SR Mini HG SYSTEM

Ethernet [Modbus/TCP]
Communication Module

H-LNK-B

Instruction Manual

RKC® RKC INSTRUMENT INC.

IMS01S01-E2

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- Company names and product names used in this manual are the trademarks or registered trademarks of the respective companies.

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

SYMBOLS

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

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

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

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

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

 : This mark indicates where additional information may be located.

⚠ WARNING

- To prevent injury to persons, damage to instrument and equipment, a suitable external protection device shall be required.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to 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 as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as fuse, circuit breaker, etc.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dispensation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the instrument.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push front panel with a hard object.
- Do not connect modular connectors to telephone line.
- When high alarm with hold action/re-hold action is used for Alarm function, alarm does not turn on while hold action is in operation. Take measures to prevent overheating which may occur if the control device fails.

NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for purpose of illustration.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
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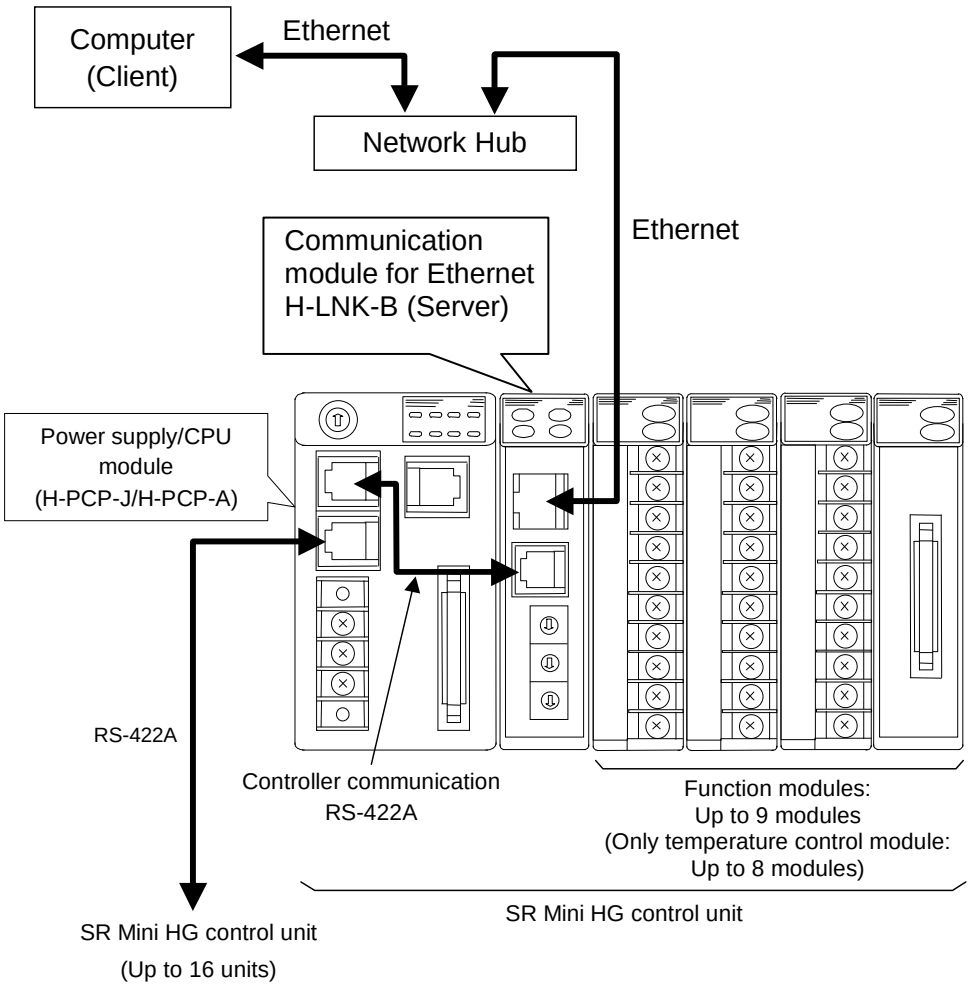
1. OUTLINE

This manual describes communication specification, wiring, setting, and data instructions for Ethernet [Modbus/TCP] communication module H-LNK-B for SR Mini HG SYSTEM (hereafter called the H-LNK-B).
Modbus/TCP is an open field network provided with the Modbus protocol on the TCP/IP protocol of Ethernet.

- The data request side is called “client” (such as computer) and the data response (supply) side is called “server” (H-LNK-B).
- Basically, one client corresponds to one server (i.e. one to one). However, one client can communicate with two or more servers depending on the program on the client side, but two or more clients cannot communicate with one server.
- This manual should be used in conjunction with **Hardware Quick Manual (IMS01V01-E□)**.

A control unit of SR Mini HG SYSTEM consists of a dedicated power supply /CPU module (H-PCP-J or H-PCP-A module), an Ethernet communication module (H-LNK-B module) and each function module used to the temperature control.



■ Usable PCP module

● Power supply/CPU module

Power supply/CPU module	H-PCP-J (Usable protocol is Modbus/TCP and no-protocol) H-PCP-A Z-1021 specification (Usable protocol is Modbus/TCP and no-protocol) H-PCP-A standard specification (Usable protocol is only no-protocol)

☞ For the power supply/CPU module, see **H-PCP-J Instruction Manual (IMS01J02-E□)**, **Hardware Quick Manual (IMS01V01-E□)** or **Hardware Instruction Manual (IMSRM15-E□)**.

■ Usable function module

The following function module can be used in combination with the H-PCP-J or H-PCP-A module.

● H-PCP-J module

Function module	Type				
Temperature control module	H-TIO-A H-TIO-F H-TIO-R	H-TIO-B H-TIO-G	H-TIO-C H-TIO-H	H-TIO-D H-TIO-J	H-TIO-E H-TIO-P
Position proportioning control module	H-TIO-K				
Speed control module	H-SIO-A				
Temperature input module	H-TI-A	H-TI-B	H-TI-C		
Cascade control module	H-CIO-A				
Current transformer input module	H-CT-A				
Digital input module	H-DI-A	H-DI-B			
Digital output module	H-DO-A	H-DO-B	H-DO-C	H-DO-D	H-DO-G
Analog input module	H-AI-A	H-AI-B			
Analog output module	H-AO-A	H-AO-B			

● H-PCP-A module

Function module	Type				
Temperature control module	H-TIO-A H-TIO-F H-TIO-R	H-TIO-B H-TIO-G	H-TIO-C H-TIO-H	H-TIO-D H-TIO-J	H-TIO-E H-TIO-P
Position proportioning control module	H-TIO-K				
Temperature input module	H-TI-A	H-TI-B	H-TI-C		
Cascade control module	H-CIO-A				
Current transformer input module	H-CT-A				
Digital input module	H-DI-A	H-DI-B			
Digital output module	H-DO-A	H-DO-B	H-DO-C	H-DO-D	
Analog input module	H-AI-A	H-AI-B			
Analog output module	H-AO-A	H-AO-B			

☞ For the function modules, see **Hardware Quick Manual (IMS01V01-E□)**, **Hardware Instruction Manual (IMSRM15-E□)**, **H-DO-G Instruction Manual (IMS01K01-E□)** and **H-SIO-A Instruction Manual (IMS01L01-E□)**.

1.1 Product Check

Before using this product, check each of the following.

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

Accessories	Q'TY	Remarks
□ Connection cable (W-BF-02-200) [A connection for H-LNK-B and H-PCP module: Cable length 200 mm]	1	Enclosed with instrument
□ Instruction Manual (IMS01S01-E2)	1	This manual

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

If the H-LNK-B module is installed at the right end of the SR Mini HG control unit, the length of an attached cable may not be enough to reach the module. In that case, make an order placement of the connection cable, W-BF-02-500 (cable length: 500 mm) separately.

1.2 Model Code

Check whether the delivered product is as 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.

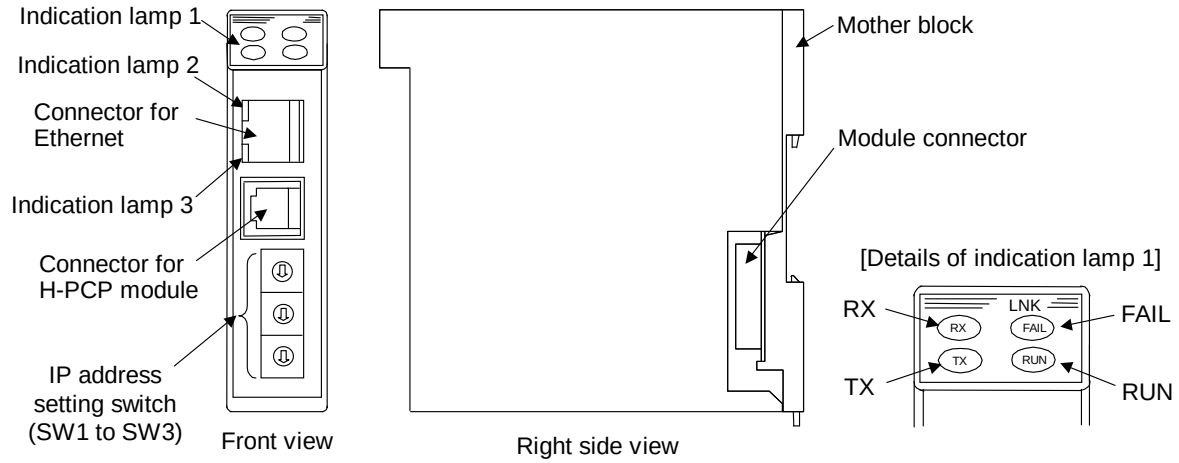
H-LNK- B-1
(1)

(1) Communication protocol

1: Modbus/TCP

1.3 Parts Description

■ H-LNK-B module



● Indication lamp 1

FAIL [Red]	When instrument abnormally: Turns on
RUN [Green]	• When normally: Flashes • Operation error: Turns on
RX [Yellow]	During controller communication data receive: Flashes
TX [Yellow]	During controller communication data send: Flashes

● Indication lamp 2

Activity	Half-duplex; activity:	[Amber] Turns on
	Full-duplex; activity:	[Green] Turns on

● Indication lamp 3

Link	10 Mbps:	[Amber] Turns on
	100 Mbps:	[Green] Turns on

● Connector

Connector for Ethernet	Modular connector for Ethernet (RJ-45 specification)
Connector for H-PCP module	Modular connector for H-PCP module

● Switch

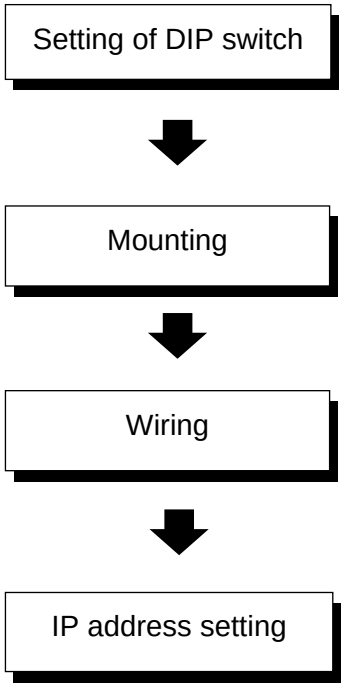
IP address setting switch (SW1 to SW3)	Set the IP address of Ethernet

● Others

Mother block	Base block for module connection
Module connector	Connector for power supply

2. HANDLING PROCEDURES

Conduct the setting necessary for performing communication in accordance with the following procedure.



Set the controller communication speed and data bit configuration of H-LNK-B, and also set the action mode of Ethernet communication.

☞ See **5.1 DIP Switch Setting (P. 21)**.

Mount the H-LNK-B.

☞ See **3. MOUNTING (P. 6)**.

Connect the H-LNK-B to Ethernet, and also connect the H-LNK-B to the H-PCP.

☞ See **4. WIRING (P. 11)**.

Set the IP address of Ethernet communication.

☞ See **5.2 IP Address Setting (P. 23)**.

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: 0 to 50 °C
- Allowable ambient humidity: 45 to 85 % RH
  (Absolute humidity: MAX.W.C 29 g/m^3 dry air at 101.3 kPa)
- Installation environment conditions: Indoor use, Altitude up to 2000 m

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

(4) Mount this instrument in the panel considering the following conditions:
- Provide adequate ventilation space so that heat does not build up
- Do not mount this instrument directly above equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage resistors).
- If the ambient temperature rises above 50 °C, cool this instrument with a forced air fan, cooler, or the like. However, do not allow cooled air to blow this instrument directly.
- 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.

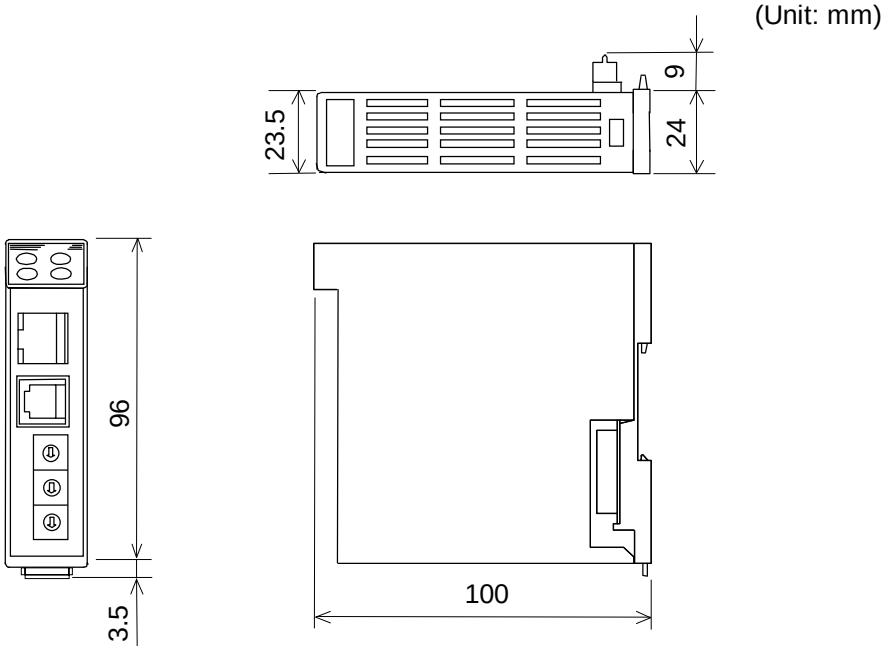
  High voltage equipment: Do not mount within the same panel.
  Power lines: Separate at least 200 mm.
  Rotating machinery: Separate as far as possible.

(5) In case this instrument is connected to a supply by means of a permanent connection, a switch or circuit-breaker shall be included in the installation. This shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.

3.2 Dimensions

■ External dimensions

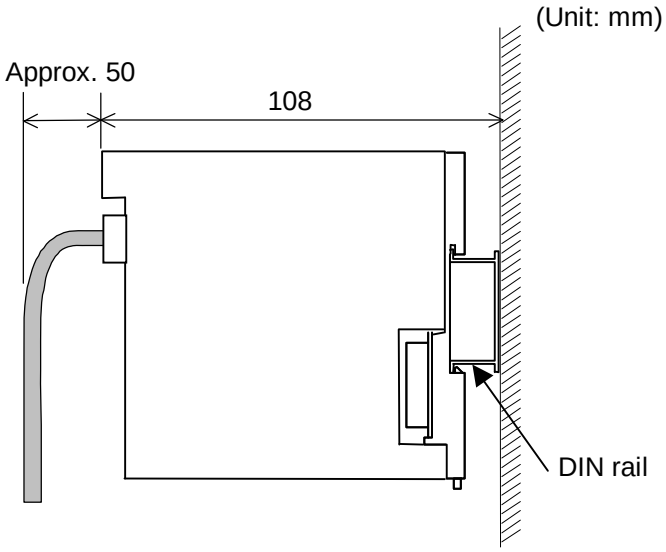
(Unit: mm)



■ Module mounting depth

The mounting depth of each module is 108 mm from the mounting surface inside the panel to the front of the module with the module mounted on the DIN rail. However, when modular connector cables are plugged in, additional depth is required.

(Unit: mm)



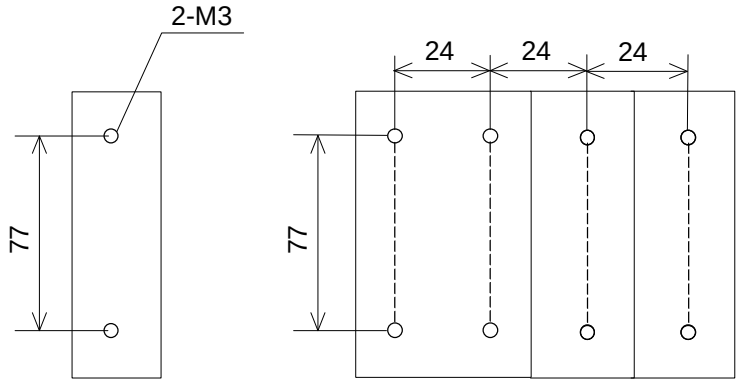
3.3 Mounting the Mother Block

The mother block can be mounted to a panel or DIN rail.

■ Panel mounting directions

1. Refer to both the panel mounting dimensions below and the external dimensions in previous section when selecting the location.

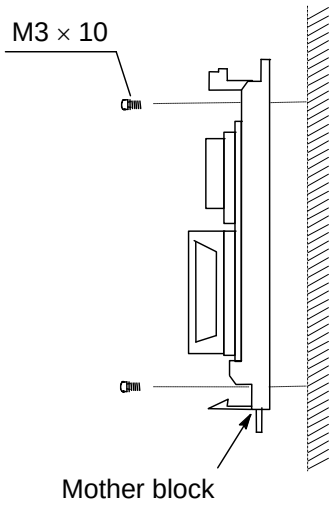
(Unit: mm)



Dimensions for multiple module mounting

2. Remove the module from the mother block. For details of removing the module, see **3.5 Removing the Module Mainframe (P. 10)**.

3. Connect the mother blocks together before tightening the screws on the panel.
(Customer must provide the set screws)



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

When the mother block is mounted on the panel, 50 mm or more space is required at the top and bottom of the mother block to attach the module mainframe.

■ DIN rail mounting directions

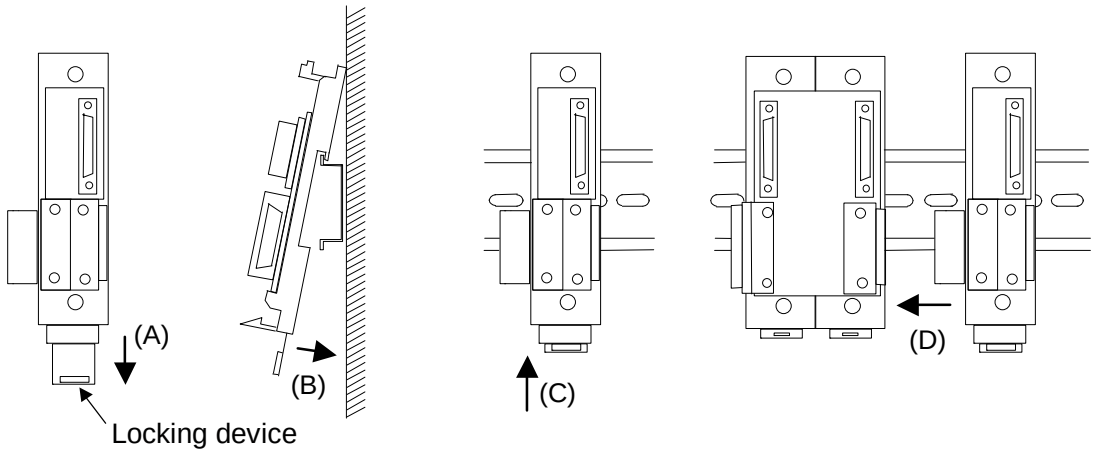
1. Remove the module mainframe from the mother block. For details of removing the module mainframe, see **3.5 Removing the Module Mainframe (P. 10)**.

2. Pull down the locking devices at the bottom of the mother block. (A)

3. Attach the top bracket of the mother block to the DIN rail and push the lower section into place on the DIN rail. (B)

4. Slide the locking devices up to secure the mother block to the DIN rail. (C)

5. Slide connectors together to complete mother block installation. (D)



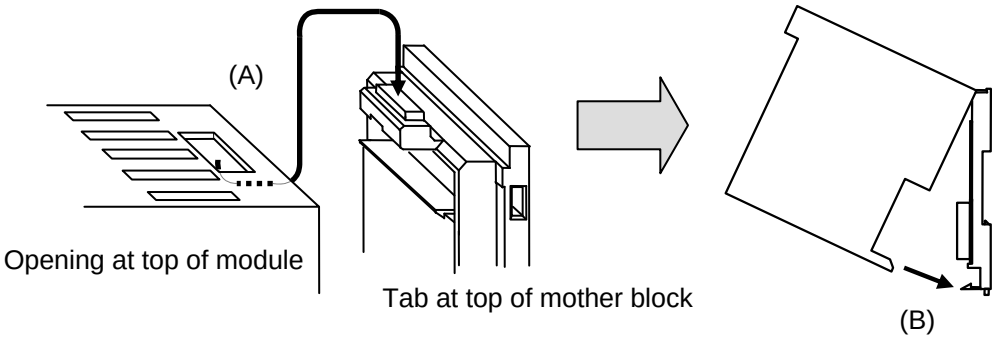
Mother block mounting

When the mother block is mounted on panel, 50 mm or more space is required at the top and bottom of the mother block to attach the module mainframe

3.4 Mounting the Module Mainframe

It engages the module with the mother block that is mounted on DIN rail or a panel.

1. Place the module mainframe opening on top of the mother block tab. (A)
2. Snap the lower part of module mainframe on to the mother block. (B)

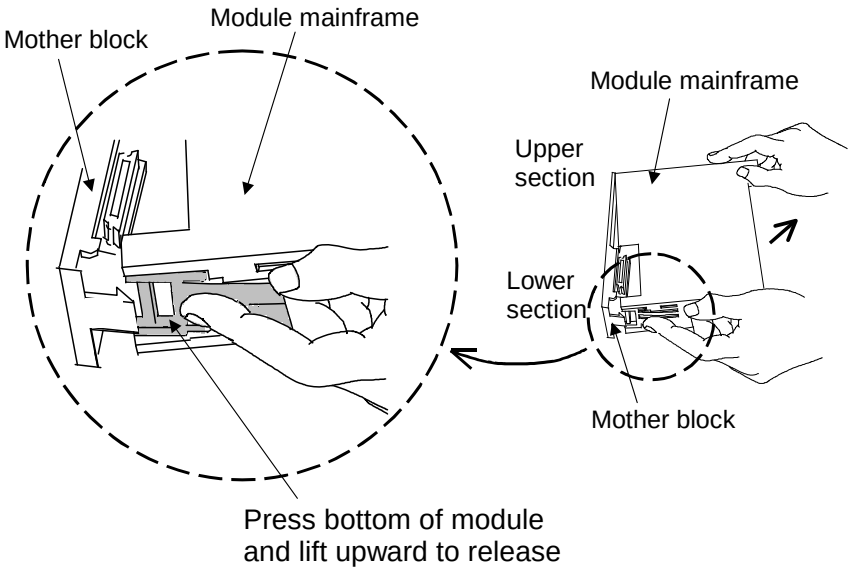


A snapping sound will be heard when module mainframe is securely connected to mother block.

3.5 Removing the Module Mainframe

It detaches the module from the mother block that is mounted on DIN rail or a panel.

To separate the module mainframe from the mother block, press the bottom on the module, lifting upward, to release connection.



4. WIRING

This chapter describes wiring cautions and wiring method.

