
*DeviceNet Communication
Converter*

COM-JH

[For FB100/FB400/FB900]

Instruction Manual

- DeviceNet is a registered trademark of Open DeviceNet Vendor Association, Inc.
- 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.
- This product has been self-tested by RKC at DeviceNet Protocol Conformance Test Software Version A-17.

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.

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

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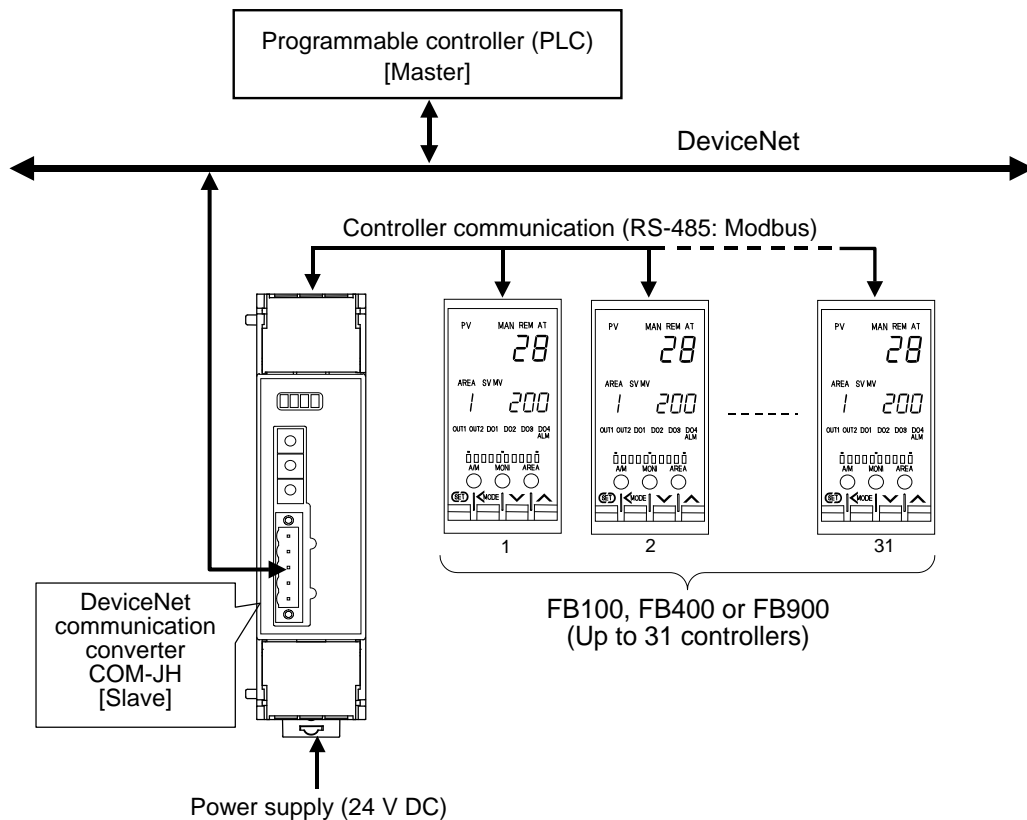
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1. OUTLINE

DeviceNet communication converter COM-JH (hereafter called COM-JH) is communication converter to connect the RKC digital controller FB100/400/900 to a programmable controller (hereafter called PLC) for DeviceNet.

This chapter describes features, package contents, model code, system configuration, etc.

- Up to 31 controllers can be connected to one COM-JH.
- On DeviceNet, a PLC is a master device, and the COM-JH is a slave device.
- There are two DeviceNet connector types: open-style connector and micro-style connector.



For DeviceNet, refer to the website of ODVA (Open DeviceNet Vendor Association).
URL: <http://www.odva.org>

1.1 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 items delivered are complete. (See below)

Accessories	Q'TY	Remarks
<input type="checkbox"/> COM-JH [For FB100/FB400/FB900] Installation Manual (IMR01Y04-E□)	1	Enclosed with instrument
<input type="checkbox"/> COM-JH [For FB100/FB400/FB900] Quick Operation Manual (IMR01Y14-E□)	1	Enclosed with instrument
<input type="checkbox"/> COM-JH [For FB100/FB400/FB900] Communication Data List (IMR01Y19-E□)	1	Enclosed with instrument
<input type="checkbox"/> COM-JH [For FB100/FB400/FB900] Instruction Manual (IMR01Y09-E5)	1	This manual (Download free or purchase hard copy)
<input type="checkbox"/> EDS file (com01.eds)*	1	Download free



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

* EDS file

The EDS file for COM-JH can be downloaded from our website:

(URL: http://www.rkcinst.com/english/download/field_network.htm)

Use the EDS file when recognizing the COM-JH on the DeviceNet by using a configurator (tool used to set a master or slave environment on the DeviceNet) of each manufacturer.



For how to use EDS file, refer to Configuration Tool Instruction Manual of each company or Instruction Manual of the master product.

1.2 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- JH - □ * 01
(1) (2)

(1) Connector type

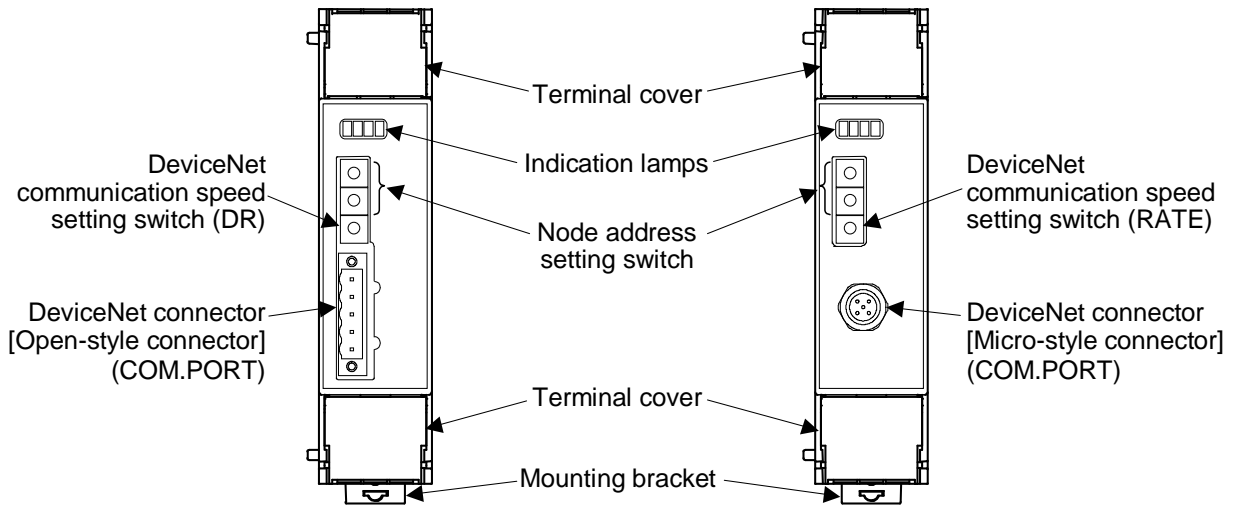
N: Open-style connector (Unshielded type)

1: Micro-style connector (Shield type)

(2) Corresponding to the RKC controller

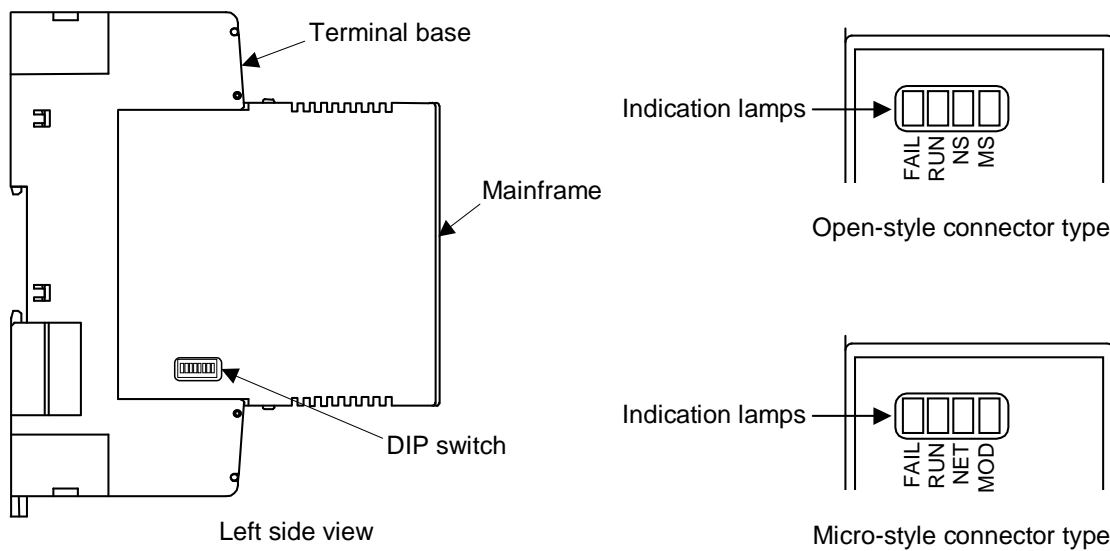
01: FB100/400/900

1.3 Parts Description



Front view of open-style connector type

Front view of micro-style connector type



Left side view

Micro-style connector type

● **Indication lamps**

FAIL [Red]	<ul style="list-style-type: none"> When instrument abnormally: Turns on Communication environment setting mode by the switch: Flashes
RUN [Green]	<ul style="list-style-type: none"> When normally: Turns on Self-diagnostic error: Flashes slowly Data collection just after the power is turned on: Flashes rapidly
NS or NET (Network status) [Green/Red]	<ul style="list-style-type: none"> Network is operating normally, but communications have not yet been established: A green lamp flashes Network is operating normally (communications established): A green lamp turns on I/O connection is timeout: A red lamp flashes A fatal communications error has occurred, Network communications are not possible: A red lamp turns on
MS or MOD (Module status) [Green/Red]	<ul style="list-style-type: none"> When DeviceNet communication is normal: A green lamp turns on Controller communication error: A green lamp flashes Memory backup error: A red lamp turns on

● **DeviceNet connector**

COM. PORT [Open-style or Micro-style connector]	Connector for PLC (Master) connection
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● **Switches**

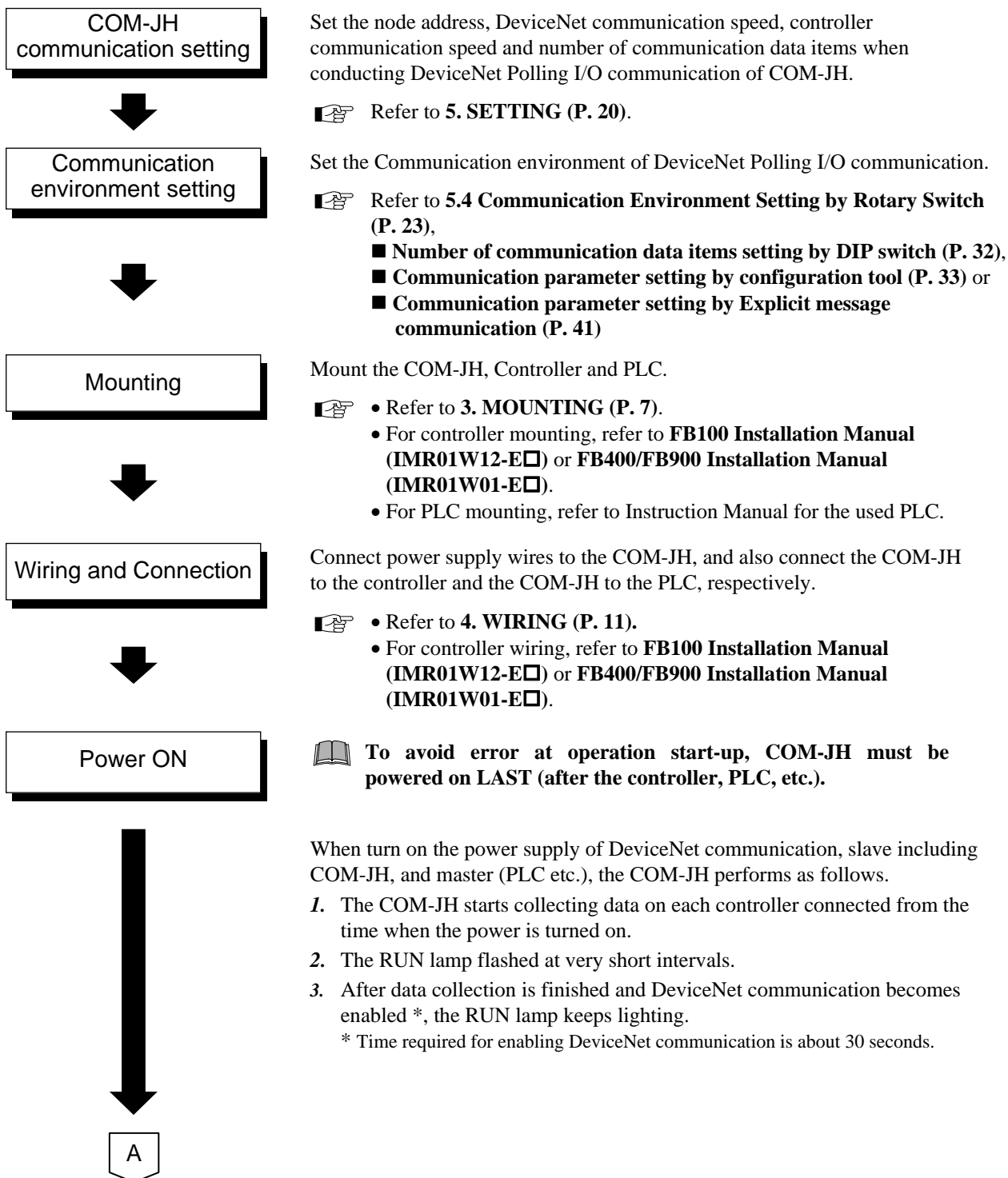
Node address setting switch	<ul style="list-style-type: none"> Set the node address for DeviceNet Used for the PLC communication environment setting
DeviceNet communication speed setting switch	<ul style="list-style-type: none"> Set the communication speed for DeviceNet Used for the PLC communication environment setting
DIP switch	<ul style="list-style-type: none"> Set the communication speed for controller communication Set the number of communication data items when conducting DeviceNet Polling I/O communication

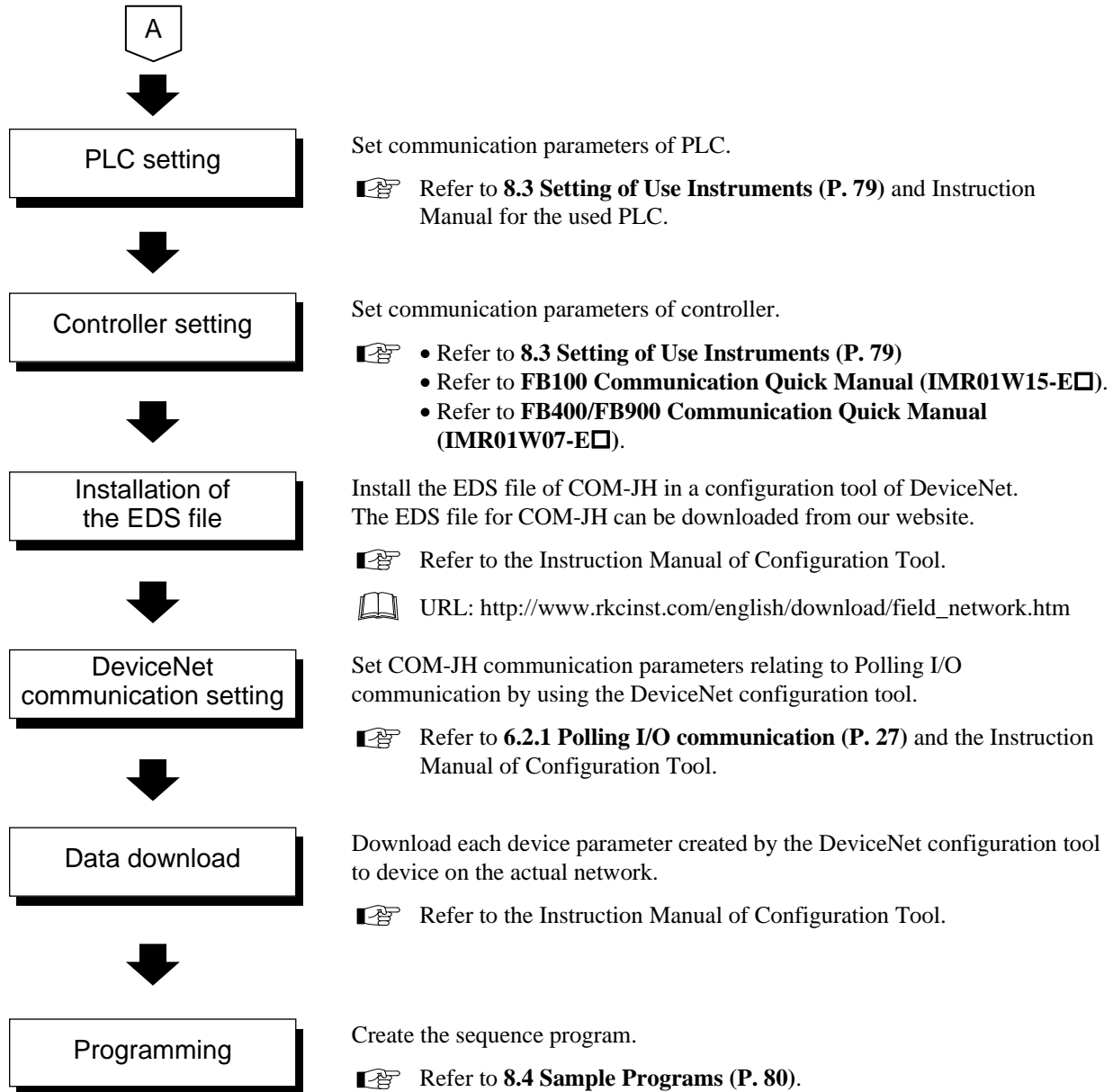
● **Others**

Terminal cover	Terminal covers above and below the COM-JH
Mounting bracket	<ul style="list-style-type: none"> 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-JH (There is the Termination resistor transfer switch in the inside of terminal base)
Mainframe	Part of the mainframe of COM-JH

2. HANDLING PROCEDURES

Conduct necessary setting before communication according to the procedure described below.





3. MOUNTING

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



WARNING

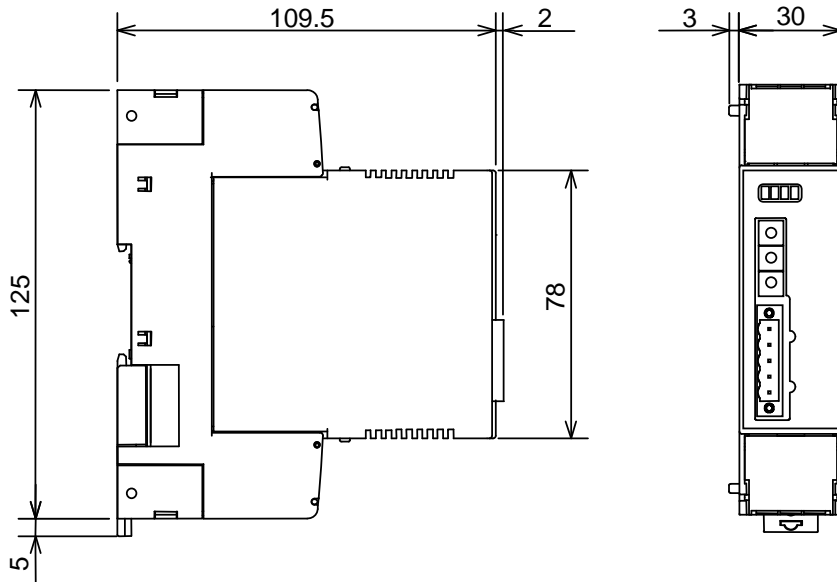
To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

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/m³ 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:
 - Ensure at least 50 mm space on top and bottom of the instrument for maintenance and environmental reasons.
 - 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.

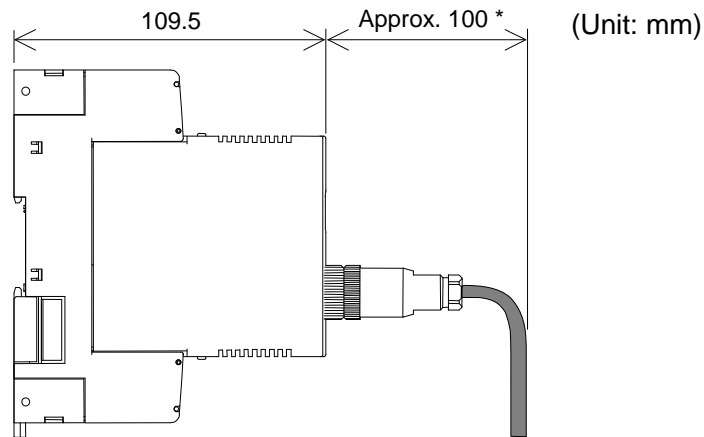
3.2 Dimensions

(Unit: mm)



● **Depth in connector mounting**

Conduct installation in consideration of the sizes of the connector and cable when connector-connected.
 [Usage example of micro-style connector]

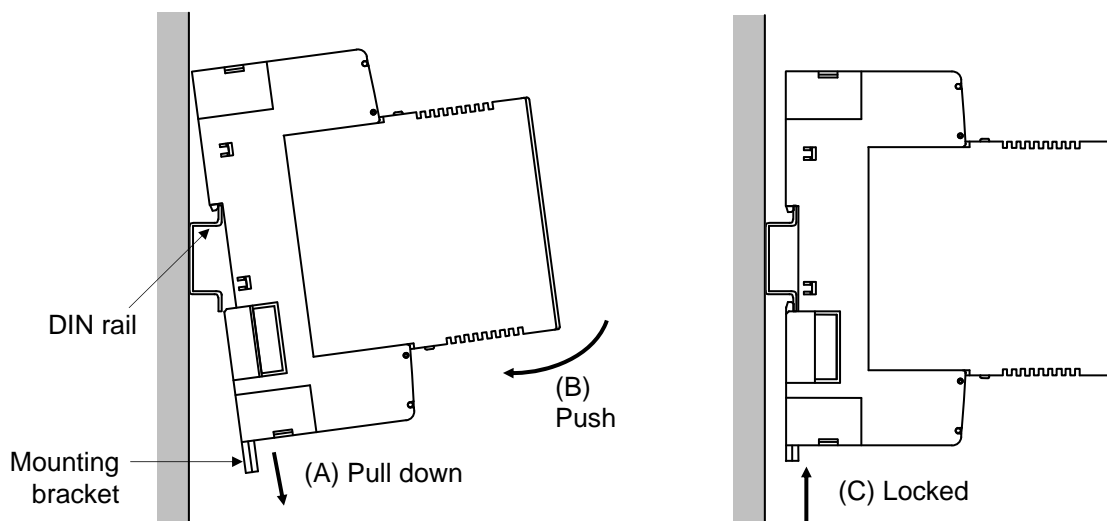


* For open-style connector: Approx. 50 mm

3.3 DIN Rail Mounting

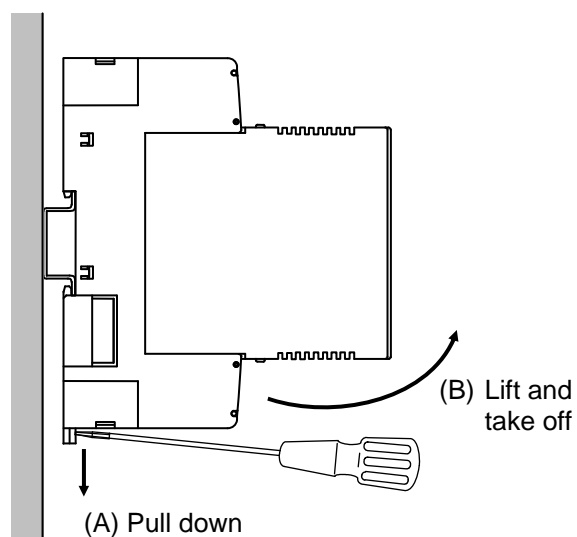
■ Mounting procedures

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 blade screwdriver (A). Lift the instrument from bottom, and take it off (B).



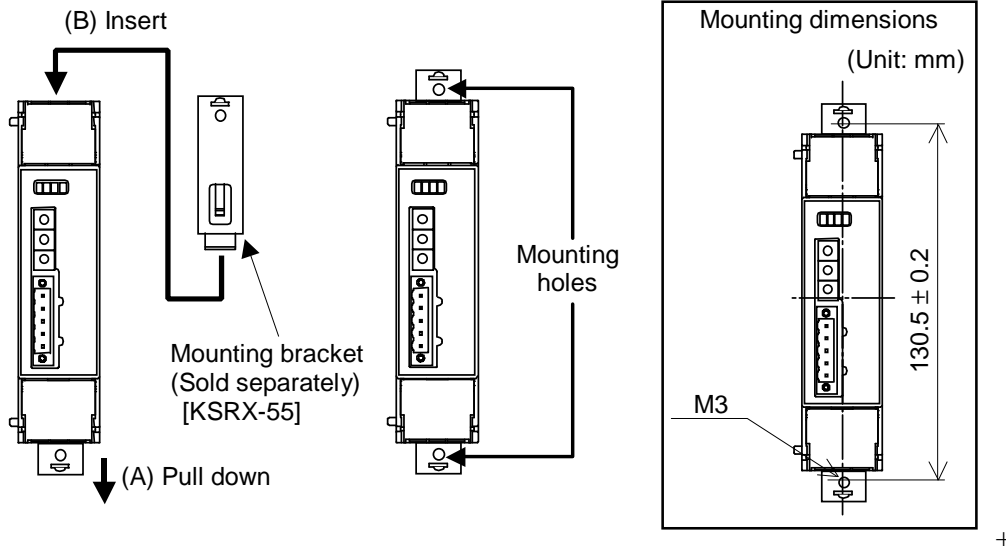
3.4 Panel Mounting

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, wiring layout and wiring of terminals.

