PLC Communication Converter

COM-JE

Instruction Manual

RKC INSTRUMENT INC.

IMR01Y07-E7

- 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.

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

SYMBOLS

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.

 : 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.

⚠ WARNING

- An external protection device must be installed if failure of this instrument could result in damage to the instrument, equipment or injury to personnel.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to instrument and equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to instrument and 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 can 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.)
- 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 by operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- All wiring must be in accordance with local codes and regulations.
- 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.
- To prevent instrument damage or failure, protect the power line and the input/output lines from high currents with a protection device such as fuse, circuit breaker, etc.
- 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 dispensation.
- 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 will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push front panel with a hard object.
- Do not connect modular connectors to telephone line.
- When high alarm with hold action/re-hold action is used for Event function, alarm does not turn on while hold action is in operation. Take measures to prevent overheating which may occur if the control device fails.

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 purpose of illustration.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
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CONTENTS

MEMO

1. OUTLINE

PLC communication converter COM-JE (hereafter called COM-JE) is a communication converter to connect the RKC temperature controller FB100/400/900 (hereafter called controller) to a programmable controller (hereafter called PLC) and a host computer.
This chapter describes features, package contents, model code, system configuration, etc.

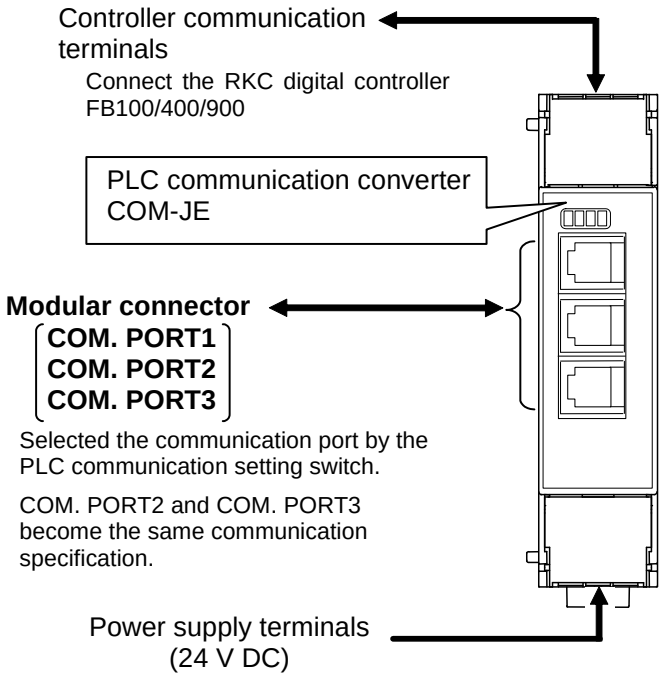
1.1 Features

- Three communication ports (COM. PORT1 to 3) of the COM-JE can be selected from among the following assignments. (The communication specification of COM. PORT2 is the same as that of COM. PORT3.)

	Assignment 1	Assignment 2
COM. PORT1	Host communication	PLC communication *
COM. PORT2/COM. PORT3	PLC communication *	Host communication

* It is also possible to select Host communication. In this case, all of the three ports are used for Host communication.

- Up to 31 controllers can be connected to one COM-JE.
- When the COM.PORT2/3 is used in PLC communication, up to four COM-JE units can be multi-drop connected to one PLC communication port. Therefore, temperature control of up to 124 channels per one PLC communication port can be performed.
- When the COM.PORT2/3 is used in Host communication, up to 16 COM-JE units can be multi-drop connected to one communication port of host computer. Therefore, temperature control of up to 496 channels per one Host communication port can be performed.



1.2 Checking the Product

Before using this product, check each of the following.

- Model code
- Check that there are no scratches or breakage in external appearance (case, front panel, terminal, etc).
- Check that all of the accessories delivered are complete. (Refer to below)

Accessories	Q'TY	Remarks	
□ Installation Manual (IMR01Y02-E□)	1	Enclosed with instrument	
□ Quick Instruction Manual (IMR01Y12-E□)	1	Enclosed with instrument	
□ Communication Data List (IMR01Y17-E□)	1	Enclosed with instrument	
□ Instruction Manual (IMR01Y07-E7)	1	This manual (sold separately)	This manual can be downloaded from the official RKC website: http://www.rkcinst.com/english/manual_load.htm.

If any of the products are missing, damaged, or if your manual is incomplete, please contact RKC sales office or the agent.

1.3 Model Code

Check that the product received is correctly specified by referring to the following model code list:
If the product is not identical to the specifications, please contact RKC sales office or the agent.

COM- JE - □ ∗ 01
(1) (2)

(1) Communication interface (COM. PORT1) *

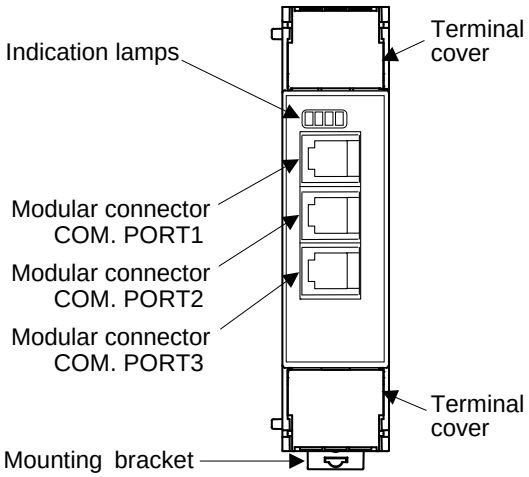
1: RS-232C
4: RS-422A

* COM. PORT2/COM. PORT3 is RS-422A, controller communication terminals is RS-485 (Fixed).

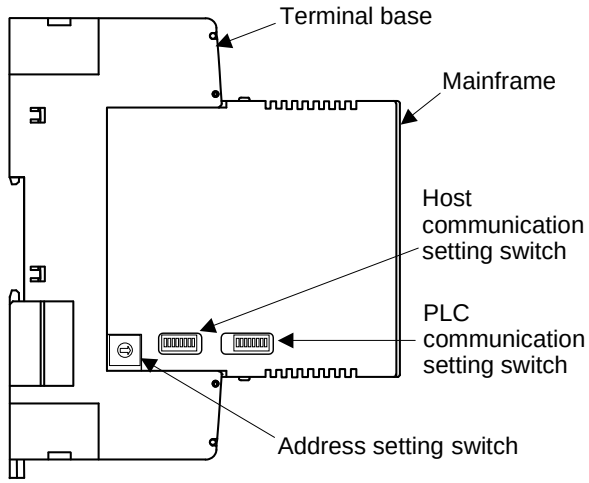
(2) Corresponding to the RKC controller

01: FB100/400/900

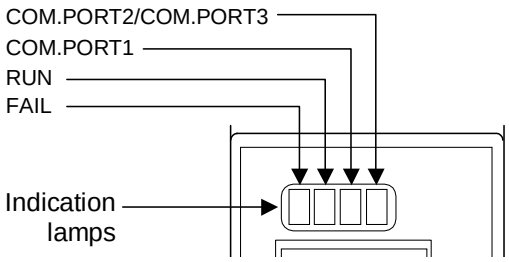
1.4 Parts Description



Front view



Left side view



CAUTION

Do not separate the mainframe from the terminal base with the power turned on. If so, instrument failure may result.

- **Indication lamps**

FAIL [Red]	• When CPU/RAM abnormal: Turns on • Communication environment setting mode by the switch: Flashes
RUN [Green]	• When normally working: Turns on • Self-diagnostic error: Flashes slowly • Data collection just after the power is turned on: Flashes rapidly
COM. PORT1 [Yellow]	During COM. PORT1 data send and receive: Turns on
COM. PORT2/COM. PORT3 [Yellow]	During COM. PORT2/ COM. PORT3 data send and receive: Turns on

- **Modular connectors**

COM. PORT1	Connector for PLC or Host computer connection [Based on RS-422A/RS-232C] (Specify when ordering)
COM. PORT2	Connector for PLC, Host computer or COM-JE connection [Based on RS-422A]
COM. PORT3	Connector for COM-JE extension [Based on RS-422A]

- **Switches**

Address setting switch	• Set the address for COM-JE • Used for the PLC communication environment setting
Host communication setting switch	• Set the communication speed, data bit configuration, and protocol for Host communication. • Used for the PLC communication environment setting
PLC communication setting switch	• Set the communication speed, data bit configuration, and protocol for PLC communication • Select the communication port of modular connector • Used for the PLC communication environment setting

- **Others**

Terminal cover	Terminal covers above and below the COM-JE
Mounting bracket	• Used for the DIN rail mounting • When panel mounted, two mounting brackets are required for the upper and lower sides (one required for the upper side: separately sold).
Terminal base	Part of the terminal and base of COM-JE (There is the Termination resistor transfer switch in the inside of terminal base)
Mainframe	Part of the mainframe of COM-JE

☞ For the Termination resistor transfer switch, refer to **4.4 Installation of Termination Resistor (P. 18)**.

1.5 Example of System Configuration

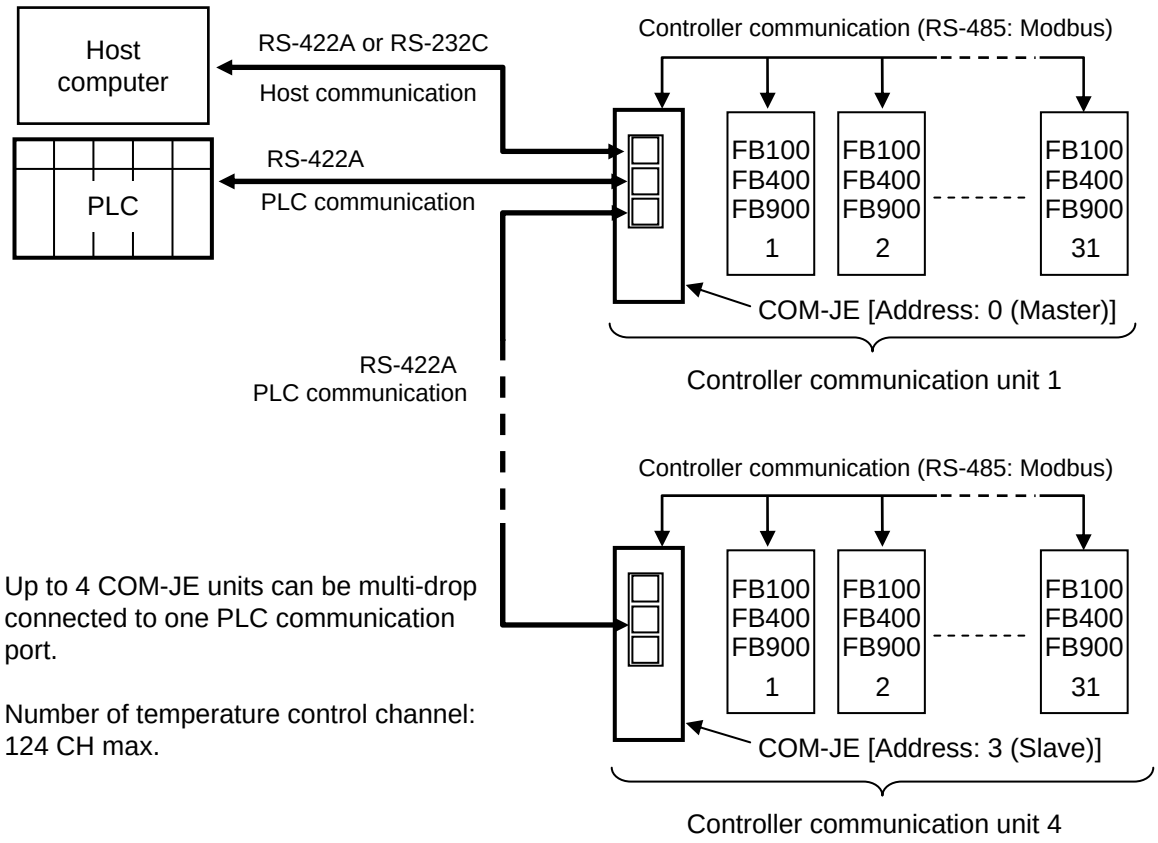
The following is an example of system configuration when the controller communication unit configured with one COM-JE and controllers (FB100/400/900) is connected to the PLC/host computer.

The controller communication unit means that one COM-JE and several controllers are connected via Controller communication (RS-485, Modbus).

1.5.1 Multi-drop connection by PLC communication

- When the COM.PORT2/3 is used in PLC communication, up to 4 COM-JE units (i.e. 4 controller communication units) can be multi-drop connected to one PLC communication port.
- As up to 31 FB100/400/900s are connected to one COM-JE, temperature control of up to 124 channels (31 channels × 4 units) can be performed.

[Example] When each communication port of the COM-JE is assigned as follows.
COM.PORT1: Host communication (RS-422A or RS-232C)
COM.PORT2/3: PLC communication (RS-422A) [Multi-drop connection]



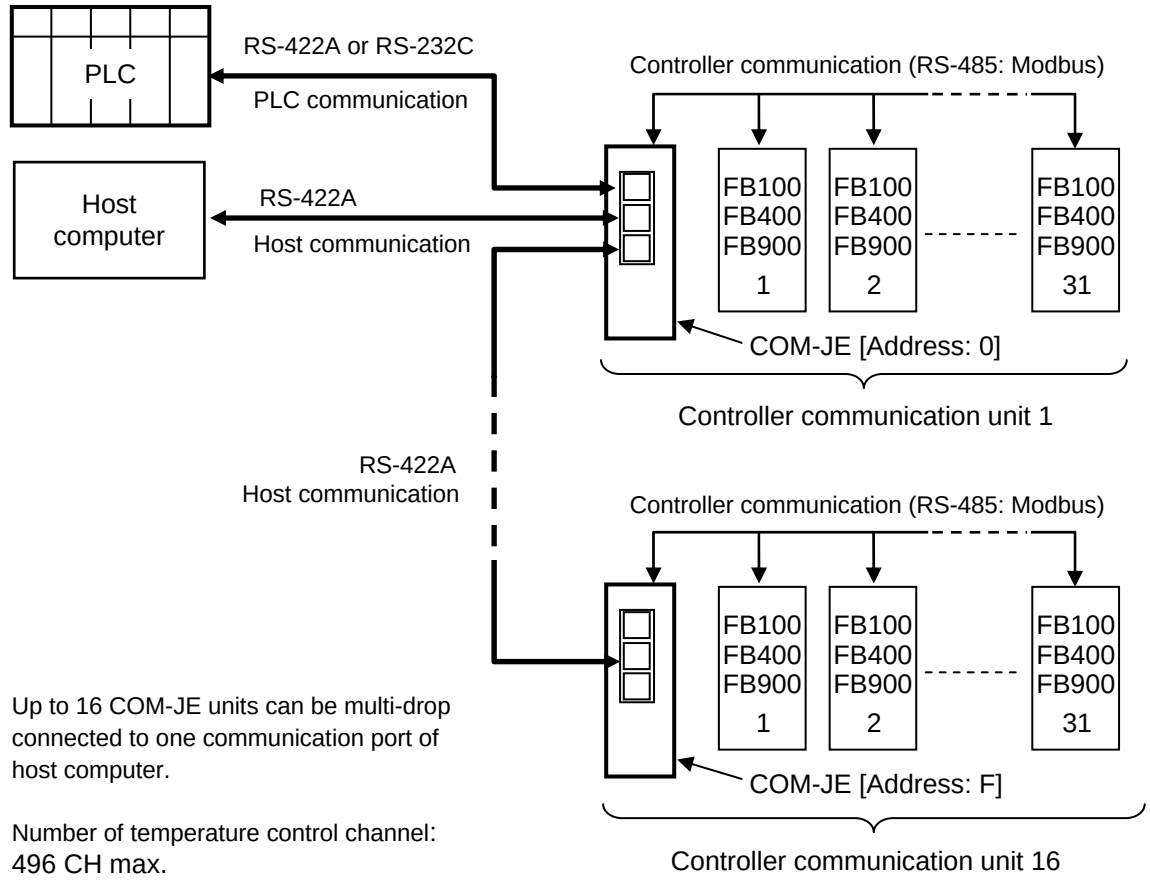
When in the above figure, the host computer connected to COM. PORT1 of COM-JE (Address: 0) can communicate only with controller communication unit 1.

For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

1.5.2 Multi-drop connection by Host communication

- When the COM.PORT2/3 is used in Host communication, up to 16 COM-JE units (i.e. 16 controller communication units) can be multi-drop connected to one communication port of host computer.
- As up to 31 FB100/400/900s are connected to one COM-JE, temperature control of up to 496 channels (31 channels × 16 units) can be performed.

[Example] When each communication port of the COM-JE is assigned as follows.
COM.PORT1: PLC communication (RS-422A or RS-232C)
COM.PORT2/3: Host communication (RS-422A) [Multi-drop connection]



📖 When in the above figure, the host computer connected to COM. PORT1 of COM-JE (Address: 0) can communicate only with controller communication unit 1.

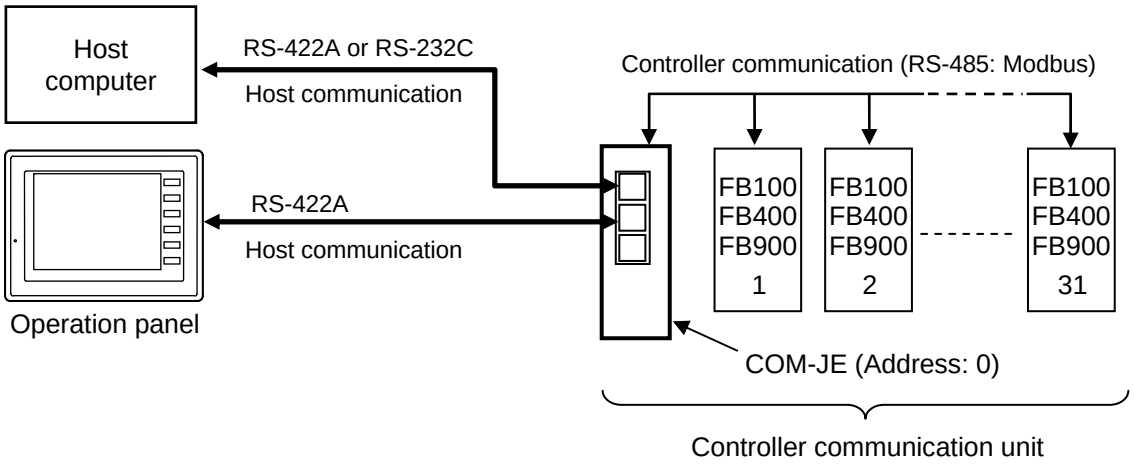
☞ For the multi-drop connection using the COM. PORT1, refer to **6.1.2 Wiring (P. 29) [MITSUBISHI PLC]**, **6.2.2 Wiring (P. 48) [OMRON PLC]** or **7.2 Wiring (P. 102) [Host communication]**.

☞ For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

1.5.3 Connection of only Host communication

If all of COM.PORT1 to 3 are used for Host communication, it is possible to simultaneously connect the host computer and operation panel.

[Example] When each communication port of the COM-JE is assigned as follows.
COM.PORT1: Host communication (RS-422A or RS-232C)
COM.PORT2/3: Host communication (RS-422A) [Multi-drop connection]



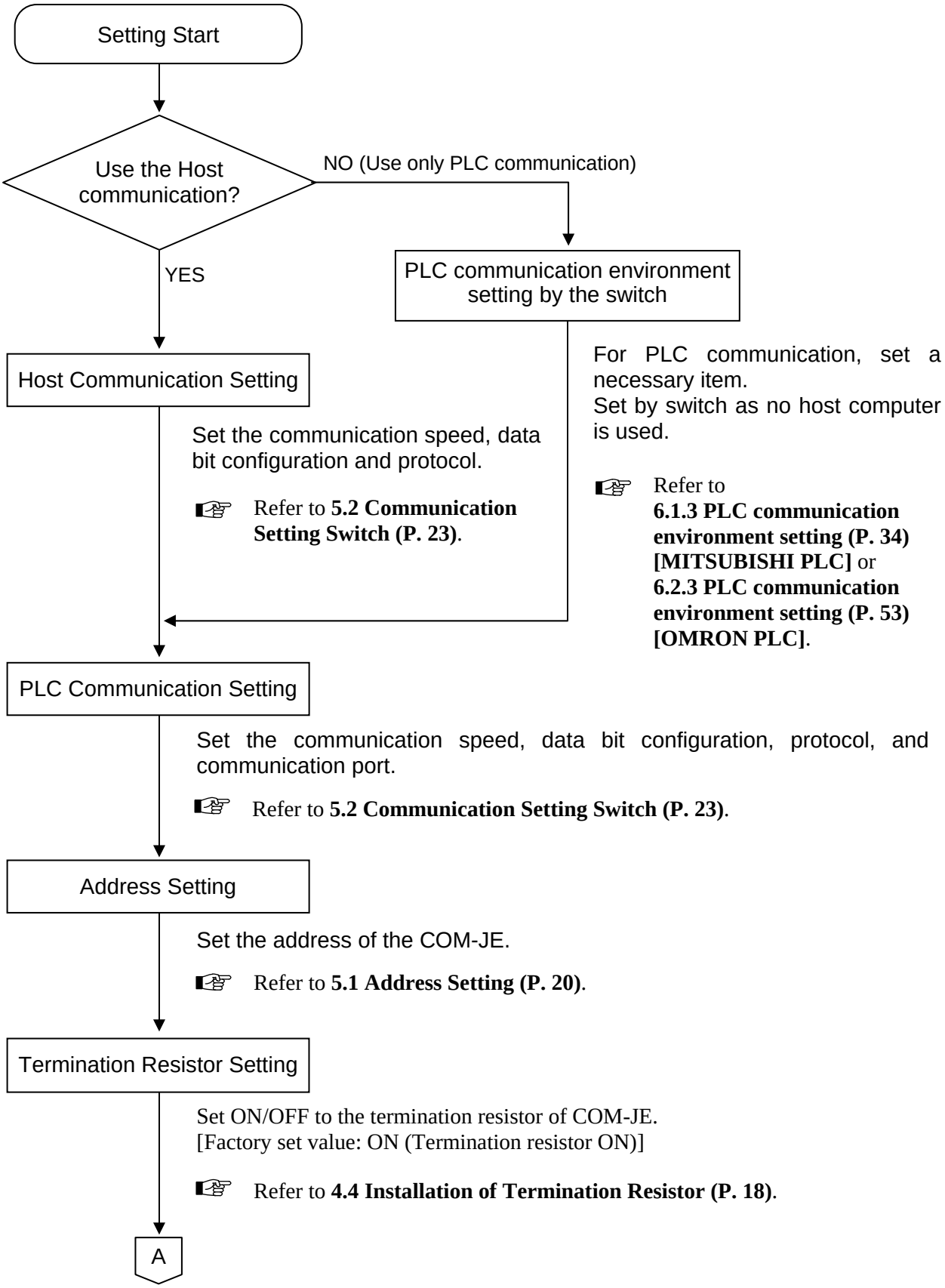
📖 When connected the operation panel to the COM-JE, please contact RKC sales office or the agent.

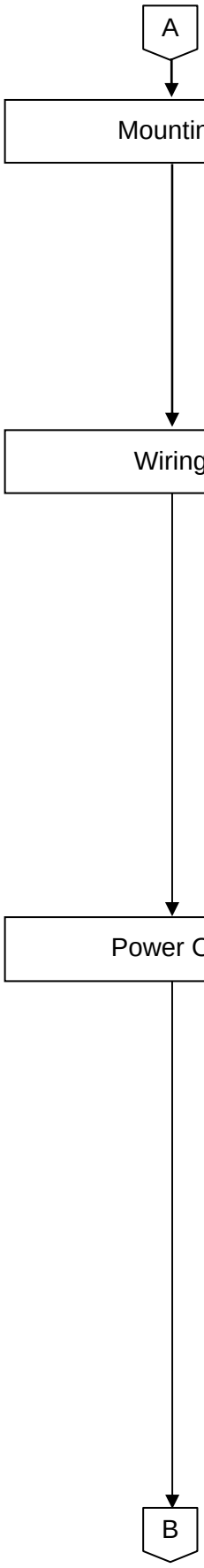
☞ For the multi-drop connection of COM.PORT2/3 by Host communication, refer to **1.5.2 Multi-drop connection by Host communication (P. 6)**.

☞ For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

2. HANDLING PROCEDURES

Conduct setting according to the procedure described below.





Conduct mounting the COM-JE, the controller and the PLC.

☞
- For mounting of the COM-JE, refer to **3. MOUNTING (P. 12)**.
- For mounting of the controller, refer to **FB100 Installation Manual (IMR01W12-E□)** or **FB400/FB900 Installation Manual (IMR01W01-E□)**.
- For mounting of the PLC, refer to the PLC instruction manual.

Wire a power supply of the COM-JE, wiring of the COM-JE and the controller, and wiring the COM-JE and the PLC. In addition, for Host communication, connect to host computer.

☞
- For wiring of a power supply of the COM-JE, refer to **4.2 Terminal Configuration (P. 16)**.
- For wiring of the COM-JE and the controller, refer to **4.3 Connection to the Controllers (P. 17)**.
- For wiring of the COM-JE and the PLC, refer to **6.1.2 Wiring (P. 29) [MITSUBISHI PLC]** or **6.2.2 Wiring (P. 48) [OMRON PLC]**.
- For wiring of the COM-JE and the host computer, refer to **7.2 Wiring (P. 102) [Host communication]**.

When power is applied to COM-JE, controller, PLC and host computer, the COM-JE performs as follows.

1. The COM-JE starts collecting data on each controller connected from the time when the power is turned on.

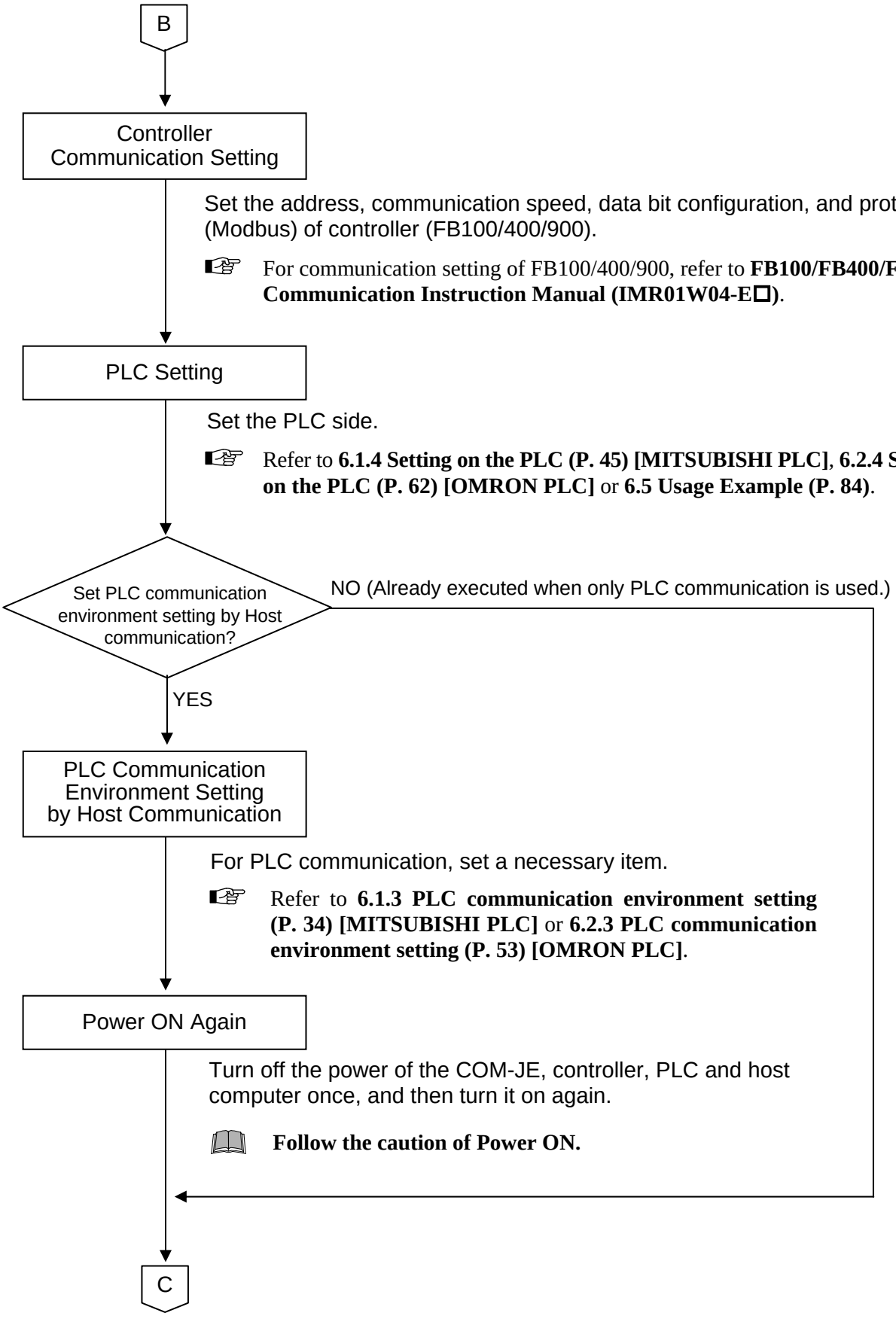
2. The RUN lamp flashes at very short intervals.

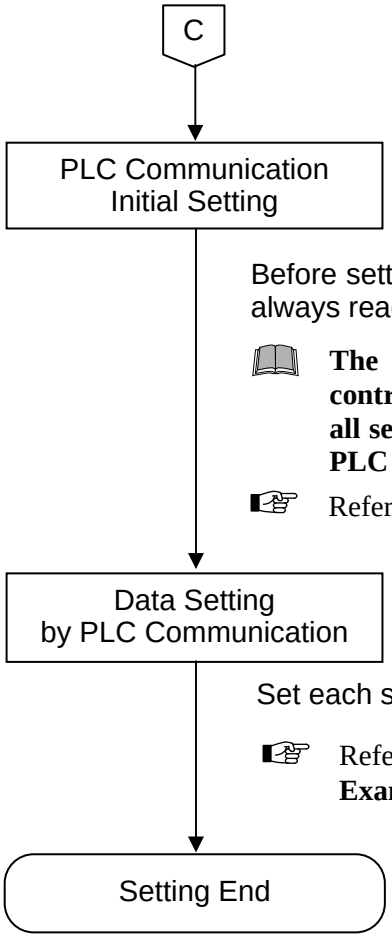
3. After data collection is finished and PLC communication becomes enabled *, the RUN lamp keeps lighting and as a result Controller communication state and Control word 2 are set to 1.

* Time required for enabling PLC communication is maximum 30 seconds.

To prevent malfunction, always turn on the power of the COM-JE last. In addition, if there are two or more Controller communication units in PLC communication, always turn on the power of the master unit last.

☞ For the master unit, refer to **5.1 Address Setting (P. 20)**.


B
Controller Communication Setting
Set the address, communication speed, data bit configuration, and protocol (Modbus) of controller (FB100/400/900).
☞ For communication setting of FB100/400/900, refer to **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.
PLC Setting
Set the PLC side.
☞ Refer to **6.1.4 Setting on the PLC (P. 45) [MITSUBISHI PLC]**, **6.2.4 Setting on the PLC (P. 62) [OMRON PLC]** or **6.5 Usage Example (P. 84)**.
Set PLC communication environment setting by Host communication?
NO (Already executed when only PLC communication is used.)
YES
PLC Communication Environment Setting by Host Communication
For PLC communication, set a necessary item.
☞ Refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]** or **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.
Power ON Again
Turn off the power of the COM-JE, controller, PLC and host computer once, and then turn it on again.
Follow the caution of Power ON.
C



Before setting data for the controller from PLC, the data in the controller is always read into the PLC once.

The initial setting must always be conducted. If each set value of controller is changed from the PLC without setting the initial values, all set values of the controller are rewritten to 0 if the set values of the PLC at that time are 0.

Refer to **Initial setting (P. 65)** or **6.5.6 Initial setting (P. 94)**.

Set each set value data of controller from the PLC.

Refer to **6.4 PLC Communication Data Map (P. 74)** or **6.5 Usage Example (P. 84)**.

3. MOUNTING

This chapter describes installation environment, mounting cautions, dimensions and mounting procedures.

⚠ WARNING

To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

3.1 Mounting Cautions

(1) This instrument is intended to be used under the following environmental conditions. **(IEC61010-1)**
[OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]

(2) Use this instrument within the following environment conditions:
- Allowable ambient temperature: −10 to +50 °C
- Allowable ambient humidity: 5 to 95 %RH
  (Absolute humidity: MAX. W. C 29.3 g/m^3 dry air at 101.3 kPa)
- Installation environment conditions: Indoor use
  Altitude up to 2000 m

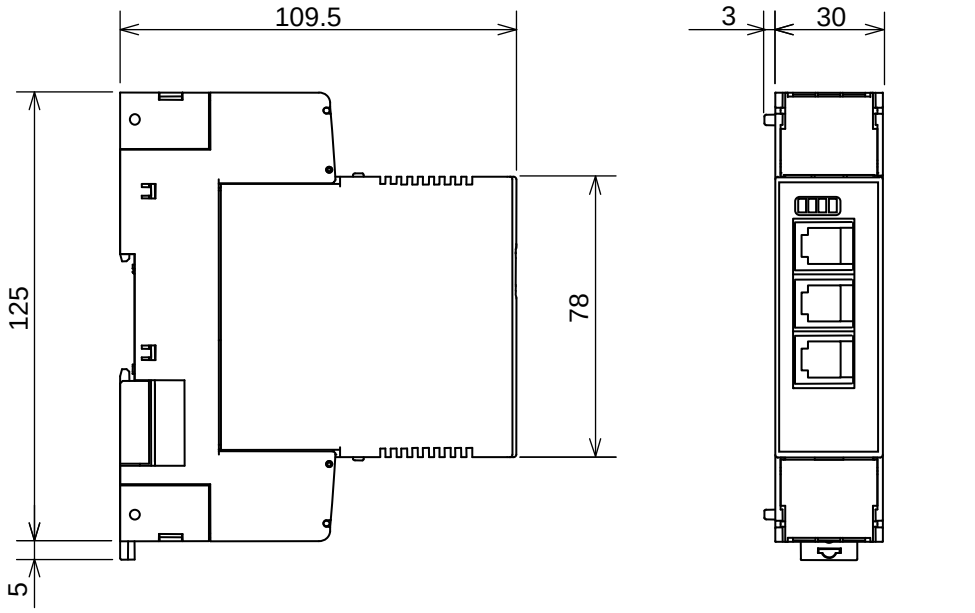
(3) Avoid the following conditions when selecting the mounting location:
- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the mainframe.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt or iron particles.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Direct air flow from an air conditioner.
- Exposure to direct sunlight.
- Excessive heat accumulation.

(4) Mount this instrument in the panel considering the following conditions:
- Provide adequate ventilation space so that heat does not build up.
- Do not mount this instrument directly above equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage resistors).
- If the ambient temperature rises above 50 °C, cool this instrument with a forced air fan, cooler, etc. Cooled air should not blow directly on this instrument.
- In order to improve safety and the immunity to withstand noise, mount this instrument as far away as possible from high voltage equipment, power lines, and rotating machinery.
  High voltage equipment: Do not mount within the same panel.
  Power lines: Separate at least 200 mm.
  Rotating machinery: Separate as far as possible.

(5) If this instrument is permanently connected to equipment, it is important to include a switch or circuit-breaker into the installation. This should be in close proximity to the equipment and within easy reach of the operator. It should be marked as the disconnecting device for the equipment.

3.2 Dimensions

(Unit: mm)

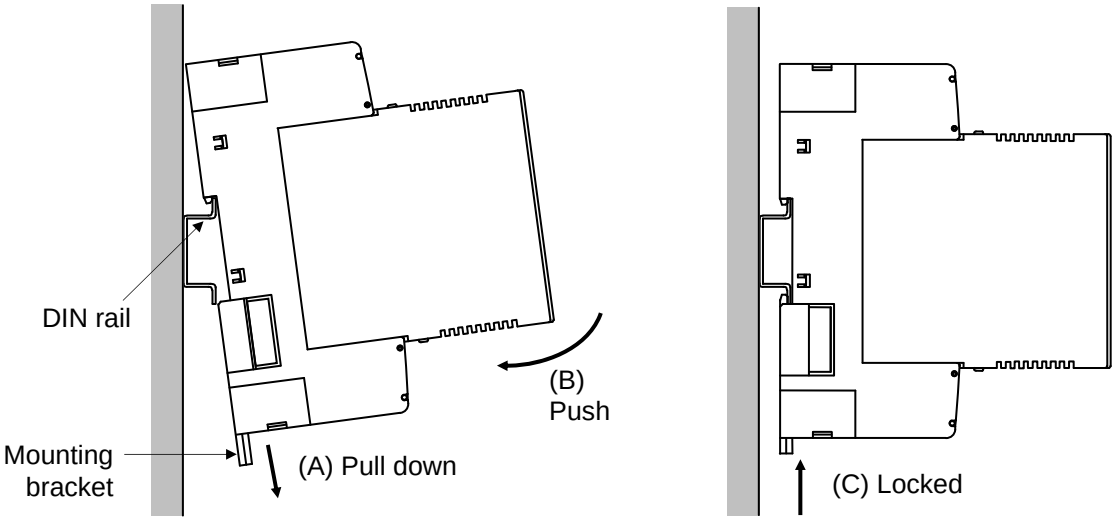


3.3 DIN Rail Mounting and Removing

■ Mounting procedures

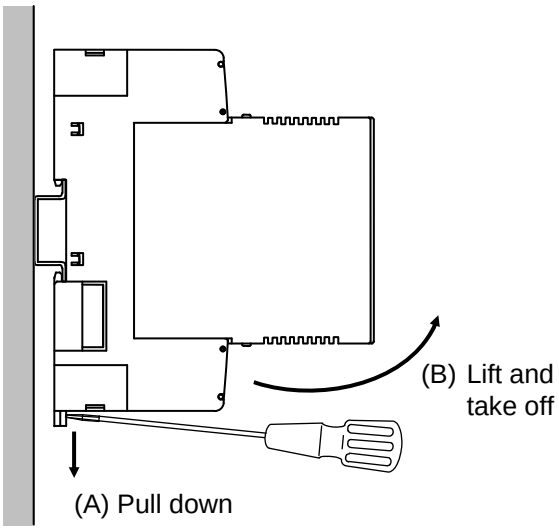
1. Pull down the mounting bracket at the bottom of the instrument (A). Attach the hooks on the top of the instrument to the DIN rail and push the lower section into place on the DIN rail (B).

2. Slide the mounting bracket up to secure the instrument to the DIN rail (C).



■ Removal procedures

1. Turn the power OFF.
2. Remove the wiring.
3. Pull down a mounting bracket with a slotted screwdriver (A). Lift the instrument from bottom, and take it off (B).



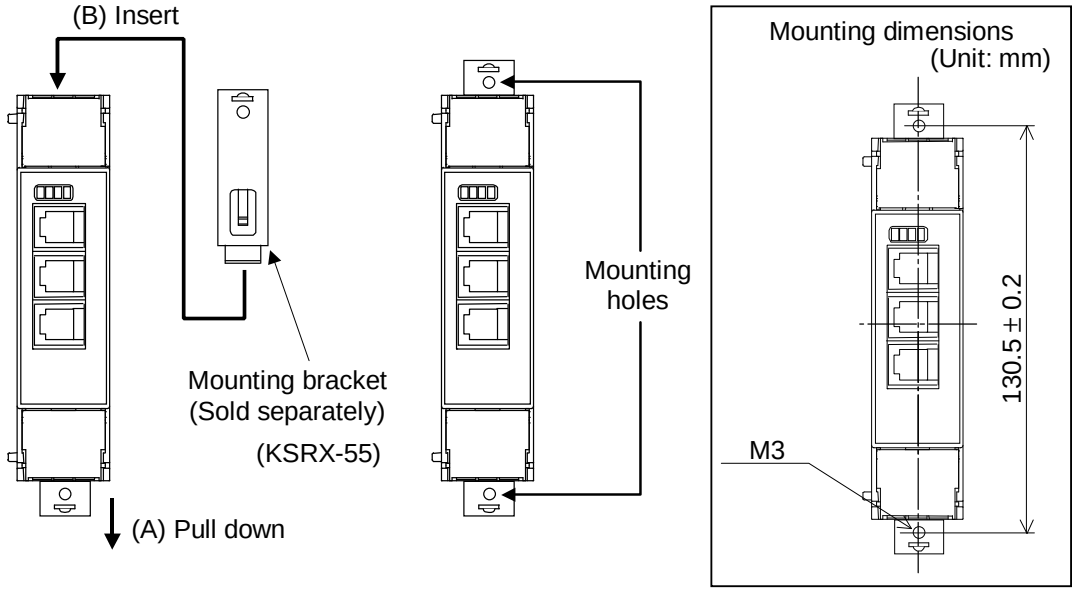
3.4 Panel Mounting

■ Mounting procedures

1. Pull down the mounting bracket (A) until locked and that a mounting hole appears.
2. Prepare one mounting bracket per instrument (B) sold separately (KSRX-55) and then insert it in the rear of the terminal board at top of the instrument until locked but a mounting hole does not disappear.
3. Mount each module directly on the panel with screws which are inserted in the mounting holes of the top and bottom mounting brackets.

   Recommended tightening torque: 0.3 N·m (3 kgf·cm)

The customer needs to provide the M3 size screws. Select the screw length that matches the mounting panel.



4. WIRING

This chapter describes wiring cautions and terminal configuration.

☞ For wiring of the COM-JE and the PLC, refer to **6.1.2 Wiring (P. 29) [MITSUBISHI PLC]** or **6.2.2 Wiring (P. 48) [OMRON PLC]**.

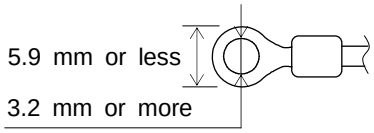
☞ For wiring of the COM-JE and the host computer, refer to **7.2 Wiring (P. 102) [Host communication]**.

4.1 Wiring Cautions

⚠ 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.

- To avoid noise induction, keep communication signal wire away from instrument power line, load lines and power lines of other electric equipment.
- If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.
  - Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.
  - Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
  - Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.
- Power supply wiring must be twisted and have a low voltage drop.
- For an instrument with 24 V power supply, supply power from a SELV circuit.
- A suitable power supply should be considered in end-use equipment. The power supply must be in compliance with a limited-energy circuits (maximum available current of 8 A).
- Use the solderless terminal appropriate to the screw size (M3).

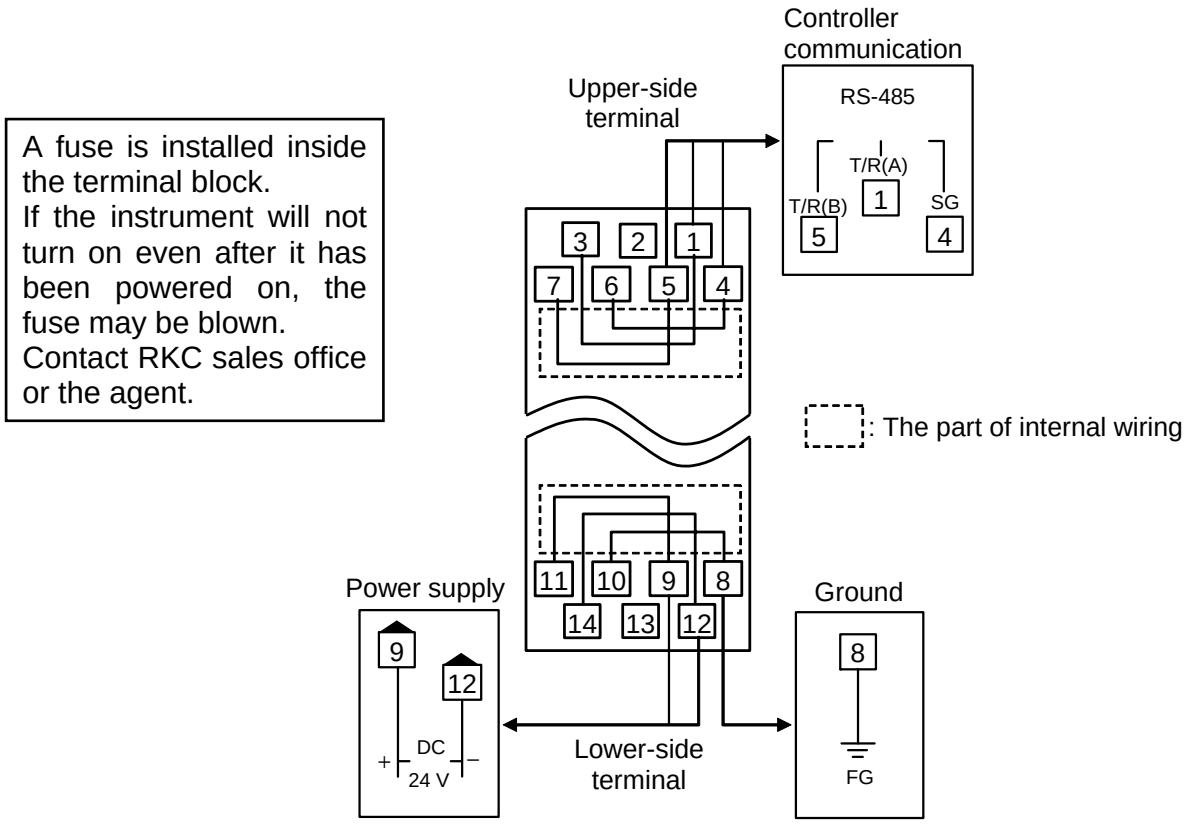


Recommended tightening torque:
0.4 N·m (4 kgf·cm)

- Make sure that the any wiring such as solderless terminal is not in contact with the adjoining terminals.

4.2 Terminal Configuration

The terminal layout is as follows.



- As controller communication terminal No. 1, 4 and 5 are internally connected to terminal No. 3, 6 and 7, any terminals can be used.
- As ground and power supply terminal No. 8, 9 and 12 are internally connected to terminal No. 10, 11 and 14, any terminals can be used.
- Terminal No. 2 and No. 13 are not used.

4.3 Connection to the Controllers

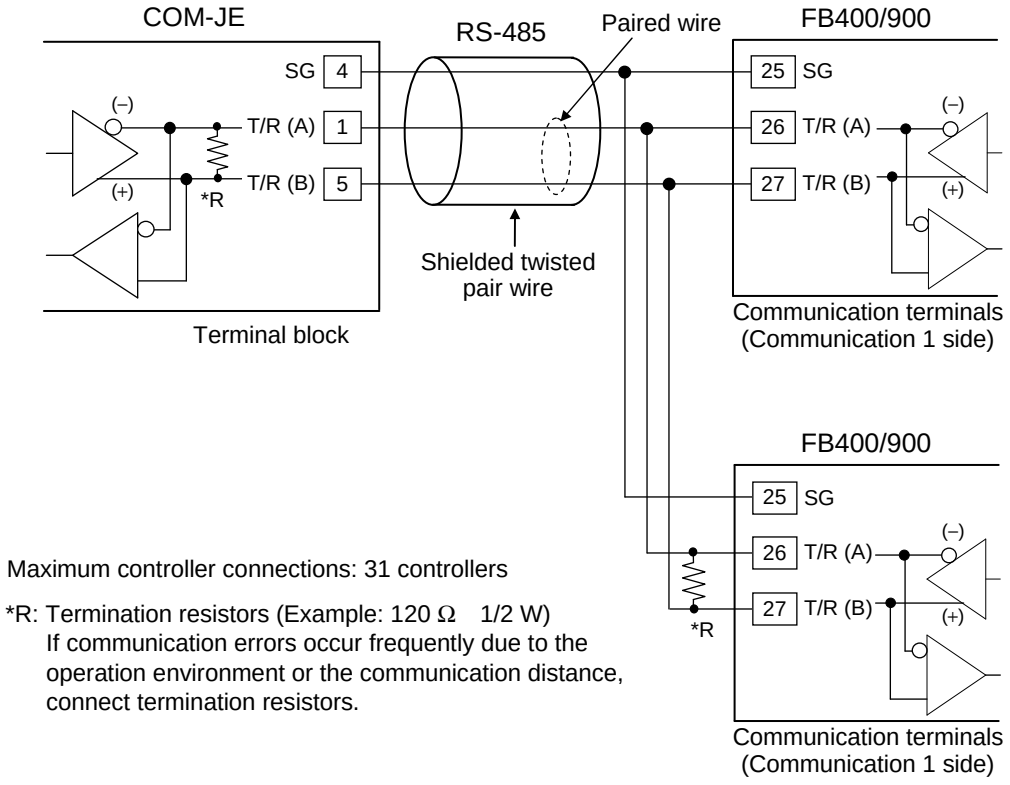
Conduct wiring between the COM-JE and controller (FB100/400/900) as shown in the following.