4.1 Wiring Cautions

⚠ WARNING

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

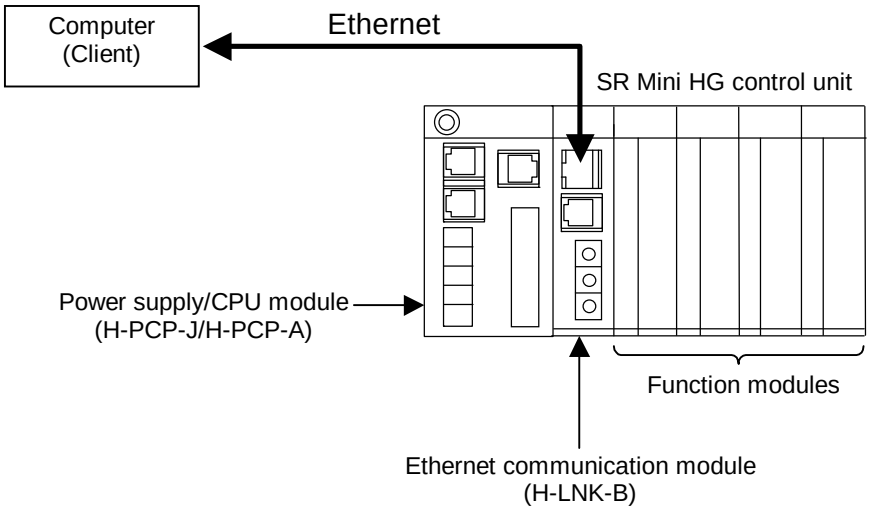
CAUTION

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

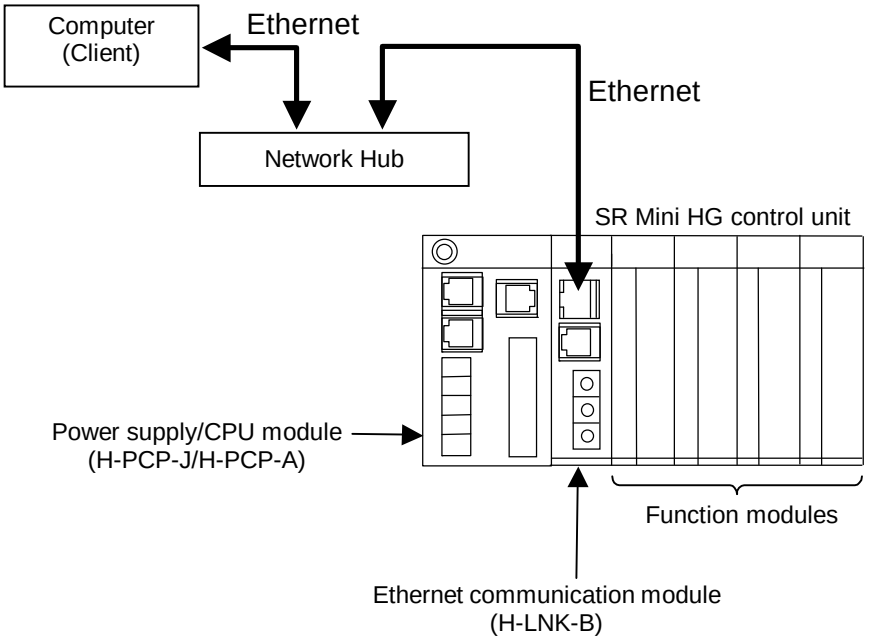
4.2 Connection to Ethernet

4.2.1 Wiring configuration

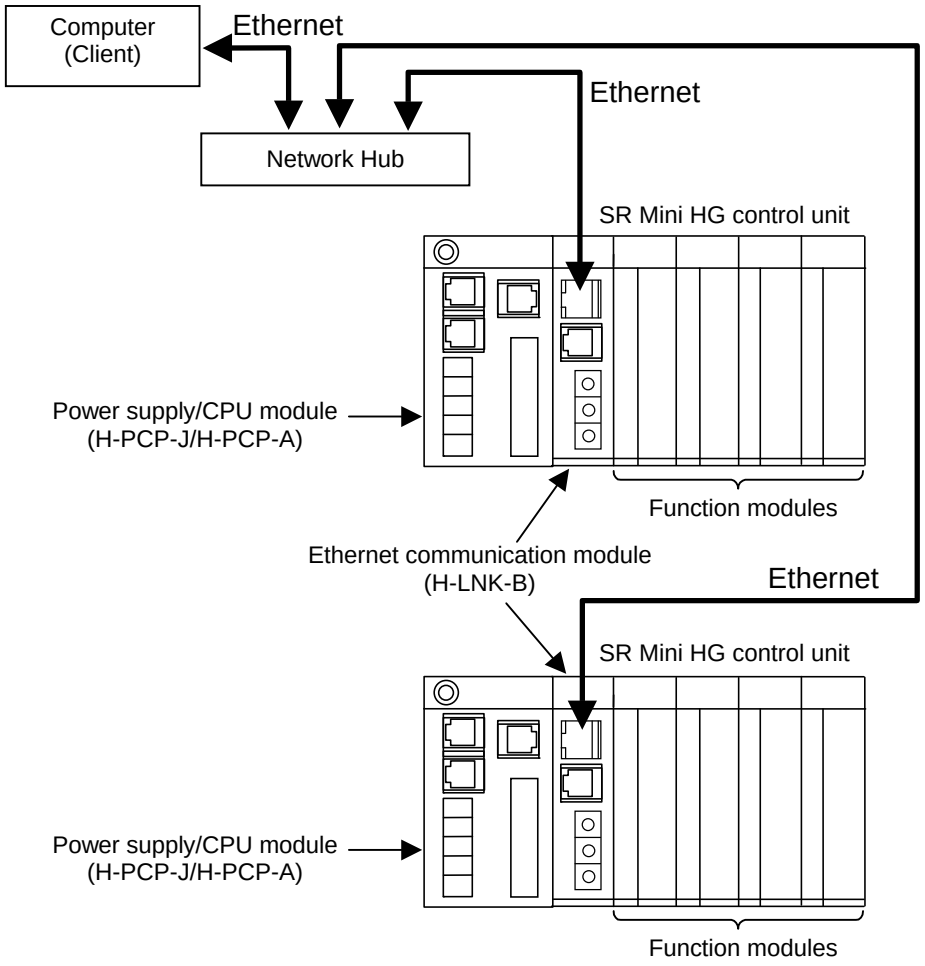
■ When directly connected to client



■ When use network hub

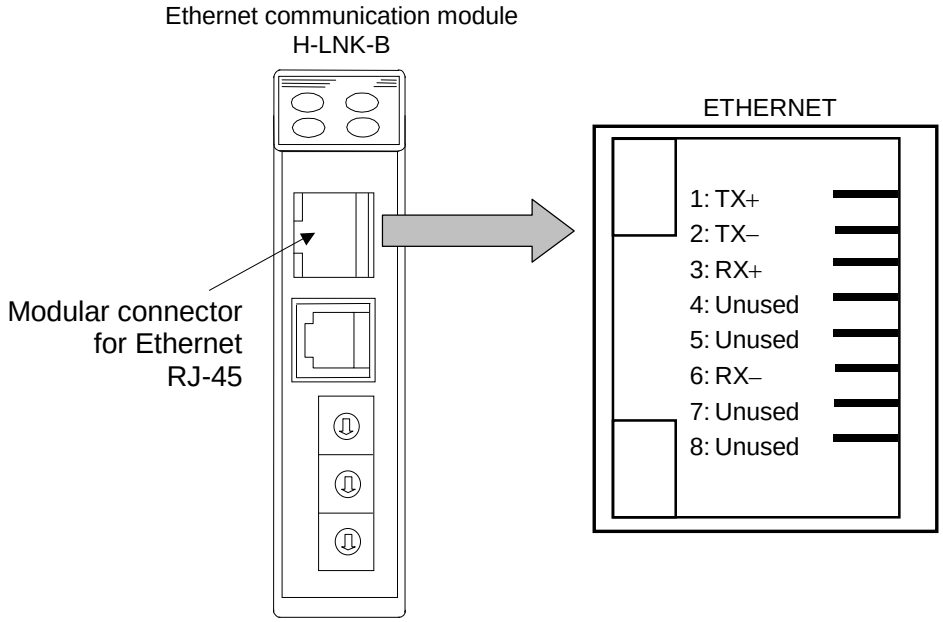


Basically, one client corresponds to one server (i.e. one to one). However, one client can communicate with two or more servers depending on the program on the client side, but two or more clients cannot communicate with one server.



4.2.2 Wiring details

■ Pin layout of modular connector



- **Connector pin number and signal details**

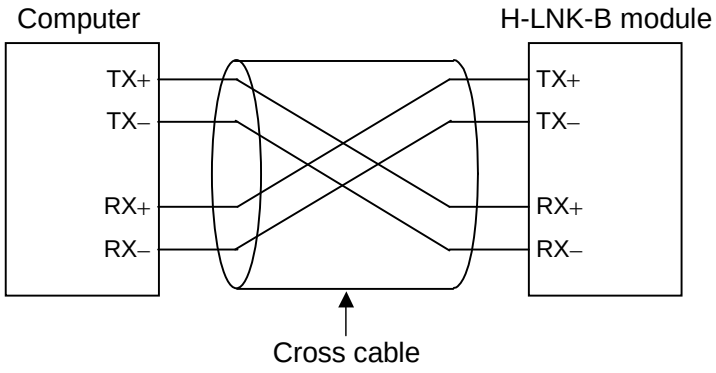
Pin No.	Signal name	Symbol
1	Send data +	TX+
2	Send data –	TX–
3	Receive data +	RX+
4	Unused	—
5	Unused	—
6	Receive data –	RX–
7	Unused	—
8	Unused	—

The cable is provided by the customer.
Used cable: The cable is based on the 10BASE-T or the 100BASE-TX standard of Ethernet.
Used connector: RJ-45 type

■ Wiring example

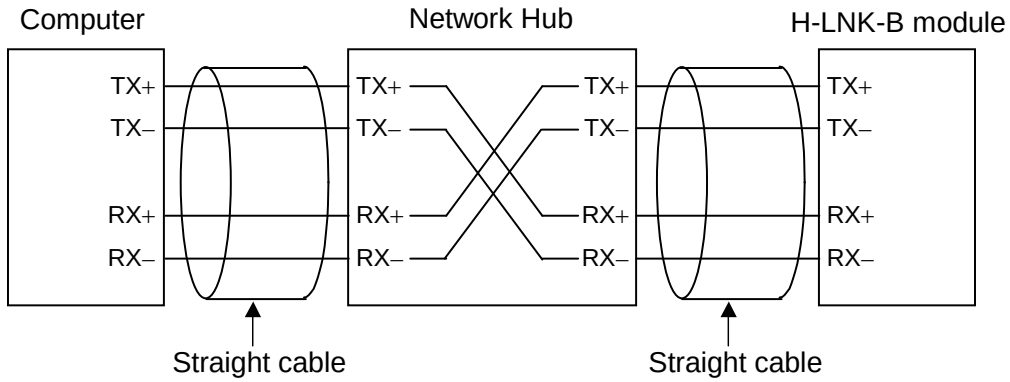
● When directly connected to client

Use a cross cable when directly connected to the client (such as computer).



● When use network hub

Use straight cables when connected to the network hub.



Cross cables may be used depending on the connecting device used. Therefore, follow the instructions for the respective device.

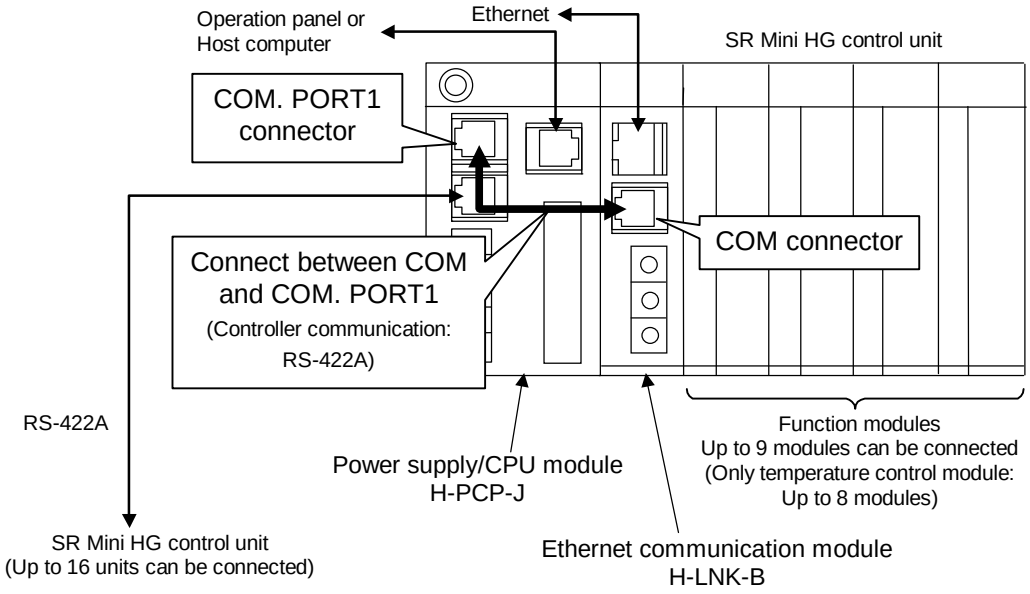
4.3 Connection to H-PCP Module

4.3.1 Wiring configuration

■ When connect to the H-PCP-J module

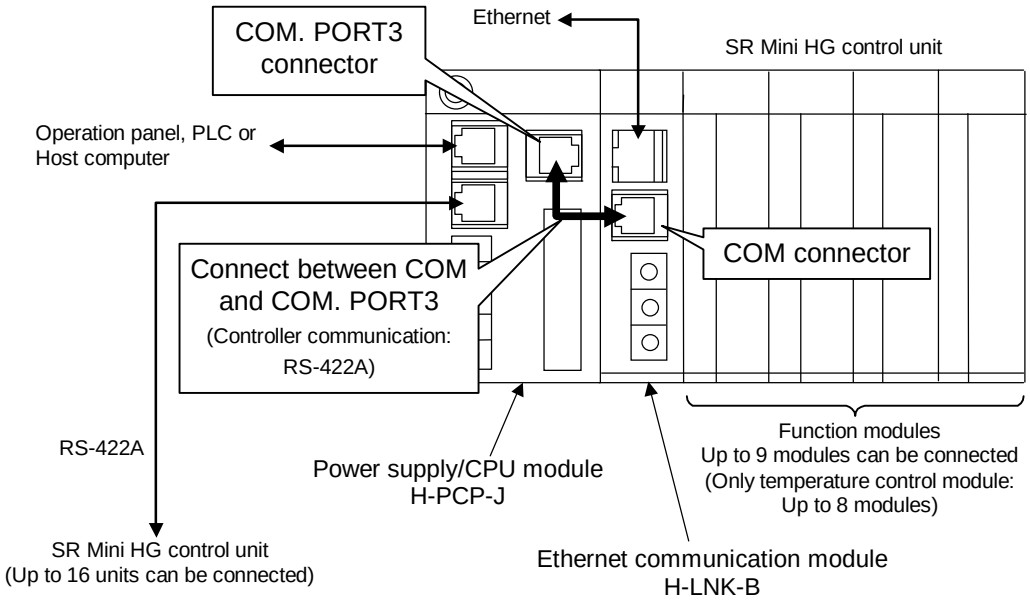
● When use COM.PORT1 of H-PCP-J

Connect the “COM” connector on the H-LNK-B module to the “COM.PORT1” connector on the H-PCP-J module.



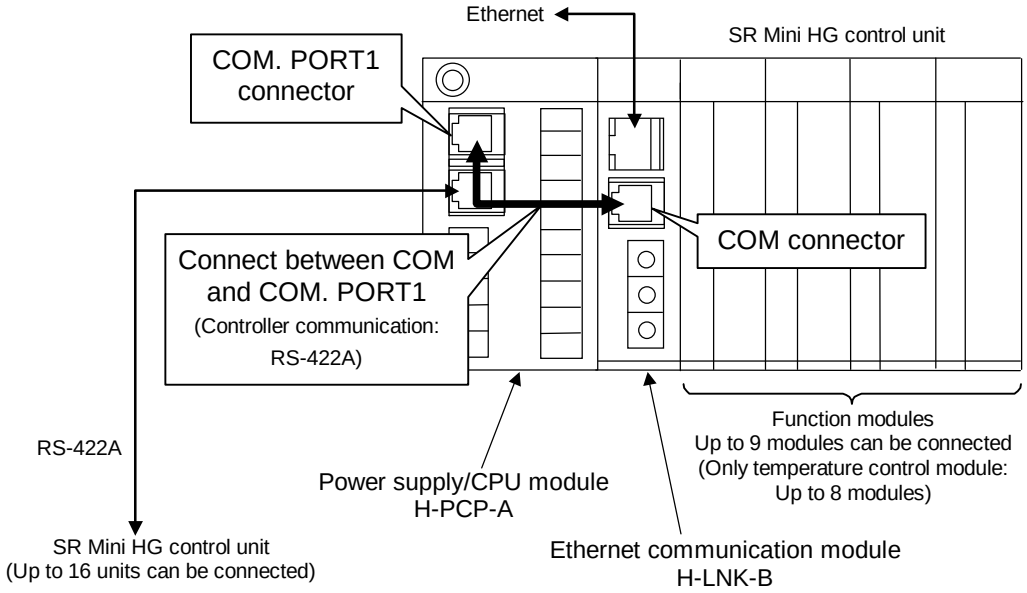
● When use COM.PORT3 of H-PCP-J

Connect the “COM” connector on the H-LNK-B module to the “COM.PORT3” connector on the H-PCP-J module.

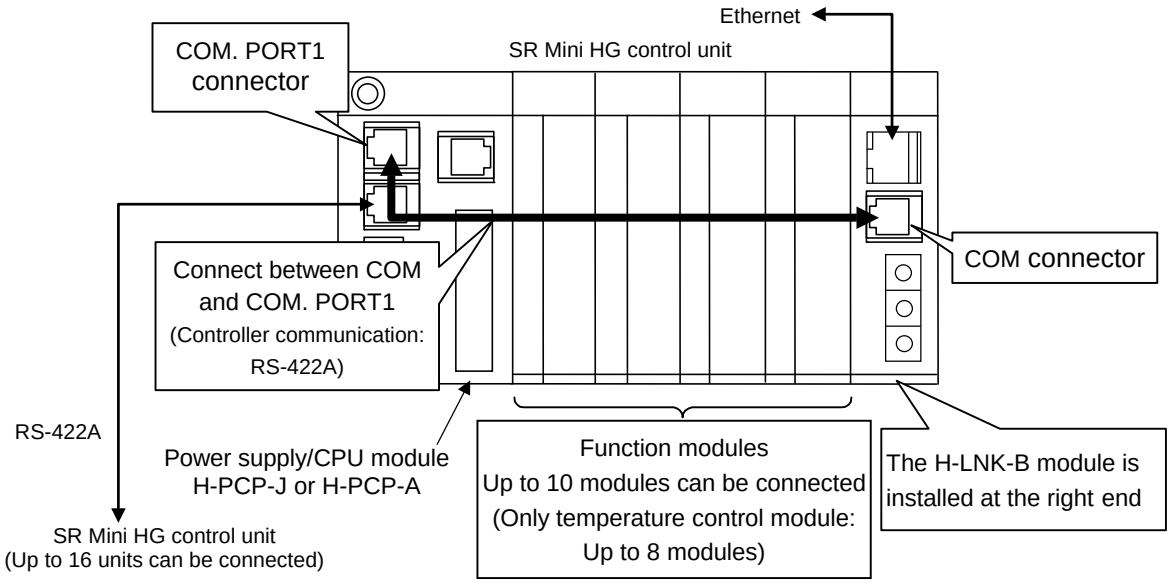


■ When connect to the H-PCP-A module

Connect the “COM” connector on the H-LNK-B module to the “COM.PORT1” connector on the H-PCP-A module.



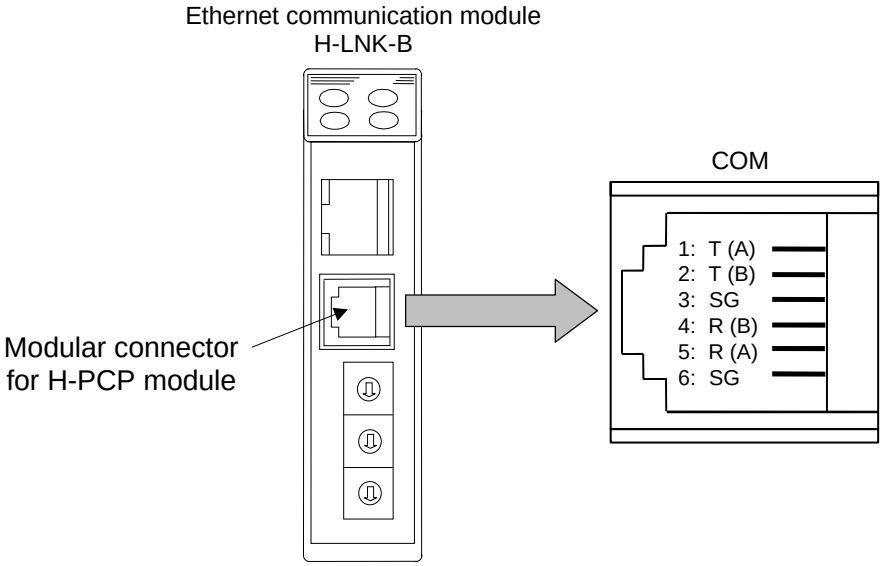
If the H-LNK-B module is installed at the right end of the SR Mini HG control unit, up to ten function modules can be connected. However, if configured only with temperature control modules, up to 8 function modules can be connected.
When in the above case, the length of an attached cable (cable length: 200 mm) may not be enough to reach the module. In that case, make an order placement of the connection cable, W-BF-02-500 (cable length: 500 mm) separately.



