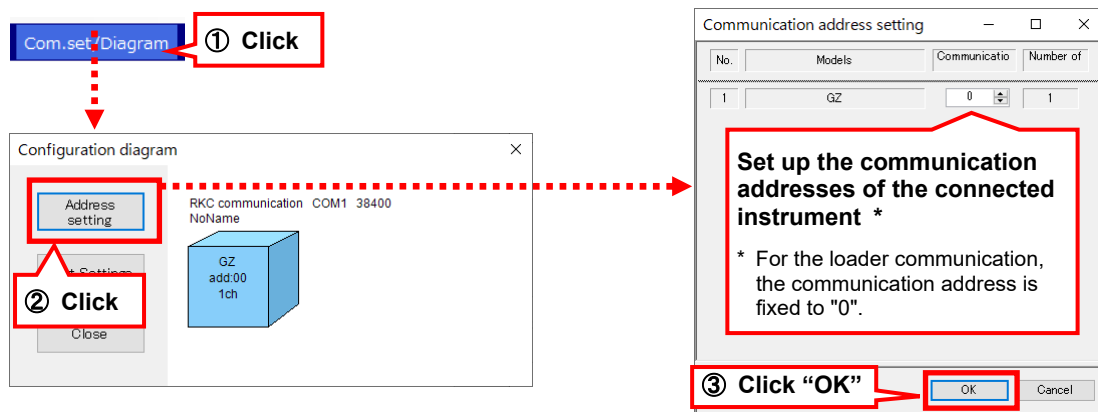
* Communication speed and data bit configuration are fixed for the loader communication.

- ☐ Communication speed: 38400 bps
- ☐ Data bit: 8
- ☐ Parity bit: NONE
- ☐ Stop bit: 1

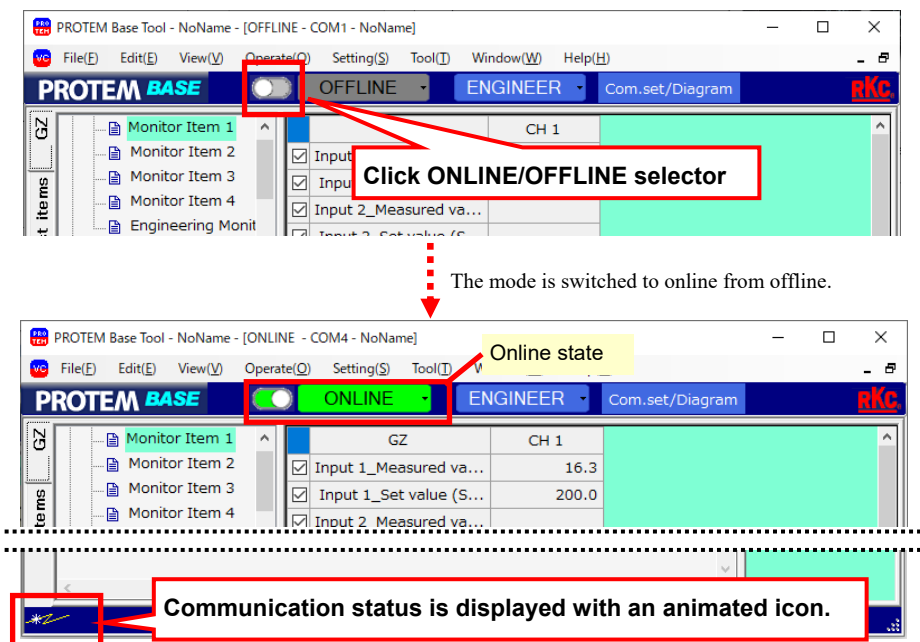
⑧ Click "OK"

The screenshot shows the 'COM port settings' dialog box within the PROTEM2 Base Tool. The 'COM port' is set to 'COM4'. The 'Baud rate' is set to '38400', 'Data bits' to '8', 'Parity' to 'NONE', and 'Stop bit(s)' to '1'. The 'Send delay time' is set to '3' and the 'Timeout time' is set to '3'. The 'OK' button is highlighted with a red box and a callout.

3. Click “Com.set/Diagram” and check the communication address

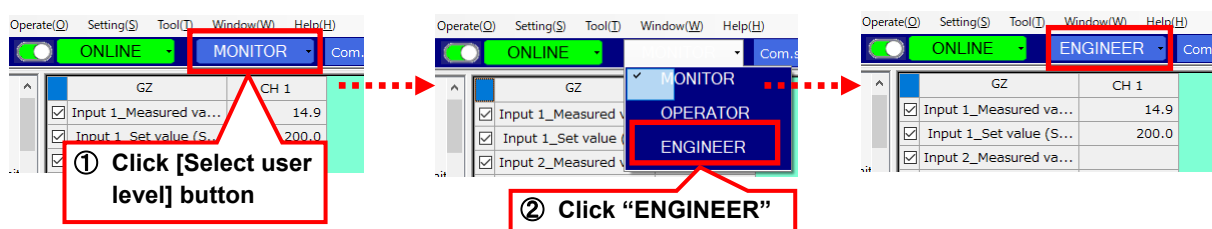


4. Switching to online

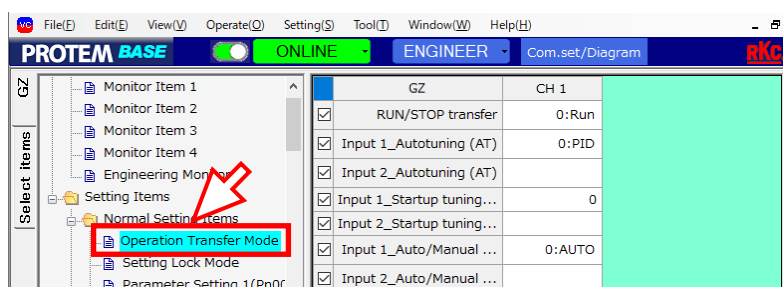


5. Authorize a user to set the Engineering Setting Items.

To allow the user to change the set values, the user level must be switched.

