PLC Communication Converter

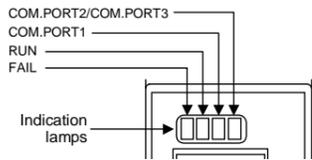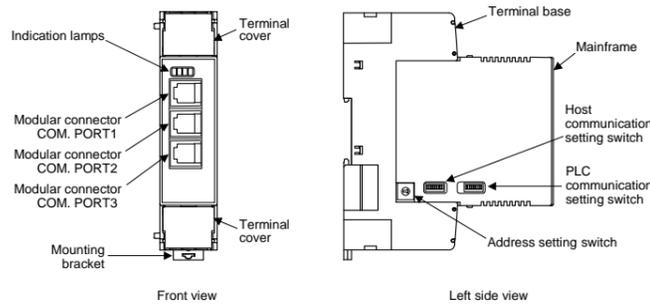# COM-JE

Quick Instruction Manual

IMR01Y12-E4

This manual describes the basic operation method of the COM-JE. For the installation, the communication data, the detail handling procedures and various function settings, please read if necessary the following separate manuals.

- COM-JE Installation Manual (IMR01Y02-E□): Attached to the product
- COM-JE Communication Data List (IMR01Y17-E□): Attached to the product
- COM-JE Instruction Manual (IMR01Y07-E□): Separate manual *
  * Download free or purchase hard copy

📖 These manuals can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm.

1. PARTS DESCRIPTION

● Indication lamps

FAIL	[Red]	• When CPU/RAM abnormally: Turns on • Communication environment setting mode by the switch: Flashes
RUN	[Green]	• When normally: 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

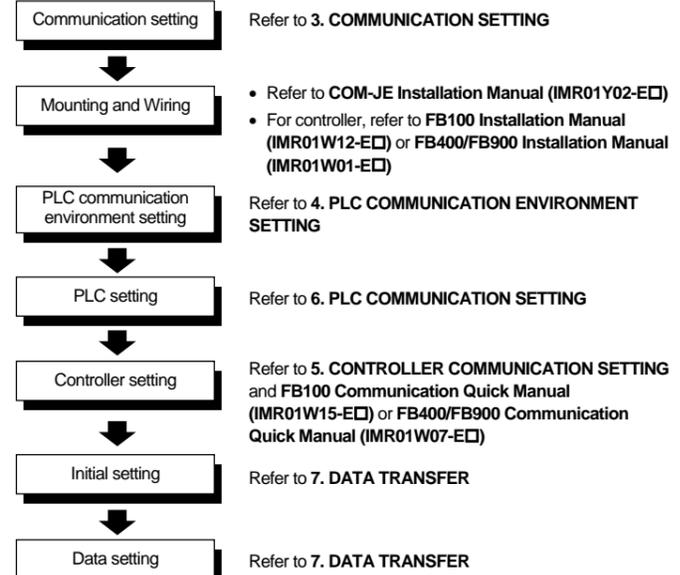| COM. PORT1	Connector for PLC or Host computer connection [Based on RS-422A/RS-232C] (Specify when ordering)
COM. PORT2	Connector for PLC, Host computer or COM-JE connection [Based on RS-422A]
COM. PORT3	Connector for COM-JE extension [Based on RS-422A]

● 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

CAUTION

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

2. HANDLING PROCEDURES

|	
Communication setting	Refer to **3. COMMUNICATION SETTING**
Mounting and Wiring	• Refer to **COM-JE Installation Manual (IMR01Y02-E□)** • For controller, refer to **FB100 Installation Manual (IMR01W12-E□)** or **FB400/FB900 Installation Manual (IMR01W01-E□)**
PLC communication environment setting	Refer to **4. PLC COMMUNICATION ENVIRONMENT SETTING**
PLC setting	Refer to **6. PLC COMMUNICATION SETTING**
Controller setting	Refer to **5. CONTROLLER COMMUNICATION SETTING** and **FB100 Communication Quick Manual (IMR01W15-E□)** or **FB400/FB900 Communication Quick Manual (IMR01W07-E□)**
Initial setting	Refer to **7. DATA TRANSFER**
Data setting	Refer to **7. DATA TRANSFER**

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

3. COMMUNICATION SETTING

3.1 Address Setting

For this setting, use a small blade screwdriver.