4.3.2 Wiring details

■ Pin layout of modular connector

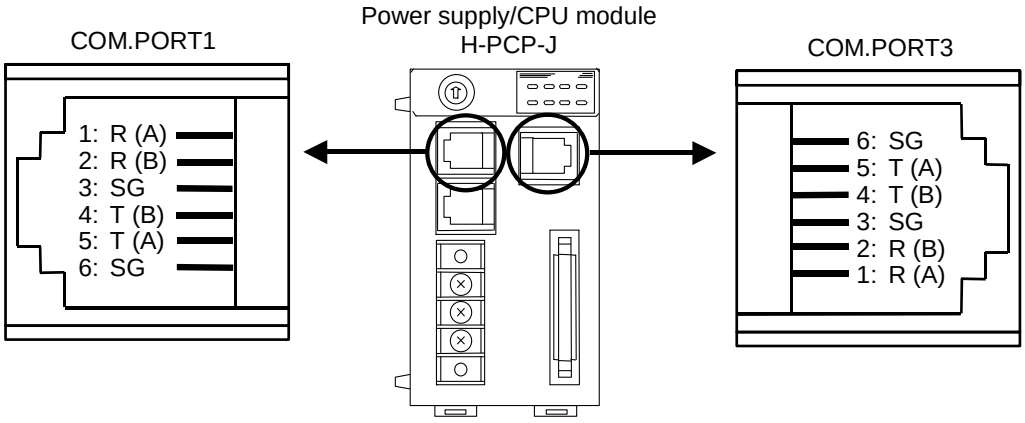
- **H-LNK-B module**



- **Connector pin number and signal details**

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

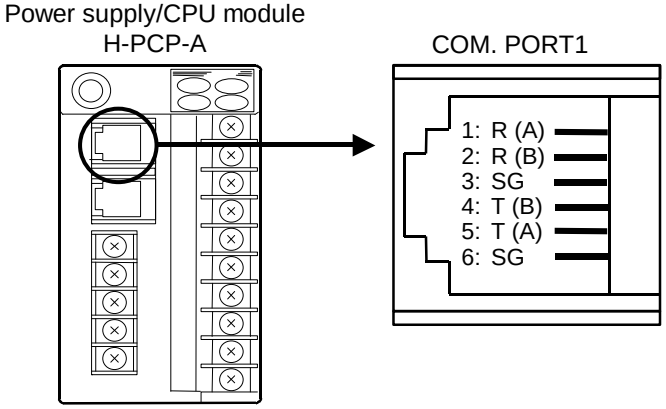
- **H-PCP-J module**



- **Connector pin number and signal details**

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

- **H-PCP-A module**

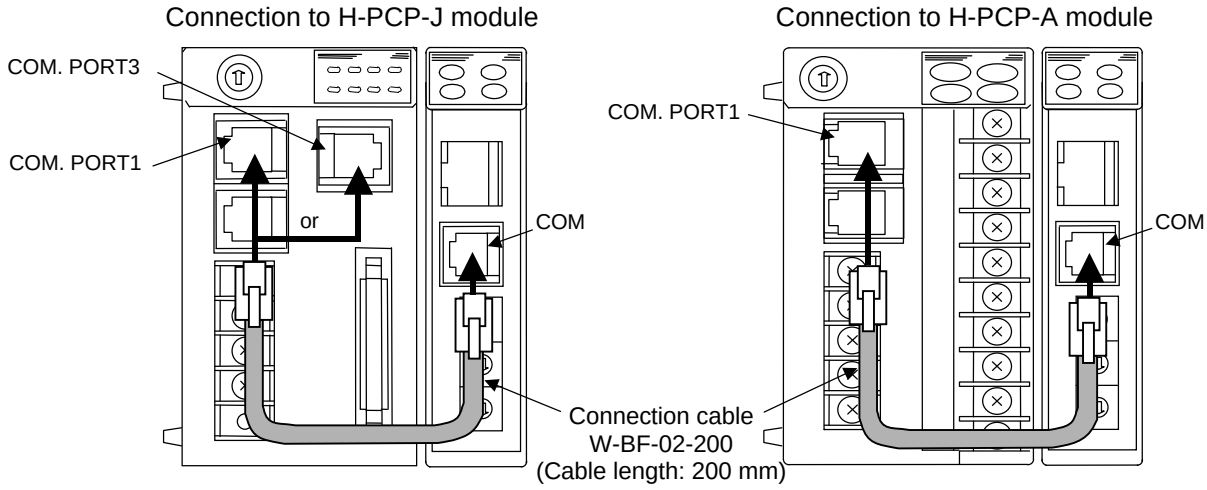


- **Connector pin number and signal details**

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

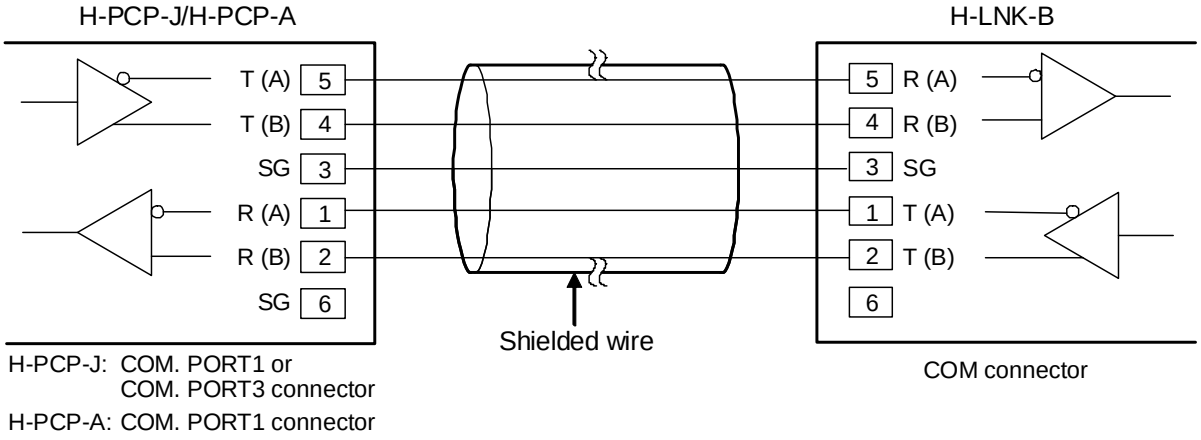
■ Wiring example

Connect the H-LNK-B module to the H-PCP module using the cable (W-BF-02-200) attached to the H-LNK-B module.



Shields of the cable are connected to SG (No. 6 pin) of the H-PCP-J (or H-PCP-A) connector.

- **Wiring details**



The 6-pin type modular connector should be used for the connection to the H-PCP-J (or H-PCP-A) module.
Recommended model: TM4P-66P (Manufactured by HIROSE ELECTRIC CO., LTD.,)

5. SETTING

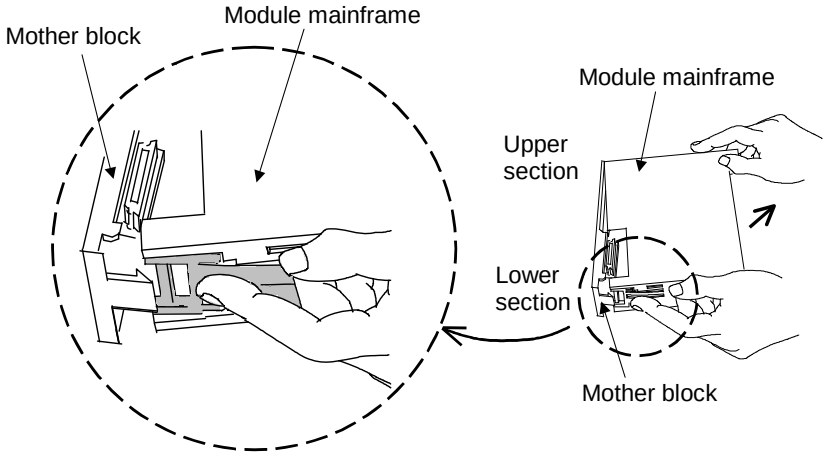
5.1 DIP Switch Setting

⚠ WARNING

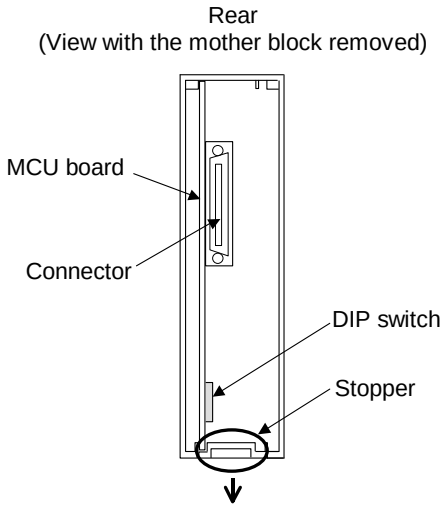
- To prevent electric shock or instrument failure, always turn off the power before setting the switch.
- To prevent electric shock or instrument failure, never touch any section other than those instructed in this manual.

Communication speed of controller communication, data bit configuration and protocol of Ethernet communication can be set with the DIP switch located in the H-LNK-B module.

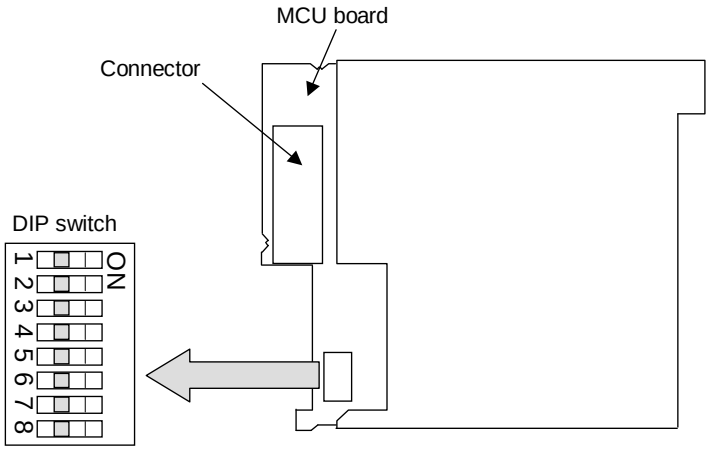
1. To separate the module mainframe from the mother block, press the bottom on the module, lifting upward, to release connection.



2. Remove the MCU board from the case while holding the connector by hand with the stopper pulled in the direction shown by the arrow.



3. Communication speed of controller communication, data bit configuration and protocol of Ethernet communication can be set with the DIP switch.



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

Factory set value: Data 8-bit, Without parity, Stop 1-bit

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

Factory set value: 9600 bps

5	6	7	Protocol
OFF	OFF	OFF	Modbus/TCP
ON	OFF	OFF	No-protocol
OFF	ON	OFF	**Do not set this one**
ON	ON	OFF	
OFF	OFF	ON	
ON	OFF	ON	
OFF	ON	ON	
ON	ON	ON	

Factory set value: Modbus/TCP

8	
OFF	Fixed

4. After setting is complete, install the MCU board.

5. Place the module mainframe opening on top of the mother block tab and snap the lower part of module mainframe on to the mother block. A snapping sound will be heard when module mainframe is securely connected to mother block.

5.2 IP Address Setting

Set an IP address of a H-LNK-B module.
Three types of IP address setting are available: “setting by Telnet,” “setting by Web browser” and “setting by rotary switch.”

📖 **Confirm the IP address number to the network administrator of the network (LAN) to which the H-LNK-B module is connected.**

5.2.1 Setting by telnet

Set the IP address by the software “Telnet” attached to Windows.

■ Preparations before setting

When setting the IP address by Telnet, it is necessary to coincide the 1st to 3rd bytes and masking range of the IP address of the client (computer) which starts Telnet with those of the IP address of the H-LNK-B module.

1. Connect the H-LNK-B module and client, and then turn on the power.

☞ For wiring procedure, see **4. WIRING (P. 11)**.

2. The IP address of the H-LNK-B module is set to a factory set value of “192.168.1.1.” As it is necessary to coincide the 1st to 3rd byte values of this IP address with those of the IP address of the client, change the IP address of the client to “192.168.1.□” (□: Any value in the range of 0 to 255, but other than 1).

3. As the subnet mask of the H-LNK-B module is “255.255.255.0,” also change the subnet mask of the client to “255.255.255.0.”

📖 After the IP address of the server is set, return the present IP address of the client to the original address or change to the address meeting the network to be connected.

📖 It is possible to set the IP address of the H-LNK-B module using the client already connected to the network. However, as the IP address of the client is changed, that client is disconnected from the network so far connected.
In addition, when setting the IP address by this method, confirm to the network administrator whether or not no problem arises.

■ Setting example

An example of setting the IP address to “192.168.1.3” is shown in the following.

1. Display the MS-DOS prompt (command prompt); enter the following command and then press the Enter key.

```
C:¥>telnet 192.168.1.1 9999
```

2. Device information on the module (H-LNK-B module) whose IP address is “192.168.1.1” is displayed. Finally, as the message “Press Enter to go into Setup Mode” is displayed, press the Enter key to go into Setup Mode.

```
MAC address 00204A8064BD
Software version 01.3 (030612) XPTE

Press Enter to go into Setup Mode
```

If the timing of pressing the Enter key is late, the message “Connection with Host was cut off” is displayed and thus the client is disconnected from the H-LNK-B module. Therefore if the message “Press Enter to go into Setup Mode” is displayed, immediately press the Enter key. If disconnected, try again from “***1.***”

3. If entered into Setup Mode, the present Ethernet information is displayed.
Finally, eight choices are displayed as “Change Setup:.” Therefore enter “0” after “Your choice ?” and then press the Enter key.

```
*** basic parameters
Hardware: Ethernet TPI
IP addr 192.168.1.1, no gateway set,netmask 255.255.255.000

********** Security **********
SNMP is                 enabled
SNMP Community Name:    public
Telnet Setup is         enabled
TFTP Download is        enabled
Port 77FEh is           enabled
```

```
Change Setup:
   0 Server configuration
   1 Channel 1 configuration
   3 E-mail settings
   5 Expert settings
   6 Security
   7 Factory defaults
   8 Exit without save
   9 Save and exit          Your choice ? 0
```

Enter “0” (Server configuration), and press the Enter key.

4. Selecting “0: Server configuration” makes ready to set the IP address.
Enter the IP address one byte by one byte.
As the following display appears, enter “192” into the first byte and then press the Enter key.

```
IP Address : (192) 192
```

Next, enter “168” into the second byte and then press the Enter key.

```
IP Address : (192) 192.(168) 168
```

Enter “1” into the third byte and then press the Enter key.

```
IP Address : (192) 192.(168) 168.(001) 1
```

Enter “3” into the fourth byte and then press the Enter key.

```
IP Address : (192) 192.(168) 168.(001) 1.(001) 3
```

5. After the IP address is entered, the following display appears. Therefore press the Enter key to proceed to the next.

```
IP Address : (192) 192.(168) 168.(001) 1.(001) 3
Set Gateway IP Address (N) N
```

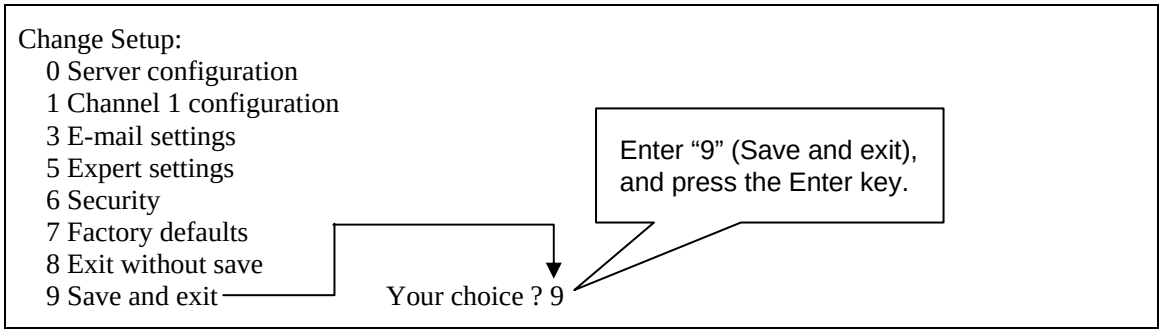
In addition, as one line is displayed, press the Enter key to proceed to the next.

```
IP Address : (192) 192.(168) 168.(001) 1.(001) 3
Set Gateway IP Address (N) N
Netmask: Number of Bits for Host Part (0=default) (16)
```

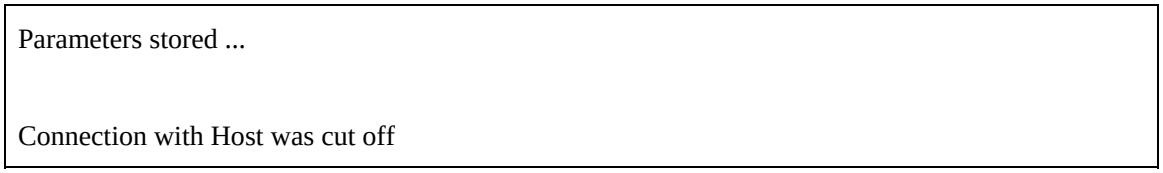
Further, as more one line is displayed, press the Enter key to proceed to the next.

```
IP Address : (192) 192.(168) 168.(001) 1.(001) 3
Set Gateway IP Address (N) N
Netmask: Number of Bits for Host Part (0=default) (16)
Change telnet config password (N) N
```

6. As “Change Setup:” is displayed again, enter “9” after “Your choice ?” and then press the Enter key.



7. “Parameters stored ...” is displayed and thus the setting is finished.



5.2.2 Setting by the web browser

It is possible to set the IP address by using the Web browser (such as Internet Explorer).

■ Preparations before setting

When setting the IP address by Web browser, it is necessary to coincide the 1st to 3rd bytes and masking range of the IP address of the client (computer) which starts Web browser with those of the IP address of the H-LNK-B module.

1. Connect the H-LNK-B module and client, and then turn on the power.

☞ For wiring procedure, see **4. WIRING (P. 11)**.

2. The IP address of the H-LNK-B module is set to a factory set value of "192.168.1.1." As it is necessary to coincide the 1st to 3rd byte values of this IP address with those of the IP address of the client, change the IP address of the client to "192.168.1. □" (□: Any value in the range of 0 to 255, but other than 1).

3. As the subnet mask of the H-LNK-B module is "255.255.255.0," also change the subnet mask of the client to "255.255.255.0."

📖 After the IP address of the server is set, return the present IP address of the client to the original address or change to the address meeting the network to be connected.

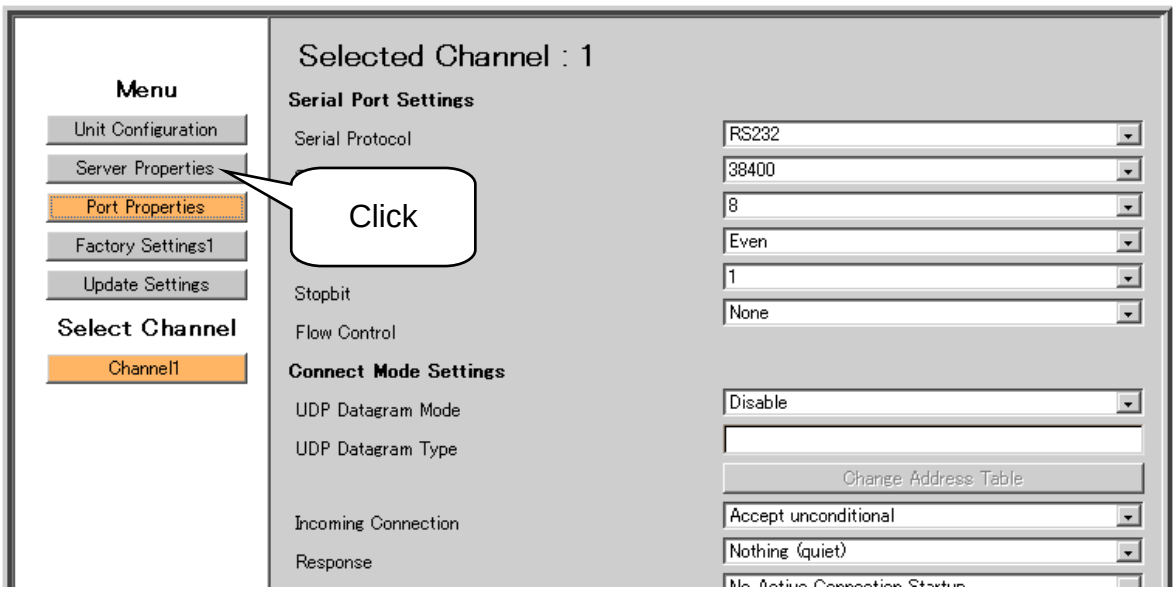
📖 It is possible to set the IP address of the H-LNK-B module using the client already connected to the network. However, as the IP address of the client is changed, that client is disconnected from the network so far connected.
In addition, when setting the IP address by this method, confirm to the network administrator whether or not no problem arises.

■ Setting example

An example of setting the IP address to “192.168.1.3” is shown in the following.

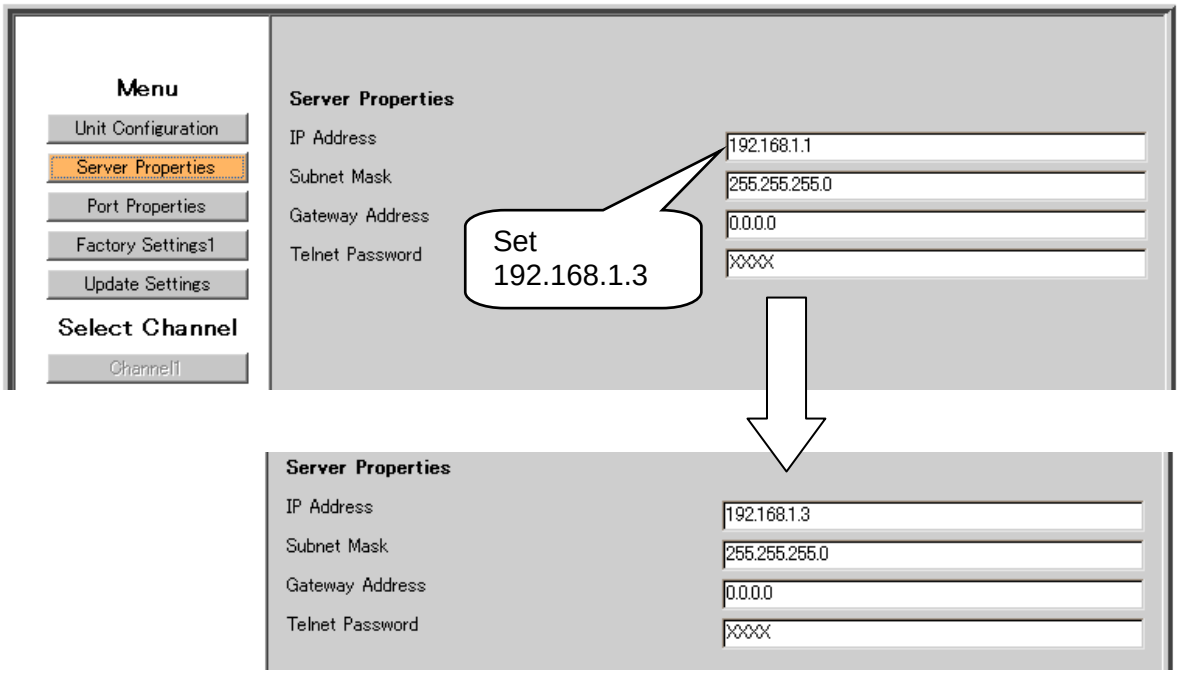
1. Start the Web browser; enter the present IP address “192.168.1.1” into the address bar and then press the Enter key.

2. The initial setting applet starts. “Selected Channel: 1” is displayed on the main display with “Port Properties” selected on the Menu display on the left side of the screen.
Under this condition, click the Server Properties button on the Menu display.



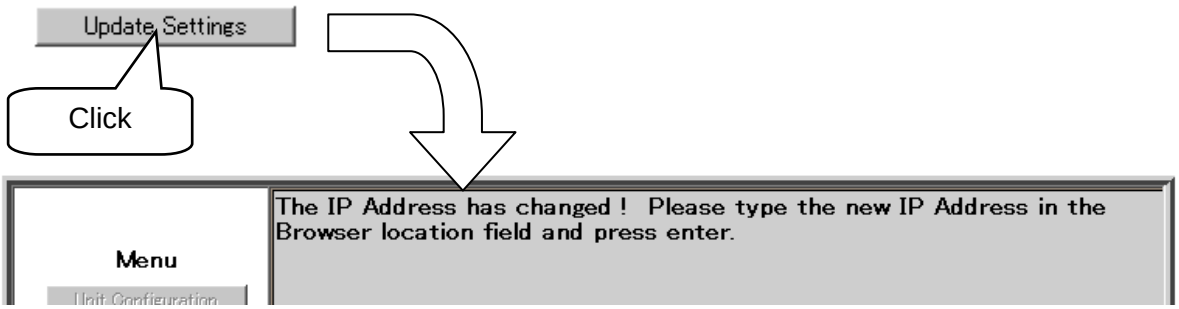
Do not change the contents of “Selected Channel: 1.” If changed, device failure or error may result.

3. Display the Server Properties screen.
Set “192.168.1.3” in IP Address.



Do not change any items other than the IP Address. If so, device failure or error may result.

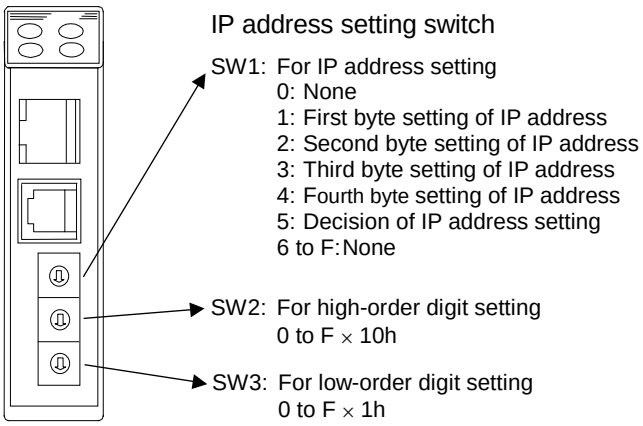
4. Clicking the Update Settings button on the Menu display updates the setting to display the following message.