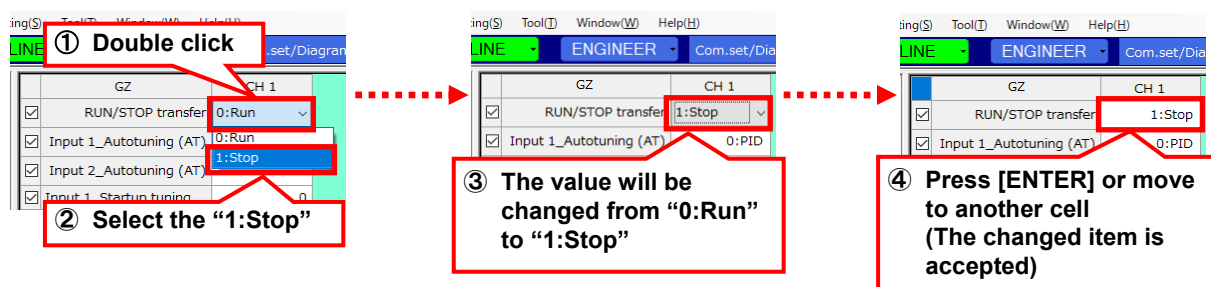


6. Select the “Operation Transfer Mode” in a TreeView

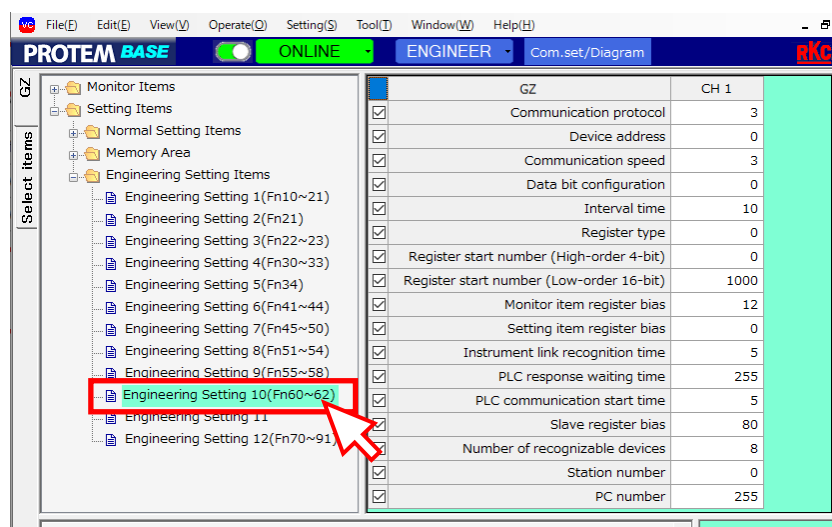


7. Control is stopped

Switch over to “1: Stop” in the RUN/STOP transfer.



8. Select the “Engineer Setting 10(Fn60~62)” in a TreeView



9. Set the communication related items and PLC communication environment items

Set communication related parameters (such as communication speed) and PLC communication environment items at “Engineer setting 10(Fn60~62).”

Set as follows for the data in “Engineer setting 10(Fn60~62).” (Refer to **Table 1**.)

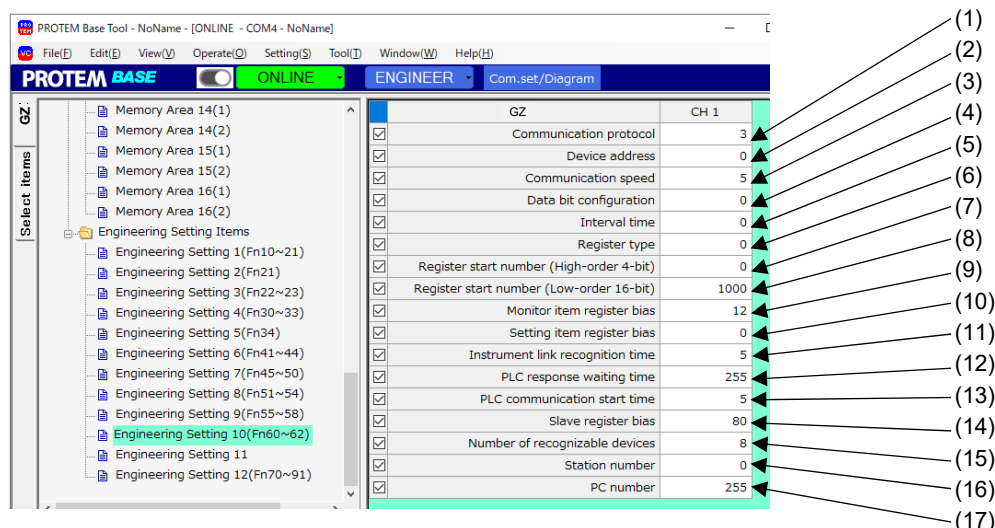


Table 1

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)
(6) Register type (D, R, W, ZR) ¹	0 (D register) (Factory set value)
(7) Register start number (High-order 4-bit) ¹	0 (Factory set value)
(8) Register start number (Low-order 16-bit) ¹	1000 (Factory set value)
(9) Monitor item register bias ¹	12 (Factory set value)
(10) Setting item register bias ¹	0 (Factory set value)
(11) Instrument link recognition time	5 seconds (Factory set value)
(12) PLC response waiting time	255 ms (Factory set value)
(13) PLC communication start time ²	5 seconds (Factory set value)
(14) Slave register bias ¹	80 (Factory set value)
(15) Number of recognizable devices ³	2
(16) Station number	0 (Factory set value)
(17) 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 GZ master device (device address 0) can be set up.



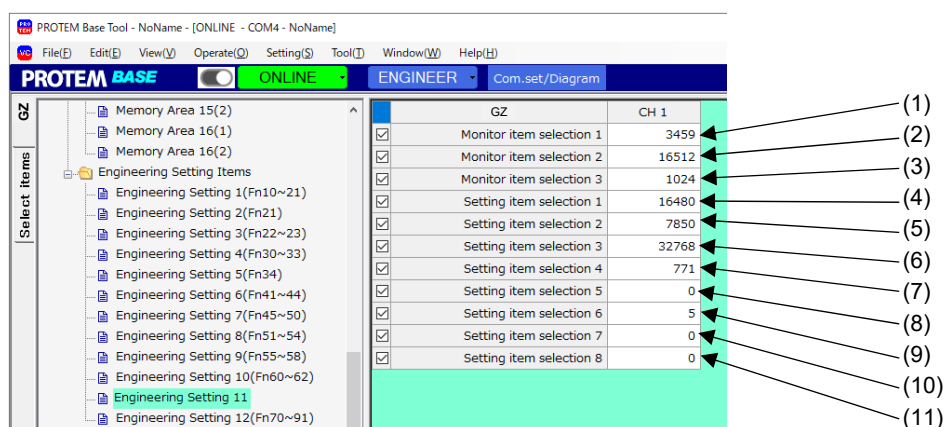
For the Register start number, Monitor item register bias and Setting item register bias, refer to **P. 5-18**.

10. Select the communication data to use.

Select the communication data that are sent/received between the PLC and the GZ master (device address 0). Selection of the communication data can be done at “Engineer Setting 11.”