📖 **Set the address such that it is different to the other addresses on the same line. Otherwise, problems or malfunction may result.**

Address setting switch

Setting range:
0 to 15 [0 to F: hexadecimal]
(Factory set value: 0)
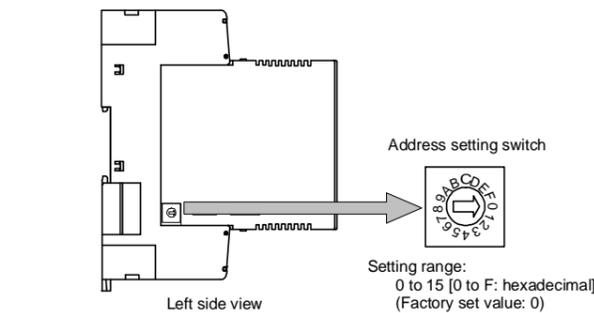
● PLC communication

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

Group	Address setting switch		Group	Address setting switch
Group 1	0		Group 3	8
	1			9
	2			A
	3			B
Group 2	4		Group 4	C
	5			D
	6			E
	7			F

📖 **Always set the address of each group including 0, 4, 8 or C. 0, 4, 8 or C becomes the master for communication transfer.**

● Host communication

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

📖 Address setting for the controller
There are two address settings for the controller (FB100/400/900) connecting to the COM-JE: continuous setting and free setting. (Set by the PLC communication environment setting.)
• For the continuous setting (factory set value), consecutive addresses starting from 1 are set to each controller.
• Free settings can be made in the range of 1 to 31.

3.2 Protocol Selections and Communication Speed Setting

■ PLC communication setting switch

Set the communication speed, data bit configuration, and protocol for PLC communication. In addition, select the communication port of modular connector.
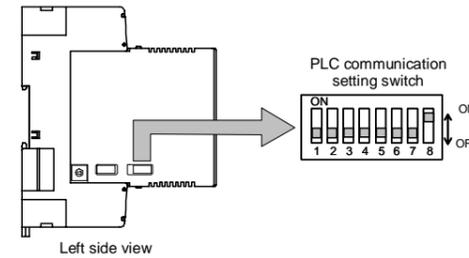
PLC communication setting switch

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: Data 8-bit, without parity, Stop 1-bit

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: 9600 bps

5	6	7	Communication protocol
OFF	OFF	OFF	Do not set this one.
ON	OFF	OFF	Do not set this one.
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.

Factory set value: 5: OFF, 6: OFF, 7: OFF (Always set the PLC communication)

| 8	Communication port assignment
OFF	COM. PORT1: PLC communication [RS-232C/RS-422A] COM. PORT2/3: Host communication [RS-422A]
ON	COM. PORT1: Host communication [RS-232C/RS-422A] COM. PORT2/3: PLC communication [RS-422A]

Factory set value: ON (COM. PORT1: Host communication [RS-232C/RS-422A] / COM. PORT2/3: PLC communication [RS-422A])

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

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

■ Host communication setting switch

Set the communication speed, data bit configuration, and protocol for Host communication.

Host communication setting switch

Left side view
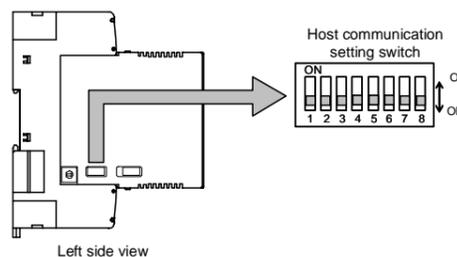
1	2	Data bit configuration
OFF	OFF	Data 8-bit, without parity, Stop 1-bit
ON	OFF	Data 7-bit *, Odd parity, Stop 1-bit
OFF	ON	Data 7-bit *, Even parity, Stop 1-bit
ON	ON	Data 7-bit *, Even parity, Stop 2-bit

* To be changed to data 8-bit only when Host communication (Modbus) is selected.
Factory set value: Data 8-bit, without parity, Stop 1-bit

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: 9600 bps

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

Factory set value: Host communication (RKC communication)

📖 • Switch No. 5, 7 and 8: OFF fixed (Do not set this one.)
• When two or more COM-JE units are multi-drop connected in Host communication, set the Host communication setting switches in all of the COM-JE units to the same positions.

4. PLC COMMUNICATION ENVIRONMENT SETTING

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

### ■ Setting by the switch

📖 When set by switch, the setting details cannot be check afterwards. When checking the details thus set, check them via Host communication. In addition, as each switch position is moved during the setting, record the switch ON/OFF position before making the setting.

● Setting procedure

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 COM-JE 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.