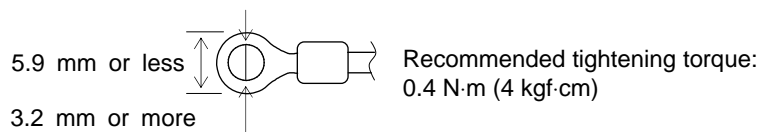
4.1 Wiring Cautions



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.

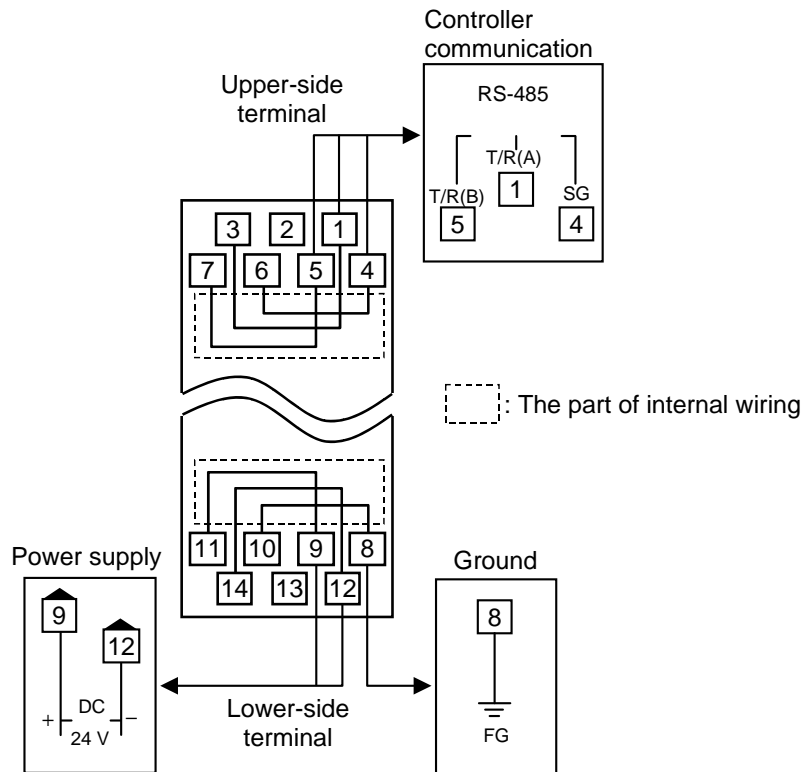
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
- If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.
 - Shorten the distance between the twisted power 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).






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

4.2 Terminal Configuration

The terminal configuration is as follows.



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

4.3 Connection to DeviceNet

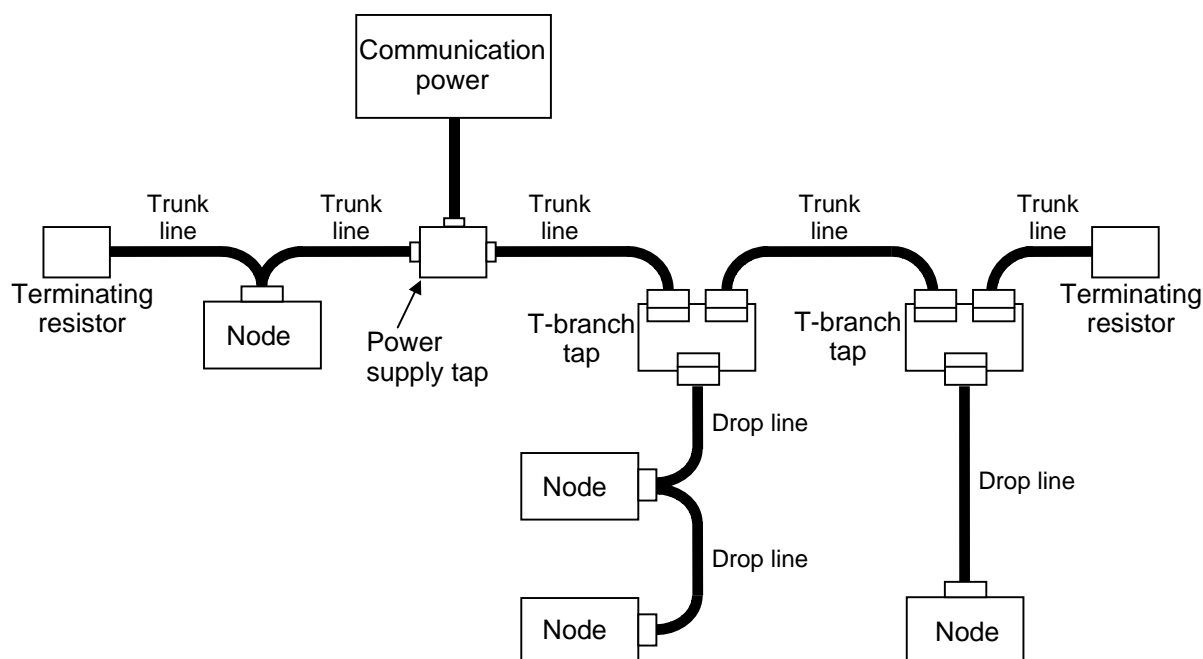


WARNING

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

4.3.1 Connection outline of DeviceNet

The following diagram shows the configuration of a DeviceNet network.




- Nodes:
There are two kinds of nodes of master and slave in DeviceNet. The master and slaves can be connected at any location in the network.
- Trunk/Drop lines:
The trunk line refers to the cable that has termination resistors on both ends. Cables branching from the trunk line are known as drop lines.
Use the DeviceNet communication cable (thick or thin cable) for Trunk/Drop lines.
- Connection methods:
Two methods can be used to connect DeviceNet nodes: The T-branch method and the multi-drop method. With the T-branch method, the node is connected to a drop line created with a T-branch Tap. With the multi-drop method, the node is directly connected to the trunk line or the drop line.

- Termination resistors:
Install termination resistors to both ends of a trunk line in DeviceNet.
Specification of termination resistor: 121 Ω , $\pm 1\%$, 1/4 W (Metal film resistance)
- Communications power supplies:
To use DeviceNet, connect a communications power supply (24 V DC) to the communications connector of each node with a cable.
- Communication length:

Communication speed	Maximum network length *		Maximum drop length	Cumulative drop length
	Thick trunk length	Thin trunk length		
125 kbps	500 m	100 m	6 m	156 m or less
250 kbps	250 m			78 m or less
500 kbps	100 m			39 m or less

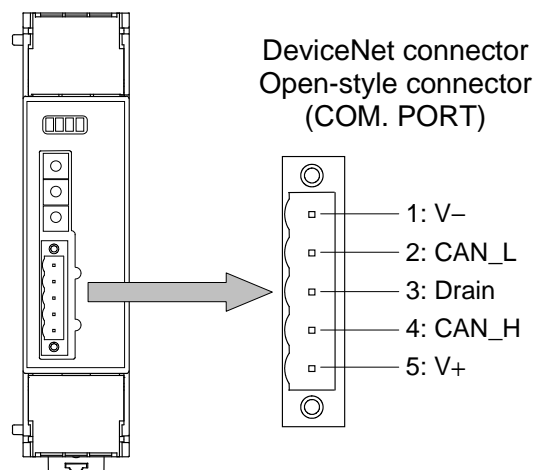
* Maximum distance between nodes

-  For details of DeviceNet Network installation conditions and methods, refer to the instruction manual of the DeviceNet master unit or DeviceNet Specifications.
DeviceNet specifications are available at ODVA (Open DeviceNet Vendor Association).

URL: <http://www.odva.org>

4.3.2 Pin layout of connector

■ Open-style connector



Pin No. and signal details

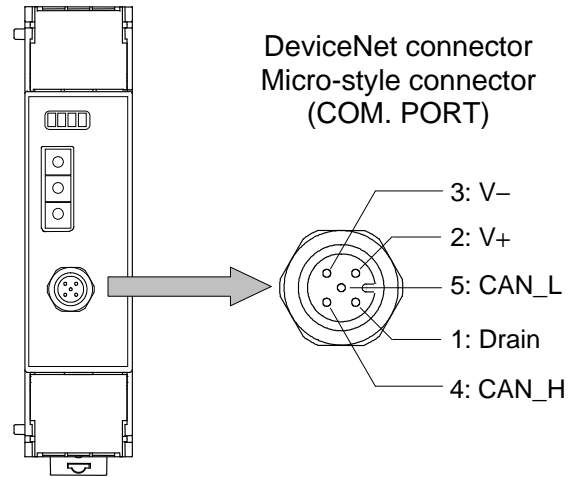
Pin No.	Signal name	Symbol	Cable color
1	Power supply, minus (-)	V-	Black
2	Communication data, low	CAN_L	Blue
3	Shield	Drain	—
4	Communication data, high	CAN_H	White
5	Power supply, plus (+)	V+	Red

● Connection plugs (Recommended model)

MSTB2.5/5-STF-5.08AUM (PHOENIX CONTACT, Inc.)

(Multi-drop type (recommended model)
TMSTBP2.5/5-STF-5.08AUM (PHOENIX CONTACT, Inc.))

■ Micro-style connector



Pin No. and signal details

Pin No.	Signal name	Symbol	Cable color
1	Shield	Drain	—
2	Power supply, plus (+)	V-	Red
3	Power supply, minus (-)	V+	Black
4	Communication data, high	CAN_H	White
5	Communication data, low	CAN_L	Blue

● Connection socket (Recommended model)

SACC-M12FS-5CON-PG 9-M (PHOENIX CONTACT, Inc.)

(This socket is a type to use thin cable.)

■ Cable

Use the communication cable (thick cable or thin cable) that matched specification of DeviceNet.



By thickness of a cable to use and connection method, usable connection connector type is different.



For cable specifications, connection method and vendor, refer to the website of ODVA (Open DeviceNet Vendor Association).

URL: <http://www.odva.org>

4.4 Wiring to the Controllers

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

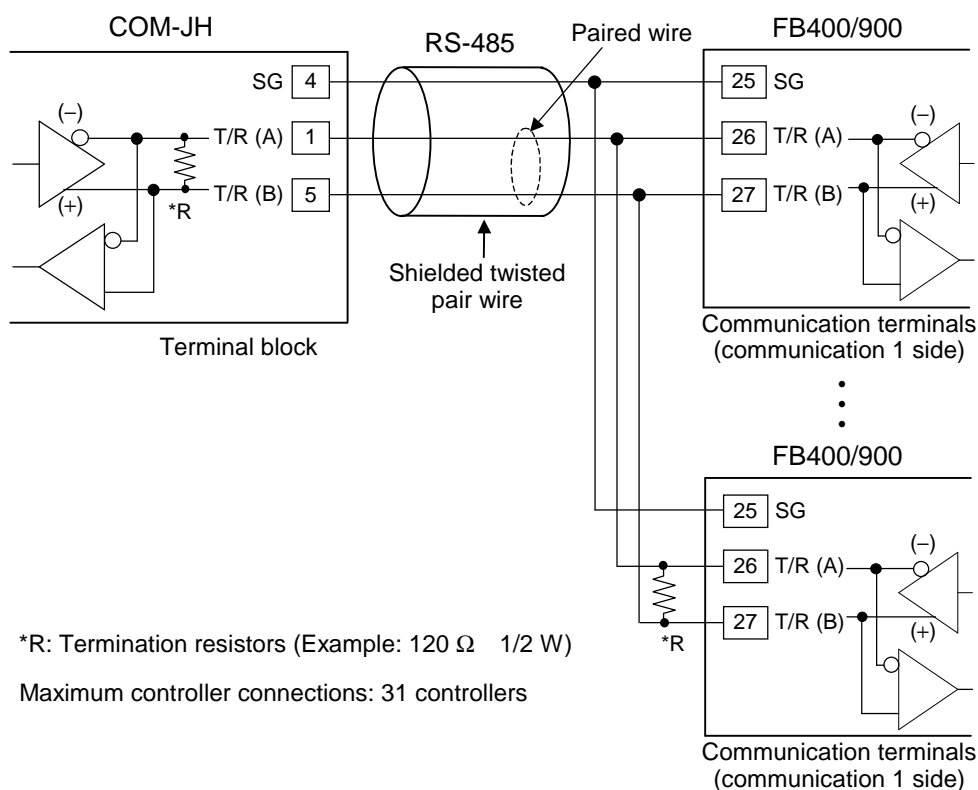


When conducting wiring to the FB100/400/900, always conduct wiring to the Communication 1 terminal.

■ FB100/400/900 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)



The cable is provided by the customer.



The termination resistor existing within the COM-JH can be connected or disconnected by the switch. (Factory set value: Termination resistor connected)

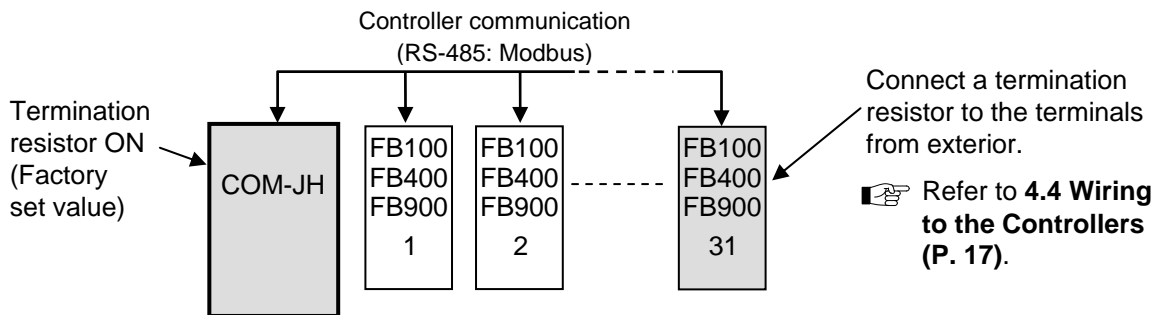
[Refer to **4.5 Termination Resistor (P. 18)**]

4.5 Termination Resistor

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



■ Setting procedure of termination resistor (COM-JH)

As the COM-JH 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.

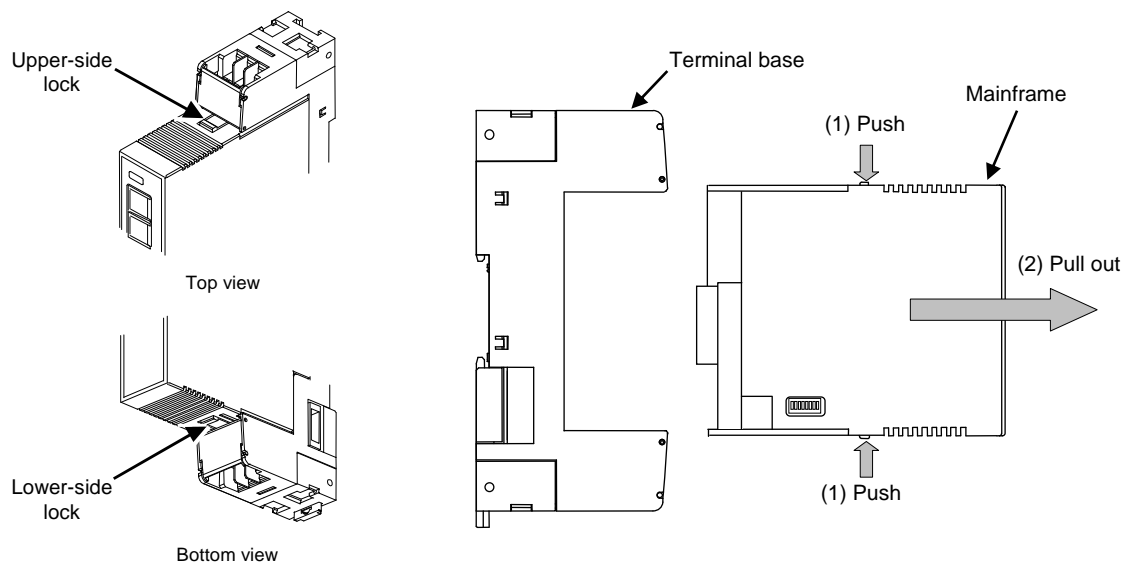
(Factory set value: Termination resistor connected)

1. Turn off the power supply of the module.



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

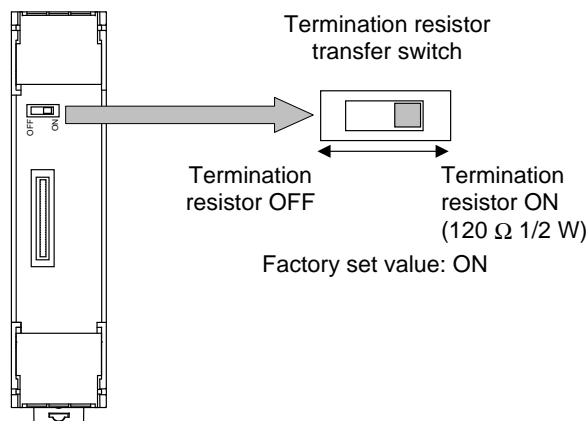
2. Pull out the mainframe itself toward you (2) while pushing the locks at its top and bottom (1), and then separate it from the terminal base.



Removing the module mainframe

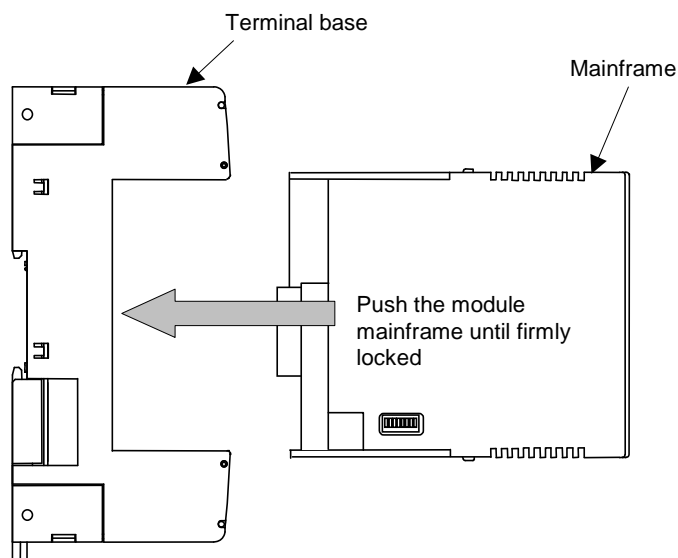
- Turn on the Termination resistor transfer switch in the terminal base.

The COM-JH is shipped from the factory with the selector switch set to “ON: Termination resistor connected.”



A terminal base of the state which removed module mainframe

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



Mounting the module 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.

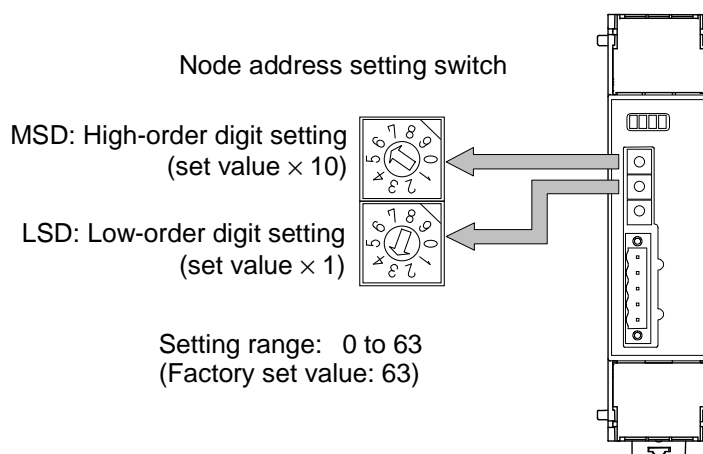
5.1 Node Address Setting

To identify each device connected to the network, it is necessary to set a different address to each device (node). For the DeviceNet, as it is possible to connect up to 64 devices including a master to the network, node address (MAC ID) from 0 to 63 can be set.

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.



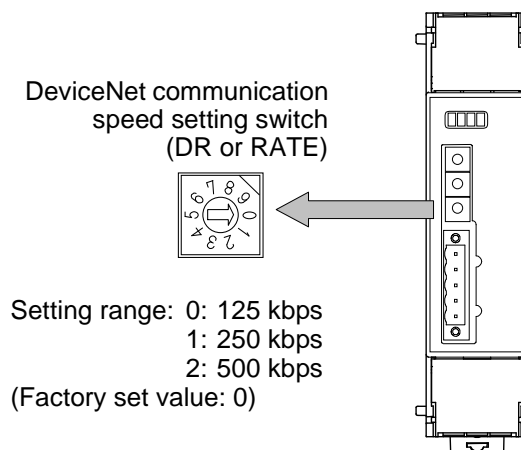
The above figure is open-style connector type. The figure of micro-style connector type is the same as an open-style connector type.



When any number exceeding 64 is set, the node address number becomes “63.”

5.2 DeviceNet Communication Speed Setting

Set a communication speed for the DeviceNet using a small blade screwdriver.



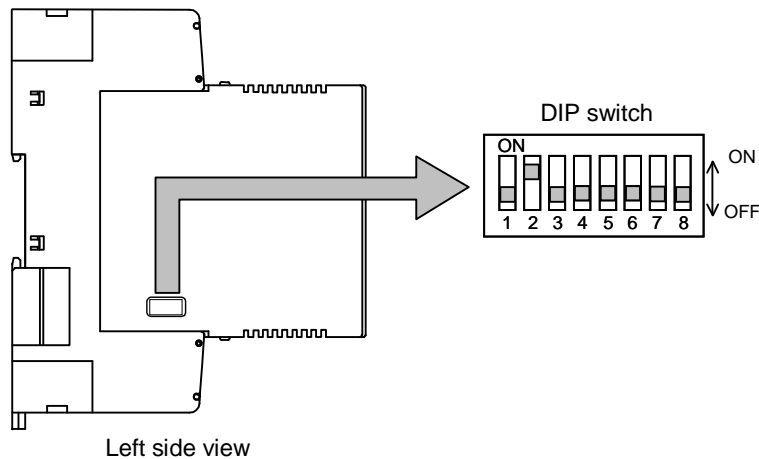
The above figure is open-style connector type. The figure of micro-style connector type is the same as an open-style connector type.



When any number between 3 and 9 is set, the communication speed becomes “500 kbps.”

5.3 DIP Switch Setting

With the DIP switch which there is on the left side of mainframe, set the controller communication speed and set the number of communication data items when conducting DeviceNet Polling I/O communication.



1	2	Controller communication speed
OFF	OFF	38400 bps
ON	OFF	9600 bps
OFF	ON	19200 bps
ON	ON	38400 bps

Factory set value: 19200 bps

4	5	Number of communication data items when conducting DeviceNet Polling I/O communication
OFF	OFF	7 words
ON	OFF	25 words
OFF	ON	45 words
ON	ON	100 words

Factory set value: 7 words



Switch No. 3, 6, 7 and 8: OFF fixed. (Don't change this one)



The number of communication data items can be calculated from the following equation.

Number of communication data items

= Number of communication items × Number of communication controllers

+ Fixed communication data items: 5 words*

* Measured data items (IN)

Receive counter: 1 word
Alarm state: 2 words
RUN/STOP state: 2 words

Setting data items (OUT)

Setting state selection: 3 words
RUN/STOP transfer: 2 words



The number of communication data items when conducting Polling I/O communication can also be set via Explicit message communication, or by the configuration tool or rotary switch. However, when the number of communication words is set via Explicit message communication, or by the configuration tool or rotary switch, the value set by the DIP switch may be ignored.

5.4 Communication Environment Setting by Rotary Switch

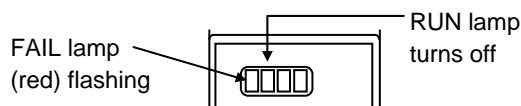
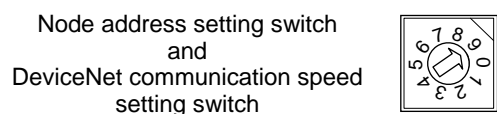
Set communication environment of Polling I/O communication of DeviceNet by using the Node address setting switch and the DeviceNet communication speed setting switch which are the rotary switch of the COM-JH.



The setting details cannot be check afterwards. When checking the details thus set, check them via Explicit message communication. In addition, as each switch position is moved during the setting, record the switch setting state before making the setting.

● Setting procedure

1. Turn off the power supply.
2. Before communication environment, record the switch positions of Node address setting switch and DeviceNet communication speed setting switch. (When this module is used for the first time, no recording is required.)
3. Set all the values of a Node address setting switch and a DeviceNet communication speed setting switch to “9.”
4. Turning on the power sets the module to the Communication environment setting mode. If set to the Communication environment setting mode, the RUN lamp goes off and the FAIL lamp flashes.
5. Select a setting item number with MSD of the Node address setting switch, and set data with LSD of the Node address setting switch.



 Refer to ■ **List of communication environment setting items (P. 24).**

6. Set the DeviceNet communication speed setting switch in the order of “9,” “0” and “1.”
The RUN lamp turns on and then it turns off after registration of the set data is complete (after a lapse about 3 seconds).
7. Repeat the steps from 5. to 6. of above, and set other setting items.
However, set the DeviceNet communication speed setting switch in the order of “1,” “0” and “1” from the second setting.
8. First check that the RUN lamp goes off, and then turn off the power.
9. Return the switch positions of Node address setting switch and DeviceNet communication speed setting switch to the positions already recorded.
10. Turn on the power again.
The set data valid if the power is turned on again.