In the following example, the data in the Engineer Setting 11 are used as they are configured at the factory. (Refer to **Table 2**)

- ☞ To select communication data, refer to **6.3 Example of PLC Communication Data Map Editing (P. 6-59)**.
- ☞ For the communication data type and data range, refer to the following sections:
 - **P. 5-8 to P. 5-13 of 5.2.1 Setting items list**
 - **6.2 PLC Communication Data Map (P. 6-23)**



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

Bit image: 0000000000000000
 Bit 15 ----- Bit 0
 0: Unused
 1: Used

Table 2

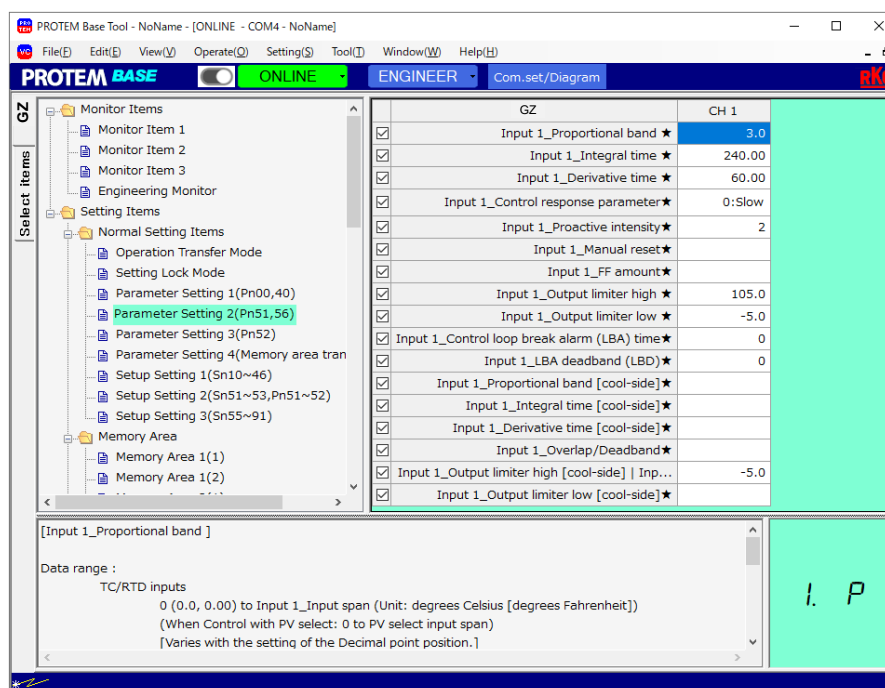
Setting item	Set value (factory set value)	
	Bit	Decimal
(1) Monitor item selection 1	0000110110000011	3459
(2) Monitor item selection 2	0100000010000000	16512
(3) Monitor item selection 3	0000010000000000	1024
(4) Setting item selection 1	0100000001100000	16480
(5) Setting item selection 2	0001111010101010	7850
(6) Setting item selection 3	1000000000000000	32768
(7) Setting item selection 4	0000001100000011	771
(8) Setting item selection 5	0000000000000000	0
(9) Setting item selection 6	0000000000000101	5
(10) Setting item selection 7	0000000000000000	0
(11) Setting item selection 8	0000000000000000	0

11. Make other initial setting

Following the setting of the PLC environment items, set up necessary functions and a set value (SV) to operate the GZ900 master (device address 0). This setting can be done using PROTEM 2.



Refer to **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)** for non-PLC communication related functions and parameters.



12. Activate the settings

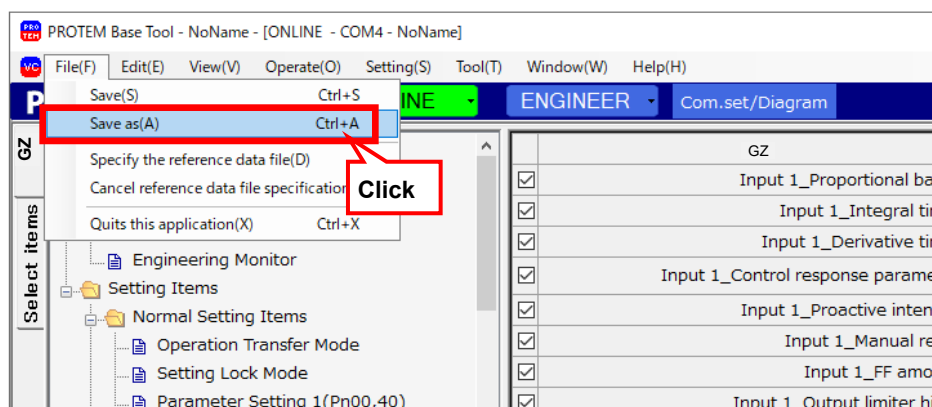
To activate the settings done so far, shut down the GZ900 master (device address 0) once, and reapply power to the instrument. After power up, the modified values become effective.

If the GZ 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 GZ. The same effect can be obtained as powering up the GZ.

13. Save the project

Save the PROTEM 2 project used to set the GZ900 master (device address 0).

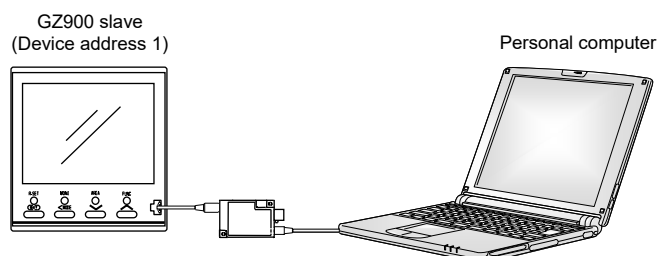
Click "File (F)" and "Save as (A)" to save the project with a project name.



(5) Configuring the PLC communication environment item and GZ setting data of GZ900 slave

Following the setting of the GZ900 master (device address 0), the GZ900 slave (device address 1), set up the personal computer for the PLC communication environment setting and the initial setting.

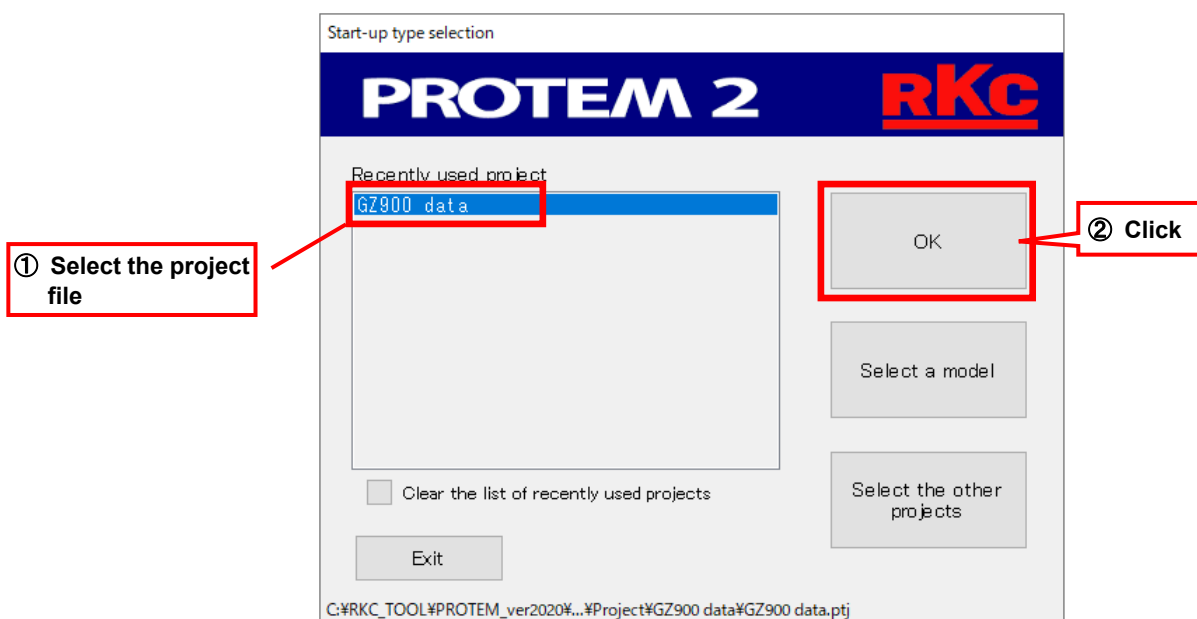
1. Connect the loader communication cable to GZ900 slave (device address 1)