When conducting wiring to the FB100/400/900, always conduct wiring to the Communication 1 terminal.

■ Communication terminal number and signal details

Terminal No.		Signal name	Symbol
FB100	FB400/900		
13	25	Signal ground	SG
14	26	Send/receive data	T/R (A)
15	27	Send/receive data	T/R (B)

■ Wiring example [FB400/900] (Connections are similar for the FB100)



Maximum controller connections: 31 controllers

*R: Termination resistors (Example: 120 Ω 1/2 W)
If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors.

The cable and termination resistor(s) must be provided by the customer.

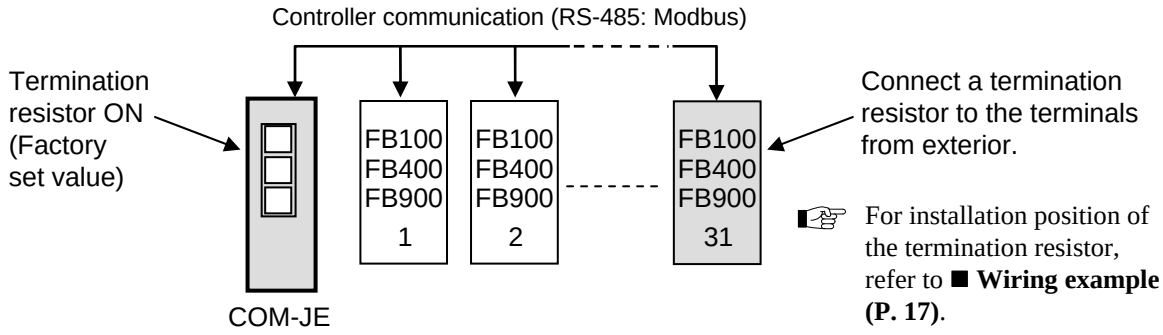
The termination resistor existing within the COM-JE can be connected or disconnected by the switch. (Factory set value: Termination resistor connected)
[Refer to **4.4 Installation of Termination Resistor (P. 18)**]

4.4 Installation of Termination Resistor

If communication errors occur frequently due to the operation environment or the communication distance, connect termination resistors to the COM-JE and the controller.
Procedure for setting a termination resistor to Controller communication (RS-485) and its setting position are described in the following.

■ Termination resistor setting position

If the COM-JE is connected to the extreme end of the communication line, install one termination resistor each to the COM-JE and the controller located most distantly from the COM-JE.



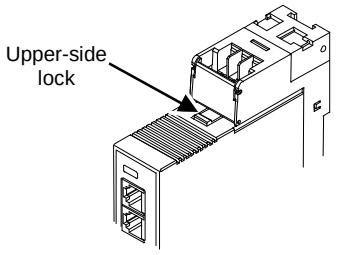
☞ For installation position of the termination resistor, refer to ■ **Wiring example (P. 17)**.

■ Setting procedure of termination resistor (COM-JE)

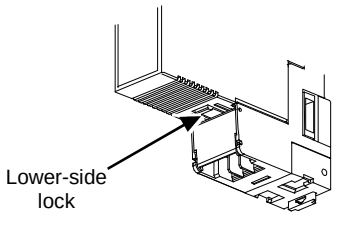
As the COM-JE is internally provided with a selector switch for choosing the ON/OFF of a termination resistor, it is not required to externally install the termination resistor.
(Factory set value: Termination resistor ON)

1. Turn off the power supply of the COM-JE.
Do not separate the mainframe from terminal base with the power turned on. If so, instrument failure may result.

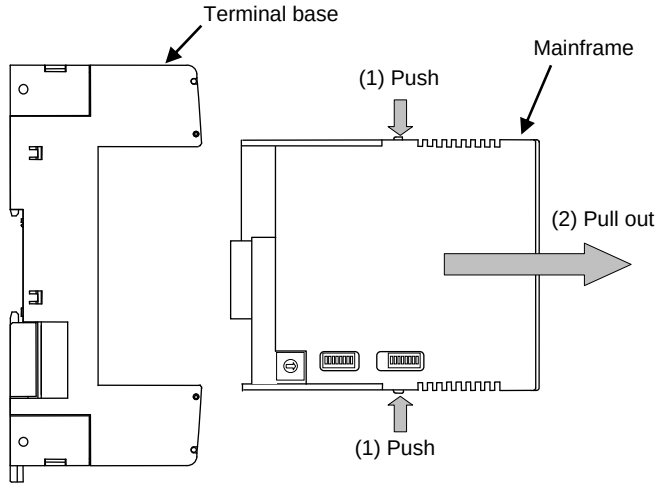
2. Pull out the mainframe itself toward you (2) while pushing the locks at its top and bottom (1), and then separate it from the terminal base.



Top view

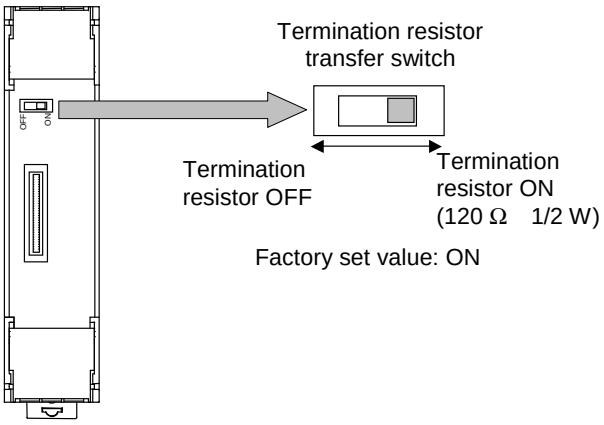


Bottom view



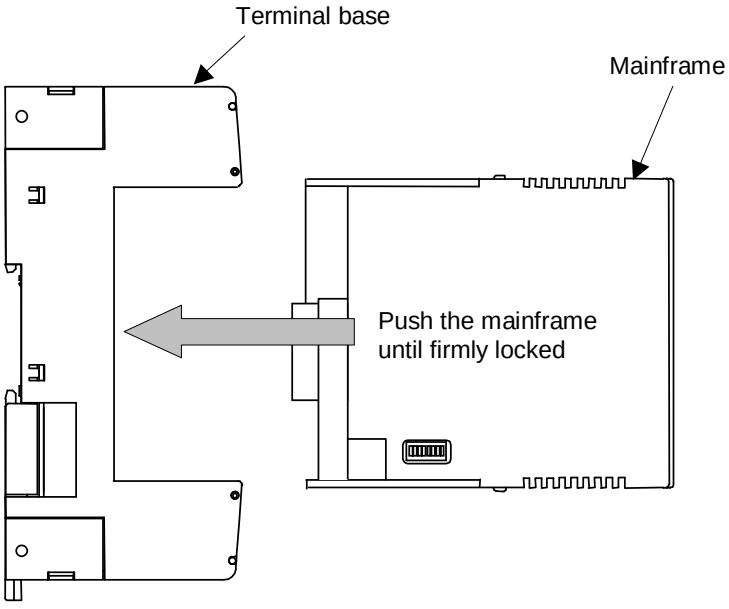
Removing the mainframe

3. Turn on the Termination resistor transfer switch in the terminal base.
The COM-JE is shipped from the factory with the selector switch set to "ON: Termination resistor connected."



A terminal base of the state which removed mainframe

4. Push the mainframe thus separated in the terminal base until firmly locked.



Mounting the mainframe

5. SETTING

⚠ WARNING

- To prevent electric shock or instrument failure, always turn off the power before setting the switch.
- To prevent electric shock or instrument failure, never touch any section other than those instructed in this manual.

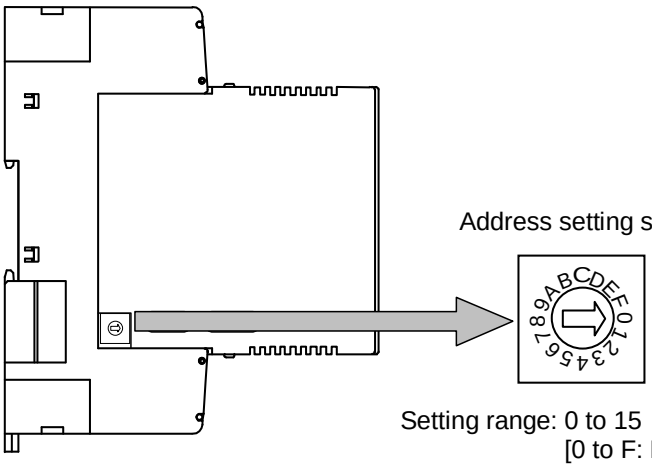
CAUTION

Do not separate the module mainframe from the terminal base with the power turned on. If so, instrument failure may result.

Set the following communication setting before communication.

5.1 Address Setting

When multi-drop connecting two or more COM-JE, set the desired address to each COM-JE.
(This is the address of controller communication unit.)
Set the address by address setting switch of left side of COM-JE. For this setting, use a small slotted screwdriver.



To avoid problems or malfunction, do not duplicate an address on the same communication line.

■ PLC communication

Up to 4 COM-JE units can be connected to a PLC communication port. Therefore the unit address uses the 4 COM-JE units as a group. Use consecutive numbers in any one of 4 groups in the following table as unit address.

Always set the top address of each group in 0, 4, 8, or C. 0, 4, 8 or C becomes the master for communication transfer.

Group	Address setting switch
Group 1	0 (Master)
	1
	2
	3
Group 2	4 (Master)
	5
	6
	7

Group	Address setting switch
Group 3	8 (Master)
	9
	A
	B
Group 4	C (Master)
	D
	E
	F

■ Host communication

Differently from PLC communication, there are no group restrictions. Free settings can be made in the range of 0 to F.

For Modbus, the value obtained by adding "1" to the set address corresponds to the address used for the actual program.

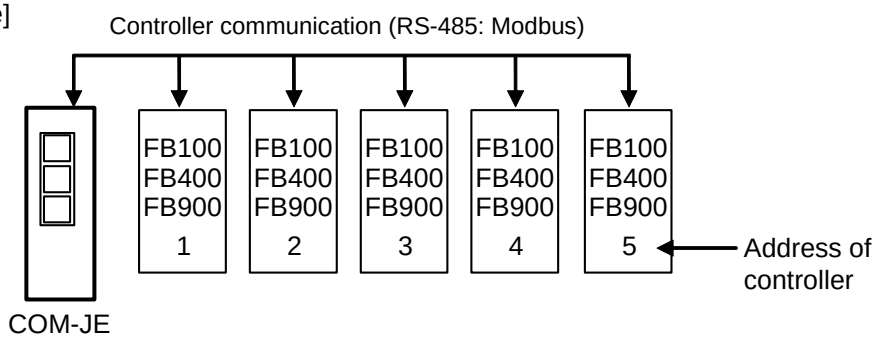
■ Address setting of controller

Address setting is necessary for controller (FB100/400/900) connected to the COM-JE.
Addresses are set by either of continuous and free settings. A controller address is set for each controller. However, the address setting method is set by the PLC communication environment setting of the COM-JE.

● Continuous setting

Set each controller addresses to consecutive numbers starting from 1.

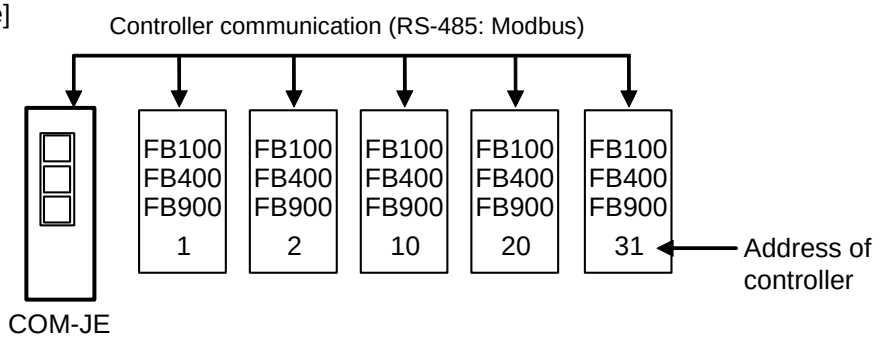
[Setting example]



● Free setting

Address can be set freely to any number between 1 to 31.

[Setting example]



📖 The factory set value of address setting method is Continuous setting.

📖 The number of controllers which can be used via PLC communication is in accordance with the Maximum controller number of PLC communication by the PLC communication environment setting.

📖 As wiring is always conducted to the Communication 1 terminals when connected to the FB100/400/900, set the FB100/400/900 address to device address 1.

☞ For PLC communication environment setting, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]** or **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

☞ For address setting method of the FB100/400/900, refer to **FB100 Communication Quick Manual (IMR01W15-E□)**, **FB400/FB900 Communication Quick Manual (IMR01W07-E□)** or **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

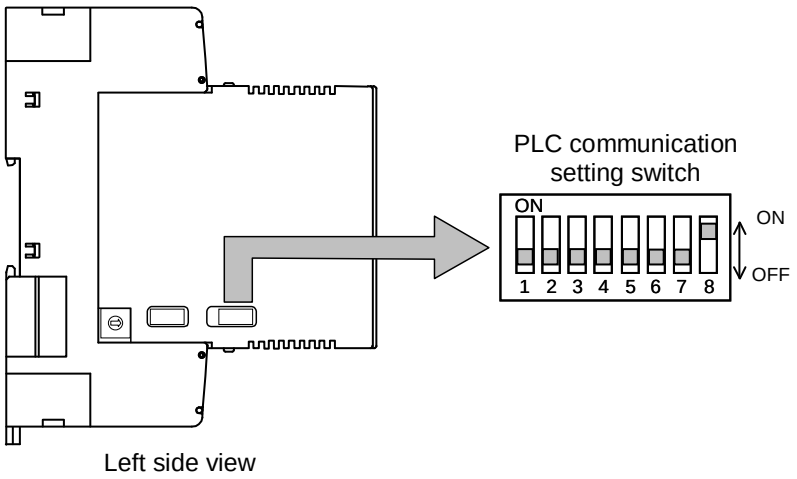
5.2 Communication Setting Switch

■ PLC communication setting switch

The PLC communication setting switch is used to set the data bit configuration, communication speed and communication protocol of PLC communication. They are also used to select the assigned contents of COM. PORT1 and COM. PORT2/3.

Set the same contents as data bit configuration, communication speed and communication protocol of PLC or host computer.

When two or more COM-JE units are connected in PLC communication, set the PLC communication setting switches in all of the COM-JE units to the same positions.



Left side view

1	2	Data bit configuration	
OFF	OFF	Data 8-bit, Without parity, Stop 1-bit	← Factory set value
ON	OFF	Data 7-bit, Odd parity, Stop 1-bit	
OFF	ON	Data 7-bit, Even parity, Stop 1-bit	
ON	ON	Data 7-bit, Even parity, Stop 2-bit	

3	4	Communication speed	
OFF	OFF	9600 bps	← Factory set value
ON	OFF	19200 bps	
OFF	ON	38400 bps	
ON	ON	**Do not set this one.**	

Continued on the next page.

Continued from the previous page.

5	6	7	Communication protocol
OFF	OFF	OFF	Host communication 2 (RKC communication) ← Factory set value*
ON	OFF	OFF	Host communication 2 (Modbus)
OFF	ON	OFF	**Do not set this one.**
ON	ON	OFF	PLC communication OMRON SYSMAC series special protocol C mode command (RD/WD, RE/WE)
OFF	OFF	ON	PLC communication MITSUBISHI MELSEC series special protocol A-compatible 1C frame (format 4), ACPU common command (WR/WW)
ON	OFF	ON	PLC communication MITSUBISHI MELSEC series special protocol • Register type: 0 to 2 * A-compatible 1C frame (format 4), AnA/AnUCPU common command (QR/QW) • Register type: 3 to 6 * QnA-compatible 3C frame (format 4), command (0401/1401) * The register type is selected by the PLC communication environment setting. When CPU unit QnUCPU of the Q series is used, select the QnA-compatible 3C frame.
OFF	ON	ON	**Do not set this one.**
ON	ON	ON	**Do not set this one.**

* Be careful that no PLC communication can be made if set to the factory set value.

8	Communication port assignment
OFF	COM. PORT1: The communication protocol which is set by PLC communication setting switch No. 5 to 7 [RS-232C/RS-422A] COM. PORT2/3: The communication protocol which is set by Host communication setting switch No. 6 [RS-422A]
ON	COM. PORT1: The communication protocol which is set by Host communication setting switch No. 6 [RS-232C/RS-422A] COM. PORT2/3: The communication protocol which is set by PLC communication setting switch No. 5 to 7 [RS-422A] ← Factory set value

COM. PORT2 and COM. PORT3 become the same communication specification.

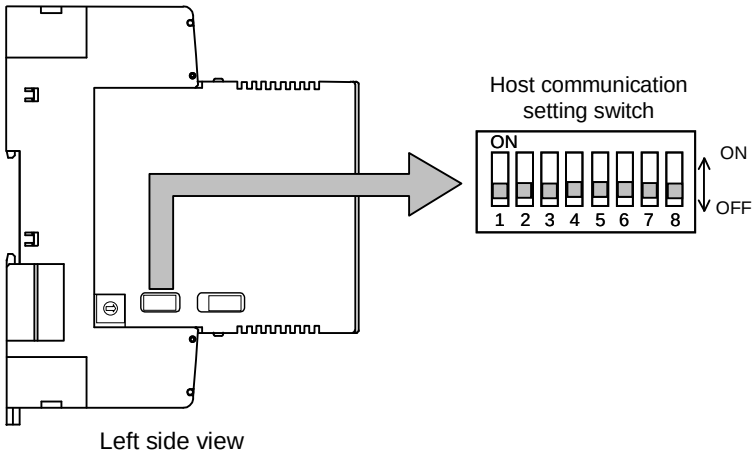
■ Host communication setting switch

The Host communication setting switch is used to set the data bit configuration, communication speed and communication protocol of Host communication.

Switch No. 5, 7 and 8 must be always OFF. Do not set to ON.

Set the same contents as communication speed, data bit configuration and communication protocol of host computer.

When two or more COM-JE units are connected in Host communication, set the Host communication setting switches in all of the COM-JE units to the same positions.



Left side view

1	2	Data bit configuration
OFF	OFF	Data 8-bit, Without parity, Stop 1-bit
ON	OFF	Data 7-bit *, Odd parity, Stop 1-bit
OFF	ON	Data 7-bit *, Even parity, Stop 1-bit
ON	ON	Data 7-bit *, Even parity, Stop 2-bit

← Factory set value

* To be changed to data 8-bit only when Host communication (Modbus) is selected.

3	4	Communication speed
OFF	OFF	9600 bps
ON	OFF	19200 bps
OFF	ON	38400 bps
ON	ON	**Do not set this one.**

← Factory set value

6	Communication protocol
OFF	Host communication (RKC communication)
ON	Host communication (Modbus)

← Factory set value

5.3 Controller Communication Setting

The COM-JE and controllers (FB100/400/900) are connected via the controller communication.
To perform the controller communication, set the controller communication setting as follows.

- Protocol: Modbus
- Data bit configuration: Data 8-bit, Without parity, Stop 1-bit
- Communication speed: 9600 bps, 19200 bps, 38400 bps
- Address: 1 to 31
  For address setting method, refer to ■ **Address setting of controller (P. 22)**.

☞ For communication setting of the FB100/400/900, refer to **FB100 Communication Quick Manual (IMR01W15-E□)**, **FB400/FB900 Communication Quick Manual (IMR01W07-E□)** or **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

☞ The communication speed can be adjusted also through the host communication (initial setting data) of the COM-JE. For the host communication, refer to **7. HOST COMMUNICATION (P. 101)**.

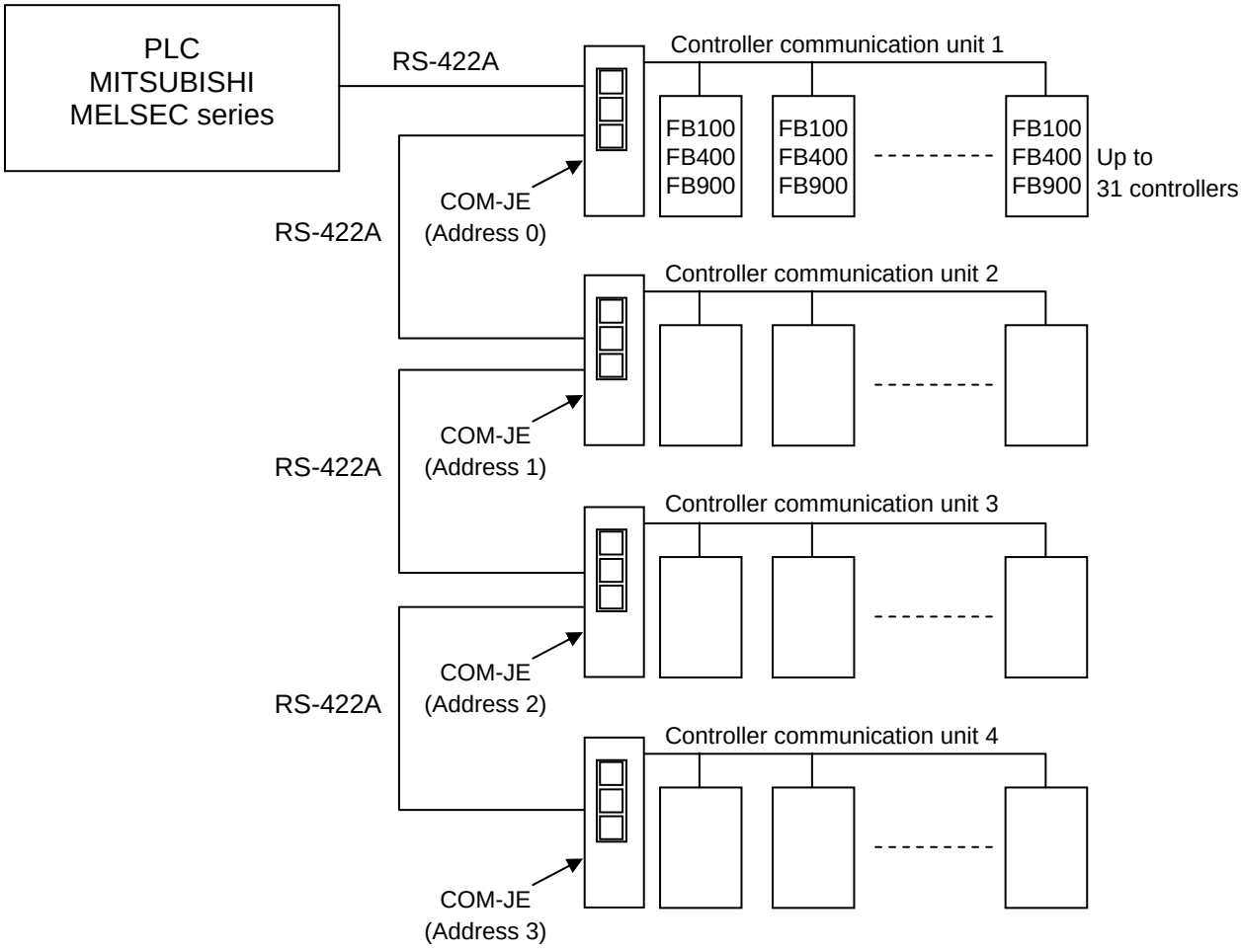
6. PLC COMMUNICATION

6.1 MITSUBISHI MELSEC Series

6.1.1 Outline

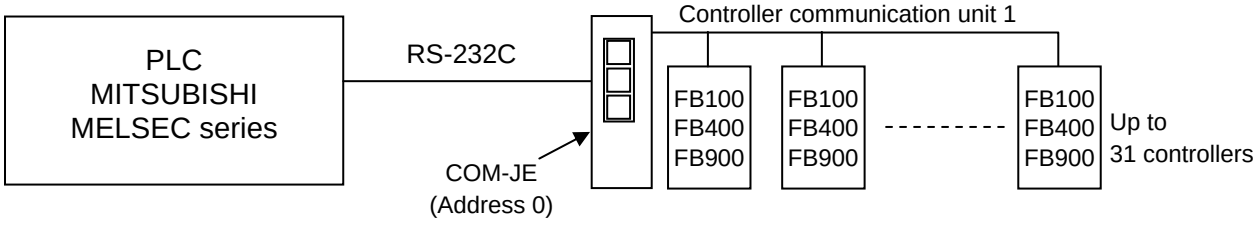
The COM-JE can be connected to the MITSUBISHI MELSEC series computer link module and controllers (FB100/400/900) without using any program.

- **RS-422A**



Up to 4 COM-JE units can be multi-drop connected to one PLC communication port.

- **RS-232C**



One COM-JE unit can be connected to one PLC communication port.

■ Usable PLC modules (MITSUBISHI MELSEC series)

Name	Type
Computer link module	AJ71UC24 A1SJ71UC24-R2 A1SJ71UC24-R4 A1SJ71UC24-PRF A1SJ71C24-R2 A1SJ71C24-R4 A1SJ71C24-PRF A1SCPUC24-R2 A2CCPUC24 (PRF) etc. The module which A-compatible 1C frame (format 4) or QnA-compatible 3C frame (format 4) can use.
Serial communication modules	AJ71QC24N A1SJ71QC24N QJ71C24 LJ71C24 etc. The module which A-compatible 1C frame (format 4) or QnA-compatible 3C frame (format 4) can use.
Adapter	FX0N-232ADP FX0N-485ADP FX2NC-485ADP FX3U-485ADP
Expanded function board	FX2N-232BD FX2N-485BD FX3U-485-BD

■ Usable controllers (Temperature controller)

Name	Type
FB100 FB400 FB900	Satisfy the following requirements • Interface of communication 1: RS-485 • Protocol of communication 1: Modbus-RTU

Up to 31 controllers (FB100/400/900) can be connected to one COM-JE.

6.1.2 Wiring

⚠ WARNING

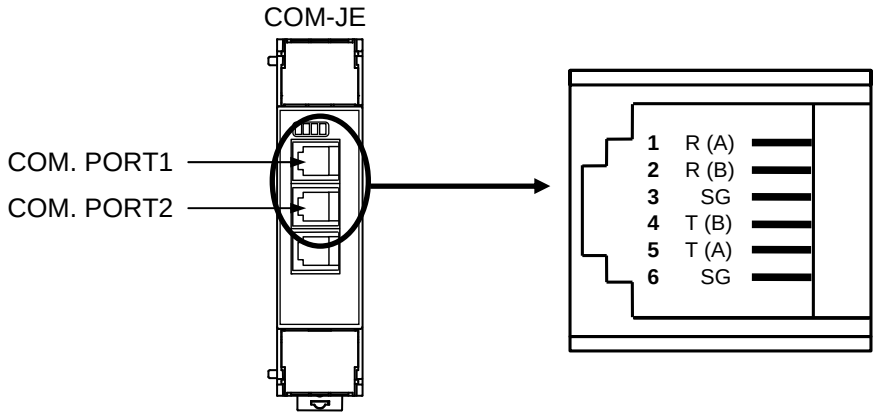
To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

CAUTION

- Connect connectors correctly in the right position. If it is forcibly pushed in with pins in the wrong positions, the pins may be bent resulting in instrument failure.
- When connecting or disconnecting the connectors, do not force it too far to right and left or up and down, but move it on the straight. Otherwise, the connector pins may be bent, causing instrument failure.
- When disconnecting a connector, hold it by the connector itself. Disconnecting connectors by yanking on their cables can cause breakdowns.
- To prevent malfunction, never touch the contact section of a connector with bare hands or with hands soiled with oil or the like.
- To prevent malfunction, connect cable connectors securely, then firmly tighten the connector fastening screws.
- To prevent damage to cables, do not bend cables over with excessive force.
- If the instrument is easily affected by noise, use the ferrite core at the both ends of the communication cable (nearest the connector).

■ RS-422A

● Pin layout of modular connector



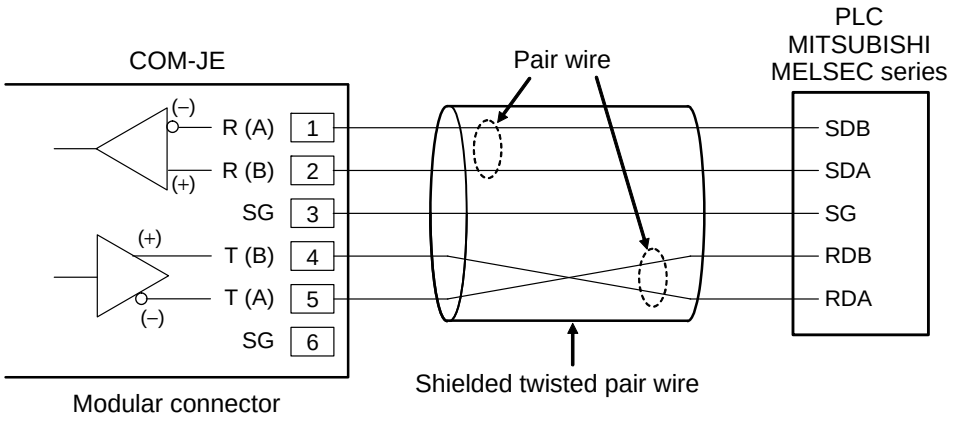
● Connector pin number and signal details

Pin No.	Signal name	Symbol
1	Receive data	R (A)
2	Receive data	R (B)
3	Signal ground	SG
4	Send data	T (B)
5	Send data	T (A)
6	Signal ground	SG

● Diagram of RS-422A wiring

The signal polarity A and B may be reversed between the computer link unit of the MITSUBISHI MELSEC series and the COM-JE. 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.

Example: Connect the COM-JE T (A) send data terminal to the RDB receive data terminal on the computer link module belonging to the MITSUBISHI MELSEC series



Connect as instructed on the next page to make wiring using our connection cable W-BF-01.

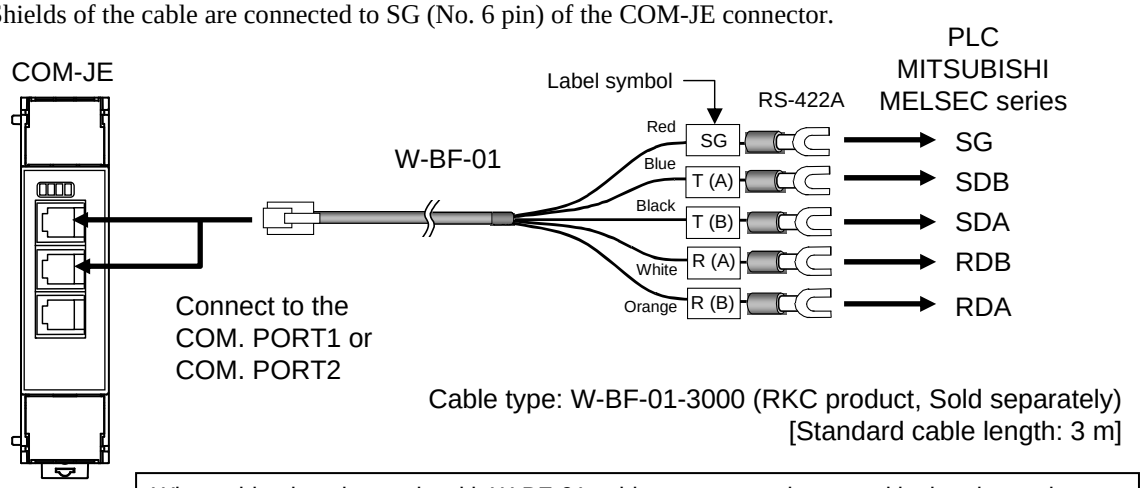
The 6-pin type modular connector should be used for the connection to the COM-JE.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.)

Customer is requested to prepare a communication cable fit for the control unit to be connected by the PLC.

● Connection using our cable

Connection cable W-BF-01 * (RKC product) can be used to connect the PLC.

* Shields of the cable are connected to SG (No. 6 pin) of the COM-JE connector.



Cable type: W-BF-01-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

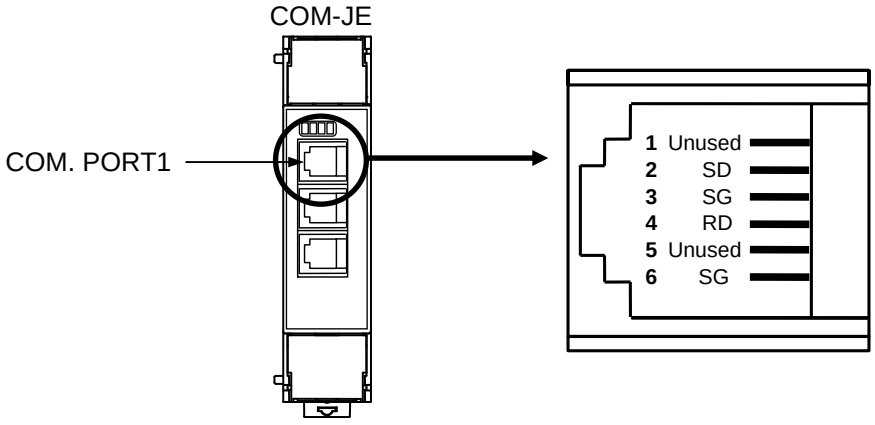
When wiring is to be made with W-BF-01 cable, connect as instructed in the above picture.
You do not need to reverse the signal polarity of A and B.
(Just use the label symbol for leadwire identification and ignore the contents.)

☞ For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

☞ The details of the connectable connector for the PLC, refer to the instruction manual for the used PLC.

■ RS-232C

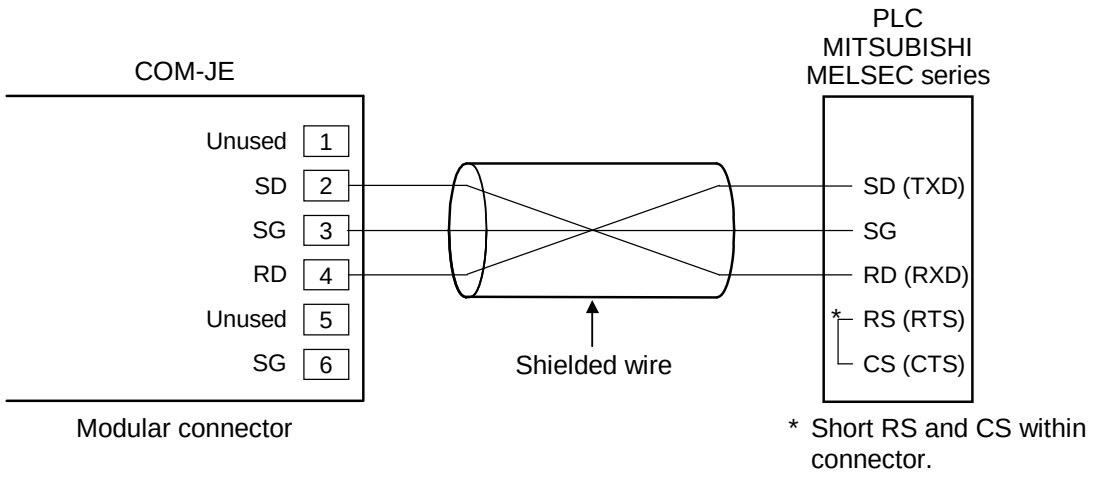
● Pin layout of modular connector



● Connector pin number and signal details

Pin No.	Signal name	Symbol
1	Unused	—
2	Send data	SD (TXD)
3	Signal ground	SG
4	Receive data	RD (RXD)
5	Unused	—
6	Signal ground	SG

- **Diagram of RS-232C wiring**



The 6-pin type modular connector should be used for the connection to the COM-JE.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.)

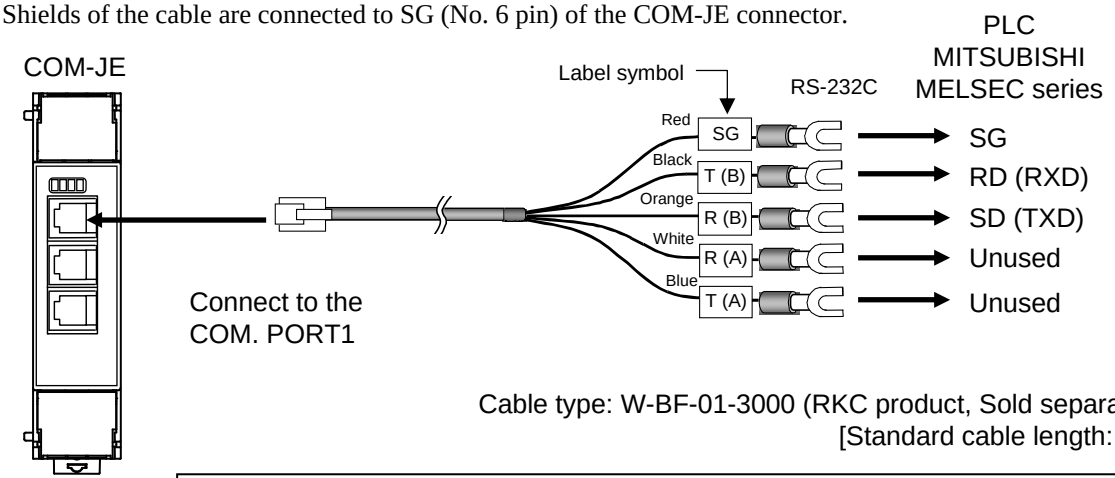
Customer is requested to prepare a communication cable fit for the control unit to be connected by the PLC.

As the details of connection differ depending on the type of PLC for RS-232C, refer to the instruction manual for PLC to be connected.

- **Connection using our cable**

Connection cable W-BF-01 * (RKC product) can be used to connect the PLC.

* Shields of the cable are connected to SG (No. 6 pin) of the COM-JE connector.



Cable type: W-BF-01-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

When wiring is to be made with W-BF-01 cable, connect as instructed in the above picture. (Just use the label symbol for leadwire identification and ignore the contents.)

Be sure to insulate the wires that are not used by covering them with insulating tape.

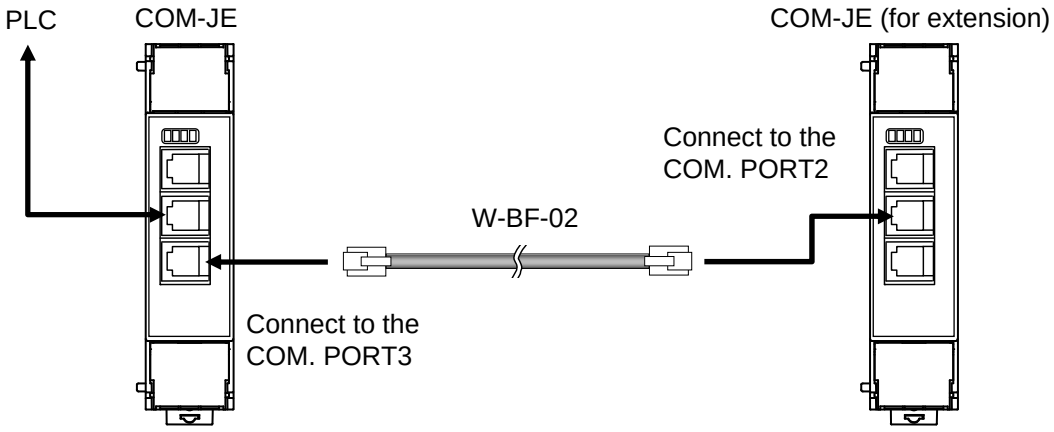
For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

The details of the connectable connector for the PLC, refer to the instruction manual for the used PLC.

■ Multiple COM-JE connections

● COM. PORT2/3

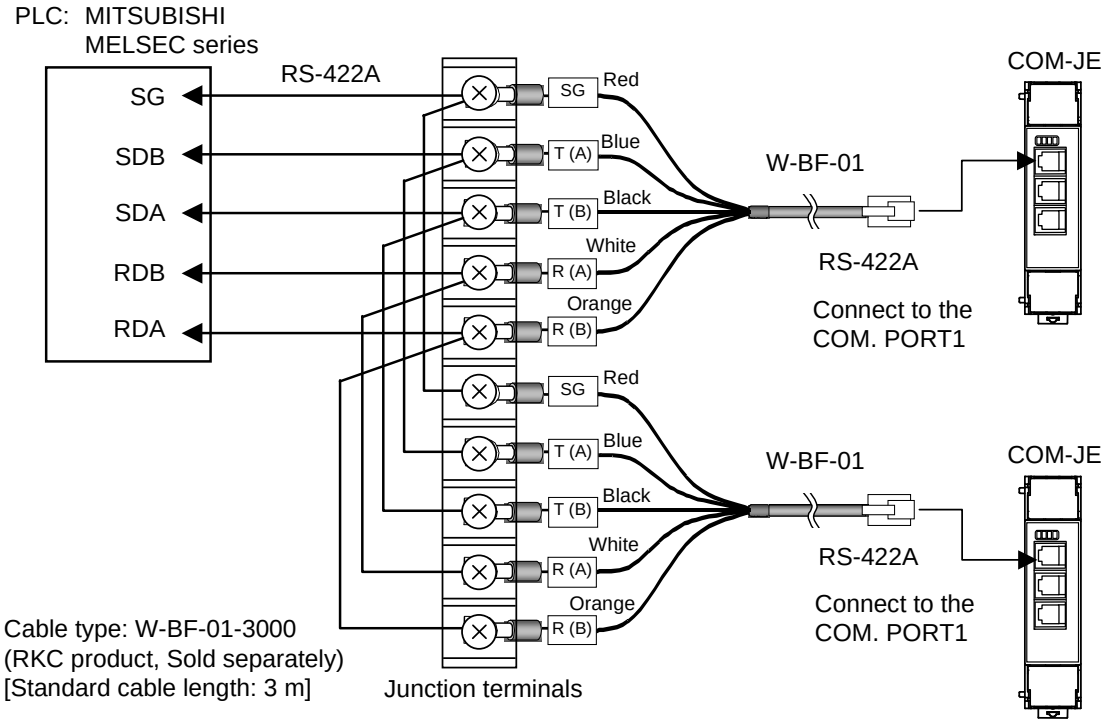
COM. PORT2/3 is connectors for multi-drop connection of the COM-JE.
For COM-JE extension, connect COM. PORT3 to COM. PORT2 of the COM-JE for extension using our cable (Sold separately: W-BF-02).



Cable type: W-BF-02-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

● COM. PORT1

When multi-drop connection is made by using COM. PORT1, it is necessary to conduct wiring by using junction terminals and our cables (Sold separately: W-BF-01).



6.1.3 PLC communication environment setting

There are two types of PLC communication environment settings: via Host communication and by switch.

PLC communication start time can be set only when in Host communication.

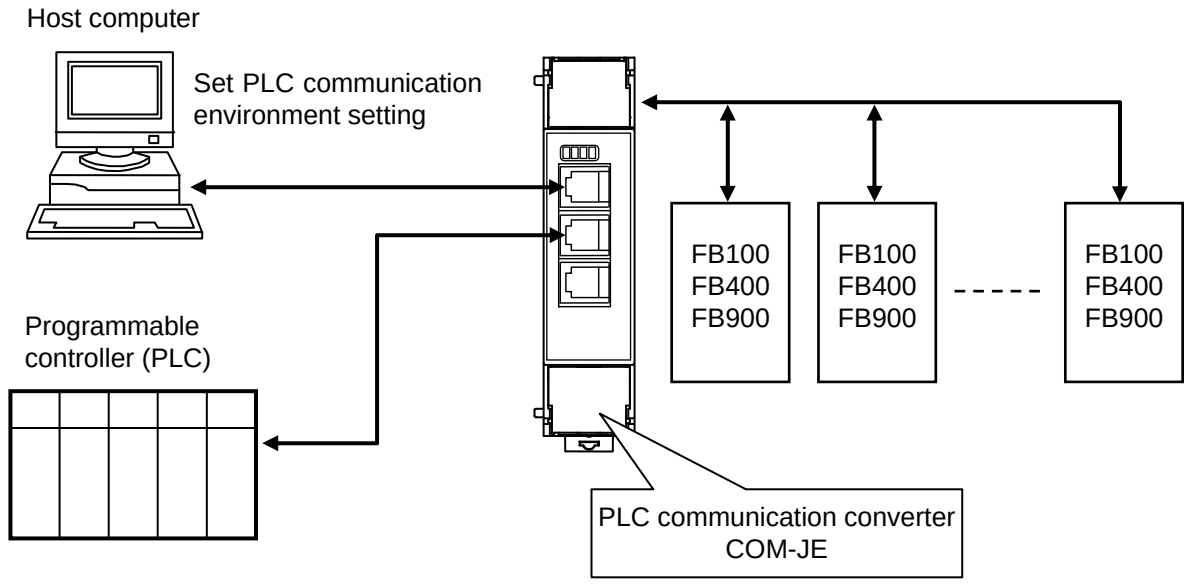
■ Setting by Host communication

Set the PLC communication environment via Host communication in which the COM-JE communication port (COM. PORT1 or COM. PORT2) is used.

For setting the PLC communication environment via Host communication, data becomes valid just when the power is turned off once after the data is set, and then it is turned on again.

The only PLC communication environment setting data is described here.
- For connection with host computer, refer to **7.2 Wiring (P. 102)**.
- For setting about Host communication, refer to **5. SETTING (P. 20)**.
- For communication protocol of Host communication, refer to **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

For the communication port assignment of the COM-JE, refer to **5.2 Communication Setting Switch (P. 23)**.



● Setting items list

The following items are set to the COM-JE.

The following items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

All of the following items can be read and written (R/W). In addition, no channel designation is required.

Identifier and Digits are used for RKC communication and Register address is used for Modbus.

Name	Identifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
Station number	**QV**	7	8000	32768	0 to 31 Set the PLC station number. Set it to the same number as the PLC.	0
PC number	**QW**	7	8001	32769	0 to 255 Set the PLC PC number. Set it to the same number as the PLC.	255
Register start number [1, 2] (Low-order 16-bit)	**QX**	7	8002	32770	0 to 9937: A-compatible 1C frame (format 4), ACPU common command (WR/WW) 0 to 65535: A-compatible 1C frame (format 4), AnA/AnUCPU common command (QR/QW) and QnA-compatible 3C frame (format 4), command (0401/1401) Set the start number of the register used in PLC communication. (For the setting procedure, refer to P. 39.)	1000
Maximum number of controller in PLC communication	**QY**	7	8003	32771	1 to 31 Set the maximum number of controllers used in PLC communication.	10
Register type [1] (D, R, W, ZR)	**QZ**	7	8004	32772	0: D register (A-compatible 1C frame) 1: R register (A-compatible 1C frame) 2: W register (A-compatible 1C frame) 3: ZR register (QnA-compatible 3C frame) [Method of specifying consecutive numbers when 32767 of file register is exceeded.] 4: D register (QnA-compatible 3C frame) 5: R register (QnA-compatible 3C frame) 6: W register (QnA-compatible 3C frame) Set the register types used in PLC communication. (D: Data register, R: File register, W: Link register)	0

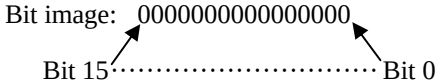
[1] Usable register ranges and types vary depending on used CPU types. For register ranges and types that can actually be used, refer to the PLC instruction manual.