RUN lamp turns off
FAIL lamp (red) flashing
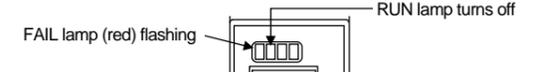
5. Select a setting item with a Host communication setting switch or a PLC communication setting switch. Select setting items one by one.
   • For the Host communication setting switch, change its position from OFF to ON.
   • For the PLC communication setting switch, change its position from ON to OFF.
6. Set data with address setting switch.
7. After the setting is finished, for the Host communication setting switch return its position to OFF from ON (for the PLC communication setting switch, to ON from OFF).
   The RUN lamp goes on and it 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.
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, the Host communication setting switch and PLC communication setting switch to the positions already recorded.
11. Turn on the power again.
    The set data valid if the power is turned on again.

Setting items 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	0
2	PC number [1]	0 to E: 0 to 14 F: 255	255
3	Register start number	0 to F: 0 to 15000 (set value × 1000)	1000
4	Maximum controller number of PLC communication	0: 1 controller 1 to E: 2 to 28 controllers (set value × 2) F: 31 controllers	10 controllers
5	Register type	For MITSUBISHI PLC 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: Do not set this one. For OMRON PLC 0: DM register A: EM register 1 to 9, B to F: Do not set this one.	For MITSUBISHI PLC: D register (A-compatible 1C frame) For OMRON PLC: DM register
6	PLC scanning time	0 to 7: 0 to 280 ms (set value × 40) 8 to E: 800 to 1400 ms (set value × 100) F: 3000 ms	255 ms
7	COM-JE link recognition time [2]	0: No controller 1 to E: 10 to 140 seconds (set value × 10) F: 255 seconds	10 seconds
8	Unused	Do not set this one.	—

[1] Do not set for the OMRON PLC.
[2] Set this item to the COM-JE (master) with the address of 0, 4, 8 or C.

Setting items 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	Selection of the address setting method and the error elimination method of the controller 0: Continuous setting, Manual elimination 1: Free setting, Manual elimination 2: Continuous setting, Automatic elimination 3: Free setting, Automatic elimination 4 to F: Do not set this one.	Continuous setting, Manual elimination
7	Monitor item selection	Monitoring items are assigned to each binary bit and their combination is decimally expressed. 0: 1 6: 3587 C: 3687 1: 3 7: 3590 D: 3695 2: 6 8: 3591 E: 4095 3: 7 9: 3617 F: Do not set this one. 4: 3585 A: 3619 5: 3586 B: 3681 Monitor item 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 1for Reserve.	4095
8	Cannot be used for setting the PLC communication environment.	—	—

☞ In addition to the above, it is possible to select the Controller communication block and to set the Controller communication speed. For setting procedure, refer to the **COM-JE Instruction Manual (IMR01Y07-E□)**.

■ Setting by Host communication

Set the PLC communication environment after connecting the modular connector (COM.PORT) assigned with Host communication to the host computer.

Setting items are the same as those set by the switches. However, only the "PLC communication start time" can be set via Host communication.

Setting items list

Setting item	RKC identifier	Modbus register address	
		HEX	DEC
Station number	QV	8000	32768
PC number [1]	QW	8001	32769
Register start number	QX	8002	32770
Maximum controller number of PLC communication	QY	8003	32771
Register type	QZ	8004	32772
Monitor item selection	QS	8006	32774
COM-JE link recognition time	QT	8007	32775
PLC scanning time	VT	8009	32777
Action mode selection	RZ	800C	32780
PLC communication start time	R5	800F	32783
Register start number high-order 4 bits [2]	VX	8012	32786

[1] Do not set for the OMRON PLC.
[2] Valid only when QnA-compatible 3C frame (excluding the R register) of the MITSUBISHI PLC is selected.

☞ For data range of Host communication, refer to the **COM-JE Communication Data List (IMR01Y17-E□)**.

5. CONTROLLER COMMUNICATION SETTING

Set the communication setting of controller as follows.

Protocol: Modbus
Data bit configuration: Data 8-bit, without parity, Stop 1-bit
Communication speed: 19200 bps (factory set value)

☞ For details on changing the Controller communication speed of the COM-JE, refer to the **COM-JE Instruction Manual (IMR01Y07-E□)**.

6. PLC COMMUNICATION SETTING

Set the PLC as follows. (Recommend setting example)

■ MITSUBISHI MELSEC series

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

■ OMRON SYSMAC series

Item	Description
Serial communication mode	High-order link
Unit number (Model No.)	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. The details of the setting procedure for the PLC, refer to the instruction manual for the PLC being used.

7. DATA TRANSFER

☞ Data transferred between the PLC and controller is shown in a PLC communication data map. For the PLC communication data map, refer to the **COM-JE Communication Data List (IMR01Y17-E□)**.

7.1 Data Transfer Type

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

■ Fixed data transfer type

The PLC communication data map data already assigned is transferred by the 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.

● **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.
– 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.

● **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.

☞ For details on the setting item number, refer to the PLC communication data map of **COM-JE Communication Data List (IMR01Y17-E□)**.