2. Click "Base Tool"



3. Open the project file used for the GZ900 master.
Select a project file to use and click "OK."



4. Similar to setting the GZ900 master, follow the procedures 4 through 8 to select the Engineering setting 10(Fn60~62) screen.
5. Set the communication related items and PLC communication environment items of GZ900 slave (device address 1)
Set as follows for the data in “Engineer setting 10(Fn60~62).” (Refer to **Table 3**.)

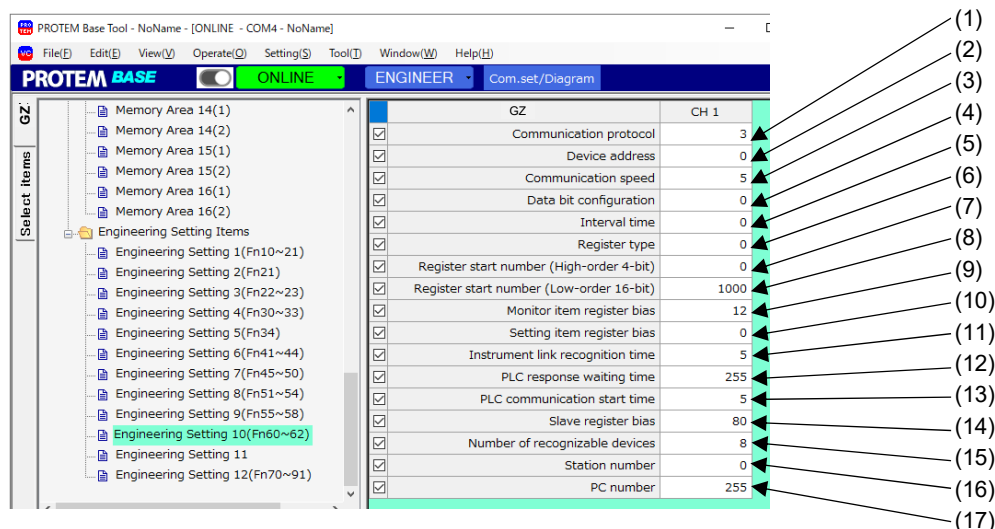


Table 3

Setting items	Set value
(1) Communication protocol	3
(2) Device address	1
(3) Communication speed	3 (19200 bps) (Factory set value)
(4) Data bit configuration	0 (Factory set value)
(5) Interval time	10 (Factory set value)
(6) Register type (D, R, W, ZR) ¹	0 (D register) (Factory set value)
(7) Register start number (High-order 4-bit) ¹	0 (Factory set value)
(8) Register start number (Low-order 16-bit) ¹	1000 (Factory set value)
(9) Monitor item register bias ¹	12 (Factory set value)
(10) Setting item register bias ¹	0 (Factory set value)
(11) Instrument link recognition time	5 seconds (Factory set value)
(12) PLC response waiting time	255 ms (Factory set value)
(13) PLC communication start time ²	5 seconds (Factory set value)
(14) Slave register bias ¹	80 (Factory set value)
(15) Number of recognizable devices ³	8 (Factory set value)
(16) Station number	0 (Factory set value)
(17) 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 (D1080) changes to “1.”

³ Only the GZ 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. 5-18**.

6. Select the communication data to use.

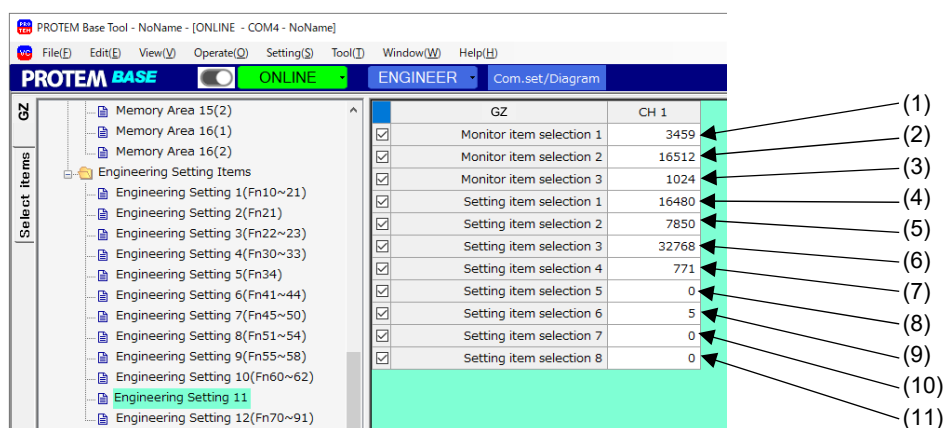
Select the communication data that are sent/received between the PLC and the GZ900 slave (device address 1). Selection of the communication data can be done at “Engineer Setting 11.”

In the following example, the data in the Engineer Setting 11 are used as they are configured at the factory. (Refer to **Table 4**)

 To select communication data, refer to **6.3 Example of PLC Communication Data Map Editing (P. 6-59)**.