[2] When two or more COM-JE are connected, shift the "Register start number" of each COM-JE so that the register addresses of the PLC used on the COM-JE will not be overlapped.

Name	Iden-tifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
Monitor item selection [1]	**QS**	7	8006	32774	Bit data Bit 0: Measured value (PV) Bit 1: Current transformer 1 (CT1) input value monitor Bit 2: Current transformer 2 (CT2) input value monitor Bit 3: Set value (SV) monitor Bit 4: Remote setting (RS) input value monitor Bit 5: Manipulated output value (MV1) monitor [heat-side] Bit 6: Manipulated output value (MV2) monitor [cool-side] Bit 7: Digital input (DI) state monitor Bit 8: Output state monitor Bit 9: Controller state 1 Bit 10: Controller state 2 Bit 11: Controller state 3 Bit 12 to Bit 15: Reserve (This item is fixed at 0) * * Do not set 1 for Reserve. Data 0: Invalid 1: Valid [Decimal number: 0 to 4095] The data updating period is shortened by selecting the only necessary data from among the above monitored data.	Bit 0: 1 Bit 1: 1 Bit 2: 1 Bit 3: 1 Bit 4: 1 Bit 5: 1 Bit 6: 1 Bit 7: 1 Bit 8: 1 Bit 9: 1 Bit 10: 1 Bit 11: 1 [Decimal number: 4095]
COM-JE link recognition time [2]	**QT**	7	8007	32775	0 to 255 seconds When two or more COM-JE units are connected, set the time required until after the second COM-JE unit is recognized. Set this item to the master unit.	10

[1] This setting shortens the data updating period by not sending unnecessary monitored items to the PLC. Only items selected by this setting are written to the PLC.

Monitor item selection is assigned as a bit image in binary numbers. However, data is changed to decimal ASCII code from the bit image in binary numbers for RKC communication.



[2] When two or more COM-JE units are connected to the PLC, the master unit with the unit address of "0," "4," "8" or "C" will search for the existence of slave units (unit address: 1 to 3, 5 to 7, 9 to B and D to F). It checks for the existence of slaves during the time period set by COM-JE link recognition time. Any slave with the address which did not respond is judged not to be in existence, and only the remaining units will start communicating with the master unit.

Set this item to the COM-JE (master unit) with the unit address of "0," "4," "8" or "C."

The slave units must to be ready for communicating with the PLC during the time period set by COM-JE link recognition time. Therefore, if the power of all the modules cannot be simultaneously turned on, turn on the power of the master unit last. Data sent to the PLC starts processing slave unit recognition approximately 5 seconds after the power of the master unit is turned on.

Name	Iden-tifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
PLC scanning time setting	**VT**	7	8009	32777	0 to 3000 ms Set the time of waiting for a response from the PLC. Usually, no factory set values are necessary to be changed.	255
Action mode selection	**RZ**	7	800C	32780	Bit data Bit 0: Address setting [1] 0: Continuous setting 1: Free setting Bit 1: PLC register read/write error elimination [2] 0: Manual elimination 1: Automatic elimination Bit 2 to Bit 7: Reserve (This item is fixed at 0) * * Do not set 1 for Reserve. [Decimal numbers expression: 0 to 3] Selection of the address setting method and the PLC register read/write error elimination method of the controller.	Bit 0: 0 Bit 1: 0 Bit 2 to 7: 0 [Decimal number: 0]

[1] Module address setting differs depending on address settings.

- When in the Continuous setting, set the controller addresses to consecutive numbers (up to 31) starting from 1.
- When in the Free setting, any numbers from 1 to 31 can be freely set. Data in any address unused becomes 0.

In the Free setting, module recognition operation may take longer to end compared to Continuous setting as this operation is performed on addresses from 1 to 31 when the power turns on regardless of the number of connected modules.

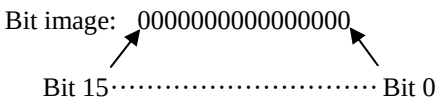
For the setting procedure of the address, refer to **5.1 Address Setting (P. 20)**.

[2] Specifies the procedure for eliminating a PLC register read/write error. The PLC register read/write error is assigned to the PLC communication error code, Bit 0.

- When eliminating manually, the request command, "2: Set value monitor" should be executed first. The error will be eliminated after all of the set values are written in the register.
- When automatically eliminated, the error is automatically eliminated after PLC communication returns to normal and the error is retained for more than one second (or monitor processing time).

For PLC communication error code and request command, refer to **6.4 PLC Communication Data Map (P. 74)**. In addition, for the monitor processing time, refer to **APPENDIX B.3.1 Monitor processing time (P. 165)**.

Action mode selection is assigned as a bit image in binary numbers.
However, data is changed to decimal ASCII code from the bit image in binary numbers for RKC communication.



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Name	Iden-tifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
PLC communication start time	**R5**	7	800F	32783	1 to 255 seconds Time until communication with the PLC starts is set after the power is turned on.	5
Register start number * (High-order 4-bit)	**VX**	7	8012	32786	0 to 15 Valid only when "QnA-compatible 3C frame (format 4) command 0401/1401" of the MITSUBISHI PLC is selected. Set the start number of the register used in PLC communication. (For the setting procedure, refer to P. 39.)	0

* 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. Also, when two or more COM-JE are connected, shift the "Register start number" of each COM-JE so that the register addresses of the PLC used on the COM-JE will not be overlapped.

● Setting method of the Register start number

The start number of the register used for PLC communication can be changed. The factory set value starts from D01000 of the D register (data register). Refer to the example below for the procedure for changing the start number.

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

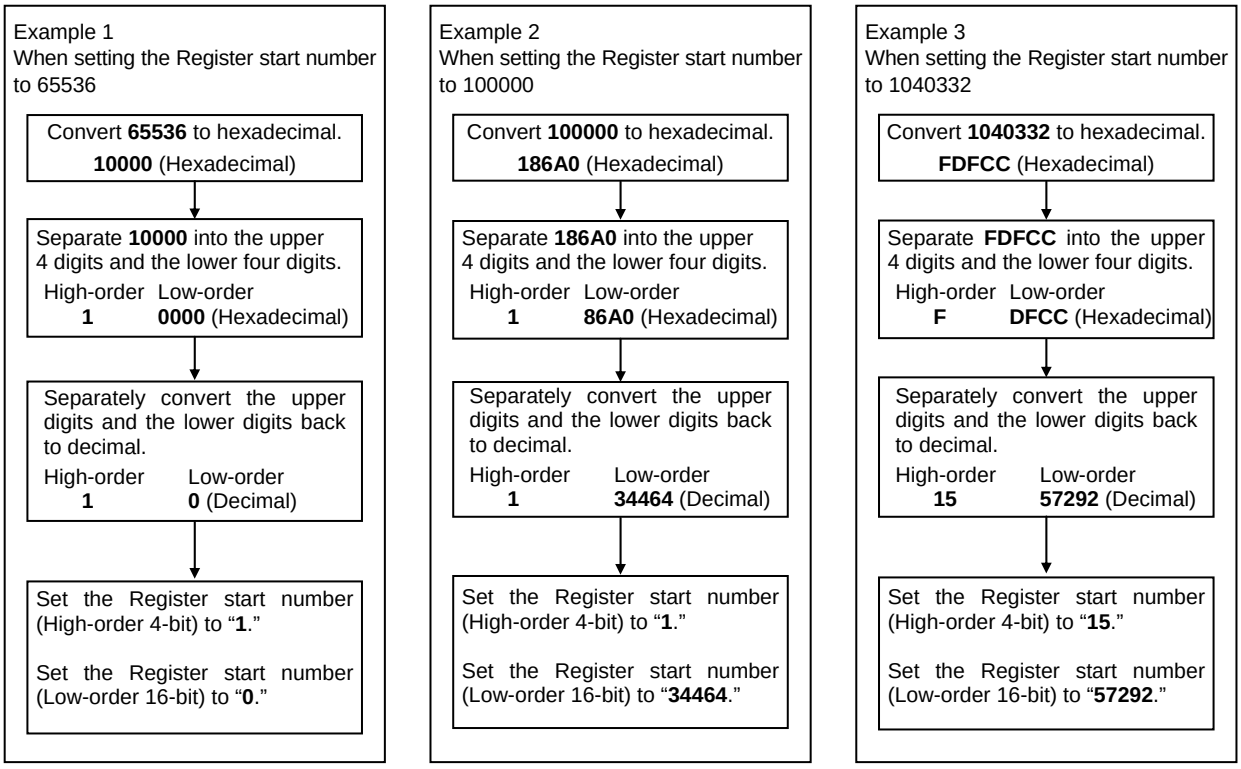
1. Set the Register start number (High-order 4-bit) [Identifier: VX, Modbus register address: 8012H] to 0.
2. In the Register start number (Low-order 16-bit) [Identifier: QX, Modbus register address: 8002H], set the register address to a value from 0 to 65535.

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

Register start number (High-order 4-bit) Set the “0.”	Register start number (Low-order 16-bit) Set the “10188.”

When any numbers from 65536 to 1042431 are set to the Register start number [QnA-compatible 3C frame (format 4) command 0401/1401]

If set within the range from 65536 to 1042431, 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.



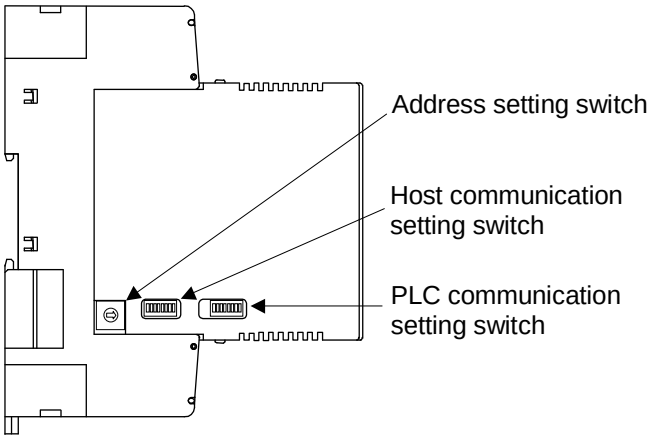
When two or more COM-JE are connected, shift the “Register start number” of each COM-JE so that the register addresses of the PLC used on the COM-JE will not be overlapped.

■ Setting by the switch

The PLC communication environment is set by using the switch in the COM-JE without conducting Host communication. The switch to use for setting is Address setting switch, Host communication setting switch and PLC communication setting switch.

To set up the PLC communication environment setting with the switches, the data setting range may be limited compared to the setting by the host communication.
For example, the register starting number can be freely set within the range of 0 and 65535 in case of the host communication. However, this range may be between 0 and 15000 and at 1000 intervals in case of setting with the switches.

When the PLC communication environment is set by switch, the setting details cannot be checked afterwards. Use Host communication to check setting details. Also, since each switch position is moved during the setting, record the ON/OFF switch position before changing the setting.



COM-JE left side view

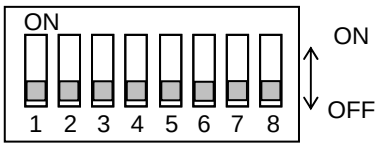
■ Setting procedures

1. Turn off the power supply.

2. Before setting the PLC communication environment, record the ON/OFF positions of address setting switch, Host communication setting switch and PLC communication setting switch.

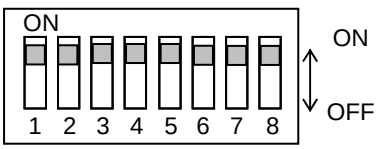
3. Turn off all of the sub switches in the Host communication setting switch. In addition, turn on all of the sub switches in the PLC communication setting switch.

Host communication setting switch



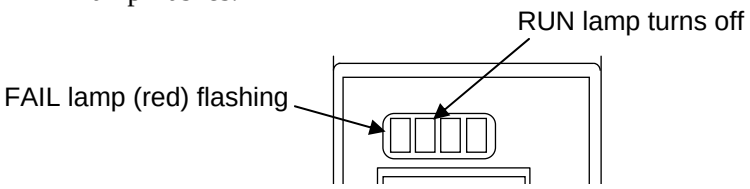
All switches: OFF

PLC communication setting switch



All switches: ON

4. Turning on the power sets the module to the PLC communication environment setting mode.
If set to the PLC communication environment setting mode, the RUN lamp goes off and the FAIL lamp flashes.



5. Select a setting item with a Host communication setting switch or a PLC communication setting switch. Select setting items one by one.

- For the Host communication setting switch, change its position from OFF to ON.
  Refer to **Setting items list of Host communication setting switch (P. 42)**.
- For the PLC communication setting switch, change its position from ON to OFF.
  Refer to **Setting items list of PLC communication setting switch (P. 43)**.

6. Set data with Address setting switch.

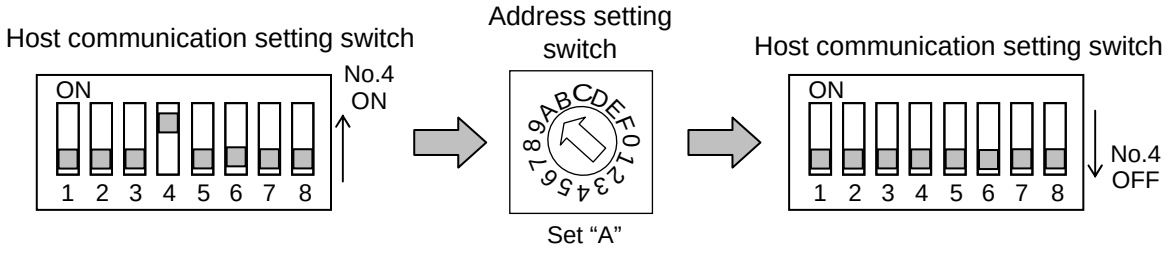
☞ Refer to **Setting items list of Host communication setting switch (P. 42)** or **Setting items list of PLC communication setting switch (P. 43)**.

7. After the setting is finished, return the Host communication setting switch position to OFF from ON (for the PLC communication setting switch, to ON from OFF).
The RUN lamp goes on and then goes off after the set data has been registered (about 3 seconds later).

8. Repeat the above steps from ***5.*** to ***7.*** to set other setting items.

[Example] When setting maximum number of controller in PLC communication to 20 controllers.

- Change the No. 4 position of the Host communication setting switch to ON from OFF.
- Set Address setting switch to "A" ($10 \times 2 = 20$).
- Return the No. 4 positions of the Host communication setting switch to OFF from ON.
  The RUN lamp goes on and then goes off after the set data has been registered (about 3 seconds later).



9. First check that the RUN lamp goes off, and then turn off the power.

10. Return the ON/OFF positions of address setting switch, and the Host communication setting and PLC communication setting switches to the positions already recorded.

11. Turn the power on again.
The set data becomes valid when the power is turned on again.

● Setting items list of Host communication setting switch

Switch No.	Setting item	Data range (Address setting switch)	Factory set value
1	Station number	0 to F: 0 to 15 Set the PLC station number. Set it to the same number as the PLC.	0
2	PC number	0 to E: 0 to 14 F: 255 Set the PLC PC number. Set it to the same number as the PLC.	255
3	Register start number	0 to F: 0 to 15000 (Set value × 1000) Set the start number of the register used in PLC communication.	1000
4	Maximum number of controller in PLC communication	0: 1 controller 1 to E: 2 to 28 controllers (Set value × 2) F: 31 controllers Set the maximum number of controllers used in PLC communication.	10 controllers
5	Register type (D, R, W, ZR)	0: D register (A-compatible 1C frame) 1: R register (A-compatible 1C frame) 2: W register (A-compatible 1C frame) 3: ZR register (QnA-compatible 3C frame) 4: D register (QnA-compatible 3C frame) 5: R register (QnA-compatible 3C frame) 6: W register (QnA-compatible 3C frame) 7 to F: Unused (Do not set this one) Set the register types used in PLC communication.	D register (A-compatible 1C frame)
6	PLC scanning time setting	0 to 7: 0 to 280 ms (Set value × 40) 8 to E: 800 to 1400 ms (Set value × 100) F: 3000 ms Set the response wait time from the PLC. It is not usually necessary to change factory settings.	255 ms
7	COM-JE link recognition time *	0: No slave unit 1 to E: 10 to 140 seconds (Set value × 10) F: 255 seconds When two or more COM-JE units are connected, set the time required until after the second COM-JE unit is recognized.	10 seconds
8	Unused (Do not set this one.)	—	—

* For details, refer to ● **Setting items list (P. 35)** of ■ **Setting by Host communication**.

- **Setting items list of PLC communication setting switch**

Switch No.	Setting item	Data range (Address setting switch)	Factory set value
1 to 5	Cannot be used for setting the PLC communication environment.	—	—
6	Action mode selection *	0: Continuous setting, Manual elimination 1: Free setting, Manual elimination 2: Continuous setting, Automatic elimination 3: Free setting, Automatic elimination 4 to F: Unused (Do not set this one.) Selection of the address setting method and the PLC register read/write error elimination method of the controller.	Continuous setting, Manual elimination

* **[Address setting]**

- When in the Continuous setting, set the controller addresses to consecutive numbers (up to 31) starting from 1.
- When in the Free setting, any numbers from 1 to 31 can be freely set. Data in any address unused becomes 0.

In the Free setting, module recognition operation may take longer to end compared to Continuous setting as this operation is performed on addresses from 1 to 31 when the power turns on regardless of the number of connected modules.

[PLC register read/write error elimination]

Specifies the procedure for eliminating a PLC register read/write error. The PLC register read/write error is assigned to the PLC communication error code, Bit 0.

- When eliminating manually, the request command, "2: Set value monitor" should be executed first. The error will be eliminated after all of the set values are written in the register.
- When automatically eliminated, the error is automatically eliminated after PLC communication returns to normal and the error is retained for more than one second (or monitor processing time).

For PLC communication error code and request command, refer to **6.4 PLC Communication Data Map (P. 74)**. In addition, for the monitor processing time, refer to **APPENDIX B.3.1 Monitor processing time (P. 165)**.

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Switch No.	Setting item	Data range (Address setting switch)	Factory set value
7	Monitor item selection *	0 to E: Refer to **Monitor items selection** (below) F: Do not set this one. Monitor items [2] • Measured value (PV) • Current transformer 1 (CT1) input value monitor • Current transformer 2 (CT2) input value monitor • Set value (SV) monitor • Remote setting (RS) input value monitor • Manipulated output value (MV1) monitor [heat-side] • Manipulated output value (MV2) monitor [cool-side] • Digital input (DI) state monitor • Output state monitor • Controller state 1 • Controller state 2 • Controller state 3	All monitor item of the left column is selected
8	Cannot be used for setting the PLC communication environment.	—	—

* This is the setting of shortening the data updating period by not sending unnecessary monitored items from among all items which are sent to the PLC. The only items selected by this setting are written to the PLC.

☞ For contents to set with switch No. 1 to 5 and 8, refer to **APPENDIX A. VARIOUS SETTING CHANGE BY THE SWITCH (P. 161)**.

Monitor items selection

Monitor items	Address setting switch															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Measured value (PV)	×	×	—	×	×	—	×	—	×	×	×	×	×	×	×	—
Current transformer 1 (CT1) input value monitor	—	×	×	×	—	×	×	×	×	—	×	—	×	×	×	—
Current transformer 2 (CT2) input value monitor	—	—	×	×	—	—	—	×	×	—	—	—	×	×	×	—
Set value (SV) monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	×	×	—
Remote setting (RS) input value monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
Manipulated output value (MV1) monitor [heat-side]	—	—	—	—	—	—	—	—	—	×	×	×	×	×	×	—
Manipulated output value (MV2) monitor [cool-side]	—	—	—	—	—	—	—	—	—	—	—	×	×	×	×	—
Digital input (DI) state monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
Output state monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
Controller state 1	—	—	—	—	×	×	×	×	×	×	×	×	×	×	×	—
Controller state 2	—	—	—	—	×	×	×	×	×	×	×	×	×	×	×	—
Controller state 3	—	—	—	—	×	×	×	×	×	×	×	×	×	×	×	—

×: Valid —: Invalid

6.1.4 Setting on the PLC (Computer link module)

Set the PLC as follows. (Recommend setting example)

Item	Description
Protocol	Type 4 protocol mode
Station number	00
Computer link/multi-drop selection	Computer link
Communication rate	Set the same as COM-JE
Operation setting	Independent
Data bit	8
Parity bit	Without
Stop bit	1
Sum check code	Provided
Writing during RUN	Allowed
Setting modification	Allowed
Termination resistor	Connect the termination resistor attached to the PLC

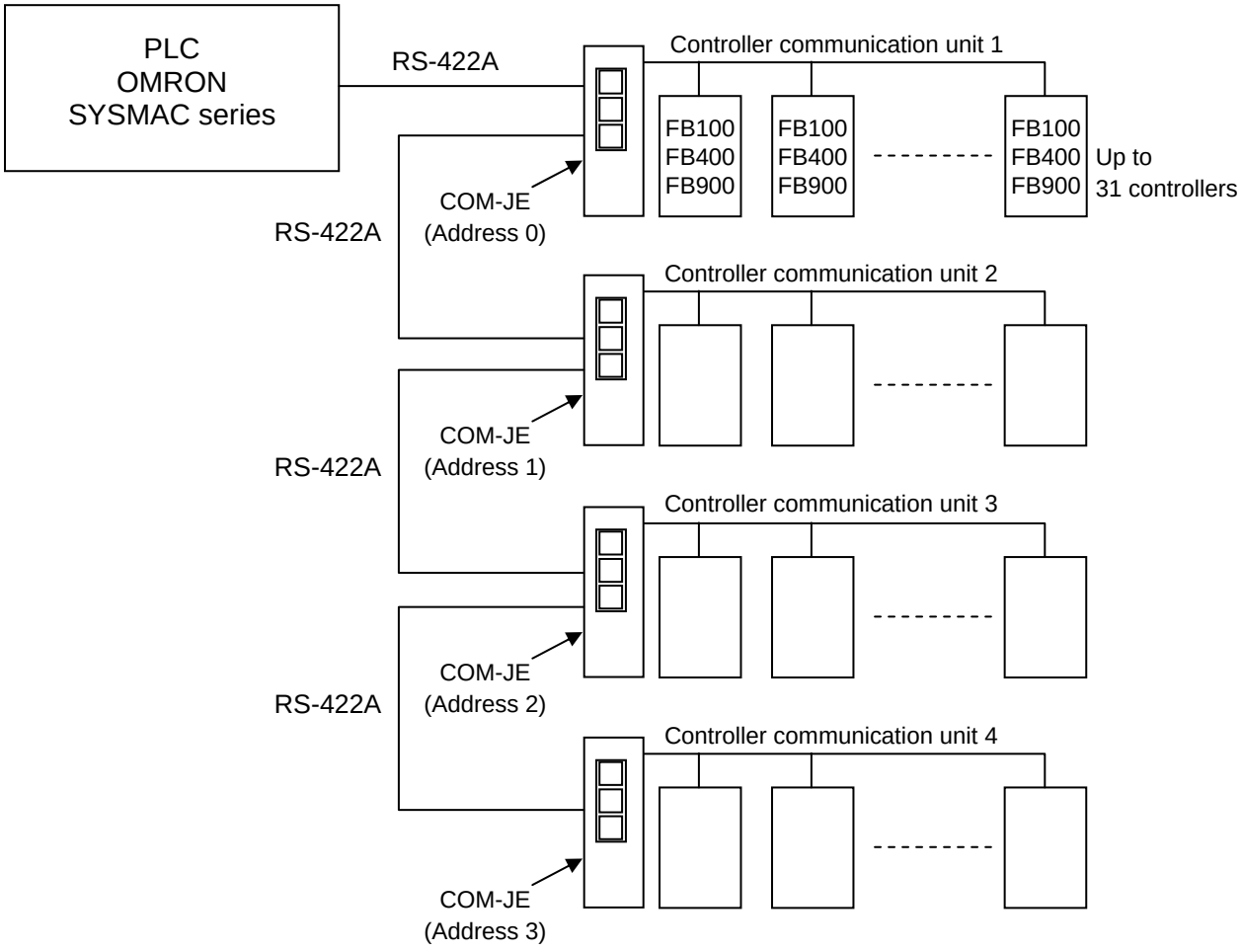
☞ The setting item varies depending on the PLC. For details of PLC setting procedures, refer to the instruction manual for the PLC being used.

6.2 OMRON SYSMAC Series

6.2.1 Outline

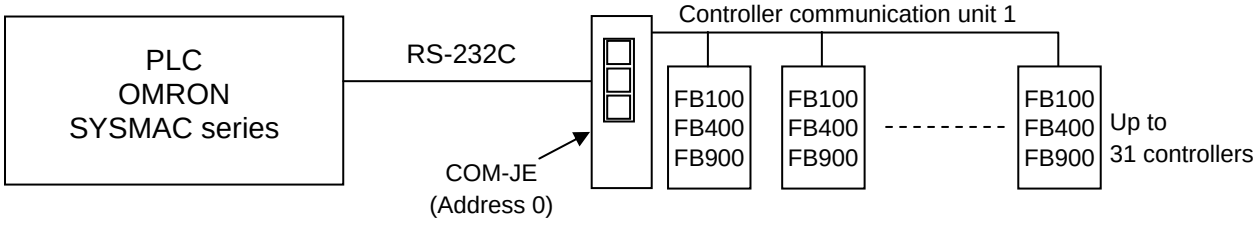
The COM-JE can be connected to the OMRON SYSMAC series PLC units and controllers (FB100/400/900) without using any program.

- **RS-422A**



Up to 4 COM-JE units can be multi-drop connected to one PLC communication port.

- **RS-232C**



One COM-JE unit can be connected to one PLC communication port.

■ Usable PLC units (OMRON SYSMAC series)

Name	Type
High-order link unit	C200H-LK202-V1, C500-LK203, C120-LK202-V1 (SYSMAC C series), etc.
CPU unit with a built in communication port	CPU unit of SYSMAC CS1 series CPU unit of SYSMAC CJ1 series
Serial communication board	CS1W-SCB41 (SYSMAC CS1 series), CJ1W-SCU41 (SYSMAC CJ1 series), etc.

■ Usable controllers (Temperature controller)

Name	Type
FB100 FB400 FB900	Satisfy the following requirements • Interface of communication 1: RS-485 • Protocol of communication 1: Modbus-RTU

Up to 31 controllers (FB100/400/900) can be connected to one COM-JE.

6.2.2 Wiring

⚠ WARNING

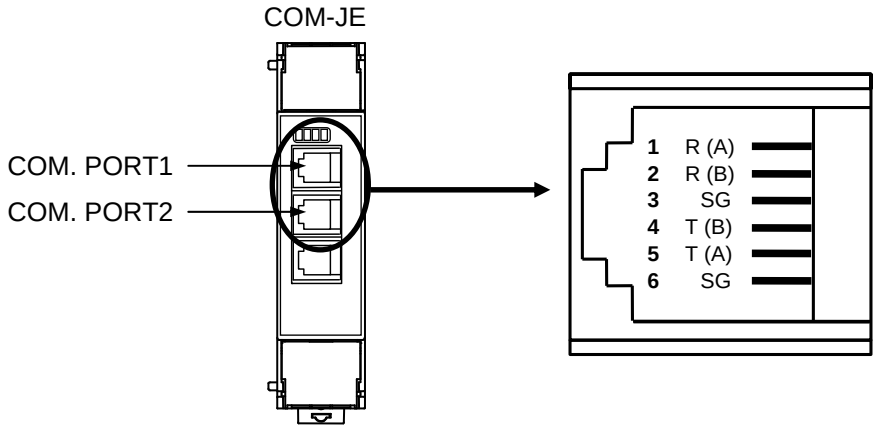
To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

CAUTION

- Connect connectors correctly in the right position. If it is forcibly pushed in with pins in the wrong positions, the pins may be bent resulting in instrument failure.
- When connecting or disconnecting the connectors, do not force it too far to right and left or up and down, but move it on the straight. Otherwise, the connector pins may be bent, causing instrument failure.
- When disconnecting a connector, hold it by the connector itself. Disconnecting connectors by yanking on their cables can cause breakdowns.
- To prevent malfunction, never touch the contact section of a connector with bare hands or with hands soiled with oil or the like.
- To prevent malfunction, connect cable connectors securely, then firmly tighten the connector fastening screws.
- To prevent damage to cables, do not bend cables over with excessive force.
- If the instrument is easily affected by noise, use the ferrite core at the both ends of the communication cable (nearest the connector).

■ RS-422A

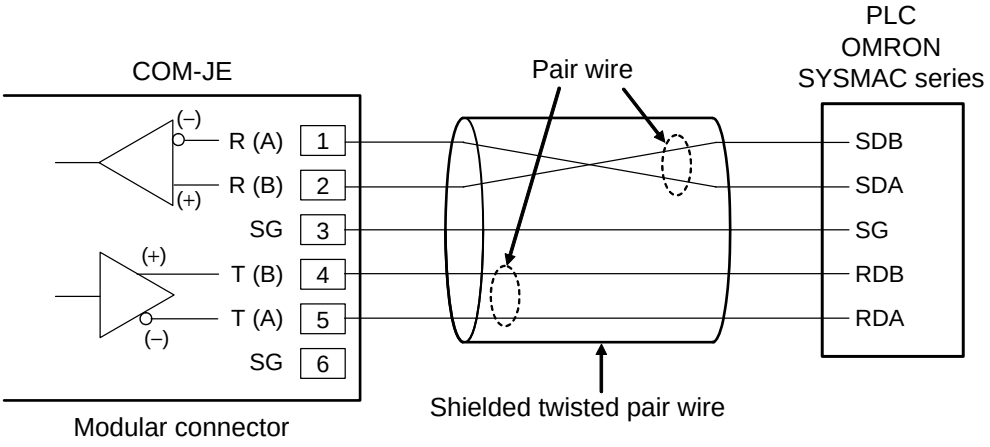
● Pin layout of modular connector



● Connector pin number and signal details

Pin No.	Signal name	Symbol
1	Receive data	R (A)
2	Receive data	R (B)
3	Signal ground	SG
4	Send data	T (B)
5	Send data	T (A)
6	Signal ground	SG

● Diagram of RS-422A wiring



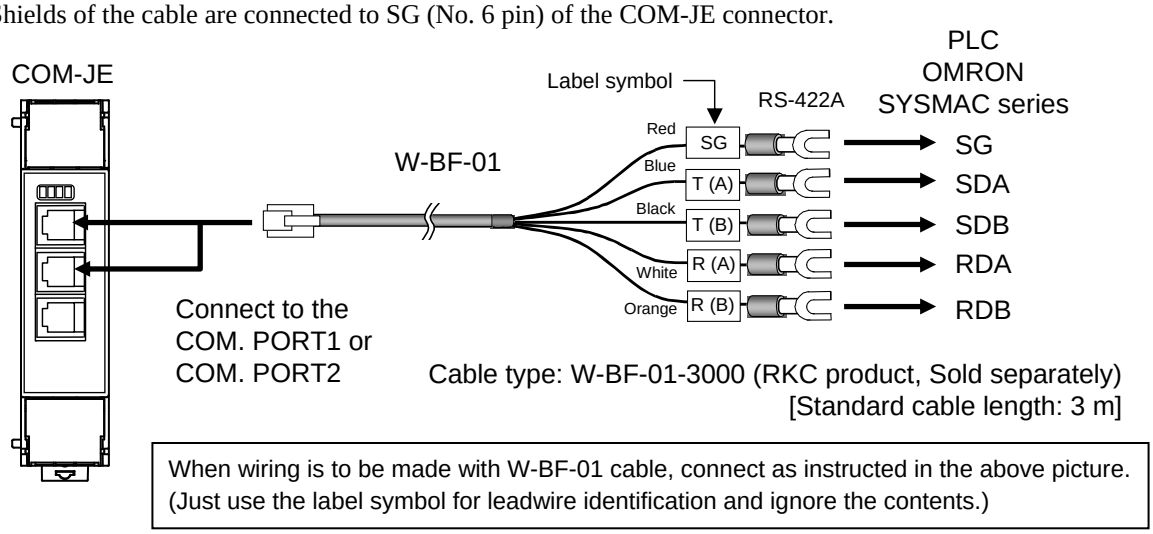
The 6-pin type modular connector should be used for the connection to the COM-JE.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.)

Customer is requested to prepare a communication cable fit for the control unit to be connected by the PLC.

● Connection using our cable

Connection cable W-BF-01 * (RKC product) can be used to connect the PLC.

* Shields of the cable are connected to SG (No. 6 pin) of the COM-JE connector.



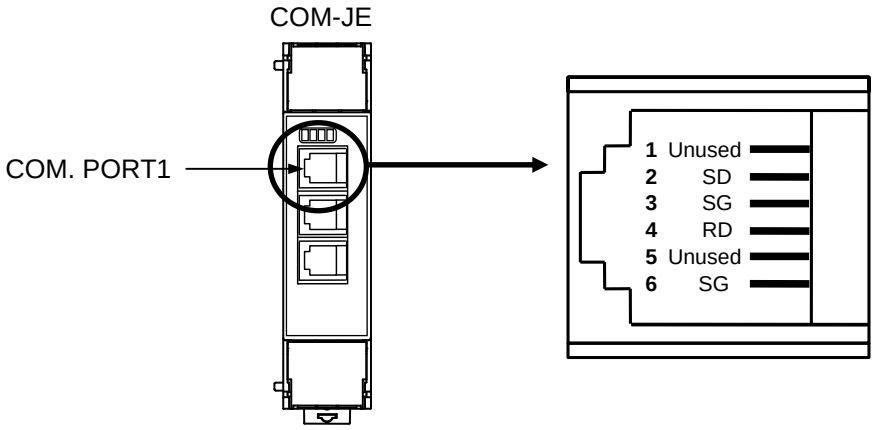
When wiring is to be made with W-BF-01 cable, connect as instructed in the above picture. (Just use the label symbol for leadwire identification and ignore the contents.)

☞ For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

☞ The details of the connectable connector for the PLC, refer to the instruction manual for the used PLC.

■ RS-232C

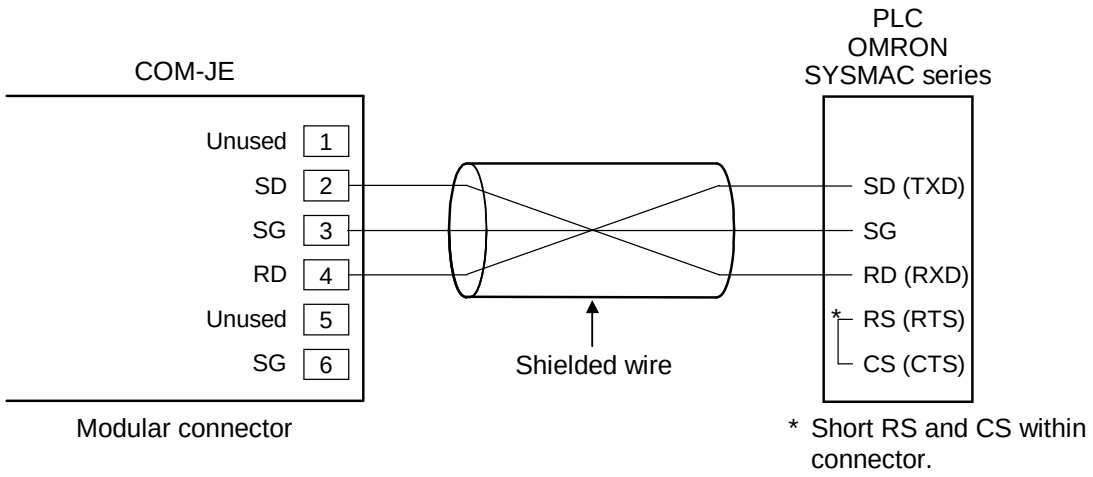
● Pin layout of modular connector



● Connector pin number and signal details

Pin No.	Signal name	Symbol
1	Unused	—
2	Send data	SD (TXD)
3	Signal ground	SG
4	Receive data	RD (RXD)
5	Unused	—
6	Signal ground	SG

- **Diagram of RS-232C wiring**



The 6-pin type modular connector should be used for the connection to the COM-JE.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.)

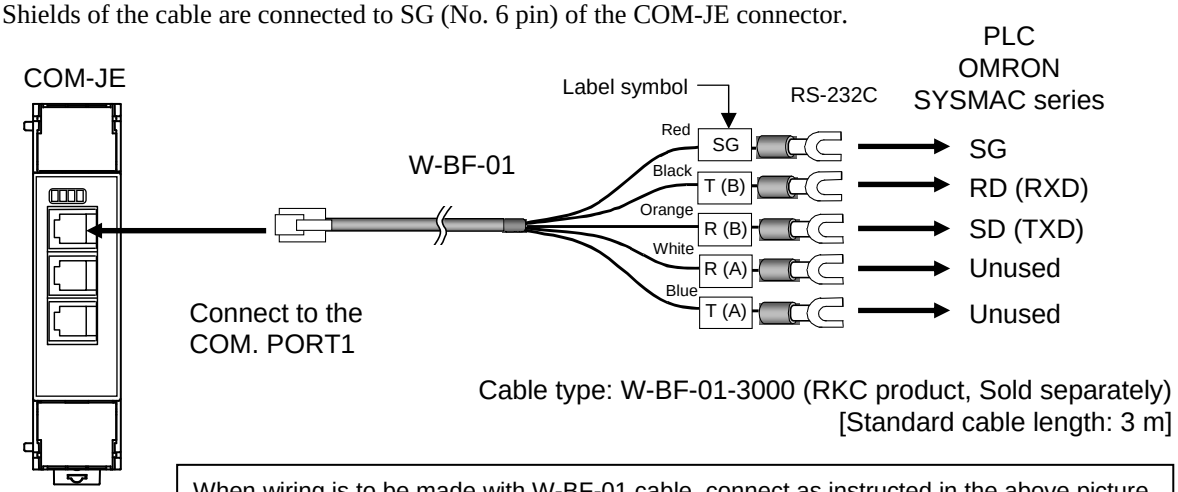
Customer is requested to prepare a communication cable fit for the control unit to be connected by the PLC.

As the details of connection differ depending on the type of PLC for RS-232C, refer to the instruction manual for PLC to be connected.

- **Connection using our cable**

Connection cable W-BF-01 * (RKC product) can be used to connect the PLC.

* Shields of the cable are connected to SG (No. 6 pin) of the COM-JE connector.



Cable type: W-BF-01-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

When wiring is to be made with W-BF-01 cable, connect as instructed in the above picture. (Just use the label symbol for leadwire identification and ignore the contents.)

Be sure to insulate the wires that are not used by covering them with insulating tape.

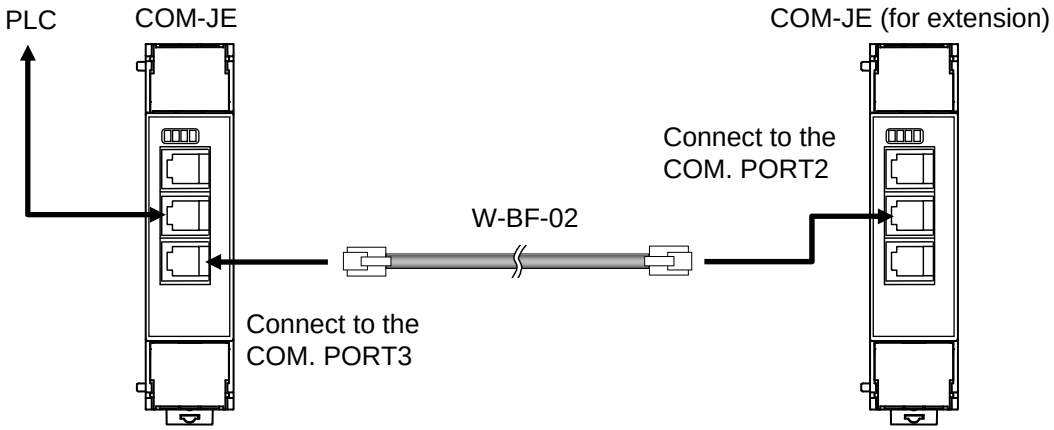
For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

The details of the connectable connector for the PLC, refer to the instruction manual for the used PLC.

■ Multiple COM-JE connections

● COM. PORT2/3

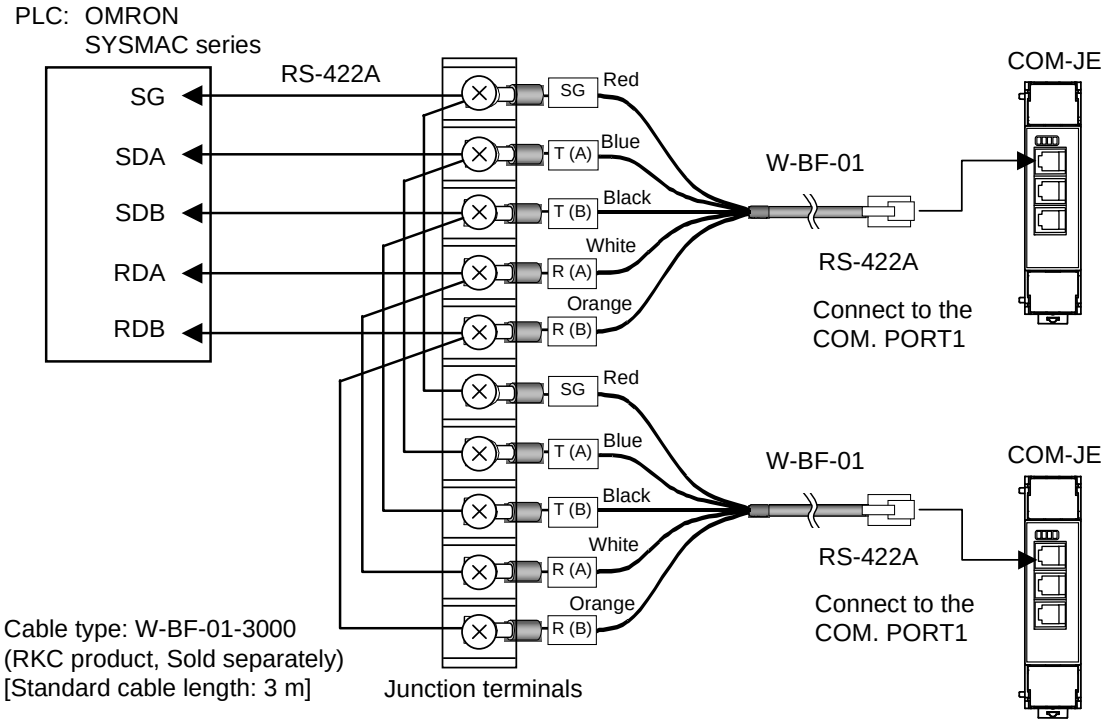
COM. PORT2/3 is connectors for multi-drop connection of the COM-JE.
For COM-JE extension, connect COM. PORT3 to COM. PORT2 of the COM-JE for extension using our cable (Sold separately: W-BF-02).



Cable type: W-BF-02-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

● COM. PORT1

When multi-drop connection is made by using COM. PORT1, it is necessary to conduct wiring by using junction terminals and our cables (Sold separately: W-BF-01).



6.2.3 PLC communication environment setting

There are two types of PLC communication environment settings: via Host communication and by switch.

PLC communication start time can be set only when in Host communication.

■ Setting by Host communication

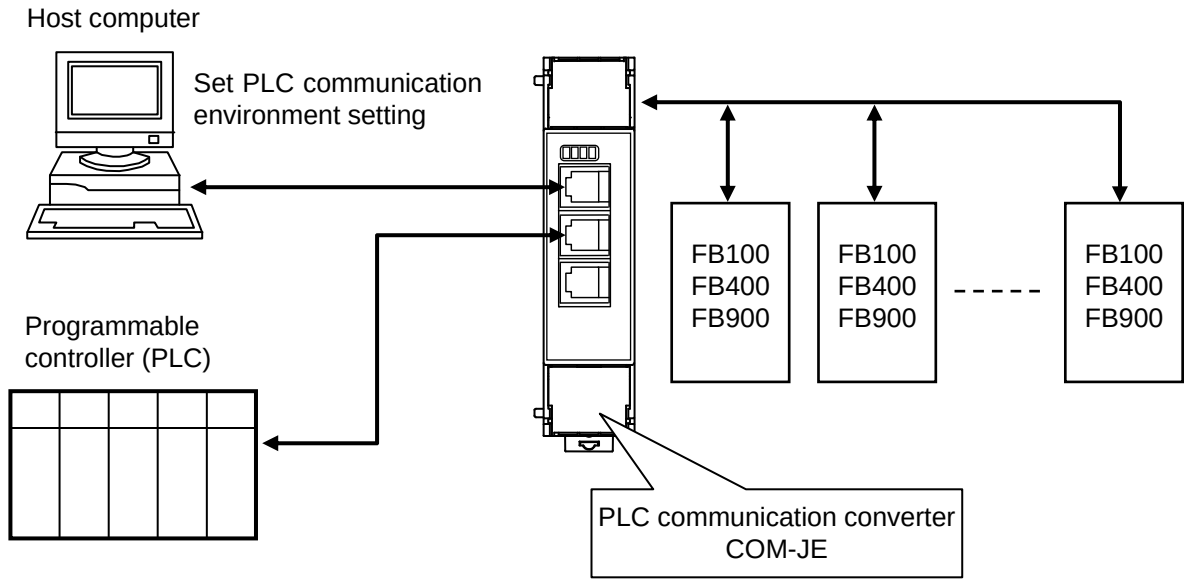
Set the PLC communication environment via Host communication in which the COM-JE communication port (COM. PORT1 or COM. PORT2) is used.

For setting the PLC communication environment via Host communication, each data becomes valid just when the power is turned off once after the data is set, and then it is turned on again.

The only PLC communication environment setting data is described here.

- For connection with host computer, refer to **7.2 Wiring (P. 102)**.
- For setting about Host communication, refer to **5. SETTING (P. 20)**.
- For communication protocol of Host communication, refer to **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

For the communication port assignment of the COM-JE, refer to **5.2 Communication Setting Switch (P. 23)**.



● Setting items list

The following items are set to the COM-JE.

The following items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

All of the following items can be read and written (R/W). In addition, no channel designation is required.

Identifier and Digits are used for RKC communication and Register address is used for Modbus.

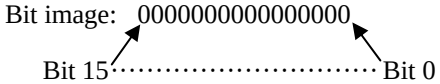
Name	Iden-tifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
Unit number	**QV**	7	8000	32768	0 to 31 Set the PLC unit number. Set it to the same number as the PLC.	0
Register start number	**QX**	7	8002	32770	0 to 9937 Set the start number of the register used in PLC communication.	1000
Maximum number of controller in PLC communication	**QY**	7	8003	32771	1 to 31 Set the maximum number of controllers used in PLC communication.	10
Register type * (DM, EM)	**QZ**	7	8004	32772	0: DM register (Data memory) 1 to 9: Unused 10 to 22: EM register (Extended data memory) [Specify the bank No.] Set the bank No.+10 23 to 28: Unused 29: EM register (Extended data memory) [Specify the current bank] Set the register types used in PLC communication.	0

* Usable register ranges and types vary depending on used PLC types. For register ranges and types that can actually be used, refer to the PLC instruction manual. Also, when two or more COM-JE are connected, shift the "Register start number" of each COM-JE so that the register addresses of the PLC used on the COM-JE will not be overlapped.