5. Enter the new IP address “192.168.1.3” into the address bar as instructed by message and then press the Enter key. Thus, a new IP address setting screen appears to end the setting.

5.2.3 Setting by the rotary switch

It is possible to set the IP address by rotary switch with Ethernet not connected.
Rotary switches used are “SW1,” “SW2” and “SW3” on the front side of the module.



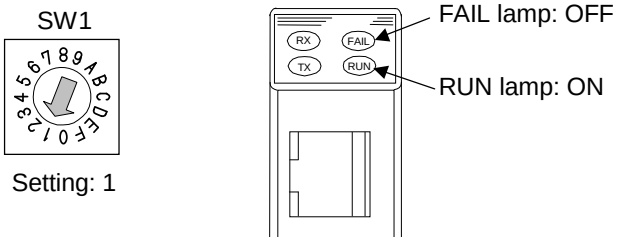
Factory set value of an IP address of a H-LNK-B module is “192.168.1.1.”

■ Setting example

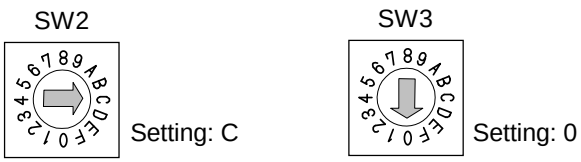
An example of setting the IP address to “192.168.1.3” is shown in the following.

1. **Setting preparations**
Set SW1 to “1” with the power turned off.

2. **First byte setting mode**
Turning the power on goes to the first byte setting mode.
The RUN lamp goes on and the FAIL lamp goes off if set to the first byte setting mode.



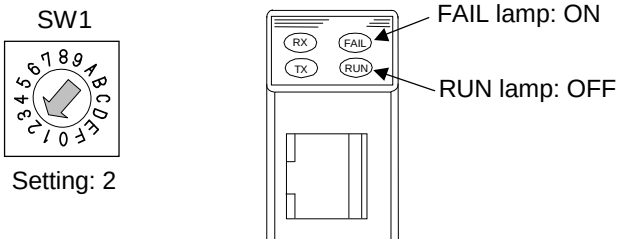
3. **Input the first byte “192”**
Enter the first byte (most significant byte) by SW2 and SW3.
As the first byte (most significant byte) is entered with “192,” this number corresponds to a hexadecimal number of “C0.”
Conduct the following setting with SW2 and SW3.



4. **Second byte setting mode**

Change SW1 to “2.”

The RUN lamp goes off and the FAIL lamp goes on if set to the second byte setting mode.



5. **Input the second byte “168”**

Enter the second byte by SW2 and SW3.

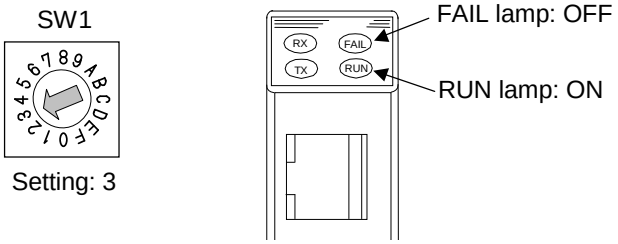
As the second byte is entered with “168,” this number corresponds to a hexadecimal number of “A8.”

Conduct the following setting with SW2 and SW3.

6. **Third byte setting mode**

Change SW1 to “3.”

The RUN lamp goes on and the FAIL lamp goes off if set to the third byte setting mode.

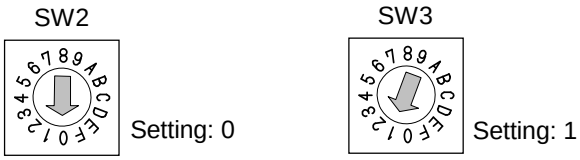


7. **Input the third byte “1”**

Enter the third byte by SW2 and SW3.

As the third byte is entered with “1,” this number corresponds to a hexadecimal number of “01.”

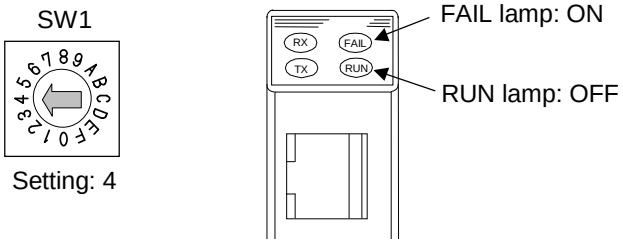
Conduct the following setting with SW2 and SW3.



8. **Fourth byte setting mode**

Change SW1 to “4.”

The RUN lamp goes off and the FAIL lamp goes on if set to the fourth byte setting mode.

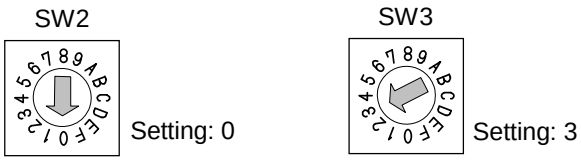


9. **Input the fourth byte “3”**

Enter the fourth byte by SW2 and SW3.

As the fourth byte is entered with “3,” this number corresponds to a hexadecimal number of “03.”

Conduct the following setting with SW2 and SW3.

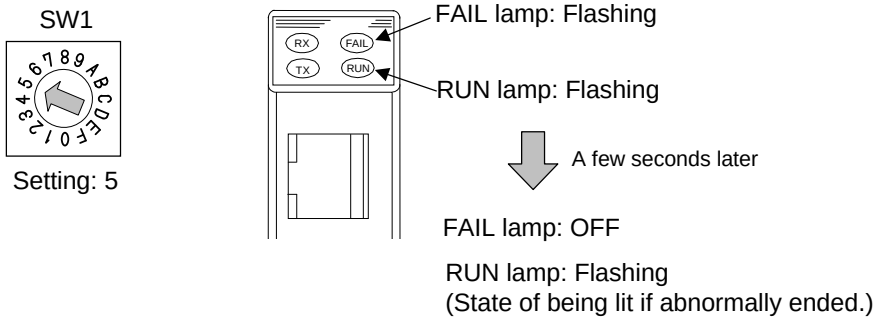


10. **Decision of the IP address**

Change SW1 to “5.”

After a lapse of a few seconds, the RUN lamp lights and the IP address is established.

The FAIL and RUN lamps flash until the IP address is established



11. **Power OFF**

If the power is turned off once and turned on again, operation starts at the preset IP address.

If incorrect IP address setting operation is conducted, turn the power off once and then try the setting again from the beginning. However, if no Procedure ***10*** (IP address establishment) operation is performed, it is possible to try again from Procedure ***2*** after SW1 is returned to "0" once without turning off the power.

Setting the IP address to “0.0.0.0” results in the automatic IP address acquisition mode, thereby automatically acquiring the IP address from the address server on LAN. However, the special tool (Device Installer produced by LANTRONIX) is required for checking the IP address thus acquired.

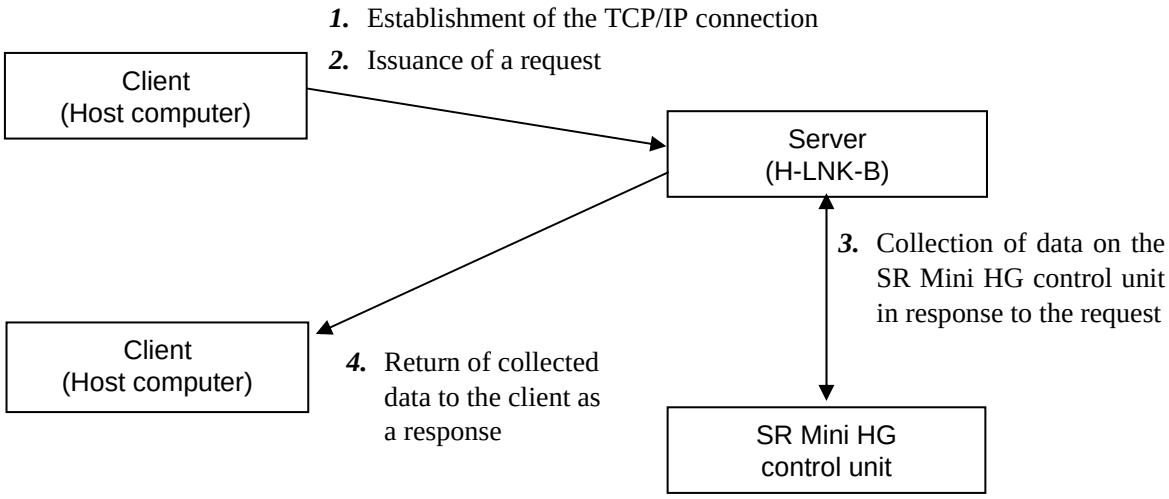
6. COMMUNICATION PROTOCOL

As an Ethernet communication protocol, the H-LNK-B module supports Modbus/TCP and No-protocol.

6.1 Modbus/TCP

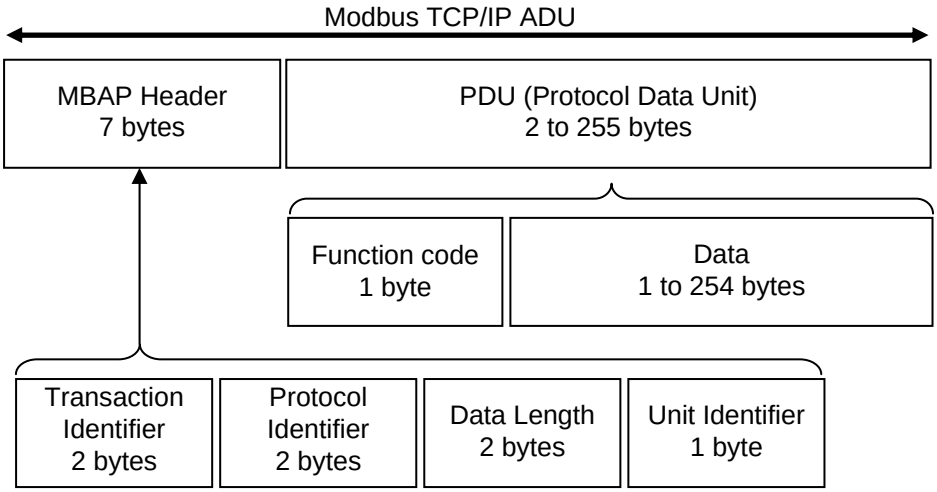
Modbus/TCP is an open field network provided with the Modbus protocol on the TCP/IP protocol of Ethernet.
The data request side is called “client” (such as computer) and the data response (supply) side is called “server” (H-LNK-B module).

<Procedure for data distribution>



6.1.1 Message configuration

Modbus ADU (Application Data Unit) on TCP/IP is in the following configuration.



■ MBAP Header

MBAP (Modbus Application Protocol) header contains the following fields: Transaction Identifier, Protocol Identifier, Data Length and Unit Identifier.

Fields	Length	Request (Client)	Response (Server)
Transaction Identifier	2 bytes	Unused However, data corresponding to two bytes is sent	Returns data from the client as is
Protocol Identifier	2 bytes	"0" fixed (Modbus protocol = 0)	Returns data from the client as is
Data Length	2 bytes	The total number of bytes of Unit Identifier and PDU (256 bytes max.)	The total number of bytes of Unit Identifier and PDU (256 bytes max.)
Unit Identifier	1 byte	Send the unit address of the communicating SR Mini HG. (Value obtained by adding "1" to the H-PCP module rotary switch setting) However, unused if in unit ID fixed mode *. (Send any data corresponding to 2 bytes.) * See **6.1.5 Unit ID fixed mode (P. 43)**	Returns data from the client as is

■ PDU

PDU (Protocol Data Unit) consists of two blocks: function codes and data.

Fields	Length	Request (Client)	Response (Server)
Function code	1 byte	03H: Read holding registers 06H: Write single register 08H: Diagnostics (loopback test) 10H: Write multiple registers	Normal response Returns data from the client as is Error response 80H + Function code
Data	1 to 254 bytes	Data meeting the function code	Normal response Data meeting the function code Error response Exception code 01H: Illegal function code 02H: Illegal register address 03H: Illegal data value 04H: Server failure

6.1.2 Function code

- **Function code contents**

Function code	Function	Contents
03H	Read holding registers	Measured value, Control output value, Current transformer input value, Event status, etc.
06H	Write single register	Set value, PID constants, event set value, etc.
08H	Diagnostics (loopback test)	Loopback test
10H	Write multiple registers	Set value, PID constants, event set value, etc.

- **Message (PDU) length of each function [Unit: byte]**

Function code	Function	Request message		Response message	
		Min	Max	Min	Max
03H	Read holding registers	5	5	4	252
06H	Write single register	5	5	5	5
08H	Diagnostics (loopback test)	5	5	5	5
10H	Write multiple registers	8	252	5	5

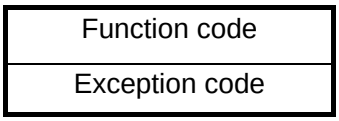
6.1.3 Server (H-LNK-B) responses

■ Normal response

- In the response message of the read holding registers, the server (H-LNK-B) returns the “Function code,” “Number of data items” and the “Read out data” as the response message.
- In the response message of the write single register and diagnostics (loopback test), the server (H-LNK-B) returns the same message as the request message.
- In the response message of the write multiple registers, the server (H-LNK-B) returns the “Function code,” the “Register address number” and the “Number of register” as the response message.

■ Defective message response

- If the request message from the client is defective, except for transmission error, the server (H-LNK-B) returns the exception response message without any action.
- If the self-diagnostic function of the server (H-LNK-B) detects an error, the server will return an exception response message to all request messages.



Exception response message

- The function code of each exception response message is obtained by adding "80H" to the function code of the request message.

Exception code	Contents	Causes
01H	Illegal function code	An unsupported function code was specified
02H	Illegal register address	When the mismatched register address is specified.
03H	Illegal data value	• The number of specified data points was out of the following range during data read or write. Function code 03H: 1 to 125 Function code 10H: 1 to 123 • When the data written exceeds the setting range
04H	Server failure	State under which the server cannot normally respond (An error occurred in the server)

Exception code priority order

No response in PDU data length error > 04H > 01H, 02H or 03H

- Order when reading/writing the register contents
  When there is 02H or 03H only for read processing: 01H > 04H > 03H > 02H
- Order when out of the setting range
  For 03H when out of the setting range: 01H > 02H > 04H > 03H

■ No response

The server (H-LNK-B) ignores the request message and does not respond when:

- The IP address does not coincide.
- The server (H-LNK-B) is not connected to the network.
- The PDU (Protocol Data Unit) data length is abnormal.
  When the PDU data length specified by the request message does not coincide with the number of bytes received as one TCP packet.
  H-LNK-B determines whether or not communication messages correspond to one packet by time-out (approx. 12 ms) between characters.

6.1.4 Message format

■ Read holding registers [03H]

The request message specifies the starting register address number and quantity of register addresses to be read.
The contents of the registers are entered in the response message as data, divided into two parts: the high-order eight bits and low-order eight bits, arranged in the order of the register numbers.

Example: The contents of the three registers from 0000H to 0002H are the read out.

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		01H	
Function code		03H	
Register address	High	00H	First register address
	Low	00H	
Quantity (Number of words)	High	00H	The setting must be between 1 (0001H) and 125 (007DH).
	Low	03H	

Normal response message [Server]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	09H	
Unit Identifier		01H	
Function code		03H	
Number of data (byte)		06H	→ Number of registers × 2
First register contents	High	00H	
	Low	78H	
Next register contents	High	00H	
	Low	00H	
Next register contents	High	00H	
	Low	14H	

Exception response message [Sever]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	03H	
Unit Identifier		01H	
80H + Function code		83H	
Exception code		03H	→ When the data exceeds the setting range

■ Write single register [06H]

The request message specifies data to be written into the designated register.
Write data items are arranged in the request message in order starting from the smallest register address number. In addition, each register address is assigned in the order of high-order eight bits and low-order eight bits, respectively.

Example: When 100 (64H) is written to the register 0010H

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		01H	
Function code		06H	
Register address	High	00H	
	Low	10H	
Write data	High	00H	Any data within the range
	Low	64H	

Normal response message [Server]

Transaction Identifier	High	00H	Contents will be the same as request message data
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		01H	
Function code		06H	
Register address	High	00H	
	Low	10H	
Write data	High	00H	
	Low	64H	

Exception response message [Sever]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	03H	
Unit Identifier		01H	
80H + Function code		86H	
Exception code		03H	→ When the data exceeds the setting range

■ Diagnostics (Loopback test) [08H]

The client's request message will be returned as the response message from the server.
This function checks the communication system between the client and server.

Example: Loopback test

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		01H	
Function code		08H	
Test code	High	00H	Test code must be set to *00H*
	Low	00H	
Data	High	1FH	Any pertinent data
	Low	34H	

Normal response message [Server]

Transaction Identifier	High	00H	Contents will be the same as request message data
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		01H	
Function code		08H	
Test code	High	00H	
	Low	00H	
Data	High	1FH	
	Low	34H	

Exception response message [Sever]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	03H	
Unit Identifier		01H	
80H + Function code		88H	
Exception code		06H	→ When server is busy

■ Write multiple registers [10H]

Each data is written to registers in specified quantities starting from the specified register address.
Write data items are arranged in the request message in order starting from the smallest register address number. In addition, each register address is assigned in the order of high-order eight bits and low-order eight bits, respectively.

Example: When 100 (64H) and 30 (1EH) are written to the register 0010H and 0011H (two in total)

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	0BH	
Unit Identifier		01H	
Function code		10H	
Register address	High	00H	First register address
	Low	10H	
Quantity (Number of words)	High	00H	The setting must be between 1 (0001H) and 123 (007BH).
	Low	02H	
Number of data (byte)		04H	→ Number of registers × 2
Data to first register	High	00H	
	Low	64H	
Data to next register	High	00H	
	Low	1EH	

Normal response message [Server]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		01H	
Function code		10H	
Register address	High	00H	First register address
	Low	10H	
Quantity (Number of words)	High	00H	
	Low	02H	

Exception response message [Sever]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	03H	
Unit Identifier		01H	
80H + Function code		90H	
Exception code		03H	→ When the data exceeds the setting range

6.1.5 Unit ID fixed mode

The unit ID fixed mode is used if the client cannot freely specify any unit ID in the Modbus/TCP packet.

If in unit ID fixed mode, the number of SR Mini HG control units connectable to the H-LNK-B module is only one.

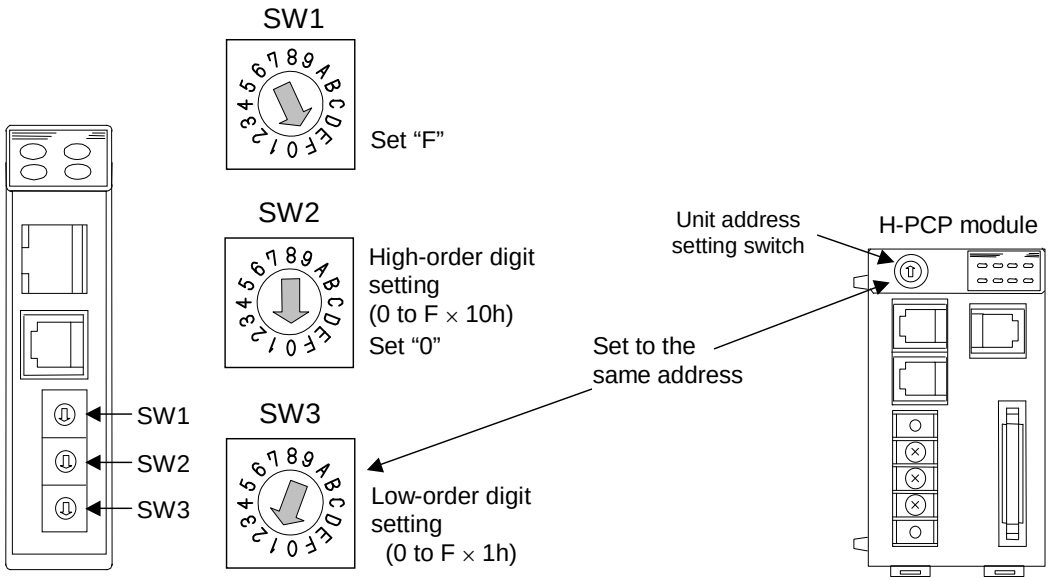
■ Setting procedure

1. Turn off the power supply.

2. Set Nos. 5, 6 and 7 of the DIP switch inside the H-LNK-B module to OFF [Protocol: Modbus/TCP (factory set value)].

☞ For setting procedure of the DIP switch, see **5.1 DIP Switch Setting (P. 21)**.

3. Set SW1 at the front of the H-LNK-B module to "F." Next, set the unit ID by SW2 and SW3. Set the unit ID to the same number as the unit address (rotary switch number) of the H-PCP module in the SR Mini HG.



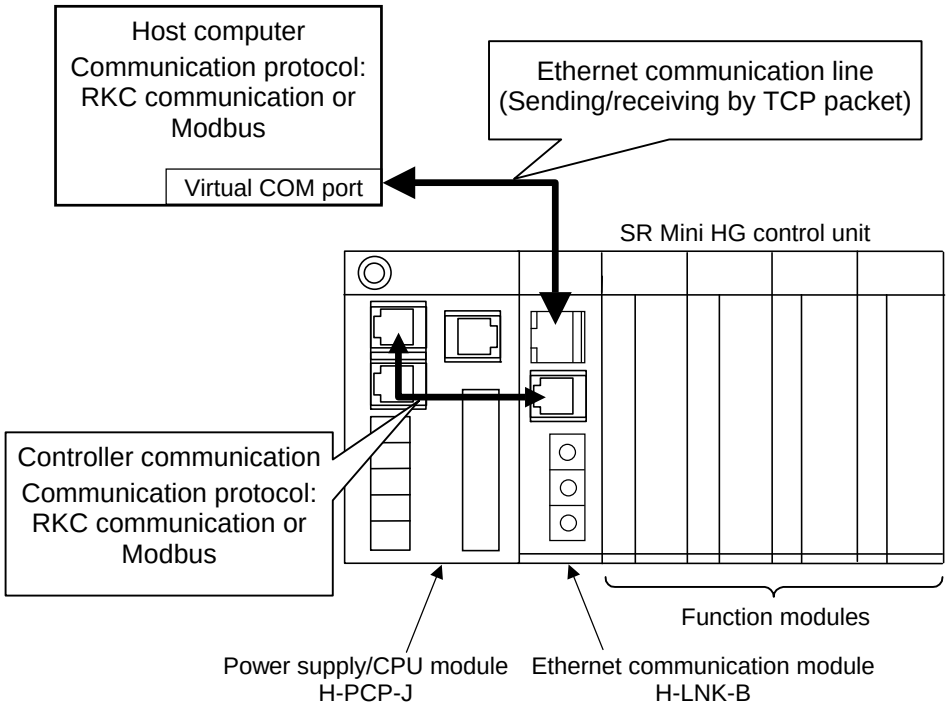
4. Turning on the power starts communicating in unit ID fixed mode.

6.2 No-Protocol

When No-protocol is used, it is possible to communicate with the SR Mini HG controller with only the communication line set to Ethernet without changing the software (RKC communication or Modbus) on the computer side already under operation by setting the virtual COM port to such higher-level equipment as a host computer, etc.

● Communication outline

The TCP packet received from the host computer is sent to the SR Mini HG controller without any modification via controller communication and data received from the SR Mini HG controller side is sent without any modification to the host computer as a TCP packet.



● Communication requirements

- TCP packet: 256 bytes or less (Characters exceeding 256 bytes are all discarded.)
- Communication with such higher-level equipment as a host computer, etc. is of the request & response type and should be via half-duplex communication. (RKC communication and Modbus fall into this category.)