■ 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 of the data exchangeable via Host communication (Modbus). Data corresponding to up to 16 words can be transferred.
For data transfer, Control word 1 (request command) is used.

☞ For the Specified data transfer type, refer to the **COM-JE Instruction Manual (IMR01Y07-E□)**.
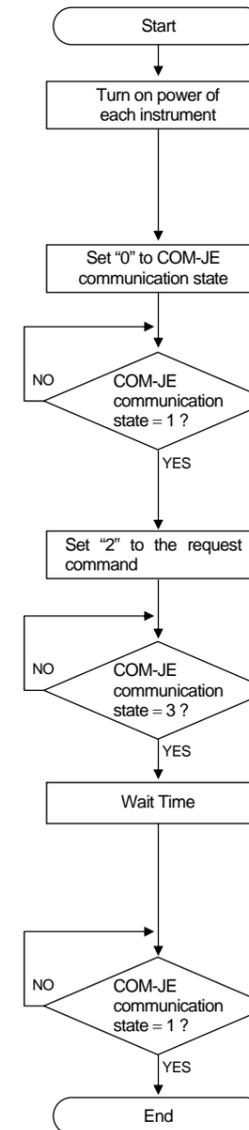
7.2 Transfer Procedures

⚠ 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 the controller to PLC by the fixed data transfer type

Start → Turn on power of each instrument → Set "0" to COM-JE communication state → COM-JE communication state = 1? (NO loops) YES → Set "2" to the request command → COM-JE communication state = 3? (NO loops) YES → Wait Time → COM-JE communication state = 1? (NO loops) YES → End

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 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.

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

📖 Changes depending on the maximum controller number of PLC communication and PLC response time.

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 the controller by the fixed data transfer type

Start → Set the Set value (SV) and other setting data to each register (memory) in the PLC. → Set "1" or "Setting item number × 10 + 1" to the request command → A

[Data setting]
When 1 **(Setting)** or **Setting item number × 10 + 1** is set to request command in PLC register, the controller starts reading the data* set to the register (memory) on the PLC side.
* For **Setting item number × 10 + 1**: the data of Setting item number

A → COM-JE communication state = 2? (NO loops) YES → Wait Time → COM-JE communication state = 1? (NO loops) YES → Set "2" or "Setting item number × 10 + 2" to the request command → COM-JE communication state = 3? (NO loops) YES → Wait Time → COM-JE communication state = 1? (NO loops) YES → End

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.

📖 Changes depending on the maximum controller number of PLC communication and PLC response time.

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 2 (Set value monitor) or **Setting item number × 10 + 2** is set to request command in PLC register, the controller starts writing the data* set to the PLC side.
* For **Setting item number × 10 + 2**: the data of Setting item number

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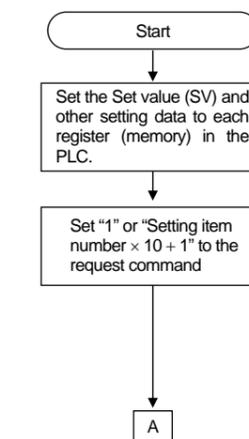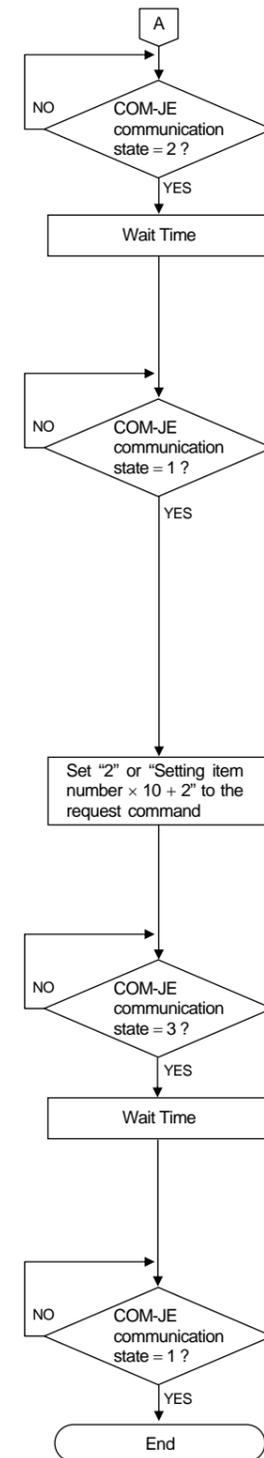
Reserve data write time as wait time. In addition, process data in each item as indefinite during this period.

📖 Changes depending on the maximum controller number of PLC communication and PLC response time.

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)
• 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.

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