Name	Iden-tifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
Monitor item selection [1]	**QS**	7	8006	32774	Bit data Bit 0: Measured value (PV) Bit 1: Current transformer 1 (CT1) input value monitor Bit 2: Current transformer 2 (CT2) input value monitor Bit 3: Set value (SV) monitor Bit 4: Remote setting (RS) input value monitor Bit 5: Manipulated output value (MV1) monitor [heat-side] Bit 6: Manipulated output value (MV2) monitor [cool-side] Bit 7: Digital input (DI) state monitor Bit 8: Output state monitor Bit 9: Controller state 1 Bit 10: Controller state 2 Bit 11: Controller state 3 Bit 12 to Bit 15: Reserve (This item is fixed at 0) * * Do not set 1 for Reserve. Data 0: Invalid 1: Valid [Decimal number: 0 to 4095] The data updating period is shortened by selecting the only necessary data from among the above monitored data.	Bit 0: 1 Bit 1: 1 Bit 2: 1 Bit 3: 1 Bit 4: 1 Bit 5: 1 Bit 6: 1 Bit 7: 1 Bit 8: 1 Bit 9: 1 Bit 10: 1 Bit 11: 1 [Decimal number: 4095]
COM-JE link recognition time [2]	**QT**	7	8007	32775	0 to 255 seconds When two or more COM-JE units are connected, set the time required until after the second COM-JE unit is recognized. Set this item to the master unit.	10

[1] This setting shortens the data updating period by not sending unnecessary monitored items to the PLC. Only items selected by this setting are written to the PLC.

Monitor item selection is assigned as a bit image in binary numbers. However, data is changed to decimal ASCII code from the bit image in binary numbers for RKC communication.



[2] When two or more COM-JE units are connected to the PLC, the master unit with the unit address of "0," "4," "8" or "C" will search for the existence of slave units (unit address: 1 to 3, 5 to 7, 9 to B and D to F). It checks for the existence of slaves during the time period set by COM-JE link recognition time. Any slave with the address which did not respond is judged not to be in existence, and only the remaining units will start communicating with the master unit.

Set this item to the COM-JE (master unit) with the unit address of "0," "4," "8" or "C."

The slave units must to be ready for communicating with the PLC during the time period set by COM-JE link recognition time. Therefore, if the power of all the modules cannot be simultaneously turned on, turn on the power of the master unit last. Data sent to the PLC starts processing slave unit recognition approximately 5 seconds after the power of the master unit is turned on.

Name	Iden-tifier	Digits	Register address		Data range	Factory set value
			HEX	DEC		
PLC scanning time setting	**VT**	7	8009	32777	0 to 3000 ms Set the time of waiting for a response from the PLC. Usually, no factory set values are necessary to be changed.	255
Action mode selection	**RZ**	7	800C	32780	Bit data Bit 0: Address setting [1] 0: Continuous setting 1: Free setting Bit 1: PLC register read/write error elimination [2] 0: Manual elimination 1: Automatic elimination Bit 2 to Bit 7: Reserve (This item is fixed at 0) * * Do not set 1 for Reserve. [Decimal numbers expression: 0 to 3] Selection of the address setting method and the PLC register read/write error elimination method of the controller.	Bit 0: 0 Bit 1: 0 Bit 2 to 7: 0 [Decimal number: 0]
PLC communication start time	**R5**	7	800F	32783	1 to 255 seconds Time until communication with the PLC starts is set after the power is turned on.	5

[1] Module address setting differs depending on address settings.

- When in the Continuous setting, set the controller addresses to consecutive numbers (up to 31) starting from 1.
- When in the Free setting, any numbers from 1 to 31 can be freely set. Data in any address unused becomes 0.

In the Free setting, module recognition operation may take longer to end compared to Continuous setting as this operation is performed on addresses from 1 to 31 when the power turns on regardless of the number of connected modules.

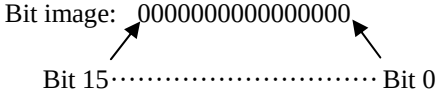
For the setting procedure of the address, refer to **5.1 Address Setting (P. 20)**.

[2] Specifies the procedure for eliminating a PLC register read/write error. The PLC register read/write error is assigned to the PLC communication error code, Bit 0.

- When eliminating manually, the request command, "2: Set value monitor" should be executed first. The error will be eliminated after all of the set values are written in the register.
- When automatically eliminated, the error is automatically eliminated after PLC communication returns to normal and the error is retained for more than one second (or monitor processing time).

For PLC communication error code and request command, refer to **6.4 PLC Communication Data Map (P. 74)**. In addition, for the monitor processing time, refer to **APPENDIX B.3.1 Monitor processing time (P. 165)**.

Action mode selection is assigned as a bit image in binary numbers.
However, data is changed to decimal ASCII code from the bit image in binary numbers for RKC communication.

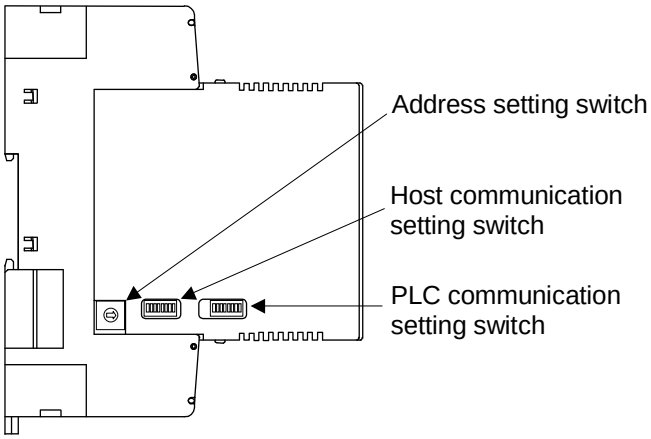


■ Setting by the switch

The PLC communication environment is set by using the switch in the COM-JE without conducting Host communication. The switch to use for setting is Address setting switch, Host communication setting switch and PLC communication setting switch.

To set up the PLC communication environment setting with the switches, the data setting range may be limited compared to the setting by the host communication.
For example, the register starting number can be freely set within the range of 0 and 65535 in case of the host communication. However, this range may be between 0 and 15000 and at 1000 intervals in case of setting with the switches.

When the PLC communication environment is set by switch, the setting details cannot be checked afterwards. Use Host communication to check setting details. Also, since each switch position is moved during the setting, record the ON/OFF switch position before changing the setting.



COM-JE left side view

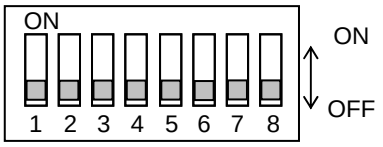
● Setting procedures

1. Turn off the power supply.

2. Before setting the PLC communication environment, record the ON/OFF positions of address setting switch, Host communication setting switch and PLC communication setting switch.

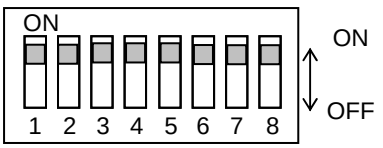
3. Turn off all of the sub switches in the Host communication setting switch. In addition, turn on all of the sub switches in the PLC communication setting switch.

Host communication setting switch



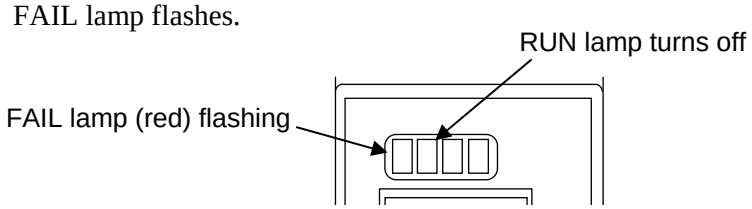
All switches: OFF

PLC communication setting switch



All switches: ON

4. Turning on the power sets the module to the PLC communication environment setting mode.
If set to the PLC communication environment setting mode, the RUN lamp goes off and the FAIL lamp flashes.



5. Select a setting item with a Host communication setting switch or a PLC communication setting switch. Select setting items one by one.

- For the Host communication setting switch, change its position from OFF to ON.
  Refer to **Setting items list of Host communication setting switch (P. 59)**.
- For the PLC communication setting switch, change its position from ON to OFF.
  Refer to **Setting items list of PLC communication setting switch (P. 60)**.

6. Set data with Address setting switch.

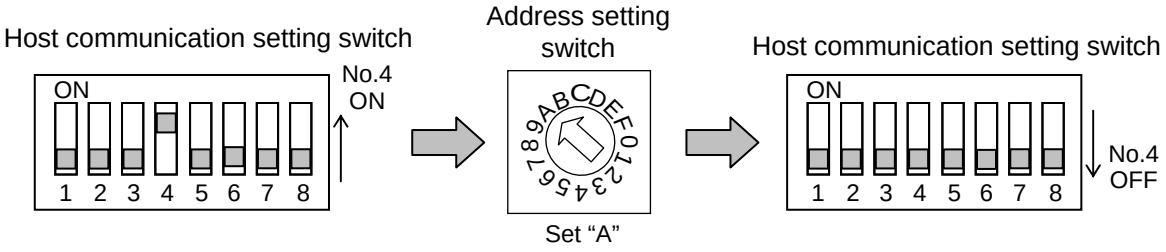
☞ Refer to **Setting items list of Host communication setting switch (P. 59)** or **Setting items list of PLC communication setting switch (P. 60)**.

7. After the setting is finished, return the Host communication setting switch position to OFF from ON (for the PLC communication setting switch, to ON from OFF).
The RUN lamp goes on and then goes off after the set data has been registered (about 3 seconds later).

8. Repeat the above steps from ***5.*** to ***7.*** to set other setting items.

[Example] When setting maximum number of controller in PLC communication to 20 controllers.

- Change the No. 4 position of the Host communication setting switch to ON from OFF.
- Set Address setting switch to "A" ($10 \times 2 = 20$).
- Return the No. 4 positions of the Host communication setting switch to OFF from ON.
  The RUN lamp goes on and then goes off after the set data has been registered (about 3 seconds later).



9. First check that the RUN lamp goes off, and then turn off the power.

10. Return the ON/OFF positions of address setting switch, and the Host communication setting and PLC communication setting switches to the positions already recorded.

11. Turn the power on again.
The set data becomes valid when the power is turned on again.

● Setting items list of Host communication setting switch

Switch No.	Setting item	Data range (Address setting switch)	Factory set value
1	Unit number	0 to F: 0 to 15 Set the PLC unit number. Set it to the same number as the PLC.	0
2	Unused (Do not set this one.)	—	—
3	Register start number	0 to F: 0 to 15000 (Set value × 1000) Set the start number of the register used in PLC communication.	1000
4	Maximum number of controller in PLC communication	0: 1 controller 1 to E: 2 to 28 controllers (Set value × 2) F: 31 controllers Set the maximum number of controllers used in PLC communication.	10 controllers
5	Register type (DM, EM)	0: DM register (A-compatible 1C frame) 1 to 9: Do not set this one A: EM register (bank 0) B to F: Do not set this one. Set the register types used in PLC communication.	DM register
6	PLC scanning time setting	0 to 7: 0 to 280 ms (Set value × 40) 8 to E: 800 to 1400 ms (Set value × 100) F: 3000 ms Set the response wait time from the PLC. It is not usually necessary to change factory settings.	255 ms
7	COM-JE link recognition time *	0: No slave unit 1 to E: 10 to 140 seconds (Set value × 10) F: 255 seconds When two or more COM-JE units are connected, set the time required until after the second COM-JE unit is recognized.	10 seconds
8	Unused (Do not set this one.)	—	—

* For details, refer to ● **Setting items list (P. 54)** of ■ **Setting by Host communication**.

● Setting items list of PLC communication setting switch

Switch No.	Setting item	Data range (Address setting switch)	Factory set value
1 to 5	Cannot be used for setting the PLC communication environment.	—	—
6	Action mode selection *	0: Continuous setting, Manual elimination 1: Free setting, Manual elimination 2: Continuous setting, Automatic elimination 3: Free setting, Automatic elimination 4 to F: Unused (Do not set this one.) Selection of the address setting method and the PLC register read/write error elimination method of the controller.	Continuous setting, Manual elimination

* **[Address setting]**

- When in the Continuous setting, set the controller addresses to consecutive numbers (up to 31) starting from 1.
- When in the Free setting, any numbers from 1 to 31 can be freely set. Data in any address unused becomes 0.

In the Free setting, module recognition operation may take longer to end compared to Continuous setting as this operation is performed on addresses from 1 to 31 when the power turns on regardless of the number of connected modules.

[PLC register read/write error elimination]

Specifies the procedure for eliminating a PLC register read/write error. The PLC register read/write error is assigned to the PLC communication error code, Bit 0.

- When eliminating manually, the request command, "2: Set value monitor" should be executed first. The error will be eliminated after all of the set values are written in the register.
- When automatically eliminated, the error is automatically eliminated after PLC communication returns to normal and the error is retained for more than one second (or monitor processing time).

For PLC communication error code and request command, refer to **6.4 PLC Communication Data Map (P. 74)**. In addition, for the monitor processing time, refer to **APPENDIX B.3.1 Monitor processing time (P. 165)**.

Continued on the next page.

Continued from the previous page.

Switch No.	Setting item	Data range (Address setting switch)	Factory set value
7	Monitor item selection *	0 to E: Refer to **Monitor items selection** (below) F: Do not set this one. Monitor items [2] • Measured value (PV) • Current transformer 1 (CT1) input value monitor • Current transformer 2 (CT2) input value monitor • Set value (SV) monitor • Remote setting (RS) input value monitor • Manipulated output value (MV1) monitor [heat-side] • Manipulated output value (MV2) monitor [cool-side] • Digital input (DI) state monitor • Output state monitor • Controller state 1 • Controller state 2 • Controller state 3	All monitor item of the left column is selected
8	Cannot be used for setting the PLC communication environment.	—	—

* This is the setting of shortening the data updating period by not sending unnecessary monitored items from among all items which are sent to the PLC. The only items selected by this setting are written to the PLC.

☞ For contents to set with switch No. 1 to 5 and 8, refer to **APPENDIX A. VARIOUS SETTING CHANGE BY THE SWITCH (P. 161)**.

Monitor items selection

Monitor items	Address setting switch															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Measured value (PV)	×	×	—	×	×	—	×	—	×	×	×	×	×	×	×	—
Current transformer 1 (CT1) input value monitor	—	×	×	×	—	×	×	×	×	—	×	—	×	×	×	—
Current transformer 2 (CT2) input value monitor	—	—	×	×	—	—	—	×	×	—	—	—	×	×	×	—
Set value (SV) monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	×	×	—
Remote setting (RS) input value monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
Manipulated output value (MV1) monitor [heat-side]	—	—	—	—	—	—	—	—	—	×	×	×	×	×	×	—
Manipulated output value (MV2) monitor [cool-side]	—	—	—	—	—	—	—	—	—	—	—	×	×	×	×	—
Digital input (DI) state monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
Output state monitor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
Controller state 1	—	—	—	—	×	×	×	×	×	×	×	×	×	×	×	—
Controller state 2	—	—	—	—	×	×	×	×	×	×	×	×	×	×	×	—
Controller state 3	—	—	—	—	×	×	×	×	×	×	×	×	×	×	×	—

×: Valid —: Invalid

6.2.4 Setting on the PLC

Set the PLC as follows. (Recommend setting example)

Item	Description
Serial communication mode	High-order link
Unit number (Model number)	0
Start bit	1
Data bit	7
Stop bit	2
Parity bit	Even
Transmission speed	Set the same as COM-JE
I/O port selection	RS-422A
Synchronization selection	Internal synchronization
CTS selection	0 V (always ON)
5 V supply	OFF
Termination resistor	Termination resistor is inserted

☞ The setting item varies depending on the PLC. For details of PLC setting procedures, refer to the instruction manual for the PLC being used.

6.3 Data Transfer

For data transfer between the PLC and controller, both Fixed data transfer type and Specified data transfer type are available.

6.3.1 Fixed data transfer type

The PLC communication data map data already assigned is transferred. The type of data is fixed but register address and the number of data transfer channels can be changed.

These register address and the number of data transfer channels are changed by the communication environment setting.

For details of data contents, refer to **6.4 PLC Communication Data Map (P. 74)**.

■ Request command

Data transfer between PLC and controller are executed by request command.

- **Request command "0: Monitor (PLC ← Controller)"**
  - Command which requests the controller to write data such as temperature measured values, etc. (attribute: RO) to the PLC side.
  - The controller always repeats data writing until "1: Setting" or "2: Set value monitor" is set to the request command.
  - The COM-JE communication state is set to "1: Writing monitoring data" during data transfer.

  Relevant data: Data whose register addresses are from Measured value (PV) to Controller state 3 on the PLC communication data map

- **Request command "1: Setting (PLC → Controller)" or "Setting item number × 10 + 1"**
  - Command which requests the controller to read data such as temperature set values, etc. (attribute: RW) from the PLC side.
  - Just when "1: Setting" or "Setting item number × 10 + 1" is set to the request command, the controller starts reading the data from the PLC side.
  - For "1: Setting," all of the objective data is transferred.
    For "Setting item number × 10 + 1," only the data corresponding to that setting item number is transferred.
  - The COM-JE communication state is set to "2: Set data read" during data transfer.
  - After the data is transferred, the request command and COM-JE communication state returns to "0: Monitor" and "1: Writing monitoring data," respectively.

  Relevant data: Data whose register addresses are from PID/AT transfer to Manual manipulated output value on the PLC communication data map

For details on the setting item number, refer to **6.4 PLC Communication Data Map (P. 74)**.

- **Request command**
  "2: Set value monitor (PLC ← Controller)" or "Setting item number × 10 + 2"
  - Command which requests the controller to write data such as temperature set values, etc. (attribute: RW) to the PLC side.
  - Just when "2: Set value monitor" or "Setting item number × 10 + 2" is set to the request command, the controller starts writing the data to the PLC side.
  - For "2: Set value monitor," all of the objective data is transferred.
    For "Setting item number × 10 + 2," only the data corresponding to that setting item number is transferred.
  - The COM-JE communication state is set to "3: Set data write" during data transfer.
  - After the data is transferred, the request command and COM-JE communication state returns to "0: Monitor" and "1: Writing monitoring data," respectively.

  Relevant data: Data whose register addresses are from PID/AT transfer to Manual manipulated output value on the PLC communication data map

☞ For details on the setting item number, refer to **6.4 PLC Communication Data Map (P. 74)**.

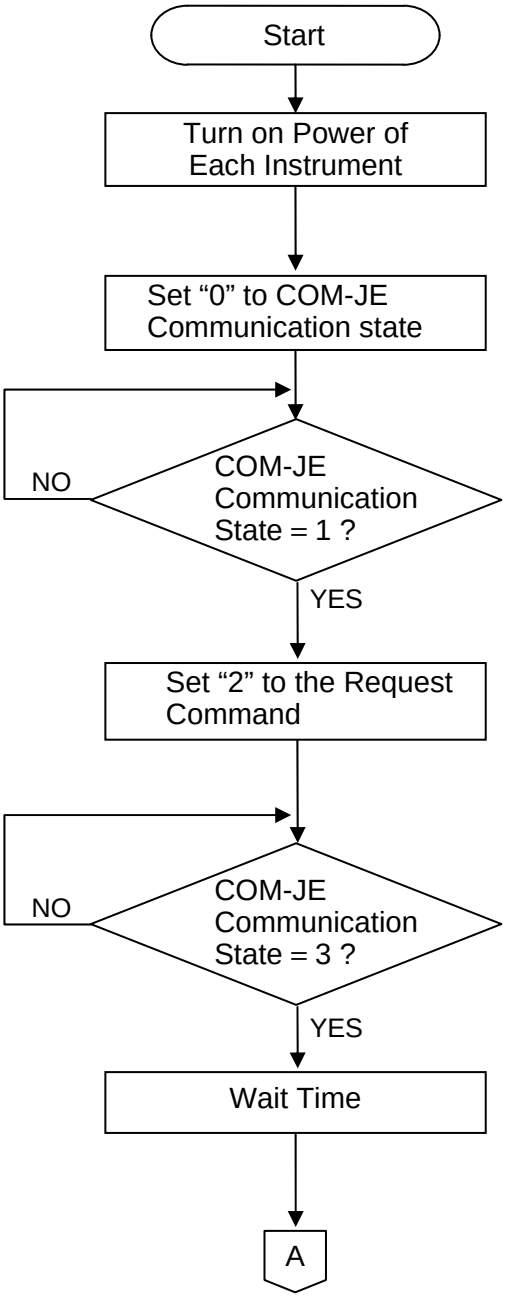
■ Data transfer procedures

CAUTION

If a program to set all of the set values to zero is sent by the PLC to the controllers at the beginning of the data transmission, unexpected operation may occur in the control. To avoid this, carefully read the manual for the data transmission protocol when creating a program.

Change each set value of controller from the PLC after the initial settings are made. If each set value of controller is changed from the PLC without setting the initial values, all set values of the controller are rewritten to 0 if the set values of the PLC at that time are 0.

● Initial setting
(When transmitting data of temperature setting values from controller to PLC)



Soon after the COM-JE is powered on, data collection from the controller is started.
After the elapse of the set PLC communication starting time (5 seconds as default), the normal communication flag will be written.

To determine if the request command is ready, set 0 to the communication status of the COM-JE.

The COM-JE writes 1 (Writing monitoring data) into the COM-JE communication status after the controller data collection is completed.
PLC communication can be started when the COM-JE communication status is 1 (Writing monitoring data).

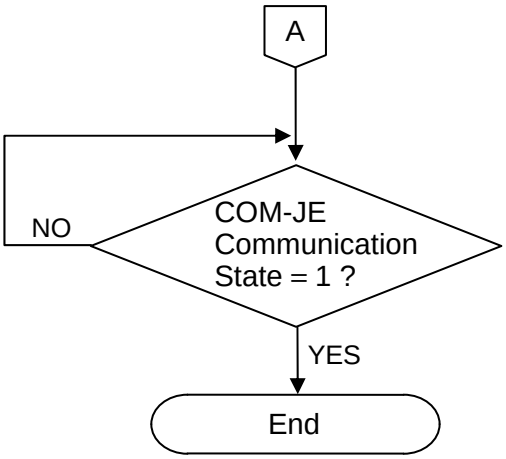
When 2 (Set value monitor) is set to request command in PLC register, the controller starts writing the data items to the PLC side.

Relevant data: Data whose register addresses are from PID/AT transfer to Manual manipulated output value on the PLC communication data map

If 3 (Set data write) is set to COM-JE communication state in the PLC register, this indicates that controller data items are being written into the PLC.

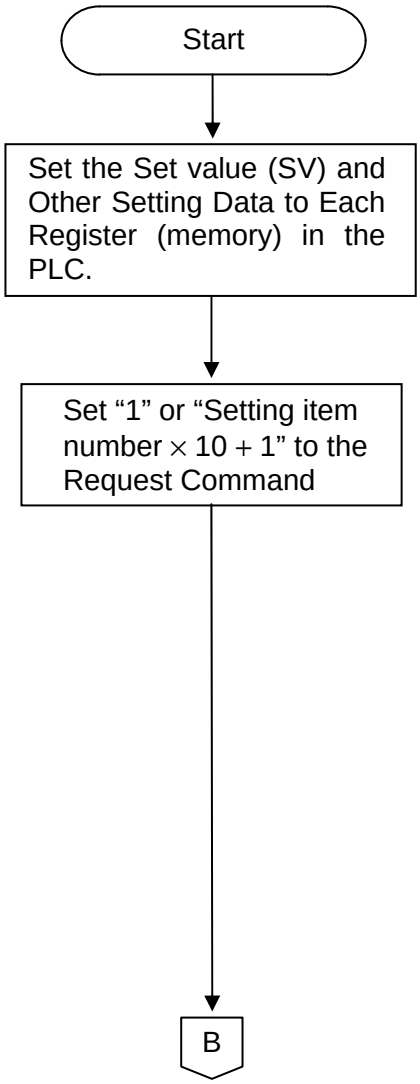
Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

For writing time, refer to **APPENDIX B.3.3 Set value monitor processing time (P. 167)**.



If the COM-JE communication state in the PLC register is set to 1 (Writing monitoring data), this indicates that data write to the PLC terminates to return to the monitored state (Request command: 0).

- **Data setting**
  (When transmitting data of temperature setting values from PLC to controller)

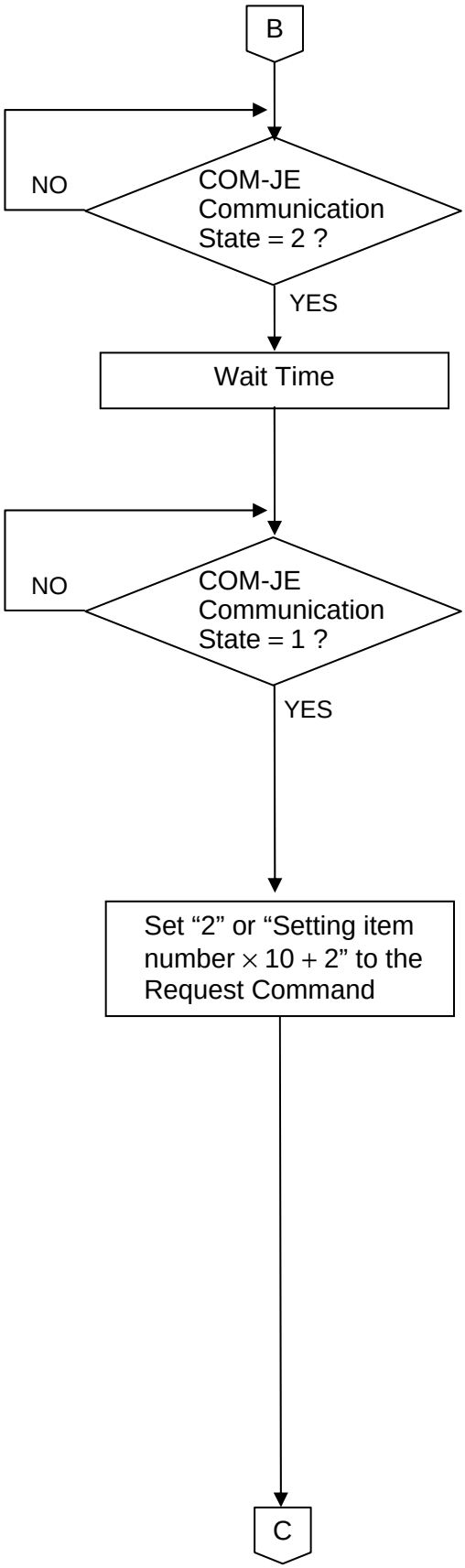


[Data setting]

- **When all relevant data is set**
  When 1 (Setting) is set to request command in PLC register, the controller starts reading the data set to the register (memory) on the PLC side.
  Relevant data: Data whose register addresses are from PID/AT transfer to Manual manipulated output value on the PLC communication data map

- **When specific data is set**
  (Example: Manual manipulated output value)
  When **"Setting item number of manual manipulated output value (21) × 10 + 1 = 211"** is set to request command in PLC register, the controller starts reading the data set to the register (memory) on the PLC side.

☞ For details on the setting item number, refer to **6.4 PLC Communication Data Map (P. 74)**.



If 2 (Set data read) is set to COM-JE communication state in the PLC register, this indicates that controller data items are being read from the PLC side.

Reserve data read time as wait time. In addition, process data in each item as indefinite during this period.

☞ For readout time, refer to **APPENDIX B.3.2 Setting processing time (P. 166)**.

If the COM-JE communication state in the PLC register is set to 1 (Writing monitoring data), this indicates that data read to the PLC terminates to return to the monitored state (Request command: 0).

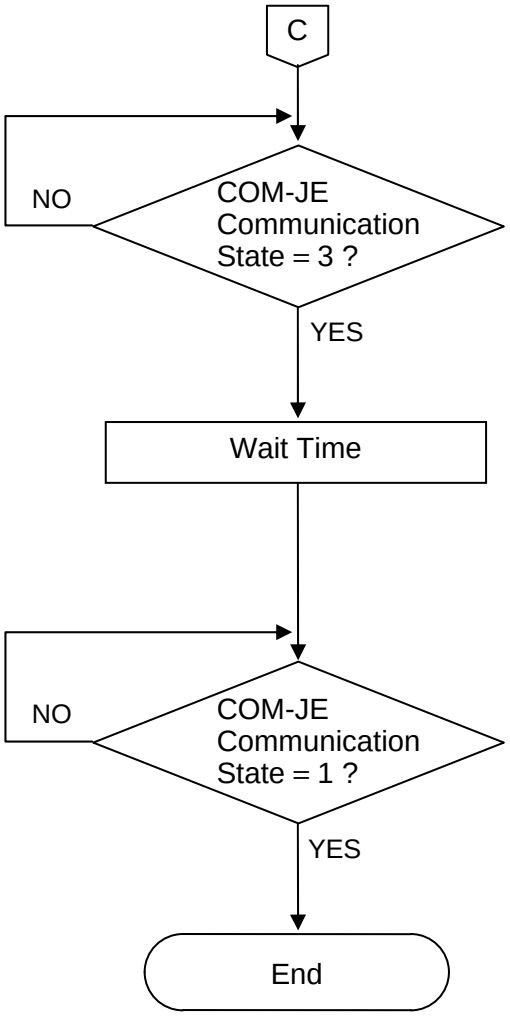
When all connected controllers are in communication error (such as time-out and error state), COM-JE communication state does not return to 1 (Writing monitoring data).
Confirm the controller connection condition and state of power supply.

[Confirmation of setting data]

- **When all relevant data is set**
  When 2 (Set value monitor) is set to request command in PLC register for confirmation of readout data, the controller starts writing the data set to the PLC side.
  Relevant data: Data whose register addresses are from PID/AT transfer to Manual manipulated output value on the PLC communication data map

- **When specific data is set**
  (Example: Manual manipulated output value)
  When **“Setting item number of manual manipulated output value (21) × 10 + 2 = 212”** is set to request command in PLC register, the controller starts writing the data set to the PLC side.

☞ For details on the setting item number, refer to **6.4 PLC Communication Data Map (P. 74)**.



If 3 (Set data write) is set to COM-JE communication state in the PLC register, this indicates that controller data items are being written into the PLC.

Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

☞ For writing time, refer to **APPENDIX B.3.3 Set value monitor processing time (P. 167)**.

If the COM-JE communication state in the PLC register is set to 1 (Writing monitoring data), this indicates that data write to the PLC terminates to return to the monitored state (Request command: 0).

■ Data processing precautions

- 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. (excluding the bit data)

  [Example] Setting of proportional band
  Initial value of internal data: 3.0
  Communication data: 30

- The COM-JE does not detect a data setting range error. After the setting is changed, execute the request command “2: Set value monitor” to check that the data has been correctly set.

- The autotuning (AT) function starts its execution with PID/AT transfer and the request command set to “1: AT operation” and “1: Setting,” respectively. After the autotuning function finishes its execution, PID/AT transfer returns to “0: PID control operation” and thus the PID constants are updated.

- Some communication data may become invalid according to the function selection. If their data is written, no error response message is returned.

6.3.2 Specified data transfer type

This is the transfer type of specifying data address and the number of data points to be transferred. It is possible to transfer all data (except some data) which can be communicated via Host communication (Modbus). Data corresponding to up to 16 words can be transferred.

📖 As data addresses specified by Start address, Host communication (Modbus) register addresses are used.

☞ For register address of Host communication (Modbus), refer to **7.5 Communication Data List (P. 114)**.

■ Control word 1 (request command)

Data transfer between the PLC and controller when of the specified data transfer type is made by Control word 1 (request command). Only when Control word 1 (request command) is set to "1: Setting" or "2: Monitor," data transfer is made.

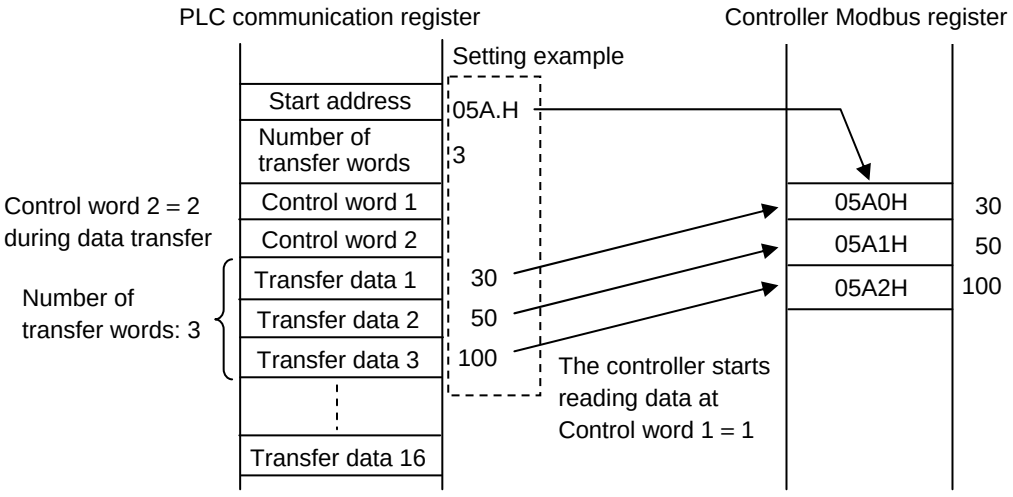
Relevant data: Start address, Number of transfer words, Control word 2 (communication state) and Transfer data

- **Control word 1 (request command) "1: Setting (PLC → Controller)"**
  Command requesting PLC data to be read to the controller.

  1. Specifying the address of data to be transferred to Start address and sets the number of data words to the Number of transfer words. In addition, the data value is set to Transfer data in advance.

  2. If Control word 1 (request command) in the PLC register is set to "1: Setting," the controller starts reading Transfer data set to the register (memory) on the PLC side by the Number of transfer words specified to Start address on the controller Modbus register addresses.
  The Control word 2 (communication state) is set to "2: Set data read (PLC → Controller)" during data transfer.

  3. After data transfer is finished, Control word 2 (communication state) returns to "1: No transfer operation." Control word 1 (request command) also returns to "0: No transfer operation."



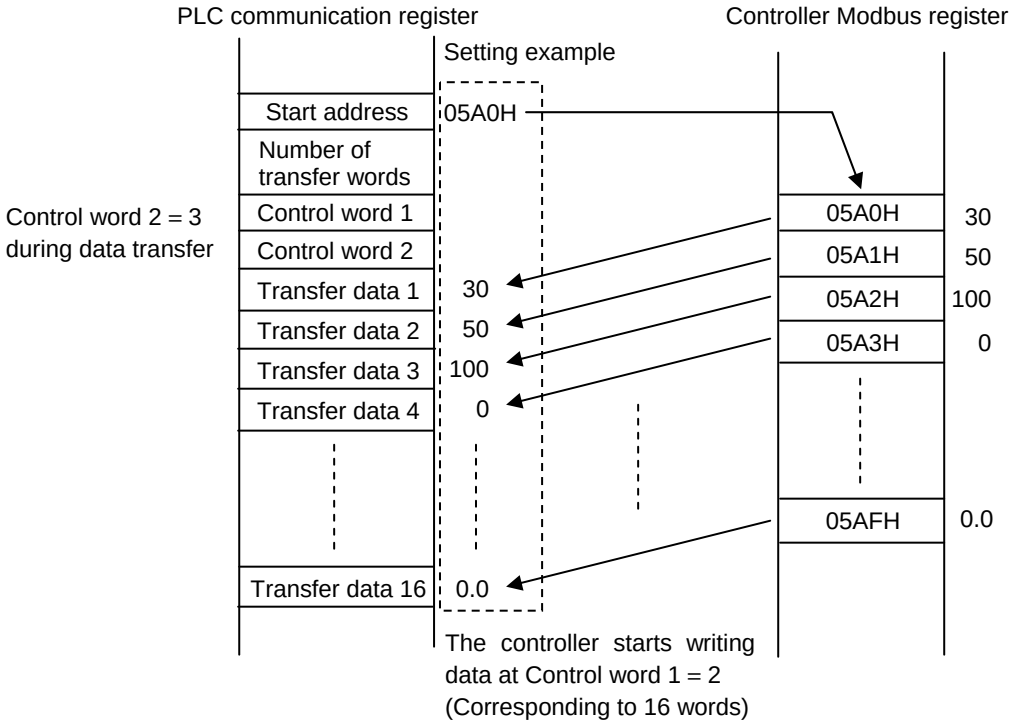
Conceptual diagram of setting (PLC → Controller)

- **Control word 1 (request command) "2: Monitor (PLC ← Controller)"**
  Command requesting the controller data to be written to the PLC.

  1. Specifying the address of data to be transferred to Start address.

  2. If Control word 1 (request command) in the PLC register is set to "2: Monitor," the controller starts writing data corresponding to 16 words (corresponding to 16 register address) from Start address on Modbus register addresses to Transfer data in the register (memory) on the PLC side. The Control word 2 (communication state) is set to "3: Writing monitoring data (PLC ← Controller)" during data transfer.

  3. After data transfer is finished, Control word 2 (communication state) returns to "1: No transfer operation." Control word 1 (request command) also returns to "0: No transfer operation."



Conceptual diagram of monitor (PLC ← Controller)

📖 **As the specified data transfer type enables data transfer of up to 16 words at a time, it is necessary to transfer the data by dividing it into two parts when the number of connected controllers exceeds 16.**

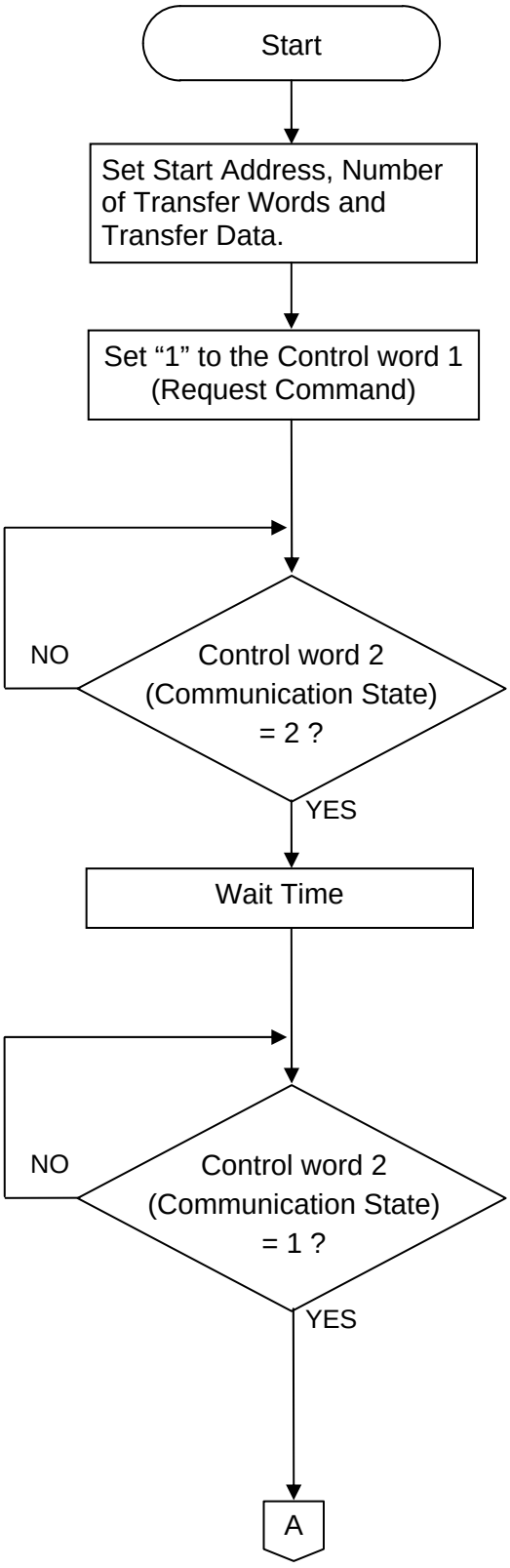
📖 The setting of Number of transfer words is valid only when Control word 1 (request command) is set to "1: Setting." If Control word 1 (request command) is set to "2: Monitor," data corresponding to 16 words is always transferred.

📖 Data in unused or inexistent registers may be transferred depending on the value in Start address. Transfer data in that case becomes "0."

📖 Data which can be set by the specified data transfer type is limited to the content set by Controller communication block selection (Modbus register address: 800DH). For details, refer to **7.5.5 COM-JE communication data items (P. 145)**.

■ Data transfer procedures

● Data setting (When transmitting data from PLC to controller)



[Data setting]

If Control word 1 (request command) in the PLC register is set to 1 (Setting), the controller starts reading Transfer data set to the register (memory) on the PLC side by the Number of transfer words specified to Start address on the controller Modbus register addresses.

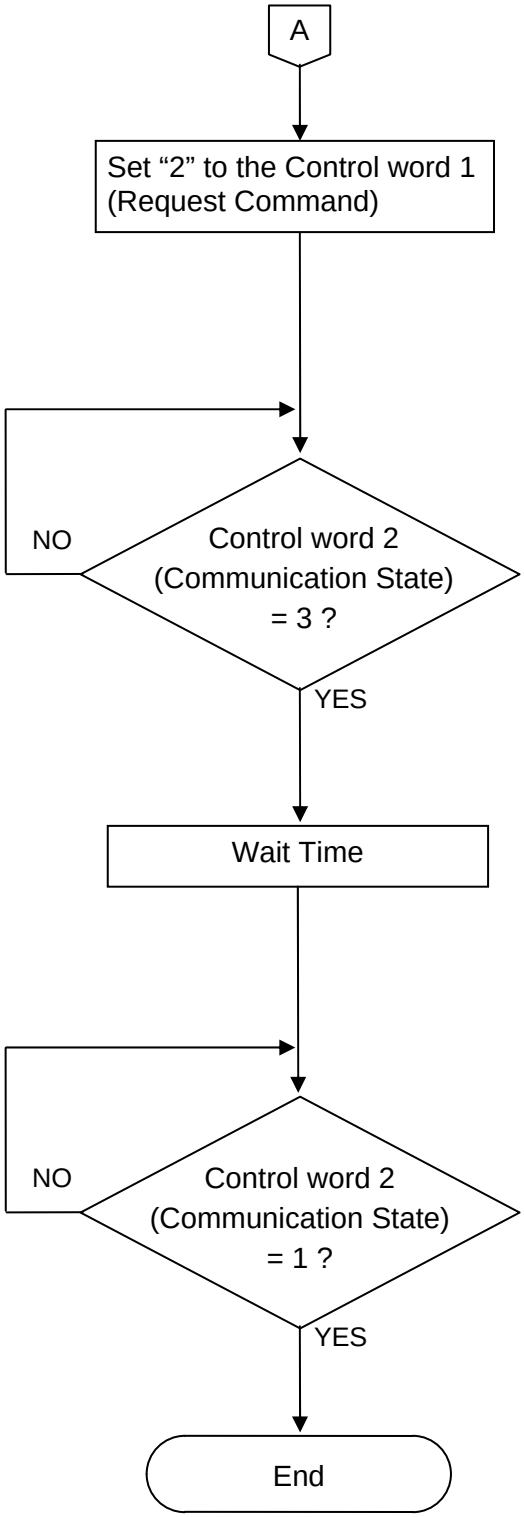
If Control word 2 (communication state) in the PLC register is set to 2 (Setting read), this indicates that the controller is reading Transfer data on the PLC side.

Reserve data read time as wait time. In addition, process data in each item as indefinite during this period.

☞ For readout time, refer to **APPENDIX B.3.2 Setting processing time (P. 166)**.

If Control word 2 (communication state) in the PLC register is set to 1 (No transfer operation), this indicates that Transfer data read is finished.

When all connected controllers are in communication error (such as time-out and error state), Control word 2 (Communication state) does not return to 1 (Writing monitoring data).
Confirm the controller connection condition and state of power supply.



[Confirmation of setting data]

In order for the controller to check Transfer data read from the PLC, if Control word 1 (request command) in the PLC register is set to “2: Monitor,” the controller starts writing data corresponding to 16 words (corresponding to 16 register address) from Start address on Modbus register addresses to Transfer data in the register (memory) on the PLC side.

If Control word 2 (communication state) in the PLC register is set to 3 (Writing monitoring data), this indicates that data corresponding to 16 words (corresponding to 16 register address) is being written to Transfer data of the PLC from Start address of the controller.

Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

☞ For writing time, refer to **APPENDIX B.3.3 Set value monitor processing time (P. 167)**.

If Control word 2 (communication state) in the PLC register is set to 1 (No transfer operation), this indicates that data write to Transfer data of the PLC is finished.

6.4 PLC Communication Data Map

The PLC communication data map shows data which can be used for communication between the PLC and controller.

■ Reference to data map

(1) (2) (3) (4) (5) (6) (7)

Name	Register address	Setting item	Struc-ture	Attri-bute	Data range	Factory set value
Request command	D01000	—	U	R/W	0 to 212 Command selection Command applicable items • Command selection (The first digit) 0: Monitor (PLC ← Controller)	—

(1) Name: Name of communication data

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

- PLC: MITSUBISHI MELSEC series
  A-compatible 1C frame (format 4),
  AnA/AnUCPU common command (QR/QW)
  (Also for the OMRON PLC, the content of data remains unchanged.)
- Communication environment setting:
  Maximum number of controller in PLC communication: 10
  Register start number: 1000
  Register type: 0 (D register)
  Monitor item selection: 4095 (all items)

Setting of Maximum number of controller in PLC communication and Register start number changes an assignment of a register address.

Name	Register address
Request command	D01000
COM-JE communication state	D01001
⋮	⋮
Measured value (PV)	D01030 to D01039
Current transformer 1 (CT1) input value monitor	D01040 to D01049
Current transformer 2 (CT2) input value monitor	D01050 to D01059

← Register start number

Measured value (PV) Controller 1 to 10

CT1 monitor Controller 1 to 10

CT2 monitor Controller 1 to 10

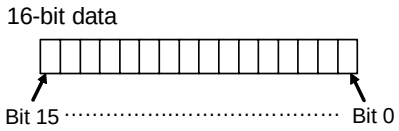
For the PLC communication environment setting, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]** and **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

(3) Setting item: This is the number set when a special setting item is read or written by the request command.

(4) Structure: U: Data for each controller communication unit *
C: Data for each controller
* A controller communication unit denotes a case where one COM-JE are connected to several controllers via controller communication (RS-485, Modbus).

(5) Attribute: RO: Read only data (PLC ⟵ Controller)
R/W: Read and Write data (PLC ⟷ Controller)

(6) Data range: Read or write range of communication data
Bit image of bit data is as follows.



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

■ Data map list

Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
Request command [1]	D01000	—	U	R/W	0 to 212 Command selection Command applicable items • Command selection (The first digit) 0: Monitor (PLC ← Controller) 1: Setting (PLC → Controller) 2: Set value monitor (PLC ← Controller) • Command applicable items (The tenth and hundreds digit) 0: All items 1 to 21: Setting item number	0
COM-JE communication state	D01001	—	U	RO	0: Unused 1: Writing monitoring data During monitor data of attribute RO is written to PLC 2: Set data read During setting data of attribute R/W is read from PLC 3: Set data write During setting data of attribute R/W is written to PLC	—
COM-JE normal communication flag [2]	D01002	—	U	RO	0/1 transfer (For communication checking) "0" and "1" are repeated for each communication period.	—
—	D01003	—	—	—	Do not use this register address as it is used for the internal processing.	—
—	D01004	—	—	—		—

[1] For details, refer to **6.3.1 Fixed data transfer type (P. 63)**.

[2] The COM-JE re-writes this area alternately in order of 0→1→0 for each communication period. It is possible to judge that the COM-JE does not communicate any more by periodically monitoring this area using the PLC program.

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Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
PLC communication error code [1]	D01005	—	U	RO	Bit data Bit 0: PLC register read/write error Bit 1: Slave communication timeout Data 0: OFF 1: ON [Decimal number: 0 to 3]	—
Unit recognition flag [2]	D01006	—	U	RO	Bit data Bit 0: Controller communication unit 1 Bit 1: Controller communication unit 2 Bit 2: Controller communication unit 3 Bit 3: Controller communication unit 4 Data 0: No unit exists 1: Unit exists [Decimal number: 0 to 15]	—

[1] Bit 0: PLC register read/write error
To be turned on when data read and write cannot be made to/from the PLC register.
The PLC communication environment setting enables the PLC register read/write error to be eliminated.

