High-performance Multi-point Control System

SR Mini HG SYSTEM

Communication Quick Manual

IMS01V02-E3

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

CONTENTS

1. OUTLINE

This manual describes the connection method with host computer, communication setting, protocol and communication data of the SR Mini HG SYSTEM control unit (H-PCP-A/B module, Function modules).
For the detail connection method when it uses RKC operation panel and communicates with a host computer, and initial setting data, please read if necessary the following separate manuals.

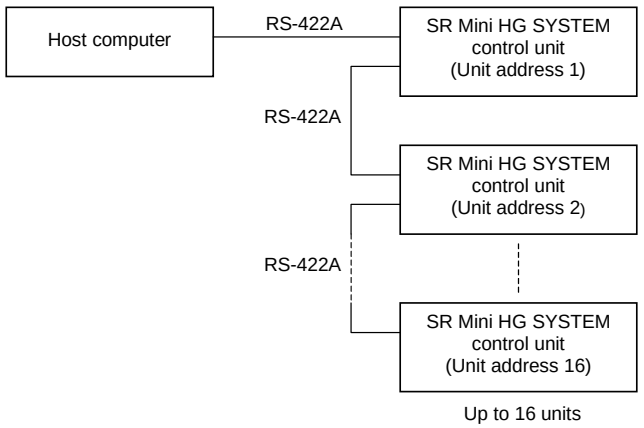
- **SR Mini HG SYGTEM Communication Manual (IMSRM09-E□)**
- **SR Mini/SR Mini HG SYGTEM Supplementary Information Initialize Settings [Extended Communications] (IMSRM07-E□)**

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

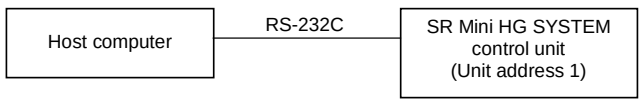
The SR Mini HG SYSTEM control unit can send/receive data to/from host computer via RKC communication.

Communication interfaces: RS-232C, RS-422A
(Specify when ordering)

■ Multi-drop connection



■ Point-to-point connection



The RKC communication data transmission/reception status can be checked by using the Communication tool PROTEM2. The PROTEM2 can be downloaded from the official RKC website:
http://www.rkcinst.com/.

2. SPECIFICATIONS

Interface: Based on RS-422A EIA standard
Based on RS-232C EIA standard
Specify when ordering

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

Synchronous method: Start/stop synchronous type

Communication speed: 2400 bps, 4800 bps, 9600 bps, 19200 bps
Any can be selected

Data bit configuration: Start bit: 1
Data bit: 7 or 8
Parity bit: Without, Odd or Even
Without for 8 data bits
Stop bit: 1

Protocol: Based on ANSI X3.28-1976 subcategories 2.5 and B1

Error control: Vertical parity (when parity bit is selected)
Horizontal parity

Block length: 128 bytes or less

Data types: Text: ASCII 7-bit code
Control codes:
EOT (04H), ENQ (05H), ACK (06H), NAK (15H), STX (02H), ETB (17H), ETX (03H)
Codes in brackets ( ) are in hexadecimal.

Time-out time: 3 seconds

Data sending transfer time:
0 to 255 ms

Maximum connections: RS-422A: 16 units
RS-232C: 1 unit
(Maximum number of control units that can be connected to one communication port of host computer)

Signal logic: RS-422A

Signal voltage	Logic
V (A) − V (B) ≥ 2 V	0 (SPACE)
V (A) − V (B) ≤ −2 V	1 (MARK)

Voltage between V (A) and V (B) is the voltage of (A) terminal for the (B) terminal.

RS-232C

Signal voltage	Logic
+3 V or more	0 (SPACE)
−3 V or less	1 (MARK)

3. CONNECTIONS

WARNING

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

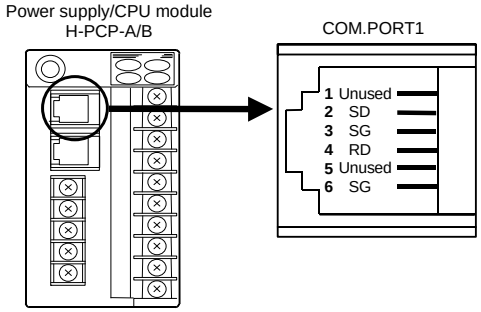
Customer is requested to prepare a communication cable fit for the control unit to be connected by the host computer. Connection cable W-BF-01*, W-BF-02* and W-BF-28* (RKC product) can use to connect host computer.

* If noise is a factor, customer should use a twisted pair cable (not included) or something to that effect. Shields of the cable are connected to SG (No. 6 pin) of the H-PCP-A/B connector.

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

■ When the interface of H-PCP-A/B is RS-232C

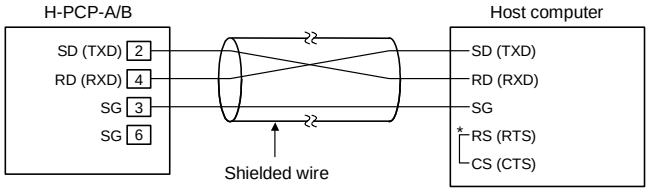
● Pin layout of modular connector



● Connector pin number and signal details

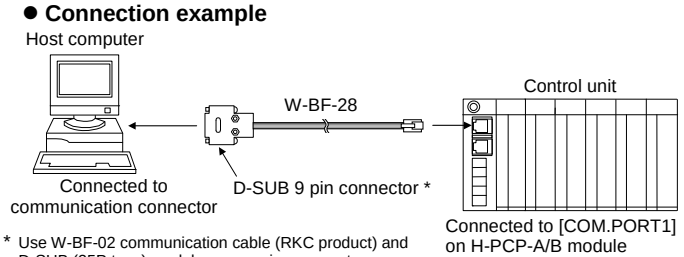
Pin No.	Signal name	Symbol
1	Unused	—
2	Send data	SD (TXD)
3	Signal ground	SG
4	Receive data	RD (RXD)
5	Unused	—
6	Signal ground	SG

● Wiring method



* Short RS and CS within connector

● Connection example

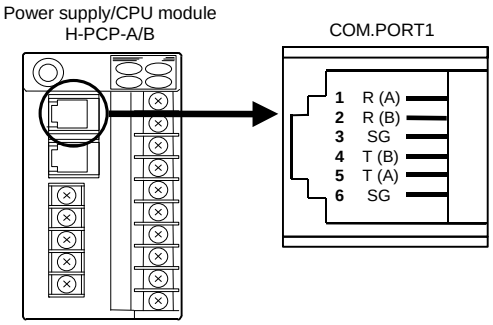


* Use W-BF-02 communication cable (RKC product) and D-SUB (25P type) modular conversion connector (TM12RV-64-H to HIROSE ELECTRIC CO., LTD. or equivalent.) when connector of host computer is D-SUB 25-pin.

