SR Mini HG SYSTEM

*High-performance
Multi-point Control System*

SR Mini HG SYSTEM

Communication Instruction Manual

Notice of production discontinuation

The following operation panels mentioned in this manual are already discontinued.
・OPM (discontinued in November, 2010)
・OPC (discontinued in November, 2006)
・OPM-H (discontinued in November, 2010)
・OPC-H (discontinued in February, 2012)

RKC® **RKC INSTRUMENT INC.**

IMSRM09-E5

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.
- 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. SPECIFICATIONS

1.1 Control unit

Communication interface: Based on EIA RS-422A
Based on EIA RS-232C
Specify when ordering.

Communications modes: 4-wire system, multi-drop connection (RS-422A)
Point-to-point connection (RS-232C)

Maximum connections: 16 units (RS-422A)
1 unit   (RS-232C)

Synchronous method: Start/stop synchronous type

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

Data format: Start bit: 1
Data bit: 7 or 8
Parity bit: Unused or Used (Odd number or Even number)
                Unused when data bit is 8
Stop bit :   1

Protocol: Based on ANSI X3.28 subcategories 2.5 and B1
Polling/selecting type

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

Block length: 128 bytes or less

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

Time out time: 3 seconds

Unit address: 00 to 15

Communications content: Temperature measured value, Temperature set value,
Check of alarm state and setting of alarms

Data sending transfer time: 0 to 255 ms

1.2 OPM (Operation panel) *

<div align="right">* Discontinued products</div>

Communication interface: Based on EIA RS-422A
Based on EIA RS-485
Based on EIA RS-232C
Specify when ordering.

Communications modes: 4-wire system, multi-drop connection (RS-422A)
2-wire system, multi-drop connection (RS-485)
Point-to-point connection (RS-232C)

Maximum connections: 16 units (RS-422A, RS-485)
1 unit   (RS-232C)

Synchronous method: Start/stop synchronous type

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

Data format: Start bit: 1
Data bit: 7 or 8
Parity bit: Unused or Used (Odd number or Even number)
Stop bit : 1 or 2

Protocol: Based on ANSI X3.28 subcategories 2.5 and B1
Polling/selecting type

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

Block length: 128 bytes or less

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

Time out time: 3 seconds

Unit address: 00 to 15

Communications content: Temperature measured value, Temperature set value,
Check of alarm state and setting of alarms

Data sending transfer time: 0 to 300 ms (Setting every 3 ms)
(CE marked OPM only)

1.3 OPC (Operation panel) *

* Discontinued products

Communication interface: Based on EIA RS-422A
Based on EIA RS-485
Based on EIA RS-232C
Specify when ordering.

Communications modes: 4-wire system, multi-drop connection (RS-422A)
2-wire system, multi-drop connection (RS-485)
Point-to-point connection (RS-232C)

Maximum connections: 32 units (RS-422A, RS-485)
1 unit   (RS-232C)

Synchronous method: Start/stop synchronous type

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

Data format: Start bit: 1
Data bit: 7 or 8
Parity bit: Unused or Used (Odd number or Even number)
Stop bit: 1 or 2

Protocol: SR Mini HG communication:
  Based on ANSI X3.28 subcategories 2.5 and B1
  Polling/selecting type
Programmable controller (PC) communication:
  Protocol especially for the respective company

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

Block length: SR Mini HG communication: 128 bytes or less
PC communication: 512 bytes or less

Data types: Text: ASCII code
Control codes:
        ENQ (05H), EOT (04H), STX (02H), ETB (17H),
        ETX (03H), ACK (06H), NAK (15H)
        Codes in brackets (   ) are in hexadecimal.
        However for PC communication, the control code especially
        for the respective company other than the above is used.

Time out time: 1 to 255 seconds

Unit address: 00 to 31

Communications content: Temperature measured value, Temperature set value,
Check of alarm state and setting of alarms, Each PC device state

1.4 OPM-H (Operation panel) *

* Discontinued products

Communication interface: Based on EIA RS-422A
Based on EIA RS-485
Based on EIA RS-232C
Specify when ordering.

Communications modes: 4-wire system, multi-drop connection (RS-422A)
2-wire system, multi-drop connection (RS-485)
Point-to-point connection (RS-232C)

Maximum connections: 16 units (RS-422A, RS-485)
1 unit   (RS-232C)

Synchronous method: Start/stop synchronous type

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

Data format: Start bit: 1
Data bit: 7 or 8
Parity bit: Unused or Used (Odd number or Even number)
Stop bit: 1 or 2

Protocol: Based on ANSI X3.28 subcategories 2.5 and B1
Polling/selecting type

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

Block length: 128 bytes or less

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

Time out time: 3 seconds

Unit address: 00 to 15

Communications content: Temperature measured value, Temperature set value,
Check of alarm state and setting of alarms

1.5 OPC-H (Operation panel) *

* Discontinued products

Communication interface: Based on EIA RS-422A
Based on EIA RS-485
Based on EIA RS-232C
Specify when ordering.