☞ For the PLC communication environment setting, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]** and **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

Bit 1: Slave communication timeout
If communication with slave units during communication with the PLC is timed up with controller communication units multi-drop connected, this register bit of the master unit is turned on. (Cannot be checked by the PLC as communication with slave units is cut off.)

[Slave unit operation]
Stops data send to the PLC and set to the standby state. In addition, re-starts communication if data send from the master unit starts again.

[Master unit operation]
Send data to the slave unit again

[2] The master unit (address: 0, 4, 8 or C) can recognize all of the units but the slave unit can only recognize its own unit.

☞ For the address, refer to **5.1 Address Setting (P. 20)**.

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Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
Maximum number of controllers in PLC communication [1]	D01007	—	U	RO	1 to 31	—
Number of connection controller in controller communication	D01008	—	U	RO	1 to 31	—
Setting change flag	D01009	—	U	RO	0: Controller setting not changed 1: Controller setting changed Set to "0" when data is written to the PLC by request command 2. In addition, set to "1" when there is a change in the value written to the PLC by the controller.	—
Start address [2]	D01010	—	U	R/W	Register address range of Host communication (Modbus) Transfer data start address of Specified data transfer type	0
Number of transfer words [2]	D01011	—	U	R/W	1 to 16 words 0: No transfer operation Number of transfer data words of Specified data transfer type	0
Control word 1 (request command) [2]	D01012	—	U	R/W	0: No transfer operation 1: Setting (PLC → Controller) 2: Monitor (PLC ← Controller) Request command of Specified data transfer type	0
Control word 2 (communication state) [2]	D01013	—	U	RO	0: Unused 1: No transfer operation 2: Reading out setting data During data is read from PLC 3: Writing monitoring data During data is written to PLC Controller communication state of Specified data transfer type	—

[1] Set it by PLC communication environment setting.

☞ For the PLC communication environment setting, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]** and **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

[2] Used for Specified data transfer type. For details, refer to **6.3.2 Specified data transfer type (P. 70)**.

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Name	Register address	Setting item	Struc-ture	Attri-bute	Data range	Factory set value
Transfer data [1]	D01014 to D01029	—	U	R/W	Data range specified by Start address Data written or read by Specified data transfer type	0
Measured value (PV)	D01030 to D01039	—	C	RO	Input scale low to Input scale high [2]	—
Current transformer 1 (CT1) input value monitor	D01040 to D01049	—	C	RO	CTL-6-P-N: 0.0 to 30.0 A CTL-12-S56-10L-N: 0.0 to 100.0 A	—
Current transformer 2 (CT2) input value monitor	D01050 to D01059	—	C	RO		—
Set value (SV) monitor	D01060 to D01069	—	C	RO	Setting limiter low to Setting limiter high [2]	—
Remote setting (RS) input value monitor	D01070 to D01079	—	C	RO	Setting limiter low to Setting limiter high [2]	—
Manipulated output value (MV1) monitor [heat-side]	D01080 to D01089	—	C	RO	PID control or Heat/Cool PID control: −5.0 to +105.0 % Position proportioning PID control with feedback resistance (FBR) input: 0.0 to 100.0 %	—
Manipulated output value (MV2) monitor [cool-side]	D01090 to D01099	—	C	RO	−5.0 to +105.0 %	—
Digital input (DI) state monitor	D01100 to D01109	—	C	RO	Bit data Bit 0: DI1 Bit 1: DI2 Bit 2: DI3 Bit 3: DI4 Bit 4: DI5 Bit 5: DI6 * Bit 6: DI7 * Bit 7 to Bit 15: Unused Data 0: Open 1: Closed [Decimal number: 0 to 127] * Unused on the FB100.	—

[1] Used for Specified data transfer type. For details, refer to **6.3.2 Specified data transfer type (P. 70)**.

[2] Varies with the setting of the Decimal point position selection.

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Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
Output state monitor	D01110 to D01119	—	C	RO	Bit data Bit 0: OUT1 Bit 1: OUT2 Bit 2: DO1 Bit 3: DO2 Bit 4: DO3 * Bit 5: DO4 * Bit 6 to Bit 15: Unused Data 0: Open 1: Closed [Decimal number: 0 to 63] * Unused on the FB100.	—
Controller state 1 (comprehensive alarm state)	D01120 to D01129	—	C	RO	Bit data Bit 0: Burnout state Bit 1: Burnout state of feedback resistance (FBR) input Bit 2: Event 1 state Bit 3: Event 2 state Bit 4: Event 3 state Bit 5: Event 4 state Bit 6: Heater break alarm 1 (HBA1) state Bit 7: Heater break alarm 2 (HBA2) state Bit 8 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	—
Controller state 2 (error code)	D01130 to D01139	—	C	RO	Bit data Bit 0: Adjustment data error Bit 1: Back-up error Bit 2: A/D conversion error Bit 3 to Bit 4: Unused Bit 5: Custom data error Bit 6: Unused Bit 7: Watchdog timer error Bit 8: Stack overflow Bit 9 to Bit 10: Unused Bit 11: Program error (busy) Bit 12 to Bit 14: Unused Bit 15: Controller communication error Data 0: OFF 1: ON [Decimal number: 0 to 35239]	—

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Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
Controller state 3 (Operation mode state)	D01140 to D01149	—	C	RO	Bit data Bit 0: Control STOP Bit 1: Control RUN Bit 2: Manual mode [1] Bit 3: Remote mode [1] Bit 4 to Bit 13: Unused Bit 14: Backup memory state monitor Bit 15: Autotuning (AT) Data 0: OFF 1: ON [Decimal number: 0 to 49167]	—
PID/AT transfer	D01150 to D01159	1	C	R/W	0: PID control 1: Autotunig (AT) When the Autotuning (AT) is finished, the control automatically returns to 0: PID control.	0
Auto/Manual transfer	D01160 to D01169	2	C	R/W	0: Auto mode 1: Manual mode	0
RUN/STOP transfer	D01170 to D01179	3	C	R/W	0: RUN (control start) 1: STOP (control stop)	0
Event 1 set value	D01180 to D01189	4	C	R/W	Deviation: −Input span to +Input span [2] Process and set value: Input scale low to Input scale high [2] Manipulated output value (MV1 or MV2): −5.0 to +105.0 %	50
Event 2 set value	D01190 to D01199	5	C	R/W		50
Event 3 set value	D01200 to D01209	6	C	R/W		50
Event 4 set value	D01210 to D01219	7	C	R/W		50
Set value (SV)	D01220 to D01229	8	C	R/W	Setting limiter low to Setting limiter high [2]	TC/RTD: 0 V/I: 0.0
Proportional band [heat-side]	D01230 to D01239	9	C	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span [2] (Unit: °C [°F]) Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of Input span (0, 0.0 or 0.00: ON/OFF action)	TC/RTD: 30 V/I: 30.0

[1] During operation in Manual mode, the Manual mode of the Operation mode state monitor is set to the "1: ON" state and the Remote mode of the same monitor is se to the "0: OFF" state even if the parameter, Remote/Local transfer is set to "1: Remote mode."

[2] Varies with the setting of the Decimal point position selection.

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Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
Integral time [heat-side]	D01240 to D01249	10	C	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds or 0.0 to 1999.9 seconds [1] (0, 0.0: PD action) [2] Position proportioning PID control: 1 to 3600 seconds or 0.1 to 1999.9 seconds [1]	240
Derivative time [heat-side]	D01250 to D01259	11	C	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [1] (0, 0.0: PI action)	60
Proportional band [cool-side]	D01260 to D01269	12	C	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span [3] (Unit: °C [°F]) Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of Input span	TC/RTD: 30 V/I: 30.0
Integral time [cool-side]	D01270 to D01279	13	C	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [1] (0, 0.0: PD action) [2]	240
Derivative time [cool-side]	D01280 to D01289	14	C	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds [1] (0, 0.0: PI action)	60
Overlap/Deadband	D01290 to D01299	15	C	R/W	TC/RTD inputs: −Input span to +Input span [3] (Unit:°C [°F]) Voltage (V)/Current (I) inputs: −100.0 to +100.0 % of Input span Minus (−) setting results in Overlap. However, the overlapping range is within the proportional range.	0
Setting change rate limiter (up)	D01300 to D01309	16	C	R/W	0 to Input span [3]/unit time * (0: Unused)	0
Setting change rate limiter (down)	D01310 to D01319	17	C	R/W	* Unit time: 60 seconds (factory set value)	0

[1] Varies with the setting of the Integral/Derivative time decimal point position selection.

[2] When the heat-side or cool-side Integral time is set to zero for Heat/Cool PID control, PD action will take place for both heat-side and cool-side.

[3] Varies with the setting of the Decimal point position selection.

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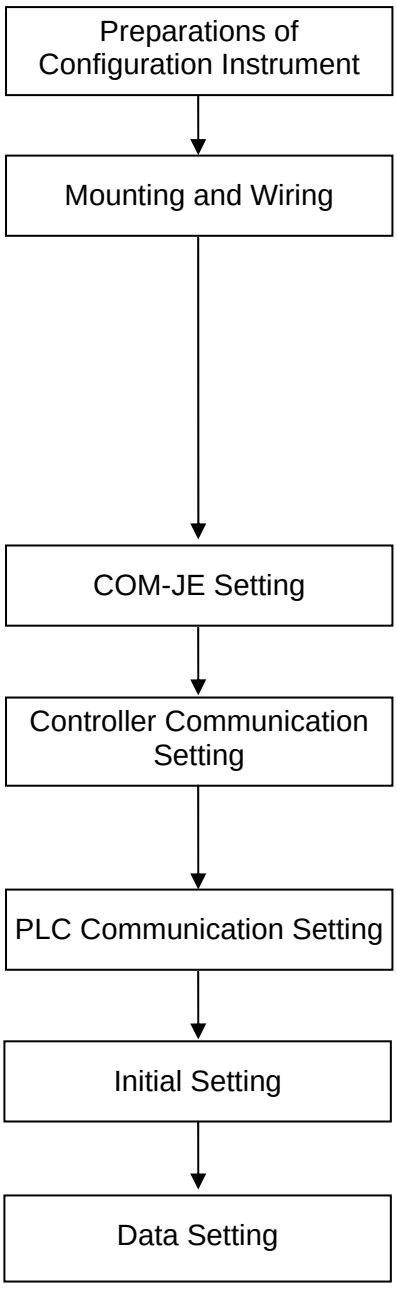
Name	Register address	Setting item	Structure	Attribute	Data range	Factory set value
Heater break alarm 1 (HBA1) set value	D01320 to D01329	18	C	R/W	CTL-6-P-N: 0.0 to 30.0 A (0.0: Unused) CTL-12-S56-10L-N: 0.0 to 100.0 A (0.0: Unused)	0.0
Heater break alarm 2 (HBA2) set value	D01330 to D01339	19	C	R/W		0.0
PV bias	D01340 to D01349	20	C	R/W	−Input span to +Input span [1]	0
Manual manipulated output value	D01350 to D01359	21	C	R/W	PID control: Output limiter low (MV1) to Output limiter high (MV1) Heat/Cool PID control: −Output limiter high (MV2) to +Output limiter high (MV1) For overlap: −105.0 to +105.0 % * * Actual output value is limited by the output limiter function. Position proportioning PID control with feedback resistance (FBR) input: Output limiter low (MV1) to Output limiter high (MV1)	0.0

[1] Varies with the setting of the Decimal point position selection.

6.5 Usage Example

In this chapter, an example of data setting procedure is explained when connected with controller (FB900) and the PLC of MITSUBISHI MELSEC series with the COM-JE.

6.5.1 Handling procedures



☞ Refer to **6.5.2 System configuration (P. 85)**.

☞
- Refer to **3. MOUNTING (P. 12)**, **4.3 Connection to the Controllers (P. 17)**, **4.4 Installation of Termination Resistor (P. 18)** and **6.1.2 Wiring (P. 29) [MITSUBISHI PLC]**
- For mounting and wiring of the controller (FB900), refer to **FB400/FB900 Installation Manual (IMR01W01-E□)**.
- For mounting and wiring of PLC, refer to the instruction manual for the used PLC.

☞ Refer to **6.5.3 COM-JE setting (P. 86)**.

☞ Refer to **6.5.4 Controller communication setting (P. 91)** and **FB400/FB900 Communication Quick Manual (IMR01W07-E□)**.

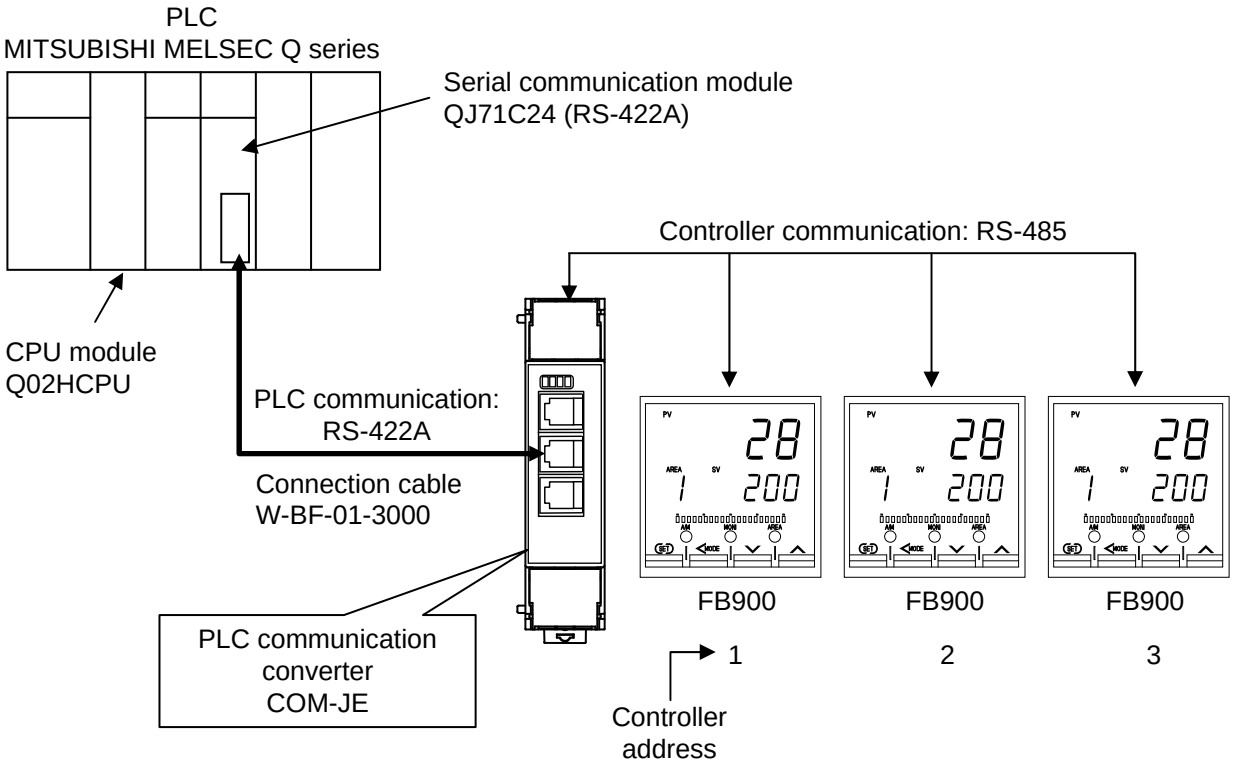
☞ Refer to **6.5.5 PLC communication setting (P. 92)**.

☞ Refer to **6.5.6 Initial setting (P. 94)**.

☞ Refer to **6.5.7 Data setting (P. 95)**.

📖 **To avoid error at operation start-up, COM-JE must be powered on LAST (after the FB900, PLC, etc.).**

6.5.2 System configuration



■ Use instruments

- **MITSUBISHI MELSEC Q series**

  CPU module Q02HCPU 1
  Serial communication module QJ71C24 (RS-422A)..... 1
  Power supply, I/O module, etc.

- **PLC communication converter**

  COM-JE-□-01 1

- **Controller**

  FB900 (Interface of Communication 1: RS-485)..... 3

- **Connection cable for connected COM-JE and PLC**

  W-BF-01-3000 (RKC product, Sold separately) [Standard cable length: 3 m] 1

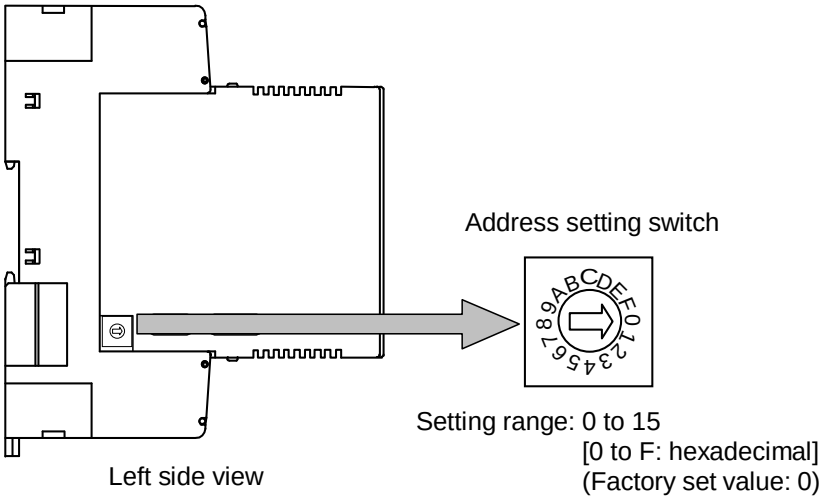
- **Others**

  Connection cable for connected COM-JE and controller 3
  Termination resister for controller communication (120 Ω, 1/2 W)..... 1
  [Connect a termination resistor to the terminal of the FB900 Communication 1 from exterior.]

6.5.3 COM-JE setting

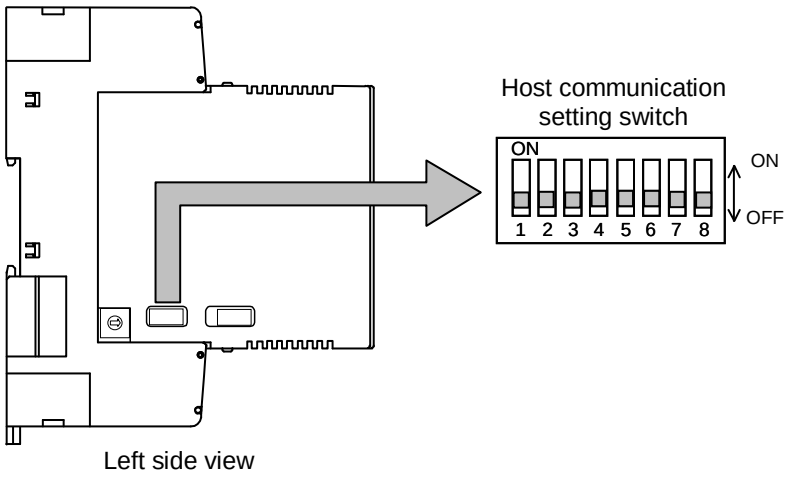
■ Address setting

Set the address by address setting switch of left side of COM-JE. For this setting, use a small blade screwdriver.
In this application, the address is assumed to be “0.”



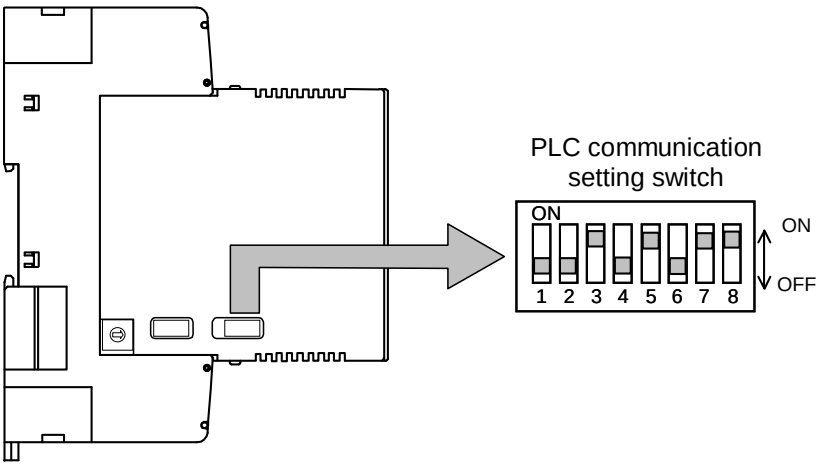
■ Host communication setting

As no Host communication is made, keep setting the Host communication setting switch at the left side of the COM-JE to the factory set value.



■ PLC communication setting

The PLC communication setting switch on the left side of the COM-JE enables the setting of data bit configuration, communication speed and protocol, and assign the communication port to the front of the COM-JE.
In the usage example, set it as follows.



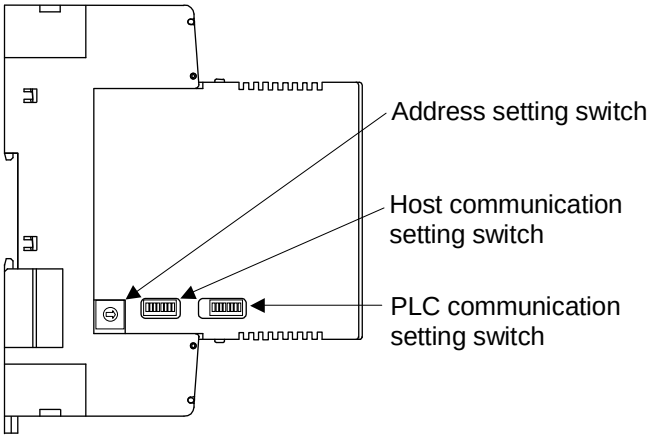
Left side view

PLC communication setting switch		Setting contents
1	OFF	Data bit configuration: Data 8-bit, Without parity, Stop 1-bit
2	OFF	
3	ON	Communication speed: 19200 bps
4	OFF	
5	ON	Protocol: MITSUBISHI MELSEC series special protocol A-compatible 1C frame (format 4) AnA/AnUCPU common command (QR/QW)
6	OFF	
7	ON	
8	ON	Communication port: COM. PORT1: Host communication [RS-232C/RS-422A] COM. PORT2/3: PLC communication [RS-422A]

☞ For details of setting, refer to **5.2 Communication Setting Switch (P. 23)**.

■ PLC communication environment setting

In this application, the PLC communication environment is set as follows by switch.
Address setting switch and the Host communication setting and PLC communication setting switches at the left side of the COM-JE are used.



Left side view of COM-JE

☞ For setting procedure, refer to ■ **Setting by the switch (P. 40)** of **6.1.3 PLC communication environment setting**.

● Setting items with the Host communication setting switch

Switch No.	Setting items	Set value
1	Station number	0
2	PC number (CPU number)	255
3	Register start number	1000
4	Maximum number of controllers in PLC communication	4 *
5	Register type (D, R, W, ZR)	D register (A-compatible 1C frame)
6	PLC scanning time setting	255 ms
7	COM-JE Link recognition time	10 seconds
8	Unused (Do not set this one)	—

* The number of connected FB900s is three. However, the setting is made in even numbers if the PLC communication environment setting is made by the switch.

● Setting items with the PLC communication setting switch

Switch No.	Setting items	Set value
1 to 5	Unused (Do not set this one)	—
6	Action mode selection	0: Continuous setting, Manual elimination
7	Monitor item selection	A: Measured value (PV), Current transformer 1 (CT1) input value monitor, Manipulated output value (MV1) monitor [heat-side], Controller state 1 to 3
8	Unused (Do not set this one)	—

■ PLC communication register address

The register address of each data in PLC communication becomes as follows with the Register start number set to “1000,” the Maximum number of controllers in PLC communication set to “4” and the Register type set to D register in PLC communication environment setting items.

Register address	Setting item No.	Communication items
D01000	—	Request command
D01001	—	COM-JE communication state
D01002	—	COM-JE normal communication flag
D01003	—	Do not use this register address as it is used for the internal processing.
D01004	—	
D01005	—	PLC communication error code
D01006	—	Unit recognition flag
D01007	—	Maximum number of controllers in PLC communication
D01008	—	Number of connection controller in controller communication
D01009	—	Setting change flag
D01010	—	Start address
D01011	—	Number of transfer words
D01012	—	Control word 1 (request command)
D01013	—	Control word 2 (communication state)
D01014 to D01029	—	Transfer data 1 to 16
D01030 to D01033	—	Measured value (PV) Controller 1 to 4
D01034 to D01037	—	Current transformer 1 (CT1) input value monitor Controller 1 to 4
D01038 to D01041	—	Current transformer 2 (CT2) input value monitor Controller 1 to 4
D01042 to D01045	—	Set value (SV) monitor Controller 1 to 4
D01046 to D01049	—	Remote setting (RS) input value monitor Controller 1 to 4
D01050 to D01053	—	Manipulated output value (MV1) monitor [heat-side] Controller 1 to 4
D01054 to D01057	—	Manipulated output value (MV2) monitor [cool-side] Controller 1 to 4
D01058 to D01061	—	Digital input (DI) state monitor Controller 1 to 4
D01062 to D01065	—	Output state monitor Controller 1 to 4
D01066 to D01069	—	Controller state 1 (comprehensive alarm state) Controller 1 to 4
D01070 to D01073	—	Controller state 2 (error code) Controller 1 to 4
D01074to D01077	—	Controller state 3 (operation mode state) Controller 1 to 4
D01078 to D01081	1	PID/AT transfer Controller 1 to 4
D01082 to D01085	2	Auto/Manual transfer Controller 1 to 4
D01086 to D01089	3	RUN/STOP transfer Controller 1 to 4
D01090 to D01093	4	Event 1 set value Controller 1 to 4
D01094 to D01197	5	Event 2 set value Controller 1 to 4

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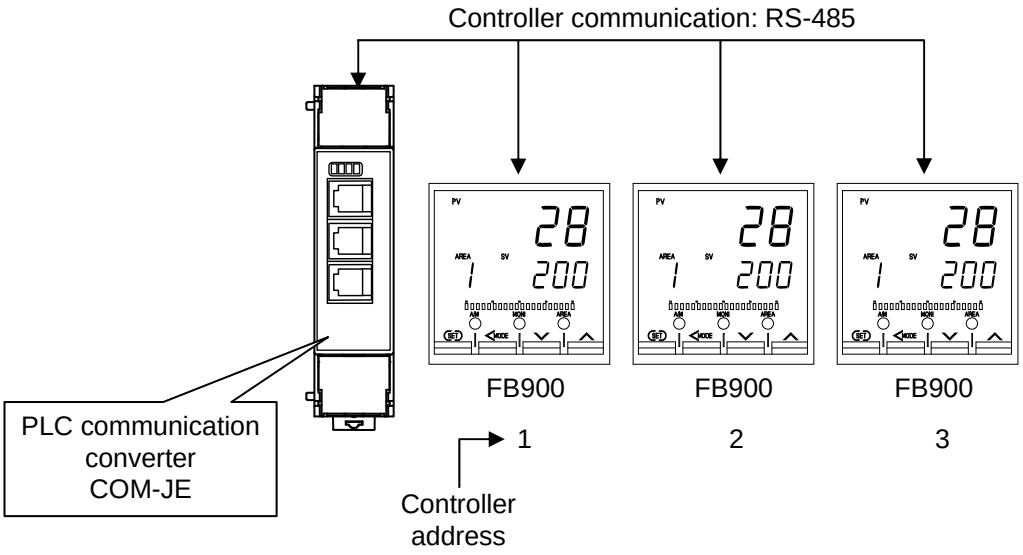
Register address	Setting item No.	Communication items	
D01098 to D01101	6	Event 3 set value	Controller 1 to 4
D01102 to D01105	7	Event 4 set value	Controller 1 to 4
D01106 to D01109	8	Set value (SV)	Controller 1 to 4
D01110 to D01113	9	Proportional band [heat-side]	Controller 1 to 4
D01114to D01117	10	Integral time [heat-side]	Controller 1 to 4
D01118 to D01121	11	Derivative time [heat-side]	Controller 1 to 4
D01122 to D01125	12	Proportional band [cool-side]	Controller 1 to 4
D01126 to D01129	13	Integral time [cool-side]	Controller 1 to 4
D01130 to D01133	14	Derivative time [cool-side]	Controller 1 to 4
D01134 to D01137	15	Overlap/Deadband	Controller 1 to 4
D01138 to D01141	16	Setting change rate limiter (up)	Controller 1 to 4
D01142 to D01145	17	Setting change rate limiter (down)	Controller 1 to 4
D01146 to D01149	18	Heater break alarm 1 (HBA1) set value	Controller 1 to 4
D01150 to D01153	19	Heater break alarm 2 (HBA2) set value	Controller 1 to 4
D01154 to D01157	20	PV bias	Controller 1 to 4
D01158 to D01161	21	Manual manipulated output value	Controller 1 to 4

6.5.4 Controller communication setting

Set the communication setting of the controller (FB900) as the following.

- Protocol: Modbus
- Data bit configuration: Data 8-bit, Without parity, Stop 1-bit
- Communication speed: 19200 bps (factory set value)
- Address: Shown in the following figure

  As the address setting method is set to Continuous setting by the PLC communication environment setting, successive numbers starting from "1" are assigned to addresses.



When connected as shown in the above figure, externally connect a termination resistor (120 Ω, 1/2 W) to the Communication 1 terminals of the FB900 with address "3."

6.5.5 PLC communication setting

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

Setting item	Description
Operation setting	Independent
Data bit	8
Parity bit	NO
Even/odd parity	Odd
Stop bit	1
Sum check code	YES

Setting item	Description
Writing during RUN	Allowed
Setting modification	Allowed
Communication rate	19200 bps
Communication protocol	MC protocol, Format 4
Station number	0

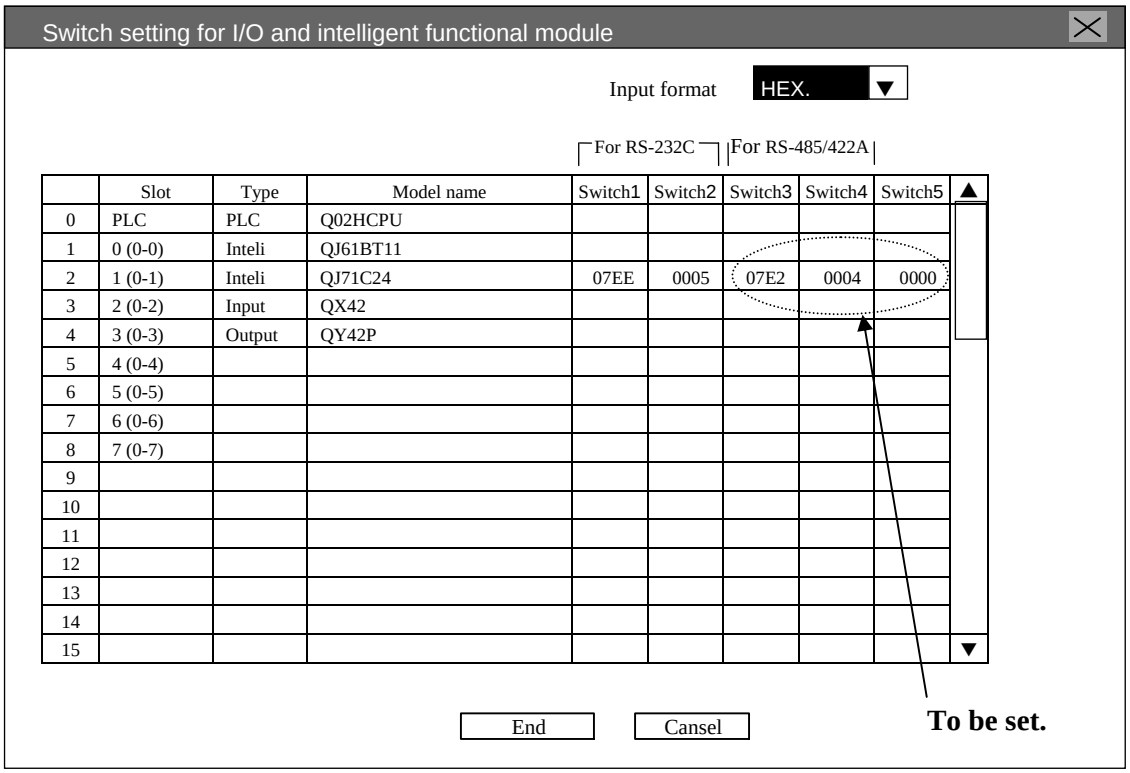
Setting in the serial communication module (QJ71C24) belonging to the MITSUBISHI MELSEC Q series do with the GX Developer of the MITSUBISHI MELSEC PLC programming software (SW□D5C-GPPW-E).
Setting set the following set value with switch setting for I/O and intelligent functional module.

Switch 3: **07E2** * Switch 4: **0004** * Switch 5: **0000** * * Hexadecimal

[Setting procedure]

[GX Developer] → [PLC parameters] → [I/O assignment setting] → **Switch setting**

[Setting screen]



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- **Description Switches 1 to 5**

Switch number	Description	
Switch 1	b15 to b8	b7 to b0
	CH1 Communication rate setting	CH1 Transmission setting
Switch 2	CH1 Communication protocol setting	
Switch 3	b15 to b8	b7 to b0
	CH2 Communication rate setting	CH2 Transmission setting
Switch 4	CH2 Communication protocol setting	
Switch 5	Station number setting	

Set the transmission specifications and communication protocol of each interface using the combinations of setting values for each switch with 16-bit binary data.

- **Setting on switch 3 (CH2 Transmission setting)**

Bit	Description	OFF (0)	ON (1)	Setting	Set value
b0	Operation setting *	Independent	Link	0	2
b1	Data bit	7	8	1	
b2	Parity bit	No	Yes	0	
b3	Even/Odd parity	Odd	Even	0	
b4	Stop bit	1	2	0	E
b5	Sum check code	No	Yes	1	
b6	Write during RUN	Prohibited	Allowed	1	
b7	Setting modifications	Prohibited	Allowed	1	

* Must be set to OFF (0) on CH1

- **Setting on switch 3 (CH2 Communication rate setting)**

Communication rate (Unit: bps)	Bit position b15 to b8	Communication rate (Unit: bps)	Bit position b15 to b8
300	00H	14400	06H
600	01H	19200	07H
1200	02H	28800	08H
2400	03H	38400	09H
4800	04H	57600	0AH
9600	05H	115200	0BH

Set 19200 bps on communication rate. (Set value: 07H)

- **Setting on switch 4 (CH2 Communication protocol setting)**

Set number	Description	
0H	GX Developer connection	
1H	MC protocol	Format 1
2H		Format 2
3H		Format 3
4H		Format 4
5H		Format 5

Set number	Description
6H	Non procedure protocol
7H	Bidirectional protocol
8H	For linked operation setting
9H to DH	Setting prohibited
EH	ROM/RAM/switch test
FH	Individual station loopback test

Set MC protocol Format 4 on communication protocol setting. (Set value: 4H)

- **Setting on switch 5 (Station number setting)**

This setting is common for both CH1 and CH2 sides.
Set the station number to 0.

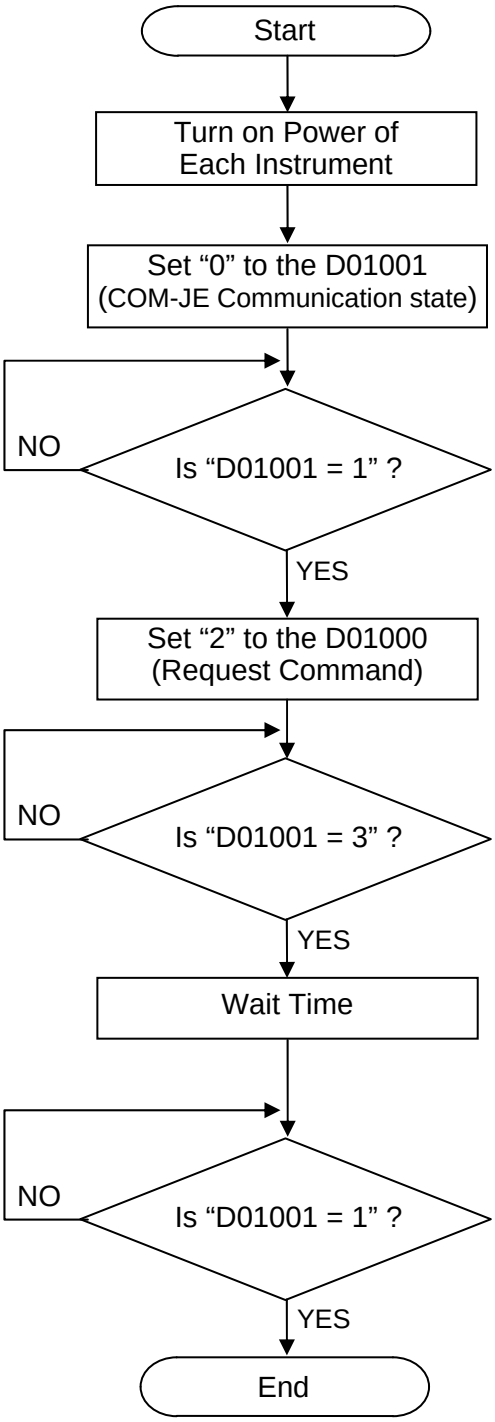
☞ The details of the switch setting for the PLC, refer to the instruction manual for the PLC being used.

6.5.6 Initial setting

CAUTION

If a program to set all of the set values to zero is sent by the PLC to the controllers at the beginning of the data transmission, unexpected operation may occur in the control. To avoid this, carefully read the manual for the data transmission protocol when creating a program.

Change each set value of controller (FB900) from the PLC after the initial settings are made.



Soon after the COM-JE is powered on, data collection from the controller is started.
After the elapse of the set PLC communication starting time (5 seconds as default), the normal communication flag will be written.

To determine if the **D01000** (Request command) is ready, set 0 to the **D01001** (COM-JE communication state).

The COM-JE writes 1 (Writing monitoring data) into the **D01001** (COM-JE communication state) after the controller data collection is completed.
PLC communication can be started when the **D01001** (COM-JE communication state) is 1 (Writing monitoring data).

When 2 (Set value monitor) is set to **D01000** (Request command), the controller starts writing the data items such as temperature set value, etc. (attribute: R/W) to the PLC side.

If 3 (Set data write) is set to **D01001** (COM-JE communication state) in the PLC, this indicates that controller data items such as temperature set value, etc. (attribute: R/W) are being written into the PLC.

Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

☞ For writing time, refer to **APPENDIX B.3.3 Set value monitor processing time (P. 167)**.

If 1 (Writing monitoring data) is set to **D01001** (COM-JE communication state) in the PLC, this indicates that controller data items such as temperature set value, etc. (attribute: R/W) have been written to start writing controller data items such as temperature measured values (PV), etc. (attribute: RO) into the PLC.

6.5.7 Data setting

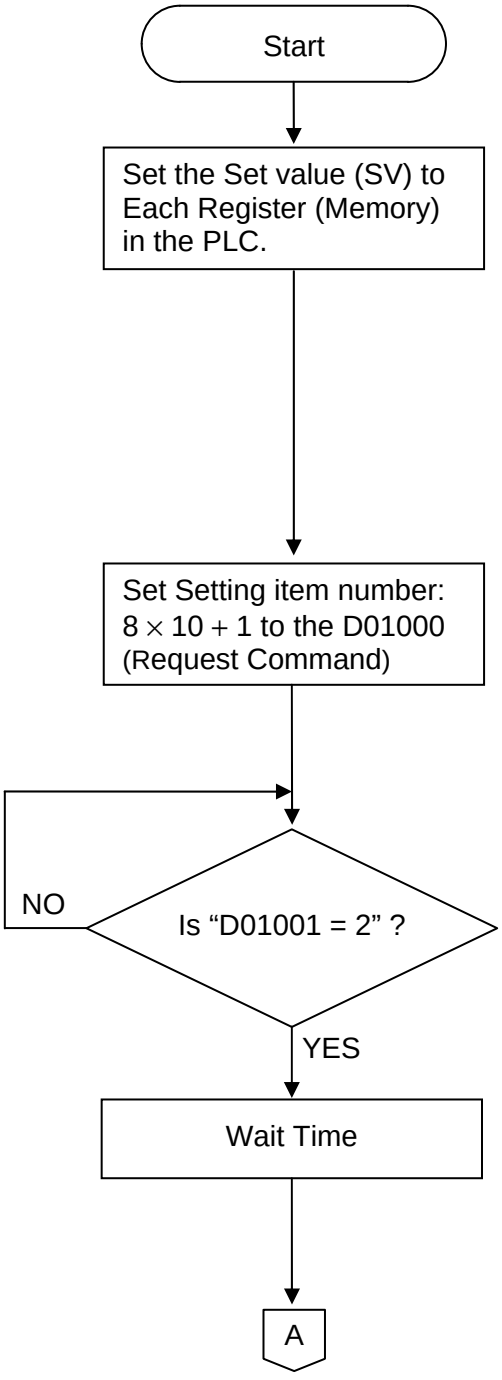
It is assumed that initial setting is finished.

If each set value of controller (FB900) 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 (Fixed data transfer type)

When set the Set value (SV) of controller as follows:

Set value (SV): Controller 1 = 100 Controller 2 = 120 Controller 3 = 80



Register address of Set value (SV) (refer to P. 90)

Register address	Communication item		Set value
D01106	Set value (SV)	Controller 1	100
D01107	Set value (SV)	Controller 2	120
D01108	Set value (SV)	Controller 3	80
D01109	—		0

The maximum controller number of PLC communication was set to four by the PLC communication environment setting but no controller 4 is connected. Therefore, the setting becomes 0.

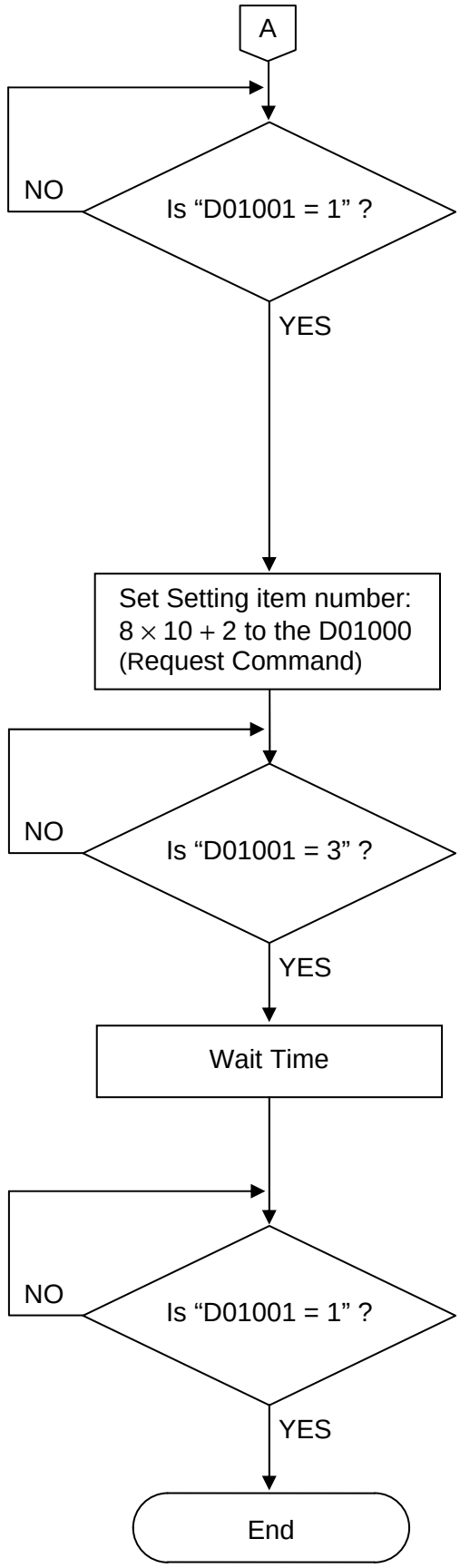
[Data setting]

When **Setting item number of Set value (SV): 8 × 10 + 1 = 81** is set to **D01000** (Request command), the controller starts reading the Set value (SV) data set to the register (memory) on the PLC side

If 2 (Set data read) is set to **D01001** (COM-JE communication state) in the PLC, this indicates that Set values (SV) data are being read from the PLC.

Reserve data read time as wait time. In addition, process data in each item as indefinite during this period.

For readout time, refer to **APPENDIX B.3.2 Setting processing time (P. 166)**.



If 1 (Writing monitoring data) is set to **D01001** (COM-JE communication state) in the PLC, this indicates that Set value (SV) data have been read to start writing controller data items such as Measured values (PV) etc. (attribute: RO) into the PLC.

When all connected controllers are in communication error (such as time-out and error state), D01001 (COM-JE Communication state) does not return to 1 (Writing monitoring data).
Confirm the controller connection condition and state of power supply.

[Confirmation of setting data]

When **Setting item number of Set value (SV): 8 × 10 + 2 = 82** is set to **D01000** (Request command), the controller starts writing the Set value (SV) data set to the PLC side.

If 3 (Set data write) is set to **D01001** (COM-JE communication state) in the PLC, this indicates that controller Set value (SV) data are being written into the PLC.

Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

For writing time, refer to **APPENDIX B.3.3 Set value monitor processing time (P. 167)**.

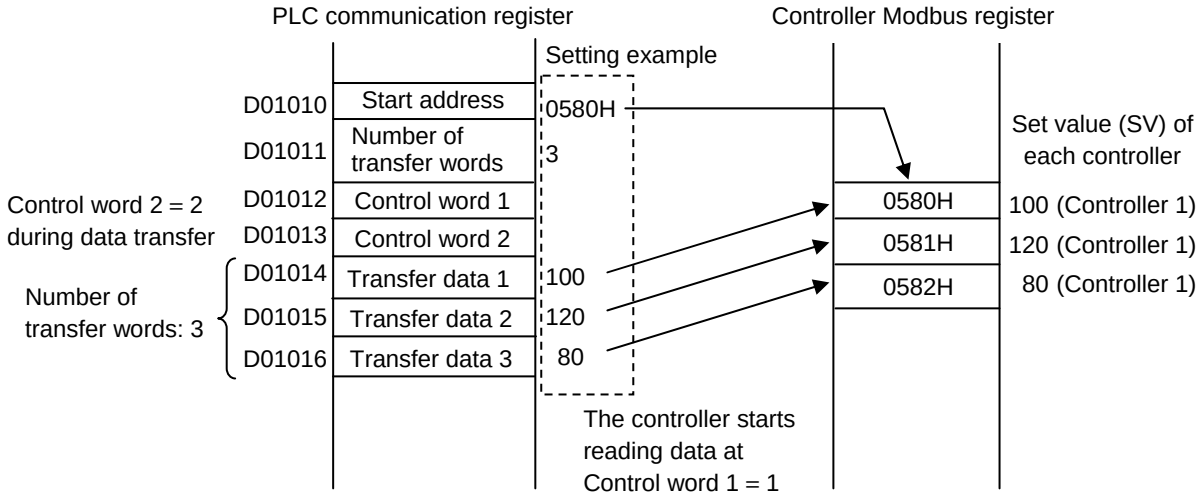
If 1 (Writing monitoring data) is set to **D01001** (COM-JE communication state) in the PLC, this indicates that Set values (SV) have been written to start writing controller data items such as Measured values (PV), etc. (attribute: RO) into the PLC.

■ Setting example (Specified data transfer type)

● Set the Set value (SV) of controller (PLC → Controller)

When set the Set value (SV) of controller as follows:

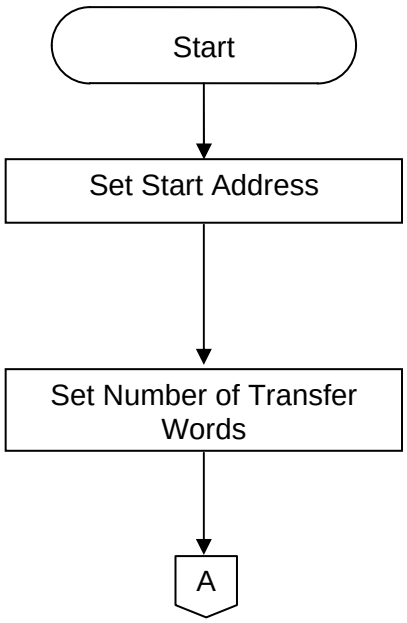
Set value (SV): Controller 1 = 100 Controller 2 = 120 Controller 3 = 80



As the Specified data transfer type enables data transfer of up to 16 words at a time, it is necessary to transfer the data by dividing it into two parts when the number of connected controllers exceeds 16.