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

■ When the interface of H-PCP-AB is RS-422A

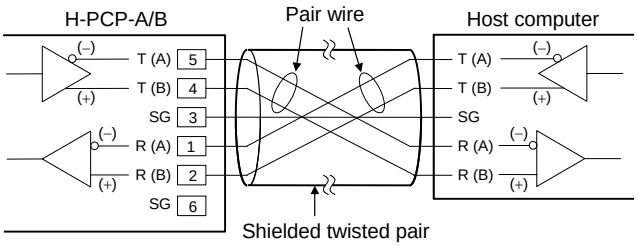
● Pin layout of modular connector



● Connector pin number and signal details

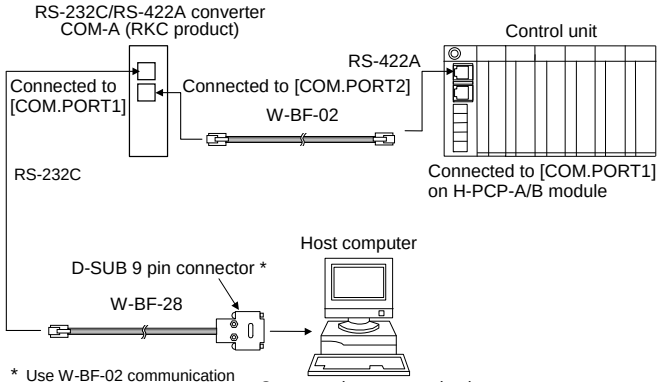
Pin No.	Signal name	Symbol
1	Receive data	R (A)
2	Receive data	R (B)
3	Signal ground	SG
4	Send data	T (B)
5	Send data	T (A)
6	Signal ground	SG

● Wiring method



● Connection example

< When the interface of host computer is RS-232C>



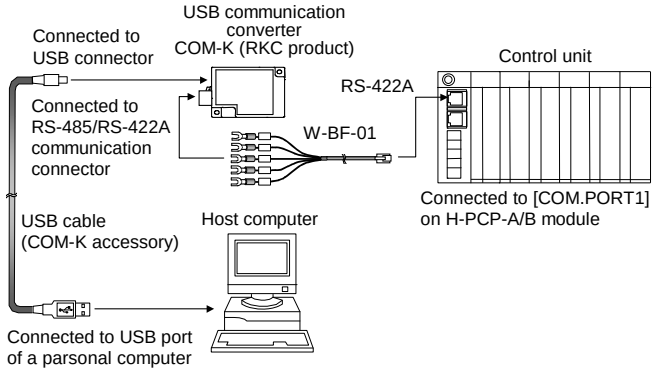
* Use W-BF-02 communication cable (RKC product) and D-SUB (25P type) modular conversion connector (TM12RV-64-H to HIROSE ELECTRIC CO., LTD. or equivalent.) when connector of host computer is D-SUB 25-pin.

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

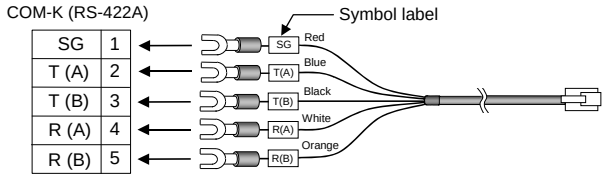
Recommended RS-232C/RS-422A converter: **COM-A** (RKC product)
For the COM-A, refer to the **COM-A/COM-B Instruction Manual (IMSRM33-E□)**.

Continued on the next page.

< When the host computer is corresponding to the USB>



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



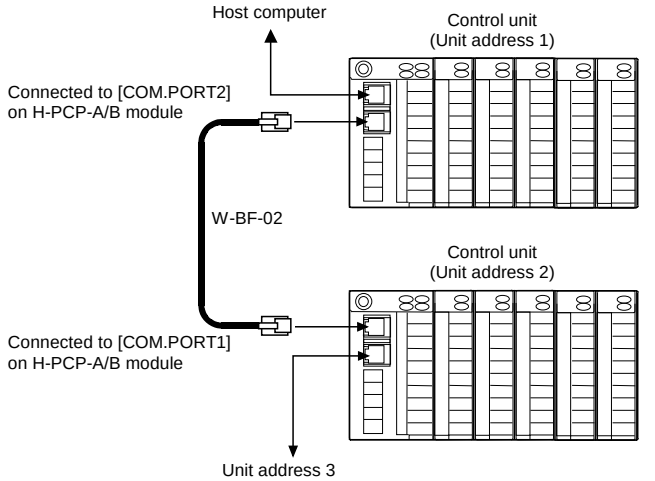
RS-485/RS-422A communication connector

Connect according to the label names as they are without crossing the wires.
For RS-485/RS-422A communication connector of the COM-K, do not use the solderless terminal. Please use after processing.

Recommended USB communication converter:
COM-K (RKC product)
For the COM-K, refer to **COM-K Instruction Manual (IMR01Z01-E□)**.

■ Multiple control unit connections

Connect COM.PORT2 on unit address 1 to COM.PORT1 on unit address 2.



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

4. SETTING

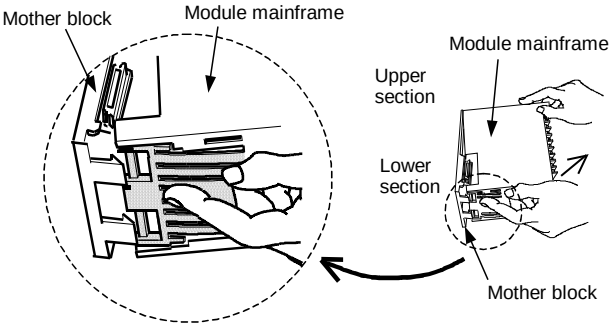
4.1 Communication Setting

WARNING

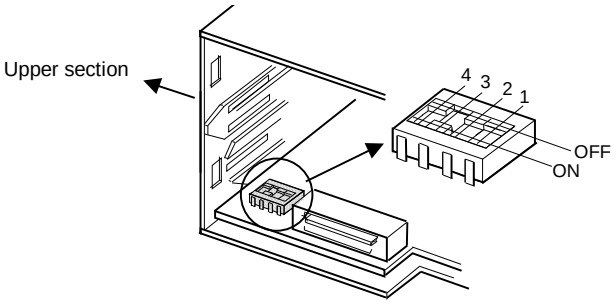
- To prevent electric shock or instrument failure, always turn off the power before setting the switch.
- To prevent electric shock or instrument failure, never touch any section other than those instructed in this manual.

Using the dip switches inside the H-PCP-A/B module, sets the communication speed and data configuration.