■ List of communication environment setting items

Node address setting switch MSD		Node address setting switch LSD	Factory set value
No.	Setting item	Data range	
0	Action mode selection	Address setting method 0: Continuous setting ¹ 1: Free setting ¹ 2: Continuous setting ² 3: Free setting ² 4 to 9: Don't set this one Continuous setting: The addresses that are set in object instances 1 to 31 of the controller address settings* must be set in order from the lowest instance. Free setting: The addresses that are set in object instances 1 to 31 of the controller address settings* can be set freely. * The Attribute ID: 246 of controller object (0x64: 64Hex).	0
1	Number of Polling I/O communication controllers	0: 1 controller 1 to 8: 2 to 30 controllers (= set value × 4 – 2) 9: 31 controllers Set the number of controller communicating by Polling I/O communication.	10 controllers
2	Unused	Don't set this one	—
3	Unused	Don't set this one	—
4	Number of communication measured data items (IN) when conducting Polling I/O communication	0 to 8: 0 to 80 words (= set value × 10) 9: 200 words Set the number of measured data items (IN) communicating via Polling I/O communication.	0: Depends on the DIP switch setting (7 words)
5	Number of communication setting data items (OUT) when conducting Polling I/O communication	0 to 8: 0 to 80 words (= set value × 10) 9: 200 words Set the number of setting data items (OUT) communicating via Polling I/O communication.	0: Depends on the DIP switch setting (7 words)

¹ The PID/AT transfer by Polling I/O communication is invalid.

² The PID/AT transfer by Polling I/O communication is valid.

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Node address setting switch MSD		Node address setting switch LSD	Factory set value
No.	Setting item	Data range	
6	Controller communication transmission wait time	0 to 5: 0 to 20 ms (= set value × 4) 6: 30 ms 7: 50 ms 8: 70 ms 9: 100 ms Set the standby time until the COM-JH starts sending data after receiving data from the controller.	0
7	Unused	Don't set this one	—
8	Controller address setting	0: Controller 1 to 31: 1 to 31 1: Controller 1: 1 Controller 2 to 31: 0 2~8: Don't set this one 9: Automatic acquisition of controller address Set the address of the controller that is connected to COM-JH to have communication take place with only that address. Set "9: Automatic acquisition of controller address" and turn on the power again to acquire the connected controller address automatically.	0
9	Set value initialization	0 to 8: Unused 9: Communication environment setting initialization execution Initialize each communication environment setting data item which can be set by the rotary switch.	—



The number of communication data items can be calculated from the following equation.

Number of communication data items

= Number of communication items × Number of communication controllers

+ Fixed communication data items: 5 words*

* Measured data items (IN)

Receive counter: 1 word
Alarm state: 2 words
RUN/STOP state: 2 words

Setting data items (OUT)

Setting state selection: 3 words
RUN/STOP transfer: 2 words



The number of Polling I/O communication controllers, the number of communication measured data items (IN) and the number of communication setting data items (OUT) can also be set via Explicit message communication, or by the configuration tool.

6. DeviceNet COMMUNICATION

6.1 Features and Functionality

- One DeviceNet Network can have a maximum of 64 Media Access Control Identifiers (MAC ID: Node address).
- Network length changes with communication speed.

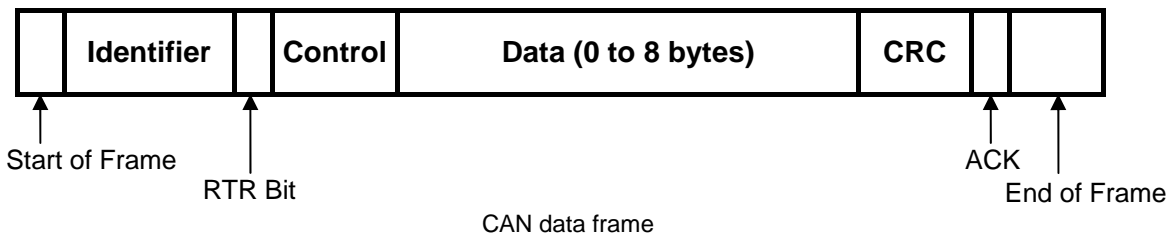
Communication speed	Maximum network length *		Maximum drop length	Cumulative drop length
	Thick trunk length	Thin trunk length		
125 kbps	500 m	100 m	6 m	156 m or less
250 kbps	250 m			78 m or less
500 kbps	100 m			39 m or less

* Maximum distance between nodes

- Install termination resistors to both ends of a trunk line in DeviceNet.
Specification of termination resistor: 121 Ω, ±1 %, 1/4 W (Metal film resistance)
- A DeviceNet node is modeled as a collection of objects.
The object model provides a template for organizing and implementing the Attributes (data), Services and Behaviors of the components of a DeviceNet product.
This model has represented the construction of address designation to consist of four levels of Node address (MAC ID), Object class ID, Instance ID and Attribute ID.
An address of this 4 level is used as an identification factor of data in Explicit message communication.

Address	Lowest	Highest
Node	0	63
Object class	1	65535
Instance	0	65535
Attribute	1	255

- DeviceNet incorporates CAN (Controller Area Network). CAN defines the syntax or form of the data movement. Data on DeviceNet is transmitted using CAN data frame.



- ☞ For details on the communication specification of DeviceNet, refer to DeviceNet specifications. DeviceNet specifications are available from ODVA (Open DeviceNet Vendor Association).

URL: <http://www.odva.org>

6.2 Communication Method

COM-JH has supported Polling I/O communication and Explicit message communication as a communication method of DeviceNet.

6.2.1 Polling I/O communication

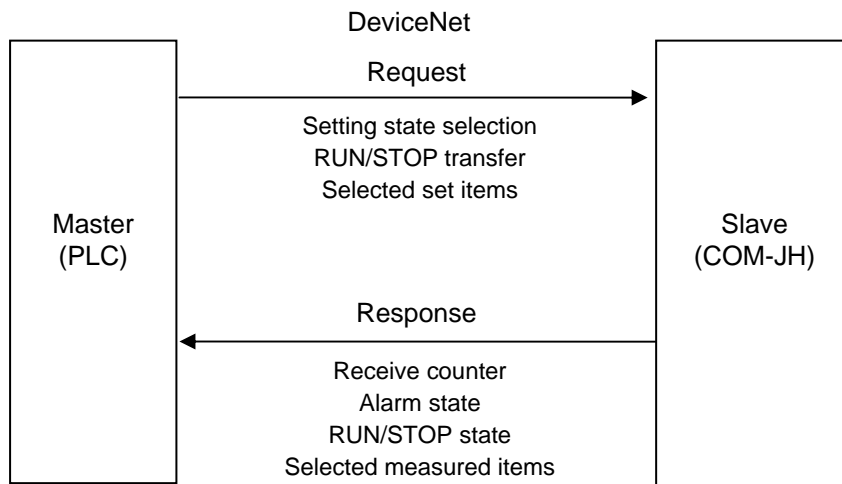
Polling I/O communication is the communication that master and slave always execute transmission and reception of data. Used always when checking data items such as measured values, etc.

Set the following items before communication start.

- Communication items (setting data items and measured data items)
- Number of communication controllers
- Number of communication data items
- Controller address
- Action mode
- Automatic acquisition of controller address

Polling made once enables the following data items to be read or written via Polling I/O communication.

Request: setting data items (OUT)	Response: measured data items (IN)
Setting state selection	Receive counter
RUN/STOP transfer	Alarm state
Selected set items	RUN/STOP state
	Selected measured items



Outline of Polling I/O communication



For data processed in actual communication, its decimal point is ignored. In addition, data with a minus sign is expressed as 2's complement data.

[Example 1]

For a set value of "120.0," set "1200."

[Example 2]

For a set value of "-1," set "65535."

(10000H - 1 = FFFFH = 65535)

■ Data to send from a master [Request: setting data items (OUT)]

A master transmits data of the following for slave (COM-JH).

Communication data (setting data items) contents

No.	Items	Data range	Factory set value
1	Setting state selection (All controller)	Bit data Bit 0: Data setting disabled/enabled 0: Depending on the setting contents of communication data No. 2 and No. 3 1: All-controller setting enabled (include RUN/STOP) Bit 1 to 15: Unused [Decimal number: 0 to 1]	0
2	Setting state selection (Controller 1 to 16)	Bit data Bit 0 to 15: Data setting disabled/enabled (Controller 1 to 16) 0: Setting disabled 1: Setting enabled [Decimal number: 0 to 65535]	0
3	Setting state selection (Controller 17 to 31, RUN/STOP)	Bit data Bit 0 to 14: Data setting disabled/enabled (Controller 17 to 31) Bit 15: RUN/STOP transfer disabled/enabled 0: Setting disabled 1: Setting enabled [Decimal number: 0 to 65535]	0
4	RUN/STOP transfer (Controller 1 to 16)	Bit data Bit 0 to 15: RUN/STOP transfer * (Controller 1 to 16) 0: RUN 1: STOP [Decimal number: 0 to 65535]	Same as RUN/STOP state of controller
5	RUN/STOP transfer (Controller 17 to 31)	Bit data Bit 0 to 14: RUN/STOP transfer * (Controller 17 to 31) 0: RUN 1: STOP Bit 15: Unused [Decimal number: 0 to 32767]	Same as RUN/STOP state of controller

* It is possible to change the logic of RUN/STOP by Explicit message communication.



Communication data Nos. 1 to 5 (corresponding to 5 words) are fixed communication data items.

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No.	Items	Data range	Factory set value
On and after 6	Selected set items Setting items are set by the configuration tool or via Explicit message communication are assigned by the number of controllers similarly set. [Factory set value: Set value (SV)]	Same as the range of setting items selected	Same as the factory set value of setting data items selected



In order to validate data after communication data No. 6, it is necessary to set the controllers corresponding to communication data Nos. 2 and 3 to “1: Setting enabled” or to communication data No. 1 to “1: All-controller setting enabled.”



For the setting method of the number of communication data items, refer to the following.

- **5.3 DIP Switch Setting (P. 22),**
- **5.4 Communication Environment Setting by Rotary Switch (P. 23)**
- **■ Number of communication data items setting by DIP switch (P. 32)**
- **■ Communication parameter setting by configuration tool (P. 33)**
- **■ Communication parameter setting by Explicit message communication (P. 41)**



For the setting method of the number of communication controllers, controller address and automatic acquisition of controller address, refer to the following.

- **5.4 Communication Environment Setting by Rotary Switch (P. 23)**
- **■ Communication parameter setting by configuration tool (P. 33)**
- **■ Communication parameter setting by Explicit message communication (P. 41)**



For the setting method of the action mode, refer to the following.

- **5.4 Communication Environment Setting by Rotary Switch (P. 23)**
- **■ Communication parameter setting by Explicit message communication (P. 41)**



For contents of setting data items, refer to **7. COMMUNICATION DATA LIST (P. 44)**.

■ Data which a master receives [Response: measured data items (IN)]

A master transmits data of the following for slave (COM-JH).

Communication data (measured data items) contents

No.	Items	Data range
1	Receive counter ¹	0 to 65535 Increments each time the COM-JH receives the setting item (OUT) data.
2	Alarm state (Controller 1 to 16)	Bit data Bit 0 to 15: Alarm state ² (Controller 1 to 16) 0: Alarm OFF 1: Alarm ON [Decimal number: 0 to 65535]
3	Alarm state (Controller 17 to 31, Setting update flag/Flag during Polling I/O communication updating)	Bit data Bit 0 to 14: Alarm state ² (Controller 17 to 31) 0: Alarm OFF 1: Alarm ON Bit 15: <i>OR</i> operation is performed to the Setting update flag ³ and the Flag during Polling I/O communication updating 0: Setting update is completed 1: During setting update [Decimal number: 0 to 65535]
4	RUN/STOP state (Controller 1 to 16)	Bit data Bit 0 to 15: RUN/STOP state ⁴ (Controller 1 to 16) 0: RUN 1: STOP [Decimal number: 0 to 65535]
5	RUN/STOP state (Controller 17 to 31)	Bit data Bit 0 to 14: RUN/STOP state ⁴ (Controller 17 to 31) 0: RUN 1: STOP Bit 15: Unused [Decimal number: 0 to 32767]

¹ The counter is reset when the power is turned on or when it exceeds 65535.

² Set to "1" if any bit in "Controller state 1" of the controller object (0x64) is set to ON.

³ Set to 1 if the item whose setting was changed from among data items on and after measured data item (IN) No.4 is being updated while set to 0 if the same item has been update.

No setting change has been finished as for as this value remains set at 1. In addition, ReadOnly items can always be read regardless of this value.

⁴ It is possible to change the logic of RUN/STOP by Explicit message communication.







Communication data Nos. 1 to 5 (corresponding to 5 words) are fixed communication data items.

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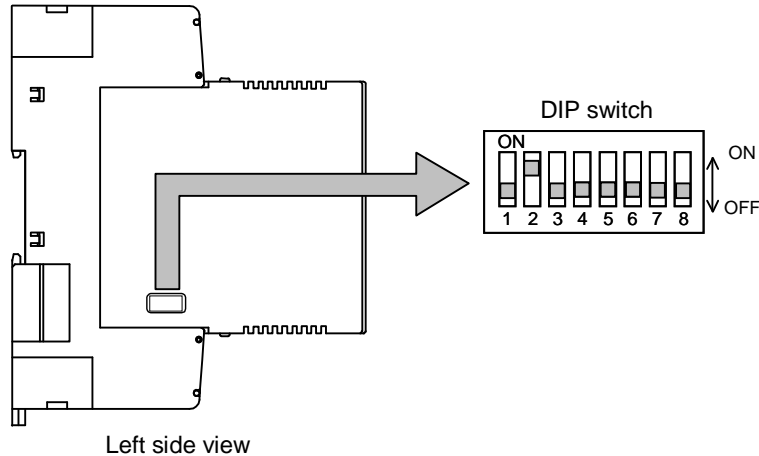
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No.	Items	Data range
On and after 6	Selected measured items Measured items set by the configuration tool or via Explicit message communication are assigned by the number of controllers similarly set. [Factory set value: Measured value (PV)]	Same as the range of measured items selected

-  For the setting method of the number of communication words, refer to the following.
 - **5.3 DIP Switch Setting (P. 22)**,
 - **5.4 Communication Environment Setting by Rotary Switch (P. 23)**
 - **■ Number of communication data items setting by DIP switch (P. 32)**
 - **■ Communication parameter setting by configuration tool (P. 33)**
 - **■ Communication parameter setting by Explicit message communication (P. 41)**
-  For the setting method of the number of communication controllers, controller address and automatic acquisition of controller address, refer to the following.
 - **5.4 Communication Environment Setting by Rotary Switch (P. 23)**
 - **■ Communication parameter setting by configuration tool (P. 33)**
 - **■ Communication parameter setting by Explicit message communication (P. 41)**
-  For the setting method of the action mode, refer to the following.
 - **5.4 Communication Environment Setting by Rotary Switch (P. 23)**
 - **■ Communication parameter setting by Explicit message communication (P. 41)**
-  For contents of setting data items, refer to **7. COMMUNICATION DATA LIST (P. 44)**.

■ Number of communication data items setting by DIP switch

Use the switch Nos. 4 and 5 of the DIP switch which there is on the left side of COM-JH, sets the number of communication data items when conducting Polling I/O communication.



4	5	Number of communication data items when conducting DeviceNet Polling I/O communication
OFF	OFF	7 words
ON	OFF	25 words
OFF	ON	45 words
ON	ON	100 words

Factory set value: 7 words



Switch No. 3, 6, 7 and 8: OFF fixed. (Don't change this one)



The number of communication data items can be calculated from the following equation.
Number of communication data items

= Number of communication items × Number of communication controllers
+ Fixed communication data items: 5 words*

* Measured data items (IN)

Receive counter: 1 word
Alarm state: 2 words
RUN/STOP state: 2 words

Setting data items (OUT)

Setting state selection: 3 words
RUN/STOP transfer: 2 words



The number of communication data items when conducting Polling I/O communication can also be set via Explicit message communication, or by the configuration tool or rotary switch. However, when the number of communication data items is set via Explicit message communication, or by the configuration tool or rotary switch, the value set by the DIP switch may be ignored.



For switch Nos. 1 and 2, refer to **5.3 DIP Switch Setting (P. 22)**.

■ Communication parameter setting by configuration tool

Set the following items with the configuration tool.

- Communication items (setting data items and measured data items)
- Number of communication controllers
- Number of communication data items
- Controller address
- Automatic acquisition of controller address



Time-out may occur if trying to read any COM-JH parameter from the configuration tool while in Polling I/O communication between the master station and COM-JH. When reading or setting the parameters by the configuration tool, stop Polling I/O at the master station.



For operation of the configuration tool, refer to each configuration tool instruction manual.



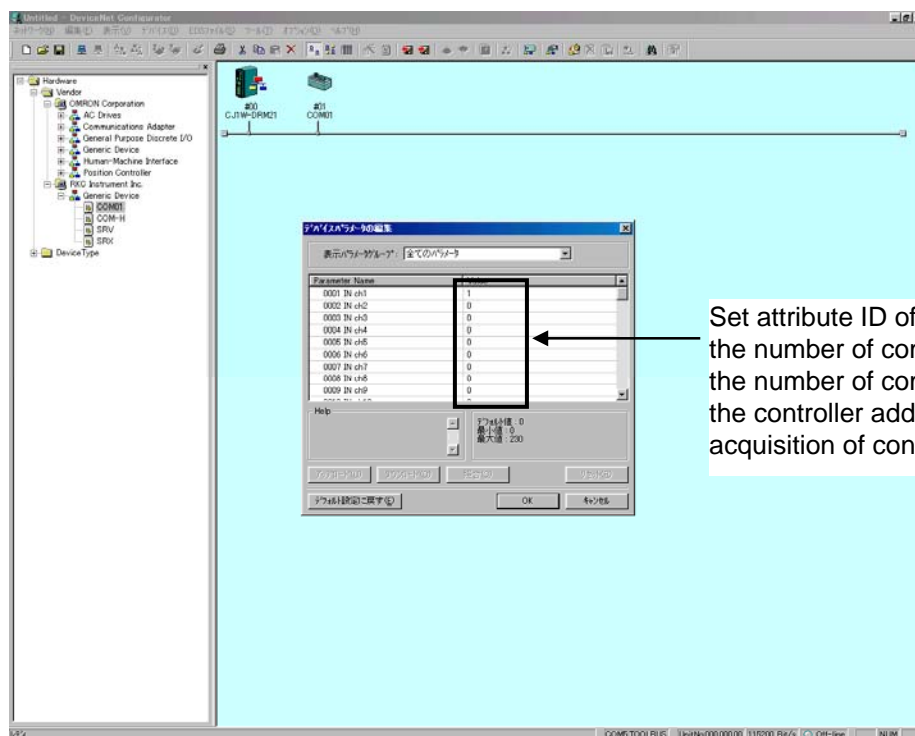
It is also possible to set communication items, the number of communication controllers, the number of communication data items, the controller address and the automatic acquisition of controller address using Explicit message communication.

For details, refer to **■ Communication parameter setting by Explicit message communication (P. 41)**.

● Setting procedure

1. Connect a personal computer installed with the configuration tool to the COM-JH via DeviceNet.
2. Install EDS file (com01.eds) of COM-JH on the configuration tool.
3. Open a parameter setting screen of COM-JH after having added COM-JH to network configuration by using a configuration tool.

< Reference screen 1: Configuration tool made by OMRON >

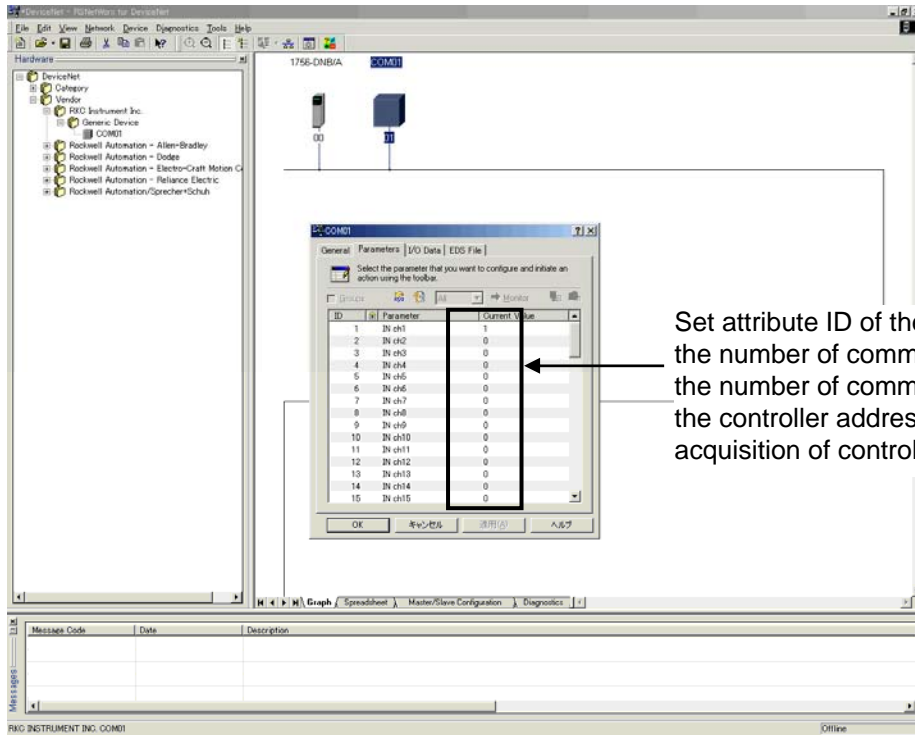


Set attribute ID of the communication item, the number of communication controllers, the number of communication data items, the controller address and the automatic acquisition of controller address.

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<Reference screen 2: Configuration tool made by Rockwell>



Set attribute ID of the communication item, the number of communication controllers, the number of communication data items, the controller address and the automatic acquisition of controller address.

4. Sets the attribute ID of communication items, the number of communication controllers, the number of communication data items, the controller address and the automatic acquisition of controller address with a parameter setting screen.



“The number of communication controllers” corresponds to number of controllers communicating via Polling I/O communication.



For the attribute ID of communication items, refer to **7. COMMUNICATION DATA LIST (P. 44)**.

● Parameter setting example of Polling I/O communication

An example of how to set each parameter for polling of the following data is shown.

- Measured data items: Alarm state, RUN/STOP state, Measured value (PV),
Manipulated output value (MV1) monitor
- Setting data items: Setting state selection, RUN/STOP transfer, Set value (SV),
Event 1 set value
- Number of communication controllers: 3 controllers
- Number of communication data items: 11 words * (IN), 11 words * (OUT)
* 2 (Number of communication items) ×
3 (Number of communication controllers) +
5 (Fixed communication data items: five words)
- Controller address: 1 to 3 (Address of controller 1 to controller 3)
- Automatic acquisition of controller address: 0 (Do not execute the automatic acquisition)



Fixed five communication data words are assigned to the measured data items of Alarm state and RUN/STOP state. In addition, fixed five communication data words are assigned to the setting data items of Setting state selection and RUN/STOP transfer.



When the number of communication words is set via Explicit message communication, or by the configuration tool or rotary switch, the value set by the DIP switch may be ignored.

Conduct parameter set according to the procedure described below.

I. Set measured data items (IN) with a parameter setting screen of COM-JH.

- Set attribute ID “1” of Measured value (PV) in “IN ch1 (Parameter 1).”
- Set attribute ID “14” of Manipulated output value (MV1) monitor in “IN ch2 (Parameter 2).”
- “0” is set to unused IN ch (Parameter 3 to 32).

Parameter	Value
1 IN ch1	1
2 IN ch2	14
3 IN ch3	0
4 IN ch4	0
•	•
•	•
•	•
32 IN ch32	0
•	•
•	•
•	•

← Attribute ID of Measured value (PV): 1

← Attribute ID of Manipulated output value (MV1) monitor: 14


} Set “0” in unused items




In addition to Alarm state and RUN/STOP state assigned as fixed, up to 32 types of measured data items can be selected.

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-  Set measured data items in order starting from IN ch1 (Parameter 1). If any of the following values is set, all items from that item to IN ch32 (Parameter 32) are the same as those when set at “0.”
 - If at “0”
 - If set to attribute ID to which no communication data items are assigned
 - If at 231 to 236 or 238 to 243 as attribute ID

 For attribute ID of the communication items, refer to **7. COMMUNICATION DATA LIST (P. 44)**.

2. Set the setting data item (OUT) on the same COM-JH parameter setting screen.


- Set attribute ID “45” of Set value (SV) in OUT ch1 (Parameter 33).
- Set attribute ID “39” of Event 1 set value in OUT ch2 (Parameter 34).
- “0” is set to unused OUT ch (Parameter 35 to 64).


Parameter	Value
•	•
•	•
•	•
33 OUT ch1	45
34 OUT ch2	39
35 OUT ch3	0
36 OUT ch4	0
•	•
•	•
•	•
64 OUT ch32	0
•	•
•	•
•	•

← Attribute ID of Set value (SV): 45


← Attribute ID of Event 1 set value: 39

} Set “0” in unused items

 In addition to Setting state selection and RUN/STOP transfer assigned as fixed, up to 32 types of setting data items can be selected.

 Set the setting data items in order starting from OUT ch1 (Parameter 33). If any of the following values is set, all items from that item to OUT ch32 (Parameter 64) are the same as those when set at “0.”

- If at “0”
- If set to attribute ID to which readable communication data items are assigned
- If set to attribute ID to which no communication data items are assigned
- If at 36, 231 to 236 or 238 to 243 as attribute ID
- If at 33 as attribute ID (when “Bit 1: PID/AT transfer by Polling I/O communication” of attribute ID “246” (Action mode selection) is “0: Invalid”)

 For attribute ID of the communication data items, refer to **7. COMMUNICATION DATA LIST (P. 44)**.

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3. Set the number of communication controllers on the same COM-JH parameter setting screen.
Set "3" which is the number of controllers communicating via Polling I/O communication to Number of I/O Controllers (Parameter 65).