■ Setting of virtual COM port

The virtual COM port is set by using the following software which can be downloaded from the Internet.

- DeviceInstaller (by LANTRONIX)
- Com Port Redirector (by LANTRONIX)

LANTRONIX URL: http://www.lantronix.com

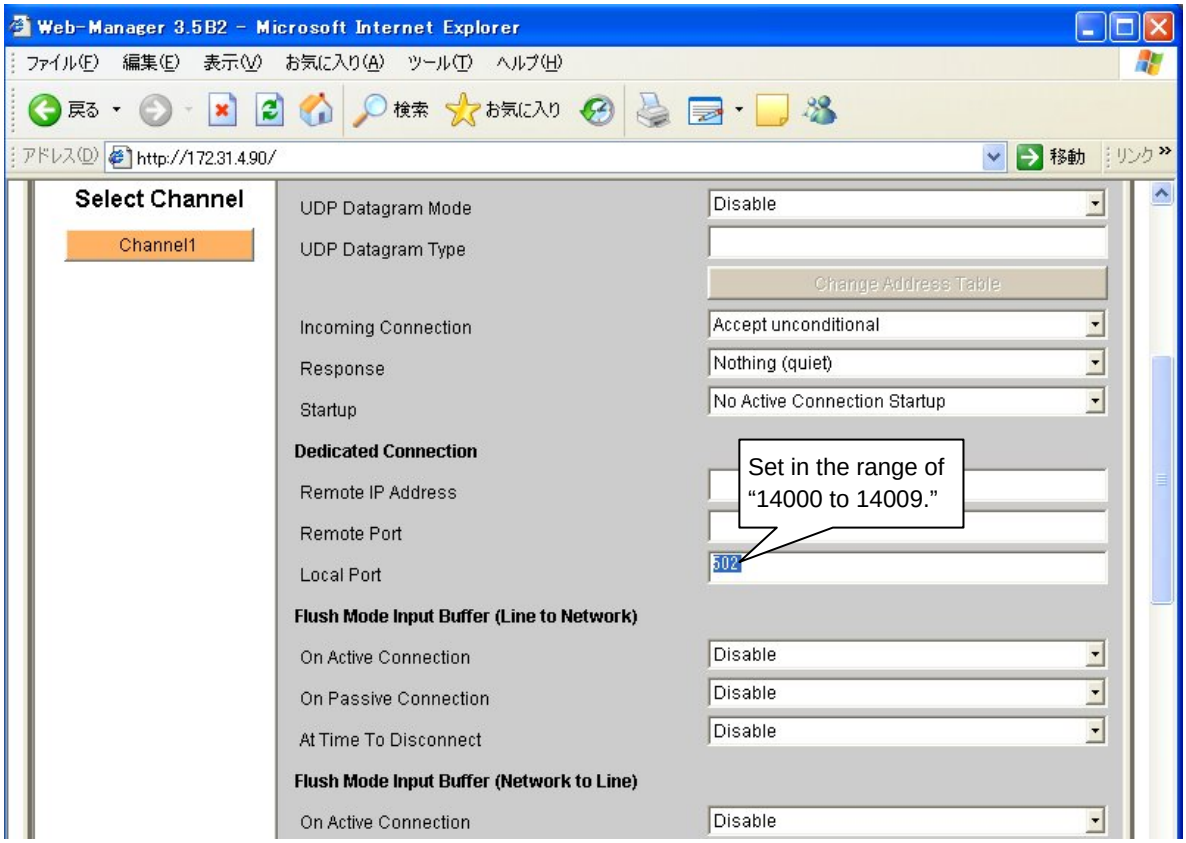
● Operating environment

– OS: Windows XP/Vista/7
– Microsoft.NET Framework v4.0 must be installed on your PC.
– 45 MB free hard drive space (DeviceInstaller: 15 MB, Com Port Redirector: 30 MB)
– Ethernet implementation
– It is assumed that communication (IP address setting, etc.) with XPort (Ethernet connector of H-LNK-B) has been established.

● Setting procedure

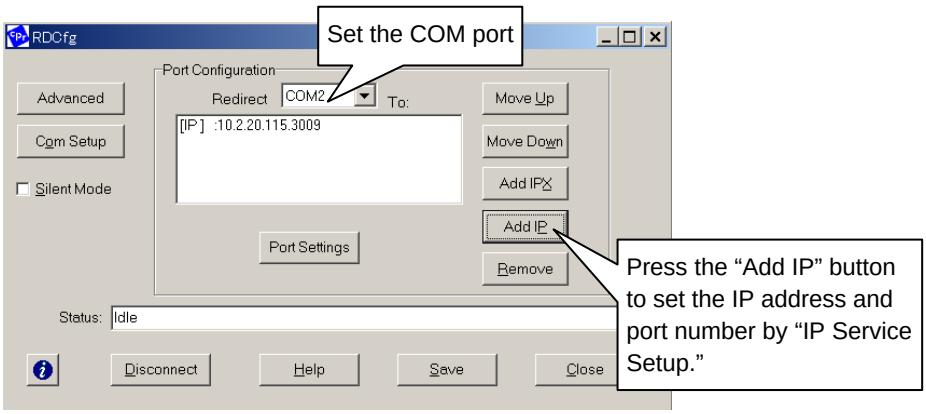
The TCP port is set by using the software already downloaded from the Internet.

1. Start XPort Web-Manager by using the DeviceInstaller Web button or Web browser (Internet Explorer, etc.).
2. Set “Local Port” in the Dedicated Connection setting in the range of “14000 to 14009.” (For Modbus/TCP: Fixed to 502)



3. Start running the ComPort Redirector program produced by LANTRONIX to set the COM port and the XPort IP address and port number by "AddIP." Set a port number to any number in the range of "3000 to 3009."

As a port number, set the value obtained by subtracting "11000" from the "Local Port" number set in Procedure *2*.



Set all of the port values using decimal numbers.

4. Thus, it becomes possible conduct communication by No-protocol used with the Ethernet communication line.

6.3 Ethernet Response Time

The maximum Ethernet response time is obtained as follows.

Maximum Ethernet response time (Recovery processing time-out time during communication failure)
= Ethernet delay time + Controller communication response time × 2

If the following sending is made from the host computer in response to the sending from the host computer before the H-LNK-B responds (within Ethernet response time), the sending message becomes invalid and is discarded.

Example: Response time when the number of SR Mini HG controller temperature control points corresponds to 8 channels

Requirements: • Delay time of Ethernet: 0
• Communication speed of controller communication: 38400 bps

Response time
= [0 (Delay time of Ethernet) + Approx. 25 ms (Response time of controller communication) × 2]
= Approx. 50 ms

7. COMMUNICATION DATA LIST

- Name
  ◆: Item stored in the memory area.
  [ ]: The functional module name that data becomes valid is written.
- Attributes
  RO: Read only SR Mini HG controller → Host computer
  R/W: Read and Write SR Mini HG controller ↔ Host computer
  WO: Write only SR Mini HG controller ← Host computer
- Structure
  C: Data of each channel L: Data of each event input losic circuit
  M: Data of each module U: Data of each unit address

☞ For data configuration, data processing precautions and identifier of RKC communication, see **H-PCP-J Instruction Manual (IMS01J02-E□)**, **H-PCP-A Z-1021 Instruction Manual (IMSRM65-E□)** and **SR Mini HG SYSTEM Communication Instruction Manual (IMSRM09-E□)**.

7.1 Communication Data List of H-PCP-J Module

Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Temperature measured value (PV) [H-TIO-□, H-CIO-A]	0000 ⋮ 0013	0 ⋮ 19	RO	C	TC/RTD input: Within input range Current (V)/Voltage (I) input: Within display scale range	—
Moter speed measured value [H-SIO-A]					Within display scale range	—
Heat-side manipulated output value [H-TIO-□, H-CIO-A, H-SIO-A]	0014 ⋮ 0027	20 ⋮ 39	RO	C	−0.5 to +105.0 %	—
Cool-side manipulated output value [H-TIO-□, H-CIO-A]	0028 ⋮ 003B	40 ⋮ 59	RO	C	−0.5 to +105.0 %	—
Current tramsformer input measured value 1 [H-TIO-A/C/D]	003C ⋮ 004F	60 ⋮ 79	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current tramsformer (CT) input measured value of the H-TIO-A/C/D module	—
Current tramsformer input measured value 2 (CH1 to CH20) [H-CT-A]	0050 ⋮ 0063	80 ⋮ 99	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current tramsformer (CT) input measured value of the H-CT-A module	—
Status [H-TIO-□, H-CIO-A, H-SIO-A]	0064 ⋮ 0077	100 ⋮ 119	RO	C	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: Alarm 1 state bit 1: Alarm 2 state bit 2: Burnout state bit 3: Heater break alarm state *OR* operation of the H-TIO-A/C/D module and H-CT-A module bit 4: Control leep break alarm (LBA) state bit 5: Temperature rise completion state bit 6: Heat-side manipulated output state bit 7 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 127] For H-SIO-A module, only alarm 1 state (bit 0), alarm 2 state (bit 1) and Heat-side manipulated output state (bit 6) are effective.	—

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Temperature rise completion state [H-TIO-☐, H-CIO-A]	0078	120	RO	U	0: Rise not complete 1: Rise completed	—
Error code [H-PCP-J]	0079	121	RO	U	0: Operations normal 1: Backup data check error 2: RAM read/write error 3: System structure error 4: Internal communications error 5: A/D converter error 6: Adjustment data error	—
Comprehensive alarm state [H-PCP-J]	007A	122	RO	U	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: Logical *OR* of alarm 1 state in all channels bit 1: Logical *OR* of alarm 2 state in all channels bit 2: Logical *OR* of burnout alarm state in all channels bit 3: Logical *OR* of heater break alarm state in all channels bit 4: Temperature rise completion state bit 5: Logical *OR* of AI alarm 1 state in all channels bit 6: Logical *OR* of AI alarm 2 state in all channels bit 7: Logical *OR* of control loop break alarm state in all channels bit 8: Logical *OR* of TI alarm 1 state in all channels bit 9: Logical *OR* of TI alarm 2 state in all channels bit 10: Logical *OR* of TI burnout alarm state in all channels bit 11 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 2047]	—
Unused	007B ⋮ 008B	123 ⋮ 139	—	—	—	
Set value monitor [H-TIO-☐, H-CIO-A, H-SIO-A]	008C ⋮ 009F	140 ⋮ 159	RO	C	TC/RTD input: Within input range Current/Voltage input, H-SIO-A: Within display scale range	—
Current tramsformer input measured value 2 (CH21 to CH60) [H-CT-A]	00A0 ⋮ 00C7	160 ⋮ 199	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current tramsformer (CT) input measured value of the H-CT-A module	—
Temperature set value (SV) ◆ [H-TIO-☐, H-CIO-A]	00C8 ⋮ 00DB	200 ⋮ 219	R/W	C	TC/RTD input: Within input range (Within setting limiter) Current/Voltage input: Within display scale range (Within setting limiter) The position of the decimal point differs depending on the input range.	0
Motor speed set value ◆ [H-SIO-A]					Within display scale range (Within setting limiter) The position of the decimal point differs depending on the input range.	0

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
PID/AT transfer [H-TIO-☐, H-CIO-A, H-SIO-A]	00DC ⋮ 00EF	220 ⋮ 239	R/W	C	0: PID control operation 1: AT (Autotuning) operation	0
Heat-side proportional band ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	00F0 ⋮ 0103	240 ⋮ 259	R/W	C	0.1 to 1000.0 % of span	H-TIO-☐, H-CIO-A: 3.0 H-SIO-A: 300.0
Cool-side proportional band ◆ [H-TIO-☐, H-CIO-A]	0104 ⋮ 0117	260 ⋮ 279	R/W	C	0.1 to 1000.0 % of span	3.0
Integral time ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	0118 ⋮ 012B	280 ⋮ 299	R/W	C	1 to 3600 seconds	H-TIO-☐, H-CIO-A: 240 H-SIO-A: 2
Derivative time ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	012C ⋮ 013F	300 ⋮ 319	R/W	C	0 to 3600 seconds (0: PI action)	H-TIO-☐, H-CIO-A: 60 H-SIO-A: 0
Overlap/deadband ◆ [H-TIO-☐, H-CIO-A]	0140 ⋮ 0153	320 ⋮ 339	R/W	C	−10.0 to +10.0 % of span	0.0
Control response parameters ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	0154 ⋮ 0167	340 ⋮ 359	R/W	C	0: Slow 1: Medium 2: Fast In order to perform PID control by using the fuzzy function, specify “Fast.” The fuzzy function is effective to restrict overshoot or undershoot occurring at operation start, or resulting from set value changes. (Fuzzy function correspond to H-TIO-P/R module only.)	0 *

* Heat control (H-TIO-☐/H-CIO-A): 0
Heat/cool control (H-TIO-☐/H-CIO-A): 2
Position proportioning control (H-TIO-K): 0
Speed control (H-SIO-A): 0

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Alarm 1 set value ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	0168 ⋮ 017B	360 ⋮ 379	R/W	C	TC/RTD input: Within input range or span range Current/voltage input, H-SIO-A: Within display scale range or span range	See Factory set value table of Alarm 1/ Alarm 2 set value [a]
Alarm 2 set value ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	017C ⋮ 018F	380 ⋮ 399	R/W	C		
Heater break alarm set value 1 [H-TIO-A/C/D]	0190 ⋮ 01A3	400 ⋮ 419	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A For the current tramsformer (CT) input of the H-TIO-A/C/D module	0.0
Heater break alarm set value 2 (CH1 to CH20) [H-CT-A]	01A4 ⋮ 01B7	420 ⋮ 439	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A For the current tramsformer (CT) input of the H-CT-A module	0.0
Operation mode transfer [H-TIO-☐, H-CIO-A, H-SIO-A]	01B8 ⋮ 01CB	440 ⋮ 459	R/W	C	0: Unused If set to "Unused," no control, monitor or alarm monitor is performed. 1: Monitor If set to "Monitor," only the monitor is performed. No control or alarm monitor is performed. 2: Alarm If set to "Alarm," monitor or alarm monitor is performed. No control is performed. 3: Normal Selected to normal mode to perform control, monitor or alarm monitor.	3
Heat-side proportioning cycle time [H-TIO-☐, H-CIO-A]	01CC ⋮ 01DF	460 ⋮ 479	R/W	C	1 to 100 seconds Setting will be invalid in current/voltage output.	20 [b]
Cool-side proportioning cycle time [H-TIO-☐, H-CIO-A]	01E0 ⋮ 01F3	480 ⋮ 499	R/W	C	1 to 100 seconds Setting will be invalid in current/voltage output and heat control.	20 [b]

[a] Factory set value table of Alarm 1/Alarm 2 set value

Input type	Alarm type	Alarm 1 set value	Alarm 2 set value
TC/RTD input	Process high alarm	Input range (high limit)	Input range (high limit)
	Process low alarm	Input range (low limit)	Input range (low limit)
	Deviation high alarm, Deviation high/low alarm, Band alarm	50 °C *	50 °C *
	Deviation low alarm	–50 °C *	–50 °C *
	No alarm function	Input range (high limit)	Input range (low limit)
Current/voltage input H-SIO-A	Process high alarm	100 (100.0) %	100 (100.0) %
	Process low alarm	0 (0.0) %	0 (0.0) %
	Deviation high alarm, Deviation high/low alarm, Band alarm	50 (50.0) %	50 (50.0) %
	Deviation low alarm	–50 (–50.0) %	–50 (–50.0) %
	No alarm function	100 (100.0) %	100 (100.0) %

* The position of the decimal point differs depending on the input range.

[b] Relay contact output: 20 seconds
Voltage pulse output, Open collector output, Triac output: 2 seconds

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Auto/Manual transfer [H-TIO-☐, H-CIO-A]	01F4 ⋮ 0207	500 ⋮ 519	R/W	C	0: Auto 1: Manual Setting will be invalid in ON/OFF control and heat/cool control.	0
Manual output value [H-TIO-☐, H-CIO-A]	0208 ⋮ 021B	520 ⋮ 539	R/W	C	–5.0 to +105.0 % Setting will be invalid in ON/OFF control and heat/cool control. H-TIO-C/D [Z-1017 specification]: –105.0 to 0.0 % (cool-side) 0.0 to +105.0 % (heat-side)	0.0
LBA use selection [H-TIO-☐, H-CIO-A]	021C ⋮ 022F	540 ⋮ 559	R/W	C	0: Unused 1: Used	0
LBA time [H-TIO-☐, H-CIO-A]	0230 ⋮ 0243	560 ⋮ 579	R/W	C	1 to 7200 seconds	480
LBA deadband [H-TIO-☐, H-CIO-A]	0244 ⋮ 0257	580 ⋮ 599	R/W	C	Input span The position of the decimal point differs depending on the input range.	0
PV bias [H-TIO-☐, H-CIO-A, H-SIO-A]	0258 ⋮ 026B	600 ⋮ 619	R/W	C	–5.00 to +5.00 % of span ZK-1103 specification: –Input span to +Input span Unit (°C, °F, etc.) and decimal point position (No decimal place, One decimal place, Two decimal places or Three decimal places) depends on input range type.	0.00 ZK-1103: 0
Temperature rise completion range [H-TIO-☐, H-CIO-A]	026C ⋮ 027F	620 ⋮ 639	R/W	C	1 to 10 °C or 1 to 20 °F The position of the decimal point differs depending on the input range.	10 [a]
Temperature rise completion trigger [H-TIO-☐, H-CIO-A]	0280 ⋮ 0293	640 ⋮ 659	R/W	C	0: Unused 1: Used [b] Do not set “1: Used” in H-TIO-H/J module and H-SIO-A module, because temperature rise completion is not judged.	0
CT channel setting (CH1 to CH20) [H-CT-A]	0294 ⋮ 02A7	660 ⋮ 679	R/W	C	0 to 20 (0: Unused) Allocates the channels for H-TIO-☐ module to the input channels of H-CT-A module.	The factory set value varies depending on the specifications when ordering.
Unused	02A8 ⋮ 02BB	680 ⋮ 699	—	—	—	—
Control RUN/STOP transfer [H-PCP-J]	02BC	700	R/W	U	0: Control STOP 1: Control RUN	0

[a] TC/RTD input: 10 °C or 20 °F
Current/voltage input, H-SIO-A: 10 % of display scale

[b] If the channel of each of the H-TIO-H/J and H-SIO-A modules is set “1: Used,” it does no reach the completion of temperature rise. As a result, the state of this completion (control unit) which is judged by performing the *OR* operation of all the channels cannot be attained, thereby continuing the incompletion of temperature rise.

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Memory area number [H-TIO-☐, H-CIO-A, H-SIO-A]	02BD	701	R/W	U	1 to 8	1
Temperature rise completion soak time [H-TIO-☐, H-CIO-A]	02BE	702	R/W	U	0 to 360 minutes	0
Module initialization * [H-PCP-J]	02BF	703	R/W	U	0: Normal state (Initialization is not executed) 1: Initialize only the new module (Only modules which are not recognized by the H-PCP-J module are initialized) 2: Initialize all modules Returns to 0 after the module is initialized.	0
Alarm interlock release [H-TIO-☐, H-CIO-A, H-TI-☐, H-AI-☐]	02C0	704	WO	U	1: Release (1 only)	—
Unused	02C1 ⋮ 02CF	705 ⋮ 719	—	—	—	—
CT channel setting (CH21 to CH60) [H-CT-A]	02D0 ⋮ 02F7	720 ⋮ 759	R/W	C	0 to 20 (0: Unused) Allocates the channels for H-TIO-☐ module to the input channels of H-CT-A module.	The factory set value varies depending on the specifications when ordering.
Cascade ON/OFF [H-CIO-A]	02F8 ⋮ 030B	760 ⋮ 779	R/W	C	0: OFF 1: ON Setting will be valid in master channel.	0
Cascade gain [H-CIO-A]	030C ⋮ 031F	780 ⋮ 799	R/W	C	–9.999 to +10.000 As the cascade gain is valid only in the slave channel, the polling or selecting of the same value is made also in the master channel.	1.000
Cascade bias [H-CIO-A]	0320 ⋮ 0333	800 ⋮ 819	R/W	C	–99.99 to +100.00 % As the cascade bias is valid only in the slave channel, the polling or selecting of the same value is made also in the master channel.	–50.00
Positioning output neutral zone [H-TIO-K]	0334 ⋮ 0347	820 ⋮ 839	R/W	C	0.1 to 10.0 % of motor time	2.0
Motor time [H-TIO-K]	0348 ⋮ 035B	840 ⋮ 859	R/W	C	5 to 1000 seconds	10

* Initialize method for changing the module composition
To change module configuration, use the following procedures:

- When a module is added to the control unit..... Initialize only the new module
- When a module is deleted from the control unit ..... Initialize only the new module
- When a module is inserted (Added) between the modules in the control unit ..... Initialize all modules
- To change the arrangement of the modules in the control unit ..... Initialize all modules

Note that when all modules are initialized all internal data of all modules are set to the default values.