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



2. Data configuration and communication speed can be set with the dip switches located in the H-PCP-A/B module.



Rear view of module mainframe with mother block removed

1	2	Data configuration
OFF	OFF	8-bit without parity
OFF	ON	7-bit even parity
ON	OFF	7-bit odd parity
ON	ON	Do not set this one

Factory set value: 8-bit without parity

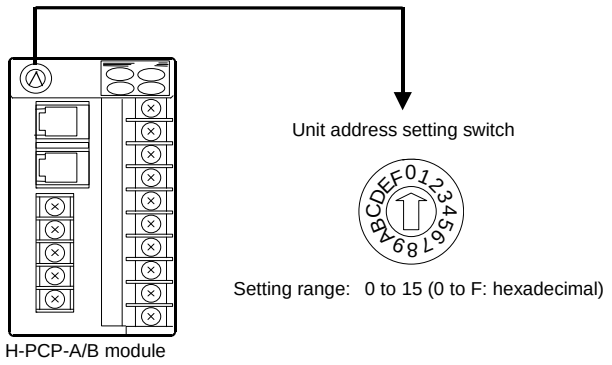
3	4	Communication speed
OFF	OFF	2400 bps
OFF	ON	4800 bps
ON	OFF	9600 bps
ON	ON	19200 bps

Factory set value: 9600 bps

3. After communication setting is complete, 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.

4.2 Unit Address Setting

When each control unit is multi-drop connected to host computer or operation panel, set the address of each control unit using the unit address setting switch in the H-PCP-A/B module.
Use a very small slotted screwdriver to set the unit address on the unit address setting switch located on the front of each H-PCP-A/B module.



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

Number of connectable control unit: Up to 16 units

4.3 Communication Requirements

■ Processing times during send/receive

The SR Mini HG SYSTEM required the following processing times during data send/receive.
Whether the host computer is using either the polling or selecting procedure for communication, the following processing times are required for SR Mini HG SYSTEM to send data:
-Response wait time after SR Mini HG SYSTEM sends BCC in polling procedure
-Response wait time after SR Mini HG SYSTEM sends ACK or NAK in selecting

RKC communication (Polling procedure)

Procedure details	Time (ms)		
	MIN	TYP	MAX
Response send time after SR Mini HG SYSTEM receives ENQ	4	7	20
Response send time after SR Mini HG SYSTEM receives ACK	4	–	20
Response send time after SR Mini HG SYSTEM receives NAK	4	–	20
Response wait time after SR Mini HG SYSTEM sends BCC	–	–	1.0

RKC communication (Selecting procedure)

Procedure details	Time (ms)		
	MIN	TYP	MAX
Response send time after SR Mini HG SYSTEM receives BCC	4	7	20
Response wait time after SR Mini HG SYSTEM sends ACK	–	–	1.0
Response wait time after SR Mini HG SYSTEM sends NAK	–	–	1.0

Only 1 port uses communication port, and response send time is time when interval time is set at 0 ms.
In addition, in status of the following, there is not communication between a little.
- AT end: About 0.8 seconds
- Setting of initial setting item: About 0.8 to 3 seconds

■ Fail-safe

A transmission error may occur with the transmission line disconnected, shorted or set to the high-impedance state. In order to prevent the above error, it is recommended that the fail-safe function be provided on the receiver side of the host computer. The fail-safe function can prevent a framing error from its occurrence by making the receiver output stable to the MARK "1" when the transmission line is in the high-impedance state.

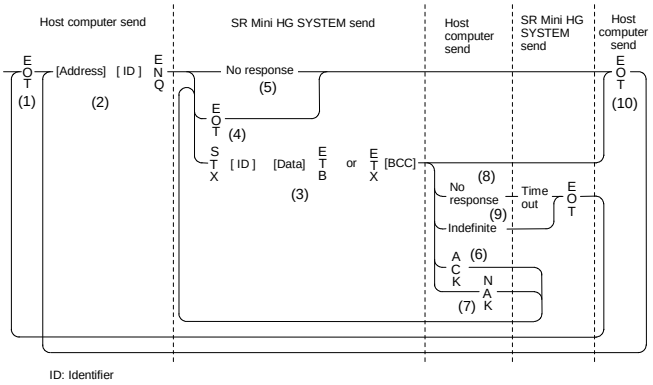
5. PROTOCOL

RKC communication uses the polling/selecting method to establish a data link. The basic procedure is followed ANSI X3.28-1976 subcategories 2.5 and B1 basic mode data transmission control procedure (Fast selecting is the selecting method used in SR Mini HG SYSTEM).

- The polling/selecting procedures are a centralized control method where the host computer controls the entire process. The host computer initiates all communication so the controller responds according to queries and commands from the host.
- The code use in communication is 7-bit ASCII code including transmission control characters.
  Transmission control characters used in SR Mini HG SYSTEM: EOT (04H), ENQ (05H), ACK (06H), NAK (15H), STX (02H), ETB (17H), ETX (03H)
  ( ): Hexadecimal

5.1 Polling

Polling is the action where the host computer requests one of the connected SR Mini HG SYSTEM to transmit data. An example of the polling procedure is shown below:



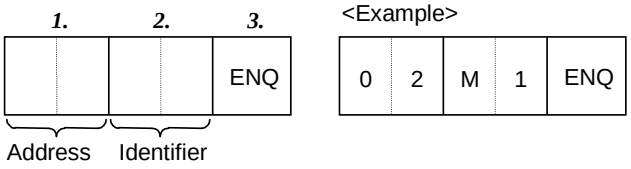
■ Polling procedures

(1) Data link initialization

Host computer sends EOT to the controllers to initiate data link before polling sequence.

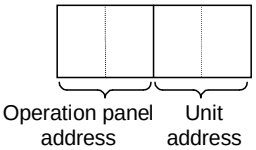
(2) Data sent from host computer - Polling sequence

Host computer sends polling sequence with the format shown below:



1. Address (2 digits)
This data is a unit address of the SR Mini HG SYSTEM for polled and must be the same as the unit address set value in item **4.2 Unit Address Setting (P. 5)**.

When it connects a host computer to an operation panel and does host communication, address becomes 4 digits.



2. Identifier (2 digits)
The identifier specifies the type of data that is requested from the SR Mini HG SYSTEM. Always attach the ENQ code to the end of the identifier.

3. ENQ
The ENQ is the transmission control character that indicates the end of the polling sequence. The host computer then must wait for a response from the SR Mini HG SYSTEM.

(3) Data sent from the SR Mini HG SYSTEM

If the polling sequence is received correctly, the SR Mini HG SYSTEM sends data in the following format:

1.	*2.*	*3.*	*4.*	*6.*
STX	Identifier	Data	ETB	BCC

or

1.	*2.*	*3.*	*5.*	*6.*
STX	Identifier	Data	ETX	BCC

If the length of send data (from STX to BCC) exceeds 128 bytes, it is divided into blocks by ETB. In this case, the succeeding divided data is sent after STX.

1. STX
STX is the transmission control character which indicates the start of the text transmission (identifier and data).