Parameter	Value
1 IN ch1	1
•	•
•	•
•	•
64 OUT ch32	0
65 Number of I/O Controllers	3
66 I/O IN WORDS	0
67 I/O OUT WORDS	0

← Number of communication controllers: 3

4. Set the number of communication data items on the same COM-JH parameter setting screen.
- Set "11 words" which is the number of communication measured data items communicating via Polling I/O communication to I/O IN WORDS (Parameter 66).
 - Set "11 words" which is the number of communication setting data items communicating via Polling I/O communication to I/O OUT WORDS (Parameter 67).

Parameter	Value
1 IN ch1	1
•	•
•	•
•	•
64 OUT ch32	0
65 Number of I/O Controllers	3
66 I/O IN WORDS	11
67 I/O OUT WORDS	11

← Number of communication measured data items:
11 words

← Number of communication setting data items:
11 words

5. Set the controller address on the same COM-JH parameter setting screen.
- Set address "1" of controller 1 in Address of Controller 1 (Parameter 68).
 - Set address "2" of controller 2 in Address of Controller 2 (Parameter 69).
 - Set address "3" of controller 3 in Address of Controller 3 (Parameter 70).
 - Set "0" in non-connected controllers 4 to 31 (Parameters 71 to 98).

Parameter	Value
68 Address of Controller 1	1
69 Address of Controller 2	2
70 Address of Controller 3	3
71 Address of Controller 4	0
•	•
•	•
•	•
98 Address of Controller 31	0
99 Auto acquisition of address	0

← Address of controller 1: 1

← Address of controller 2: 2

← Address of controller 3: 3

Set "0" in non-connected controllers *

* Controllers with addresses set to "0" will not perform communication. If a value other than "0" (1 to 31) is set in a non-connected controller, communication will take place, however, all data will be "0."

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- 6. Set the automatic acquisition of controller address on the same COM-JH parameter setting screen.
 - Set “0”, no automatic acquisition of controller address, in Auto acquisition of address (Parameter 99).

Parameter	Value
68 Address of Controller 1	1
69 Address of Controller 2	2
70 Address of Controller 3	3
71 Address of Controller 4	0
•	•
•	•
98 Address of Controller 31	0
99 Auto acquisition of address	0

0: Do not execute the automatic acquisition
 1: Execute the automatic acquisition *

* Automatically reverts to “0: Do not execute the automatic acquisition” after automatic acquisition
 When automatic acquisition of controller address is executed, the “number of communication controllers” and “controller address” parameters are updated.



The controller address automatic acquisition set “1: Execute the automatic acquisition,” performs the automatic acquisition of the controller address by turning on the power again.

● **Example of communication data list**

This is a list of communication data items in the previous parameter setting example (P. 35). (Communication data items IN and OUT corresponding to 11 words, respectively.)

- Measured and setting data items from No. 1 to 5 (corresponding to 5 words) are those assign as fixed. (section)
- Communication items set on and after No. 6 are assigned by the specified number of communication controllers.
- Data of unused items become “0.”

No.	Measured data items (IN)
1	Receive counter
2	Alarm state (Controller 1 to 16)
3	Alarm state 2 (Controller 17 to 31, Setting update flag)
4	RUN/STOP state (Controller 1 to 16)
5	RUN/STOP state (Controller 17 to 31)
6	Controller 1 Measured value (PV)
7	Controller 2 Measured value (PV)
8	Controller 3 Measured value (PV)
9	Controller 1 Manipulated output value (MV1) monitor
10	Controller 2 Manipulated output value (MV1) monitor
11	Controller 3 Manipulated output value (MV1) monitor

No.	Setting data items (OUT)
1	Setting state selection (All controller)
2	Setting state selection (Controller 1 to 16)
3	Setting state selection (Controller 17 to 31, RUN/STOP)
4	RUN/STOP transfer (Controller 1 to 16)
5	RUN/STOP transfer (Controller 17 to 31)
6	Controller 1 Set value (SV)
7	Controller 2 Set value (SV)
8	Controller 3 Set value (SV)
9	Controller 1 Event 1 set value
10	Controller 2 Event 1 set value
11	Controller 3 Event 1 set value



For details of communication data items, refer to **7. COMMUNICATION DATA LIST (P. 44)**.

6.2.2 Explicit message communication

Explicit message communication uses an Explicit message defined with DeviceNet, and be communication to execute transmission and reception of data between nodes when it is necessary.

Explicit message communication is executed like the following, when COM-JH (slave) is connected to a master instrument with DeviceNet.

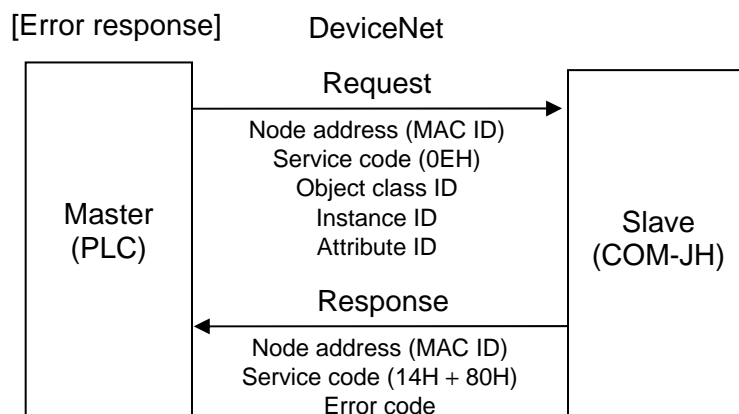
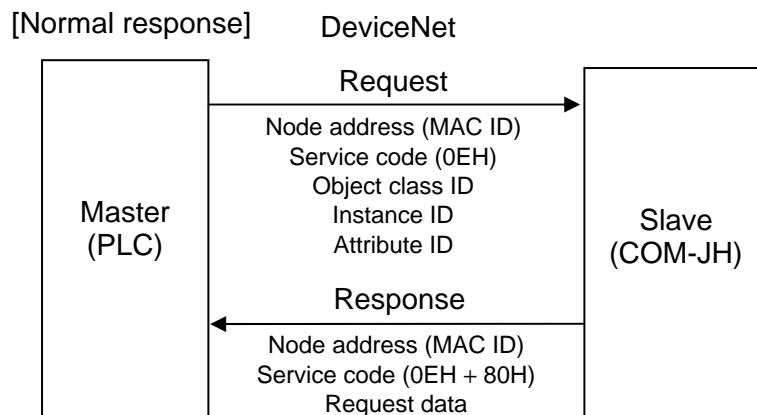


In Explicit message communication, not only data relating to the COM-JH but also all of the attributes (data) described in **APPENDIX A. DEVICE PROFILES (P. 96)** are subject to being sent or received.

■ When read data

If the node address (MAC ID), service code (0EH: Get_Attribute_Single), object class ID, instance ID and attribute ID are sent from the master, the node address (MAC ID) thus sent and service code (0EH + 80H *) as well as the data requested are sent from the slave.

* 80H represents a response message.



Service code 14H of Error response has shown that it is error response.

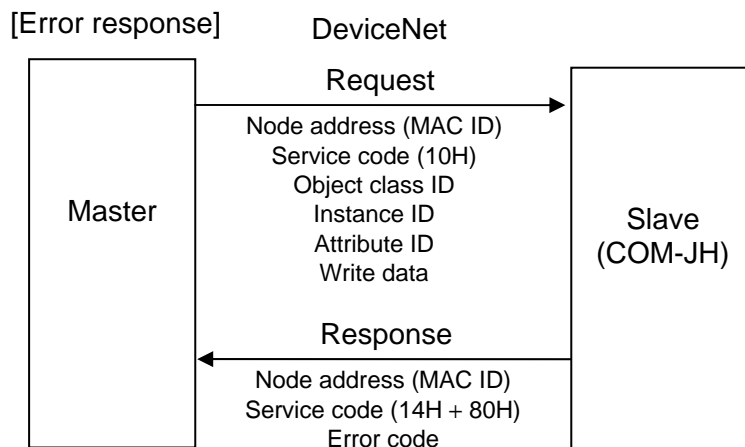
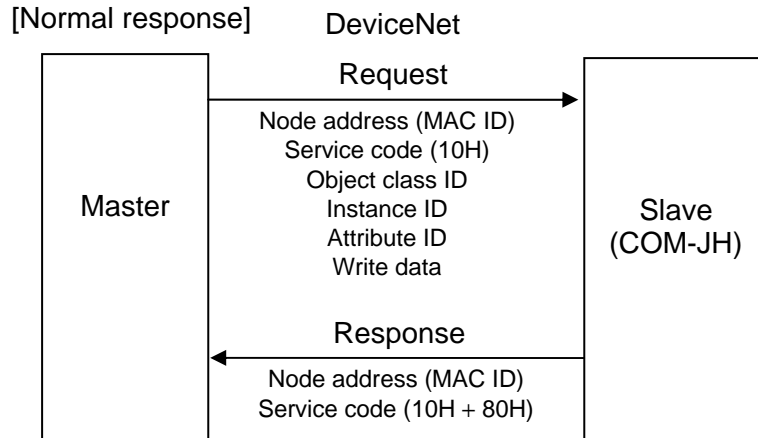


For Error code of Error response, refer to DeviceNet specifications.

■ When write data

If the node address (MAC ID), service code (10H: Set_Attribute_Single), object class ID, instance ID attribute ID and write data are sent from the master, the node address (MAC ID) thus sent and service code (10H + 80H *) are sent from the slave.

* 80H represents a response message.



For data processed in actual communication, its decimal point is ignored. In addition, data with a minus sign is expressed as 2's complement data.

[Example 1] For a set value of "120.0," set "1200."

[Example 2] For a set value of "-1," set "65535."

(10000H - 1 = FFFFH = 65535)



Service code 14H of Error response has shown that it is error response.



For Error code of Error response, refer to DeviceNet specifications.



For Explicit message communication specification of data relating to COM-JH, refer to **■ Controller object (0x64: 64Hex) (P. 102) of APPENDIX A. DEVICE PROFILES.**

■ Communication parameter setting by Explicit message communication

Communication item setting, Setting the number of communication controllers, Controller address setting, Action mode selection and Automatic acquisition of controller address necessary when conducting Polling I/O communication are described by referring to the same settings made via Explicit message communication.

● Communication item setting

Each communication data item when conducting Polling I/O communication is set by object instance (instance ID) 1 in Controller communication item setting object (0xC7: C7Hex).

Controller communication item setting object (0xC7: C7Hex): Object instance 1

Attribute ID	Contents	Data range	Factory set value
1	Measured data item (IN) 1	Select the necessary measured data item from among controller objects (0x64: 64Hex) and set the relevant attribute ID. Attribute ID: 1 to 255	1
2	Measured data item (IN) 2		0
3	Measured data item (IN) 3		
4	Measured data item (IN) 4		
5	Measured data item (IN) 5		
•	•		
•	•		
32	Measured data item (IN) 32		
33	Setting data item (OUT) 1	Select the necessary setting data item from among controller objects (0x64: 64Hex) and set the relevant attribute ID. Attribute ID: 1 to 255	45
34	Setting data item (OUT) 2		0
35	Setting data item (OUT) 3		
36	Setting data item (OUT) 4		
37	Setting data item (OUT) 5		
•	•		
•	•		
64	Setting data item (OUT) 32		



Set measured data items in order starting from “Measured data item (IN) 1.” If any of the following values is set, all items from that item to “Measured data item (IN) 32” are the same as those when set at “0.”

- If at “0”
- If set to attribute ID to which no communication data items are assigned
- If at 231 to 236 or 238 to 243 as attribute ID



Set the setting data items in order starting from “Setting data item (OUT) 1.” If any of the following values is set, all items from that item to “Setting data item (OUT) 32” are the same as those when set at “0.”

- If at “0”
- If set to attribute ID to which readable communication data items are assigned
- If set to attribute ID to which no communication data items are assigned
- If at 36, 231 to 236, or 238 to 243 as attribute ID
- If at 33 as attribute ID (when “Bit 1: PID/AT transfer by Polling I/O communication” of attribute ID “246” (Action mode selection) is “0: Invalid”)



For contents of attribute ID of controller object (0x64: 64Hex), refer to **7. COMMUNICATION DATA LIST (P. 44)**.

● Number of communication controllers setting

The number of communication controllers when conducting Polling I/O communication is set by the attribute ID 236 of object instance (instance ID) 1 in “Controller object (0x64: 64Hex).”

Corresponding object: Controller object (0x64)
 Object class ID: 64
 Instance ID: 1
 Attribute ID: 236 (Number of polling I/O communication controllers)
 Write data: 1 to 31

● Number of communication data items setting

The number of communication data items when conducting Polling I/O communication is set by the attribute IDs, 240 and 241 of object instance (instance ID) 1 in Controller object (0x64: 64Hex).

Attribute ID 240: Number of communication measured data items (IN)

Attribute ID 241: Number of communication setting data items (OUT)

Corresponding object: Controller object (0x64)
 Object class ID: 64
 Instance ID: 1
 Attribute ID: 240 (Number of communication measured words)
 241 (Number of communication setting words)
 Write data: 0 to 200 words



The number of communication data items can be calculated from the following equation.

Number of communication data items

= Number of communication items × Number of communication controllers
 + Fixed communication data items: 5 words*

* Measured data items (IN)

Receive counter: 1 word
 Alarm state: 2 words
 RUN/STOP state: 2 words

Setting data items (OUT)

Setting state selection: 3 words
 RUN/STOP transfer: 2 words

● Controller address setting

The controller address setting when conducting Polling I/O communication is set by the attribute ID 245 of object instance (instance ID) 1 to 31 in Controller object (0x64: 64Hex).

Corresponding object: Controller object (0x64)
 Object class ID: 64
 Instance ID: 1 to 31
 Attribute ID: 245 (Controller address setting)
 Write data: 0 to 99



Set “0” in non-connected controllers.

Controllers with addresses set to “0” will not perform communication. If a value other than “0” (1 to 99) is set in a non-connected controller, communication will take place, however, all data will be “0.”

● Action mode selection

The action mode selection when conducting Polling I/O communication is set by the attribute ID 246 of object instance (instance ID) 1 in Controller object (0x64: 64Hex).

Corresponding object: Controller object (0x64)
 Object class ID: 64
 Instance ID: 1
 Attribute ID: 246 (Action mode selection)
 Write data: Bit data
 Bit 0: Address setting method transfer
 0: Continuous setting
 1: Free setting
 Bit 1: PID/AT transfer by Polling I/O communication
 0: Invalid
 1: Valid
 [Decimal number: 0 to 3]

● Automatic acquisition of controller address setting

The Automatic acquisition of controller address when conducting Polling I/O communication is set by the attribute ID 247 of object instance (instance ID) 1 in Controller object (0x64: 64Hex).

Corresponding object: Controller object (0x64)
 Object class ID: 64
 Instance ID: 1
 Attribute ID: 247 (Automatic acquisition of controller address)
 Write data: 0: Do not execute the automatic acquisition
 1: Execute the automatic acquisition *
 * Automatically reverts to “0: Do not execute the automatic acquisition” after automatic acquisition.
 When automatic acquisition of controller address is executed, the “number of communication controllers” and “controller address” parameters are updated.



The controller address automatic acquisition set “1: Execute the automatic acquisition,” performs the automatic acquisition of the controller address by turning on the power again.

■ Data setting by Explicit message communication

Corresponding object: Controller object (0x64)
 Object class ID: 64
 Instance ID: 1 to 31
 Attribute ID: 1 to 255

[Example] Node address of COM-JH: 1

	When set in “100” in set value (SV) of controller 3	When set in “50” in proportional band [heat-side] of controller 2
Node address (MAC ID)	1	1
Service code	10H (Set_Attribute_Single)	10H (Set_Attribute_Single)
Object class ID	64	64
Instance ID	3 (Controller number)	2 (Controller number)
Attribute ID	45 (Set value (SV))	46 (Proportional band [heat side])
Write data	100	50

7. COMMUNICATION DATA LIST

Attribute contents of the controller object (0x64: 64Hex) are described to the communication data list.

(1) ID	(2) Name	(3) Number of data items	(4) Attribute	(5) Data range	(6) Factory set value
1 (0x0001)	Measured value (PV)	31	RO	Input scale low to Input scale high	—
2 (0x0002)	Current transformer 1 (CT1) input value monitor	31	RO	CTL-6-P-N: 0.0 to 30.0 A	—
3 (0x0003)	Current transformer 2 (CT2) input value monitor	31	RO	CTL-12-S56-10L-N: 0.0 to 100.0 A	—

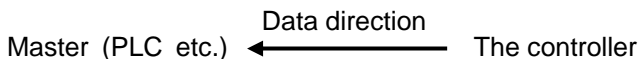
(1) ID: Attribute ID
Attribute ID is written using both of decimal and hexadecimal (in parentheses) numbers.

(2) Name: The communication item name is written.

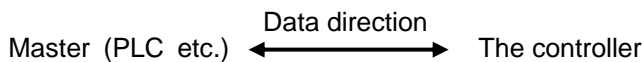
(3) Number of data items: The number of data items is written.
1: Only object instance 1 is valid
2: Only object instance 1 and 2 are valid
31: Valid for object instance 1 to 31

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

RO: Only reading data is possible. (Get: Yes, Set: No)
Correspond to Service code: 0EH (Get_Attribute_Single) of DeviceNet. For data request of a master, data is read from slave.

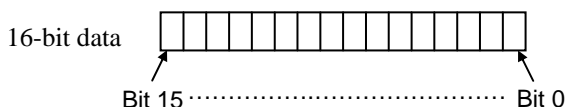


R/W: Reading and writing data is possible. (Get: Yes, Set: Yes)
Correspond to Service code: 0EH (Get_Attribute_Single)/Service code: 10H (Set_Attribute_Single) of DeviceNet.
In Get_Attribute_Single, data is read for data request of a master from Slave.
In Set_Attribute_Single, write in data for Slave from a master.



(5) Data range: The data range of communication item is written.

Bit image of bit data is as follows.



(6) Factory set value: The factory set value of communication item is written.

For controller object (0x64: 64Hex), refer to **Controller Object (0x64: 64Hex) of APPENDIX A. DEVICE PROFILES (P. 102).**



Reading/writing operation of undefined attribute ID

When the master read/write data with an undefined attribute ID, an error response is sent by the slave.

Error response occurs at the following attribute IDs:

- from 228 (0x00E4) to 230 (0x00E6)
- 248 (0x00F8) or later.



Reading/writing operation of unused controller object (unused item)*

When the master reads/writes data of an unused item, an error response does not occur.

- For reading, the slave sends default value to the master.
- For writing, data sent by the master to the slave becomes invalidated. Data of the slave remains.

* Unused items

- Controller object is for an optional function not specified at time of order.
Example: Heater break alarm function, Transmission output function
- Controller object is for a function set to “None.”
Example: Event hold action, Event interlock
- Controller object is only available for FB400/900 but the FB100 is the controller being used.
Example: Power feed forward selection, Power feed forward gain

■ Communication data (Controller Object 0x64)

ID	Name	Number of data items	Attribute	Data range	Factory set value
1 (0x0001)	Measured value (PV)	31	RO	Input scale low to Input scale high	—
2 (0x0002)	Current transformer 1 (CT1) input value monitor	31	RO	CTL-6-P-N: 0.0 to 30.0 A CTL-12-S56-10L-N: 0.0 to 100.0 A	—
3 (0x0003)	Current transformer 2 (CT2) input value monitor	31	RO		—
4 (0x0004)	Set value (SV) monitor	31	RO	Setting limiter low to Setting limiter high	—
5 (0x0005)	Remote setting (RS) input value monitor	31	RO	Setting limiter low to Setting limiter high	—
6 (0x0006)	Burnout state monitor	31	RO	0: OFF 1: ON	—
7 (0x0007)	Burnout state monitor of feedback resistance input	31	RO	0: OFF 1: ON	—
8 (0x0008)	Event 1 state monitor	31	RO	0: OFF 1: ON	—
9 (0x0009)	Event 2 state monitor	31	RO		—
10 (0x000A)	Event 3 state monitor	31	RO		—
11 (0x000B)	Event 4 state monitor	31	RO		—
12 (0x000C)	Heater break alarm 1 (HBA1) state monitor	31	RO	0: OFF 1: ON	—
13 (0x000D)	Heater break alarm 2 (HBA2) state monitor	31	RO		—
14 (0x000E)	Manipulated output value (MV1) monitor [heat-side]	31	RO	PID control or Heat/Cool PID control: -5.0 to +105.0 % Position proportioning control with feedback resistance (FBR) input: FBR input value is displayed. 0.0 to 100.0 %	—
15 (0x000F)	Manipulated output value (MV2) monitor [cool-side]	31	RO	-5.0 to +105.0 %	—
16 (0x0010)	Error code	31	RO	Bit data Bit 0: Adjustment data error Bit 1: Back-up error Bit 2: A/D conversion error Bit 3: Unused 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]	—

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ID	Name	Number of data items	Attribute	Data range	Factory set value
17 (0x0011)	Digital input (DI) state monitor	31	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: Contact open 1: Contact closed [Decimal number: 0 to 127] * Unused on the FB100.	—
18 (0x0012)	Output state monitor	31	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: OFF 1: ON [Decimal number: 0 to 63] * Unused on the FB100.	—
19 (0x0013)	Operation mode state monitor	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 set to the "0: OFF" state even if the parameter, Remote/Local transfer is set to "1: Remote mode."	—
20 (0x0014)	Memory area soak time monitor	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 (0x0015)	Integrated operating time monitor	31	RO	0 to 19999 hours	—

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7. COMMUNICATION DATA LIST

Continued from the previous page.

ID	Name	Number of data items	Attribute	Data range	Factory set value
22 (0x0016)	Holding peak value ambient temperature monitor	31	RO	-10.0 to +100.0 °C	—
23 (0x0017)	Power feed forward input value monitor ♦	31	RO	0.0 to 160.0 % Display in the percentage of the load voltage (rated value).	—
24 (0x0018)	Backup memory state monitor	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 (0x0019) ⋮ 32 (0x0020)	Unused	—	—	—	—
33 (0x0021)	PID/AT transfer ^{1,2}	31	R/W	0: PID control 1: Autotuning (AT) * * Automatically reverts to 0 after autotuning ends.	0
34 (0x0022)	Auto/Manual transfer	31	R/W	0: Auto mode 1: Manual mode	0
35 (0x0023)	Remote/Local transfer	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
36 (0x0024)	RUN/STOP transfer	31	R/W	0: RUN mode (Control start) 1: STOP mode (Control stop)	0
37 (0x0025)	Memory area transfer	31	R/W	1 to 8 [FB100] When the Digital input (DI) assignment (ID: 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

♦ Unused on the FB100.

¹ When used in Polling I/O communication, set PID/AT transfer by Polling I/O communication in the Action mode selections (ID: 246) to “1: Valid.”

² When PID/AT transfer is set to “1: Autotuning (AT)” in Polling I/O communication, do not change any of the other communication data for controllers with AT set until AT ends, as “1: Autotuning (AT)” may set again when AT ends.

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ID	Name	Number of data items	Attribute	Data range	Factory set value
38 (0x0026)	Interlock release	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 (0x0027)	Event 1 set value (EV1) ★	31	R/W	Deviation: -Input span to +Input span Process and set value:	50
40 (0x0028)	Event 2 set value (EV2) ★	31	R/W	Input scale low to Input scale high Manipulated output value (MV1 or MV2): -5.0 to +105.0 %	50
41 (0x0029)	Event 3 set value (EV3) ★	31	R/W	If the Event type corresponds to "0: None," set to RO (Read only data).	50
42 (0x002A)	Event 4 set value (EV4) ★	31	R/W	If Event 4 corresponds to "9: Control loop break alarm (LBA)," the Event 4 set value becomes RO (Read only data).	50
43 (0x002B)	Control loop break alarm (LBA) time ★	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 (0x002C)	LBA deadband ★	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
45 (0x002D)	Set value (SV) ★	31	R/W	Setting limiter low to Setting limiter high	TC/RTD: 0 V/I: 0.0
46 (0x002E)	Proportional band [heat-side] ★	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
47 (0x002F)	Integral time [heat-side] ★	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) * Position proportioning control: 1 to 3600 seconds or 0.1 to 1999.9 seconds * 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. Varies with the setting of the Integral/Derivative time decimal point position selection.	240

★: Data related to multi-memory area function

It is possible to change only the data of the control area which is selected by the Memory area transfer (ID: 37).

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ID	Name	Number of data items	Attribute	Data range	Factory set value
48 (0x0030)	Derivative time [heat-side] ★	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 (0x0031)	Control response parameter ★	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 control: 0 Heat/Cool PID control: 2
50 (0x0032)	Proportional band [cool-side] ★	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 (0x0033)	Integral time [cool-side] ★	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds (0, 0.0: PD action) * * 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. 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
52 (0x0034)	Derivative time [cool-side] ★	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

★: Data related to multi-memory area function

It is possible to change only the data of the control area which is selected by the memory area transfer (ID: 37).

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ID	Name	Number of data items	Attribute	Data range	Factory set value
53 (0x0035)	Overlap/Deadband ★	31	R/W	TC/RTD inputs: –Input span to +Input span (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. If control is other than Heat/Cool PID control, set to RO (Read only data).	0
54 (0x0036)	Manual reset ★	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 (0x0037)	Setting change rate limiter (up) ★	31	R/W	0 to Input span/unit time * (0: Unused)	0
56 (0x0038)	Setting change rate limiter (down) ★	31	R/W	* Unit time: 60 seconds (factory set value)	0
57 (0x0039)	Area soak time ★	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 (ID: 95) value is 6 to 12, this data becomes RO (Read only data).	0
58 (0x003A)	Link area number ★	31	R/W	0 to 8 (0: No link) [FB100] When the Digital input (DI) assignment (ID: 95) value is 6 to 12, this data becomes RO (Read only data).	0
59 (0x003B)	Heater break alarm 1 (HBA1) set value	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
60 (0x003C)	Heater break determination point 1	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

★: Data related to Multi-memory area function

It is possible to change only the data of the control area which is selected by the Memory area transfer (ID: 37).