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Integrated output limiter [H-TIO-K]	035C ⋮ 036F	860 ⋮ 879	R/W	C	100.0 to 200.0 % of motor time	150.0
Manual positioning output value [H-TIO-K]	0370 ⋮ 0383	880 ⋮ 899	R/W	C	–5.0 to +105.0 %	0.0
Heater break alarm set value 2 (CH21 to CH60) [H-CT-A]	0384 ⋮ 03AB	900 ⋮ 939	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A Current tramsformer (CT) input measured value of the H-CT-A module	0.0
Unused	03AC ⋮ 03E7	940 ⋮ 999	—	—	—	—
Setting change rate limiter ◆ [H-TIO-☐, H-CIO-A, H-SIO-A]	03E8 ⋮ 03FB	1000 ⋮ 1019	R/W	C	0.0 to 100.0 % of span/minute	0.0
Output limiter (high) [For heat/cool control: Heat-side output limiter (high)] [H-TIO-☐, H-CIO-A, H-SIO-A]	03FC ⋮ 040F	1020 ⋮ 1039	R/W	C	[Heat control, Position proportioning control and Speed control] Output limiter (low) to 105.0 % [Heat/cool control] Heat-side output limiter (high): –5.0 % to +105.0 % Heat-side output limiter (low): –5.0 % (fixed)	100.0 [a]
Output limiter (low) [For heat/cool control: Cool-side output limiter (high)] [H-TIO-☐, H-CIO-A, H-SIO-A]	0410 ⋮ 0423	1040 ⋮ 1059	R/W	C	[Heat control, Position proportioning control and Speed control] –5.0 % to Output limiter (high) [Heat/cool control] Cool-side output limiter (high): –5.0 % to +105.0 % Cool-side output limiter (low): –5.0 % (fixed)	0.0 [b]
Output change rate limiter (up) [H-TIO-☐, H-CIO-A, H-SIO-A]	0424 ⋮ 0437	1060 ⋮ 1079	R/W	C	0.0 to 100.0 %/second (0.0: OFF) Setting will be invalid in ON/OFF control.	0.0
Output change rate limiter (down) [H-TIO-☐, H-CIO-A, H-SIO-A]	0438 ⋮ 044B	1080 ⋮ 1099	R/W	C		0.0
Display scale high [H-TIO-H/J, H-CIO-A, H-SIO-A]	044C ⋮ 045F	1100 ⋮ 1119	R/W	C	Span 10000 or less (Within –9999 to +10000) The position of the decimal point differs depending on Decimal point position setting.	H-TIO-H/J, H-CIO-A: 100.0 H-SIO-A: 300
Display scale low [H-TIO-H/J, H-CIO-A, H-SIO-A]	0460 ⋮ 0473	1120 ⋮ 1139	R/W	C	Span 10000 or less (Within –9999 to +10000) The position of the decimal point differs depending on Decimal point position setting.	H-TIO-H/J, H-CIO-A: 0.0 H-SIO-A: 0

[a] Heat control (H-TIO-☐/H-CIO-A): 100.0
Position proportioning control (H-TIO-K): 100.0
Heat/cool control (H-TIO-☐/H-CIO-A): 100.0
Speed control (H-SIO-A): 100

[b] Heat control (H-TIO-☐/H-CIO-A): 0.0
Position proportioning control (H-TIO-K): 0.0
Heat/cool control (H-TIO-☐/H-CIO-A): 100.0
Speed control (H-SIO-A): 0

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Digital filter [H-TIO-□, H-CIO-A, H-SIO-A]	0474 ⋮ 0487	1140 ⋮ 1159	R/W	C	H-TIO-A/B/C/D/K/P 0 to 100 seconds (0: OFF) H-TIO-E/F/G/H/J/R, H-CIO-A, H-SIO-A 0.0 to 100.0 seconds (0.0: OFF)	0 or 0.0
H-SIO-A control range [H-SIO-A]	0488 ⋮ 049B	1160 ⋮ 1179	R/W	C	0.00 to 50.00 %	10.00
H-SIO-A input frequency at full scale [H-SIO-A]	049C ⋮ 04AF	1180 ⋮ 1199	R/W	C	10 to 50000 Hz	130
H-SIO-A output scale high [H-SIO-A]	04B0 ⋮ 04C3	1200 ⋮ 1219	R/W	C	H-SIO-A output scale low to 10000 The position of the decimal point differs depending on Decimal point position setting.	400
H-SIO-A output scale low [H-SIO-A]	04C4 ⋮ 04D7	1220 ⋮ 1239	R/W	C	–9999 to H-SIO-A output scale high The position of the decimal point differs depending on Decimal point position setting.	0
H-SIO-A correction trigger [H-SIO-A]	04D8 ⋮ 04EB	1240 ⋮ 1259	R/W	C	0: Normal (Not executed) 1: Correction executed 2: Correction canceled Processing time of correction execution or cancel is about 1 second. Do not turn OFF the power during the processing time. In addition, maintain the setting more than 0.5 second in order to let it recognize modification in setting modification.	0
H-SIO-A correction actual measured value [H-SIO-A]	04EC ⋮ 04FF	1260 ⋮ 1279	R/W	C	Within display scale range The position of the decimal point differs depending on Decimal point position setting.	0
H-SIO-A measuring method [H-SIO-A]	0500 ⋮ 0513	1280 ⋮ 1299	R/W	C	0: Periodic computation method 1: Pulse count method	0
H-SIO-A divide ratio [H-SIO-A]	0514 ⋮ 0527	1300 ⋮ 1319	R/W	C	1 to 1000 Effective only for periodic computation method.	10
H-SIO-A gate time [H-SIO-A]	0528 ⋮ 053B	1320 ⋮ 1339	R/W	C	0.1 to 4.0 seconds Effective only for pulse count method.	1.0
H-SIO-A auto zero time [H-SIO-A]	053C ⋮ 054F	1340 ⋮ 1359	R/W	C	1 to 100 seconds	5
H-SIO-A open/closed loop control transfer [H-SIO-A]	0550 ⋮ 0563	1360 ⋮ 1379	R/W	C	0: Closed loop control (PID control) 1: Open loop control	0
H-SIO-A alarm hold cancel time [H-SIO-A]	0564	1380	R/W	U	1 to 255 seconds Setting will be invalid in no alarm hold action.	60
Unused	0565 ⋮ 0577	1381 ⋮ 1399	—	—	—	—

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Decimal point position [H-TIO-H/J, H-CIO-A, H-SIO-A]	0578 ⋮ 058B	1400 ⋮ 1419	R/W	C	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places	H-TIO-H/J, H-CIO-A: 1 H-SIO-A: 0
Input range number [H-TIO-☐, H-CIO-A, H-SIO-A]	058C ⋮ 059F	1420 ⋮ 1439	R/W	C	H-TIO-A/B/C/D/K/P: 0 to 63 H-TIO-E/F/G/R, H-CIO-A: 0 to 120 H-TIO-H/J, H-CIO-A: 0 to 12 H-SIO-A: 0 (Fixed) If the input range number is changed, all of the settings corresponding to the channels in the relevant module return to the default values. See ■ **Input range table (P. 75)**.	The factory set value varies depending on the specifications when ordering.
Setting limiter (high) [H-TIO-☐, H-CIO-A, H-SIO-A]	05A0 ⋮ 05B3	1440 ⋮ 1459	R/W	C	TC/RTD input: Setting limiter (low) to Input range (high)	Input range (high)
					Current/voltage input, H-SIO-A: Setting limiter (low) to Display scale high	Display scale high
Setting limiter (low) [H-TIO-☐, H-CIO-A, H-SIO-A]	05B4 ⋮ 05C7	1460 ⋮ 1479	R/W	C	TC/RTD input: Input range (low) to Setting limiter (high)	Input range (low)
					Current/voltage input, H-SIO-A: Display scale low to Setting limiter (high)	Display scale low
Input error determination point (high) [H-TIO-☐, H-CIO-A, H-SIO-A]	05C8 ⋮ 05DB	1480 ⋮ 1499	R/W	C	TC/RTD input: Within input range	Input range (high)
					Current/voltage input, H-SIO-A: Within display scale range	Display scale high
Input error determination point (low) [H-TIO-☐, H-CIO-A, H-SIO-A]	05DC ⋮ 05EF	1500 ⋮ 1519	R/W	C	TC/RTD input: Within input range	Input range (low)
					Current/voltage input, H-SIO-A: Within display scale range	Display scale low
Action at input error (high) [H-TIO-☐, H-CIO-A, H-SIO-A]	05F0 ⋮ 0603	1520 ⋮ 1539	R/W	C	0: Normal control 1: Manipulated output value at input error	0 *
Action at input error (low) [H-TIO-☐, H-CIO-A, H-SIO-A]	0604 ⋮ 0617	1540 ⋮ 1559	R/W	C	0: Normal control 1: Manipulated output value at input error	0
AT bias [H-TIO-☐, H-CIO-A, H-SIO-A]	0618 ⋮ 062B	1560 ⋮ 1579	R/W	C	Within ± input span range The position of the decimal point differs depending on the input range.	0
ON/OFF control differential gap (upper) [H-TIO-☐, H-CIO-A, H-SIO-A]	062C ⋮ 063F	1580 ⋮ 1599	R/W	C	0.00 to 10.00 % of span	0.02
ON/OFF control differential gap (lower) [H-TIO-☐, H-CIO-A, H-SIO-A]	0640 ⋮ 0653	1600 ⋮ 1619	R/W	C	0.00 to 10.00 % of span	0.02
Manipulated output value at input error [H-TIO-☐, H-CIO-A, H-SIO-A]	0654 ⋮ 0667	1620 ⋮ 1639	R/W	C	–5.0 to +105.0 % (Heat control, Position proportioning control, Speed control) –105.0 to +105.0 % (Heat/cool control)	0.0

* Heat control (H-TIO-☐/H-CIO-A): 0 Heat/cool control (H-TIO-☐/H-CIO-A): 1
Position proportioning control (H-TIO-K): 0 Speed control (H-SIO-A): 0

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Direct/Reverse action selection [H-TIO-☐, H-CIO-A, H-SIO-A]	0668 ⋮ 067B	1640 ⋮ 1659	R/W	C	0: Direct action 1: Reverse action If the Direct/Reverse action selection is changed, all of the settings corresponding to the channels in the relevant module return to the default values. Setting will be invalid in heat/cool control.	The factory set value varies depending on the specifications when ordering.
Hot/Cold start selection [H-TIO-☐, H-CIO-A, H-SIO-A]	067C ⋮ 068F	1660 ⋮ 1679	R/W	C	0: Hot start At restarting Operation mode → Same as mode before the power failure Output value → Same as value before the power failure 1: Cold start At restarting Operation mode → Same as mode before the power failure Output value → Output limiter (low)	1
Start determination point [1] [H-TIO-☐, H-CIO-A]	0690 ⋮ 06A3	1680 ⋮ 1699	R/W	C	0.0 to 100.0 % of span (Deviation setting from the temperature set value) Setting will be invalid in H-SIO-A module.	3.0
Control RUN/STOP holding [2] [H-PCP-J]	06A4	1700	R/W	U	0: Not hold Start-up from control stop status 1: Hold Start-up from before the stop status 2: Start-up from control run status	1
Temperature rise completion hold function [H-PCP-J]	06A5	1701	R/W	U	0: Not hold 1: Hold	1
Interval time setting COM. PORT1/ COM. PORT2 [H-PCP-J]	06A6	1702	R/W	U	0 to 100 ms	1
Interval time setting COM. PORT3 [H-PCP-J]	06A7	1703	R/W	U	0 to 100 ms	1

[1] On restarting after power failure, if the temperature measured value (PV) is within the setting range by the start determination points, the hot start will definitely be carried out. If the temperature measured value (PV) is outside this range, the operation will begin with the start condition with was selected by the hot/cold start selection.

[2] Action after power-ON differs depending on control RUN/STOP holding setting.

Control RUN/STOP holding	Status after power-ON	
	Operation mode transfer	Control RUN/STOP transfer
0: Not hold	Same as mode before the power failure	"0: Control STOP" Stopped until "1: Control RUN" is instructed from the PLC or host computer.
1: Hold	Same as mode before the power failure	Same as status before the power failure Control before power failure is maintained even if no PLC or host computer is connected.
2: Start-up from control run status	"1: Monitor" mode However if the operation mode is set to "0: Unused," "0: Unused" remains unchanged.	"1: Control RUN" However, no control is performed until the operation mode is set to "3: Normal (perform control)."

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
PLC scanning time setting [a] [H-PCP-J]	06A8	1704	R/W	U	0 to 3000 ms	10
Power supply frequency selection [H-PCP-J]	06A9	1705	R/W	U	0: 50 Hz 1: 60 Hz	0
H-PCP-J module DO de-energized selection [H-PCP-J]	06AA	1706	R/W	U	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: CH1 (DO1) bit 1: CH2 (DO2) bit 2: CH3 (DO3) bit 3: CH4 (DO4) bit 4: CH5 (DO5) bit 5: CH6 (DO6) bit 6: CH7 (DO7) bit 7: CH8 (DO8) bit 8 to 15: Unused Data 0: Energized 1: De-energized [Decimal number: 0 to 255]	0
Number of HBA trigger points [H-CT-A]	06AB	1707	R/W	U	0 to 255 times	5
PV bias unit selection [H-TIO-☐, H-CIO-A, H-SIO-A]	06AC	1708	R/W	U	0: % (of span) 1: Unit of input range	0 [b]
Integral time limiter at AT end [H-TIO-☐, H-CIO-A, H-SIO-A]	06AD	1709	R/W	U	1 to 3600 seconds Setting will be valid in heat/cool control.	3600
Unused	06AE ⋮ 06B7	1710 ⋮ 1719	—	—	—	—
Alarm 1 differential gap [H-TIO-☐, H-CIO-A, H-SIO-A]	06B8	1720	R/W	U	0.00 to 10.00 % of span	0.10
Alarm 2 differential gap [H-TIO-☐, H-CIO-A, H-SIO-A]	06B9	1721	R/W	U	0.00 to 10.00 % of span	0.10
Alarm 1 type selection [H-TIO-☐, H-CIO-A, H-SIO-A]	06BA	1722	R/W	U	0: Process high alarm 1: Process low alarm 2: Deviation high alarm 3: Deviation low alarm 4: Deviation high/low alarm 5: Band alarm 6: No alarm function	The factory set value varies depending on the specifications when ordering.

[a] Set the PLC scanning time (time of waiting for a response from the PLC) so as to adapt to the environment used.
Setting example: Set PLC scanning time to any value more than twice as long as the maximum scanning time of PLC.

If PLC scanning time is extremely short (When at a factory set value of 10 ms as an example), the SR Mini HG SYSTEM may detect the time-out not conducting normal communication processing.
The maximum scanning time of PLC differs depending on the CPU processing speed, I/O unit configuration and the user program capacity of the PLC.

[b] For the ZK-1103 specification, the factory set value is 1 (Unit of input range).

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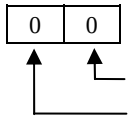
Name	Modbus address		Attri-bute	Struc-ture	Data range	Factory set value
	HEX	DEC				
Alarm 2 type selection [H-TIO-☐, H-CIO-A, H-SIO-A]	06BB	1723	R/W	U	0: Process high alarm 1: Process low alarm 2: Deviation high alarm 3: Deviation low alarm 4: Deviation high/low alarm 5: Band alarm 6: No alarm function	The factory set value varies depending on the specifications when ordering.
Alarm 1 hold action [H-TIO-☐, H-CIO-A, H-SIO-A]	06BC	1724	R/W	U	0: Not provided 1: Provided 2: Re-hold action Re-hold action will be valid in deviation alarm.	The factory set value varies depending on the specifications when ordering.
Alarm 2 hold action [H-TIO-☐, H-CIO-A, H-SIO-A]	06BD	1725	R/W	U		
Alarm 1 interlock [H-TIO-☐, H-CIO-A, H-SIO-A]	06BE	1726	R/W	U	0: Not provided 1: Provided	0
Alarm 2 interlock [H-TIO-☐, H-CIO-A, H-SIO-A]	06BF	1727	R/W	U		
Alarm 1 action at input error [H-TIO-☐, H-CIO-A, H-SIO-A]	06C0	1728	R/W	U	0: Normal alarm action 1: Forced alarm ON when temperature measured value exceeds abnormal input trigger input.	0
Alarm 2 action at input error [H-TIO-☐, H-CIO-A, H-SIO-A]	06C1	1729	R/W	U		
Number of alarm delay times [H-TIO-☐, H-CIO-A, H-SIO-A]	06C2	1730	R/W	U	0 to 255 times	0
Unused	06C3 ⋮ 06CB	1731 ⋮ 1739	—	—	—	—
DO function selection [H-DO-A/B/D]	06CC ⋮ 06D5	1740 ⋮ 1749	R/W	M	00～88 *	The factory set value varies depending on the specifications when ordering.

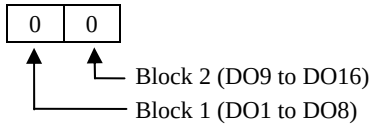
* DO function selection (H-DO-A/B/D module)

H-DO-A/B module



Setting will be valid for only block 1 (DO1 to DO4) in case of H-DO-B module.

H-DO-D module



Data range
- 0: No alarm function
- 1: Alarm 1
- 2: Alarm 2
- 3: Burnout
- 4: Heater break alarm (HBA)
- 5: AI alarm 1
- 6: AI alarm 2
- 7: Control loop break alarm (LBA)
- 8: (Not settable)

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Unused	06D6 ⋮ 06DF	1750 ⋮ 1759	—	—	—	—
DI function selection [H-DI-A]	06E0 ⋮ 06E9	1760 ⋮ 1769	R/W	M	0: Unused 1: Function mode 1 – Memory area transfer (ENABLE terminal is used) After area selection setting, the actual area is changed by detecting the ENABLE edge. – Control RUN/STOP transfer – Alarm interlock release 2: Function mode 2 – Memory area transfer The actual area is changed approximately 2 seconds after area selection setting. – Control RUN/STOP transfer – Alarm interlock release	1
Unused	06EA ⋮ 06F3	1770 ⋮ 1779	—	—	—	—
DI using selection [H-DI-A]	06F4 ⋮ 06FD	1780 ⋮ 1789	R/W	M	0 to 255 *	255
Unused	06FE ⋮ 0707	1790 ⋮ 1799	—	—	—	—

* DI using selection (H-DI-A module) ×: Used –: Unused

Setting data	Memory area transfer	Control RUN/STOP transfer	Alarm interlock release
63	×	×	×
127			
191			
255			
48	–	×	×
47	×	–	×
32	–	–	×
31	×	×	–
16	–	×	–
15	×	–	–
0	–	–	–

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Name	Modbus address		Attri-bute	Struc-ture	Data range	Factory set value
	HEX	DEC				
H-PCP-J module DO type selection (CH1 to CH8) [H-PCP-J]	0708 ⋮ 070F	1800 ⋮ 1807	R/W	C	0: No alarm function 1: Alarm 1/TI alarm 1 2: Alarm 2/TI alarm 2 3: Burnout 4: Heater break alarm (HBA) 5: Temperature rise completion output 6: AI alarm 1 7: AI alarm 2 8: Control loop break alarm (LBA) 9: FAIL output 10: PLC communication status [Action] 1 to 4, 6 to 8: Closed at alarm occurrence 5: Closed at temperature rise completion 9: Open at fail occurrence 10: Closed at communication with PLC Be action of energized case. Action reverses in case of de-energized. (For the energize/de-energized, see H-PCP-J module DO de-energized selection.)	CH1: 9 CH2: 1 CH3: 2 CH4: 3 CH5: 4 CH6: 5 CH7: 8 CH8: 10
Unused	0710 ⋮ 071B	1808 ⋮ 1819	—	—	—	—
Cascade tracking [H-CIO-A]	071C ⋮ 0725	1820 ⋮ 1829	R/W	M	0: Not provided Cascade monitored value becomes zero. 1: Provided Cascade monitored value just before is hold.	0
Unused	0726 ⋮ 072F	1830 ⋮ 1839	—	—	—	—
Cascade data selection [H-CIO-A]	0730 ⋮ 0739	1840 ⋮ 1849	R/W	M	0: Manipulated outpur value 1: Temperature measured value (PV) 2: Temperature set value (SV) 3: Set value monitor 4: Temperature deviation	0
Unused	073A ⋮ 0743	1850 ⋮ 1859	—	—	—	—

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Cascade DI function selection [H-CIO-A]	0744 ⋮ 074D	1860 ⋮ 1869	R/W	M	0: Unused 1: Cascade control ON/OFF only 2: Auto/Manual transfer only 3: DI1 valid (Cascade control ON/OFF), DI2 valid (Auto/Manual transfer)	3
DI process selection * [H-SIO-A]					0: Unused 1: H-SIO-A open/closed loop control transfer only 2: Control RUN/STOP transfer only 3: H-SIO-A open/closed loop control transfer and Control RUN/STOP transfer	3
Unused	074E ⋮ 0757	1870 ⋮ 1879	—	—	—	—
Positioning adjustment counter (CH1 to CH8) [H-TIO-K]	0758 ⋮ 076B	1880 ⋮ 1899	R/W	C	0 to 100 The opening adjustment and the motor time are taken in. When the specified setting counter value is input, the operations begin. (This is only valid when control is stopped.) For details of data item, see ■ **Positioning adjustment counter (P. 71)**.	0
Unused	076C ⋮ 085B	1900 ⋮ 2139	—	—	—	—
H-CT-A module heater break alarm state (CH1 to CH60) [H-CT-A]	085C ⋮ 0897	2140 ⋮ 2199	RO	C	0: Normal 1: Break 2: Welding	—
H-DI-A module input state [H-DI-A]	0898 ⋮ 08A1	2200 ⋮ 2209	RO	M	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: CH1 (DI1) bit 1: CH2 (DI2) bit 2: CH3 (DI3) bit 3: CH4 (DI4) bit 4: CH5 (DI5) bit 5: CH6 (DI6) bit 6: CH7 (DI7) bit 7: CH8 (DI8) bit 8 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	—

* DI process selection setting or communication setting ×: Valid –: Invalid

Transfer by external contact input	Transfer via communication	
DI process selection	H-SIO-A open/closed loop control transfer	Control RUN/STOP transfer
0: Unused	×	×
1: H-SIO-A open/closed loop control transfer only	–	×
2: Control RUN/STOP transfer only	×	–
3: H-SIO-A open/closed loop control transfer and Control RUN/STOP transfer	–	–

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Unused	08A2 ⋮ 08AB	2210 ⋮ 2219	—	—	—	—
Cascade monitor [H-CIO-A]	08AC ⋮ 08BF	2220 ⋮ 2239	RO	C	± Input span Data will be valid in slave channel	—
Positioning monitor [H-TIO-K]	08C0 ⋮ 08D3	2240 ⋮ 2259	RO	C	–5.0 to +105.0 %	—
Unused	08D4 ⋮ 0BB7	2260 ⋮ 2999	—	—	—	—
H-DO-G manipulated output value (CH1 to CH160) [H-DO-G]	0BB8 ⋮ 0C57	3000 ⋮ 3159	RO	C	–5.0 to +105.0 %	—
H-DO-G output limiter (high) (CH1 to CH160) [H-DO-G]	0C58 ⋮ 0CF7	3160 ⋮ 3319	R/W	C	Output limiter (low) to 105.0 %	100.0
H-DO-G output limiter (low) (CH1 to CH160) [H-DO-G]	0CF8 ⋮ 0D97	3320 ⋮ 3479	R/W	C	–5.0 % to Output limiter (high)	0.0
H-DO-G output cycle time (CH1 to CH160) [H-DO-G]	0D98 ⋮ 0E37	3480 ⋮ 3639	R/W	C	1 to 100	2
H-DO-G master channel setting (CH1 to CH160) [H-DO-G]	0E38 ⋮ 0ED7	3640 ⋮ 3799	R/W	C	0 to The number of H-TIO-□ module use channel (0: Unused)	0
H-DO-G output ratio set value (CH1 to CH160) [H-DO-G]	0ED8 ⋮ 0F77	3800 ⋮ 3959	R/W	C	0.001 to 9.999	1.00
H-DO-G Auto/Manual transfer (CH1 to CH160) [H-DO-G]	0F78 ⋮ 1017	3960 ⋮ 4119	R/W	C	0: Auto 1: Manual Setting will be invalid in ON/OFF control and heat/cool control.	0
H-DO-G manual output value (CH1 to CH160) [H-DO-G]	1018 ⋮ 10B7	4120 ⋮ 4279	R/W	C	–5.0 to +105.0 % Setting will be invalid in ON/OFF control and heat/cool control.	0.0
Unused	10B8 ⋮ 1193	4280 ⋮ 4499	—	—	—	—
AI measured value (CH1 to CH40) [H-AI-A/B]	1194 ⋮ 11BB	4500 ⋮ 4539	RO	C	Within display scale range The position of the decimal point differs depending on AI decimal point position setting.	—

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
AI status (CH1 to CH40) [H-AI-A/B]	11BC ⋮ 11E3	4540 ⋮ 4579	RO	C	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: AI alarm 1 state bit 1: AI alarm 2 state bit 2 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 3]	—
AI alarm 1 set value (CH1 to CH40) [H-AI-A/B]	11E4 ⋮ 120B	4580 ⋮ 4619	R/W	C	Within display scale range The position of the decimal point differs depending on AI decimal point position setting.	Process high alarm: 100.0 Process low alarm: 0.0 No alarm function: 100.0
AI alarm 2 set value (CH1 to CH40) [H-AI-A/B]	120C ⋮ 1233	4620 ⋮ 4659	R/W	C		Process high alarm: 100.0 Process low alarm: 0.0 No alarm function: 0.0
AI zero point correction (CH1 to CH40) [H-AI-A/B]	1234 ⋮ 125B	4660 ⋮ 4699	R/W	C	0: Cancel 1: Execution	0
AI full scale correction (CH1 to CH40) [H-AI-A/B]	125C ⋮ 1283	4700 ⋮ 4739	R/W	C	0: Cancel 1: Execution	0
AI operation mode transfer (CH1 to CH40) [H-AI-A/B]	1284 ⋮ 12AB	4740 ⋮ 4779	R/W	C	0: Unused Neither monitor nor alarm monitor is done in this mode. 1: Normal mode Normal mode in which monitor and alarm are done.	1
AI input range number (CH1 to CH40) [H-AI-A/B]	12AC ⋮ 12D3	4780 ⋮ 4819	R/W	C	0: 0 to 10 mV DC 1: −10 to +10 mV DC 2: 0 to 100 mV DC 3: −100 to +100 mV DC 4: 0 to 1 V DC 5: −1 to +1 V DC 6: 0 to 5 V DC 7: 1 to 5 V DC 8: −5 to +5 V DC 9: 0 to 10 V DC 10: −10 to +10 V DC 11: 0 to 20 mA DC 12: 4 to 20 mA DC Voltage (low) input group: 0 to 8 Voltage (high) input group: 9 to 10 Current input group: 11 to 12 An input type change may only be made within the input groups. If the input range number is changed, all of the settings corresponding to the channels in the relevant module return to the default values.	The factory set value varies depending on the specifications when ordering.
AI display scale high (CH1 to CH40) [H-AI-A/B]	12D4 ⋮ 12FB	4820 ⋮ 4859	R/W	C	Span 10000 or less (Within −9999 to +10000) The position of the decimal point differs depending on AI decimal point position setting.	100.0