The PLC communication register address in this example is in allocation when set as follows by the PLC communication environment setting.

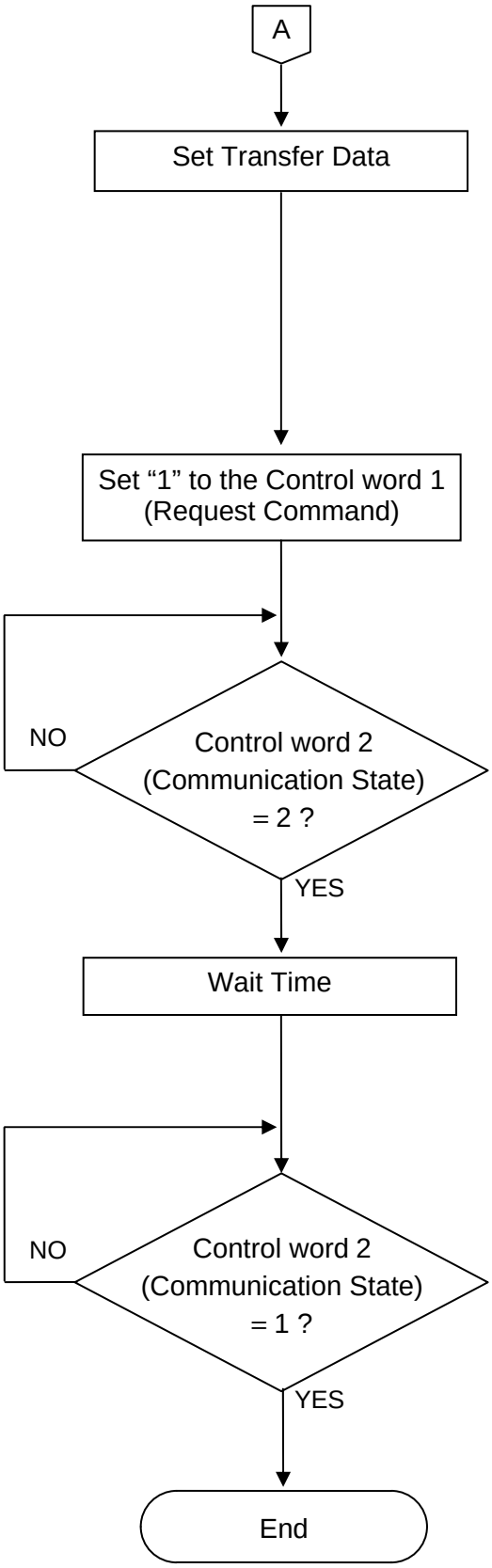
- Register start number: 1000
- Register type: 0 (D register)



Set **D01010** (Start address) of the PLC to the Modbus register address **0580H (1408)** of Set value (SV).

☞ Refer to **7.5 Communication Data List (P. 114)**.

As the number of connected controllers is three, set **3** to **D01011** (number of transfer words) of the PLC.
As Number of transfer words is set to **3**, it is possible to transfer five Transfer data (three words).



Set **D01014 to D01016** (Transfer data) of the PLC to the desired Set value (SV) of controller 1 to 3.

Register address	Communication item		Set value
D01014	Set value (SV)	Controller 1	100
D01015	Set value (SV)	Controller 2	120
D01016	Set value (SV)	Controller 3	80

If **D01012** (Control word 1) of the PLC is set to **1** (Setting), the controller reads Transfer data set to **D01014 to D01016** of the PLC onto the controller Modbus register addresses, **0580H (1408) to 0582H (1410)**.

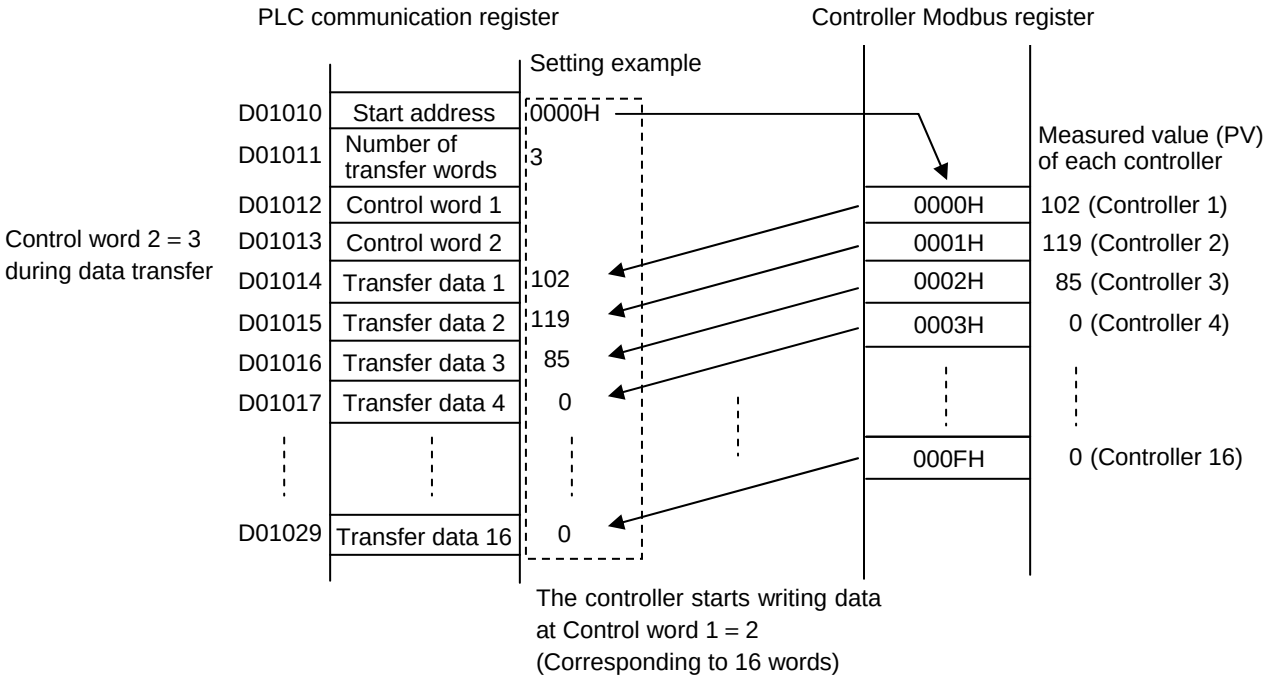
If 2 (Reading out setting data) is set to **D01013** (Control word 2) in the PLC, this indicates that transfer data are being read from the PLC.

Reserve data read time as wait time. In addition, process data in each item as indefinite during this period.

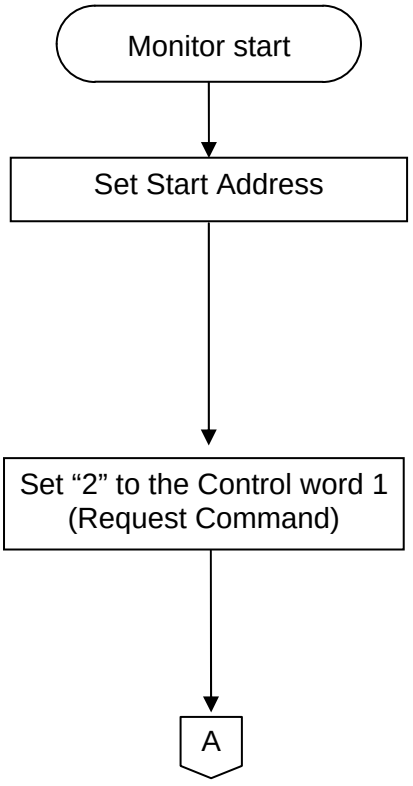
☞ For readout time, refer to **APPENDIX B.3.2 Setting processing time (P. 166)**.

If **D01013** (Control word 2) in the PLC is set to 1 (No transfer operation), this indicates that Transfer data read is finished.
D01012 (Control word 1) in the PLC also returns to “0: No transfer operation.”

- **When monitoring the Measured value (PV) of the controller (PLC ← Controller)**



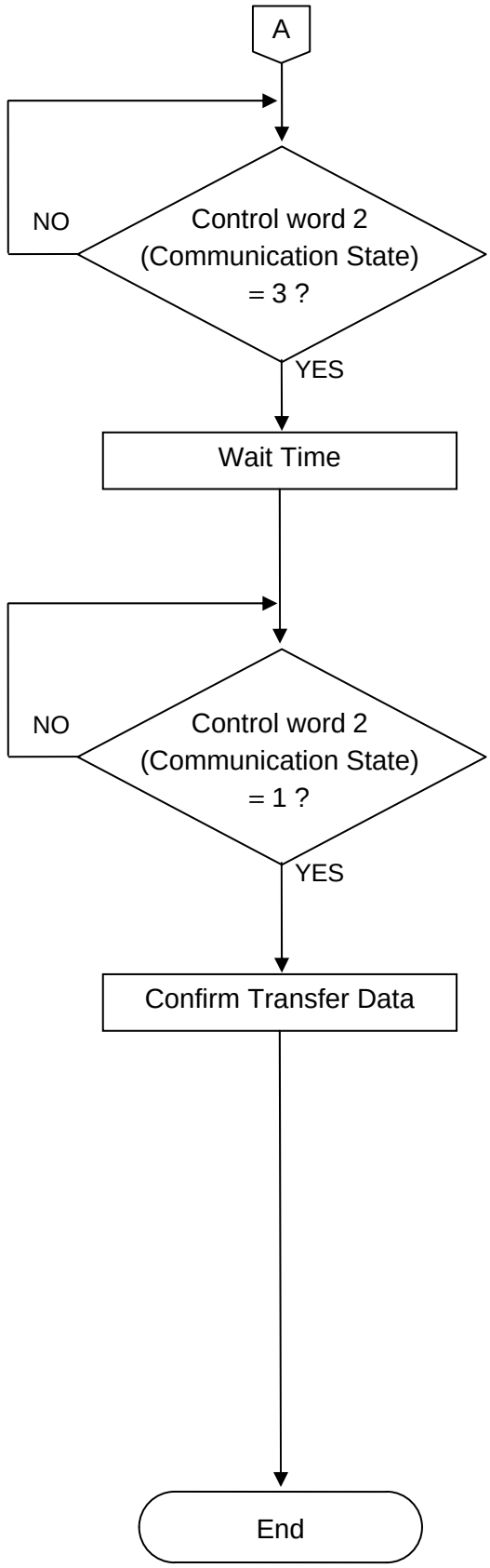
As only 3 controllers are used, Measured values (PV) of controllers 4 to 16 become "0."



Set **D01010** (Start address) of the PLC to the Modbus register address **0000H (0)** of Measured value (PV).

☞ Refer to **7.5 Communication Data List (P. 114)**.

If **D01012** (Control word 1) of the PLC is set to 2 (Monitor), the controller starts writing Transfer data set on the Modbus register addresses, **0000H (0) to 000FH (15)** [16 words] to **D01014 to D01029** of the PLC.



If **D01013** (Control word 2) in the PLC is set to 3 (Writing monitoring data), this indicates that data corresponding to 16 words (corresponding to 16 register address) is being written to Transfer data of the PLC from Start address of the controller.

Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

☞ For writing time, refer to **APPENDIX B.3.3 Set value monitor processing time (P. 167)**.

If **D01013** (Control word 2) in the PLC is set to 1 (No transfer operation), this indicates that Transfer data read is finished.
D01012 (Control word 1) in the PLC also returns to "0: No transfer operation."

Check the Measured value (PV) of the controller set to **D01014 to D01029** (Transfer data) of the PLC.
As controllers 4 to 16 are not used, their Measured values (PV) become 0.

Register address	Communication item	Monitor value
D01014	Measured value (PV): Controller 1	102
D01015	Measured value (PV): Controller 2	119
D01016	Measured value (PV): Controller 3	85
D01017	Measured value (PV): Controller 4	0
⋮	⋮	⋮
D01029	Measured value (PV): Controller 16	0

7. HOST COMMUNICATION

7.1 Outline

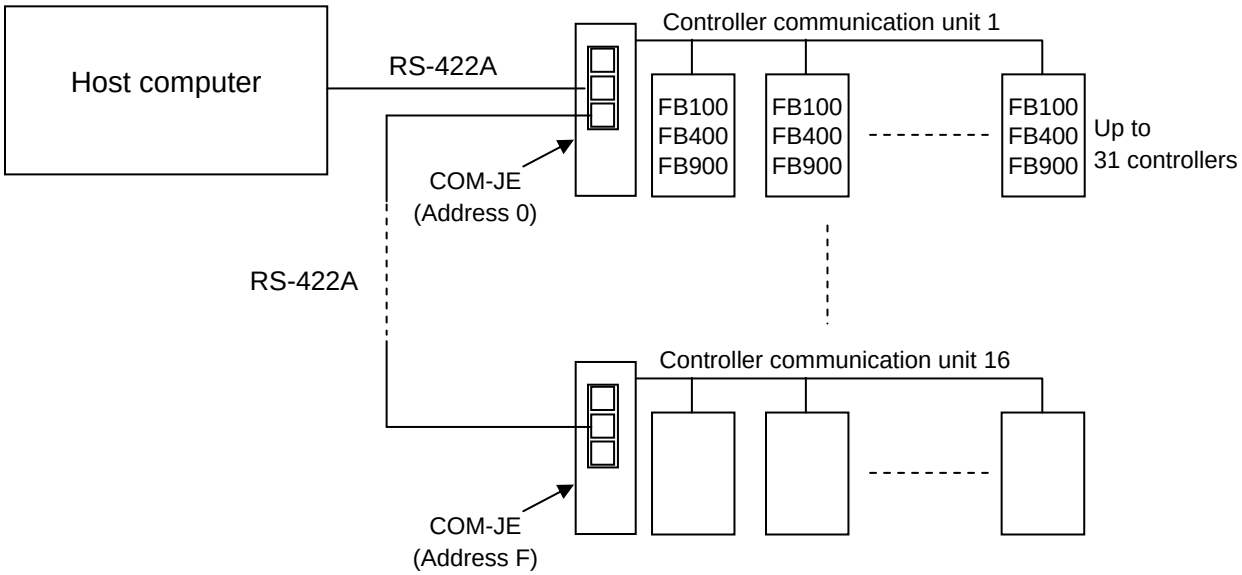
Three communication ports (COM. PORT1 to 3) of the COM-JE can be selected from among the following assignments. (The communication specification of COM. PORT2 is the same as that of COM. PORT3.)

	Assignment 1	Assignment 2
COM. PORT1	Host communication	PLC communication *
COM. PORT2/COM. PORT3	PLC communication *	Host communication

* It is also possible to select Host communication. In this case, all of the three ports are used for Host communication.

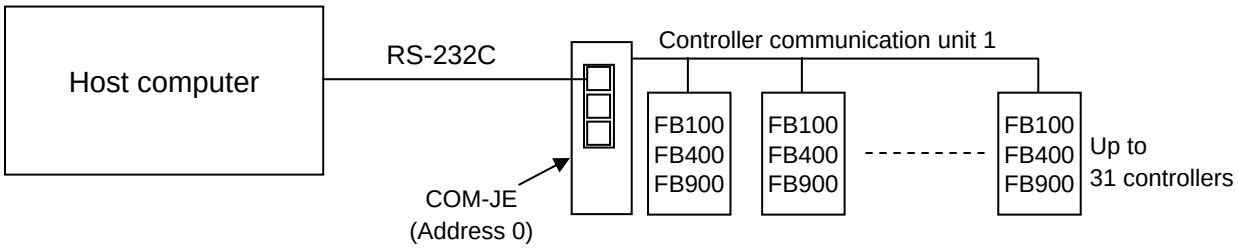
- For COM. PORT1, either RS-422A or RS-232C can be selected when ordering. In addition, for COM. PORT2/3, only RS-422A is available.
- When the COM.PORT2/3 is used in Host communication, up to 16 COM-JE units can be multi-drop connected to one communication port of host computer.

● RS-422A



Up to 16 COM-JE units can be multi-drop connected to one host computer communication port.

● RS-232C



One COM-JE unit can be connected to one host computer communication port.

7.2 Wiring

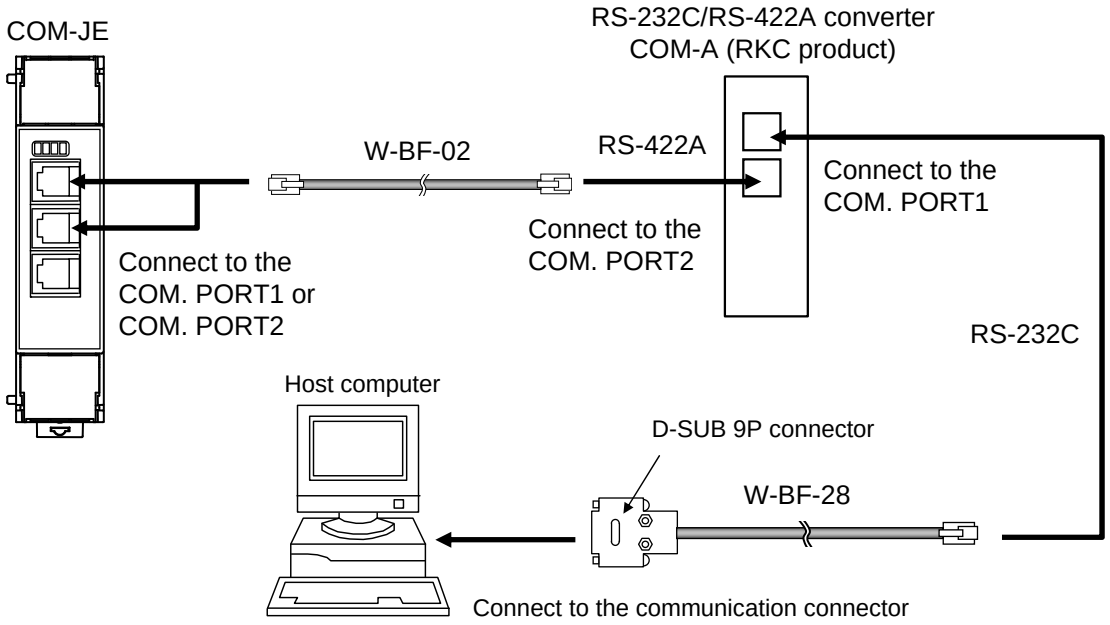
⚠ WARNING

To prevent electric shock or instrument failure, turn off the power before connecting or disconnecting the instrument and peripheral equipment.

CAUTION

- Connect connectors correctly in the right position. If it is forcibly pushed in with pins in the wrong positions, the pins may be bent resulting in instrument failure.
- When connecting or disconnecting the connectors, do not force it too far to right and left or up and down, but move it on the straight. Otherwise, the connector pins may be bent, causing instrument failure.
- When disconnecting a connector, hold it by the connector itself. Disconnecting connectors by yanking on their cables can cause breakdowns.
- To prevent malfunction, never touch the contact section of a connector with bare hands or with hands soiled with oil or the like.
- To prevent malfunction, connect cable connectors securely, then firmly tighten the connector fastening screws.
- To prevent damage to cables, do not bend cables over with excessive force.
- If the instrument is easily affected by noise, use the ferrite core at the both ends of the communication cable (nearest the connector).

■ RS-422A



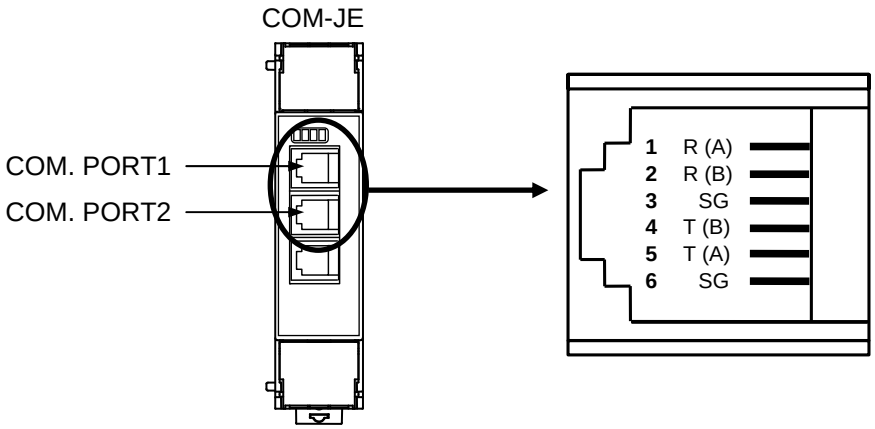
Cable type: W-BF-02-3000 (RKC product, Sold separately) [Standard cable length: 3 m]
W-BF-28-3000 (RKC product, Sold separately) [Standard cable length: 3 m]

Connection cable W-BF-02 * and W-BF-28 (RKC product) can be used to connect the host computer.
* Shields of the cable are connected to SG (No. 6 pin) of the COM-JE connector.

Recommended RS-232C/RS-422A converter: **COM-A** (RKC product)
For the COM-A, refer to **COM-A/COM-B Instruction Manual (IMSRM33-E□)**.

For the communication port assignment of the COM-JE, refer to **5.2 Communication Setting Switch (P. 23)**.

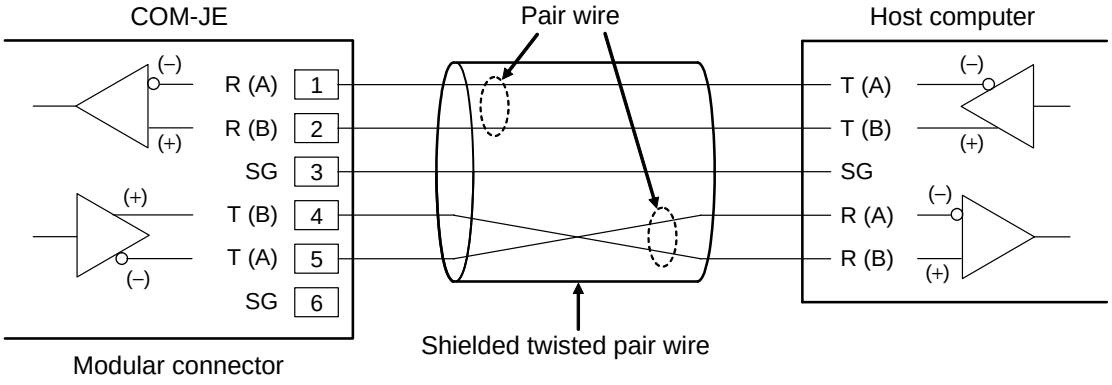
● Pin layout of modular connector



- **Connector pin number and signal details**

Pin No.	Signal name	Symbol
1	Receive data	R (A)
2	Receive data	R (B)
3	Signal ground	SG
4	Send data	T (B)
5	Send data	T (A)
6	Signal ground	SG

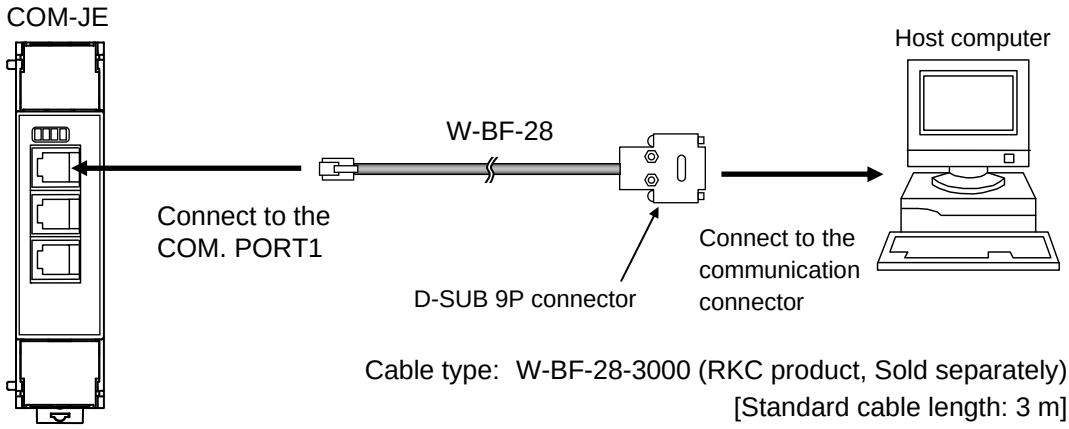
- **Diagram of RS-422A wiring**



The 6-pin type modular connector should be used for the connection to the COM-JE.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.)

Customer is requested to prepare a communication cable fit for the control unit to be connected by the host computer.

■ RS-232C

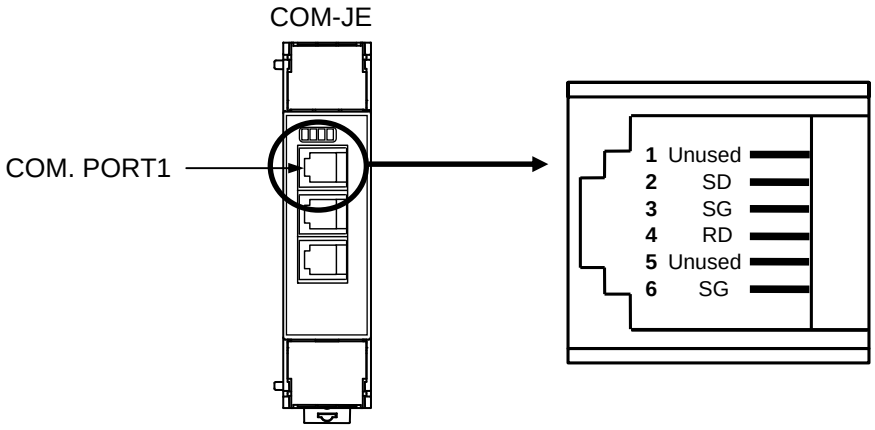


Cable type: W-BF-28-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

Connection cable W-BF-28 * (RKC product) can use to connect the host computer.
* Shields of the cable are connected to SG (No. 6 pin) of the COM-JE connector.

For the communication port assignment, refer to **5.2 Communication Setting Switch (P. 23)**.

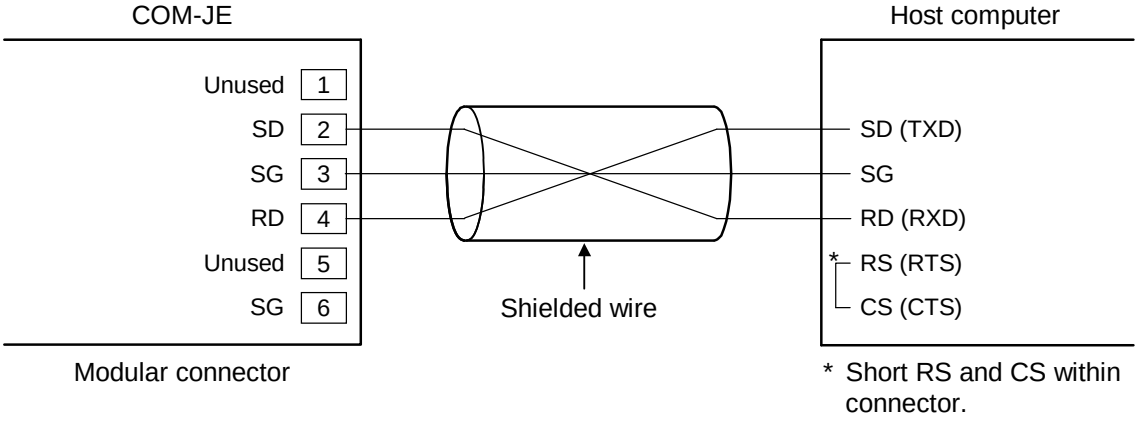
- **Pin layout of modular connector**



- **Connector pin number and signal details**

Pin No.	Signal name	Symbol
1	Unused	—
2	Send data	SD (TXD)
3	Signal ground	SG
4	Receive data	RD (RXD)
5	Unused	—
6	Signal ground	SG

- **Diagram of RS-232C wiring**



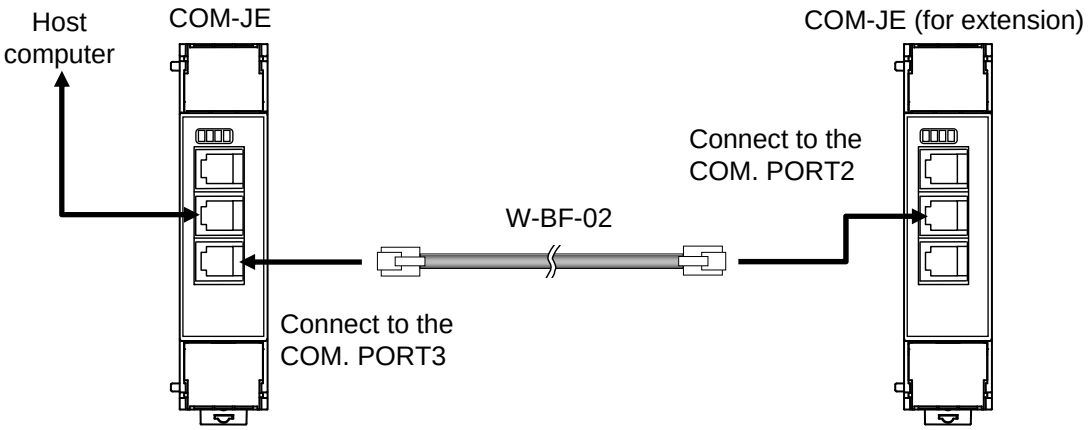
The 6-pin type modular connector should be used for the connection to the COM-JE.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.)

Customer is requested to prepare a communication cable fit for the control unit to be connected by the host computer.

■ Multiple COM-JE connections

● COM. PORT2/3

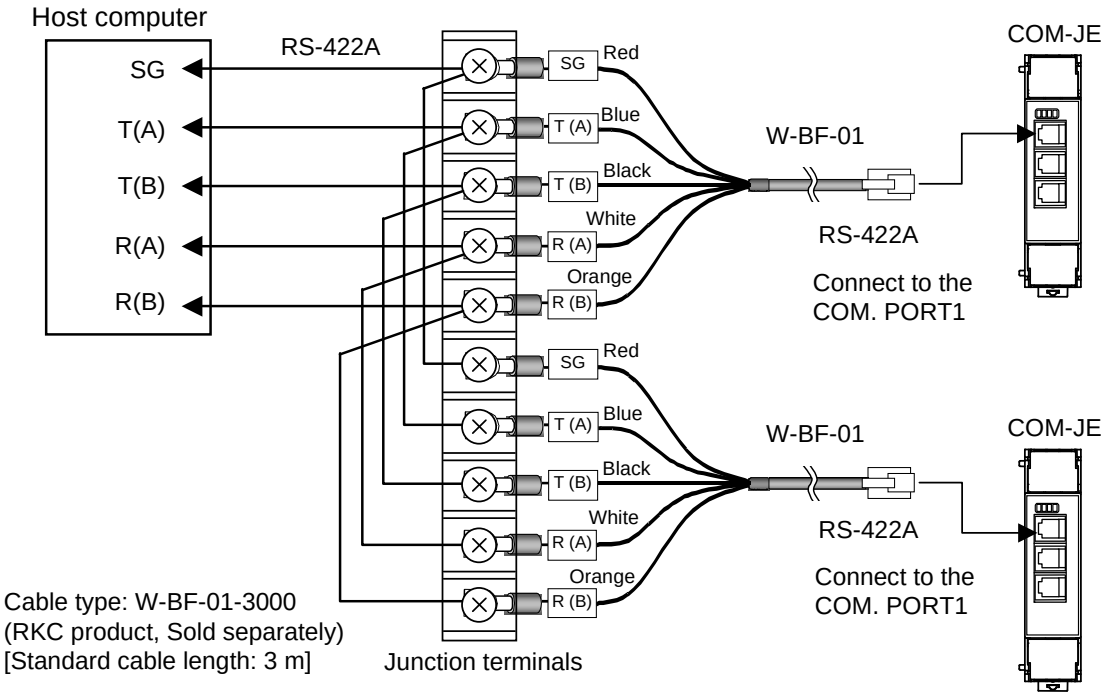
COM. PORT2/3 is connectors for multi-drop connection of the COM-JE.
For COM-JE extension, connect COM. PORT3 to COM. PORT2 of the COM-JE for extension using our cable (Sold separately: W-BF-02).



Cable type: W-BF-02-3000 (RKC product, Sold separately)
[Standard cable length: 3 m]

● COM. PORT1

When multi-drop connection is made by using COM. PORT1, it is necessary to conduct wiring by using junction terminals and our cables (Sold separately: W-BF-01).



7.3 Host Communication Environment Setting

The Host communication environment setting is common to the PLC communication environment setting. However, Host communication related items are set only by the address setting method (Bit 0) in Action mode selection (identifier: RZ, register address: 800CH).

☞ For PLC communication environment setting, refer to **6.1.3 PLC communication environment setting [MITSUBISHI PLC] (P. 34)** or **6.2.3 PLC communication environment setting [OMRON PLC] (P. 53)**.

☞ For the address setting, refer to **5.1 Address Setting (P. 20)**.

☞ For the Host communication setting, refer to ■ **Host communication setting switch (P. 25)** of **5.2 Communication Setting Switch**.

📖 **Data which can be set by the Host communication is limited to the content set by Controller communication block selection (identifier: R4, register address: 800DH)**. **For details, refer to 7.5.5 COM-JE communication data items (P. 145).**

7.4 Communication Requirements

Basically, Host communication is the same as FB100/400/900 Host communication.
Difference from the latter are described in the following:

📖 **COM-JE does not read/write data for Control area Local/External transfer of FB100. COM-JE does not read Model code and ROM version monitor of FB100/400/900.**

☞ For Host communication of FB100/400/900, refer to **FB100/FB400/FB900 Communication Instruction Manual (IMR01W04-E□)**.

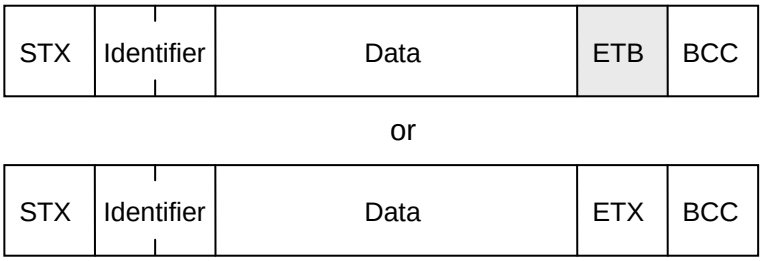
7.4.1 RKC communication

■ Protocol

For the COM-JE, the protocol bases on ANSI X3.28-1976 subcategories 2.5 and B1.
Therefore, it is possible to divide sending data into blocks by using the transmission control character, ETB.

● Pooling

If the polling sequence is received correctly, the COM-JE sends data in the following format:

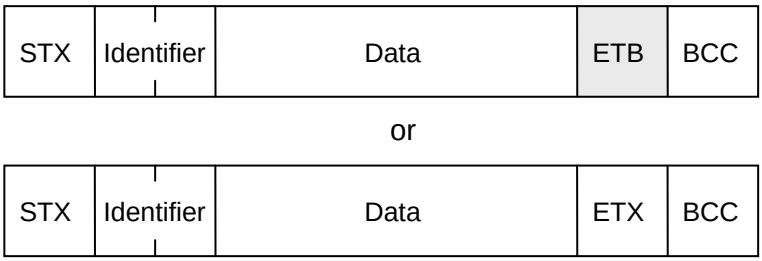


📖 If the length of send data (from STX to BCC) exceeds 255 bytes *, it is divided into blocks by ETB. In this case, the succeeding divided data is sent after STX.

* Communication data block length can be changed with Communication data block length (identifier Z3) of the initial setting mode.

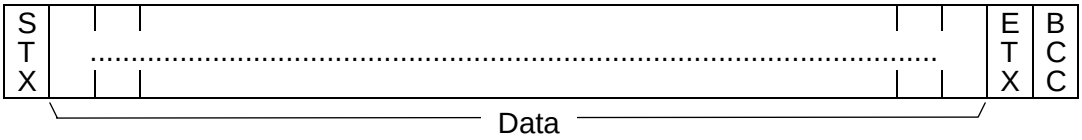
● Selecting

The host computer sends data for the selecting sequence with the following format:



📖 Send data (from STX to BCC) can be divided into some groups by ETB. In this case, the succeeding divided data is sent after STX.

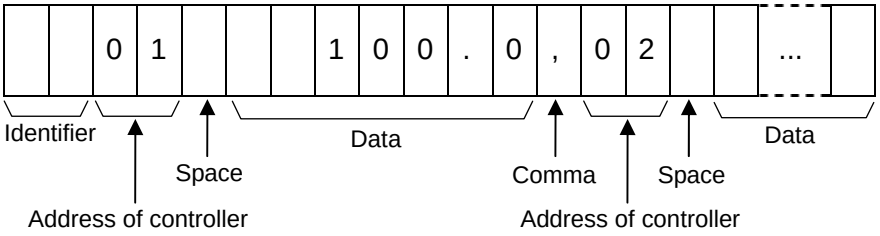
■ Communication data structure



Part of the data above is shown below.

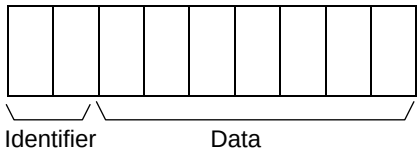
● Data for each controller

Data length 7 digits



● Data for each controller communication unit

Data length 7 digits



7.4.2 Modbus

For the FB100/400/900, one communication item corresponds to one register address. However for the COM-JE, as up to 31 FB100/400/900s can be connected to one COM-JE 31 register addresses are assigned in succession to one communication item for data relating to every controller.

☞ For details, refer to **7.5 Communication Data List (P. 114)**.

■ Memory area data

● Read and write of memory area data

If any memory area number to perform data read and write is specified by the Setting memory area number (2000H to 201EH), data corresponding to the specified memory area number is called up to the register addresses from 2020H to 22BFH. By using these register addresses from 2020H to 22BFH, it becomes possible to read and write data in any memory area.

- Register address to specify memory area: 2000H to 201EH (Setting memory area number)

  2000H: Setting memory area number for controller address 1
  2001H: Setting memory area number for controller address 2
  ⋮
  201EH: Setting memory area number for controller address 31
  (201FH: Unused)

- Register address of memory area data: 2020H to 22BFH

2020H to 203EH:	Event 1 set value	(203FH: Unused)
2040H to 205EH:	Event 2 set value	(205FH: Unused)
2060H to 207EH:	Event 3 set value	(207FH: Unused)
2080H to 209EH:	Event 4 set value	(209FH: Unused)
20A0H to 20BEH:	Control loop break alarm (LBA) time	(20BFH: Unused)
20C0H to 20DEH:	LBA deadband	(20DFH: Unused)
20E0H to 20FEH:	Set value (SV)	(20FFH: Unused)
2100H to 211EH:	Proportional band [heat-side]	(211FH: Unused)
2120H to 213EH:	Integral time [heat-side]	(213FH: Unused)
2140H to 215EH:	Derivative time [heat-side]	(215FH: Unused)
2160H to 217EH:	Control response parameter	(217FH: Unused)
2180H to 219EH:	Proportional band [cool-side]	(219FH: Unused)
21A0H to 21BEH:	Integral time [cool-side]	(21BFH: Unused)
21C0H to 21DEH:	Derivative time [cool-side]	(21DFH: Unused)
21E0H to 201FH:	Overlap/Deadband	(21FFH: Unused)
2200H to 221EH:	Manual reset	(221FH: Unused)
2220H to 223EH:	Setting change rate limiter (up)	(223FH: Unused)
2240H to 225EH:	Setting change rate limiter (down)	(225FH: Unused)
2260H to 227EH:	Area soak time	(227FH: Unused)
2280H to 229EH:	Link area number	(229FH: Unused)
22A0H to 22BFH:	Unused	

📖 Register address of each item corresponds to any controller address from 1 to 31.

● Control area transfer

Any memory area used for control is specified by the memory area transfer (0480H to 049EH). The area (04C0H to 073FH) now used for control is called Control area.

- Register address of memory area transfer: 0480H to 049EH

  0480H: Memory area transfer for controller address 1
  0481H: Memory area transfer for controller address 2
  ⋮
  049EH: Memory area transfer for controller address 31
  (049FH: Unused)

- Register address of control area data: 04C0H to 073FH

04C0H to 04DEH:	Event 1 set value	(04DFH: Unused)
04E0H to 04FEH:	Event 2 set value	(04FFH: Unused)
0500H to 051EH:	Event 3 set value	(051FH: Unused)
0520H to 053EH:	Event 4 set value	(053FH: Unused)
0540H to 055EH:	Control loop break alarm (LBA) time	(055FH: Unused)
0560H to 057EH:	LBA deadband	(057FH: Unused)
0580H to 059EH:	Set value (SV)	(059FH: Unused)
05A0H to 05BEH:	Proportional band [heat-side]	(05BFH: Unused)
05C0H to 05DEH:	Integral time [heat-side]	(05DFH: Unused)
05E0H to 05FEH:	Derivative time [heat-side]	(05FFH: Unused)
0600H to 061EH:	Control response parameter	(061FH: Unused)
0620H to 063EH:	Proportional band [cool-side]	(063FH: Unused)
0640H to 065EH:	Integral time [cool-side]	(065FH: Unused)
0660H to 067EH:	Derivative time [cool-side]	(067FH: Unused)
0680H to 069FH:	Overlap/Deadband	(069FH: Unused)
06A0H to 06BEH:	Manual reset	(06BFH: Unused)
06C0H to 06DEH:	Setting change rate limiter (up)	(06DFH: Unused)
06E0H to 06FEH:	Setting change rate limiter (down)	(06FFH: Unused)
0700H to 071EH:	Area soak time	(071FH: Unused)
0720H to 073EH:	Link area number	(073FH: Unused)

Register address of each item corresponds to any controller address from 1 to 31.

■ Data mapping

In this communication, it is possible to continuously read/write data by freely specifying 16 sets of data for each controller.

- Register address to specify mapping data: 3000H to 31FFH

  3000H to 301EH: Register address setting 1 (Controller 1 to 31) (301FH: Unused)
  3020H to 303EH: Register address setting 2 (Controller 1 to 31) (303FH: Unused)
  3040H to 305EH: Register address setting 3 (Controller 1 to 31) (305FH: Unused)
  3060H to 307EH: Register address setting 4 (Controller 1 to 31) (307FH: Unused)
  3080H to 309EH: Register address setting 5 (Controller 1 to 31) (309FH: Unused)
  30A0H to 30BEH: Register address setting 6 (Controller 1 to 31) (30BFH: Unused)
  30C0H to 30DEH: Register address setting 7 (Controller 1 to 31) (30DFH: Unused)
  30E0H to 30FEH: Register address setting 8 (Controller 1 to 31) (30FFH: Unused)
  3100H to 311EH: Register address setting 9 (Controller 1 to 31) (311FH: Unused)
  3120H to 313EH: Register address setting 10 (Controller 1 to 31) (313FH: Unused)
  3140H to 315EH: Register address setting 11 (Controller 1 to 31) (315FH: Unused)
  3160H to 317EH: Register address setting 12 (Controller 1 to 31) (317FH: Unused)
  3180H to 319EH: Register address setting 13 (Controller 1 to 31) (319FH: Unused)
  31A0H to 31BEH: Register address setting 14 (Controller 1 to 31) (31BFH: Unused)
  31C0H to 31DFH: Register address setting 15 (Controller 1 to 31) (31DFH: Unused)
  31E0H to 31FEH: Register address setting 16 (Controller 1 to 31) (31FFH: Unused)

- Register address to actually read/write data: 3400H to 35FFH

  3400H to 341EH: Specified item of register address setting 1 (Controller 1 to 31) (341FH: Unused)
  3420H to 343EH: Specified item of register address setting 2 (Controller 1 to 31) (343FH: Unused)
  3440H to 345EH: Specified item of register address setting 3 (Controller 1 to 31) (345FH: Unused)
  3460H to 347EH: Specified item of register address setting 4 (Controller 1 to 31) (347FH: Unused)
  3480H to 349EH: Specified item of register address setting 5 (Controller 1 to 31) (349FH: Unused)
  34A0H to 34BEH: Specified item of register address setting 6 (Controller 1 to 31) (34BFH: Unused)
  34C0H to 34DEH: Specified item of register address setting 7 (Controller 1 to 31) (34DFH: Unused)
  34E0H to 34FEH: Specified item of register address setting 8 (Controller 1 to 31) (34FFH: Unused)
  3500H to 351EH: Specified item of register address setting 9 (Controller 1 to 31) (351FH: Unused)
  3520H to 353EH: Specified item of register address setting 10 (Controller 1 to 31) (353FH: Unused)

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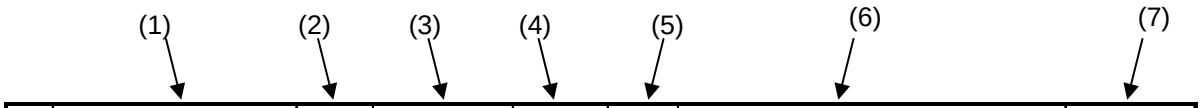
3540H to 355EH: Specified item of register address setting 11 (Controller 1 to 31)
(355FH: Unused)
3560H to 357EH: Specified item of register address setting 12 (Controller 1 to 31)
(357FH: Unused)
3580H to 359EH: Specified item of register address setting 13 (Controller 1 to 31)
(359FH: Unused)
35A0H to 35BEH: Specified item of register address setting 14 (Controller 1 to 31)
(35BFH: Unused)
35C0H to 35DFH: Specified item of register address setting 15 (Controller 1 to 31)
(35DFH: Unused)
35E0H to 35FEH: Specified item of register address setting 16 (Controller 1 to 31)
(35FFH: Unused)

7.5 Communication Data List

7.5.1 Reference to communication data list



No.	Name	RKC Identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
1	Measured value (PV)	M1	0000	0	31	RO	Input scale low to Input scale high	—
2	Current transformer 1 (CT1) input value monitor	M3	0020	32	31	RO	CTL-6-P-N: 0.0 to 30.0 A	—
3	Current transformer 2 (CT2) input value monitor	M4	0040	64	31	RO	CTL-12-S56-10L-N: 0.0 to 100.0 A	—

(1) Name: Communication data name

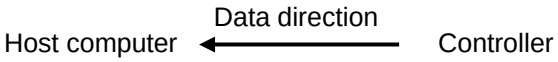
(2) RKC communication identifier:
Communication identifier of RKC communication

(3) Modbus register address:
The register start number of each communication item in Modbus (Vacant numbers becomes unused.)
HEX: Hexadedimal DEC: Decimal

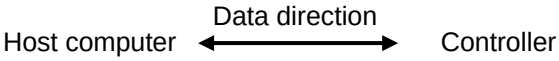
(4) Number of data items: Number of communication data items is written.

(5) Attribute: A method of how communication data items are read or written when viewed from the host computer is described.

RO: Read only data

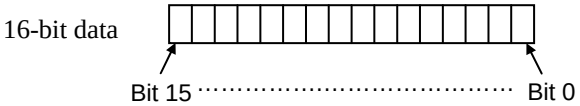


R/W: Read and Write data



(6) Data range: Read or Write range of communication data

Bit image of bit data is as follows.



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

Reading data of unused setting items are factory set values. Unused setting items may not be written. To do so will not cause an error however and data will be rejected.

For the Memory area data, refer to **7.5.3 Memory area data items (P. 140)**.