2. Identifier (2 digits)
The identifier indicates the type of data (measured value, status and set value) sent to the host computer.

3. Data
Data which is indicated by an identifier of this instrument, consisting of channel numbers, data, etc. Each channel number and data are delimited by a space (20H). The data and the next channel number are delimited by a comma.

- Channel number:
  2-digit ASCII code, not zero-suppressed. Channels without channel numbers may exist depending on the type of identifier.
- Data:
  ASCII code, zero-suppressed with spaces (20H). The number of digits varies depending on the type of identifier.

4. ETB
Transmission control character indicating the end of the block.

5. ETX
Transmission control character indicating the end of the text.

6. BCC
BCC (Block Check Character) detects error using horizontal parity and is calculated by horizontal parity (even number).
< Calculation method of BCC>
Exclusive OR all data and characters from STX through ETB or ETX, not including STX.

<Example>

STX	M	1	0	1			1	5	0	.	0	ETX	BCC
4DH	31H	30H	31H	20H	20H	31H	35H	30H	2EH	30H	03H		

Hexadecimal numbers

BCC = 4DH ⊕ 31H ⊕ 30H ⊕ 31H ⊕ 20H ⊕ 20H ⊕ 31H ⊕ 35H ⊕ 30H ⊕ 2EH ⊕ 30H ⊕ 03H = 54H
(⊕: *Exclusive OR*)
Value of BCC becomes 54H

(4) EOT send (Ending data transmission from the SR Mini HG SYSTEM)

In the following cases, the SR Mini HG SYSTEM sends EOT to terminate the data link:

- When the specified identifier is invalid
- When there is an error in the data format
- When all the data has been sent

(5) No response from the SR Mini HG SYSTEM

The SR Mini HG SYSTEM will not respond if the polling address is not received correctly. It may be necessary for the host computer to take corrective action such as a time-out.

(6) ACK (Acknowledgment)

An acknowledgment ACK is sent by the host computer when data received is correct. When the SR Mini HG SYSTEM receives ACK from the host computer, the SR Mini HG SYSTEM will send any remaining data of the next identifier without additional action from the host computer.

For the identifier, refer to **6. COMMUNICATION IDENTIFIER LIST (P. 8)**.

When host computer determines to terminate the data link, EOT is sent from the host computer.

(7) NAK (Negative acknowledge)

If the host computer does not receive correct data from the SR Mini HG SYSTEM, it sends a negative acknowledgment NAK to the SR Mini HG SYSTEM. The SR Mini HG SYSTEM will re-send the same data when NAK is received. This cycle will go on continuously until either recovery is achieved or the data link is corrected at the host computer.

(8) No response from host computer

When the host computer does not respond within approximately three seconds after the SR Mini HG SYSTEM sends data, the SR Mini HG SYSTEM sends EOT to terminate the data link (time-out time: about 3 seconds).

(9) Indefinite response from host computer

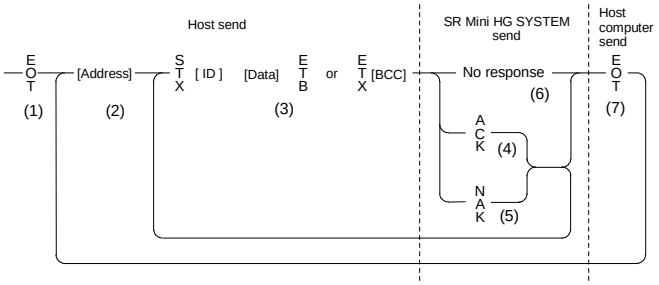
The SR Mini HG SYSTEM sends EOT to terminate the data link when the host computer response is indefinite.

(10) EOT (Data link termination)

The host computer sends EOT message when it is necessary to suspend communication with the SR Mini HG SYSTEM or to terminate the data link due lack of response from the SR Mini HG SYSTEM.

5.2 Selecting

Selecting is the action where the host computer requests one of the connected SR Mini HG SYSTEM to receive data. An example of the selecting procedure is shown below:



■ Selecting procedures

(1) Data link initialization

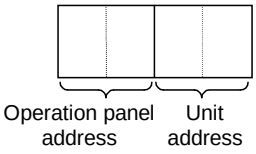
Host computer sends EOT to the SR Mini HG SYSTEM to initiate data link before selecting sequence.

(2) Sending selecting address from the host computer

Host computer sends selecting address for the selecting sequence.

Address (2 digits)
This data is a unit address of the SR Mini HG SYSTEM to be selected and must be the same as the unit address set value in item **4.2 Unit Address Setting (P. 5)**.

When it connects a host computer to an operation panel and does host communication, address becomes 4 digits.



(3) Data sent from the host computer

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

1. STX	*2.* Identifier	*3.* Data	*4.* ETB	*6.* BCC

or

1. STX	*2.* Identifier	*3.* Data	*5.* ETX	*6.* BCC

If the length of send data (from STX to BCC) exceeds 128 bytes, it is divided into blocks by ETB. In this case, the succeeding divided data is sent after STX.

Details for ***1*** to ***6*** , refer to **5.1 Polling (P. 5)**.

(4) ACK (Acknowledgment)

An acknowledgment ACK is sent by the SR Mini HG SYSTEM when data received is correct. When the host computer receives ACK from the SR Mini HG SYSTEM, the host computer will send any remaining data. If there is no more data to be sent to SR Mini HG SYSTEM, the host computer sends EOT to terminate the data link.

(5) NAK (Negative acknowledge)

If the SR Mini HG SYSTEM does not receive correct data from the host computer, it sends a negative acknowledgment NAK to the host computer. Corrections, such as re-send, must be made at the host computer. The SR Mini HG SYSTEM will send NAK in the following cases:

- When an error occurs on communication the line (parity, framing error, etc.)
- When a BCC check error occurs
- When the specified identifier is invalid
- When receive data exceeds the setting range

(6) No response from SR Mini HG SYSTEM

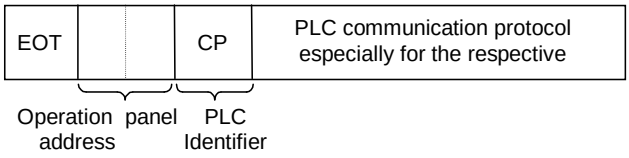
The SR Mini HG SYSTEM does not respond when it can not receive the selecting address, STX, ETB, ETX or BCC.

(7) EOT (Data link termination)

The host computer sends EOT when there is no more data to be sent from the host computer or there is no response from the SR Mini HG SYSTEM.