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
AI display scale low (CH1 to CH40) [H-AI-A/B]	12FC ⋮ 1323	4860 ⋮ 4899	R/W	C	Span 10000 or less (Within –9999 to +10000) The position of the decimal point differs depending on AI decimal point position setting.	0.0
AI decimal point position (CH1 to CH40) [H-AI-A/B]	1324 ⋮ 134B	4900 ⋮ 4939	R/W	C	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places	1
AI digital filter (CH1 to CH40) [H-AI-A/B]	134C ⋮ 1373	4940 ⋮ 4979	R/W	C	0.0 to 100.0 seconds (0.0: OFF)	0.0
AI moving average (CH1 to CH40) [H-AI-A/B]	1374 ⋮ 139B	4980 ⋮ 5019	R/W	C	0: Not provided 1: Provided	0
AI alarm 1 differential gap [H-AI-A/B]	139C	5020	R/W	U	0.00 to 10.00 % of span	0.10
AI alarm 2 differential gap [H-AI-A/B]	139D	5021	R/W	U		
AI alarm 1 type selection [H-AI-A/B]	139E	5022	R/W	U	0: Process high alarm 1: Process low alarm 2 to 6: No alarm function	The factory set value varies depending on the specifications when ordering.
AI alarm 2 type selection [H-AI-A/B]	139F	5023	R/W	U		
AI alarm 1 hold action [H-AI-A/B]	13A0	5024	R/W	U	0: Not provided 1: Provided	The factory set value varies depending on the specifications when ordering.
AI alarm 2 hold action [H-AI-A/B]	13A1	5025	R/W	U		
AI alarm 1 interlock [H-AI-A/B]	13A2	5026	R/W	U	0: Not provided 1: Provided	0
AI alarm 2 interlock [H-AI-A/B]	13A3	5027	R/W	U		
Number of AI alarm delay times [H-AI-A/B]	13A4	5028	R/W	U	0 to 255 times	0
Unused	13A5 ⋮ 13EB	5029 ⋮ 5099	—	—	—	—
TI measured value (CH1 to CH40) [H-TI-A/B/C]	13EC ⋮ 1413	5100 ⋮ 5139	RO	C	Within input range The position of the decimal point differs depending on the input range.	—
TI status (CH1 to CH40) [H-TI-A/B/C]	1414 ⋮ 143B	5140 ⋮ 5179	RO	C	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: TI alarm 1 state bit 1: TI alarm 2 state bit 2: TI burnout state bit 3 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 7]	—

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
TI alarm 1 set value (CH1 to CH40) [H-TI-A/B/C]	143C ⋮ 1463	5180 ⋮ 5219	R/W	C	Within input range The position of the decimal point differs depending on the input range.	The factory set value varies depending on the alarm type. *
TI alarm 2 set value (CH1 to CH40) [H-TI-A/B/C]	1464 ⋮ 148B	5220 ⋮ 5259	R/W	C		
TI_ PV bias (CH1 to CH40) [H-TI-A/B/C]	148C ⋮ 14B3	5260 ⋮ 5299	R/W	C	–5.00 to +5.00 % of span	0.00
TI operation mode transfer (CH1 to CH40) [H-TI-A/B/C]	14B4 ⋮ 14DB	5300 ⋮ 5339	R/W	C	0: Unused Neither monitor nor alarm monitor is done in this mode. 1: Normal mode Normal mode in which monitor and alarm are done.	1
TI input range number (CH1 to CH40) [H-TI-A/B/C]	14DC ⋮ 1503	5340 ⋮ 5379	R/W	C	0 to 120 If the input range number is changed, all of the settings corresponding to the channels in the relevant module return to the default values. See **Input range table (P. 75)**.	The factory set value varies depending on the specifications when ordering.
TI digital filter (CH1 to CH40) [H-TI-A/B/C]	1504 ⋮ 152B	5380 ⋮ 5419	R/W	C	0.0 to 100.0 seconds (0.0: OFF)	0.0
TI alarm 1 differential gap [H-TI-A/B/C]	152C	5420	R/W	U	0.00 to 10.00 % of span	0.10
TI alarm 2 differential gap [H-TI-A/B/C]	152D	5421	R/W	U		
TI alarm 1 type selection [H-TI-A/B/C]	152E	5422	R/W	U	0: Process high alarm 1: Process low alarm 2 to 6: No alarm function	The factory set value varies depending on the specifications when ordering.
TI alarm 2 type selection [H-TI-A/B/C]	152F	5423	R/W	U		
TI alarm 1 hold action [H-TI-A/B/C]	1530	5424	R/W	U	0: Not provided 1: Provided	The factory set value varies depending on the specifications when ordering.
TI alarm 2 hold action [H-TI-A/B/C]	1531	5425	R/W	U		
TI alarm 1 interlock [H-TI-A/B/C]	1532	5426	R/W	U	0: Not provided 1: Provided	0
TI alarm 2 interlock [H-TI-A/B/C]	1533	5427	R/W	U		
TI alarm 1 action at input error [H-TI-A/B/C]	1534	5428	R/W	U	0: Normal alarm action 1: Forced alarm ON when temperature measured value exceeds abnormal input trigger input.	0

* Process high alarm: Input range (high)
Process low alarm: Input range (low)
No alarm function: Input range (high) for TI alarm 1 set value or
Input range (low) for TI alarm 2 set value

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
TI alarm 2 action at input error [H-TI-A/B/C]	1535	5429	R/W	U	0: Normal alarm action 1: Forced alarm ON when temperature measured value exceeds abnormal input trigger input.	0
Number of TI alarm delay times [H-TI-A/B/C]	1536	5430	R/W	U	0 to 255 times	0
Unused	1537 ⋮ 157B	5431 ⋮ 5499	—	—	—	—
AO output value monitor (CH1 to CH40) [H-AO-A/B]	157C ⋮ 15A3	5500 ⋮ 5539	RO	C	Display scale range Data will be valid in manual mode. The position of the decimal point differs depending on AO decimal point position setting.	—
AO output set value (CH1 to CH40) [H-AO-A/B]	15A4 ⋮ 15CB	5540 ⋮ 5579	R/W	C		0.0
AO function selection (CH1 to CH40) [H-AO-A/B]	15CC ⋮ 15F3	5580 ⋮ 5619	R/W	C	0: Unused 1: Manual mode (outputs data given by the AO output set value) 2: Temperature measured value (PV) 3: Set value monitor 4: Temperature deviation value (deviation between the temperature measured value and set value monitor) 5: Heat-side manipulated output value 6: Cool-side manipulated output value 7: AI measured value 8: TI measured value 9: Opening monitor (2 to 9: Recorder output mode)	1
AO corresponding channel setting (CH1 to CH40) [H-AO-A/B]	15F4 ⋮ 161B	5620 ⋮ 5659	R/W	C	1 to 20 (TIO channel) 1 to 40 (AI and TI channel) Setting will be valid in recorder output mode.	1
AO zooming high limit (CH1 to CH40) [H-AO-A/B]	161C ⋮ 1643	5660 ⋮ 5699	R/W	C	AO zooming low limit to 100.0 % Setting will be valid in recorder output mode.	100.0
AO zooming low limit (CH1 to CH40) [H-AO-A/B]	1644 ⋮ 166B	5700 ⋮ 5739	R/W	C	0.0 % to AO zooming high limit Setting will be valid in recorder output mode.	0.0
AO zero point correction (CH1 to CH40) [H-AO-A/B]	166C ⋮ 1693	5740 ⋮ 5779	R/W	C	–5.00 to +5.00 %	0.00
AO full scale correction (CH1 to CH40) [H-AO-A/B]	1694 ⋮ 16BB	5780 ⋮ 5819	R/W	C	–5.00 to +5.00 %	0.00
AO display scale high (CH1 to CH40) [H-AO-A/B]	16BC ⋮ 16E3	5820 ⋮ 5859	R/W	C	Span 10000 or less The position of the decimal point differs depending on AO decimal point position setting.	100.0
AO display scale low (CH1 to CH40) [H-AO-A/B]	16E4 ⋮ 170B	5860 ⋮ 5899	R/W	C		0.0

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
AO decimal point position (CH1 to CH40) [H-AO-A/B]	170C ⋮ 1733	5900 ⋮ 5939	R/W	C	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places	1
AO output change rate limiter (CH1 to CH40) [H-AO-A/B]	1734 ⋮ 175B	5940 ⋮ 5979	R/W	C	0.0 to 100.0 %/second (0.0: OFF)	0.0
Unused	175C ⋮ 176F	5980 ⋮ 5999	—	—	—	—
Event DI contact input monitor [H-DI-B]	1770 ⋮ 1779	6000 ⋮ 6009	RO	M	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: CH1 (DI1) bit 1: CH2 (DI2) bit 2: CH3 (DI3) bit 3: CH4 (DI4) bit 4: CH5 (DI5) bit 5: CH6 (DI6) bit 6: CH7 (DI7) bit 7: CH8 (DI8) bit 8 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	—
Unused	177A ⋮ 1783	6010 ⋮ 6019	—	—	—	—
Event DI logic output monitor [H-DI-B]	1784 ⋮ 178D	6020 ⋮ 6029	RO	M	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: Logic output 1 bit 1: Logic output 2 bit 2: Logic output 3 bit 3: Logic output 4 bit 4: Logic output 5 bit 5: Logic output 6 bit 6: Logic output 7 bit 7: Logic output 8 bit 8 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	—
Unused	178E ⋮ 1797	6030 ⋮ 6039	—	—	—	—
Event DI logic input monitor [H-DI-B]	1798 ⋮ 17E7	6040 ⋮ 6119	RO	L	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: Logic input 1 bit 1: Logic input 2 bit 2: Logic input 3 bit 3: Logic input 4 bit 4 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 15]	—

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Event DI type selection 1 [H-DI-B]	17E8 ⋮ 1837	6120 ⋮ 6199	R/W	L	0 to 30 (17 to 30: Not settable) Set the type and corresponding channel of Event DI. Event DI uses it with logic input function. Each contact status can be monitored by the following data. Digital input (1 to 8): Event DI contact input monitor Logic input (1 to 4)/Logic section: Event DI logic input monitor Logic input (1 to 8): Event DI logic output monitor For details of data item, see ■ **Logic input function (P. 72)**.	0
Event DI type selection 2 [H-DI-B]	1838 ⋮ 1887	6200 ⋮ 6279	R/W	L		0
Event DI type selection 3 [H-DI-B]	1888 ⋮ 18D7	6280 ⋮ 6359	R/W	L		0
Event DI type selection 4 [H-DI-B]	18D8 ⋮ 1927	6360 ⋮ 6439	R/W	L		0
Event DI corresponding channel selection 1 [H-DI-B]	1928 ⋮ 1977	6440 ⋮ 6519	R/W	L	1 to 80 Set the type and corresponding channel of Event DI. Event DI uses it with logic input function. Each contact status can be monitored by the following data. Digital input (1 to 8): Event DI contact input monitor Logic input (1 to 4)/Logic section: Event DI logic input monitor Logic input (1 to 8): Event DI logic output monitor For details of data item, see ■ **Logic input function (P. 72)**.	1
Event DI corresponding channel selection 2 [H-DI-B]	1978 ⋮ 19C7	6520 ⋮ 6599	R/W	L		1
Event DI corresponding channel selection 3 [H-DI-B]	19C8 ⋮ 1A17	6600 ⋮ 6679	R/W	L		1
Event DI corresponding channel selection 4 [H-DI-B]	1A18 ⋮ 1A67	6680 ⋮ 6759	R/W	L		1
Event DI reversal selection 1 [H-DI-B]	1A68 ⋮ 1AB7	6760 ⋮ 6839	R/W	L	0: Normal 1: Reversal	0
Event DI reversal selection 2 [H-DI-B]	1AB8 ⋮ 1B07	6840 ⋮ 6919	R/W	L		0
Event DI reversal selection 3 [H-DI-B]	1B08 ⋮ 1B57	6920 ⋮ 6999	R/W	L		0
Event DI reversal selection 4 [H-DI-B]	1B58 ⋮ 1BA7	7000 ⋮ 7079	R/W	L		0
Event DI logic circuit selection [H-DI-B]	1BA8 ⋮ 1BF7	7080 ⋮ 7159	R/W	L	0: *AND* (1 active) 1: *NAND* (0 active) 2: *OR* (1 active) 3: *NOR* (0 active)	0
Event DI delay timer setting [H-DI-B]	1BF8 ⋮ 1C47	7160 ⋮ 7239	R/W	L	0 to 255 times	1
Unused	1C48 ⋮ 1C83	7240 ⋮ 7299	—	—	—	—

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Event DO state [H-DO-C]	1C84 ⋮ 1C8D	7300 ⋮ 7309	RO	M	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: CH1 (DO1) bit 1: CH2 (DO2) bit 2: CH3 (DO3) bit 3: CH4 (DO4) bit 4: CH5 (DO5) bit 5: CH6 (DO6) bit 6: CH7 (DO7) bit 7: CH8 (DO8) bit 8 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	—
Unused	1C8E ⋮ 1C97	7310 ⋮ 7319	—	—	—	—
Event DO manual output value [H-DO-C]	1C98 ⋮ 1CA1	7320 ⋮ 7329	R/W	M	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: CH1 (DO1) bit 1: CH2 (DO2) bit 2: CH3 (DO3) bit 3: CH4 (DO4) bit 4: CH5 (DO5) bit 5: CH6 (DO6) bit 6: CH7 (DO7) bit 7: CH8 (DO8) bit 8 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 255]	0
Unused	1CA2 ⋮ 1CAB	7330 ⋮ 7339	—	—	—	—
Event DO extension alarm set value [H-DO-C]	1CAC ⋮ 1CFB	7340 ⋮ 7419	R/W	C	TC/RTD input: Within input range or span range Current/voltage input, H-SIO-A: Within display scale range or span range The position of the decimal point differs depending on the input range.	0
Event DO function selection [H-DO-C]	1CFC ⋮ 1D4B	7420 ⋮ 7499	R/W	C	0 to 30 Set the function, corresponding channel and mode select of Event DO. Event DO uses it with event output function. For details of data item, see ■ **Event output function (P. 73)**.	0
Event DO corresponding channel setting [H-DO-C]	1D4C ⋮ 1D9B	7500 ⋮ 7579	R/W	C	1 to 40 Set the function, corresponding channel and mode select of Event DO. Event DO uses it with event output function. For details of data item, see ■ **Event output function (P. 73)**.	1

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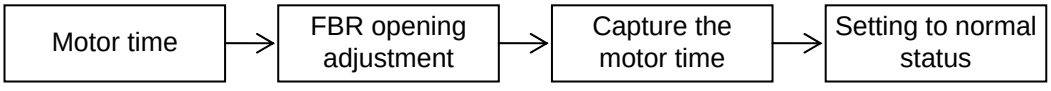
Name	Modbus address		Attri-bute	Struc-ture	Data range	Factory set value
	HEX	DEC				
Event DO mode select setting [H-DO-C]	1D9C ⋮ 1DEB	7580 ⋮ 7659	R/W	C	0 to 40 Set the function, corresponding channel and mode select of Event DO. Event DO uses it with event output function. For details of data item, see ■ **Event output function (P. 73)**.	0
Event DO extension alarm differential gap [H-DO-C]	1DEC	7660	R/W	U	0.00 to 10.00 %	0.10
Event DO extension alarm interlock [H-DO-C]	1DED	7661	R/W	U	0: Not provided 1: Provided	0
Number of Event DO extension alarm delay times [H-DO-C]	1DEE	7662	R/W	U	0 to 255 times	0

■ Positioning adjustment counter

Item	Setting data (Setting counter value)	Description	Status
Opening adjustment	0	Normal status	
	1	Opening adjustment star, open-side output start (Motor time: 110 %)	Automatic
	2	Capture the open-side opening value after 3 seconds stop	
	3	Close-side output start (Motor time: 110 %)	
	4	Capture the close-side opening value after 3 seconds stop	
	5	Above data stored in H-TIO-K module	
	6	Hold status	
Capture the motor time	7	Outputs the close-side until the positioning becomes 0 %. Open-side output start if the positioning is less than 0 %. Stops at an positioning of more than 100 %, and capture the motor time by H-TIO-K module	Automatic
	8	After the motor time has been captured, close-side output comes ON (Motor time: 110 %)	
	9	Hold status	
–	10 to 100	Not settable	

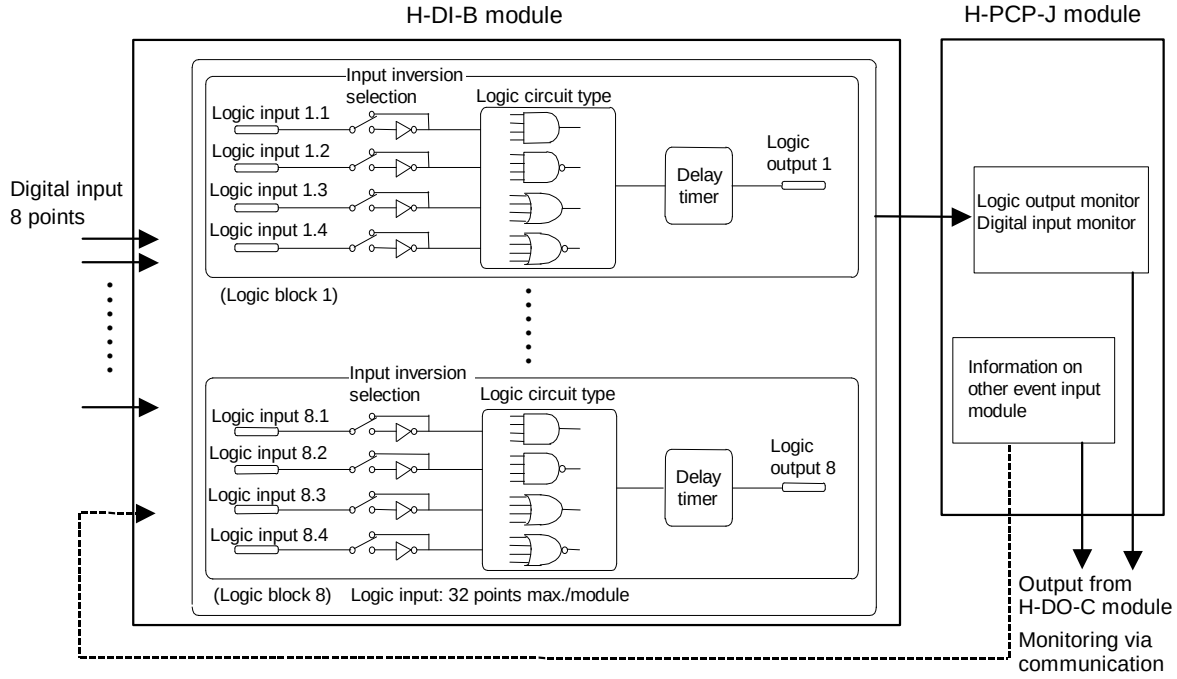
When you input setting counter 1, the opening adjustment starts, operations are carried out automatically up to setting counter 6, then the system goes on hold status. When you input setting counter 7, the motor time capture starts, operations are carried out automatically up to setting counter 9, then the system goes on hold status. After the settings are complete, always set to “0: Normal status.”

Always adjust the opening first and capture the motor time after the adjustment is complete.



■ Logic input function

Each logic is built by four event inputs. Up to eight logic results (logic outputs) per H-DI-B module can be monitored through communication or can be output from H-DO-C module. In addition, this function can assign the input of the H-DI-B module to any channel number of the H-DO-C module to output the result.
The logic section of event DI module consists of 4 logic input points, input reversal selection, logic circuit type selection, input delay timer and logic output.



Event DI type selection (Modbus address: 17E8H to 1927H)		Event DI corresponding channel selection (Modbus address: 1928H to 1A67)	Note	
Setting data	Description			
0	Input always OFF	—	Always ON at "Reversal" selection	
1	Event DI input	1 to 80	0: OFF	1: ON
2	Event DI logic output	1 to 80	0: OFF	1: ON
3	Event DO output	1 to 72	0: OFF	1: ON
4	PCP error code	—	0: Not provided	1: Provided
5	Temperature rise completion	—	0: Rise not complete	1: Rise completed
6	PID/AT logical *OR*	—	0: All PID	1: Any one is in AT
7	Alarm 1	1 to18	0: OFF	1: ON
8	Alarm 2	1 to18	0: OFF	1: ON
9	Burnout	1 to18	0: OFF	1: ON
10	Heater break alarm (HBA)	1 to18	0: OFF	1: ON
11	Control loop break alarm (LBA)	1 to18	0: OFF	1: ON
12	AI alarm 1	1 to 36	0: OFF	1: ON
13	AI alarm 2	1 to 36	0: OFF	1: ON
14	TI alarm 1	1 to 36	0: OFF	1: ON
15	TI alarm 2	1 to 36	0: OFF	1: ON
16	TI burnout	1 to 36	0: OFF	1: ON
17 to 30	Not settable	—	—	

Each contact status can be monitored by the following Modbus address.
Digital input 1 to 8 → Event DI contact input monitor (Modbus address: 1770H to 1779H)
Logic input 1 to 4/Logic section → Event DI logic input monitor (Modbus address: 1798H to 17E7H)
Logic output 1 to 8 → Event DI logic output monitor (Modbus address: 1784H to 178DH)

■ Event output function

The event output function enables up to eight points to be output per module of unique alarms different from ordinary temperature and AI alarms (Extension alarm output function), control unit operations (Status output function) and comparison results which are output only under certain conditions (Data comparison output function). The function can be set for each channel of the H-DO-C module.

● Extension alarm output function

An extension alarm is output independently of H-TIO-□ module alarms. As it is independently set, it can be provided as a dedicated alarm output.

Event DO function selection (Modbus address: 1CFCH to 1D4BH)		Event DO corresponding channel setting (Modbus address: 1D4CH to 1D9BH)	Event DO mode select setting (Modbus address: 1D9CH to 1DEBH)
Setting data	Function name		
10	Temperature deviation alarm	1 to 20 CH (H-TIO-□ module)	0: High alarm 1: Low alarm 2: High/low alarm 3: Band alarm 4: High alarm with hold action 5: Low alarm with hold action 6: High/low alarm with hold action 7: Band alarm with hold action 8: High alarm with re-hold action 9: Low alarm with re-hold action 10: High/low alarm with re-hold action
	Motor speed deviation alarm	1 to 20 CH (H-SIO-A module)	
11	Temperature process alarm	1 to 20 CH (H-TIO-□ module)	0: High alarm 1: Low alarm 2: High alarm with hold action 3: Low alarm with hold action
	Motor speed process alarm	1 to 20 CH (H-SIO-A module)	
12	Temperature set value alarm	1 to 20 CH (H-TIO-□ module)	0: High alarm 1: Low alarm
	Motor speed set value alarm	1 to 20 CH (H-SIO-A module)	
13	AI process alarm	1 to 40 CH (H-AI-□ module)	0: High alarm 1: Low alarm 2: High alarm with hold action 3: Low alarm with hold action
20	TI process alarm	1 to 40 CH (H-TI-□ module)	0: High alarm 1: Low alarm 2: High alarm with hold action 3: Low alarm with hold action

This output is different from the ordinary alarm output from the H-DO-A/B type module. Similarly, the ordinary alarm cannot be output from the H-DO-C type module (for event output).

The alarm differential gap and alarm delay timer are commonly set.

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- **Status output function**

This function is used to output the control unit action state other than the extension alarm output in addition to the ordinary alarm output state (Alarm 1 state, etc.).