For the data mapping address, refer to **7.5.4 Data mapping address items (P. 143)**.

For details on the data, refer to **FB100 Instruction Manual (IMR01W16-E□)** or **FB400/FB900 Instruction Manual (IMR01W03-E□)**.

7.5.2 FB100/400/900 communication data items (RKC communication/Modbus)

For data corresponding to Nos. 76 to 219 (other than No. 204 Startup tuning and No. 210 Automatic temperature rise learning), its attribute becomes RO (Read only data) during RUN (control). When setting data corresponding to Nos. 76 to 219 (other than No. 204 and No. 210), write the data after STOP (control stop) is selected.

No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
1	Measured value (PV)	M1	0000	0	31	RO	Input scale low to Input scale high Varies with the setting of the Decimal point position selection.	—
2	Current transformer 1 (CT1) input value monitor	M3	0020	32	31	RO	CTL-6-P-N: 0.0 to 30.0A CTL-12-S56-10L-N: 0.0 to 100.0 A	—
3	Current transformer 2 (CT2) input value monitor	M4	0040	64	31	RO		—
4	Set value (SV) monitor	MS	0060	96	31	RO	Setting limiter low to Setting limiter high Varies with the setting of the Decimal point position selection.	—
5	Remote setting (RS) input value monitor	S2	0080	128	31	RO	Setting limiter low to Setting limiter high Varies with the setting of the Decimal point position selection.	—
6	Burnout state monitor	B1	00A0	160	31	RO	0: OFF 1: ON	—
7	Burnout state monitor of feedback resistance input	B2	00C0	192	31	RO	0: OFF 1: ON	—
8	Event 1 state monitor	AA	00E0	224	31	RO	0: OFF 1: ON	—
9	Event 2 state monitor	AB	0100	256	31	RO		—
10	Event 3 state monitor	AC	0120	288	31	RO		—
11	Event 4 state monitor	AD	0140	320	31	RO		—
12	Heater break alarm 1 (HBA1) state monitor	AE	0160	352	31	RO	0: OFF 1: ON	—
13	Heater break alarm 2 (HBA2) state monitor	AF	0180	384	31	RO		—
14	Manipulated output value (MV1) monitor [heat-side]	O1	01A0	416	31	RO	PID control or Heat/Cool PID control: −5.0 to +105.0 % Position proportioning PID control with feedback resistance (FBR) input: 0.0 to 100.0 %	—

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
15	Manipulated output value (MV2) monitor [cool-side]	O2	01C0	448	31	RO	−5.0 to +105.0 %	—
16	Error code	ER	01E0	480	31	RO	Bit data Bit 0: Adjustment data error Bit 1: Back-up error Bit 2: A/D conversion error Bit 3 to Bit 4: Unused Bit 5: Custom data error Bit 6: Unused Bit 7: Watchdog timer error Bit 8: Stack overflow Bit 9 to Bit 10: Unused Bit 11: Program error (busy) Bit 12 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 4095]	—
17	Digital input (DI) state monitor	L1	0200	512	31	RO	Bit data Bit 0: DI 1 Bit 4: DI 5 Bit 1: DI 2 Bit 5: DI 6 * Bit 2: DI 3 Bit 6: DI 7 * Bit 3: DI 4 Bit 7 to Bit 15: Unused Data 0: Contact open 1: Contact closed [Decimal number: 0 to 127] * Unused on the FB100.	—
18	Output state monitor	Q1	0220	544	31	RO	Bit data Bit 0: OUT1 Bit 3: DO2 Bit 1: OUT2 Bit 4: DO3 * Bit 2: DO1 Bit 5: DO4 * Bit 6 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 63] * Unused on the FB100.	—
19	Operation mode state monitor	L0	0240	576	31	RO	Bit data Bit 0: Control STOP Bit 1: Control RUN Bit 2: Manual mode * Bit 3: Remote mode * Bit 4 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 15] * During operation in Manual mode, the Manual mode of the Operation mode state monitor is set to the “1: ON” state and the Remote mode of the same monitor is se to the “0: OFF” state even if the parameter, Remote/Local transfer is set to “1: Remote mode.”	—

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
20	Memory area soak time monitor	TR	0260	608	31	RO	0 to 11999 seconds or 0 to 5999 minutes Data range of Area soak time can be selected on the Soak time unit.	—
21	Integrated operating time monitor	UT	0280	640	31	RO	0 to 19999 hours	—
22	Holding peak value ambient temperature monitor	Hp	02A0	672	31	RO	−10.0 to +100.0 °C	—
23	Power feed forward input value monitor ♦	HM	02C0	704	31	RO	0.0 to 160.0 % Display in the percentage of the load voltage (rated value).	—
24	Backup memory state monitor	EM	02E0	736	31	RO	0: The content of the backup memory does not coincide with that of the RAM. 1: The content of the backup memory coincides with that of the RAM.	—
25	Unused	—	0300	768	32	—	—	—
26	Unused	—	0320	800	32	—	—	—
27	Unused	—	0340	832	32	—	—	—
28	Unused	—	0360	864	32	—	—	—
29	Unused	—	0380	896	32	—	—	—
30	Unused	—	03A0	928	32	—	—	—
31	Unused	—	03C0	960	32	—	—	—
32	Unused	—	03E0	992	32	—	—	—
33	PID/AT transfer	G1	0400	1024	31	R/W	0: PID control 1: Autotuning (AT) When the Autotuning (AT) is finished, the control automatically returns to 0: PID control.	0
34	Auto/Manual transfer	J1	0420	1056	31	R/W	0: Auto mode 1: Manual mode	0
35	Remote/Local transfer	C1	0440	1088	31	R/W	0: Local mode 1: Remote mode When performing Remote control by Remote setting input and also performing Cascade control and Ratio setting via Intercontroller communication, transfer to the Remote mode. [FB100] When the Remote setting (RS) input is not provided, this data becomes RO (Read only data).	0

♦ Unused on the FB100.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
36	RUN/STOP transfer	SR	0460	1120	31	R/W	0: RUN mode (Control start) 1: STOP mode (Control stop)	0
37	Memory area transfer	ZA	0480	1152	31	R/W	1 to 8 [FB100] When the Digital input (DI) assignment (No. 95) value is 6 to 12 and Control area Local/External transfer * is External mode, this data becomes RO (Read only data). * Operation of Control area Local/External transfer is only available for FB100.	1
38	Interlock release	IL	04A0	1184	31	R/W	0: Interlock release (execution/state) 1: Interlock An event whose event interlock is set to "1: Used" is set to the event ON state results in "1: Interlocked state." "1" is for monitoring the interlocked state. Under this condition, do not write "1."	0
39	Event 1 set value ★	A1	04C0	1216	31	R/W	Deviation: –Input span to +Input span Varies with the setting of the Decimal point position selection. Process and set value: Input scale low to Input scale high Varies with the setting of the Decimal point position selection. Manipulated output value (MV1 or MV2): –5.0 to +105.0 % If the Event type corresponds to "0: None," set to RO (Read only data). If Event 4 corresponds to "9: Control loop break alarm (LBA)," the Event 4 set value becomes RO (Read only data).	50
40	Event 2 set value ★	A2	04E0	1248	31	R/W		50
41	Event 3 set value ★	A3	0500	1280	31	R/W		50
42	Event 4 set value ★	A4	0520	1312	31	R/W		50
43	Control loop break alarm (LBA) time ★	A5	0540	1344	31	R/W	0 to 7200 seconds (0: Unused) If Event 4 is other than "9: Control loop break alarm (LBA)," set to RO (Read only data).	480
44	LBA deadband ★	N1	0560	1376	31	R/W	0 to Input span Varies with the setting of the Decimal point position selection. If Event 4 is other than "9: Control loop break alarm (LBA)," set to RO (Read only data).	0
45	Set value (SV) ★	S1	0580	1408	31	R/W	Setting limiter low to Setting limiter high Varies with the setting of the Decimal point position selection.	TC/RTD: 0 V/I: 0.0

★ Data related to multi-memory area function

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
46	Proportional band [heat-side] ★	P1	05A0	1440	31	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of input span (0, 0.0 or 0.00: ON/OFF action)	TC/RTD: 30 V/I: 30.0
47	Integral time [heat-side] ★	I1	05C0	1472	31	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PD action) [both heat-side and cool-side] Position proportioning PID control: 1 to 3600 seconds or 0.1 to 1999.9 seconds Varies with the setting of the Integral/ Derivative time decimal point position selection.	240
48	Derivative time [heat-side] ★	D1	05E0	1504	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PI action) Varies with the setting of the Integral/ Derivative time decimal point position selection.	60
49	Control response parameter ★	CA	0600	1536	31	R/W	0: Slow 1: Medium 2: Fast When the P or PD action is selected, this setting becomes invalid.	PID control, Position proportioning PID control: 0 Heat/Cool PID control: 2
50	Proportional band [cool-side] ★	P2	0620	1568	31	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span, (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of input span If control is other than Heat/Cool PID control, set to RO (Read only data).	TC/RTD: 30 V/I: 30.0
51	Integral time [cool-side] ★	I2	0640	1600	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PD action) [both heat-side and cool-side] Varies with the setting of the Integral/ Derivative time decimal point position selection. If control is other than Heat/Cool PID control, set to RO (Read only data).	240

★ Data related to multi-memory area function

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
52	Derivative time [cool-side] ★	D2	0660	1632	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PI action) Varies with the setting of the Integral/ Derivative time decimal point position selection. If control is other than Heat/Cool PID control, set to RO (Read only data).	60
53	Overlap/Deadband ★	V1	0680	1664	31	R/W	TC/RTD inputs: −Input span to +Input span (Unit:°C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: −100.0 to +100.0 % of input span Minus (−) setting results in Overlap. However, the overlapping range is within the proportional range. If control is other than Heat/Cool PID control, set to RO (Read only data).	0
54	Manual reset ★	MR	06A0	1696	31	R/W	−100.0 to +100.0 % The offset can be manually eliminated. If the integral function is valid, set to RO (Read only data).	0.0
55	Setting change rate limiter (up) ★	HH	06C0	1728	31	R/W	0 to Input span/unit time * (0: Unused) Varies with the setting of the Decimal point position selection. * Unit time: 60 seconds (factory set value)	0
56	Setting change rate limiter (down) ★	HL	06E0	1760	31	R/W		0
57	Area soak time ★	TM	0700	1792	31	R/W	0 to 11999 seconds or 0 to 5999 minutes Data range of Area soak time can be selected on the Soak time unit. [FB100] When the Digital input (DI) assignment (No. 95) value is 6 to 12, this data becomes RO (Read only data).	0
58	Link area number ★	LP	0720	1824	31	R/W	0 to 8 (0: No link) [FB100] When the Digital input (DI) assignment (No. 95) value is 6 to 12, this data becomes RO (Read only data).	0
59	Heater break alarm 1 (HBA1) set value	A7	0740	1856	31	R/W	When CT is CTL-6-P-N: 0.0 to 30.0 A (0.0: Not used) When CT is CTL-12-S56-10L-N: 0.0 to 100.0 A (0.0: Not used) If there is no Current transformer 1 (CT1) or CT1 is assigned to "0: None," set to RO (Read only data).	0.0

★ Data related to multi-memory area function

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
60	Heater break determination point 1	NE	0760	1888	31	R/W	0.0 to 100.0 % of HBA1 set value (0.0: Heater break determination is invalid) If there is no Current transformer 1 (CT1) or CT1 is assigned to "0: None," set to RO (Read only data). If Heater break alarm 1 (HBA1) corresponds to "0: Type A," set to RO (Read only data).	30.0
61	Heater melting determination point 1	NF	0780	1920	31	R/W	0.0 to 100.0 % of HBA1 set value (0.0: Heater melting determination is invalid) If there is no Current transformer 1 (CT1) or CT1 is assigned to "0: None," set to RO (Read only data). If Heater break alarm 1 (HBA1) corresponds to "0: Type A," set to RO (Read only data).	30.0
62	Heater break alarm 2 (HBA2) set value	A8	07A0	1952	31	R/W	When CT is CTL-6-P-N: 0.0 to 30.0 A (0.0: Not used) When CT is CTL-12-S56-10L-N: 0.0 to 100.0 A (0.0: Not used) If there is no Current transformer 2 (CT2) or CT2 is assigned to "0: None," set to RO (Read only data).	0.0
63	Heater break determination point 2	NH	07C0	1984	31	R/W	0.0 to 100.0 % of HBA2 set value (0.0: Heater break determination is invalid) If there is no Current transformer 2 (CT2) or CT2 is assigned to "0: None," set to RO (Read only data). If Heater break alarm 2 (HBA2) corresponds to "0: Type A," set to RO (Read only data).	30.0
64	Heater melting determination point 2	NI	07E0	2016	31	R/W	0.0 to 100.0 % of HBA2 set value (0.0: Heater melting determination is invalid) If there is no Current transformer 2 (CT2) or CT2 is assigned to "0: None," set to RO (Read only data). If Heater break alarm 2 (HBA2) corresponds to "0: Type A," set to RO (Read only data).	30.0
65	PV bias	PB	0800	2048	31	R/W	–Input span to +Input span Varies with the setting of the Decimal point position selection.	0
66	PV digital filter	F1	0820	2080	31	R/W	0.0 to 100.0 seconds (0.0: Unused)	0.0
67	PV ratio	PR	0840	2112	31	R/W	0.500 to 1.500	1.000

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
68	PV low input cut-off	DP	0860	2144	31	R/W	0.00 to 25.00 % of input span If the Input square root extraction corresponds to "0: Unused," set to RO (Read only data).	0.00
69	RS bias Cascade control: Cascade bias Retio setting: Ratio setting bias	RB	0880	2176	31	R/W	–Input span to +Input span Varies with the setting of the Decimal point position selection. [FB100] When the Remote setting (RS) input is not provided, this data becomes RO (Read only data).	0
70	RS digital filter Cascade control: Cascade digital filter Retio setting: Ratio setting digital filter	F2	08A0	2208	31	R/W	0.0 to 100.0 seconds (0.0: Unused) [FB100] When the Remote setting (RS) input is not provided, this data becomes RO (Read only data).	0.0
71	RS ratio Cascade control: Cascade ratio Retio setting: Ratio setting ratio	RR	08C0	2240	31	R/W	0.001 to 9.999 [FB100] When the Remote setting (RS) input is not provided, this data becomes RO (Read only data).	1.000
72	Proportional cycle time [heat-side]	T0	08E0	2272	31	R/W	0.1 to 100.0 seconds This item becomes RO (Read only data) for the Voltage/Current output specification.	Relay contact output: 20.0 Voltage pulse output, Triac output and Open collector output: 2.0
73	Proportional cycle time [cool-side]	T1	0900	2304	31	R/W	0.1 to 100.0 seconds If control is other than Heat/Cool PID control, set to RO (Read only data). This item becomes RO (Read only data) for the Voltage/Current output specification.	Relay contact output: 20.0 Voltage pulse output, Triac output and Open collector output: 2.0
74	Manual manipulated output value	ON	0920	2336	31	R/W	PID control: Output limiter low (MV1) to Output limiter high (MV1) Heat/Cool PID control: –Output limiter high (MV2) to +Output limiter high (MV1) For overlap: –105.0 to +105.0 % * * Actual output value is limited by the output limiter function. Position proportioning PID control with feedback resistance (FBR) input: Output limiter low (MV1) to Output limiter high (MV1)	0.0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
75	Set lock level	LK	0940	2368	31	R/W	Bit data Bit 0: Lock only setting items other than SV and Event set value (EV1 to EV4). Bit 1: Lock only Event set value (EV1 to EV4) Bit 2: Lock only Set value (SV) Bit 3 to Bit 15: Unused Data 0: Unlock 1: Lock [Decimal number: 0 to 7]	0
76	STOP display	DX	0960	2400	31	R/W	0: SToP is displayed on the PV display. 1: SToP is displayed on the SV display.	1
77	Bar graph display	DA	0980	2432	31	R/W	0: No display 1: Manipulated output value (MV) 2: Measred value (PV) 3: Set value (SV) monitor 4: Deviation value 5: CT1 input value 6: CT2 input value	1
78	Bar graph display resolution	DE	09A0	2464	31	R/W	1 to 100 digit/dot Becomes valid when the Bar graph display is “4: Deviation value,” “5: CT1 input value” or “6: CT2 input value.”	100
79	Direct key 1 [FB100] Direct key selection	DK	09C0	2496	31	R/W	[FB100] 0: Unused 1: Used [FB400/900] 0: Unused 1: A/M transfer key (Type 1, Type 2)	1
80	Direct key 2 ♦	DL	09E0	2528	31	R/W	0: Unused 1: MONI key (For type 1) or R/L transfer key (For type 2)	1
81	Direct key 3 ♦	DM	0A00	2560	31	R/W	0: Unused 1: AREA key (For type 1) or RUN/STOP transfer key (For type 2)	1
82	Direct key type	DN	0A20	2592	31	R/W	[FB100] 1: Auto/Manual transfer 2: Monitor 3: Memory area transfer 4: Remote/Local transfer 5: RUN/STOP transfer [FB400/900] 1: Type 1 2: Type 2	1

♦ Unused on the FB100.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
83	Input type	XI	0A40	2624	31	R/W	0: TC input K 1: TC input J 2: TC input R 3: TC input S 4: TC input B 5: TC input E 6: TC input N 7: TC input T 8: TC input W5Re/W26Re 9: TC input PLII 10: TC input U 11: TC input L 12: RTD input Pt100 13: RTD input JPt100 14: Current input 0 to 20 mA DC 15: Current input 4 to 20 mA DC 16: Voltage (high) input 0 to 10 V DC 17: Voltage (high) input 0 to 5 V DC 18: Voltage (high) input 1 to 5 V DC 19: Voltage (low) input 0 to 1 V DC 20: Voltage (low) input 0 to 100 mV DC 21: Voltage (low) input 0 to 10 mV DC 24: Voltage (high) input ±1 V DC 25: Voltage (low) input ±100 mV DC 26: Voltage (low) input ±10 mV DC If changed to Voltage (high) input from TC/RTD/Current/Voltage (low) input, select the hardware by the input selector switch (for measurement input) at the side of the instrument. For the selecting procedure, refer to **FB100 Instruction Manual (IMR01W16-E□)** or **FB400/FB900 Instruction Manual (IMR01W03-E□)**.	Based on model code. When not specifying: 0
84	Display unit	PU	0A60	2656	31	R/W	0: °C 1: °F Use to select the temperature unit for thermocouple (TC) and RTD inputs.	Based on model code. When not specifying: 0
85	Decimal point position	XU	0A80	2688	31	R/W	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places 4: Four decimal places TC input: K, J, E: Only 0 or 1 can be set. T, U, L: Only 1 can be set. Other than the above: Only 0 can be set. RTD input: From 0 to 2 can be set. V/I inputs: From 0 to 4 can be set.	Based on model code. When not specifying: TC/RTD: 0 V/I: 1

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
86	Input scale high	XV	0AA0	2720	31	R/W	TC/RTD inputs: Input scale low to Maximum value of the selected input range Voltage (V)/Current (I) inputs: −19999 to +19999 Varies with the setting of the Decimal point position.	TC/RTD: Maximum value of the selected input range V/I: 100.0
87	Input scale low	XW	0AC0	2752	31	R/W	TC/RTD inputs: Minimum value of the selected input range to Input scale high Voltage (V)/Current (I) inputs: −19999 to +19999 Varies with the setting of the Decimal point position.	TC/RTD: Minimum value of the selected input range V/I: 0.0
88	Input error determination point (high)	AV	0AE0	2784	31	R/W	Input scale low − (5 % of input span) to Input scale high + (5 % of input span) Varies with the setting of the Decimal point position.	TC/RTD: Input scale high + (5 % of input span) V/I: 105.0
89	Input error determination point (low)	AW	0B00	2816	31	R/W		TC/RTD: Input scale low − (5 % of input span) V/I: −5.0
90	Burnout direction	BS	0B20	2848	31	R/W	0: Upscale 1: Downscale Valid only when the TC input and Voltage (low) input are selected.	0
91	Square root extraction	XH	0B40	2880	31	R/W	0: Unused 1: Used	0
92	Power supply frequency	JT	0B60	2912	31	R/W	0: 50 Hz 1: 60 Hz If power frequency measurement was made possible with CT input and/or Power feed forward (PFF) input applied, set to RO (Read only data).	0
93	Sampling cycle	TZ	0B80	2944	31	R/W	0: 50 ms 1: 100 ms 2: 250 ms	1

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
94	Remote setting input type	XR	0BA0	2976	31	R/W	14: Current input 0 to 20 mA DC 15: Current input 4 to 20 mA DC 16: Voltage (high) input 0 to 10 V DC 17: Voltage (high) input 0 to 5 V DC 18: Voltage (high) input 1 to 5 V DC 19: Voltage (low) input 0 to 1 V DC 20: Voltage (low) input 0 to 100 mV DC 21: Voltage (low) input 0 to 10 mV DC If changed to Voltage (high) input from Current/Voltage (low) input, select the hardware by the input selector switch (for remote setting input) at the side of the instrument. For the selecting procedure, refer to **FB100 Instruction Manual (IMR01W16-E□)** or **FB400/FB900 Instruction Manual (IMR01W03-E□)**.	Based on model code. When not specifying: 15
95	Digital input (DI) assignment	H2	0BC0	3008	31	R/W	[FB100] 1 to 26 [FB400/900] 1 to 8 Refer to **Table 1 Digital input (DI) assignment (P. 138)**.	Based on model code. When not specifying: 1
96	Output assignment	E0	0BE0	3040	31	R/W	[FB100] 1 to 15 [FB400/900] 1 to 7 Refer to **Table 2 Output assignment (P. 139)**.	Based on model code. When not specifying: FB100: 1 FB400/900: 2
97	Timer 1	TH	0C00	3072	31	R/W	0.0 to 600.0 seconds Customization tool is necessary when the timer function is availed.	0.0
98	Timer 2	TI	0C20	3104	31	R/W		0.0
99	Timer 3	TJ	0C40	3136	31	R/W		0.0
100	Timer 4	TK	0C60	3168	31	R/W		0.0
101	Energized/ De-energized	NA	0C80	3200	31	R/W	Bit data Bit 0: DO1 Bit 1: DO2 Bit 2: DO3 * Bit 3: DO4 * Bit 4 to Bit 15: Unused Data 0: Energized 1: De-energized [Decimal number: 0 to 15] * Unused on the FB100.	0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
102	Alarm (ALM) lamp lighting condition 1 [a]	LY	0CA0	3232	31	R/W	Bit data Bit 0: Event 1 Bit 1: Event 2 Bit 2: Event 3 Bit 3: Event 4 Bit 4 to Bit 15: Unused Data 0: ALM lamp is not lit 1: ALM lamp is lit [Decimal number: 0 to 15]	1111 (Bit image)
103	Alarm (ALM) lamp lighting condition 2 [a]	LZ	0CC0	3264	31	R/W	Bit data Bit 0: HBA1 Bit 1: HBA2 Bit 2 to Bit 15: Unused Data 0: ALM lamp is not lit 1: ALM lamp is lit [Decimal number: 0 to 3]	11 (Bit image)
104	Output status at STOP mode	SS	0CE0	3296	31	R/W	Bit data Bit 0: Event function Bit 1: Transmission output Bit 2 to Bit 15: Unused Data 0: OFF 1: Action continued [Decimal number: 0 to 3]	0
105 ⋮ 110	Unused	—	0D00 ⋮ 0DA0	3328 ⋮ 3488	—	—	—	—
111	Transmission output type	LA	0DC0	3520	31	R/W	0: None 1: Measured value (PV) 2: Set value (SV) monitor 3: Deviation value 4: Manupulated output value (MV1) [heat-side] 5: Manupulated output value (MV2) [cool-side] 6: Set value (SV) 7: Remote seting (RS) input value	1
112	Transmission output scale high	HV	0DE0	3552	31	R/W	When the PV, SV, SV monitor and RS: Input scale low to Input scale high Varies with the setting of the Decimal point position. When the MV1 and MV2: –5.0 to +105.0 % When the deviation value: –Input span to +Input span	PV/SV/RS: Input scale high MV1/MV2: 100.0 Deviation: +Input span

[a] When two or more items are set to "1: ALM lamp is lit," if an error occurs in any one of these items, the alarm lamp on the front of the controller (FB100/400/900) lights.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
113	Transmission output scale low	HW	0E00	3584	31	R/W	When the PV, SV, SV monitor and RS: Input scale low to Input scale high Varies with the setting of the Decimal point position. When the MV1 and MV2: −5.0 to +105.0 % When the deviation value: −Input span to +Input span	PV/SV/RS: Input scale low MV1/MV2: 0.0 Deviation: −Input span
114	Event 1 type	XA	0E20	3616	31	R/W	0: None 1: Deviation high [1] 2: Deviation low [1] 3: Deviation high/low [1] 4: Band [1] 5: Process high [1] 6: Process low [1] 7: SV high 8: SV low 9: Unused 10: MV1 high [heat-side] [1, 2] 11: MV1 low [heat-side] [1, 2] 12: MV2 high [cool-side] [1] 13: MV2 low [cool-side] [1] [1] Event hold action is available. [2] If there is Feedback resistance (FBR) input in Position proportioning PID control, set to the Feedback resistance (FBR) input value.	Based on model code. When not specifying: 0
115	Event 1 hold action	WA	0E40	3648	31	R/W	0: OFF 1: Hold action ON (when power turned on; when transferred from STOP to RUN) 2: Re-hold action ON (when power turned on; when transferred from STOP to RUN; SV changed)	Based on model code. When not specifying: 0
116	Event 1 interlock	LF	0E70	3680	31	R/W	0: Unused 1: Used	0
117	Event 1 differential gap	HA	0E80	3712	31	R/W	① Deviation, process or set value: 0 to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position. ② MV: 0.0 to 110.0 %	①TC/RTD: 2 V/I: 0.2 ②0.2
118	Event 1 delay timer	TD	0EA0	3744	31	R/W	0.0 to 600.0 seconds	0.0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
119	Force ON of Event 1 action	OA	0EC0	3776	31	R/W	Bit data Bit 0: Event output turned on at input error occurrence Bit 1: Event output turned on in Manual mode Bit 2: Event output turned on during the Autotuning (AT) function is being executed Bit 3: Event output turned on during the Setting change rate limiter is being operated Bit 4 to Bit 15: Unused Data 0: Invalid 1: Valid [Decimal number: 0 to 15]	0
120	Event 2 type	XB	0EE0	3808	31	R/W	Same as Event 1 type	
121	Event 2 hold action	WB	0F00	3840	31	R/W	Same as Event 1 hold action	
122	Event 2 interlock	LG	0F20	3872	31	R/W	Same as Event 1 interlock	
123	Event 2 differential gap	HB	0F40	3904	31	R/W	Same as Event 1 differential gap	
124	Event 2 delay timer	TG	0F60	3936	31	R/W	Same as Event 1 delay timer	
125	Force ON of Event 2 action	OB	0F80	3968	31	R/W	Same as Force ON of Event 1 action	
126	Event 3 type	XC	0FA0	4000	31	R/W	Same as Event 1 type	
127	Event 3 hold action	WC	0FC0	4032	31	R/W	Same as Event 1 hold action	
128	Event 3 interlock	LH	0FE0	4064	31	R/W	Same as Event 1 interlock	
129	Event 3 differential gap	HC	1000	4096	31	R/W	Same as Event 1 differential gap	
130	Event 3 delay timer	TE	1020	4128	31	R/W	Same as Event 1 delay timer	
131	Force ON of Event 3 action	OC	1040	4160	31	R/W	Same as Force ON of Event 1 action	

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
132	Event 4 type	XD	1060	4192	31	R/W	0: None 1: Deviation high [1] 2: Deviation low [1] 3: Deviation high/low [1] 4: Band [1] 5: Process high [1] 6: Process low [1] 7: SV high 8: SV low 9: Control loop break alarm (LBA) 10: MV1 high [heat-side] [1, 2] 11: MV1 low [heat-side] [1, 2] 12: MV2 high [cool-side] [1] 13: MV2 low [cool-side] [1] [1] Event hold action is available. [2] If there is Feedback resistance (FBR) input in Position proportioning PID control, set to the Feedback resistance (FBR) input value.	Based on model code. When not specifying: 0
133	Event 4 hold action	WD	1080	4224	31	R/W	Same as Event 1 hold action	
134	Event 4 interlock	LI	10A0	4256	31	R/W	Same as Event 1 interlock	
135	Event 4 differential gap	HD	10C0	4288	31	R/W	① Deviation, process or set value: 0 to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position. ② MV: 0.0 to 110.0 % Becomes invalid when the Event 4 type corresponds to "9: Control loop break alarm (LBA)."	①TC/RTD: 2 V/I: 0.2 ②0.2
136	Event 4 delay timer	TF	10E0	4320	31	R/W	Same as Event 1 delay timer	
137	Force ON of Event 4 action	OD	1100	4352	31	R/W	Same as Force ON of Event 1 action	
138	CT1 ratio	XS	1120	4384	31	R/W	0 to 9999	CTL-6-P-N: 800 CTL-12-S56-10L-N: 1000
139	CT1 assignment	ZF	1140	4416	31	R/W	0: None 1: OUT1 2: OUT2 3 to 6: Do not set this one.	1

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
140	Heater break alarm 1 (HBA1) type	ND	1160	4448	31	R/W	0: Heater break alarm 1 (HBA1) type A (Time-proportional control output) 1: Heater break alarm 1 (HBA1) type B (Continuous control output) Time-proportional control output: Relay contact, Voltage pulse, Triac, or Open collector output Continuous control output: Voltage/Current continuous output	Based on OUT1 model code. Time-proportional control output: 0 Continuous control output: 1
141	Number of Heater break alarm 1 (HBA1) delay times	DH	1180	4480	31	R/W	0 to 255 times	5
142	CT2 ratio	XT	11A0	4512	31	R/W	0 to 9999	CTL-6-P-N: 800 CTL-12-S56-10L-N: 1000
143	CT2 assignment	ZG	11C0	4544	31	R/W	0: None 1: OUT1 2: OUT2 3 to 6: Do not set this one.	0
144	Heater break alarm 2 (HBA2) type	NG	11E0	4576	31	R/W	0: Heater break alarm 1 (HBA1) type A (Time-proportional control output) 1: Heater break alarm 1 (HBA1) type B (Continuous control output) Time-proportional control output: Relay contact, Voltage pulse, Triac, or Open collector output Continuous control output: Voltage/Current continuous output	0
145	Number of Heater break alarm 2 (HBA2) delay times	DF	1200	4608	31	R/W	0 to 255 times	5
146	Hot/Cold start	XN	1220	4640	31	R/W	0: Hot start 1 1: Hot start 2 2: Cold start 3: Stop start	0
147	Start determination point	SX	1240	4672	31	R/W	0 to Input span (The unit is the same as input value.) 0: Action depending on the Hot/Cold start selection Varies with the setting of the Decimal point position.	3 % of input span

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
148	External input type	KM	1260	4704	31	R/W	0: Remote setting input (Remote control) 1: Intercontroller communication Cascade control 2: Intercontroller communication Ratio setting When performing Cascade control or Ratio setting, set the master controller to 0 (Remote control). Set slave controllers to 1 (Cascade control) or 2 (Ratio setting).	0
149	Master channel selection	MC	1280	4736	31	R/W	0 to 31 If the External input type corresponds to "1: Cascade control" or "2: Ratio setting," the setting becomes valid.	0
150	SV tracking	XL	12A0	4768	31	R/W	0: Unused 1: Used	1
151	MV transfer function [Action taken when changed to Manual mode from Auto mode]	OT	12C0	4800	31	R/W	0: MV1 or MV2 in Auto mode is used. 1: When selected by Digital input (DI): MV1 or MV2 in previous Manual mode is used. When selected by front key: MV1 or MV2 in Auto mode is used. 2: MV1 or MV2 in previous Manual mode is used.	0
152	Control action	XE	12E0	4832	31	R/W	0: Brilliant II PID control (direct action) 1: Brilliant II PID control (reverse action) 2: Brilliant II Heat/Cool PID control [water cooling] 3: Brilliant II Heat/Cool PID control [air cooling] 4: Brilliant II Heat/Cool PID control [Cooling gain linear type] 5: Brilliant II Position proportioning PID control (reverse action) 6: Brilliant II Position proportioning PID control (direct action)	Based on model code. When not specifying: 1
153	Integral/Derivative time decimal point position	PK	1300	4864	31	R/W	0: 1 second setting (No decimal place) 1: 0.1 seconds setting (One decimal place)	0
154	Derivative action	KA	1320	4896	31	R/W	0: Measured value derivative 1: Deviation derivative	0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
155	Undershoot suppression factor	KB	1340	4928	31	R/W	0.000 to 1.000	Water cooling: 0.100 Air cooling: 0.250 Cooling gain linear type: 1.000
156	Derivative gain	DG	1360	4960	31	R/W	0.1 to 10.0	6.0
157	ON/OFF action differential gap (upper)	IV	1380	4992	31	R/W	TC/RTD inputs: 0 to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position. Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of input span	TC/RTD: 1 V/I: 0.1
158	ON/OFF action differential gap (lower)	IW	13A0	5024	31	R/W		TC/RTD: 1 V/I: 0.1
159	Action (high) at input error	WH	13C0	5056	31	R/W	0: Normal control 1: Manipulated output value at input error	0
160	Action (low) at input error	WL	13E0	5088	31	R/W		0
161	Manipulated output value at input error	OE	1400	5120	31	R/W	−105.0 to +105.0 % Actual output values become those restricted by the output limiter. Position proportioning PID control: If there is no Feedback resistance (FBR) input or the Feedback resistance (FBR) input is disconnected, an action taken when abnormal is in accordance with the value action setting during STOP.	0.0
162	Manipulated output value (MV1) at STOP mode [heat-side]	OF	1420	5152	31	R/W	−5.0 to +105.0 % Position proportioning PID control: Only when there is Feedback resistance (FBR) input and no Feedback resistance (FBR) input is disconnected, the Manipulated output value (MV1) during STOP is output.	−5.0
163	Manipulated output value (MV2) at STOP mode [cool-side]	OG	1440	5184	31	R/W		−5.0
164	Output change rate limiter (up) [MV1]	PH	1460	5216	31	R/W	0.0 to 100.0 %/seconds of Manipulated output (0.0: OFF) Becomes invalid when in position proportioning PID control.	0.0
165	Output change rate limiter (down) [MV1]	PL	1480	5248	31	R/W		0.0
166	Output limiter high [MV1]	OH	14A0	5280	31	R/W	Output limiter low [MV1] to 105.0 % Position proportioning PID control: Becomes valid only when there is Feedback resistance (FBR) input and it does not break.	105.0
167	Output limiter low [MV1]	OL	14C0	5312	31	R/W	−5.0 % to Output limiter high [MV1] Position proportioning PID control: Becomes valid only when there is Feedback resistance (FBR) input and it does not break.	−5.0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
168	Output change rate limiter (up) [MV2]	PX	14E0	5344	31	R/W	0.0 to 100.0 %/seconds of Manipulated output (0.0: OFF) Becomes invalid when in Position proportioning PID control.	0.0
169	Output change rate limiter (down) [MV2]	PY	1500	5376	31	R/W		0.0
170	Output limiter high [MV2]	OX	1520	5408	31	R/W	Output limiter low [MV2] to 105.0 %	105.0
171	Output limiter low [MV2]	OY	1540	5440	31	R/W	−5.0 % to Output limiter high [MV2]	−5.0
172	Power feed forward selection ♦	PF	1560	5472	31	R/W	0: Unused 1: Used	1
173	Power feed forward gain ♦	PZ	1580	5504	31	R/W	0.01 to 5.00	1.00
174	AT bias	GB	15A0	5536	31	R/W	−Input span to +Input span Varies with the setting of the Decimal point position.	0
175	AT cycles	G3	15C0	5568	31	R/W	0: 1.5 cycles 1: 2.0 cycles 2: 2.5 cycles 3: 3.0 cycles	1
176	Output value with AT turned on	OP	15E0	5600	31	R/W	Output value with AT turned off to 105.0 % Actual output values become those restricted by the output limiter. Position proportioning PID control: Becomes valid only when there is Feedback resistance (FBR) input and it does not break (high limit of Feedback resistance input at AT).	105.0
177	Output value with AT turned off	OQ	1600	5632	31	R/W	−105.0 % to Output value with AT turned on Actual output values become those restricted by the output limiter. Position proportioning PID control: Becomes valid only when there is Feedback resistance (FBR) input and it does not break (low limit of Feedback resistance input at AT).	−105.0
178	AT differential gap time	GH	1620	5664	31	R/W	0.0 to 50.0 seconds	10.0
179	Proportional band adjusting factor [heat-side]	KC	1640	5696	31	R/W	0.01 to 10.00 times	1.00
180	Integral time adjusting factor [heat-side]	KD	1660	5728	31	R/W		1.00
181	Derivative time adjusting factor [heat-side]	KE	1680	5760	31	R/W		1.00

♦ Unused on the FB100.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
182	Proportional band adjusting factor [cool-side]	KF	16A0	5792	31	R/W	0.01 to 10.00 times	1.00
183	Integral time adjusting factor [cool-side]	KG	16C0	5824	31	R/W		1.00
184	Derivative time adjusting factor [cool-side]	KH	16E0	5856	31	R/W		1.00
185	Proportional band limiter high [heat-side]	P6	1700	5888	31	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of input span	TC/RTD: Input span V/I: 1000.0
186	Proportional band limiter low [heat-side]	P7	1720	5920	31	R/W		TC/RTD: 0 V/I: 0.0
187	Integral time limiter high [heat-side]	I6	1740	5952	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds Varies with the setting of the Integral/ Derivative time decimal point position selection.	3600
188	Integral time limiter low [heat-side]	I7	1760	5984	31	R/W		0
189	Derivative time limiter high [heat-side]	D6	1780	6016	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds Varies with the setting of the Integral/ Derivative time decimal point position selection.	3600
190	Derivative time limiter low [heat-side]	D7	17A0	6048	31	R/W		0
191	Proportional band limiter high [cool-side]	P8	17C0	6080	31	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of input span	TC/RTD: Input span V/I: 1000.0
192	Proportional band limiter low [cool-side]	P9	17E0	6112	31	R/W		TC/RTD: 1 V/I:0.1
193	Integral time limiter high [cool-side]	I8	1800	6144	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds Varies with the setting of the Integral/ Derivative time decimal point position selection.	3600
194	Integral time limiter low [cool-side]	I9	1820	6176	31	R/W		0
195	Derivative time limiter high [cool-side]	D8	1840	6208	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds Varies with the setting of the Integral/Derivative time decimal point position selection.	3600
196	Derivative time limiter low [cool-side]	D9	1860	6240	31	R/W		0
197	Open/Close output neutral zone	V2	1880	6272	31	R/W	0.1 to 10.0 % of output	2.0
198	Open/Close output differential gap	VH	18A0	6304	31	R/W	0.1 to 5.0 % of output	1.0
199	Action at Feedback resistance (FBR) input break	SY	18C0	6336	31	R/W	0: Action depending on the valve action at STOP 1: Control action continued	0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
200	Feedback adjustment	FV	18E0	6368	31	R/W	0: Adjustment end 1: During adjustment on the open-side 2: During adjustment on the close-side	—
201	Control motor time	TN	1900	6400	31	R/W	5 to 1000 seconds	10
202	Integrated output limiter	OI	1920	6432	31	R/W	0.0 to 200.0 % of control motor time (0.0: OFF) Becomes invalid when there is Feedback resistance (FBR) input.	150.0
203	Valve action at STOP	VS	1940	6464	31	R/W	0: Close-side output OFF, Open-side output OFF 1: Close-side output ON, Open-side output OFF 2: Close-side output OFF, Open-side output ON Becomes valid when there is no Feedback resistance (FBR) input or the Feedback resistance (FBR) input is disconnected.	0
204	Startup tuning (ST)	ST	1960	6496	31	R/W	0: ST unused 1: Execute once * 2: Execute always * When the Startup tuning is finished, the setting will automatically returns to "0: ST unused." The Startup tuning (ST) function is activated according to the ST start condition selected. If control is other than Position proportioning PID control, set to RO (Read only data).	0
205	ST proportional band adjusting factor	KI	1980	6528	31	R/W	0.01 to 10.00 times	1.00
206	ST integral time adjusting factor	KJ	19A0	6560	31	R/W		1.00
207	ST derivative time adjusting factor	KK	19C0	6592	31	R/W		1.00
208	ST start condition	SU	19E0	6624	31	R/W	0: Activate the Startup tuning (ST) function when the power is turned on; when transferred from STOP to RUN; or when the Set value (SV) is changed. 1: Activate the Startup tuning (ST) function when the power is turned on; or when transferred from STOP to RUN. 2: Activate the Startup tuning (ST) function when the Set value (SV) is changed.	0
209	Automatic temperature rise group	Y7	1A00	6656	31	R/W	0 to 16 (0: Automatic temperature rise function OFF)	0

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
210	Automatic temperature rise learning	Y8	1A20	6688	31	R/W	0: Unused 1: Learning * * When the Automatic temperature rise learning is finished, the setting will automatically returns to "0: Unused." If the Automatic temperature rise group corresponds to "0: Automatic temperature rise function OFF," set to RO (Read only data).	1
211	Automatic temperature rise dead time	RT	1A40	6720	31	R/W	0.1 to 1999.9 seconds	10.0
212	Automatic temperature rise gradient data	R2	1A60	6752	31	R/W	0.1 to Input span/minutes	1.0
213	RUN/STOP group	GQ	1A80	6784	31	R/W	0 to 16 (0: Group RUN/STOP function OFF)	0
214	Setting change rate limiter unit time	HU	1AA0	6816	31	R/W	1 to 3600 seconds	60
215	Soak time unit	RU	1AC0	6848	31	R/W	0: 0 to 5999 minutes 1: 0 to 11999 seconds Set the data range of Memory area soak time monitor and Area soak time.	1
216	Setting limiter high	SH	1AE0	6880	31	R/W	Setting limiter low to Input scale high Varies with the setting of the Decimal point position.	Input scale high
217	Setting limiter low	SL	1B00	6912	31	R/W	Input scale low to Setting limiter high Varies with the setting of the Decimal point position.	Input scale low
218	PV transfer function	TS	1B20	6944	31	R/W	0: Unused 1: Used	0
219	PV flashing display at input error	DU	1B40	6976	31	R/W	Bit data Bit 0: Input error Bit 1 to Bit 15: Unused Data 0: Flashing display 1: Non-flashing display [Decimal number: 0 to 1]	0
220	Unused	—	1B60	7008	32	—	—	—
221	Unused	—	1B80	7040	32	—	—	—
222	Unused	—	1BA0	7072	32	—	—	—
223	Unused	—	1BC0	7104	32	—	—	—
224	Unused	—	1BE0	7136	32	—	—	—

Table 1: Digital input (DI) assignment

[FB100]

Set value	DI 1	DI 2	DI 3	DI 4	DI 5
1	Unused	Unused	Unused	Unused	Unused
2	Memory area number tarnsfer (1 to 8)			Memory area set	RUN/STOP
3	Memory area number tarnsfer (1 to 8)			Memory area set	Unused
4	Memory area number tarnsfer (1 to 8)			Memory area set	AUTO/MAN
5	Memory area number tarnsfer (1 to 8)			Memory area set	Interlock release
6	Memory area number tarnsfer (1 to 8)			RUN/STOP	Unused
7	Memory area number tarnsfer (1 to 8)			RUN/STOP	AUTO/MAN
8	Memory area number tarnsfer (1 to 8)			RUN/STOP	Interlock release
9	Memory area number tarnsfer (1 to 8)			Unused	AUTO/MAN
10	Memory area number tarnsfer (1 to 8)			Unused	Interlock release
11	Memory area number tarnsfer (1 to 8)			AUTO/MAN	Interlock release
12	Memory area number tarnsfer (1 to 8)				
13	RUN/STOP	REM/LOC *	AUTO/MAN		
14	RUN/STOP	REM/LOC *	Interlock release		
15	RUN/STOP	AUTO/MAN	Interlock release		
16	REM/LOC *	AUTO/MAN	Interlock release		
17	RUN/STOP	REM/LOC *			
18	RUN/STOP	AUTO/MAN			
19	RUN/STOP	Interlock release			
20	REM/LOC *	AUTO/MAN			
21	REM/LOC *	Interlock release			
22	AUTO/MAN	Interlock release			
23	RUN/STOP				
24	REM/LOC *				
25	AUTO/MAN				
26	Interlock release				

RUN/STOP: RUN/STOP transfer AUTO/MAN: Auto/Manual transfer REM/LOC: Remote/Local transfer

* When the optional function A, C or D is selected, the remote/local transfer is invalid.

[FB400/900]

Set value	DI 1	DI 2	DI 3	DI 4	DI 5	DI 6	DI 7
1	Memory area number tarnsfer (1 to 8)			Memory area set	Unused		
2					RUN/STOP	REM/LOC	AUTO/MAN
3					RUN/STOP	REM/LOC	Interlock release
4					RUN/STOP	AUTO/MAN	Interlock release
5					REM/LOC	AUTO/MAN	Interlock release
6					RUN/STOP	Unused	Interlock release
7					REM/LOC	Unused	Interlock release
8					AUTO/MAN	Unused	Interlock release

RUN/STOP: RUN/STOP transfer AUTO/MAN: Auto/Manual transfer REM/LOC: Remote/Local transfer

Table 2: Output assignment

[FB100]

Set value	Output 1 (OUT1)	Output 2 (OUT2)	Digital output 1 (DO1)	Digital output 2 (DO2)
1	Control output 1	Control output 2	Event 1 (EV1)	Event 2 (EV2)
2	Control output 1	Control output 2	Event 1 (EV1)	Event 4 (EV4)
3	Control output 1	Control output 2	Event 1 (EV1)	HBA
4	Control output 1	Control output 2	Event 1 (EV1)	FAIL (De-energized)
5	Control output 1	Control output 2	Event 4 (EV4)	HBA
6	Control output 1	Control output 2	Event 4 (EV4)	FAIL (De-energized)
7	Control output 1	Control output 2	HBA	FAIL (De-energized)
8	Control output 1	HBA	Event 1 (EV1)	Event 2 (EV2)
9	Control output 1	HBA	Event 1 (EV1)	Event 4 (EV4)
10	Control output 1	HBA	Event 1 (EV1)	FAIL (De-energized)
11	Control output 1	HBA	Event 4 (EV4)	FAIL (De-energized)
12	Control output 1	FAIL (De-energized)	Event 1 (EV1)	Event 2 (EV2)
13	Control output 1	FAIL (De-energized)	Event 1 (EV1)	Event 4 (EV4)
14	Control output 1	Event 1 (EV1)	Event 2 (EV2)	Event 3 (EV3)
15	Control output 1	Event 4 (EV4)	Event 1 (EV1)	Event 2 (EV2)

HBA: Heater break alarm (HBA) output

- For Position proportioning PID control, Output 1 (OUT1) is open-side output and Output 2 (OUT2) is close-side output, regardless of the above selection.
- When Current transformer (CT) input is two-point input, Heater break alarm (HBA) output is *OR* output.
- Energized or De-energized can be selected for the digital outputs (DO1 to DO4). [Factory set value: Energized] However, with the exception of FAIL (de-energized, fixed).
- When using for Heat/Cool PID control, select one of set values 1 to 7.
- Invalid for a non-existing output/event function.