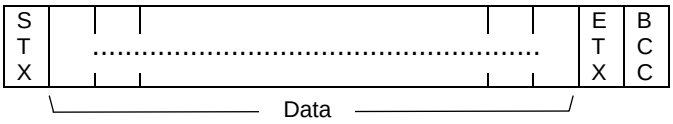
The operation panel (OPC*) can correspond not only to SR Mini HG SYSTEM communication but also to programmable controller (PLC) communication (optional). The PLC communication control procedure differs from the SR Mini HG SYSTEM communication control procedure and also from the procedure for communication between each programmable controller manufactured by the respective company. Therefore, in order to discriminate PLC communication from SR Mini HG SYSTEM communication, the former uses the identifier (CP) dedicated to it. The PLC communication protocol especially for the respective company is used after the identifier (CP).

* Discontinued in November, 2006



5.3 Communication Data Structure

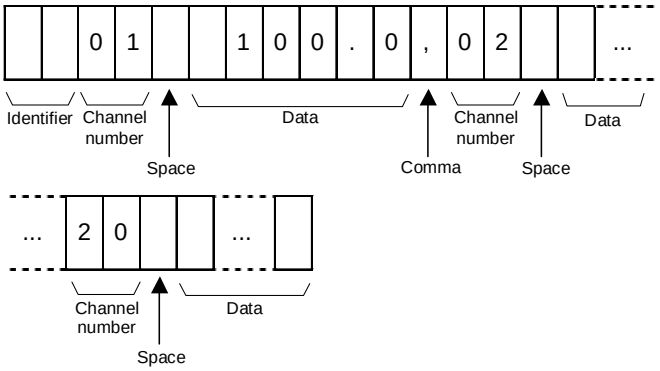
■ Data description (Transmission/Receive data structure)



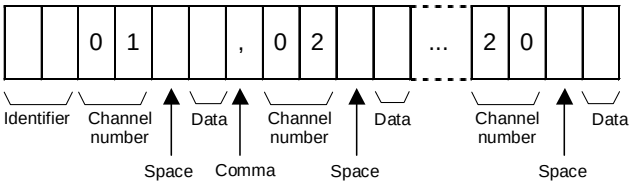
Part of the data above is shown below.

● Data for each channel

Data length 6 digits



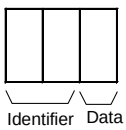
Data length 1 digit



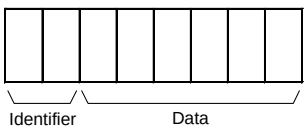
By data structure, channel number becomes as follows:
Data for each module: Module number
Data for each event input logic circuit:
Event input logic circuit number

● Data for each unit address (Without channel)

Data length 1 digit



Data length 6 digits



6. COMMUNICATION IDENTIFIER LIST

CAUTION

If you add or delete a function module, or change the arrangement of the modules, or replace a module with a different model, be sure to perform "Module initialization (identifier CL)" before setting the data.
"Module initialization" stores the new module configuration in the H-PCP module.
If data is set before "Module initialization" is performed, the H-PCP module will set the previously stored initial data of the old modules in the new modules, which may cause malfunction.

☞ For details on how to initialize the module, refer to **SR Mini/SR Mini HG SYSTEM Supplementary Information Initialize Settings [Extended Communications] (IMSRM07-E□)**.
The above manuals can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm

📖 Note that there are identifiers which indicate that communication is not possible depending on the specification.

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

Name	Identifier	Digits	Attribute	Structure	Data range	Factory set value
Temperature measured value (PV) [H-TIO-□, H-CIO-A]	**M1**	6	RO	C	TC/RTD input: Within input range The position of the decimal point differs depending on the input range. Voltage/Current input: Within display scale range The position of the decimal point differs depending on Decimal point position setting.	—
Alarm 1 status [H-TIO-□, H-CIO-A]	**AA**	1	RO	C	0: OFF 1: ON	—
Alarm 2 status [H-TIO-□, H-CIO-A]	**AB**	1	RO	C	0: OFF 1: ON	—
Burnout status [H-TIO-□, H-CIO-A]	**B1**	1	RO	C	0: OFF 1: ON	—
Heat-side manipulated output value [H-TIO-□, H-CIO-A]	**O1**	6	RO	C	−5.0 to +105.0 %	—
Cool-side manipulated output value [H-TIO-□, H-CIO-A]	**O2**	6	RO	C	−5.0 to +105.0 %	—
Heater break alarm status [H-TIO-A/C/D, H-CIO-A]	**AC**	1	RO	C	0: OFF 1: ON	—
Current transformer input measured value 1 [H-TIO-A/C/D]	**M3**	6	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current transformer (CT) input measured value of the H-TIO-A/C/D module	—
Current transformer input measured value 2 [H-CT-A]	**M4**	6	RO	C	0.0 to 100.0 A or 0.0 to 30.0 A Current transformer (CT) input measured value of the H-TIO-A/C/D module	—
Set value monitor [H-TIO-□, H-CIO-A]	**MS**	6	RO	C	TC/RTD input: Within input range The position of the decimal point differs depending on the input range. Voltage/Current input: Within display scale range The position of the decimal point differs depending on Decimal point position setting.	—
Temperature rise completion status [H-TIO-□, H-CIO-A]	**HE**	1	RO	U	0: Rise not complete 1: Rise complete	—

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Name	Iden-tifier	Digits	Attri-bute	Struc-ture	Data range	Factory set value
Error code [a] [H-PCP-A/B]	**ER**	1	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	—
PID/AT transfer [b] [H-TIO-☐, H-CIO-A]	**G1**	1	R/W	C	0: PID control operation 1: AT (Autotuning) operation	0
Temperature set value ◆ [H-TIO-☐, H-CIO-A]	**S1**	6	R/W	C	TC/RTD input: Within input range (Within setting limiter) The position of the decimal point differs depending on the input range. Voltage/Current input: Within display scale range (Within setting limiter) The position of the decimal point differs depending on Decimal point position setting.	0

◆ Item stored in the memory area.

[a] Probable causes of occurrence

- When errors 1, 2 or 5 have occurred, a breakdown in the RAM, ROM or A/D converter should be suspected.
- Error 3 occurs when the module structure is different from the initial structure. An example would be if a module is replaced by a different model of module. In this situation, replace with the same model of module. Further, this error will also occur when module initialize has not been carried out after changing the module structure.
- Error 4 occurs in the situation where a module is removed while the power is still on, etc.
- If errors 5 or 6 occur, there is a possibility that too much noise, surge or strong shock has been applied to the control unit.

[b] Autotuning (AT) is the function which automatically measures, calculates and sets the optimum PID constants according to the set temperature.

Caution for using the Autotuning (AT)

When a temperature change (UP and/or Down) is 1 °C or less per minute during Autotuning, Autotuning may be cancelled before calculating PID values. In that case, adjust the PID values manually. Manual setting of PID values may also be necessary if the set value is around the ambient temperature or is close to the maximum temperature achieved by the load.

The following is the conditions necessary to carry out autotuning and the conditions which will cause the autotuning to stop.