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

- **P. 5-8 to P. 5-13 of 5.2.1 Setting items list**
- **6.2 PLC Communication Data Map (P. 6-23)**



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

Bit image: 0000000000000000
 Bit 15 ----- Bit 0
 0: Unused
 1: Used

Table 4

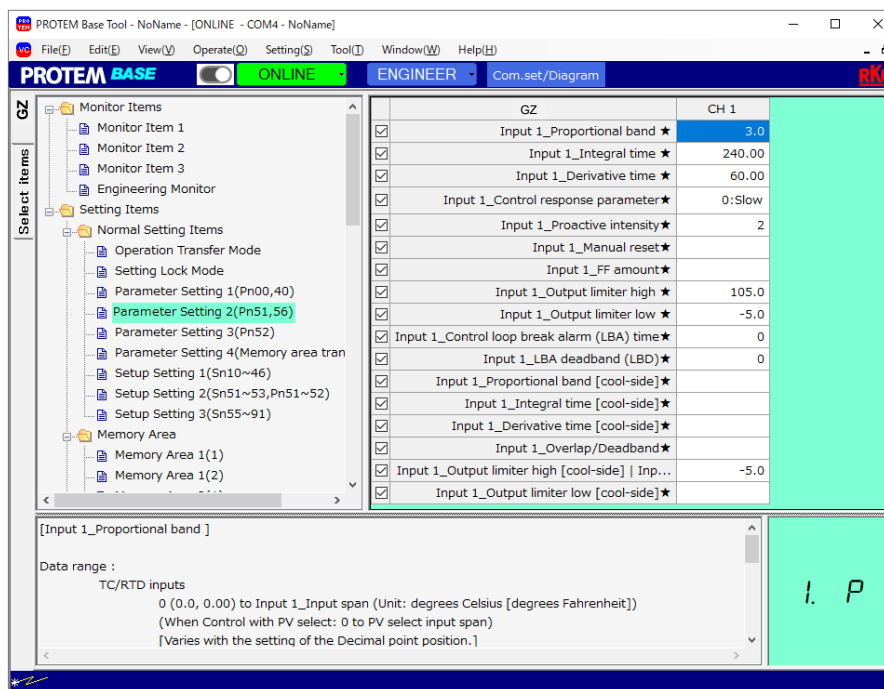
Setting item	Set value (factory set value)	
	Bit	Decimal
(1) Monitor item selection 1	0000110110000011	3459
(2) Monitor item selection 2	0100000010000000	16512
(3) Monitor item selection 3	0000010000000000	1024
(4) Setting item selection 1	0100000001100000	16480
(5) Setting item selection 2	0001111010101010	7850
(6) Setting item selection 3	1000000000000000	32768
(7) Setting item selection 4	0000001100000011	771
(8) Setting item selection 5	0000000000000000	0
(9) Setting item selection 6	0000000000000101	5
(10) Setting item selection 7	0000000000000000	0
(11) Setting item selection 8	0000000000000000	0

7. Make other initial setting

Following the setting of the PLC environment items, set up necessary functions and a set value (SV) to operate the GZ900 slave (device address 1). This setting can be done using PROTEM 2.



Refer to **GZ400/GZ900 Instruction Manual [Part2: Parameters/Functions] (IMR03D05-E□)** for non-PLC communication related functions and parameters.



8. Activate the settings

To activate the settings done so far, shut down the GZ900 slave (device address 1) once, and reapply power to the instrument. After power up, the modified values become effective.

If the GZ 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 GZ. The same effect can be obtained as powering up the GZ.

(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	
	GZ900 master (device address 0)	GZ900 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	3459	3459
Monitor item selection 2	16512	16512
Monitor item selection 3	1024	1024
Setting item selection 1	16480	16480
Setting item selection 2	7850	7850
Setting item selection 3	32768	32768
Setting item selection 4	771	771
Setting item selection 5	0	0
Setting item selection 6	5	5
Setting item selection 7	0	0
Setting item selection 8	0	0
Slave register bias	80	80



Occupied registers per data of GZ900

- 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	GZ900 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.

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Data map

Register address		Communication data	Data type
D1012	D1013	Input 1_Measured value (PV)	GZ900 master (device address 0) Monitor item selection 1 data (Double word)
D1014	D1015	Input 1_Set value (SV) monitor	
D1016	D1017	Input 1_Manipulated output value monitor [heat-side]	
D1018	D1019	Input 1_Manipulated output value monitor [cool-side]	
D1020	D1021	Current transformer 1 (CT1) input value monitor	
D1022	D1023	Current transformer 2 (CT2) input value monitor	GZ900 master (device address 0) Monitor item selection 2 data (Double word)
D1024	D1025	Comprehensive event state	
D1026	D1027	Overall operation status	GZ900 master (device address 0) Monitor item selection 3 data (Double word)
D1028	D1029	Error code	
D1030	D1031	RUN/STOP transfer	GZ900 master (device address 0) Setting item selection 1 data (Double word)
D1032	D1033	Input 1_Autotuning (AT)	
D1034	D1035	Input 1_Set value (SV)	
D1036	D1037	Event 1 set value (EV1) Event 1 set value (EV1) [high]	GZ900 master (device address 0) Setting item selection 2 data (Double word)
D1038	D1039	Event 2 set value (EV2) Event 2 set value (EV2) [high]	
D1040	D1041	Event 3 set value (EV3) Event 3 set value (EV3) [high]	
D1042	D1043	Event 4 set value (EV4) Event 4 set value (EV4) [high]	
D1044	D1045	Input 1_Proportional band [heat-side]	
D1046	D1047	Input 1_Integral time [heat-side]	
D1048	D1049	Input 1_Derivative time [heat-side]	
D1050	D1051	Input 1_Control response parameter	
D1052	D1053	Input 1_Proportional band [cool-side]	GZ900 master (device address 0) Setting item selection 3 data (Double word)
D1054	D1055	Input 1_Integral time [cool-side]	
D1056	D1057	Input 1_Derivative time [cool-side]	GZ900 master (device address 0) Setting item selection 4 data (double word)
D1058	D1059	Input 1_Setting change rate limiter (up)	
D1060	D1061	Input 1_Setting change rate limiter (down)	GZ900 master (device address 0) Setting item selection 6 data (Double word)
D1062	D1063	Heater break alarm 1 (HBA1) set value	
D1064	D1065	Heater break alarm 2 (HBA2) set value	—
D1066	D1067	Blank registers	
⋮	⋮		
D1078	D1079		

Continued on the next page.

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Data map

Register address		Communication data	Data type
D1080	—	System communication state	GZ900 slave (device address 1) System data (Single word)
D1081	—	Communication flag	
D1082	—	Internal processing	
D1083	—	Internal processing	
D1084	—	PLC communication error code	
D1085	—	PLC communication instrument recognition flag 1	
D1086	—	PLC communication instrument recognition flag 2	
D1087	—	Request item number	
D1088	—	Request command	
D1089	—	Setting group communication state	
D1090	—	Instrument recognition request command	
D1091	—	Internal processing	
D1092	D1093	Input 1_Measured value (PV)	GZ900 slave (device address 1) Monitor item selection 1 data (Double word)
D1094	D1095	Input 1_Set value (SV) monitor	
D1096	D1097	Input 1_Manipulated output value monitor [heat-side]	
D1098	D1099	Input 1_Manipulated output value monitor [cool-side]	
D1100	D1101	Current transformer 1 (CT1) input value monitor	
D1102	D1103	Current transformer 2 (CT2) input value monitor	
D1104	D1105	Comprehensive event state	GZ900 slave (device address 1) Monitor item selection 2 data (Double word)
D1106	D1107	Overall operation status	
D1108	D1109	Error code	GZ900 slave (device address 1) Monitor item selection 3 data (Double word)
D1110	D1111	RUN/STOP transfer	
D1112	D1113	Input 1_Autotuning (AT)	
D1114	D1115	Input 1_Set value (SV)	GZ900 slave (device address 1) Setting item selection 1 data (Double word)
D1116	D1117	Event 1 set value (EV1) Event 1 set value (EV1) [high]	
D1118	D1119	Event 2 set value (EV2) Event 2 set value (EV2) [high]	
D1120	D1121	Event 3 set value (EV3) Event 3 set value (EV3) [high]	
D1122	D1123	Event 4 set value (EV4) Event 4 set value (EV4) [high]	
D1124	D1125	Input 1_Proportional band [heat-side]	
D1126	D1127	Input 1_Integral time [heat-side]	
D1128	D1129	Input 1_Derivative time [heat-side]	
D1130	D1131	Input 1_Control response parameter	
D1132	D1133	Input 1_Proportional band [cool-side]	GZ900 slave (device address 1) Setting item selection 3 data (Double word)

Continued on the next page.