Event DO function selection (Modbus address: 1CFCH to 1D4BH)		Event DO corresponding channel setting (Modbus address: 1D4CH to 1D9BH)	Event DO mode select setting (Modbus address: 1D9CH to 1DEBH)
Setting data	Function name		
0	Unused (Manual mode)	—	—
1	Alarm 1	1 to 20 CH (H-TIO-☐/H-SIO-A module)	—
2	Alarm 2	1 to 20 CH (H-TIO-☐/H-SIO-A module)	—
3	Burnout	1 to 20 CH (H-TIO-☐ module)	—
4	Heater break alarm (HBA)	1 to 20 CH (H-TIO-☐ module)	—
5	AI alarm 1	1 to 40 CH (H-AI-☐ module)	—
6	AI alarm 2	1 to 40 CH (H-AI-☐ module)	—
7	Control loop break alarm (LBA)	1 to 20 CH (H-TIO-☐ module)	—
8	PID/AT	1 CH	—
17	TI alarm 1	1 to 40 CH (H-TI-☐ module)	—
18	TI alarm 2	1 to 40 CH (H-TI-☐ module)	—
19	TI burnout	1 to 40 CH (H-TI-☐ module)	—
22	Event DI logic output status	1 to 40 CH (H-DI-B module)	—
9	Not settable	—	—
23 to 30	Not settable	—	—

- **Data comparison output function**

This function is used to output the result of comparison between the measured value and measured value (or set value and set value) within the same group.

Event DO function selection (Modbus address: 1CFCH to 1D4BH)		Event DO corresponding channel setting (Modbus address: 1D4CH to 1D9BH)	Event DO mode select setting (Modbus address: 1D9CH to 1DEBH)
Setting data	Function name	Data 1	Data 2
14	**Temperature measured value comparison** Comparison between the temperature measured value and temperature measured value	1 to 20 CH (H-TIO-☐ module)	1 to 20 CH (H-TIO-☐ module)
	Motor speed measured value comparison Comparison between the motor speed measured value and motor speed measured value	1 to 20 CH (H-SIO-A module)	1 to 20 CH (H-SIO-A module)
15	**Temperature set value comparison** Comparison between the temperature set value and temperature set value	1 to 20 CH (H-TIO-☐ module)	1 to 20 CH (H-TIO-☐ module)
	Motor speed set value comparison Comparison between the motor speed set value and motor speed set value	1 to 20 CH (H-SIO-A module)	1 to 20 CH (H-SIO-A module)
16	**AI measured value comparison** Comparison between the AI measured value and AI measured value	1 to 40 CH (H-AI-☐ module)	1 to 40 CH (H-AI-☐ module)
21	**TI measured value comparison** Comparison between the TI measured value and TI measured value	1 to 40 CH (H-TI-☐ module)	1 to 40 CH (H-TI-☐ module)

[Relationship between output and comparison]

Computing equation: The output turns ON at (Data 2) − (Data 1) ≤ 0

This means:
The output turns ON if (Data 2) is smaller than or equal to (Data 1). {Data 2 ≤ Data 1}
The output turns OFF if (Data 2) is larger than (Data 1). {Data 2 > Data 1}

■ Input range table

● Thermocouple input (H-TIO-A/B/C/D/E/G/K/P/R, H-TI-B/C, H-CIO-A)

Input type		Range No.
K	0 to 400 °C	0
	0 to 800 °C	1
	0 to 1300 °C	2
	0.0 to 400.0 °C	46
	0.0 to 800.0 °C	47
	0.0 to 1300.0 °C [1]	80
	0 to 800 °F	3
	0.0 to 800.0 °F	48
	0 to 2400 °F	4
	0.0 to 2400.0 °F [1]	81
	−200.0 to +300.0 °C [1]	64
	−100.0 to +400.0 °C [2]	67
J	0 to 400 °C	5
	0 to 800 °C	6
	0 to 1200 °C	7
	0.0 to 400.0 °C	49
	0.0 to 800.0 °C	50
	0.0 to 1200.0 °C [1]	82
	0 to 1600 °F	8
	0.0 to 700.0 °F	51
	0 to 2100 °F	9
	0.0 to 1600.0 °F [1]	83
	−200.0 to +300.0 °C [1]	65
R	0 to 1700 °C	10
	0.0 to 1700.0 °C [1]	84
	0 to 3000 °F	11
S	0 to 1700 °C	12
	0.0 to 1700.0 °C [1]	85
	0 to 3000 °F	13
B [3]	0 to 1800 °C	14
	0.0 to 1800.0 °C [1]	86
	0 to 3000 °F	15
E	0 to 1000 °C	17
	0.0 to 700.0 °C	52
	0 to 400 °C	16
	0.0 to 400.0 °C [1]	87
	0.0 to 1000.0 °C [1]	88
	0 to 1800 °F	18
	0.0 to 1800.0 °F [1]	89

Input type		Range No.
T	0.0 to 400.0 °C	53
	0 to 400 °C	20
	0 to 200 °C	19
	−200 to +200 °C	21
	0.0 to 200.0 °C [1]	90
	−200.0 to +200.0 °C [1]	91
	0.0 to 700.0 °F	54
	0 to 700 °F	22
	−300 to +400 °F	23
	−300.0 to +400.0 °F [1]	92
N	0 to 1300 °C	24
	0.0 to 1300.0 °C [1]	93
	0 to 2300 °F	25
	0.0 to 2300.0 °F [1]	94
PL II	0 to 1200 °C	26
	0.0 to 1200.0 °C [1]	95
	0 to 2300 °F	27
	0.0 to 2300.0 °F [1]	96
W5Re/ W26Re	0 to 2300 °C	28
	0.0 to 2300.0 °C [1]	97
	0 to 3000 °F	29
U	0.0 to 600.0 °C	55
	0 to 400 °C	30
	−200 to +200 °C	31
	0.0 to 400.0 °C [1]	98
	−200.0 to +200.0 °C [1]	99
	0 to 700 °F	32
	−300 to +400 °F	33
	0.0 to 700.0 °F [1]	100
	−300.0 to +400.0 °F [1]	101
L	0 to 400 °C	34
	0.0 to 400.0 °C	56
	0.0 to 900.0 °C	57
	0 to 900 °C	35
	0 to 800 °F	36
	0 to 1600 °F	37
	0.0 to 800.0 °F [1]	102
	0.0 to 1600.0 °F [1]	103

[1] The range can be specified only by H-TIO-E/G/R, H-TI-B or H-CIO-A module (high accuracy type).

[2] The range can be specified only by H-TIO-A/B/C/D [Z-1013 specification] or H-TI-C module [Z-1013 specification].

[3] Accuracy is not guaranteed between 0 to 399 °C (0 to 799 °F) for type B thermocouple input.

● RTD input (H-TIO-A/B/C/D/E/F/G/K/P/R, H-TI-A/B, H-CIO-A)

Input type		Range No.
JPt100	0.0 to 400.0 °C	59
	0 to 400 °C	38
	–200 to +200 °C	39
	–200.0 to +200.0 °C	58
	–50.00 to +150.00 °C [1]	106
	–300 to +900 °F	41
	0 to 800 °F	40
	0.0 to 800.0 °F	60
	–300.0 to +900.0 °F [2]	104
Pt100	0.0 to 400.0 °C	62
	0 to 400 °C	42
	–200 to +200 °C	43
	–200.0 to +200.0 °C	61
	–50.00 to +150.00 °C [1]	107
	–300 to +1200 °F	45
	0 to 800 °F	44
	0.0 to 800.0 °F	63
	–300.0 to +1200.0 °F [2]	105

[1] The range with the resolution of 1/100 can be specified only by H-TIO-E module.
[2] The range can be specified only by H-TIO-F module (high accuracy type).

● Current input and Voltage input (H-TIO-H/J, H-CIO-A)

Input type			Range No.	Input group
Voltage input *	0 to 10 mV DC	0.0 to 100.0 %	0	Voltage (low) input group
	–10 to +10 mV DC	0.0 to 100.0 %	1	
	0 to 100 mV DC	0.0 to 100.0 %	2	
	–100 to +100 mV DC	0.0 to 100.0 %	3	
	0 to 1 V DC	0.0 to 100.0 %	4	
	–1 to +1 V DC	0.0 to 100.0 %	5	
	0 to 5 V DC	0.0 to 100.0 %	6	
	1 to 5 V DC	0.0 to 100.0 %	7	
	–5 to +5 V DC	0.0 to 100.0 %	8	
	0 to 10 V DC	0.0 to 100.0 %	9	Voltage (high) input group
	–10 to +10 V DC	0.0 to 100.0 %	10	
Current input *	0 to 20 mA DC	0.0 to 100.0 %	11	Current input group
	4 to 20 mA DC	0.0 to 100.0 %	12	

* Display scale of the current and voltage input can be changed.

An input type change may only be made within the input groups as shown above.

● Pulse input (H-SIO-A)

Input type		Range No.
Pulse input	• Dry contact input (Power supply for sensor, 12 V DC) • Voltage input (Power supply for sensor, 12 V DC) Specify when ordering with model code.	0

Do not set any number other than 0, as this may cause malfunction.

7.2 Communication Data List of H-PCP-A Module

Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Temperature measured value (PV) [H-TIO-☐, H-CIO-A]	0000 ⋮ 0013	0 ⋮ 19	RO	C	TC/RTD input: Within input range Current (V)/Voltage (I) input: Within display scale range	—
Heat-side manipulated output value [H-TIO-☐, H-CIO-A]	0014 ⋮ 0027	20 ⋮ 39	RO	C	–0.5 to +105.0 %	—
Cool-side manipulated output value [H-TIO-☐, H-CIO-A]	0028 ⋮ 003B	40 ⋮ 59	RO	C	–0.5 to +105.0 %	—
Current tramsformer input measured value 1 [H-TIO-A/C/D]	003C ⋮ 004F	60 ⋮ 79	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current tramsformer (CT) input measured value of the H-TIO-A/C/D module	—
Current tramsformer input measured value 2 [H-CT-A]	0050 ⋮ 0063	80 ⋮ 99	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current tramsformer (CT) input measured value of the H-CT-A module	—
Status [H-TIO-☐, H-CIO-A]	0064 ⋮ 0077	100 ⋮ 119	RO	C	The respective channel status is assigned to each bit in the holding register. Bit data bit 0: Alarm 1 state bit 1: Alarm 2 state bit 2: Burnout state bit 3: Heater break alarm state *OR* operation of the H-TIO-A/C/D module and H-CT-A module bit 4: Control leep break alarm (LBA) state bit 5: Temperature rise completion state bit 6: Heat-side manipulated output state bit 7 to 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 127]	—
Temperature rise completion state [H-TIO-☐, H-CIO-A]	0078	120	RO	U	0: Rise not complete 1: Rise completed	—
Unused	0079 ⋮ 00C7	121 ⋮ 199	—	—	—	
Temperature set value (SV) ◆ [H-TIO-☐, H-CIO-A]	00C8 ⋮ 00DB	200 ⋮ 219	R/W	C	TC/RTD input: Within input range (Within setting limiter) Current/Voltage input: Within display scale range (Within setting limiter) The position of the decimal point differs depending on the input range.	0
PID/AT transfer [H-TIO-☐, H-CIO-A]	00DC ⋮ 00EF	220 ⋮ 239	R/W	C	0: PID control operation 1: AT (Autotuning) operation	0
Heat-side proportional band ◆ [H-TIO-☐, H-CIO-A]	00F0 ⋮ 0103	240 ⋮ 259	R/W	C	0.1 to 1000.0 % of span	3.0
Cool-side proportional band ◆ [H-TIO-☐, H-CIO-A]	0104 ⋮ 0117	260 ⋮ 279	R/W	C	0.1 to 1000.0 % of span	3.0

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Name	Modbus address HEX	Modbus address DEC	Attribute	Structure	Data range	Factory set value
Integral time ◆ [H-TIO-☐, H-CIO-A]	0118 ⋮ 012B	280 ⋮ 299	R/W	C	1 to 3600 seconds	240
Derivative time ◆ [H-TIO-☐, H-CIO-A]	012C ⋮ 013F	300 ⋮ 319	R/W	C	0 to 3600 seconds (0: PI action)	60
Overlap/deadband ◆ [H-TIO-☐, H-CIO-A]	0140 ⋮ 0153	320 ⋮ 339	R/W	C	–10.0 to +10.0 % of span	0.0
Control response parameters ◆ [H-TIO-☐, H-CIO-A]	0154 ⋮ 0167	340 ⋮ 359	R/W	C	0: Slow 1: Medium 2: Fast In order to perform PID control by using the fuzzy function, specify “Fast.” The fuzzy function is effective to restrict overshoot or undershoot occurring at operation start, or resulting from set value changes. (Fuzzy function correspond to H-TIO-P/R module only.)	0 [a]
Alarm 1 set value ◆ [H-TIO-☐, H-CIO-A]	0168 ⋮ 017B	360 ⋮ 379	R/W	C	TC/RTD input: Within input range or span range Current/voltage input, H-SIO-A: Within display scale range or span range	See Factory set value table of Alarm 1/ Alarm 2 set value [b]
Alarm 2 set value ◆ [H-TIO-☐, H-CIO-A]	017C ⋮ 018F	380 ⋮ 399	R/W	C		
Heater break alarm set value 1 [H-TIO-A/C/D]	0190 ⋮ 01A3	400 ⋮ 419	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A For the current tramsformer (CT) input of the H-TIO-A/C/D module	0.0
Heater break alarm set value 2 [H-CT-A]	01A4 ⋮ 01B7	420 ⋮ 439	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A For the current tramsformer (CT) input of the H-CT-A module	0.0

[a] Heat control (H-TIO-☐/H-CIO-A): 0
Heat/cool control (H-TIO-☐/H-CIO-A): 2
Position proportioning control (H-TIO-K): 0

[b] Factory set value table of Alarm 1/Alarm 2 set value

Input type	Alarm type	Alarm 1 set value	Alarm 2 set value
TC/RTD input	Process high alarm	Input range (high limit)	Input range (high limit)
	Process low alarm	Input range (low limit)	Input range (low limit)
	Deviation high alarm, Deviation high/low alarm, Band alarm	50 °C *	50 °C *
	Deviation low alarm	–50 °C *	–50 °C *
	No alarm function	Input range (high limit)	Input range (low limit)
Current/voltage input	Process high alarm	100.0 %	100.0 %
	Process low alarm	0.0 %	0.0 %
	Deviation high alarm, Deviation high/low alarm, Band alarm	50.0 %	50.0 %
	Deviation low alarm	–50.0 %	–50.0 %
	No alarm function	100.0 %	0.0 %

* The position of the decimal point differs depending on the input range.

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Operation mode transfer [H-TIO-☐, H-CIO-A]	01B8 ⋮ 01CB	440 ⋮ 459	R/W	C	0: Unused If set to "Unused," no control, monitor or alarm monitor is performed. 1: Monitor If set to "Monitor," only the monitor is performed. No control or alarm monitor is performed. 2: Alarm If set to "Alarm," monitor or alarm monitor is performed. No control is performed. 3: Normal Selected to normal mode to perform control, monitor or alarm monitor.	3
Heat-side proportioning cycle time [H-TIO-☐, H-CIO-A]	01CC ⋮ 01DF	460 ⋮ 479	R/W	C	1 to 100 seconds Setting will be invalid in current/voltage output.	20 [a]
Cool-side proportioning cycle time [H-TIO-☐, H-CIO-A]	01E0 ⋮ 01F3	480 ⋮ 499	R/W	C	1 to 100 seconds Setting will be invalid in current/voltage output and heat control.	20 [a]
Auto/Manual transfer [H-TIO-☐, H-CIO-A]	01F4 ⋮ 0207	500 ⋮ 519	R/W	C	0: Auto 1: Manual Setting will be invalid in ON/OFF control and heat/cool control.	0
Manual output value [H-TIO-☐, H-CIO-A]	0208 ⋮ 021B	520 ⋮ 539	R/W	C	–5.0 to +105.0 % Setting will be invalid in ON/OFF control and heat/cool control. H-TIO-C/D [Z-1017 specification]: –105.0 to 0.0 % (cool-side) 0.0 to +105.0 % (heat-side)	0.0
LBA use selection [H-TIO-☐, H-CIO-A]	021C ⋮ 022F	540 ⋮ 559	R/W	C	0: Unused 1: Used	0
LBA time [H-TIO-☐, H-CIO-A]	0230 ⋮ 0243	560 ⋮ 579	R/W	C	1 to 7200 seconds	480
LBA deadband [H-TIO-☐, H-CIO-A]	0244 ⋮ 0257	580 ⋮ 599	R/W	C	Input span The position of the decimal point differs depending on the input range.	0
PV bias [H-TIO-☐, H-CIO-A]	0258 ⋮ 026B	600 ⋮ 619	R/W	C	–5.00 to +5.00 % of span ZK-1103 specification: –Input span to +Input span Unit (°C, °F, etc.) and decimal point position (No decimal place, One decimal place, Two decimal places or Three decimal places) depends on input range type.	0.00 ZK-1103: 0
Temperature rise completion range [H-TIO-☐, H-CIO-A]	026C ⋮ 027F	620 ⋮ 639	R/W	C	1 to 10 °C or 1 to 20 °F The position of the decimal point differs depending on the input range.	10 [b]

[a] Relay contact output: 20 seconds
Voltage pulse output, Open collector output, Triac output: 2 seconds

[b] TC/RTD input: 10 °C or 20 °F
Current/voltage input, H-SIO-A: 10 % of display scale

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Name	Modbus address		Attribute	Structure	Data range	Factory set value
	HEX	DEC				
Temperature rise completion trigger [H-TIO-☐, H-CIO-A]	0280 ⋮ 0293	640 ⋮ 659	R/W	C	0: Unused 1: Used [a] Do not set "1: Used" in H-TIO-H/J module and H-SIO-A module, because temperature rise completion is not judged.	0
CT channel setting [H-CT-A]	0294 ⋮ 02A7	660 ⋮ 679	R/W	C	0 to 20 (0: Unused) Allocates the channels for H-TIO-☐ module to the input channels of H-CT-A module.	The factory set value varies depending on the specifications when ordering.
Unused	02A8 ⋮ 02BB	680 ⋮ 699	—	—	—	—
Control RUN/STOP transfer [H-PCP-A]	02BC	700	R/W	U	0: Control STOP 1: Control RUN	0
Memory area number [H-TIO-☐, H-CIO-A]	02BD	701	R/W	U	1 to 8	1
Temperature rise completion soak time [H-TIO-☐, H-CIO-A]	02BE	702	R/W	U	0 to 360 minutes	0
Module initialization [b] [H-PCP-A]	02BF	703	R/W	U	0: Normal state (Initialization is not executed) 1: Initialize only the new module (Only modules which are not recognized by the H-PCP-A module are initialized) 2: Initialize all modules Returns to 0 after the module is initialized.	0
Unused	02C0 ⋮ 02EE	704 ⋮ 750	—	—	—	—

[a] If the channel of each of the H-TIO-H/J modules is set "1: Used," it does no reach the completion of temperature rise. As a result, the state of this completion (control unit) which is judged by performing the *OR* operation of all the channels cannot be attained, thereby continuing the incompletion of temperature rise.

[1] Initialize method for changing the module composition
To change module configuration, use the following procedures:

- When a module is added to the control unit ..... Initialize only the new module
- When a module is deleted from the control unit ..... Initialize only the new module
- When a module is inserted (Added) between the modules in the control unit ..... Initialize all modules
- To change the arrangement of the modules in the control unit ..... Initialize all modules

Note that when all modules are initialized all internal data of all modules are set to the default values.

8. 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

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.

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

Problem	Probable cause	Solution
RUN lamp does not light up	Power supply section defect	Replace H-LNK-B module
RX/TX lamp does not flash	Imperfect connection of H-LNK-B and H-PCP module	Confirm the connection condition or connector and connect correctly
FAIL lamp is lit	CPU section defect	Replace H-LNK-B module
• Can not set the IP address • The client and the server are not in the connected state (the client cannot recognize the server)	The IP address class and subnet mask of the client do not coincide with those of the server	Coincide the IP address class and subnet mask of the client with those of the server
	The network related software was started before the connection of the Ethernet cable	First connect the Ethernet cable and then start the network related software
No response	Wrong connection, no connection or disconnection of the communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Wrong IP address setting	Confirm the settings and set them correctly
	There is length of query message exceeds set range	
	The number of data points is not twice the specified number of data points at the time of data write	
Error code: 01H	Function code error (Specifying nonexistent function code)	Confirm the function code
Error code: 02H	When the mismatched address is specified	Confirm the address of holding register
Error code: 03H	When the data written exceeds the setting range	Confirm the setting data
	When the number of specified data points was out of a range of 1 to 125 during data read (function code: 03H)	
	When the number of specified data points was out of a range of 1 to 123 during data write (function code: 10H)	
Error code: 04H	State under which the server (H-LNK-B) cannot normally respond [An error occurred in the server (H-LNK-B)]	Remove the cause of the error occurring in the server (H-LNK-B)

9. SPECIFICATIONS

■ Ethernet communication

Physical layer: Ethernet
10BASE-T/100BASE-TX automatic recognition

Application layer: Modbus/TCP or No-protocol

Communication data: Based on Modbus message format (Modbus/TCP)
Based on ANSI X3.28 subcategory 2.5 A4 (No-protocol)

IP address: 0.0.0.0 to 255.255.255.255

Connector type: RJ-45

Maximum connections: Up to sixteen SR Mini HG control units can be connected to one H-LNK-B module.

■ Controller communication

Interface: Based on RS-422A, EIA standard

Connection method: 4-wire system, half-duplex multi-drop connection

Synchronous method: Start/stop synchronous type

Communication speed: 9600 bps, 19200 bps or 38400 bps

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

Protocol:
Modbus/TCP: Modbus-RTU
No-protocol: Modbus-RTU or
RKC communication (ANSI X3.28 subcategory 2.5 A4)

Maximum connections: Up to sixteen SR Mini HG control units can be connected to one H-LNK-B module.

■ Indication lamp

Operation state indication:
RUN lamp (Green)
During normal operation: Flashes
During error: Turns on
FAIL lamp (Red
When instrument abnormally: Turns on

Communication state indication:
TX lamp (Yellow)
During controller communication data send: Flashes
RX lamp (Yellow)
During controller communication data receive: Flashes

Ethernet Communication state indication:
Link lamp (Green/Amber)
10 Mbps: Amber
100 Mbps: Green
Active lamp (Green/Amber)
Half-duplex; activity: Amber
Full-duplex; activity: Green

■ Self-diagnostic function

Check item: RAM error: FAIL or RUN lamp turns on

■ General specifications

Power supply: The power is supplied from H-PCP module
Current consumption: 5 V: 270 mA max.
12 V: 120 mA max.

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

Withstand voltage: See table

Time: 1 minute	Grounding terminal	Power terminal
Grounding terminal		
Power terminal	1500 V AC	
Communication terminal	1000 V AC	1500 V AC

Memory backup: Backed up by flash memory in the Ethernet conversion parts
Number of writing: Approx. 5,000 times
Data storage period: Approx. 10 years

Allowable ambient temperature:
0 to 50 °C

Allowable ambient humidity: 45 to 85 %RH
(Absolute humidity: MAX.W.C 29 g/m^3 dry air at 101.3 kPa)

Operating environments: 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.

■ Mounting and structure

Mounting procedure: DIN rail mounting

Case color: Gray

Dimensions: 24 (W) ×96 (H) ×100 (D) mm

Weight: Approx. 120 g

■ Standard

Safety standards: UL: UL61010-1
cUL: CAN/CSA-C22.2 No.61010-1
(or CSA: CAN/CSA-C22.2 No.1010.1)

CE marking: LVD: EN61010-1
EMC: EN61326-1

The first edition: MAY 2005 [IMQ00]
The fourth edition: MAR. 2013 [IMQ00]

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IMS01S01-E2 **MAR. 2013**