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ID	Name	Number of data items	Attribute	Data range	Factory set value
61 (0x003D)	Heater melting determination point 1	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 (0x003E)	Heater break alarm 2 (HBA2) set value	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 (0x003F)	Heater break determination point 2	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 (0x0040)	Heater melting determination point 2	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 (0x0041)	PV bias	31	R/W	-Input span to +Input span	0
66 (0x0042)	PV digital filter	31	R/W	0.0 to 100.0 seconds (0.0: Unused)	0.0
67 (0x0043)	PV ratio	31	R/W	0.500 to 1.500	1.000
68 (0x0044)	PV low input cut-off	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

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ID	Name	Number of data items	Attribute	Data range	Factory set value
69 (0x0045)	RS bias Cascade control: Cascade bias Ratio setting: Ratio setting bias	31	R/W	–Input span to +Input span [FB100] When the Remote setting (RS) input is not provided, this data becomes RO (Read only data).	0
70 (0x0046)	RS digital filter Cascade control: Cascade digital filter Ratio setting: Ratio setting digital filter	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 (0x0047)	RS ratio Cascade control: Cascade ratio Ratio setting: Ratio setting ratio	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 (0x0048)	Proportional cycle time [heat-side]	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 (0x0049)	Proportional cycle time [cool-side]	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 (0x004A)	Manual manipulated output value	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] (–105.0 to +105.0 %) Position proportioning control with feedback resistance (FBR) input: Output limiter low [MV1] to Output limiter high [MV1]	0.0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
75 (0x004B)	Set lock level	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 (0x004C)	STOP display	31	R/W	0: $\frac{5}{\square}P$ is displayed on the PV display. 1: $\frac{5}{\square}P$ is displayed on the SV display.	1
77 (0x004D)	Bar graph display	31	R/W	0: No display 1: Manipulated output value (MV) 2: Measured value (PV) 3: Set value (SV) monitor 4: Deviation value 5: Current transformer 1 (CT1) input value 6: Current transformer 2 (CT2) input value	1
78 (0x004E)	Bar graph display resolution	31	R/W	1 to 100 digit/dot Becomes valid when the Bar graph display is "4: Deviation value," "5: Current transformer 1 (CT1) input value" or "6: Current transformer 2 (CT2) input value."	100
79 (0x004)	Direct key 1 [FB100] Direct key selection	31	R/W	[FB100] 0: Unused 1: Used [FB400/900] 0: Unused 1: A/M transfer key (Type 1, Type 2)	1
80 (0x0050)	Direct key 2 ◆	31	R/W	0: Unused 1: MONI key (For type 1) or R/L transfer key (For type 2)	1
81 (0x0051)	Direct key 3 ◆	31	R/W	0: Unused 1: AREA key (For type 1) or RUN/STOP transfer key (For type 2)	1
82 (0x0052)	Direct key type	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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ID	Name	Number of data items	Attribute	Data range	Factory set value
83 (0x0053)	Input type	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□) .	Depend on model code. When not specifying: 0
84 (0x0054)	Display unit	31	R/W	0: °C 1: °F Use to select the temperature unit for thermocouple (TC) and RTD inputs.	0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
85 (0x0055)	Decimal point position	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.	Depends on model code. When not specifying: TC/RTD: 0 V/I: 1
86 (0x0056)	Input scale high	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 (0x0057)	Input scale low	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 (0x0058)	Input error determination point (high)	31	R/W	Input scale low - (5 % of input span) to Input scale high + (5 % of input span)	TC/RTD: Input scale high + (5 % of input span) V/I: 105.0
89 (0x0059)	Input error determination point (low)	31	R/W		TC/RTD: Input scale low - (5 % of input span) V/I: -5.0
90 (0x005A)	Burnout direction	31	R/W	0: Upscale 1: Downscale Valid only when the TC input and Voltage (low) input are selected.	0
91 (0x005B)	Square root extraction	31	R/W	0: Unused 1: Used	0
92 (0x005C)	Power supply frequency	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

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ID	Name	Number of data items	Attribute	Data range	Factory set value
93 (0x005D)	Sampling cycle	31	R/W	0: 50 ms 1: 100 ms 2: 250 ms	1
94 (0x005E)	Remote setting input type	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 (SR) 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□) .	Depends on model code. When not specifying: 15
95 (0x005F)	Digital input (DI) assignment	31	R/W	[FB100] 1 to 26 [FB400/900] 1 to 8 Refer to Table 1 Digital input (DI) assignment (P. 75) .	Depends on model code. When not specifying: 1
96 (0x0060)	Output assignment	31	R/W	[FB100] 1 to 15 [FB400/900] 1 to 7 Refer to Table 2 Output assignment (P. 76) .	Depends on model code. When not specifying: FB100: 1 FB400/900: 2
97 (0x0061)	Timer 1	31	R/W	0.0 to 600.0 seconds Customization tool is necessary when the timer function is availed.	0.0
98 (0x0062)	Timer 2	31	R/W		0.0
99 (0x0063)	Timer 3	31	R/W		0.0
100 (0x0064)	Timer 4	31	R/W		0.0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
101 (0x0065)	Energized/De-energized	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
102 (0x0066)	Alarm (ALM) lamp lighting condition 1 ^a	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 (0x0067)	Alarm (ALM) lamp lighting condition 2 ^a	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 (0x0068)	Output status at STOP mode	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	0
105 (0x0069) ⋮ 110 (0x006E)	Unused	—	—	—	—
111 (0x006F)	Transmission output type	31	R/W	0: None 1: Measured value (PV) 2: Set value (SV) monitor 3: Deviation value 4: Manipulated output value (MV1) [heat-side] 5: Manipulated output value (MV2) [cool-side] 6: Set value (SV) 7: Remote setting (RS) input value	1

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

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ID	Name	Number of data items	Attribute	Data range	Factory set value
112 (0x0070)	Transmission output scale high	31	R/W	When the PV, SV, SV monitor and RS: Input scale low to Input scale high 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
113 (0x0071)	Transmission output scale low	31	R/W		PV/SV/RS: Input scale low MV1/MV2: 0.0 Deviation: -Input span
114 (0x0072)	Event 1 type	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 control, set to the Feedback resistance (FBR) input value.	Depends on model code. When not specifying: 0
115 (0x0073)	Event 1 hold action	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)	Depends on model code. When not specifying: 0
116 (0x0074)	Event 1 interlock	31	R/W	0: Unused 1: Used	0
117 (0x0075)	Event 1 differential gap	31	R/W	① Deviation, process or set value: 0 to Input span (Unit: °C [°F]) ② MV: 0.0 to 110.0 %	①: TC/RTD: 2 V/I: 0.2 ②: 0.2
118 (0x0076)	Event 1 delay timer	31	R/W	0.0 to 600.0 seconds	0.0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
119 (0x0077)	Force ON of Event 1 action	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 (0x0078)	Event 2 type	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 control, set to the Feedback resistance (FBR) input value.	Depends on model code. When not specifying: 0
121 (0x0079)	Event 2 hold action	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)	Depends on model code. When not specifying: 0
122 (0x007A)	Event 2 interlock	31	R/W	0: Unused 1: Used	0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
123 (0x007B)	Event 2 differential gap	31	R/W	① Deviation, process or set value: 0 to Input span (Unit: °C [°F]) ② MV: 0.0 to 110.0 %	①: TC/RTD: 2 V/I: 0.2 ②: 0.2
124 (0x007C)	Event 2 delay timer	31	R/W	0.0 to 600.0 seconds	0.0
125 (0x007D)	Force ON of Event 2 action	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
126 (0x007E)	Event 3 type	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 control, set to the Feedback resistance (FBR) input value.	Depends on model code. When not specifying: 0
127 (0x007F)	Event 3 hold action	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)	Depends on model code. When not specifying: 0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
128 (0x0080)	Event 3 interlock	31	R/W	0: Unused 1: Used	0
129 (0x0081)	Event 3 differential gap	31	R/W	① Deviation, process or set value: 0 to Input span (Unit: °C [°F]) ② MV: 0.0 to 110.0 %	①: TC/RTD: 2 V/I: 0.2 ②: 0.2
130 (0x0082)	Event 3 delay timer	31	R/W	0.0 to 600.0 seconds	0.0
131 (0x0083)	Force ON of Event 3 action	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
132 (0x0084)	Event 4 type	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 control, set to the Feedback resistance (FBR) input value.	Depends on model code. When not specifying: 0

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ID	Name	Number of data items	Attribute	Data range	Factory set value
133 (0x0085)	Event 4 hold action	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)	Depends on model code. When not specifying: 0
134 (0x0086)	Event 4 interlock	31	R/W	0: Unused 1: Used	0
135 (0x0087)	Event 4 differential gap	31	R/W	① Deviation, process or set value: 0 to Input span (Unit: °C [°F]) ② MV: 0.0 to 110.0 % Becomes invalid when the Event 4 type corresponds to "9: Control loop break alarm (LBA)."	①: TC/RTD: 2 V/I: 0.2 ②: 0.2
136 (0x0088)	Event 4 delay timer	31	R/W	0.0 to 600.0 seconds	0.0
137 (0x0089)	Force ON of Event 4 action	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
138 (0x008A)	CT1 ratio	31	R/W	0 to 9999	CTL-6-P-N: 800 CTL-12-S56- 10L-N: 1000
139 (0x008B)	CT1 assignment	31	R/W	0: None 1: OUT1 2: OUT2 3: DO1 4: DO2 5: DO3 * 6: DO4 * * Unused on the FB100.	1

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ID	Name	Number of data items	Attribute	Data range	Factory set value
140 (0x008C)	Heater break alarm 1 (HBA1) type	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 and Time-proportional control output)	1
141 (0x008D)	Number of Heater break alarm 1 (HBA1) delay times	31	R/W	0 to 255 times	5
142 (0x008E)	CT2 ratio	31	R/W	0 to 9999	CTL-6-P-N: 800 CTL-12-S56-10L-N: 1000
143 (0x008F)	CT2 assignment	31	R/W	0: None 1: OUT1 2: OUT2 3: DO1 4: DO2 5: DO3 * 6: DO4 * * Unused on the FB100.	0
144 (0x0090)	Heater break alarm 2 (HBA2) type	31	R/W	0: Heater break alarm 2 (HBA2) type A (Time-proportional control output) 1: Heater break alarm 2 (HBA2) type B (Continuous control output and Time-proportional control output)	1
145 (0x0091)	Number of Heater break alarm 2 (HBA2) delay times	31	R/W	0 to 255 times	5
146 (0x0092)	Hot/Cold start	31	R/W	0: Hot start 1 1: Hot start 2 2: Cold start 3: Stop start	0
147 (0x0093)	Start determination point	31	R/W	0 to Input span (The unit is the same as input value.) (0: Action depending on the Hot/Cold start selection)	3 % of input span
148 (0x0094)	External input type	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

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ID	Name	Number of data items	Attribute	Data range	Factory set value
149 (0x0095)	Master channel selection	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 (0x0096)	SV tracking	31	R/W	0: Unused 1: Used	1
151 (0x0097)	MV transfer function [Action taken when changed to Manual mode from Auto mode]	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 (0x0098)	Control action	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: Position proportioning control	Depends on model code. When not specifying: 1
153 (0x0099)	Integral/Derivative time decimal point position	31	R/W	0: 1 second setting (No decimal place) 1: 0.1 seconds setting (One decimal place)	0
154 (0x009A)	Derivative action	31	R/W	0: Measured value derivative 1: Deviation derivative	0
155 (0x009B)	Undershoot suppression factor	31	R/W	0.000 to 1.000	Water cooling: 0.100 Air cooling: 0.250 Cooling gain linear type: 1.000
156 (0x009C)	Derivative gain	31	R/W	0.1 to 10.0	6.0
157 (0x009D)	ON/OFF action differential gap (upper)	31	R/W	TC/RTD inputs: 0 to Input span (Unit: °C [°F])	TC/RTD: 1 V/I: 0.1
158 (0x009E)	ON/OFF action differential gap (lower)	31	R/W	Voltage (V)/Current (I) inputs: 0.0 to 100.0 % of input span	TC/RTD: 1 V/I: 0.1

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ID	Name	Number of data items	Attribute	Data range	Factory set value
159 (0x009F)	Action (high) at input error	31	R/W	0: Normal control 1: Manipulated output value at input error	0
160 (0x00A0)	Action (low) at input error	31	R/W		0
161 (0x00A1)	Manipulated output value at input error	31	R/W	–105.0 to +105.0 % Actual output values become those restricted by the output limiter. Position proportioning 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 (0x00A2)	Manipulated output value (MV1) at STOP mode [heat-side]	31	R/W	–5.0 to +105.0 % Position proportioning 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 (0x00A3)	Manipulated output value (MV2) at STOP mode [cool-side]	31	R/W		–5.0
164 (0x00A4)	Output change rate limiter (up) [MV1]	31	R/W	0.0 to 100.0 %/seconds (0.0: OFF)	0.0
165 (0x00A5)	Output change rate limiter (down) [MV1]	31	R/W	Becomes invalid when in position proportioning control.	0.0
166 (0x00A6)	Output limiter high [MV1]	31	R/W	Output limiter low [MV1] to 105.0 % Position proportioning control: Becomes valid only when there is Feedback resistance (FBR) input and it does not break.	105.0
167 (0x00A7)	Output limiter low [MV1]	31	R/W	–5.0 % to Output limiter high [MV1] Position proportioning control: Becomes valid only when there is Feedback resistance (FBR) input and it does not break.	–5.0
168 (0x00A8)	Output change rate limiter (up) [MV2]	31	R/W	0.0 to 100.0 %/seconds (0.0: OFF)	0.0
169 (0x00A9)	Output change rate limiter (down) [MV2]	31	R/W	Becomes invalid when in Position proportioning control.	0.0
170 (0x00AA)	Output limiter high [MV2]	31	R/W	Output limiter low [MV2] to 105.0 %	105.0
171 (0x00AB)	Output limiter low [MV2]	31	R/W	–5.0 % to Output limiter high [MV2]	–5.0
172 (0x00AC)	Power feed forward selection ♦	31	R/W	0: Unused 1: Used	1
173 (0x00AD)	Power feed forward gain ♦	31	R/W	0.01 to 5.00	1.00

♦ Unused on the FB100.

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ID	Name	Number of data items	Attribute	Data range	Factory set value
174 (0x00AE)	AT bias	31	R/W	-Input span to +Input span	0
175 (0x00AF)	AT cycles	31	R/W	0: 1.5 cycles 1: 2.0 cycles 2: 2.5 cycles 3: 3.0 cycles	1
176 (0x00B0)	Output value with AT turned on	31	R/W	Output value with AT turned off to +105.0 % Actual output values become those restricted by the output limiter. Position proportioning 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 (0x00B1)	Output value with AT turned off	31	R/W	-105.0 % to Output value with AT turned on Actual output values become those restricted by the output limiter. Position proportioning 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 (0x00B2)	AT differential gap time	31	R/W	0.0 to 50.0 seconds	10.0
179 (0x00B3)	Proportional band adjusting factor [heat-side]	31	R/W	0.01 to 10.00 times	1.00
180 (0x00B4)	Integral time adjusting factor [heat-side]	31	R/W		1.00
181 (0x00B5)	Derivative time adjusting factor [heat-side]	31	R/W		1.00
182 (0x00B6)	Proportional band adjusting factor [cool-side]	31	R/W		1.00
183 (0x00B7)	Integral time adjusting factor [cool-side]	31	R/W		1.00
184 (0x00B8)	Derivative time adjusting factor [cool-side]	31	R/W		1.00
185 (0x00B9)	Proportional band limiter high [heat-side]	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.	TC/RTD: Input span V/I: 1000.0
186 (0x00BA)	Proportional band limiter low [heat-side]	31	R/W	Voltage (V)/Current (I) inputs: 0.0 to 1000.0 % of input span	TC/RTD: 0 V/I: 0.0

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7. COMMUNICATION DATA LIST

Continued from the previous page.

ID	Name	Number of data items	Attribute	Data range	Factory set value
187 (0x00BB)	Integral time limiter high [heat-side]	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds	3600
188 (0x00BC)	Integral time limiter low [heat-side]	31	R/W	Derivative time decimal point position selection.	0
189 (0x00BD)	Derivative time limiter high [heat-side]	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds	3600
190 (0x00BE)	Derivative time limiter low [heat-side]	31	R/W	Derivative time decimal point position selection.	0
191 (0x00BF)	Proportional band limiter high [cool-side]	31	R/W	TC/RTD inputs: 1 (0.1, 0.01) to Input span (Unit: °C [°F])	TC/RTD: Input span V/I: 1000.0
192 (0x00C0)	Proportional band limiter low [cool-side]	31	R/W	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: 1 V/I: 0.1
193 (0x00C1)	Integral time limiter high [cool-side]	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds	3600
194 (0x00C2)	Integral time limiter low [cool-side]	31	R/W	Derivative time decimal point position selection.	0
195 (0x00C3)	Derivative time limiter high [cool-side]	31	R/W	0 to 3600 seconds or 0.0 to 1999.9 seconds	3600
196 (0x00C4)	Derivative time limiter low [cool-side]	31	R/W	Derivative time decimal point position selection.	0
197 (0x00C5)	Open/Close output neutral zone	31	R/W	0.1 to 10.0 % of output	2.0
198 (0x00C6)	Open/Close output differential gap	31	R/W	0.1 to 5.0 % of output	1.0
199 (0x00C7)	Action at Feedback resistance (FBR) input break	31	R/W	0: Action depending on the valve action at STOP 1: Control action continued	0
200 (0x00C8)	Feedback adjustment	31	R/W	0: Adjustment end 1: During adjustment on the open-side 2: During adjustment on the close-side	—
201 (0x00C9)	Control motor time	31	R/W	5 to 1000 seconds	10
202 (0x00CA)	Integrated output limiter	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 (0x00CB)	Valve action at STOP	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

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ID	Name	Number of data items	Attribute	Data range	Factory set value
204 (0x00CC)	Startup tuning (ST)	31	R/W	0: Startup tuning (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 control, set to RO (Read only data).	0
205 (0x00CD)	ST proportional band adjusting factor	31	R/W	0.01 to 10.00 times	1.00
206 (0x00CE)	ST integral time adjusting factor	31	R/W		1.00
207 (0x00CF)	ST derivative time adjusting factor	31	R/W		1.00
208 (0x00D0)	ST start condition	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 (0x00D1)	Automatic temperature rise group	31	R/W	0 to 16 (0: Automatic temperature rise function OFF)	0
210 (0x00D2)	Automatic temperature rise learning	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 (0x00D3)	Automatic temperature rise dead time	31	R/W	0.1 to 1999.9 seconds	10.0
212 (0x00D4)	Automatic temperature rise gradient data	31	R/W	0.1 to Input span/minutes	1.0
213 (0x00D5)	RUN/STOP group	31	R/W	0 to 16 (0: Group RUN/STOP function OFF)	0
214 (0x00D6)	Setting change rate limiter unit time	31	R/W	1 to 3600 seconds	60

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ID	Name	Number of data items	Attribute	Data range	Factory set value
215 (0x00D7)	Soak time unit	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 (0x00D8)	Setting limiter high	31	R/W	Setting limiter low to Input scale high	Input scale high
217 (0x00D9)	Setting limiter low	31	R/W	Input scale low to Setting limiter high	Input scale low
218 (0x00DA)	PV transfer function	31	R/W	0: Unused 1: Used	0
219 (0x00DB)	PV flashing display at input error	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 (0x00DC) ⋮ 224 (0x00E0)	Unused	—	—	—	—
225 (0x00E1)	Controller state 1	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]	—

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ID	Name	Number of data items	Attribute	Data range	Factory set value
226 (0x00E2)	Controller state 2	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]	—
227 (0x00E3)	Controller state 3	31	RO	Bit data Bit 0: Control STOP Bit 1: Control RUN Bit 2: Manual mode * Bit 3: Remote mode * Bit 4 to Bit 14: Unused Bit 15: Autotuning (AT) Data 0: OFF 1: ON [Decimal number: 0 to 32783] * 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 set to the “0: OFF” state even if the parameter, “Remote/Local transfer” is set to “1: Remote mode.”	—
228 (0x00E4) ⋮ 230 (0x00E6)	Unused	—	—	—	—

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7. COMMUNICATION DATA LIST

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ID	Name	Number of data items	Attribute	Data range	Factory set value
231 (0x00E7)	Comprehensive alarm state ¹	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 (ID: 225) in all controller	—
232 (0x00E8)	Controller alarm state ¹	2	RO	Bit data Object instance 1: Bit 0 to Bit 15: Controller 1 to 16 Object instance 2: Bit 0 to Bit 14: Controller 17 to 31 Data 0: OFF 1: ON [Decimal number: 0 to 65535] OR of Controller state 1 (ID: 225)	—
233 (0x00E9)	Error state ¹	2	RO	Bit data Object instance 1: Bit 0 to Bit 15: Controller 1 to 16 Object instance 2: Bit 0 to Bit 14: Controller 17 to 31 Data 0: OFF 1: ON [Decimal number: 0 to 65535] OR of Controller state 2 (ID: 226)	—
234 (0x00EA)	RUN/STOP ¹	2	R/W	Bit data Object instance 1: Bit 0 to Bit 15: Controller 1 to 16 Object instance 2: Bit 0 to Bit 14: Controller 17 to 31 Data RUN/STOP state is depending on the value of RUN/STOP logic selection (ID: 242) <ul style="list-style-type: none"> • ID: 242 = 0 0: RUN (control start) 1: STOP (control stop) • ID: 242 = 1 0: STOP (control stop) 1: RUN (control start) [Decimal number: 0 to 65535] Link RUN/STOP transfer (ID: 36)	0

¹ Valid only when Explicit message communication is used.

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ID	Name	Number of data items	Attribute	Data range	Factory set value
235 (0x00EB)	Setting update flag ¹	1	RO	0: Setting update is completed 1: During setting update	—
236 (0x00EC)	Number of Polling I/O communication controllers ¹	1	R/W	1 to 31	10
237 (0x00ED)	Unused	—	—	—	—
238 (0x00EE)	COM-JH error code ¹	1	RO	Bit data Bit 0: Back-up error Bit 1: Controller communication error Bit 2 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 3]	—
239 (0x00EF)	Number of connected controller in Controller communication ¹	1	RO	0 to 31	—
240 (0x00F0)	Number of communication measured data items (IN) when conducting Polling I/O communication ^{1,2}	1	R/W	0: Depends on the DIP switch setting 1 to 5: 5 words 6 to 200: 6 to 200 words	0
241 (0x00F1)	Number of communication setting data items (OUT) when conducting Polling I/O communication ^{1,2}	1	R/W	0: Depends on the DIP switch setting 1 to 5: 5 words 6 to 200: 6 to 200 words	0
242 (0x00F2)	RUN/STOP logic selection ^{1,2}	1	R/W	0: RUN = 0, STOP = 1 1: RUN = 1, STOP = 0 Valid to RUN/STOP (ID: 234) and the 4th word and the 5th word in the Polling I/O communication setting item (OUT). However, invalid to the RUN/STOP transfer (ID: 36).	0
243 (0x00F3)	Setting validity selection ¹	1	R/W	0: The setting is validated when the power is turned off once after the setting is changed and it is turned on again. 1: The setting is validated just after the setting is changed. Object data • The data of “Controller communication item setting object (0xC7)” • The data of “Number of Polling I/O communication controllers (ID: 236)”	0

¹ Valid only when Explicit message communication is used.² The setting is validated when the power is turned off once after the setting is changed and it is turned on again.

: It is possible to set in the communication environment setting by the rotary switch of COM-JH (Refer to P. 23) or configuration tool (Refer to P. 33).

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ID	Name	Number of data items	Attribute	Data range	Factory set value
244 (0x00F4)	Unused	—	—	—	—
245 (0x00F5)	Controller address setting ^{1,2}	1	R/W	0 to 99 (0: No communication)	1 to 31
246 (0x00F6)	Action mode selection ^{1,2,◆}	1	R/W	Bit data Bit 0: Address setting method transfer 0: Continuous setting 1: Free setting Bit 1: PID/AT transfer Polling I/O communication 0: Invalid 1: Valid Bit 2 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 3]	0
247 (0x00F7)	Automatic acquisition of controller address ^{1,2}	1	R/W	0: Do not execute the automatic acquisition 1: Execute the automatic acquisition	0
248 (0x00F8) ⋮ 255 (0x00FF)	Unused	—	—	—	—

¹ Valid only when Explicit message communication is used.² The setting is validated when the power is turned off once after the setting is changed and it is turned on again.

: It is possible to set in the communication environment setting by the rotary switch of COM-JH (Refer to P. 23) or configuration tool (Refer to P. 33).

◆: Communication environment setting by rotary switch of COM-JH is possible.