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Data map

Register address		Communication data	Data type
1134	1135	Input 1_Integral time [cool-side]	GZ900 slave (device address 1) Setting item selection 4 data (Double word)
1136	1137	Input 1_Derivative time [cool-side]	
1138	1139	Input 1_Setting change rate limiter (up)	
1140	1141	Input 1_Setting change rate limiter (down)	
1142	1143	Heater break alarm 1 (HBA1) set value	GZ900 slave (device address 1) Setting item selection 6 data (Double word)
1144	1145	Heater break alarm 2 (HBA2) set value	

7.5 Communication Setting of PLC

Set the Serial communication module of MITSUBISHI MELSEC Q series as follows.

Setting item	Description
Operation setting	Independent
Data bit	8
Parity bit	None
Even/odd parity	Odd
Stop bit	1
Sum check code	Exist

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



Setting in the serial communication module (QJ71C24N) belonging to the MITSUBISHI MELSEC Q series do with the GX Works2 of the MITSUBISHI MELSEC PLC programming software.
Setting set the following set value with switch setting for intelligent functional module.

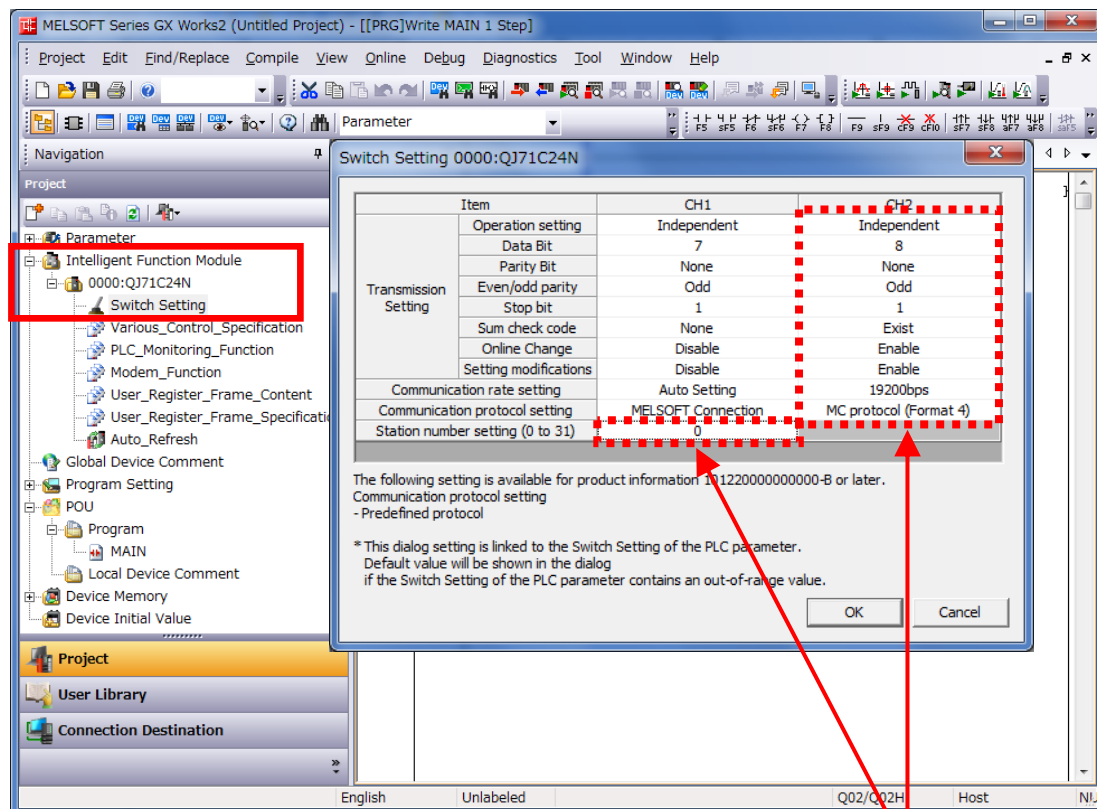
[Setting procedure]

[Intelligent functional module] → [0010: QJ71C24N] → [Switch setting]

[Setting screen]

The screen is a Japanese edition.

<Switch setting of the intelligent function module>



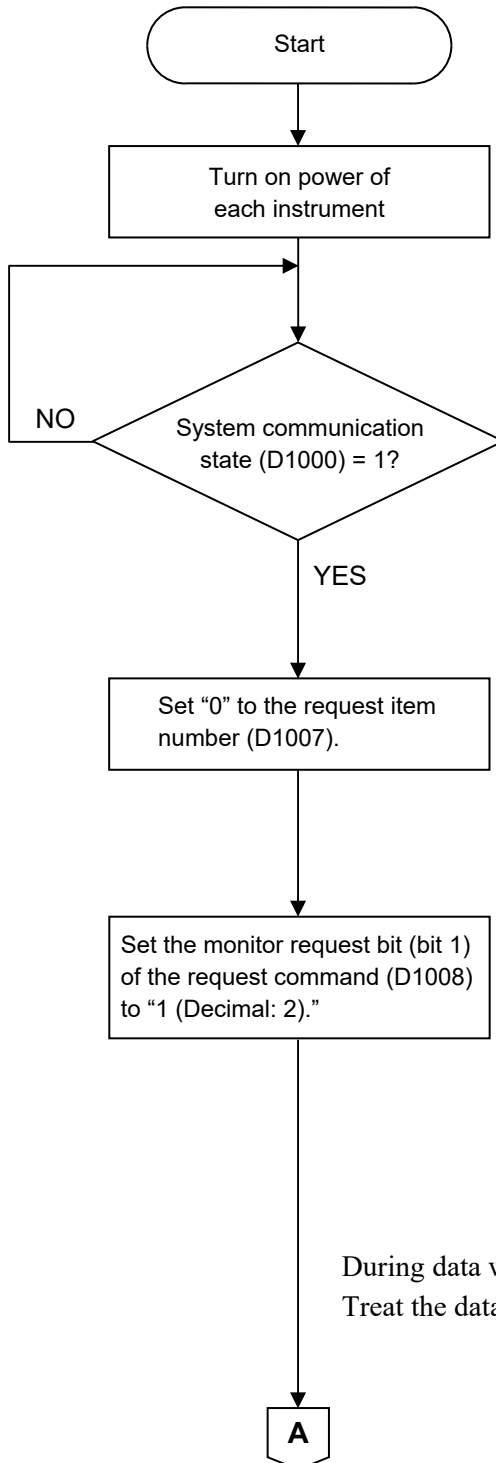
To be set.