[Conditions necessary for autotuning]

The autotuning should be executed after satisfying all of the following conditions:

- Operation mode conditions:
  - Auto/Manual transfer (Identifier J1) → Auto mode
  - PID/AT transfer (Identifier G1) → PID control mode
  - Control RUN/STOP transfer (Identifier SR) → Control RUN mode
- The measured value (PV) is without input error range [Input error determination point (high) > Measured value (PV) > Input error determination point (low)].
- The output limiter high limit should be more than 0.1 % and the output limiter low limit should be less than 99.9 %.
- When operation mode (Identifier EI) is set to “Normal (Can be controlled).”

When the autotuning is finished, the display of each channel automatically returns to “0: PID control operation.”

[Conditions which will cause the autotuning to stop]

- When the temperature set value (SV) is changed.
- When the memory area is changed.
- When the PV bias value is changed.
- When the AT bias value is changed.
- When transfer to Manual mode using the Auto/Manual transfer.
- When the measured value (PV) goes to input error range [Measured value (PV) ≥ Input error determination point (high) or Input error determination point (low) ≥ Measured value (PV)].
- When the power is cut off.
- When FAIL occurs in the module whose channel is under the autotuning. Otherwise, when FAIL occurs in the H-PCP-A/B module.
- When transfer to the PID control mode by the PID/AT transfer.
- When operation mode is set to “Unused,” “Monitor” or “Alarm.”
- When the Control RUN/STOP function is changed to the “Control STOP” function.

When the above-mentioned conditions to stop the autotuning occurs, the autotuning is immediately stopped and switch over to the PID control mode. The PID constants return to the values at the start of the autotuning.

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Name	Identifier	Digits	Attribute	Structure	Data range	Factory set value
Heat-side proportional band ◆ [H-TIO-☐, H-CIO-A]	**P1**	6	R/W	C	0.1 to 1000.0 % of span	3.0
Cool-side proportional band ◆ [H-TIO-☐, H-CIO-A]	**P2**	6	R/W	C	0.1 to 1000.0 % of span	3.0
Integral time ◆ [H-TIO-☐, H-CIO-A]	**I1**	6	R/W	C	1 to 3600 seconds	240
Derivative time ◆ [H-TIO-☐, H-CIO-A]	**D1**	6	R/W	C	0 to 3600 second (0: PI action)	60
Overlap/Deadband ◆ [H-TIO-☐, H-CIO-A]	**V1**	6	R/W	C	−10.0 to +10.0 % of span	0.0
Control response parameters ◆ [H-TIO-☐, H-CIO-A]	**CA**	1	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]	**A1**	6	R/W	C	TC/RTD input: Within input range or span range The position of the decimal point differs depending on the input range. Voltage/Current input: Within display scale range or span range The position of the decimal point differs depending on Decimal point position setting.	Refer to Factory set value table of Alarm 1/ Alarm 2 set value [b]
Alarm 2 set value ◆ [H-TIO-☐, H-CIO-A]	**A2**	6	R/W	C		
Heater break alarm set value 1 [H-TIO-A/C/D]	**A3**	6	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A Heater break alarm set value for the current transformer (CT) input of the H-TIO-A/C/D module	0.0
Heater break alarm set value 2 [H-CT-A]	**A4**	6	R/W	C	0.0 to 100.0 A or 0.0 to 30.0 A Heater break alarm set value for the current transformer (CT) input of the H-CT-A module	0.0
Operation mode transfer [H-TIO-☐, H-CIO-A]	**EI**	1	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

◆ Item stored in the memory area.

[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)
Voltage/Current 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	Identifier	Digits	Attribute	Structure	Data range	Factory set value
Heat-side proportioning cycle time [H-TIO-☐, H-CIO-A]	**T0**	6	R/W	C	1 to 100 seconds Setting will be invalid in voltage/current output.	20 [a]
Cool-side proportioning cycle time [H-TIO-☐, H-CIO-A]	**T1**	6	R/W	C	1 to 100 seconds Setting will be invalid in voltage/current output and heat control.	20 [a]
PV bias [H-TIO-☐, H-CIO-A]	**PB**	6	R/W	C	−5.00 to +5.00 % of span	0.00
Control RUN/STOP transfer [H-PCP-A/B]	**SR**	1	R/W	U	0: Control STOP 1: Control RUN Only when the initial set mode is "0: Normal communication," control can be start.	0
Initial setting mode [H-PCP-A/B]	**IN**	1	R/W	U	0: Normal communication Normal communication is possible. 1: Extended communication (Initialize setting mode) [b] Normal and initial setting communication are possible.	0
Memory area number [H-TIO-☐, H-CIO-A]	**ZA**	1	R/W	U	1 to 8	1
Alarm interlock release [H-TIO-☐, H-CIO-A, H-TI-☐, H-AI-☐]	**AR**	1	WO	U	1: Release (1 only)	—
Auto/Manual transfer [H-TIO-☐, H-CIO-A]	**J1**	1	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]	**ON**	6	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
Temperature rise completion range [H-TIO-☐, H-CIO-A]	**HD**	6	R/W	C	1 to 10 °C or 1 to 20 °F	10 or 20 [c]
Temperature rise completion trigger [d] [H-TIO-☐, H-CIO-A]	**HS**	1	R/W	C	0: Unused 1: Used Do not set "1: Used" in H-TIO-H/J module and, because temperature rise completion is not judged.	0
Temperature rise completion soak time [H-TIO-☐, H-CIO-A]	**T3**	6	R/W	U	0 to 360 minutes	0
AI measured value [H-AI-A/B]	**M5**	6	RO	C	Within display scale range The position of the decimal point differs depending on AI decimal point position setting.	—
AI alarm 1 status [H-AI-A/B]	**AD**	1	RO	C	0: OFF 1: ON	—
AI alarm 2 status [H-AI-A/B]	**AE**	1	RO	C	0: OFF 1: ON	—

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

[b] If Extended communication (Initialize setting mode) is selected, the content of each identifier described in the separate **SR Mini/SR Mini HG SYSTEM Supplementary Information Initialize Settings [Extended Communications] (IMSRM07-E☐)** can be changed or selected.

When the control is started, it is impossible to change the settings to the Extended communications (Initialize setting mode). For the change to the Extended communications (Initialize setting mode), the control must be first stopped by the "Control RUN/STOP transfer (Identifier: SR)."