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 selection (1 to 8)			Memory area set	RUN/STOP
3	Memory area number selection (1 to 8)			Memory area set	Unused
4	Memory area number selection (1 to 8)			Memory area set	AUTO/MAN
5	Memory area number selection (1 to 8)			Memory area set	Interlock release
6	Memory area number selection (1 to 8)			RUN/STOP	Unused
7	Memory area number selection (1 to 8)			RUN/STOP	AUTO/MAN
8	Memory area number selection (1 to 8)			RUN/STOP	Interlock release
9	Memory area number selection (1 to 8)			Unused	AUTO/MAN
10	Memory area number selection (1 to 8)			Unused	Interlock release
11	Memory area number selection (1 to 8)			AUTO/MAN	Interlock release
12	Memory area number selection (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 selection (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 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 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

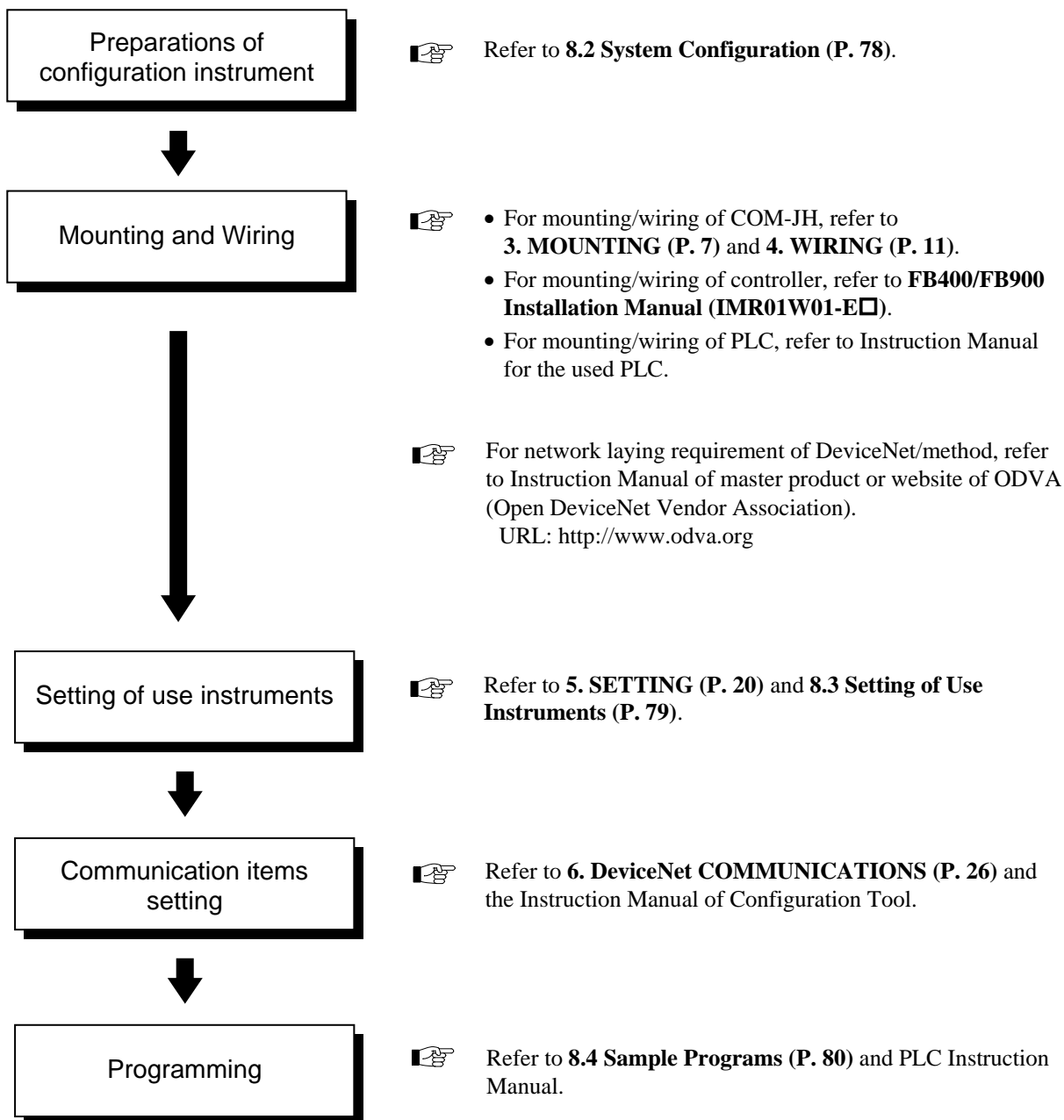
HBA2: Heater break alarm 2 (HBA2) output

- 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.

8. USAGE EXAMPLE

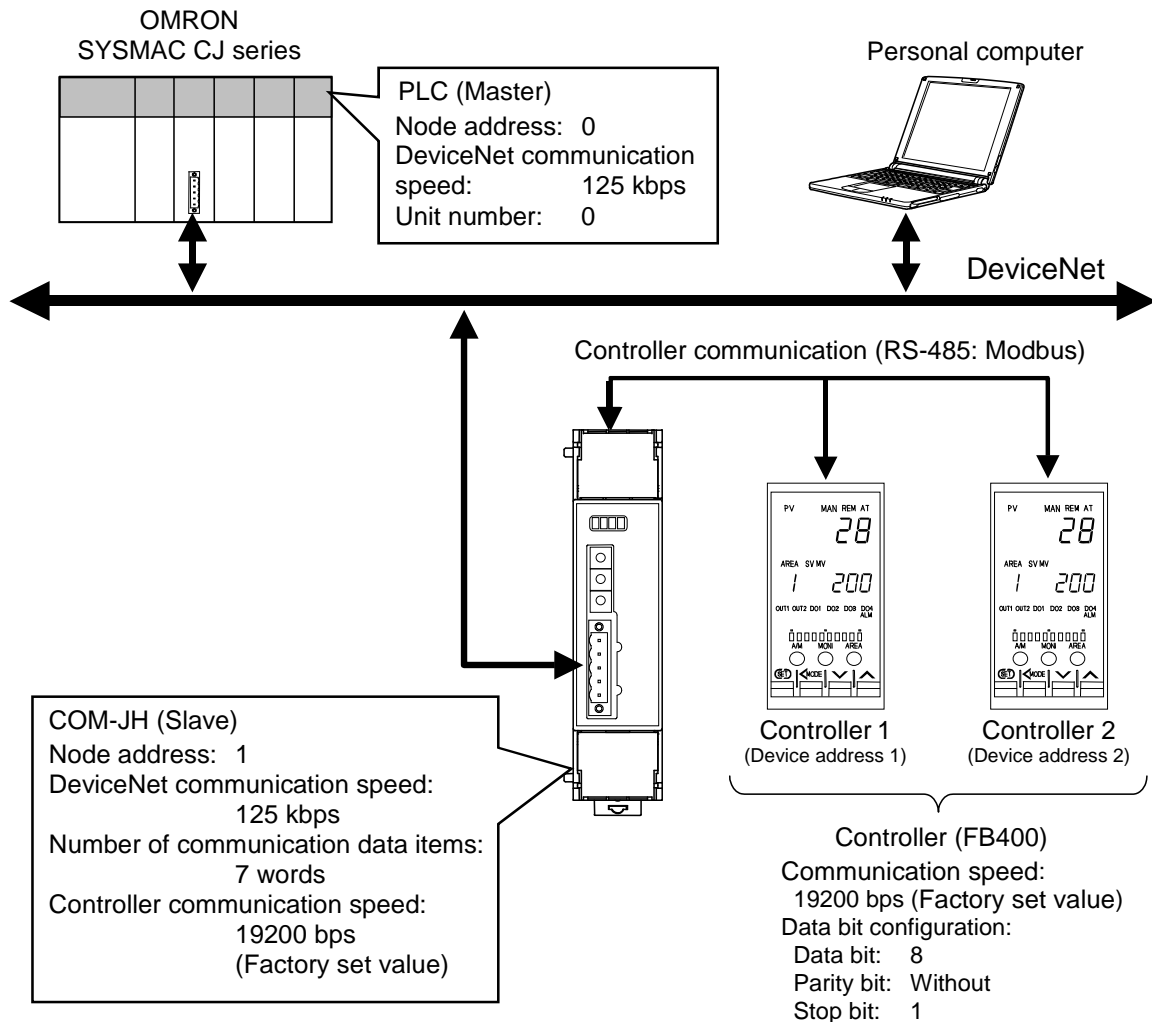
This chapter describes a usage example of DeviceNet communication when connected with the COM-JH and controller (FB400) with the PLC set to a master.

8.1 Handling Procedures



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

8.2 System Configuration



■ Use instruments

- **DeviceNet communication converter:** COM-JH × 1
- **Controller (temperature controller):** FB400 (Communication 1: With RS-485) × 2
- **PLC**
 - SYSMAC CJ (OMRON product)
CPU unit: CJ1M, DeviceNet master unit: CJ1W-DRM21
or
 - Control Logix 5550 [Rockwell Inc. (Allen-Bradley)]
CPU module: 1756-L1, LINK module (DeviceNet): 1756-DNB
- **Personal computer**
The configuration tool must be installed in a personal computer.
- **DeviceNet communication cable (thick cable)**
- **Connection cable for connecting COM-JH and controller**


8.3 Setting of Use Instruments

Setting of the PLC, COM-JH and controller is shown in the following.

■ PLC setting

[DeviceNet communication requirement]

- Node address: 0
- DeviceNet communication speed: 125 kbps
- Unit number: 0
- Communication cycle time: (Number of COM-JH communication words \times 1.2 + 50) [ms]
or more
 $= 7 \times 1.2 + 50 = 58.4$ [ms] or more

 For setting procedure, refer to **PLC Instruction Manual**.

■ COM-JH setting


[DeviceNet communication requirement]

- Node address: 1
- DeviceNet communication speed: 125 kbps
- Number of communication data items: 7 words
- Controller address: 1, 2 (Controller 1, Controller2)
- Action mode: 0
(Address setting method Continuous setting, PID/AT transfer by Polling I/O communication: Invalid)
- Automatic acquisition of controller address:
0: Do not execute the automatic acquisition

 For setting procedure, refer to **5. SETTING (P. 20)** and **6.2. Communication Method (P. 27)**.

[Controller communication requirement]


- Communication speed: 19200 bps (factory set value)

 For setting procedure, refer to **5.3 DIP Switch Setting (P. 22)**.

■ Controller (FB400) setting

[Controller communication requirement: Use communication 1 side]

- Device address: 1 and 2
- Communication protocol: Modbus-RTU
- Communication speed: 19200 bps (factory set value)
- Data bit configuration: Data 8-bit, without parity, stop 1-bit

 For setting procedure, refer to **FB400/FB900 Communication Quick Manual (IMR01W07-E□)**.

8.4 Sample Programs

8.4.1 Polling I/O communication (When the SYSMAC CJ)



Polling I/O communication is called “Remote I/O communication” in OMRON PLC related instruction manuals.

■ Communication requirement

● Contents of communication parameter setting

Communication data items: Measured data item (IN): Measured value (PV) [Attribute ID: 1]

Setting data item (OUT): Set value (SV) [Attribute ID: 45]

Number of communication controllers: 2 controllers

Number of communication data items: 7 words (Factory set value)

Controller address: 1, 2 (Factory set value: 1 to 31)

Address of controller 1 and controller 2

Action mode: 0 (Factory set value)

Address setting method: Continuous setting

PID/AT transfer Polling I/O communication: Invalid

Automatic acquisition of controller address:

0 (Factory set value)

Do not execute the Automatic acquisition



The above communication parameters can be set via Explicit message communication or by the configuration tool*.

For details, refer to ■ **Communication parameter setting by configuration tool (P. 33)**, or

■ **Communication parameter setting by Explicit message communication (P. 41)**.

* Except the setting of the Action mode.

● Memory allocation

Allocate the memory by using the configuration tool.

Allocation method: User-set

Data area: Measured data item (IN) area: D00000 to D00006 (7 words)

Setting data item (OUT) area: D10000 to D10006 (7 words)

● Data which a master receives [Response: measured data items (IN)]

No.	Items	Storage location of read data
1	Receive counter	D00000
2	Alarm state (Controller 1 to 16)	D00001
3	Alarm state (Controller 17 to 31, Setting update flag)	D00002
4	RUN/STOP state (Controller 1 to 16)	D00003
5	RUN/STOP state (Controller 17 to 31)	D00004
6	Measured value (PV) [Controller 1]	D00005
7	Measured value (PV) [Controller 2]	D00006



Communication data Nos. 1 to 5 (corresponding to 5 words) are fixed communication data items.

■ **Sample program (ladder)**

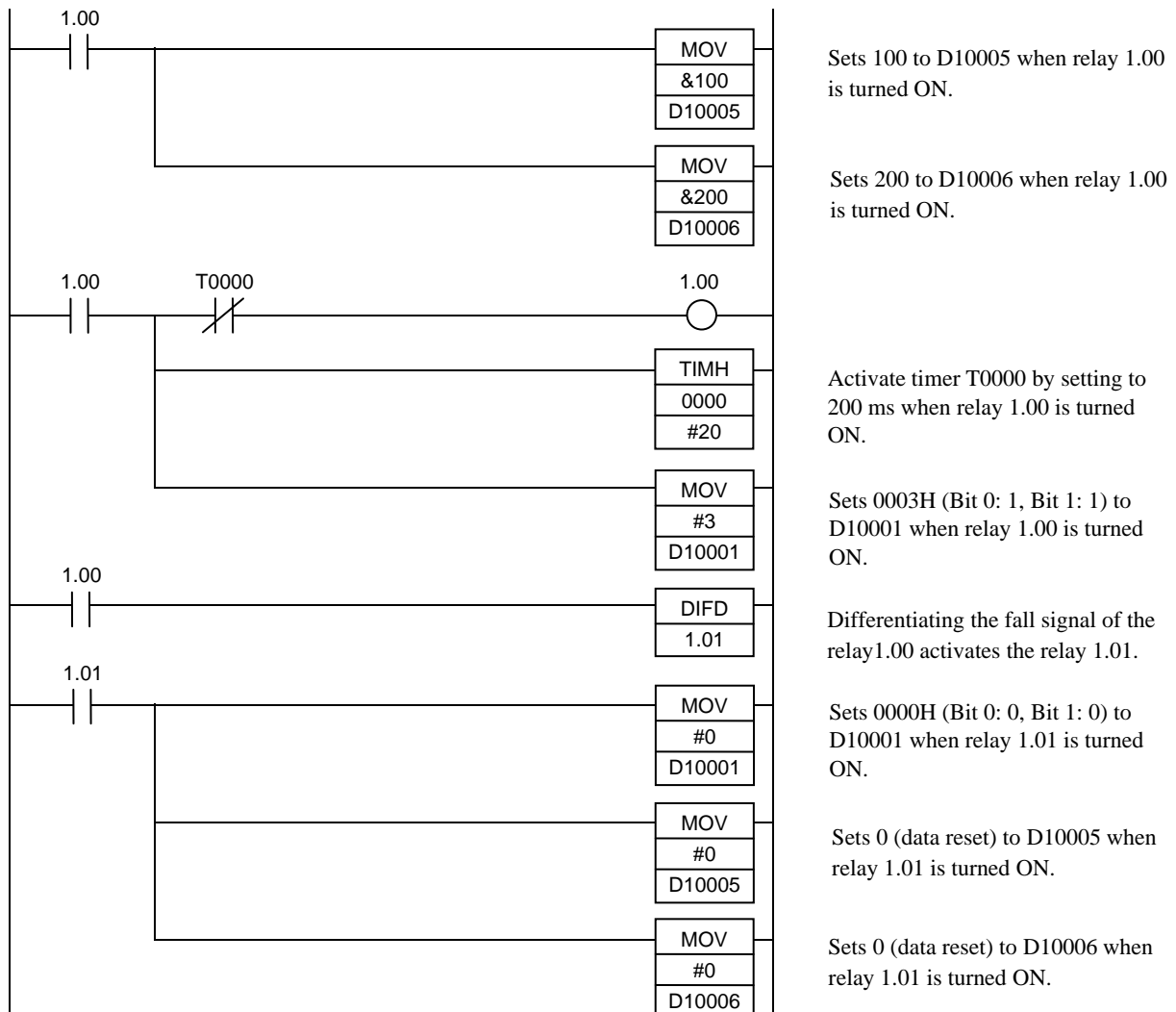
● **Measured data items (IN)**

Data corresponding to the Measured data item (IN) can be checked only by reading the data storage register assigned by the configuration tool.

● **Setting data items (OUT)**

The following procedure is required for setting data to the controller.

1. Sets 100 to “Set value (SV): D10005” of Controller 1.
 2. Sets 200 to “Set value (SV): D10006” of Controller 2.
 3. Set Bit 0 (Controller 1) and Bit 1 (Controller 2) for “Setting state selection: D10001” to “1: Setting enabled.”
 4. Set Bit 0 (Controller 1) and Bit 1 (Controller 2) for “Setting state selection: D10001” to “0: Setting disabled” after a lapse of preset time* (Example: 200 ms).
- *Sets any time longer than the “communication cycle time” set to the PLC.
5. Sets 0 (reset) to “Set value (SV): D10005” of Controller 1.
 6. Sets 0 (reset) to “Set value (SV): D10006” of Controller 2.



8.4.2 Explicit message communication (When the SYSMAC CJ)



In order to conduct Explicit message communication using the OMRON SYSMAC CJ PLC, the FINS command for FINS communication (communication protocol developed by OMRON) is used.

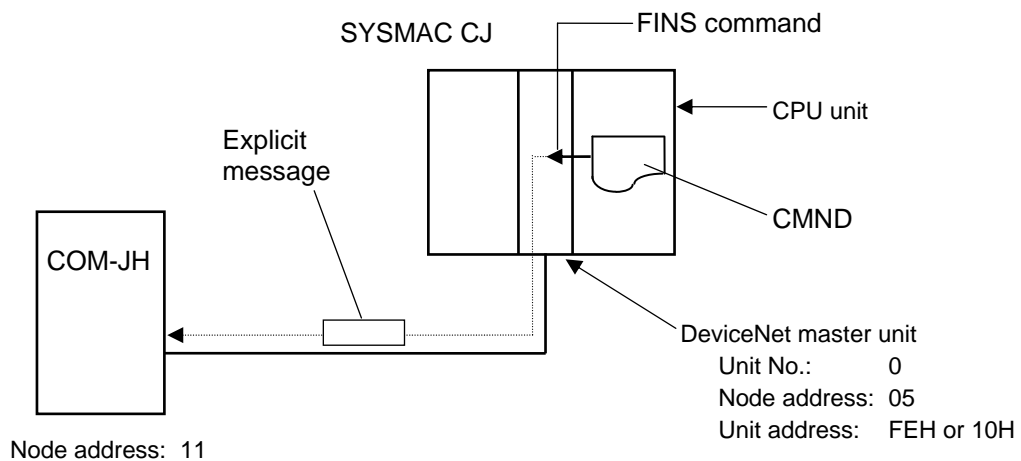


For the FINS command and the CMND instruction, refer to the Instruction Manual of OMRON SYSMAC CJ PLC.

■ Communication requirement

The vendor code is read from the COM-JH (slave). (RKC vendor code: 394 = 018AH)

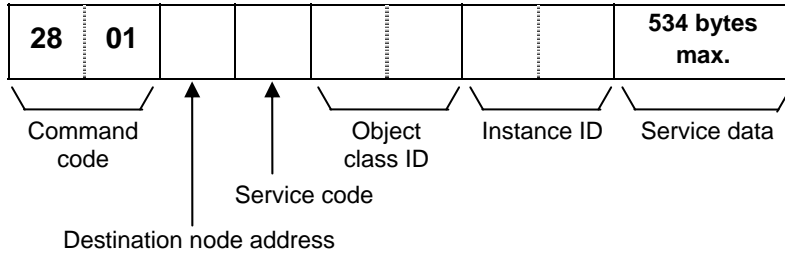
- Using the “Explicit message send” command (2801) of FINS command.
- The “CMND instruction” is used to send FINS commands.
- Write location of request data from the PLC (master): On and after D01000
- Storage location of response data from the COM-JH (slave): On and after D02000
- The completion code is stored in D00006 when execution of CMND has been completed abnormally and then the command is executed again.
- When an Explicit message is sent by the SYSMAC CJ, the send location of the FINS command is assigned to the DeviceNet master unit of its own node instead of the actual send location (COM-JH). The COM-JH node address is specified within Explicit message send command data.



● **Command data format**

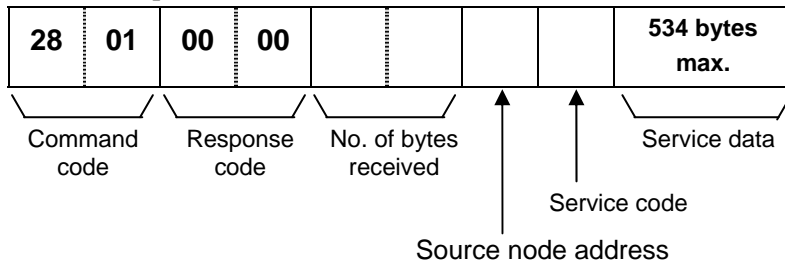
Command data format at communicating by an Explicit message with SYSMAC CJ is shown with the following.

[Request data format from the PLC (master)]

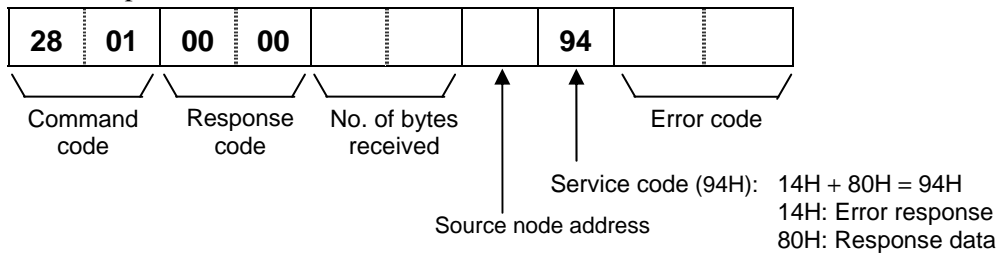


[Response data format]

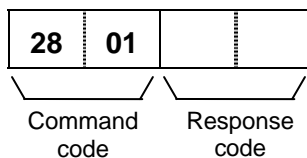
● **Normal response**



● **Error response**



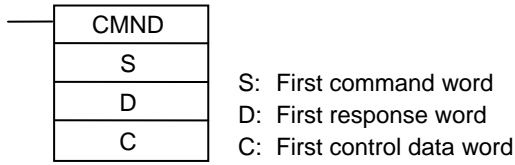
● **Cannot be sent/Timeout**



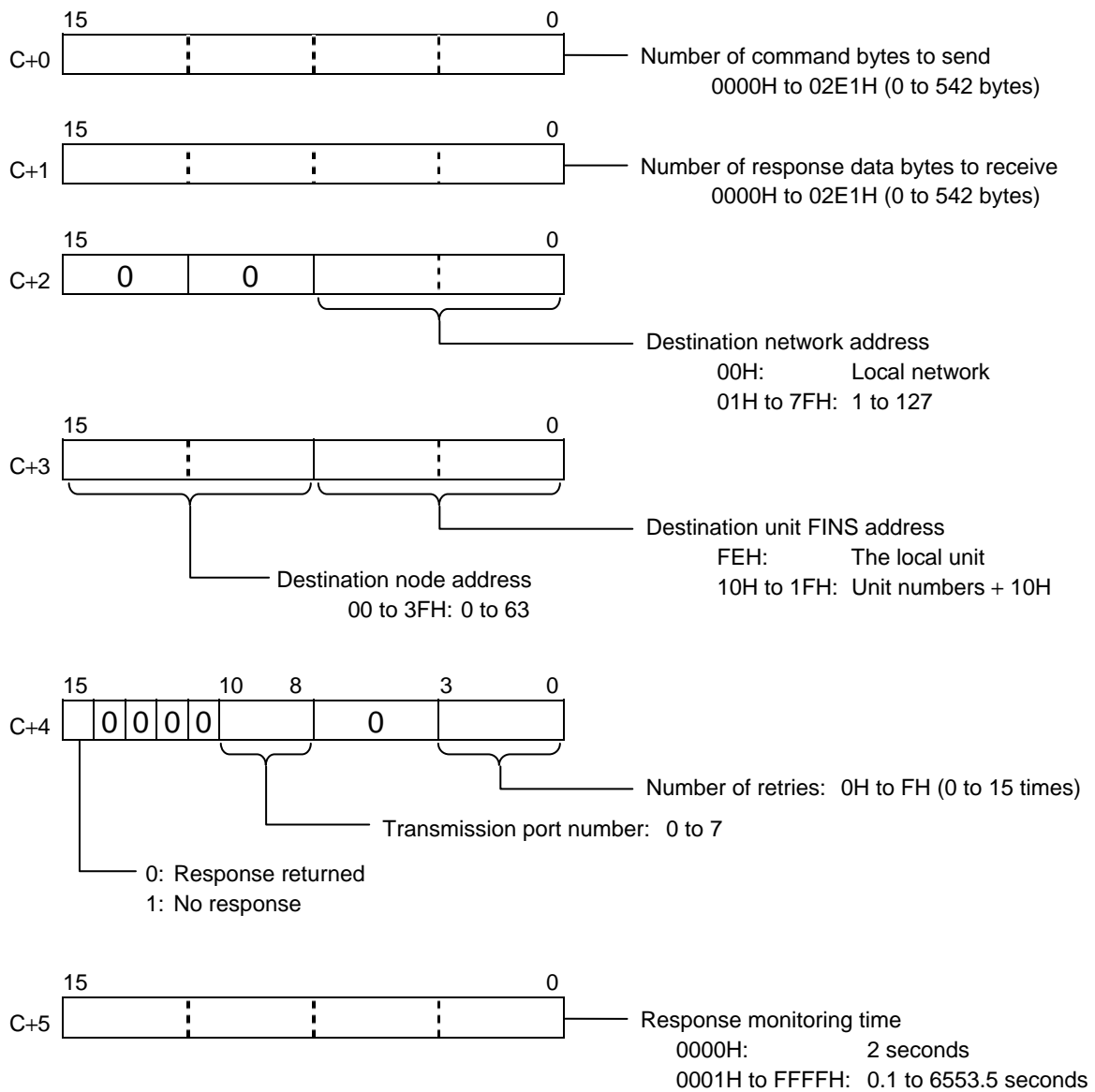
As this response (Cannot be sent/Timeout) is an error response sent to the CPU unit from the DeviceNet master unit of the SYSMAC CJ, this is not an error in DeviceNet communication.