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



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

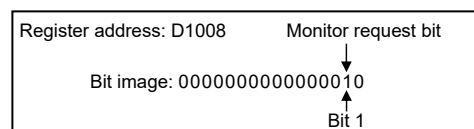


Turn on the power of the GZ controllers, and the PLC.
When the PLC communication start time (factory setting:
5 seconds) elapses, writing of the system data begins.

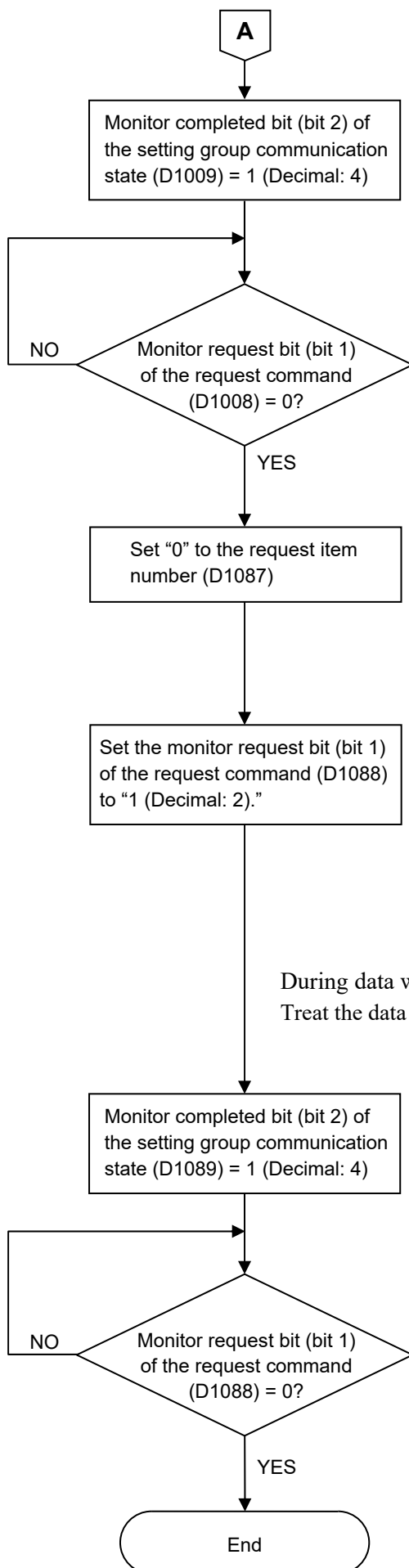
After the system data is written, the GZ controller begins writing the communication data of the monitor group to the PLC. When monitor group writing starts, “system communication state” changes to “1.” When the system communication condition becomes “1,” PLC communication can be performed.

Data of the GZ900 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 GZ master begins writing the communication data of setting group to the PLC.

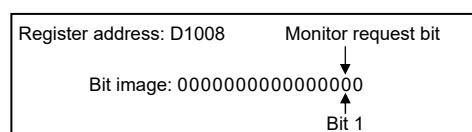


During data write:
Treat the data of all items as inconsistent during the data write.



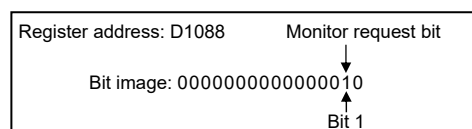
When writing is finished, the GZ master writes the communication state of the setting group to the monitor completed bit (bit 2) of the setting group communication state (D1009) of the PLC.

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 GZ900 slave (device address 1) is transferred. Because all communication data of the setting group is written to the PLC, the request item number (D1087) of the PLC register is set to “0.”

When the monitor request bit (bit 1) of request command (D1088) of the PLC register is set to “1 (Decimal: 2),” the GZ 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 GZ slave writes the communication state of the setting group to the monitor completed bit (bit 2) of the setting group communication state (D1089) of the PLC.

If the monitor request bit (bit 1) of the request command (D1088) 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.

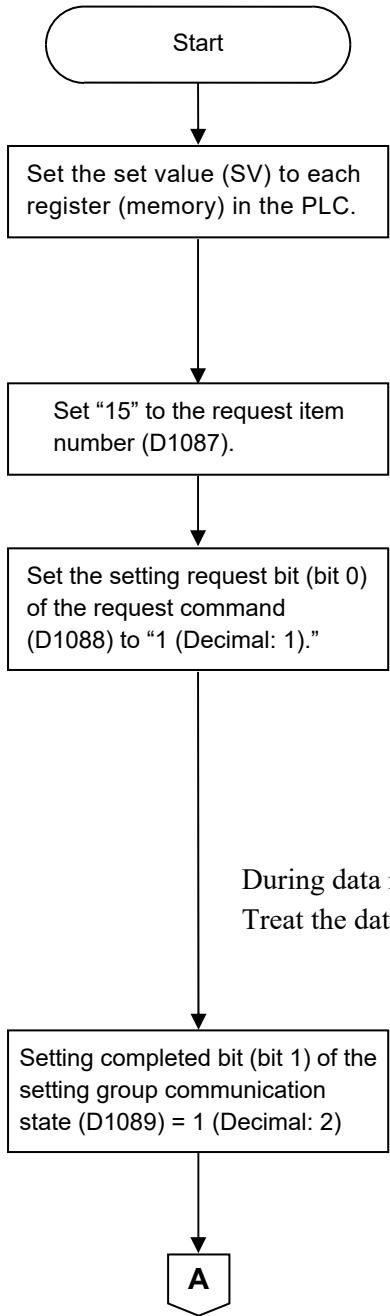


NOTE

If each set value of the GZ 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 Input 1_set value (SV) of GZ900 slave (device address 1) is set to 200 °C

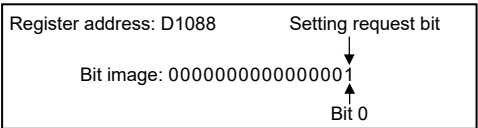


Set “200” as temperature set value to the PLC register D1114*.