The **Supplementary Information Initialize Settings [Extended Communications] (IMSRM07-E☐)** can be download from the official RKC website: http://www.rkcinst.com/english/manual_load.htm

[c] TC/RTD input: 10 °C or 20 °F
Voltage/Current input: 10 % of display scale

[d] 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 (Identifier HE) 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	Identifier	Digits	Attribute	Structure	Data range	Factory set value
AI alarm 1 set value [H-AI-A/B]	**A5**	6	R/W	C	Within display scale range The position of the decimal point differs depending on AI decimal point position setting.	100.0 [a]
AI alarm 2 set value [H-AI-A/B]	**A6**	6	R/W	C	Within display scale range The position of the decimal point differs depending on AI decimal point position setting.	0.0 [b]
AI zero point correction [H-AI-A/B]	**JI**	1	R/W	C	0: Cancel 1: Execution	0
AI full scale correction [H-AI-A/B]	**JJ**	1	R/W	C	0: Cancel 1: Execution	0
AI operation mode transfer [H-AI-A/B]	**NJ**	1	R/W	C	0: Unused Neither monitor nor alarm monitor is done in this mode. 1: Normal Normal mode in which monitor and alarm are done.	1
Control loop break alarm (LBA) status [H-TIO-☐, H-CIO-A]	**AP**	1	RO	C	0: OFF 1: ON	—
LBA use selection [H-TIO-☐, H-CIO-A]	**HP**	1	R/W	C	0: Unused 1: Used	0
LBA time [H-TIO-☐, H-CIO-A]	**C6**	6	R/W	C	1 to 7200 seconds	480
LBA deadband [H-TIO-☐, H-CIO-A]	**V2**	6	R/W	C	Input span TC/RTD input: The position of the decimal point differs depending on the input range. Voltage/Current input: The position of the decimal point differs depending on Decimal point position setting.	0
AO output value monitor [H-AO-A/B]	**M6**	6	RO	C	Display scale range The position of the decimal point differs depending on AO decimal point position setting. Data will be valid in manual mode.	—
AO output set value [H-AO-A/B]	**S6**	6	R/W	C	Display scale range The position of the decimal point differs depending on AO decimal point position setting. Data will be valid in manual mode.	0.0
AO function selection [H-AO-A/B]	**XO**	6	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 [H-AO-A/B]	**OY**	6	R/W	C	1 to 20 (TIO and FBR input channel) 1 to 40 (AI and TI channel) Setting will be valid in recorder output mode.	1
AO zooming high limit [H-AO-A/B]	**CV**	6	R/W	C	AO zooming low limit to 100.0 % Setting will be valid in recorder output mode.	100.0
AO zooming low limit [H-AO-A/B]	**CW**	6	R/W	C	0.0 % to AO zooming high limit Setting will be valid in recorder output mode.	0.0
AO zero point correction [H-AO-A/B]	**JK**	6	R/W	C	−5.00 to +5.00 %	0.00

[a] Process high alarm: 100.0 Process low alarm: 0.0 No alarm function: 100.0

[b] Process high alarm: 100.0 Process low alarm: 0.0 No alarm function: 0.0

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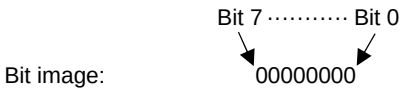
Name	Iden-tifier	Digits	Attri-bute	Struc-ture	Data range	Factory set value
AO full scale correction [H-AO-A/B]	**JL**	6	R/W	C	−5.00 to +5.00 %	0.00
H-DI-A module input status [H-DI-A]	**L1**	6	RO	M	0 to 255 [a]	—
Event DO status [H-DO-C]	**Q3**	6	RO	M	0 to 255 [b]	—
Event DO manual output value [H-DO-C]	**Q4**	6	R/W	M	0 to 255 [b]	0
Event DO extension alarm set value [H-DO-C]	**A7**	6	R/W	C	TC/RTD input: Within input range or span range The position of the decimal point differs depending on the input range. Voltage/Current input: Within display scale range or span range The position of the decimal point differs depending on Decimal point position setting.	0
Cascade monitor [H-CIO-A]	**KH**	6	RO	C	± Input span TC/RTD input: The position of the decimal point differs depending on the input range. Voltage/Current input: The position of the decimal point differs depending on Decimal point position setting. Data will be valid in slave channel	—
Cascade ON/OFF [H-CIO-A]	**KF**	1	R/W	C	0: OFF 1: ON Setting will be valid in master channel.	0
Cascade gain [H-CIO-A]	**KG**	6	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]	**KI**	6	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
TI measured value [H-TI-A/B/C]	**M7**	6	RO	C	Within input range The position of the decimal point differs depending on the input range.	—
TI alarm 1 status [H-TI-A/B/C]	**AF**	1	RO	C	0: OFF 1: ON	—
TI alarm 2 status [H-TI-A/B/C]	**AG**	1	RO	C	0: OFF 1: ON	—
TI burnout status [H-TI-A/B/C]	**B2**	1	RO	C	0: OFF 1: ON	—

[a] Each contact input status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.



Bit data 0: OFF 1: ON

Bit 0: CH1 (DI1) Bit 4: CH5 (DI5)
Bit 1: CH2 (DI2) Bit 5: CH6 (DI6)
Bit 2: CH3 (DI3) Bit 6: CH7 (DI7)
Bit 3: CH4 (DI4) Bit 7: CH8 (DI8)

[b] Each contact output status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.

Bit data 0: OFF 1: ON

Bit 0: CH1 (DO1) Bit 4: CH5 (DO5)
Bit 1: CH2 (DO2) Bit 5: CH6 (DO6)
Bit 2: CH3 (DO3) Bit 6: CH7 (DO7)
Bit 3: CH4 (DO4) Bit 7: CH8 (DO8)

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Name	Identifier	Digits	Attribute	Structure	Data range	Factory set value
TI alarm 1 set value [H-TI-A/B/C]	**A8**	6	R/W	C	Within input range The position of the decimal point differs depending on the input range.	Note 1
TI alarm 2 set value [H-TI-A/B/C]	**A9**	6	R/W	C	Within input range The position of the decimal point differs depending on the input range.	Note 1
PV bias [H-TI-A/B/C]	**PC**	6	R/W	C	−5.00 to +5.00 % of span	0.00
TI operation mode transfer [H-TI-A/B/C]	**EJ**	1	R/W	C	0: Unused Neither monitor nor alarm monitor is done in this mode. 1: Normal Normal mode in which monitor and alarm are done.	1
PCP module DI condition [H-PCP-B]	**L3**	6	RO	M	0 to 7 [a]	—
Event DI contact input monitor [H-DI-B]	**L4**	6	RO	M	0 to 255 [b]	—
Event DI logic input monitor [H-DI-B]	**L5**	6	RO	L	0 to 15 [c]	—
Event DI logic output monitor [H-DI-B]	**Q5**	6	RO	M	0 to 255 [d]	—
Heater break alarm status [H-CT-A]	**AH**	1	RO	C	0: Normal 1: Break 2: Welding	—

[a] Each contact input status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.

Bit 7 ····· Bit 0

Bit image: 00000000

Bit data 0: OFF 1: ON

Bit 0: CH1 (DI1)
Bit 1: CH2 (DI2)
Bit 2: CH3 (DI3)
Bit 3 to Bit 7 are unused.

[b] Each contact input status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.