● Description of CMND

[CMND S D C]



Command data is set in order starting with the word specified for the CMND operand S (first command word) and continuing with words with higher addresses in I/O memory in the command block format.



[Sample program]

```

S  D01000+ 0  2801H  Command code (2801H)
      + 1  0B0EH  Slave node address: 11 (0BH), Service code (0EH)
      + 2  0001H  Object class ID (0001H)
      + 3  0001H  Instance ID (0001H)
      + 4  0100H  Attribute ID (01H)

D  D02000      First response word at local node

C  D00000+ 0  0009H  Number of command bytes (9 bytes)
      + 1  000AH  Number of response bytes (10 bytes)
      + 2  0001H  Destination network address 1 (01H)
      + 3  05FEH  Destination node address 5 (05H), Destination unit address: FEH (or 10H)
      + 4  0000H  Response (0), Transmission port No.0 (0H), No retries (0H)
      + 5  0064H  Response monitoring time: 10.0 seconds (64H)

```

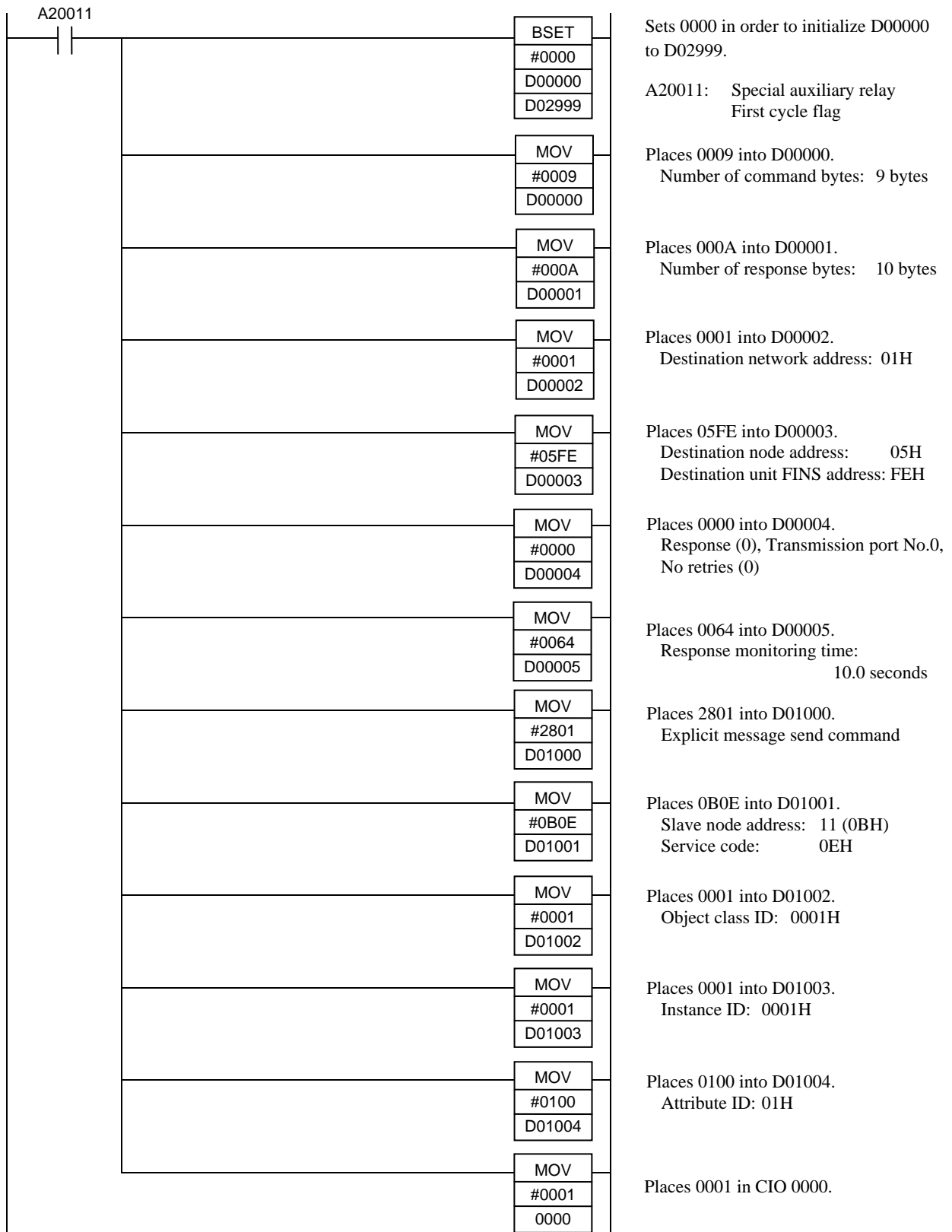
● Response

```

D02000+ 0  2801H  Command code (2801H)
      + 1  0000H  Response code (0000H)
      + 2  0004H  Number of bytes received (0004H)
      + 3  0B8EH  Response source node address: 11 (0BH), Normal completion (8EH)
      + 4  8A01H  Vendor code stored from high to low byte
                  (RKC vendor code: 394 = 018AH)

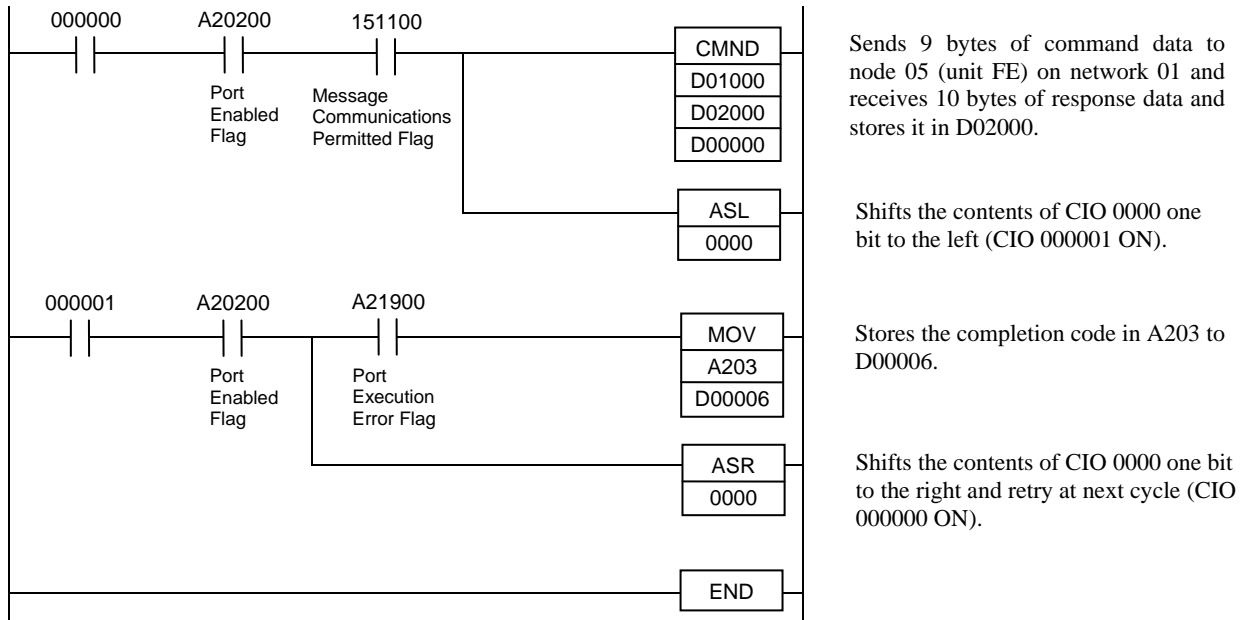
```

■ Sample program (ladder)



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Sends 9 bytes of command data to node 05 (unit FE) on network 01 and receives 10 bytes of response data and stores it in D02000.

Shifts the contents of CIO 0000 one bit to the left (CIO 000001 ON).

Stores the completion code in A203 to D00006.

Shifts the contents of CIO 0000 one bit to the right and retry at next cycle (CIO 000000 ON).

9. TROUBLESHOOTING

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

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



WARNING

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


CAUTION

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-JH

Problem	Probable 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-JH
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-JH
	Controller communication error Controller is not connected	Confirm the controller connection condition and connect correctly
FAIL lamp is lit	Hardware error	Replace COM-JH
FAIL lamp flashes	Communication environment setting mode by the switch	Return the switch to its original position  For the communication environment setting mode by the switch, refer to 5.4 Communication Environment Setting by Rotary Switch (P. 23) .
Can not recognize the controller	Incorrect sequence of power-on	COM-JH must be powered on last.

■ DeviceNet

Problem	Probable cause	Solution
No response (DeviceNet)	Wrong connection, no connection or disconnection of the DeviceNet communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the DeviceNet communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Communication speed setting of master (PLC) and the slave (COM-JH) is mismatch	Confirm the communication speed setting and set that correctly
	Wrong Node address setting	Confirm the address setting and set that correctly

Continued on the next page.

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Problem	Probable cause	Solution
<ul style="list-style-type: none"> • NS (or NET) lamp OFF • MS (or MOD) lamp ON (Green) 	Wait for completion of Node address duplication check with a master	If only the COM-JH is in this state though both of the NS/MS (NET/MOD) lamps are lit in green, re-start after checking that each communication speed is the same
MS (or MOD) lamp flashes (Green)	Controller communication error	Remove error factors from the connection with the controller and then make a re-start.
MS (or MOD) lamp ON (Red)	Memory backup error	Replace COM-JH
<ul style="list-style-type: none"> • NS (or NET) lamp ON (Red) 	Node address duplication	Re-start after the re-setting is made so that no Node address is duplicated
<ul style="list-style-type: none"> • MS (or MOD) lamp ON (Green) 	Bus off status (communication stop by data abnormality frequent occurrence)	Re-start after checking the following items. <ul style="list-style-type: none"> • Does the speed coincide with the master communication speed? • Is not the DeviceNet communication cable connected yet, incorrectly connected or removed? • Is the length of the DeviceNet communication cable appropriate? • Are termination resistors (121 Ω) connected only to both ends of the trunk line? • Does much noise exist?
	Breakdown of communication device	Replace COM-JH
<ul style="list-style-type: none"> • NS (or NET) lamp flashes (Red) • MS (or MOD) lamp ON (Green) 	DeviceNet communication I/O connection time-out state	<ul style="list-style-type: none"> • Set the I/O connection Expected packet rate (class: 0x05, instance: 2, attribute: 9) to 0 (No time-out) or set it to a sufficiently large value. • Lengthen the master I/O message communication cycle time.

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Problem	Probable cause	Solution
<ul style="list-style-type: none"> • NS (or NET) lamp flashes (Green) • MS (or MOD) lamp ON (Green) 	DeviceNet communication Communication have not yet been established	It is checked whether or not the COM-JH is registered to the master as a slave. Re-start after checking the following items. <ul style="list-style-type: none"> • Does the speed coincide with the master communication speed? • Is not the DeviceNet communication cable connected yet, incorrectly connected or removed? • Is the length of the DeviceNet communication cable appropriate? • Are termination resistors (121 Ω) connected only to both ends of the trunk line? • Does much noise exist?

10. SPECIFICATIONS

■ DeviceNet communication

Protocol: DeviceNet

Supported connection: Polling I/O, Explicit message

Connection method: Multi-drop connection, T-branch connection
(Terminating resistor is necessary)

Communication speed: 125 kbps, 250 kbps, 500 kbps
(Communication speed can be selected with switch)
Factory set value: 125 kbps

Communication length:

Communication speed	Maximum network length *		Maximum drop length	Cumulative drop length
	Thick trunk length	Thin trunk length		
125 kbps	500 m	100 m	6 m	156 m or less
250 kbps	250 m			78 m or less
500 kbps	100 m			39 m or less

* The maximum of length between nodes

Maximum number of connection nodes:

64 (including master)

Error control: CRC error, Node address (MAC ID) duplication check

Conforms to DeviceNet specification:

Volume I –Release2.0


Volume II –Release2.0

Device profile name: Generic Device

Connection cable: Use the special cable

Connector type: Open-style connector or Micro-style connector

Termination resistor: 121 Ω, 1/4 W (externally connected)

 For details of the device profile, refer to the **APPENDIX A. DEVICE PROFILES (P. 96)**.

■ Controller communication

Interface: Base on RS-485, EIA standard
Multi-drop connection is available.

Protocol: Modbus-RTU

Synchronous method: Half-duplex start-stop synchronous type

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

Communication speed: 9600 bps, 19200 bps, 38400 bps

Data bit configuration: Data 8-bit, Without parity, Stop 1-bit

Maximum connections: 31 controllers (FB100/400/900) [Device address setting: 1 to 31]

Connection method: Terminals

Termination resistor: Built-in terminal base of COM-JH [ON/OFF select with switch (120 Ω)]

■ **Self-diagnostic function**

- Hardware error:** Display: FAIL lamp ON
- Memory backup error:** Display: RUN lamp flashes, MS lamp (Red) ON
 If any error occurs, Bit 7 of attribute ID: 5 in Identity object (0x01: 01Hex) is set to 1.
 If any error occurs, Bit 0 of attribute ID: 238 in Controller object (0x64: 64Hex) is set to 1.
- Controller communication error:**
 Display: RUN lamp flashes, MS lamp (Green) flashes
 If any error occurs, Bit 7 of attribute ID: 5 in Identity object (0x01: 01Hex) is set to 1.
 If any error occurs, Bit 2 of attribute ID: 238 in Controller object (0x64: 64Hex) is set to 1.

■ **General specifications**

- Power supply voltage:** 21.6 to 26.4 V DC [Including power supply voltage variation] (Rating 24 V DC)
- Current consumption:** 80 mA max.
- 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 min.	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
 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/s² (9 to 150 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/m³ dry air at 101.3 kPa)

Installation environment conditions:

Indoor use
Altitude up to 2000 m

Operating environment:

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.

Weight:

Open-style connector type: Approx. 170 g
Micro-style connector type: Approx. 200 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
EMC: EN61326-1

RCM:

EN55011

APPENDIX

A. DEVICE PROFILES

A device profile is the specification that defined each necessary parameter with DeviceNet. Use it after understanding contents of a device profile of COM-JH fully when connected to a master.

A.1 Basic Data

■ General device data

Conforms to DeviceNet specification	Volume I -Release 2.0 Volume II -Release 2.0
Vender name	RKC INSTRUMENT INC. (Vendor ID = 394)
Device profile name	Generic Device
Product catalog number	Instruction manual number: English: IMR01Y04-E□, IMR01Y09-E□, IMR01Y14-E□, IMR01Y19-E□ Japanese: IMR01Y04-J□, IMR01Y09-J□, IMR01Y14-J□, IMR01Y19-J□
Product revision	2.1

■ Physical conformance data

Network power consumption	2 mA @ 11 V DC 4 mA @ 24 V DC
Connector type	Open-style connector or Micro-style connector
Insulated physical layer	Provided
LEDs supported	Module, Network
MAC ID setting	Rotary switch (Node address setting)
Default MAC ID	63
Communication speed setting	Rotary switch (DeviceNet communication speed setting)
Communication speed supported	125 kbps, 250 kbps, 500 kbps

■ Communication data

Predefined master/slave connection set	Group 2 Only server
Dynamic connection supported (UCMM)	Not supported
Fragmented Explicit Messaging	None

A.2 Object Mounting

■ Identity Object (0x01: 01Hex)

● Object class

Attributes	Not supported
Services	Not supported

● Object instance 1

	ID	Description	Get	Set	Type	Value	
Attributes	1	Vendor ID	Yes	No	UINT	394	
	2	Product type	Yes	No	UINT	0	
	3	Product code	Yes	No	UINT	3	
	4	Revision	Yes	No			
			Major revision			USINT	2
			Minor revision			USINT	1
	5	Status (bits supported)	Yes	No	WORD	Note	
	6	Serial number	Yes	No	UDINT		
	7	Product name	Yes	No			
		Length			USINT	5	
		Name			STRING	COM01	
		DeviceNet service	Parameter option				
Services	0x05	Reset	0				
	0x0E	Get_Attribute_Single	None				

Note: A bit layout of “Status”

Bit 0: Owned

Bit 7: Become 1 when controller state of COM-JH become abnormal

Memory backup error, Controller communication error

[Controller Object (0x64), Attribute ID 238: COM-JH error code]

Bit 1 to 6 and Bit 8 to 15: Unused

■ Message Router Object (0x02: 02Hex)

● Object class

Attributes	Not supported
Services	Not supported

● Object instance

Attributes	Not supported
Services	Not supported

■ DeviceNet Object (0x03: 03Hex)

● Object class

	ID	Description	Get	Set	Type	Value
Attributes	1	Revision	Yes	No	UINT	2
DeviceNet service			Parameter option			
Services	0x0E	Get_Attribute_Single	None			

● Object instance 1

	ID	Description	Get	Set	Type	Value	
Attributes	1	MAC ID	Yes	No	USINT	0 to 63	
	2	Baud rate	Yes	No	USINT	0 to 2	
	3	BOI	Yes	No	BOOL	0	
	4	Bus-off counter	Yes	Yes	USINT		
	5	Allocation information	Yes	No			
			Allocation choice byte			BYTE	
			Master's MAC ID			USINT	
	6	MAC ID switch changed	Yes	No	BOOL	0, 1	
	7	Baud rate switch changed	Yes	No	BOOL	0, 1	
8	MAC ID switch value	Yes	No	USINT	0 to 63		
9	Baud rate switch value	Yes	No	USINT	0 to 2		
DeviceNet service			Parameter option				
Services	0x0E	Get_Attribute_Single	None				
	0x10	Set_Attribute_Single	None				
	0x4B	Allocate_Master/Slave_	None				
		Connection_Set					
	0x4C	Release_Group_2_	None				
		Identifire_Set					

■ Assembly Object (0x04: 04Hex)

● Object class

	ID	Description	Get	Set	Type	Value
Attributes	1	Revision	Yes	No	UINT	2
DeviceNet service			Parameter option			
Services	0x0E	Get_Attribute_Single	None			

● Object instance 100

	ID	Description	Get	Set	Type	Value
Attributes	3	Data	Yes	No	INT	Measured value (PV) of controller 1
DeviceNet service			Parameter option			
Services	0x0E	Get_Attribute_Single	None			

● Object instance 101

	ID	Description	Get	Set	Type	Value
Attributes	3	Data	Yes	Yes	INT	Set value (SV) of controller 1
DeviceNet service			Parameter option			
Services	0x0E	Get_Attribute_Single	None			
	0x10	Set_Attribute_Single	None			

■ Connection Object (0x05: 05Hex)

● Object class

Attributes	Not supported
Services	Not supported
Number of maximum possible active connection	1

● Object instance 1

	Section	Information	Number of maximum instance				
	Instance type	Explicit Message	1				
	Production trigger	Cyclic					
	Transport type	Server					
	Transport class	3					
	ID	Description	Get	Set	Type	Value	
Attributes	1	State	Yes	No	USINT		
	2	Instance type	Yes	No	USINT	0x00	
	3	Transport class trigger	Yes	No	BYTE	0x83	
	4	Produced connection ID	Yes	No	UINT		
	5	Consumed connection ID	Yes	No	UINT		
	6	Initial comm. Characteristics	Yes	No	BYTE	0x21	
	7	Produced connection size	Yes	No	UINT	7	
	8	Consumed connection size	Yes	No	UINT	7	
	9	Expected packet rate	Yes	Yes	UINT	Default: 2500	
	12	Watchdog time-out action	Yes	Yes	USINT	1, 3	
	13	Produced connection path length	Yes	No	UINT	0	
	14	Produced connection path	Yes	No	(null)		
	15	Consumed connection path length	Yes	No	UINT	0	
	16	Consumed connection path	Yes	No	(null)		
		DeviceNet service	Parameter option				
	Services	0x05	Reset	None			
0x0E		Get_Attribute_Single	None				
0x10		Set_Attribute_Single	None				

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● **Object instance 2**

	Section	Information	Number of maximum instance
	Instance type	Polled I/O	1
	Production trigger	Cyclic	
	Transport type	Server	
	Transport class	2	

	ID	Description	Get	Set	Type	Value
Attributes	1	State	Yes	No	USINT	
	2	Instance type	Yes	No	USINT	0x01
	3	Transport class trigger	Yes	No	BYTE	0x82
	4	Produced connection ID	Yes	No	UINT	
	5	Consumed connection ID	Yes	No	UINT	
	6	Initial comm. Characteristics	Yes	No	BYTE	0x01
	7	Produced connection size	Yes	No	UINT	Note
	8	Consumed connection size	Yes	No	UINT	Note
	9	Expected packet rate	Yes	Yes	UINT	Default: 0
	12	Watchdog time-out action	Yes	No	USINT	0
	13	Produced connection path length	Yes	No	UINT	6
	14	Produced connection path	Yes	No		
		Logic Segment, Class			USINT	0x20
		Class Number			USINT	0x04
		Logic Segment, Instance			USINT	0x24
		Instance Number			USINT	0x64
	Logic Segment, Attributes			USINT	0x30	
	Attributes Number			USINT	0x03	
15	Consumed connection path length	Yes	No	UINT	6	
16	Consumed connection path	Yes	No			
	Logic Segment, Class			USINT	0x20	
	Class Number			USINT	0x04	
	Logic Segment, Instance			USINT	0x24	
	Instance Number			USINT	0x65	
	Logic Segment, Attributes			USINT	0x30	
	Attributes Number			USINT	0x03	

	DeviceNet service	Parameter option
Services	0x05 Reset	None
	0x0E Get_Attribute_Single	None
	0x10 Set_Attribute_Single	None

Note: Make the setting by any of the following methods. (The value is validated with the power turned on)

- Select with the DIP switch 1. [14 (7 words), 50 (25 words), 90 (45 words) or 200 (100 words)]
- Set with the number of communication data items (attribute ID: 240 and 241) of the controller object (0x64).

■ Controller Object (0x64: 64Hex)

● Object class

Attributes	Not supported
Services	Not supported

● Object instance □ (□: 1 to 31)



Any object instance from 1 to 31 corresponds to any controller from 1 to 31.



If Get is made to the instance No. corresponding to the nonexistent controller No. in communication items other than “unused,” “0” is read while no error occurs if set is made (no data is written).

	ID	Description	Get	Set	Type	Value
Attributes	1	Measured value (PV)	Yes	No	INT	Refer to P. 46
	2	Current transformer 1 (CT1) input value monitor	Yes	No	INT	Refer to P. 46
	3	Current transformer 2 (CT2) input value monitor	Yes	No	INT	Refer to P. 46
	4	Set value (SV) monitor	Yes	No	INT	Refer to P. 46
	5	Remote setting (RS) input value monitor	Yes	No	INT	Refer to P. 46
	6	Burnout state monitor	Yes	No	WORD	Refer to P. 46
	7	Burnout state monitor of feedback resistance input	Yes	No	WORD	Refer to P. 46
	8	Event 1 state monitor	Yes	No	WORD	Refer to P. 46
	9	Event 2 state monitor	Yes	No	WORD	Refer to P. 46
	10	Event 3 state monitor	Yes	No	WORD	Refer to P. 46
	11	Event 4 state monitor	Yes	No	WORD	Refer to P. 46
	12	Heater break alarm 1 (HBA1) state monitor	Yes	No	WORD	Refer to P. 46
	13	Heater break alarm 2 (HBA2) state monitor	Yes	No	WORD	Refer to P. 46
	14	Manipulated output value (MV1) monitor [heat-side]	Yes	No	INT	Refer to P. 46
	15	Manipulated output value (MV2) monitor [cool-side]	Yes	No	INT	Refer to P. 46
	16	Error code	Yes	No	WORD	Refer to P. 46
	17	Digital input (DI) state monitor	Yes	No	WORD	Refer to P. 47
	18	Output state monitor	Yes	No	WORD	Refer to P. 47
	19	Operation mode state monitor	Yes	No	WORD	Refer to P. 47
	20	Memory area soak time monitor	Yes	No	INT	Refer to P. 47
	21	Integrated operating time monitor	Yes	No	INT	Refer to P. 47
	22	Holding peak value ambient temperature monitor	Yes	No	INT	Refer to P. 48
	23	Power feed forward input value monitor	Yes	No	INT	Refer to P. 48
	24	Backup memory state monitor	Yes	No	INT	Refer to P. 48
	25	Unused	No	No	UINT	—
	26	Unused	No	No	UINT	—
	27	Unused	No	No	UINT	—
	28	Unused	No	No	UINT	—
	29	Unused	No	No	UINT	—
	30	Unused	No	No	UINT	—

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	ID	Description	Get	Set	Type	Value
Attributes	31	Unused	No	No	UINT	0 to 65535
	32	Unused	No	No	UINT	0 to 65535
	33	PID/AT transfer ^{1,2}	Yes	Yes	INT	Refer to P. 48
	34	Auto/Manual transfer	Yes	Yes	INT	Refer to P. 48
	35	Remote/Local transfer	Yes	Yes	INT	Refer to P. 48
	36	RUN/STOP transfer ³	Yes	Yes	INT	Refer to P. 48
	37	Memory area transfer	Yes	Yes	INT	Refer to P. 48
	38	Interlock release	Yes	Yes	INT	Refer to P. 49
	39	Event 1 set value (EV1)	Yes	Yes	INT	Refer to P. 49
	40	Event 2 set value (EV2)	Yes	Yes	INT	Refer to P. 49
	41	Event 3 set value (EV3)	Yes	Yes	INT	Refer to P. 49
	42	Event 4 set value (EV4)	Yes	Yes	INT	Refer to P. 49
	43	Control loop break alarm (LBA) time	Yes	Yes	INT	Refer to P. 49
	44	LBA deadband	Yes	Yes	INT	Refer to P. 49
	45	Set value (SV)	Yes	Yes	INT	Refer to P. 49
	46	Proportional band [heat-side]	Yes	Yes	INT	Refer to P. 49
	47	Integral time [heat-side]	Yes	Yes	INT	Refer to P. 49
	48	Derivative time [heat-side]	Yes	Yes	INT	Refer to P. 50
	49	Control response parameter	Yes	Yes	INT	Refer to P. 50
	50	Proportional band [cool-side]	Yes	Yes	INT	Refer to P. 50
	51	Integral time [cool-side]	Yes	Yes	INT	Refer to P. 50
	52	Derivative time [cool-side]	Yes	Yes	INT	Refer to P. 50
	53	Overlap/Deadband	Yes	Yes	INT	Refer to P. 51
	54	Manual reset	Yes	Yes	INT	Refer to P. 51
	55	Setting change rate limiter (up)	Yes	Yes	INT	Refer to P. 51
	56	Setting change rate limiter (down)	Yes	Yes	INT	Refer to P. 51
	57	Area soak time	Yes	Yes	INT	Refer to P. 51
	58	Link area number	Yes	Yes	INT	Refer to P. 51
	59	Heater break alarm 1 (HBA1) set value	Yes	Yes	INT	Refer to P. 51
	60	Heater break determination point 1	Yes	Yes	INT	Refer to P. 51
	61	Heater melting determination point 1	Yes	Yes	INT	Refer to P. 52
	62	Heater break alarm 2 (HBA2) set value	Yes	Yes	INT	Refer to P. 52
	63	Heater break determination point 2	Yes	Yes	INT	Refer to P. 52
	64	Heater melting determination point 2	Yes	Yes	INT	Refer to P. 52
	65	PV bias	Yes	Yes	INT	Refer to P. 52
	66	PV digital filter	Yes	Yes	INT	Refer to P. 52
	67	PV ratio	Yes	Yes	INT	Refer to P. 52
	68	PV low input cut-off	Yes	Yes	INT	Refer to P. 52

¹ It is validated only via Explicit message communication. If “PID/AT transfer” is set as the setting data item (OUT) by the “Controller communication item setting object (0xC7: C7Hex)” which sets communication data items via Polling I/O communication, it becomes the same as that when set at “0.” If set as the measured data item (IN), it can be used as is.