* D1114 is the register address to which a set value (SV) of Input 1 is assigned. (Refer to P. 7-18)

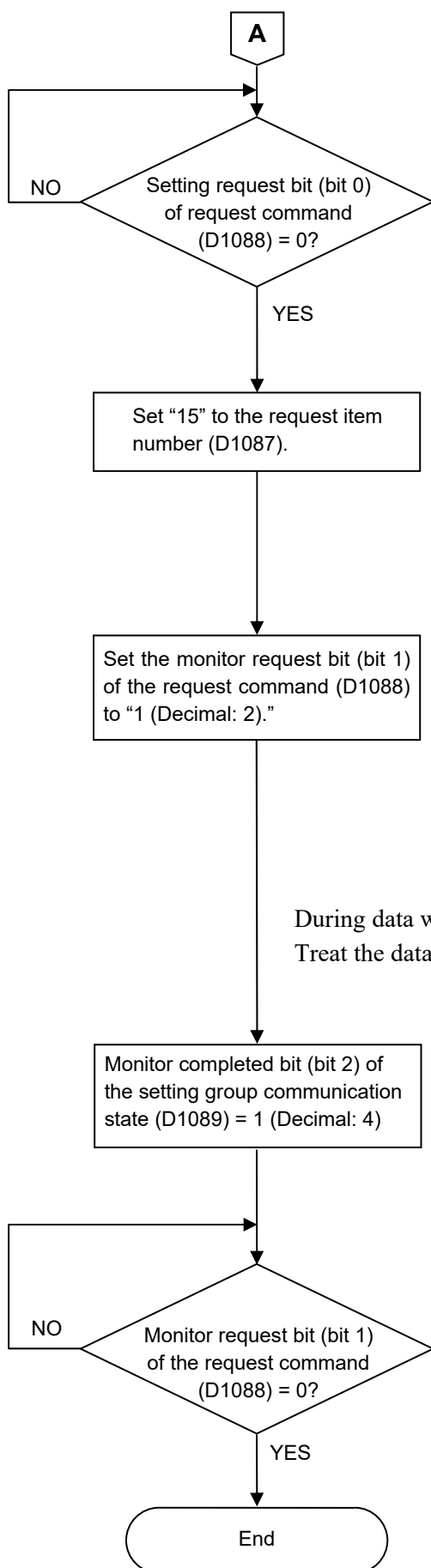
Enter “15” which is the item number of set value (SV) of Input 1 into request item number D1087 of the PLC register.

When setting “1 (1 in decimal)” to the setting request bit (Bit 0) of D1088, request command of the PLC register, GZ900 slave will start reading the data of set value (SV) of input 1 set to the PLC register (memory).

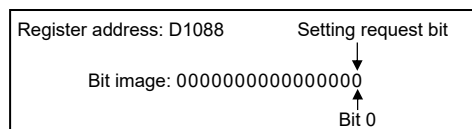


During data read:
Treat the data of all items as inconsistent during the data read.

When readout is completed, GZ900 slave will write the communication state of set value (SV) of Input 1 to the Setting completed bit (Bit 1) of the PLC Setting group communication state D1089.



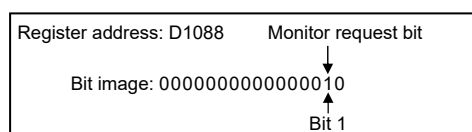
If the setting request bit (bit 0) of the request command (D1088) of the PLC register is “0,” this indicates that reading of data from the PLC is finished.



[Confirmation of setting data]]

Set “15” (item number of the Set value (SV) of Input 1) to D1087 (the Request item number of the PLC register) in order to verify the data that the GZ900 slave has read from the PLC.

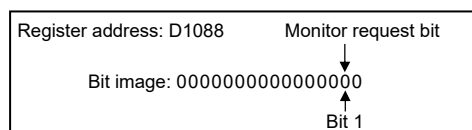
When the monitor request bit (bit 1) of request command (D1088) of the PLC register is set to “1 (Decimal 2),” the GZ slave begins writing the data of Input 1_Set value (SV) to the PLC.



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

When writing is finished, the GZ slave writes the communication state of the Input 1_Set value (SV) to the monitor completed bit (bit 2) of the setting group communication state (D1089) of the PLC.

If the monitor request bit (bit 1) of the request command (D1088) of the PLC register is “0,” this indicates that writing of data to the PLC is finished.



TROUBLE SHOOTING



8

This section explains probable 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 GZ with a new one, always use the module with the same model code.
If the GZ 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" (<i>LMRM</i>) (P. 8-5) at Fn60 in the Engineering mode of the GZ: Transmission status monitor does not display 0 and 1 alternately.	Communication protocol of the GZ is not set to "PLC communication"	Select "3: PLC communication" at "Communication protocol" at Fn60.
At "Communication response monitor" (<i>LMRM</i>) (P. 8-5) at Fn60 in the Engineering mode of the GZ. • 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 GZ has not reached the PLC. ↓ • Communication cable is wrongly connected. • Communication cable is not connected to the terminal. • Communication cable may be broken.	<ul style="list-style-type: none"> • Check terminal number and signal function, and properly connect the cable. • Check connection of communication cable. • Replace communication cable. <p>Caution: Polarity of lines A and B of Mitsubishi PLC is just reversed from ours.</p>
At "Communication response monitor" (<i>LMRM</i>) (P. 8-5) at Fn60 in the Engineering mode of the GZ. • 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 GZ 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	<ul style="list-style-type: none"> • Check terminal number and signal function, and properly connect the cable. <p>Caution: Polarity of lines A and B of Mitsubishi PLC is just reversed from ours.</p> <ul style="list-style-type: none"> • Use sum check in communication setting of the PLC.
At "Communication response monitor" (<i>LMRM</i>) (P. 8-5) at Fn60 in the Engineering mode of the GZ. • 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 GZ, but the message is not received by the GZ. ↓ • Wrong communication wiring • Wrong communication setting No sum check in communication setting of the PLC	<ul style="list-style-type: none"> • Check terminal number and signal function, and properly connect the cable. <p>For RS-422A, make sure RA and RB on the GZ side are properly wired.</p> <ul style="list-style-type: none"> • Use sum check in communication setting of the PLC.
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Communication cable is wrongly connected. • Communication cable is not connected to the terminal. • Communication cable may be broken. 	<ul style="list-style-type: none"> • 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 GZ, and set the communication speed and the data bit configuration to be equal to those of the PLC.
	Communication protocol of the GZ is not set to "PLC communication"	Change the communication protocol of the GZ 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 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.	Writing to the PLC from the GZ 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.
A request command was executed, but set values are updated only halfway through.		
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 GZ 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 GZ 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 GZ now connected. • GZ master, GZ slave, and PLC are powered on at different timing.	Conduct the recognition processing using Instrument recognition request command. When two or more GZ 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 GZ (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]

Communication
response monitor



SV display unit

Communication response monitor

0: Normal response

1: Overrun error

2: Parity error

4: Framing error

8: Receive buffer overflow

If two or more errors occur, the error values are summed up.

Errors are displayed in the hexadecimal format (0 to F).

0 (fixed)

Reception status monitor

Each time signal is received, 0 and 1 are displayed in turns.

Transmission status monitor

Each time signal is sent, 0 and 1 are displayed in turns.

Lights off



For the display method of Communication response monitor, refer to the **3.1.2 Setting via front keys (P. 3-11)**.

MEMO



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