Bit 7 ····· Bit 0

Bit image: 00000000

Bit data 0: OFF 1: ON

Bit 0: CH1 (DI1) Bit 4: CH5 (DI5)
Bit 1: CH2 (DI2) Bit 5: CH6 (DI6)
Bit 2: CH3 (DI3) Bit 6: CH7 (DI7)
Bit 3: CH4 (DI4) Bit 7: CH8 (DI8)

[c] Each logic input status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.

Bit 7 ····· Bit 0

Bit image: 00000000

Bit data 0: OFF 1: ON

Bit 0: Logic input 1
Bit 1: Logic input 2
Bit 2: Logic input 3
Bit 3: Logic input 4
Bit 4 to Bit 7 are unused.

[d] Each logic output status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.

Bit 7 ····· Bit 0

Bit image: 00000000

Bit data 0: OFF 1: ON

Bit 0: Logic output 1 Bit 4: Logic output 5
Bit 1: Logic output 2 Bit 5: Logic output 6
Bit 2: Logic output 3 Bit 6: Logic output 7
Bit 3: Logic output 4 Bit 7: Logic output 8

Note 1: The factory set value varies depending on the alarm type.

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

Continued on the next page.

Continued from the previous page.

Name	Identifier	Digits	Attribute	Structure	Data range	Factory set value
Comprehensive alarm status [H-PCP-A/B]	**AJ**	6	RO	U	0 to 2047 [a]	—
Positioning monitor [H-TIO-K]	**M8**	6	RO	C	–5.0 to +105.0 %	—
Positioning output neutral zone [H-TIO-K]	**V3**	6	R/W	C	0.1 to 10.0 % of motor time	2.0
Motor time [H-TIO-K]	**TJ**	6	R/W	C	5 to 1000 seconds	10
Integrated output limiter [H-TIO-K]	**OS**	6	R/W	C	100.0 to 200.0 % of motor time	150.0
Manual positioning output value [H-TIO-K]	**OO**	6	R/W	C	–5.0 to +105.0 %	0.0
Local/computer transfer [H-PCP-A/B]	**C1**	1	RO	U	0: Local mode 1: Computer mode (Only valid when connected with the operation panel)	—

[a] Each alarm status is assigned as a bit image in binary numbers. However, send data from the SR Mini HG SYSTEM be changed to decimal ASCII code from the bit image in binary numbers.

Bit 15 ····· Bit 0

Bit image: 0000000000000000

Bit data 0: OFF 1: ON

Bit 0: Logical *OR* of alarm 1 status in all channels
Bit 1: Logical *OR* of alarm 2 status in all channels
Bit 2: Logical *OR* of burnout alarm status in all channels
Bit 3: Logical *OR* of heater break alarm status in all channels
Bit 4: Temperature rise completion status
Bit 5: Logical *OR* of AI alarm 1 status in all channels
Bit 6: Logical *OR* of AI alarm 2 status in all channels
Bit 7: Logical *OR* of control loop break alarm status in all channels
Bit 8: Logical *OR* of TI alarm 1 status in all channels
Bit 9: Logical *OR* of TI alarm 1 status in all channels
Bit 10: Logical *OR* of TI burnout alarm status in all channels
Bit 11 to Bit 15 are unused.

■ Name setting of operation panel (OPC*/OPC-H*)

The following names and settings are checked also on the host computer side.

Name	Identifier	Digits	Attribute	Structure	Data range	Factory set value
Unit name	**NU**	12	R/W	U	12 characters	Unit1 to 8
Memory area name	**NM**	12	R/W	C	12 characters	Area1 to 8
Temperature control channel name	**N1**	8	R/W	C	8 characters	Temp1 to 20
AI channel name	**N2**	8	R/W	C	8 characters	AI1 to 40
AI channel engineering unit	**NT**	8	R/W	C	8 characters	%
Extension alarm channel name	**NQ**	8	R/W	C	8 characters	Alm 1 to 40
PC data name (Sequence item name)	**NR**	10	R/W	C	10 characters Set the unit address to "99." The PC data name function is only for the OPC*.	PC1 to 400
TI channel name	**N5**	8	R/W	C	8 characters	TI1 to 40
AO channel name	**N4**	8	R/W	C	8 characters	AO1 to 20
AO channel engineering unit	**NS**	8	R/W	C	8 characters	%
Alarm message	**NA**	32	R/W	C	32 characters Set the unit address to "99."	Messages differ depending on the type of operation panels.

* The following operation panels mentioned in this manual are already discontinued.
OPC (discontinued in November, 2006) OPC-H (discontinued in February, 2012)

7. TROUBLESHOOTING

This section lists some basic causes and solutions to be taken when any problem would arise in this instrument. If you cannot solve a problem, please contact RKC sales office or the agent, on confirming the type name and specifications of the product.

If the instrument is necessary to be replaced, observe the following warning.

⚠ 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.**
- **If you add or delete a function module, or change the arrangement of the modules, or replace a module with a different model, be sure to perform "Module initialization (identifier: CL)" before setting the data.**
  "Module initialization" stores the new module configuration in the H-PCP module.
  If data is set before "Module initialization" is performed, the H-PCP module will set the previously stored initial data of the old modules in the new modules, which may cause malfunction.

☞ For details on how to initialize the module, refer to **SR Mini/SR Mini HG SYSTEM Supplementary Information Initialize Settings [Extended Communications] (IMSRM07-E□)**.
The above manuals can be downloaded from the official RKC website: http://www.rkcinst.com/english/manual_load.htm

As all data on PID constants, alarm set values, etc. is managed by the H-PCP module, it is necessary to re-enter and re-set all data when the H-PCP module is replaced.
However, re-entry and re-set are not required in the following cases.

- **When data backup software is operating in the module by the external host computer.**
- **When it is set on the operation panel so that data on the operation panel side is transferred to the control unit side when the power is turned on again.**

■ RKC communication

Problem	Possible cause	Solution
No response	Wrong connection, no connection or disconnection of the communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Mismatch of the setting data of communication speed and data bit configuration with those of the host computer	Confirm the settings and set them correctly
	Wrong address setting	
	Error in the data format	Reexamine the communication program
	Transmission line is not set to the receive state after data send (for RS-485)	
EOT return	The specified identifier is invalid	Confirm the identifier is correct or that with the correct function is specified. Otherwise correct it
	Error in the data format	Reexamine the communication program
NAK return	Error occurs on the line (parity bit error, framing error, etc.)	Confirm the cause of error, and solve the problem appropriately. (Confirm the transmitting data, and resend data)
	BCC error	
	The data exceeds the setting range	Confirm the setting range and transmit correct data
	The block data length of the transmission exceeds 128 bytes	Divide the block using ETB before sending it
	The specified identifier is invalid	Confirm the identifier is correct or that with the correct function is specified. Otherwise correct it
	The transmission mode of the operation panel is set to local mode	Change to computer mode

8. ASCII 7-BIT CODE TABLE

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

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