² When using PID/AT transfer by Polling I/O communication, it is necessary to set Action mode selection (Attributes ID: 246) to “PID/AT transfer by Polling I/O communication is valid.”

³ If “RUN/STOP transfer” is set as the setting data item (OUT) by the “Controller communication item setting object (0xC7: C7Hex)” which sets communication data items via Polling I/O communication, it becomes the same as that when set at “0.” If set as the measured data item (IN), it can be used as is.

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	ID	Description	Get	Set	Type	Value
Attributes	69	RS bias	Yes	Yes	INT	Refer to P. 53
	70	RS digital filter	Yes	Yes	INT	Refer to P. 53
	71	RS ratio	Yes	Yes	INT	Refer to P. 53
	72	Proportional cycle time [heat-side]	Yes	Yes	INT	Refer to P. 53
	73	Proportional cycle time [cool-side]	Yes	Yes	INT	Refer to P. 53
	74	Manual manipulated output value	Yes	Yes	INT	Refer to P. 53
	75	Set lock level	Yes	Yes	WORD	Refer to P. 54
	76	STOP display	Yes	Yes	INT	Refer to P. 54
	77	Bar graph display	Yes	Yes	INT	Refer to P. 54
	78	Bar graph display resolution	Yes	Yes	INT	Refer to P. 54
	79	Direct key 1	Yes	Yes	INT	Refer to P. 54
	80	Direct key 2	Yes	Yes	INT	Refer to P. 54
	81	Direct key 3	Yes	Yes	INT	Refer to P. 54
	82	Direct key type	Yes	Yes	INT	Refer to P. 54
	83	Input type	Yes	Yes	INT	Refer to P. 55
	84	Display unit	Yes	Yes	INT	Refer to P. 55
	85	Decimal point position	Yes	Yes	INT	Refer to P. 56
86	Input scale high	Yes	Yes	INT	Refer to P. 56	
87	Input scale low	Yes	Yes	INT	Refer to P. 56	
88	Input error determination point (high)	Yes	Yes	INT	Refer to P. 56	
89	Input error determination point (low)	Yes	Yes	INT	Refer to P. 56	
90	Burnout direction	Yes	Yes	INT	Refer to P. 56	
91	Square root extraction	Yes	Yes	INT	Refer to P. 56	
92	Power supply frequency	Yes	Yes	INT	Refer to P. 56	
93	Sampling cycle	Yes	Yes	INT	Refer to P. 57	
94	Remote setting input type	Yes	Yes	INT	Refer to P. 57	
95	Digital input (DI) assignment	Yes	Yes	INT	Refer to P. 57	
96	Output assignment	Yes	Yes	INT	Refer to P. 57	
97	Timer 1	Yes	Yes	INT	Refer to P. 57	
98	Timer 2	Yes	Yes	INT	Refer to P. 57	
99	Timer 3	Yes	Yes	INT	Refer to P. 57	
100	Timer 4	Yes	Yes	INT	Refer to P. 57	
101	Energized/De-energized	Yes	Yes	WORD	Refer to P. 58	
102	Alarm (ALM) lamp lighting condition 1	Yes	Yes	WORD	Refer to P. 58	
103	Alarm (ALM) lamp lighting condition 2	Yes	Yes	WORD	Refer to P. 58	
104	Output status at STOP mode	Yes	Yes	INT	Refer to P. 58	
105	Unused	No	No	UINT	—	
106	Unused	No	No	UINT	—	
107	Unused	No	No	UINT	—	
108	Unused	No	No	UINT	—	
109	Unused	No	No	UINT	—	
110	Unused	No	No	UINT	—	
111	Transmission output type	Yes	Yes	INT	Refer to P. 58	
112	Transmission output scale high	Yes	Yes	INT	Refer to P. 59	
113	Transmission output scale low	Yes	Yes	INT	Refer to P. 59	
114	Event 1 type	Yes	Yes	INT	Refer to P. 59	
115	Event 1 hold action	Yes	Yes	INT	Refer to P. 59	
116	Event 1 interlock	Yes	Yes	INT	Refer to P. 59	
117	Event 1 differential gap	Yes	Yes	INT	Refer to P. 59	

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	ID	Description	Get	Set	Type	Value
Attributes	118	Event 1 delay timer	Yes	Yes	INT	Refer to P. 59
	119	Force ON of Event 1 action	Yes	Yes	WORD	Refer to P. 60
	120	Event 2 type	Yes	Yes	INT	Refer to P. 60
	121	Event 2 hold action	Yes	Yes	INT	Refer to P. 60
	122	Event 2 interlock	Yes	Yes	INT	Refer to P. 60
	123	Event 2 differential gap	Yes	Yes	INT	Refer to P. 61
	124	Event 2 delay timer	Yes	Yes	INT	Refer to P. 61
	125	Force ON of Event 2 action	Yes	Yes	WORD	Refer to P. 61
	126	Event 3 type	Yes	Yes	INT	Refer to P. 61
	127	Event 3 hold action	Yes	Yes	INT	Refer to P. 61
	128	Event 3 interlock	Yes	Yes	INT	Refer to P. 62
	129	Event 3 differential gap	Yes	Yes	INT	Refer to P. 62
	130	Event 3 delay timer	Yes	Yes	INT	Refer to P. 62
	131	Force ON of Event 3 action	Yes	Yes	WORD	Refer to P. 62
	132	Event 4 type	Yes	Yes	INT	Refer to P. 62
	133	Event 4 hold action	Yes	Yes	INT	Refer to P. 63
	134	Event 4 interlock	Yes	Yes	INT	Refer to P. 63
	135	Event 4 differential gap	Yes	Yes	INT	Refer to P. 63
	136	Event 4 delay timer	Yes	Yes	INT	Refer to P. 63
	137	Force ON of Event 4 action	Yes	Yes	WORD	Refer to P. 63
	138	CT1 ratio	Yes	Yes	INT	Refer to P. 63
	139	CT1 assignment	Yes	Yes	INT	Refer to P. 63
	140	Heater break alarm 1 (HBA1) type	Yes	Yes	INT	Refer to P. 64
	141	Number of Heater break alarm 1 (HBA1) delay times	Yes	Yes	INT	Refer to P. 64
	142	CT2 ratio	Yes	Yes	INT	Refer to P. 64
	143	CT2 assignment	Yes	Yes	INT	Refer to P. 64
	144	Heater break alarm 2 (HBA2) type	Yes	Yes	INT	Refer to P. 64
	145	Number of Heater break alarm 2 (HBA2) delay times	Yes	Yes	INT	Refer to P. 64
	146	Hot/Cold start	Yes	Yes	INT	Refer to P. 64
	147	Start determination point	Yes	Yes	INT	Refer to P. 64
	148	External input type	Yes	Yes	INT	Refer to P. 64
149	Master channel selection	Yes	Yes	INT	Refer to P. 65	
150	SV tracking	Yes	Yes	INT	Refer to P. 65	
151	MV transfer function [Action taken when changed to Manual mode from Auto mode]	Yes	Yes	INT	Refer to P. 65	
152	Control action	Yes	Yes	INT	Refer to P. 65	
153	Integral/Derivative time decimal point position	Yes	Yes	INT	Refer to P. 65	
154	Derivative action	Yes	Yes	INT	Refer to P. 65	
155	Undershoot suppression factor	Yes	Yes	INT	Refer to P. 65	
156	Derivative gain	Yes	Yes	INT	Refer to P. 65	
157	ON/OFF action differential gap (upper)	Yes	Yes	INT	Refer to P. 65	
158	ON/OFF action differential gap (lower)	Yes	Yes	INT	Refer to P. 65	
159	Action (high) at input error	Yes	Yes	INT	Refer to P. 66	
160	Action (low) at input error	Yes	Yes	INT	Refer to P. 66	
161	Manipulated output value at input error	Yes	Yes	INT	Refer to P. 66	

Continued on the next page.

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	ID	Description	Get	Set	Type	Value
Attributes	162	Manipulated output value (MV1) at STOP mode [heat-side]	Yes	Yes	INT	Refer to P. 66
	163	Manipulated output value (MV2) at STOP mode [cool-side]	Yes	Yes	INT	Refer to P. 66
	164	Output change rate limiter (up) [MV1]	Yes	Yes	INT	Refer to P. 66
	165	Output change rate limiter (down) [MV1]	Yes	Yes	INT	Refer to P. 66
	166	Output limiter high [MV1]	Yes	Yes	INT	Refer to P. 66
	167	Output limiter low [MV1]	Yes	Yes	INT	Refer to P. 66
	168	Output change rate limiter (up) [MV2]	Yes	Yes	INT	Refer to P. 66
	169	Output change rate limiter (down) [MV2]	Yes	Yes	INT	Refer to P. 66
	170	Output limiter high [MV2]	Yes	Yes	INT	Refer to P. 66
	171	Output limiter low [MV2]	Yes	Yes	INT	Refer to P. 66
	172	Power feed forward selection	Yes	Yes	INT	Refer to P. 66
	173	Power feed forward gain	Yes	Yes	INT	Refer to P. 66
	174	AT bias	Yes	Yes	INT	Refer to P. 67
	175	AT cycles	Yes	Yes	INT	Refer to P. 67
	176	Output value with AT turned on	Yes	Yes	INT	Refer to P. 67
	177	Output value with AT turned off	Yes	Yes	INT	Refer to P. 67
	178	AT differential gap time	Yes	Yes	INT	Refer to P. 67
	179	Proportional band adjusting factor [heat-side]	Yes	Yes	INT	Refer to P. 67
	180	Integral time adjusting factor [heat-side]	Yes	Yes	INT	Refer to P. 67
	181	Derivative time adjusting factor [heat-side]	Yes	Yes	INT	Refer to P. 67
	182	Proportional band adjusting factor [cool-side]	Yes	Yes	INT	Refer to P. 67
	183	Integral time adjusting factor [cool-side]	Yes	Yes	INT	Refer to P. 67
	184	Derivative time adjusting factor [cool-side]	Yes	Yes	INT	Refer to P. 67
	185	Proportional band limiter high [heat-side]	Yes	Yes	INT	Refer to P. 67
	186	Proportional band limiter low [heat-side]	Yes	Yes	INT	Refer to P. 67
	187	Integral time limiter high [heat-side]	Yes	Yes	INT	Refer to P. 68
	188	Integral time limiter low [heat-side]	Yes	Yes	INT	Refer to P. 68
	189	Derivative time limiter high [heat-side]	Yes	Yes	INT	Refer to P. 68
	190	Derivative time limiter low [heat-side]	Yes	Yes	INT	Refer to P. 68
	191	Proportional band limiter high [cool-side]	Yes	Yes	INT	Refer to P. 68
	192	Proportional band limiter low [cool-side]	Yes	Yes	INT	Refer to P. 68
	193	Integral time limiter high [cool-side]	Yes	Yes	INT	Refer to P. 68
	194	Integral time limiter low [cool-side]	Yes	Yes	INT	Refer to P. 68
	195	Derivative time limiter high [cool-side]	Yes	Yes	INT	Refer to P. 68
	196	Derivative time limiter low [cool-side]	Yes	Yes	INT	Refer to P. 68
	197	Open/Close output neutral zone	Yes	Yes	INT	Refer to P. 68
	198	Open/Close output differential gap	Yes	Yes	INT	Refer to P. 68
	199	Action at Feedback resistance (FBR) input break	Yes	Yes	INT	Refer to P. 68
	200	Feedback adjustment	Yes	Yes	INT	Refer to P. 68
	201	Control motor time	Yes	Yes	INT	Refer to P. 68
	202	Integrated output limiter	Yes	Yes	INT	Refer to P. 68
	203	Valve action at STOP	Yes	Yes	INT	Refer to P. 68
	204	Startup tuning (ST)	Yes	Yes	INT	Refer to P. 69
	205	ST proportional band adjusting factor	Yes	Yes	INT	Refer to P. 69
	206	ST integral time adjusting factor	Yes	Yes	INT	Refer to P. 69
	207	ST derivative time adjusting factor	Yes	Yes	INT	Refer to P. 69

Continued on the next page.

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	ID	Description	Get	Set	Type	Value
Attributes	208	ST start condition	Yes	Yes	INT	Refer to P. 69
	209	Automatic temperature rise group	Yes	Yes	INT	Refer to P. 69
	210	Automatic temperature rise learning	Yes	Yes	INT	Refer to P. 69
	211	Automatic temperature rise dead time	Yes	Yes	INT	Refer to P. 69
	212	Automatic temperature rise gradient data	Yes	Yes	INT	Refer to P. 69
	213	RUN/STOP group	Yes	Yes	INT	Refer to P. 69
	214	Setting change rate limiter unit time	Yes	Yes	INT	Refer to P. 69
	215	Soak time unit	Yes	Yes	INT	Refer to P. 70
	216	Setting limiter high	Yes	Yes	INT	Refer to P. 70
	217	Setting limiter low	Yes	Yes	INT	Refer to P. 70
	218	PV transfer function	Yes	Yes	INT	Refer to P. 70
	219	PV flashing display at input error	Yes	Yes	WORD	Refer to P. 70
	220	Unused	No	No	UINT	—
	221	Unused	No	No	UINT	—
	222	Unused	No	No	UINT	—
	223	Unused	No	No	UINT	—
	224	Unused	No	No	INT	—
	225	Controller state 1	Yes	No	WORD	Refer to P. 70
	226	Controller state 2	Yes	No	WORD	Refer to P. 71
	227	Controller state 3	Yes	No	WORD	Refer to P. 71
	228	Unused ¹	No	No	UINT	—
	229	Unused ¹	No	No	UINT	—
	230	Unused ¹	No	No	UINT	—
	231	Comprehensive alarm state ^{2,3}	Yes	No	WORD	Refer to P. 72
	232	Controller alarm state ^{2,4}	Yes	No	WORD	Refer to P. 72
	233	Error state ^{2,4}	Yes	No	WORD	Refer to P. 72
	234	RUN/STOP ^{2,4}	Yes	Yes	WORD	Refer to P. 72
	235	Setting update flag ^{2,3}	Yes	No	WORD	Refer to P. 73
	236	Number of Polling I/O communication controllers ^{2,3,5}	Yes	Yes	UNIT	Refer to P. 73
	237	Unused	No	No	UINT	—
	238	COM-JH error code ^{2,3,6}	Yes	No	WORD	Refer to P. 73

¹ If this data item is set as a measured data item (IN) or setting data item (OUT) by the “Controller communication item setting object (0xC7: C7Hex)” which sets communication data items via Polling I/O communication, it becomes the same as that when set at “0.” In addition, any data item set hereafter is invalidated.

² It is validated only via Explicit message communication. If this data item is set as a measured data item (IN) or setting data item (OUT) by the “Controller communication item setting object (0xC7: C7Hex)” which sets communication data items via Polling I/O communication, it becomes the same as that when set at “0.” In addition, any data item set hereafter is invalidated.

³ Only object instances 1 is valid.

⁴ Only object instances 1 and 2 are valid.

⁵ Data for the set number of controllers is assigned by Polling I/O communication. The number of assigned data items is the number of data items for the set number of modules in each item of the attributes set in “Controller communication item setting object (0xC7: C7Hex).”

⁶ Causes of controller communication errors

- No controllers are connected.
- “0” is set for all controller addresses.
- The controller timed-out after recognition.
- An abnormal condition exists in communication.

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	ID	Description	Get	Set	Type	Value
Attributes	239	Number of connected controller in Controller communication ^{1,2,3}	Yes	No	UNIT	Refer to P. 73
	240	Number of communication measured data items (IN) when conducting Polling I/O communication ^{1,2,4}	Yes	Yes	UNIT	Refer to P. 73
	241	Number of communication setting data items (OUT) when conducting Polling I/O communication ^{1,2,4}	Yes	Yes	UNIT	Refer to P. 73
	242	RUN/STOP logic selection ^{1,2}	Yes	Yes	WORD	Refer to P. 73
	243	Setting validity selection ^{1,2}	Yes	Yes	WORD	Refer to P. 73
	244	Unused	No	No	UINT	—
	245	Controller address setting ^{5,6}	Yes	Yes	WORD	Refer to P. 74
	246	Action mode selection ²	Yes	Yes	WORD	Refer to P. 74
	247	Automatic acquisition of controller address ^{2,7}	Yes	Yes	UNIT	Refer to P. 74
	249	Unused ⁸	No	No	UINT	—
	250	Unused ⁸	No	No	UINT	—
	251	Unused ⁸	No	No	UINT	—
	252	Unused ⁸	No	No	UINT	—
	253	Unused ⁸	No	No	UINT	—
	254	Unused ⁸	No	No	UINT	—
255	Unused ⁸	No	No	UINT	—	
	DeviceNet service		Parameter option			
Services	0x0E	Get_Attribute_Single	None			
	0x10	Set_Attribute_Single	None			

¹ It is validated only via Explicit message communication. If this data item is set as a measured data item (IN) or setting data item (OUT) by the “Controller communication item setting object (0xC7: C7Hex)” which sets communication data items via Polling I/O communication, it becomes the same as that when set at “0.” In addition, any data item set hereafter is invalidated.

² Only object instances 1 is valid.

³ The COM-JH starts collecting data on connected modules just after the power is turned on, and communication is validated after data collection is finished. If “Number of connected controller in controller communication” is read during data collection, “0” is returned. Therefore, the communication enable state after the power is turned on can be checked as far as “the number of connected controllers” is monitored.

⁴ When the set value is “0”, the number of data is the value set by DIP switch. When the set value is 1 to 5, the number of data is 5. When the set value is 6 to 200, the number of data is the set number of data.

⁵ Only object instances 1 to 31 are valid.

⁶ Set the address (0 to 99) of the controller connected to the COM-JH. Communication will only be performed with the controller whose address is set. If 0 or an address outside the setting range is set, communication will not take place with that controller and each of the communication item parts will be filled without spaces. If the address is other than “0” and a controller is not connected, the data will be “0.”

⁷ When the setting is set to “1: Execute the automatic acquisition” and the power of the COM-JH is turned off and then on, the address of the controller is automatically acquired. The address acquisition range is 1 to 99, and when automatic acquisition ends, the automatic acquisition of controller setting reverts to “0: Do not execute the automatic acquisition.” When automatic acquisition of controller address is performed, the set value of the controller address setting (attribute ID: 245) changes. Controller addresses are set without spaces from the lowest address, and “0” is set for parts that do not have a controller connected.

⁸ If this data item is set as a measured data item (IN) or setting data item (OUT) by the “Controller communication item setting object (0xC7: C7Hex)” which sets communication data items via Polling I/O communication, it becomes the same as that when set at “0.” In addition, any data item set hereafter is invalidated.

■ Controller Communication Item Setting Object (0xC7: C7Hex)

● Object class

Attributes	Not supported
Services	Not supported

● Object instance 1

	ID	Description	Get	Set	Type	Value (Default)
Attributes	1	Measured data item (IN) 1	Yes	Yes	UINT	1: Measured value (PV)
	2	Measured data item (IN) 2	Yes	Yes	UINT	0
	3	Measured data item (IN) 3	Yes	Yes	UINT	0
	4	Measured data item (IN) 4	Yes	Yes	UINT	0
	5	Measured data item (IN) 5	Yes	Yes	UINT	0
	6	Measured data item (IN) 6	Yes	Yes	UINT	0
	7	Measured data item (IN) 7	Yes	Yes	UINT	0
	8	Measured data item (IN) 8	Yes	Yes	UINT	0
	9	Measured data item (IN) 9	Yes	Yes	UINT	0
	10	Measured data item (IN) 10	Yes	Yes	UINT	0
	11	Measured data item (IN) 11	Yes	Yes	UINT	0
	12	Measured data item (IN) 12	Yes	Yes	UINT	0
	13	Measured data item (IN) 13	Yes	Yes	UINT	0
	14	Measured data item (IN) 14	Yes	Yes	UINT	0
	15	Measured data item (IN) 15	Yes	Yes	UINT	0
	16	Measured data item (IN) 16	Yes	Yes	UINT	0
	17	Measured data item (IN) 17	Yes	Yes	UINT	0
	18	Measured data item (IN) 18	Yes	Yes	UINT	0
	19	Measured data item (IN) 19	Yes	Yes	UINT	0
	20	Measured data item (IN) 20	Yes	Yes	UINT	0
	21	Measured data item (IN) 21	Yes	Yes	UINT	0
	22	Measured data item (IN) 22	Yes	Yes	UINT	0
	23	Measured data item (IN) 23	Yes	Yes	UINT	0
	24	Measured data item (IN) 24	Yes	Yes	UINT	0
	25	Measured data item (IN) 25	Yes	Yes	UINT	0
	26	Measured data item (IN) 26	Yes	Yes	UINT	0
	27	Measured data item (IN) 27	Yes	Yes	UINT	0
	28	Measured data item (IN) 28	Yes	Yes	UINT	0
	29	Measured data item (IN) 29	Yes	Yes	UINT	0
	30	Measured data item (IN) 30	Yes	Yes	UINT	0
	31	Measured data item (IN) 31	Yes	Yes	UINT	0
	32	Measured data item (IN) 32	Yes	Yes	UINT	0
	33	Setting data item (OUT) 1	Yes	Yes	UINT	45: Set value (SV)
	34	Setting data item (OUT) 2	Yes	Yes	UINT	0
	35	Setting data item (OUT) 3	Yes	Yes	UINT	0
	36	Setting data item (OUT) 4	Yes	Yes	UINT	0
	37	Setting data item (OUT) 5	Yes	Yes	UINT	0

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	ID	Description	Get	Set	Type	Value (Default)	
Attributes	38	Setting data item (OUT) 6	Yes	Yes	UINT	0	
	39	Setting data item (OUT) 7	Yes	Yes	UINT	0	
	40	Setting data item (OUT) 8	Yes	Yes	UINT	0	
	41	Setting data item (OUT) 9	Yes	Yes	UINT	0	
	42	Setting data item (OUT) 10	Yes	Yes	UINT	0	
	43	Setting data item (OUT) 11	Yes	Yes	UINT	0	
	44	Setting data item (OUT) 12	Yes	Yes	UINT	0	
	45	Setting data item (OUT) 13	Yes	Yes	UINT	0	
	46	Setting data item (OUT) 14	Yes	Yes	UINT	0	
	47	Setting data item (OUT) 15	Yes	Yes	UINT	0	
	48	Setting data item (OUT) 16	Yes	Yes	UINT	0	
	49	Setting data item (OUT) 17	Yes	Yes	UINT	0	
	50	Setting data item (OUT) 18	Yes	Yes	UINT	0	
	51	Setting data item (OUT) 19	Yes	Yes	UINT	0	
	52	Setting data item (OUT) 20	Yes	Yes	UINT	0	
	53	Setting data item (OUT) 21	Yes	Yes	UINT	0	
	54	Setting data item (OUT) 22	Yes	Yes	UINT	0	
	55	Setting data item (OUT) 23	Yes	Yes	UINT	0	
	56	Setting data item (OUT) 24	Yes	Yes	UINT	0	
	57	Setting data item (OUT) 25	Yes	Yes	UINT	0	
	58	Setting data item (OUT) 26	Yes	Yes	UINT	0	
	59	Setting data item (OUT) 27	Yes	Yes	UINT	0	
	60	Setting data item (OUT) 28	Yes	Yes	UINT	0	
	61	Setting data item (OUT) 29	Yes	Yes	UINT	0	
	62	Setting data item (OUT) 30	Yes	Yes	UINT	0	
	63	Setting data item (OUT) 31	Yes	Yes	UINT	0	
	64	Setting data item (OUT) 32	Yes	Yes	UINT	0	
			DeviceNet service	Parameter option			
	Services	0x0E	Get_Attribute_Single	None			
		0x10	Set_Attribute_Single	None			

Measured data items (IN) and setting data items (OUT) communicating via Polling I/O communication are set by the attribute ID in “Controller object (0x64: 64Hex).”

If not used, 0 is set. Any measured data item (IN) or setting data item (OUT) after the item to which 0 is set is invalidated.



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