[FB400/900]

Set value	Output 1 (OUT1)	Output 2 (OUT2)	Digital output 1 (DO1)	Digital output 2 (DO2)	Digital output 3 (DO3)	Digital output 4 (DO4)
1	Control output 1	Control output 2	Event 1 (EV1)	Event 2 (EV2)	Event 3 (EV3)	Event 4 (EV4)
2	Control output 1	Control output 2	Event 1 (EV1)	Event 2 (EV2)	Event 3 (EV3)	HBA1 HBA2
3	Control output 1	Control output 2	Event 1 (EV1)	Event 2 (EV2)	HBA1 HBA2	FAIL (De-energized)
4	Control output 1	Control output 2	Event 1 (EV1)	HBA1 HBA2	Event 3 (EV3)	Event 4 (EV4)
5	Control output 1	HBA1 HBA2	Event 1 (EV1)	Event 2 (EV2)	Event 3 (EV3)	Event 4 (EV4)
6	Control output 1	HBA1 HBA2	Event 1 (EV1)	Event 2 (EV2)	Event 3 (EV3)	FAIL (De-energized)
7	Control output 1	FAIL (De-energized)	Event 1 (EV1)	Event 2 (EV2)	Event 3 (EV3)	Event 4 (EV4)

HBA1: Heater break alarm 1 (HBA1) output HBA2: Heater break alarm 2 (HBA2) output

- When Current transformer (CT) input is two-point input, Heater break alarm (HBA) output is *OR* output.
- Energized or De-energized can be selected for the digital outputs (DO1 to DO4). [Factory set value: Energized] However, with the exception of FAIL (de-energized, fixed).
- Invalid for a non-existing output/event function.

7.5.3 Memory area data items (Modbus)

The register addresses, 2000H to 22BFH are used for checking and changing each set value belonging to the memory area.

No.	Name	Modbus register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
1	Setting memory area number	2000	8192	31	R/W	1 to 8 Use to select memory area number.	1
2	Event 1 set value (EV1)	2020	8224	31	R/W	Deviation: −Input span to +Input span Varies with the setting of the Decimal point position selection. Process and set value: Input scale low to Input scale high Varies with the setting of the Decimal point position selection. Manipulated output value (MV1 or MV2): −5.0 to +105.0 % If the Event type corresponds to "0: None," set to RO (Read only data). If Event 4 corresponds to "9: Control loop break alarm (LBA)," the Event 4 set value becomes RO (Read only data).	50
3	Event 2 set value (EV2)	2040	8256	31	R/W		50
4	Event 3 set value (EV3)	2060	8288	31	R/W		50
5	Event 4 set value (EV4)	2080	8320	31	R/W		50
6	Control loop break alarm (LBA) time	20A0	8352	31	R/W	0 to 7200 seconds (0: Unused) If Event 4 is other than "9: Control loop break alarm (LBA)," set to RO (Read only data).	480
7	LBA deadband	20C0	8384	31	R/W	0 to Input span If Event 4 is other than "9: Control loop break alarm (LBA)," set to RO (Read only data).	0
8	Set value (SV)	20E0	8416	31	R/W	Setting limiter low to Setting limiter high Varies with the setting of the Decimal point position selection.	TC/RTD: 0 V/I: 0.0
9	Proportional band [heat-side]	2100	8448	31	R/W	TC/RTD inputs: 0 (0.0, 0.00) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of input span 0 (0.0, 0.00): ON/OFF action	TC/RTD: 30 V/I: 30.0
10	Integral time [heat-side]	2120	8480	31	R/W	PID control or Heat/Cool PID control: 0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PD action) [both heat-side and cool-side] Position proportioning PID control: 1 to 3600 seconds or 0.1 to 1999.9 seconds Varies with the setting of the Integral/ Derivative time decimal point position selection.	240

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No.	Name	Modbus register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
11	Derivative time [heat-side]	2140	8512	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PI action) Varies with the setting of the Integral/ Derivative time decimal point position selection.	60
12	Control response parameter	2160	8544	31	R/W	0: Slow 1: Medium 2: Fast When the P or PD action is selected, this setting becomes invalid.	PID control, Position proportioning PID control: 0 Heat/Cool PID control: 2
13	Proportional band [cool-side]	2180	8576	31	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span (Unit: °C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/Current (I) inputs: 0.1 to 1000.0 % of input span If control is other than Heat/Cool PID control, set to RO (Read only data).	TC/RTD: 30 V/I: 30.0
14	Integral time [cool-side]	21A0	8608	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PD action) [both heat-side and cool-side] Varies with the setting of the Integral/ Derivative time decimal point position selection. If control is other than Heat/Cool PID control, set to RO (Read only data).	240
15	Derivative time [cool-side]	21C0	8640	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PI action) Varies with the setting of the Integral/ Derivative time decimal point position selection. If control is other than Heat/Cool PID control, set to RO (Read only data).	60
16	Overlap/Deadband	21E0	8672	31	R/W	TC/RTD inputs: −Input span to +Input span (Unit:°C [°F]) Varies with the setting of the Decimal point position selection. Voltage (V)/current (I) inputs: −100.0 to +100.0 % of input span Minus (−) setting results in Overlap. However, the overlapping range is within the proportional range. If control is other than Heat/Cool PID control, set to RO (Read only data).	0
17	Manual reset	2200	8704	31	R/W	−100.0 to +100.0 % The offset can be manually eliminated. If the integral function is valid, set to RO (Read only data).	0.0

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No.	Name	Modbus register address		Number of data items	Attribute	Data range	Factory set value
		HEX	DEC				
18	Setting change rate limiter (up)	2220	8736	31	R/W	0 to Input span/unit time * (0: Unused) Varies with the setting of the Decimal point position selection. * Unit time: 60 seconds (factory set value)	0
19	Setting change rate limiter (down)	2240	8768	31	R/W		0
20	Area soak time	2260	8800	31	R/W	0 to 11999 seconds or 0 to 5999 minutes Data range of Area soak time can be selected on the Soak time unit. [FB100] When the Digital input (DI) assignment (No. 95) value is 6 to 12, this data becomes RO (Read only data).	0
21	Link area number	2280	8832	31	R/W	0 to 8 (0: No link) [FB100] When the Digital input (DI) assignment (No. 95) value is 6 to 12, this data becomes RO (Read only data).	0
22	Unused	22A0	8864	32	—	—	—

7.5.4 Data mapping address items (Modbus)

- **Register address for data mapping**

No.	Name	Modbus register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
1	Register address setting 1 Read/Write address: 3400H to 341EH	3000	12288	31	RW	Decimal: −1 to 4095 (−1: No mapping) Hexadecimal: FFFFH to 0FFFH (FFFFH: No mapping) Set the register address of data to be assigned to 3400H to 35FEH.	−1
2	Register address setting 2 Read/Write address: 3420H to 343EH	3020	12320	31	RW		−1
3	Register address setting 3 Read/Write address: 3440H to 345EH	3040	12352	31	RW		−1
4	Register address setting 4 Read/Write address: 3460H to 347EH	3060	12384	31	RW		−1
5	Register address setting 5 Read/write address: 3480H to 349EH	3080	12416	31	RW		−1
6	Register address setting 6 Read/Write address: 34A0H to 34BEH	30A0	12448	31	RW		−1
7	Register address setting 7 Read/Write address: 34C0H to 34DEH	30C0	12480	31	RW		−1
8	Register address setting 8 Read/Write address: 34E0H to 34FEH	30E0	12512	31	RW		−1
9	Register address setting 9 Read/Write address: 3500H to 351EH	3100	12544	31	RW		−1
10	Register address setting 10 Read/Write address: 3520H to 353EH	3120	12576	31	RW		−1
11	Register address setting 11 Read/Write address: 3540H to 355EH	3140	12608	31	RW		−1
12	Register address setting 12 Read/Write address: 3560H to 357EH	3160	12640	31	RW		−1
13	Register address setting 13 Read/Write address: 3580H to 359EH	3180	12672	31	RW		−1
14	Register address setting 14 Read/Write address: 35A0H to 35BEH	31A0	12704	31	RW		−1
15	Register address setting 15 Read/Write address: 35C0H to 35DFH	31C0	12736	31	RW		−1
16	Register address setting 16 Read/Write address: 35E0H to 35FEH	31E0	12768	31	RW		−1

- **Register address for data read/writes**

No.	Name	Modbus register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
1	Data specified by register address setting 1 (3000H to 301EH)	3400	13312	31			
2	Data specified by register address setting 2 (3020H to 303EH)	3420	13344	31			
3	Data specified by register address setting 3 (3040H to 305EH)	3440	13376	31			
4	Data specified by register address setting 4 (3060H to 307EH)	3460	13408	31			
5	Data specified by register address setting 5 (3080H to 309EH)	3480	13440	31			
6	Data specified by register address setting 6 (30A0H to 30BEH)	34A0	13472	31			
7	Data specified by register address setting 7 (30C0H to 30DEH)	34C0	13504	31			
8	Data specified by register address setting 8 (30E0H to 30FEH)	34E0	13536	31		Differs depending on data specified.	
9	Data specified by register address setting 9 (3100H to 311EH)	3500	13568	31			
10	Data specified by register address setting 10 (3120H to 313EH)	3520	13600	31			
11	Data specified by register address setting 11 (3140H to 315EH)	3540	13632	31			
12	Data specified by register address setting 12 (3160H to 317EH)	3560	13664	31			
13	Data specified by register address setting 13 (3180H to 319EH)	3580	13696	31			
14	Data specified by register address setting 14 (31A0H to 31BEH)	35A0	13728	31			
15	Data specified by register address setting 15 (31C0H to 31DFH)	35C0	13760	31			
16	Data specified by register address setting 16 (31E0H to 31FEH)	35E0	13792	31			

7.5.5 COM-JE communication data items (RKC communication/Modbus)

: PLC communication environment setting item

No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
1	Comprehensive alarm state	AM	3800	14336	1	RO	Bit data Bit 0: Burnout state Bit 1: Burnout state of Feedback resistance (FBR) input Bit 2: Event 1 state Bit 3: Event 2 state Bit 4: Event 3 state Bit 5: Event 4 state Bit 6: Heater break alarm 1 (HBA1) state Bit 7: Heater break alarm 2 (HBA2) state Bit 8 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255] *OR* of Controller state 1 (Identifier: AK, Modbus register address: 3820H) in all controller	—
2	Controller alarm state	AN	3801	14337	2	RO	Bit data Group 1 [a]: Bit 0 to Bit 15: Controller 1 to 16 Group 2 [a]: Bit 0 to Bit 14: Controller 17 to 31 Data 0: OFF 1: ON [Decimal number: 0 to 65535] *OR* of Controller state 1 (Identifier: AK, Modbus register address: 3820H) [a] Group 1 and Group 2 are specified for the RKC communication. For Modbus, the smaller Modbus register address is for data corresponding to Group 1, while the larger Modbus register address is for data corresponding to Group 2.	—
3	Error state	EZ	3803	14339	2	RO	Bit data Group 1 [a]: Bit 0 to Bit 15: Controller 1 to 16 Group 2 [a]: Bit 0 to Bit 14: Controller 17 to 31 Data 0: OFF 1: ON [Decimal number: 0 to 65535] *OR* of Controller state 2 (Identifier: AQ, Modbus register address: 3840H) [a] Group 1 and Group 2 are specified for the RKC communication. For Modbus, the smaller Modbus register address is for data corresponding to Group 1, while the larger Modbus register address is for data corresponding to Group 2.	—

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
4	RUN/STOP	SW	3805	14341	2	R/W	Bit data Group 1 [a]: Bit 0 to Bit 15: Controller 1 to 16 Group 2 [a]: Bit 0 to Bit 14: Controller 17 to 31 Data 0: RUN (Control start) 1: STOP(Control stop) [Decimal number: 0 to 65535] Link RUN/STOP transfer (Identifier SR, Modbus register address:0460H to 047EH) [a] Group 1 and Group 2 are specified for the RKC communication. For Modbus, the smaller Modbus register address is for data corresponding to Group 1, while the larger Modbus register address is for data corresponding to Group 2.	0
5	Data updating flag	CZ	3807	14343	1	RO	0: Data not updated 1: Data being updated	—
—	Unused	—	3808 ⋮ 381F	14344 ⋮ 14367	—	—	—	—
6	Controller state 1	AK	3820	14368	31	RO	Bit data Bit 0: Burnout state Bit 1: Burnout state of Feedback resistance (FBR) input Bit 2: Event 1 state Bit 3: Event 2 state Bit 4: Event 3 state Bit 5: Event 4 state Bit 6: Heater break alarm 1 (HBA1) state Bit 7: Heater break alarm 2 (HBA2) state Bit 8 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	—
7	Controller state 2	AQ	3840	14400	31	RO	Bit data Bit 0: Adjustment data error Bit 1: Back-up error Bit 2: A/D conversion error Bit 3 to Bit 4: Unused Bit 5: Custom data error Bit 6: Unused Bit 7: Watchdog timer error Bit 8: Stack overflow Bit 9 to Bit 10: Unused Bit 11: Program error (busy) Bit 12 to Bit 14: Unused Bit 15: Controller communication error Data 0: OFF 1: ON [Decimal number: 0 to 35239]	—

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
8	Controller state 3	AS	3860	14432	31	RO	Bit data Bit 0: Control STOP Bit 1: Control RUN Bit 2: Manual mode [1] Bit 3: Remote mode [1] Bit 4 to Bit 13: Unused Bit 14: Backup memory state monitor Bit 15: Autotuning (AT) Data 0: OFF 1: ON [Decimal number: 0 to 49167] [1] During operation in Manual mode, the Manual mode of the Operation mode state monitor is set to the "1: ON" state and the Remote mode of the same monitor is se to the "0: OFF" state even if the parameter, Remote/Local transfer is set to "1: Remote mode."	—
—	Unused	—	387F ⋮ 7FFF	14463 ⋮ 32767	—	—	—	—
9	Station number ♦	QV	8000	32768	1	R/W	0 to31	0
10	PC number ♦	QW	8001	32769	1	R/W	0 to 255 Do not set for the OMRON SYSMAC series.	255
11	Register start number ♦	QX	8002	32770	1	R/W	0 to 65535 MITSUBISHI MELSEC series (A-compatible 1C frame (format 4), ACPU common command) and OMRON SYSMAC series Data range: 0 to 9937	1000
12	Maximum controller number of PLC communication ♦	QY	8003	32771	1	R/W	1 to 31	10

♦ These items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
13	Register type ♦	QZ	8004	32772	1	R/W	MITSUBISHI MELSEC series 0: D register (A-compatible 1C frame) 1: R register (A-compatible 1C frame) 2: W register (A-compatible 1C frame) 3: ZR register (QnA-compatible 3C frame) [Method of specifying consecutive numbers when 32767 of R register is exceeded.] 4: D register (QnA-compatible 3C frame) 5: R register (QnA-compatible 3C frame) 6: W register (QnA-compatible 3C frame) 7 to 29: Unused (D: Data register, R: File register, W: Link register) OMRON SYSMAC series 0: DM register (Data memory) 1 to 9: Unused 10 to 22: EM register (Extended data memory) [Specify the bank No.] Set the bank No.+10 22 to 28: Unused 29: EM register (Extended data memory) [Specify the current bank]	0
—	Unused	—	8005	32773	—	—	—	—
14	Monitor item selection ♦	QS	8006	32774	1	R/W	Bit data Bit 0: Measured value (PV) Bit 1: Current transformer 1 (CT1) input value monitor Bit 2: Current transformer 2 (CT2) input value monitor Bit 3: Set value (SV) monitor Bit 4: Remote setting (RS) input value monitor Bit 5: Manipulated output value (MV1) monitor [heat-side] Bit 6: Manipulated output value (MV2) monitor [cool-side] Bit 7: Digital input (DI) state monitor Bit 8: Output state monitor Bit 9: Controller state 1 Bit 10: Controller state 2 Bit 11: Controller state 3 Bit 12 to Bit 15: Reserve (This item is fixed at 0) * * Do not set 1 for Reserve. Data 0: OFF 1: ON [Decimal number: 0 to 4095]	Bit 0: 1 Bit 1: 1 Bit 2: 1 Bit 3: 1 Bit 4: 1 Bit 5: 1 Bit 6: 1 Bit 7: 1 Bit 8: 1 Bit 9: 1 Bit 10: 1 Bit 11: 1 [Decimal number: 4095]

♦ These items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
15	COM-JE link recognition time ♦	QT	8007	32775	1	R/W	0 to 255 seconds It becomes necessary to make the setting only to the master (COM-JE address: 0, 4, 8 or C) in the controller communication unit.	10
16	COM-JE error code	ES	8008	32776	1	RO	Bit data Bit 0: Back-up error Bit 1: Unused Bit 2: Controller communication error Bit 3 to Bit 6: Unused Bit 7: PLC communication error Bit 8 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 133]	—
17	PLC scanning time ♦	VT	8009	32777	1	R/W	0 to 3000 ms	255
—	Unused	—	800A	32778	—	—	—	—
18	Number of connected controller in controller communication	QP	800B	32779	1	RO	0 to 31	—
19	Action mode selection ♦	RZ	800C	32780	1	R/W	Bit data Bit 0: Address setting 0: Continuous setting 1: Free setting Bit 1: PLC register read/write error elimination 0: Manual elimination 1: Automatic elimination Bit 2 to Bit 7: Reserve (This item is fixed at 0) * * Do not set 1 for Reserve. [Decimal number: 0 to 3]	Bit 0: 0 Bit 1: 0 Bit 2 to Bit 7: 0 [Decimal number: 0]

♦ These items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

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No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
20	Selecting the controller communication block	R4	800D	32781	1	R/W	Bit data Bit 0: On and after No.83 of FB100/400/900 communication data items Bit 1: Memory area data items Bit 2: Data mapping address items Bit 3 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 7] FB100/400/900 communication data Nos. 1 to 82 and COM-JE communication data become valid unconditionally regardless of the setting. It is possible to communicate only those items specified by Selecting the controller communication block. It is also possible to communicate only those items specified here by using the Specified data transfer type. However, COM-JE communication data Nos. on and after No. 9 cannot be set by the Specified data transfer type.	0
—	Unused	—	800E	32782	—	—	—	—
21	PLC communication start time ♦	R5	800F	32783	1	R/W	1 to 255 seconds	5
—	Unused	—	8010	32784	—	—	—	—
—	Unused	—	8011	32785	—	—	—	—
22	Register start number (High-order 4-bit)	**VX**	8012	32786	1	R/W	0 to 15 Valid only when “QnA-compatible 3C frame (format 4) command 0401/1401” of the MITSUBISHI PLC is selected. Set the start number of the register used in PLC communication. (For the setting procedure, refer to P. 39.)	0
—	Unused	—	8013 ⋮ 8017	32787 ⋮ 32791	—	—	—	—
23	Transmision wait time of controller communication	ZZ	8018	32792	1	R/W	0 to 100 ms	0
—	Unused	—	8019 ⋮ 801F	32793 ⋮ 32799	—	—	—	—
24	Initial setting mode	IN	8020	32800	1	R/W	0: Normal setting mode 1: Initial setting mode	0

♦ These items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

7.5.6 Initial setting data items (RKC communication/Modbus)

⚠ WARNING

The Initial setting data should be set according to the application before setting any parameter related to operation. Once the parameters in the Initial setting data are set correctly, no further changes need to be made to parameters for the same application under normal conditions. If they are changed unnecessarily, it may result in malfunction or failure of the instrument. RKC will not bear any responsibility for malfunction or failure as a result of improper changes in the Initial setting.

- **Transfer to Initial setting mode.**

Transfer to Initial setting mode sets in "1" with identifier: IN or Modbus register address: 8020H (normally setting mode).

The instrument cannot be changed to the Initial setting mode state at control start (during control). If it needs to be changed to the above state, first stop the control by Control RUN/STOP transfer.

No control can be started during Initial setting mode. If the control needs to be re-started, first change the instrument the Normal setting mode state (set identifier: IN or Modbus register address: 8020H by 0).

No.	Name	RKC identifier	Modbus register address		Number of data items	Attribute	Data range	Factory set value
			HEX	DEC				
1	Host communication Transmission transfer time setting	ZX	8021	32801	1	R/W	0 to 255 ms	6
2	PLC communication Transmission transfer time setting	QU	8022	32802	1	R/W	0 to 255 ms	1
—	Unused	—	8023	32803	—	—	—	—
3	Controller communication Communication speed setting	QQ	8024	32804	1	R/W	0: Do not set this one. 1: Do not set this one. 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: Do not set this one.	3
—	Unused	—	8025	32805	—	—	—	—
4	Communication data block length (RKC communication)	Z3	8026	32806	1	R/W	20 to 255 byte	255
5	Modbus Data interval extension time ♦	ZY	8027	32807	1	R/W	0 to 255 ms	0

♦ These items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.

8. TROUBLESHOOTING

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

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

⚠ WARNING

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

CAUTION

Do not separate the mainframe from the terminal base with the power turned on. If so, instrument failure may result.

When replacing the instrument with a new one, always use the instrument with the same model code. If the instrument is replaced, it is necessary to reset each data item.

■ COM-JE

Problem	Possible cause	Solution
RUN lamp does not light up	Power not being supplied	Check external breaker etc.
	Appropriate power supply voltage not being supplied	Check the power supply
	Power supply terminal contact defect	Retighten the terminals
	Power supply section defect	Replace COM-JE
RUN lamp flashes rapidly	Data collection just after the power is turned on	After data collection, the lamp goes on, if normal
RUN lamp flashes slowly	Memory backup error	Replace COM-JE
	Controller communication error Disconnection of the controller connection or time-out	Confirm the controller connection condition and connect correctly
	Controller communication error The communication speed of even one COM-JE does not coincide with that even one controller.	Check for the communication speed and then set it to the same value.
	Controller communication error The address setting method is set to Continuous setting but there is no “1” in the controller address.	Set controller addresses to consecutive numbers starting from “1”
	PLC communication error No connection, disconnection, or imperfect contact of the communication cable or time-out	Confirm the cable connection condition and connect correctly
	PLC register read/write error Reset with the PLC side	PLC register read/write error elimination: Manual elimination The request command, “2: Set value monitor” is executed and then the error is eliminated after all of the set values are written in the register. PLC register read/write error elimination: Automatic elimination The error is automatically eliminated after PLC communication returns to normal and the error is retained for more than one second (or monitor processing time).
FAIL lamp is lit	Hardware error	Replace COM-JE
AIL lamp flashes	PLC communication environment setting mode by the switch	Return the switch to its original position
Can not recognize the controller	Incorrect sequence of power-on	COM-JE must be powered on last.

☞ For the PLC communication environment setting mode by the switch, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]**, or **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

■ PLC communication

Problem	Possible cause	Solution
• Even if "1: Setting" or "2: Set value monitor" is set in request command, transfer is not finished. Request command does not return to "0: Monitor" • COM. PORT1 lamp or COM. PORT2/ COM. PORT3 lamp is lit, and it can be seen to communicate normally, but monitor value is not transferred to PLC	Wrong connection, no connection or disconnection of the communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Mismatch of the setting data of communication speed, data bit configuration and protocol with those of the PLC	Confirm COM-JE settings and set them correctly
	Wrong setting of PLC communication data	Confirm the PLC communication settings and set them correctly
		Setting of termination resistor in accordance with PLC or the insertion is done
	Setting of PLC becomes write inhibit	Setting of PLC is turned into write enable (Write enable in RUN, shift to monitor mode, etc.)
	Accesses outside the range of memory address of PLC (wrong setting of address)	Confirm the PLC communication environment setting and set them correctly
	All connected controllers are in communication error (such as time-out and error state)	Confirm the connection condition and connect correctly
		Confirm state of power supply
If two or more units are connected, no units after the second unit are recognized	COM-JE link recognition time is short	Lengthen COM-JE link recognition time
Measured value seems to be wrong when two or more COM-JE are connected.	The same register address is used by two or more COM-JE.	Shift the "Register starting number" in the PLC communication setup for each COM-JE so that the register addresses will not overlap.
Details of each setting of the PLC communication environment by switch are unknown	There is no record of setting details	• Initialize the set state by switch, and then re-set each value • Set it by Host communication

☞ For the PLC communication environment setting mode by the switch and COM-JE link recognition time, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]**, or **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

☞ For the initialization method of communication environment setting by the switch, refer to **APPENDIX A. VARIOUS SETTING CHANGE BY THE SWITCH (P. 161)**.

■ Host communication

● RKC communication

Problem	Possible cause	Solution
No response	Wrong connection, no connection or disconnection of the communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Mismatch of the setting data of communication speed and data bit configuration with those of the host	Confirm the settings and set them correctly
	Wrong address setting	
	Error in the data format	Reexamine the communication program
	Transmission line is not set to the receive state after data send	
	Transmission transfer time is short	Lengthen transmission transfer time
EOT return	The specified identifier is invalid	Confirm the identifier is correct or that with the correct function is specified. Otherwise correct it
	Error in the data format	Reexamine the communication program
NAK return	Error occurs on the line (parity bit error, framing error, etc.)	Confirm the cause of error, and solve the problem appropriately. (Confirm the transmitting data, and resend data)
	BCC error	
	The data exceeds the setting range	Confirm the setting range and transmit correct data
	The specified identifier is invalid	Confirm the identifier is correct or that with the correct function is specified. Otherwise correct it

☞ For the setting method of host communication transmission transfer time by the switch, refer to **APPENDIX A. VARIOUS SETTING CHANGE BY THE SWITCH (P. 161)**.

- **Modbus**

Problem	Possible cause	Solution
No response	Wrong connection, no connection or disconnection of the communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Mismatch of the setting data of communication speed and data bit configuration with those of the host	Confirm the settings and set them correctly
	Wrong address setting	
	The length of query message exceeds set range	
	The number of data points is not twice the specified number of data points at the time of data write	
	A transmission error (overrun error, framing error, parity error or CRC-16 error) is found in the query message	Re-transmit after time-out occurs or verify communication program
	The time interval between adjacent data in the query message is too long, 24-bit time (or 24-bit time + a few ms) or more	• Re-transmit after time-out occurs • Verify communication program • Set Modbus data interval extension time
	Transmission transfer time is short	Lengthen transmission transfer time
Error code 1	Function code error (Specifying nonexistent function code)	Confirm the function code
Error code 2	When the mismatched address is specified	Confirm the address of holding register
Error code 3	When the data written exceeds the setting range	Confirm the setting data
	When the specified number of data items in the query message exceeds the maximum number of data items available	

☞ For the setting method of host communication transmission transfer time and Modbus data interval extension time by the switch, refer to **APPENDIX A. VARIOUS SETTING CHANGE BY THE SWITCH (P. 161)**.

9. SPECIFICATIONS

■ Indication lamp

Number of indicates: 4 points

Indication contents:

- Operation state indication [RUN, FAIL] (2 points)
  - During normal operation: Green lamp: ON (RUN)
  - During error: Red lamp: ON (FAIL)
  - During data collection after power ON: Green lamp: rapid flashing (RUN)
  - During self-diagnostic error: Green lamp: slow flashing (RUN)
  - During PLC communication environment setting mode: Red lamp: slow flashing (FAIL)
- Communication state indication [COM. PORT1, COM. PORT2/3] (2 points)
  - During data send or receive: Yellow lamp: ON (COM. PORT1)
  - During data send or receive: Yellow lamp: ON (COM. PORT2/3)

■ PLC communication

Interface:
Based on RS-422A, EIA standard
Based on RS-232C, EIA standard
COM. PORT1: Specify when ordering
COM. PORT2/3: RS-422A (fixed)

Connection method:
RS-422A: 4-wire system, half-duplex multi-drop connection
RS-232C: Point-to-point connection

Synchronous method: Start/Stop synchronous type

Communication speed:
9600 bps, 19200 bps, 38400 bps
Communication speed can be selected with switch

Data bit configuration:
Start 1-bit
Data 8-bit, Without parity, Stop 1-bit
Data 7-bit, Odd parity, Stop 1-bit
Data 7-bit, Even parity, Stop 1-bit
Data 7-bit, Even parity, Stop 2-bit
Data bit configuration can be selected with switch

Protocol:

- MITSUBISHI MELSEC series special protocol
  - A-compatible 1C frame (format 4)
    ACPU common command (WR/WW)
    (A series, FX2N, FX2NCseries)
  - A-compatible 1C frame (format 4)
    AnA/AnUCPU common command (QR/QW)
    (AnA/QnA series, Q series)
  - QnA-compatible 3C frame (format 4) command 0401/1401
    (QnA series, Q series)
- OMRON SYSMAC series special protocol
  C mode command (RD/WD, RE/WE)

The protocol can be selected with switch

Maximum connections: Four COM-JE units per communication port of PLC

■ Host communication

Interface:
Based on RS-422A, EIA standard
Based on RS-232C, EIA standard
COM. PORT1: Specify when ordering
COM. PORT2/3: RS-422A (fixed)

Connection method:
RS-422A: 4-wire system, half-duplex multi-drop connection
RS-232C: Point-to-point connection

Synchronous method:
Start/Stop synchronous type

Communication speed:
9600 bps, 19200 bps, 38400 bps
Communication speed can be selected with switch

Data bit configuration:
Start 1-bit
Data 8-bit, Without parity, Stop 1-bit
Data 7-bit *, Odd parity, Stop 1-bit
Data 7-bit *, Even parity, Stop 1-bit
Data 7-bit *, Even parity, Stop 2-bit
* For Modbus, the data bit automatically changes to data 8-bit as the data bit 7 is not available in Modbus.
Data bit configuration can be selected with switch

Protocol:
- RKC communication
  Based on ANSI X3.28-1976 subcategories 2.5 and B1
  Polling/Selecting type
  Error control: Vertical parity (with parity bit selected)
  Horizontal parity (BCC check)
  Data types: ASCII 7-bit code

- Modbus
  Signal transmission mode: Remote Terminal Unit (RTU) mode
  Function codes: 03H Read holding registers
  06H Preset single register
  08H Diagnostics (loopback test)
  10H Preset multiple registers)
  Error check method: CRC-16
  Error codes: 1: Function code error
  (An unsupported function code was specified)
  2: When the mismatched address is specified.
  3: • When the data written exceeds the setting range.
  • When the specified number of data items in the query message exceeds the maximum number (1 to 125) of data items available

RKC communication or Modbus protocol can be selected with switch

Maximum connections:
RS-422A: 16 COM-JE units per communication port of host computer
RS-232C: One COM-JE unit per communication port of host computer

■ Controller communication

Interface: Based on RS-485, EIA standard

Connection method: 2-wire system, half-duplex multi-drop connection

Synchronous method: Start/Stop synchronous type

Communication speed: 9600 bps, 19200 bps, 38400 bps

Data bit configuration:
Start bit: 1
Data bit: 8
Parity bit: Without
Stop bit: 1

Protocol: Modbus-RTU

Maximum connections: 31 controllers (FB100/400/900) per COM-JE

■ Self-diagnostic function

Hardware error: Display: FAIL lamp ON

Memory backup error: Display: RUN lamp flashes
Status: 1 is set in bit 0 of COM-JE error code

Controller communication error:
Display: RUN lamp flashes
Status:
- 1 is set in bit 2 of COM-JE error code
- 1 is set in bit 15 of Controller status 2 of relevant controller

PLC communication error: Display: RUN lamp flashes
Status: 1 is set in bit 7 of COM-JE error code

■ General specifications

Power supply voltage: 21.6 to 26.4 V AC [Including power supply voltage variation] (Rating 24 V AC)

Current consumption: 70 mA max. (24 V DC)

Rush current: 12 A or less

Insulation resistance:
Between communication terminal and grounding:
20 MΩ or more at 500 V DC
Between power supply terminal and grounding:
20 MΩ or more at 500 V DC
Between power supply and communication terminals:
20 MΩ or more at 500 V DC

Withstand voltage: Refer to table

Time: 1 minute	Grounding terminal	Power terminal
Grounding terminal		
Power terminal	600 V AC	
Communication terminal	600 V AC	600 V AC

Power failure: A power failure of 20 ms or less will not affect the control action.

Memory backup: Backed up by non-volatile memory (FRAM)
Number of writing: Approx. 100,000 times
Data storage period: Approx. 10 years

Vibration: Amplitude: < 1.5 mm (5 to 9 Hz)
Acceleration: < 5 m/s^2 (9 to150 Hz)
Each direction of XYZ axes

Shock: Height 50 mm or less
Each direction of XYZ axes (de-energized state)

Allowable ambient temperature:
−10 to +50 °C

Allowable ambient humidity: 5 to 95 %RH
(Absolute humidity: MAX.W.C 29.3 g/m^3 dry air at 101.3 kPa)

Installation environment conditions:
Indoor use
Altitude up to 2000 m

Operating environments: Avoid the following conditions when selecting the mounting location.
- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Water, oil, chemicals, vapor or steam splashes.
- Direct air flow from an air conditioner.
- Exposure to direct sunlight.
- Excessive heat accumulation.

Weight: Approx. 170 g

Dimensions: 30 × 125 × 109.5 mm (W × H × D)

■ Standard

Safety standards: UL: UL61010-1
cUL: CAN/CSA-C22.2 No.61010-1

CE marking: LVD: EN61010-1
OVERVOLTAGE CATEGORYII,
POLLUTION DEGREE 2,
Class II (Reinforced insulation)
EMC: EN61326-1

RCM: EN55011

APPENDIX A. VARIOUS SETTING CHANGE BY THE SWITCH

Usually, the following items are not necessary to be changed. Change them only when no normal communication can be made.
When changing the setting, set the COM-JE to the PLC communication environment setting mode in the same way as setting the PLC communication environment by switch of COM-JE. Switches used are the PLC communication setting switch and address setting switch.

📖 **Change the following items only when normal communication cannot be conducted as far as the factory set values are used.**

📖 **The following items become valid by turning off the power of the COM-JE once, and then turning it on again after the settings are changed.**

☞ For changing method, refer to **6.1.3 PLC communication environment setting (P. 34) [MITSUBISHI PLC]**, or **6.2.3 PLC communication environment setting (P. 53) [OMRON PLC]**.

- **PLC communication setting switch**

Switch No.	Setting items	Data range (Address setting switch)	Factory set value
1	Selecting the controller communication block [1]	0: A and E blocks 1: A, B and E blocks 2: A, C and E blocks 3: A, B, C and E blocks 4: A, D and E blocks 5: A, B, D and E blocks 6: A, C, D and E blocks 7: A, B, C, D and E blocks 8 to F: Unused (Do not set this one) Contents of communication item blocks A: FB100/400/900 communication data items No. 1 to 82 B: On and after No. 83 of FB100/400/900 communication data items C: Memory area data items D: Data mapping address items E: COM-JE communication data items It becomes possible to communicate only the communication items specified by selecting the controller communication block. In addition, it becomes possible to communicate only the communication items specified here by the specified data transfer type. However, do not set COM-JE communication data Nos. on and after No. 9 by the specified data transfer type.	FB100/400/900 communication data items No. 1 to 82 and COM-JE communication data items

[1] The setting can also be made in the Host communication.

☞ For contents of communication item blocks, refer to**7.5 Communication Data List (P. 114)**.

Continued on the next page.

Continued from the previous page.

Switch No.	Setting items	Data range (Address setting switch)	Factory set value
2	Controller communication communication speed setting [1, 2]	0: Unused 1: Unused 2: 9600 bps 3: 19200 bps 4: 38400 bps 5: Unused 6 to F: Unused (Do not set this one.) Set communication speed of controller communication	19200 bps
3	Host communication transmission transfer time setting [1]	0 to E: 0 to 140 ms (set value × 10) F: 255 ms Set the standby time until the COM-JE starts sending data after receiving data from the host computer.	6 ms
4	Modbus data interval extension time [1, 3]	0 to E: 0 to 140 ms (set value × 10) F: 255 ms Extend data time interval in Modbus.	0 ms
5	PLC communication transmission transfer time setting [1]	0 to E: 0 to 140 ms (set value × 10) F: 255 ms Set the standby time until the COM-JE starts sending data after receiving data from the PLC.	1 ms
6	Action mode selection	This item is communication environment setting item.	Continuous setting, Manual elimination
7	Monitor item selection	This item is communication environment setting item.	Select all items
8	Set value initialize	0 to E: Do not initialize F: Initialize data Initialize all of the items (including items in this table) which can be set in the PLC communication environment setting mode to return to the state prior to factory shipment.	Do not initialize

[1] The setting can also be made in the Host communication initial set mode.

☞ For Initial setting mode, refer to **7.5.6 Initial setting data items (P. 151)**.

[2] If the controller communication speed is changed, it is necessary to match the communication speed set in the controller side.

☞ For the controller communication speed, refer to **FB100 Communication Quick Manual (IMR01W15-E□)** or **FB400/FB900 Communication Quick Manual (IMR01W07-E□)**.

[3] For Modbus, a data time interval is set to less than 24 bits' time. However, it may become more than 24 bits' time depending on the type of master. In that case, extend the data time interval in this setting.

APPENDIX B. COMMUNICATION DATA PROCESSING TIME

The following communication time is required for the COM-JE.

Each time described in the following is the processing time per controller communication unit. When units are multi-drop connected, the total time obtained by adding the processing time per unit becomes the entire processing time.

B.1 Controller Communication Data Updating Cycle

This is the data updating time required for controller communication.

■ Controller communication speed: 38400 bps

- **When the set value is not changed**
  Controller communication data updating cycle = 130 ms × Number of connected controllers

- **When the set value is changed**
  [Selecting the controller communication block = 0]
  Controller communication data updating cycle
  = 600 ms × Number of controllers whose settings have been changed +130 ms
  × Number of controllers whose settings are not changed

  [Selecting the controller communication block = 1]
  Controller communication data updating cycle
  = 1000 ms × Number of controllers whose settings have been changed +130 ms
  × Number of controllers whose settings are not changed

  [Selecting the controller communication block = 7]
  Controller communication data updating cycle
  = 1200 ms × Number of controllers whose settings have been changed +130 ms
  × Number of controllers whose settings are not changed

■ Controller communication speed: 19200 bps

- When the set value is not changed
  Controller communication data updating cycle = 160 ms × Number of connected controllers

- When the set value is changed
  [Selecting the controller communication block = 0]
  Controller communication data updating cycle
  = 700 ms × Number of controllers whose settings have been changed + 160 ms
  × Number of controllers whose settings are not changed

  [Selecting the controller communication block = 1]
  Controller communication data updating cycle
  = 1200 ms × Number of controllers whose settings have been changed + 160 ms
  × Number of controllers whose settings are not changed

  [Selecting the controller communication block = 7]
  Controller communication data updating cycle
  = 1400 ms × Number of controllers whose settings have been changed + 160 ms
  × Number of controllers whose settings are not changed

Updating delay time of data which should be originally updated at the controller sampling cycle such as Measured value (PV), Manipulated output, etc. becomes the value obtained by adding the controller sampling cycle to the above value.

B.2 Connected Controller Recognition Time

This is the time required until the COM-JE recognizes the controller connected after the power is turned on.

■ Controller communication speed: 38400 bps (Selecting the controller communication block = 0)

- **When address setting is Continuous setting**

  Connected controller recognition time
  = 12 seconds + (Number of connected controllers × 0.5 seconds)

- **When address setting is Free setting**

  Connected controller recognition time
  = 12 seconds + (Number of connected controllers × 0.5 seconds)
  + (Number of nonexistent addresses × 0.7 seconds)

■ Controller communication speed: 19200 bps (Selecting the controller communication block = 0)

- **When address setting is Continuous setting**

  Connected controller recognition time
  = 12 seconds + (Number of connected controllers × 0.6 seconds)

- **When address setting is Free setting**

  Connected controller recognition time
  = 12 seconds + (Number of connected controllers × 0.6 seconds)
  + (Number of nonexistent addresses × 0.7 seconds)

Number of nonexistent addresses means the number of addresses which are not actually used from among connectable address from 1 to 31.

Example:
- When address setting is Continuous setting, the number of connected controllers is 31 (the maximum number of connected controllers) and controller communication speed is 19200 bps (selecting the controller communication block = 0)

  Connected controller recognition time
  = 12 seconds + (31 × 0.6 seconds) = 30.6 seconds

- When address setting is Free setting, the number of connected controllers is 2 and controller communication speed is 19200 bps (selecting the controller communication block = 0)

  Connected controller recognition time
  = 12 seconds + (2 × 0.6 seconds) + (29 × 0.7 seconds) = 33.5 seconds

B.3 PLC Communication Processing Time

B.3.1 Monitor processing time (Request command: 0)

This is the monitored data item updating time required for PLC communication. The controller writes data for the PLC.

■ MITSUBISHI PLC

PLC communication speed: 38400 bps

Monitor processing time
= 60 ms + Number of monitored items × Maximum number of PLC communication controllers × 1 ms
+ {(Number of monitored items × Maximum number of PLC communication controllers / 64) + 3}
× (15 ms + PLC response time [ms])

■ OMRON PLC

PLC communication speed: 38400 bps

Monitor processing time
= 100 ms + Number of monitored items × Maximum number of PLC communication controllers × 1 ms
+ {(Number of monitored items × Maximum number of PLC communication controllers / 29) + 3}
× (15 ms + PLC response time [ms])

The Monitor processing time is calculated as shown above. However the Controller communication data updating cycle time is required for actually updating the data.

Example:
When OMRON PLC is used, the maximum number of PLC communication controllers is 31 (maximum value), the number of monitored items is 12, the PLC response time is 20 ms and controller communication speed is 19200 bps

Controller communication data updating cycle = 160 ms × 31 = 4.96 seconds

Monitor processing time
= 100 ms + (12 × 31 × 1 ms) + {(12 × 31 / 29) + 3} × (15 ms + 20 ms)
= 100 + 372 + {(372 / 29) + 3} × 35 = Approx. 1026 ms = Approx. 1.03 seconds

Therefore, the monitored data is updated every 1.03 seconds. However it is actually updated every 4.96 seconds (every controller communication data updating cycle).

Monitored data items correspond to the 12 items of Measured value (PV), Current transformer 1 (CT1) input value monitor, Current transformer 2 (CT2) input value monitor, Set value (SV) monitor, Remote setting (RS) input value monitor, Manipulated output value (MV1) monitor [heat-side], Manipulated output value (MV2) monitor [cool-side], Digital input (DI) state monitor, Output state monitor, Controller state 1, Controller state 2 and Controller state 3.
Any necessary items can be selected from among those described above. They are selected by setting the PLC communication environment

The maximum number of PLC communication controllers is set with PLC communication environment setting.

B.3.2 Setting processing time (Request command: 1)

It is time when data is read by the controller from the PLC.

Setting processing time is the time required for returning to Writing on monitor data after the controller communication state is set to Writing on setting data. There is a delay time of (monitor processing time) × (Number of units) until the controller read Request commands after the user writes those commands. However, if these commands are changed simultaneously in two or more units, there is a delay in the setting (or set value monitor) processing time corresponding to the number of units whose request commands are changed.

■ MITSUBISHI PLC

PLC communication speed: 38400 bps, Controller communication speed: 19200 bps

- **When all item is set**

  Setting processing time
  = Approx. 120 ms + (Maximum number of PLC communication controllers × 21 ms)
  + {(21 × Maximum number of PLC communication controllers / 64) + 4}
  × (15 ms + PLC response time [ms])
  + (1000 ms × Number of controllers whose settings have been changed)
  + (160 ms × Number of controllers whose settings are not changed)

- **When one item is set**

  Setting processing time
  = Approx. 110 ms + (Maximum number of PLC communication controllers × 1 ms)
  + (4 × PLC response time [ms])
  + (750 ms × Number of controllers whose settings have been changed)
  + (160 ms × Number of controllers whose settings are not changed)

■ OMRON PLC

PLC communication speed: 38400 bps, Controller communication speed: 19200 bps

- **When all item is set**

  Setting processing time
  = Approx. 190 ms + (Maximum number of PLC communication controllers × 21 ms)
  + {(21 × Maximum number of PLC communication controllers / 29) + 4}
  × (15 ms + PLC response time [ms])
  + (1000 ms × Number of controllers whose settings have been changed)
  + (160 ms × Number of controllers whose settings are not changed)

- **When one item is set**

  Setting processing time
  = Approx. 60 ms + (Maximum number of PLC communication controllers × 1 ms)
  + {(Maximum number of PLC communication controllers / 29) + 4}
  × (15 ms + PLC response time [ms])
  + (750 ms × Number of controllers whose settings have been changed)
  + (160 ms × Number of controllers whose settings are not changed)

B.3.3 Set value monitor processing time (Request command: 2)

It is time when data is written by the controller for the PLC.

Setting processing time is the time required for returning to Writing on monitor data after the controller communication state is set to Writing on setting data. There is a delay time of (monitor processing time) × (Number of units) until the controller read Request commands after the user writes those commands. However, if these commands are changed simultaneously in two or more units, there is a delay in the setting (or set value monitor) processing time corresponding to the number of units whose request commands are changed.

■ MITSUBISHI PLC

PLC communication speed: 38400 bps, Controller communication speed: 19200 bps

- **When all item is set**

  Setting processing time
  = Approx. 120 ms + (Maximum number of PLC communication controllers × 21 ms)
  + {(21 × Maximum number of PLC communication controllers / 64) + 4}
  × (15 ms + PLC response time [ms])

- **When one item is set**

  Setting processing time
  = Approx. 110 ms + (Maximum number of PLC communication controllers × 1 ms)
  + (4 × PLC response time [ms])

■ OMRON PLC

PLC communication speed: 38400 bps, Controller communication speed: 19200 bps

- **When all item is set**

  Setting processing time
  = Approx. 190 ms + (Maximum number of PLC communication controllers × 21 ms)
  + {(21 × Maximum number of PLC communication controllers / 29) + 4}
  × (15 ms + PLC response time [ms])

- **When one item is set**

  Setting processing time
  = Approx. 60 ms + (Maximum number of PLC communication controllers × 1 ms)
  + {(Maximum number of PLC communication controllers / 29) + 4}
  × (15 ms + PLC response time [ms])

B.3.4 Time-out time

The time-out time is determined by the PLC scanning time setting and PLC communication transmission transfer time setting. (Any numeral of less than 10 ms is omitted)

- PLC communication speed: 38400 bps

  Time-out time = 280 ms + (PLC scanning time setting × 2)
  + PLC communication transmission transfer time setting

- PLC communication speed: 19200 bps

  Time-out time = 350 ms + (PLC scanning time setting × 2)
  + PLC communication transmission transfer time setting

- PLC communication speed: 9600 bps

  Time-out time = 490 ms + (PLC scanning time setting × 2)
  + PLC communication transmission transfer time setting

The PLC scanning time setting is set with PLC communication environment setting.

B.4 Maximum Host Communication Data Updating Time

This is the maximum time required until updated to the new data revised via Host communication.

■ Controller communication speed: 38400 bps

- Selecting the controller communication block = 0

  Maximum host communication data updating time = 600 ms × Number of connected controllers

- Selecting the controller communication block = 1

  Maximum host communication data updating time = 1000 ms × Number of connected controllers

- Selecting the controller communication block = 7

  Maximum host communication data updating time = 1200 ms × Number of connected controllers

■ Controller communication speed: 19200 bps

- Selecting the controller communication block = 0

  Maximum host communication data updating time = 700 ms × Number of connected controllers

- Selecting the controller communication block = 1

  Maximum host communication data updating time = 1200 ms × Number of connected controllers

- Selecting the controller communication block = 7

  Maximum host communication data updating time = 1400 ms × Number of connected controllers

APPENDIX C. ASCII 7-BIT CODE TABLE

					b7	0	0	0	0	1	1	1	1
					b6	0	0	1	1	0	0	1	1
					b5	0	1	0	1	0	1	0	1
b5～b7	b4	b3	b2	b1	＼	0	1	2	3	4	5	6	7
	0	0	0	0	0	NUL	DLE	SP	0	@	P	‘	p
	0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
	0	0	1	0	2	STX	DC2	”	2	B	R	b	r
	0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
	0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
	0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
	0	1	1	0	6	ACK	SYM	&	6	F	V	f	v
	0	1	1	1	7	BEL	ETB	’	7	G	W	g	w
	1	0	0	0	8	BS	CAN	(	8	H	X	h	x
	1	0	0	1	9	HT	EM	)	9	I	Y	i	y
	1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
	1	0	1	1	B	VT	ESC	+	;	K	[	k	{
	1	1	0	0	C	FF	FS	,	<	L	¥	l	|
	1	1	0	1	D	CR	GS	–	=	M	]	m	}
	1	1	1	0	E	SO	RS	.	>	N	^	n	~
	1	1	1	1	F	SI	US	/	?	O	_	o	DEL

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