Communications modes: 4-wire system, multi-drop connection (RS-422A)
2-wire system, multi-drop connection (RS-485)
Point-to-point connection (RS-232C)

Maximum connections: 32 units (RS-422A, RS-485)
1 unit   (RS-232C)

Synchronous method: Start/stop synchronous type

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

Data format: Start bit: 1
Data bit: 7 or 8
Parity bit: Unused or Used (Odd number or Even number)
Stop bit: 1 or 2

Protocol: Based on ANSI X3.28 subcategories 2.5 and B1
Polling/selecting type

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

Block length: 128 bytes or less

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

Time out time: 3 seconds

Unit address: 00 to 31

Communications content: Temperature measured value, Temperature set value,
Check of alarm state and setting of alarms

1.6 Terminal voltage and signal logic

■ RS-422A and RS-485

Name	Mark state (Stop bit and signal 1)	Space state (Start bit and signal 0)
Send data T (A), T (B)	Voltage between T (A) and T (B) ≤ -2 V	Voltage between T (A) and T (B) $\geq +2$ V
Receive data R (A), R (B)	Voltage between R (A) and R (B) ≤ -2 V	Voltage between R (A) and R (B) $\geq +2$ V

Voltage between T (A) and T (B) is the voltage of T (A) to the T (B) terminal.
Voltage between R (A) and R (B) is the voltage of R (A) to the R (B) terminal.

■ RS-232C

Signal voltage	Logic
+ 3 V or more	0 (Space status)
− 3 V or less	1 (Mark status)

2. CONNECTING

⚠ **WARNING**

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

CAUTIONS

- 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 as straight as possible. 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.

- In order to prevent malfunction, never touch the contact section of a connector with bare hands or with hands soiled with oil or the like.

- In order to prevent malfunction, connect cable connectors securely, then firmly tighten the connector fastening screws.

- In order 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 cable (nearest the connector).

2.1 Connection block diagram

2.1.1 When connecting control unit with host computer directly

The communication levels for control unit are RS-232C and RS-422A. When using the RS-422A levels, a maximum of 16 control units can be connected.

However, when connecting to the computer which only has a RS-232C driver, conversion of the communication level will be necessary.
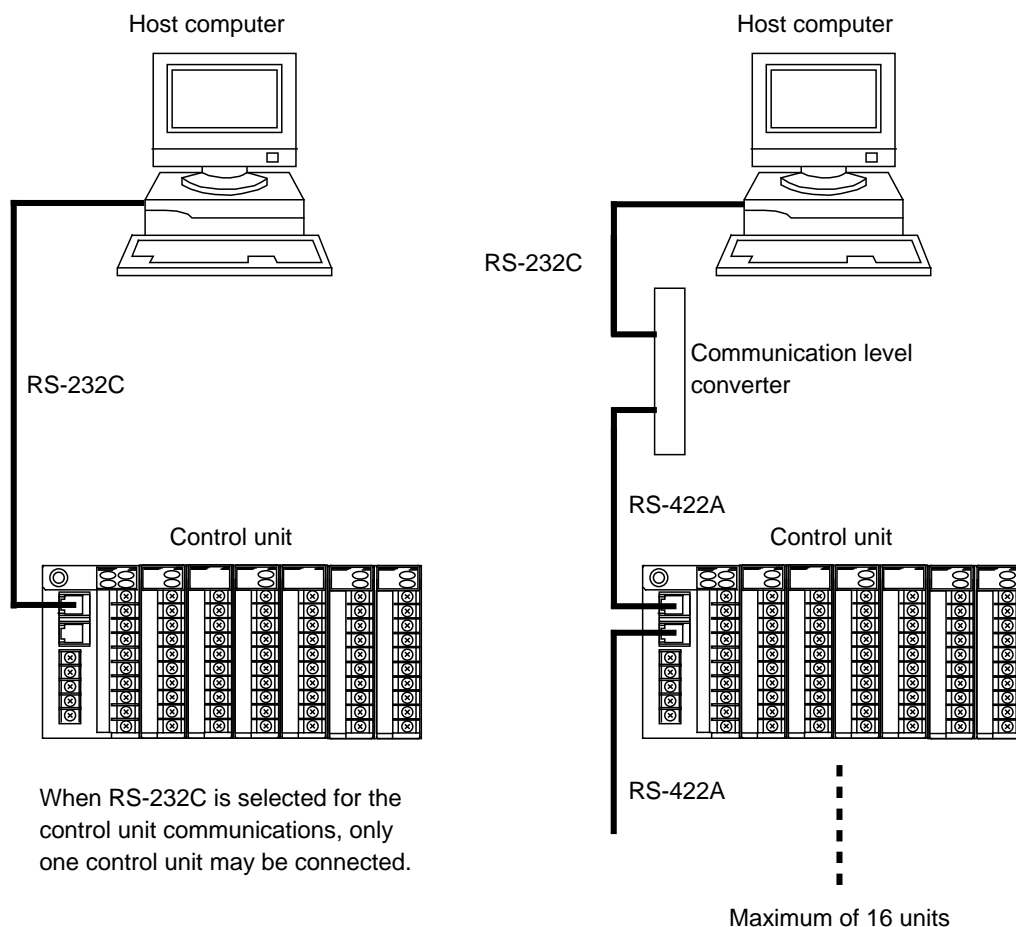
☞   Recommended RS-232C/RS-422A converter: **COM-A** (RKC product)
      For the COM-A, refer to **COM-A/COM-B Instruction Manual (IMSRM33-E☐)**.

2.1.2 When using operation panel

The communication levels for operation panel are RS-232C, RS-422A and RS-485. When using the RS-422A or RS-485 levels, a maximum of 16 control units (OPC*/OPC-H*: 32 control units) can be connected.

However, when connecting to the computer which only has a RS-232C driver, conversion of the communication level will be necessary.

* Discontinued products
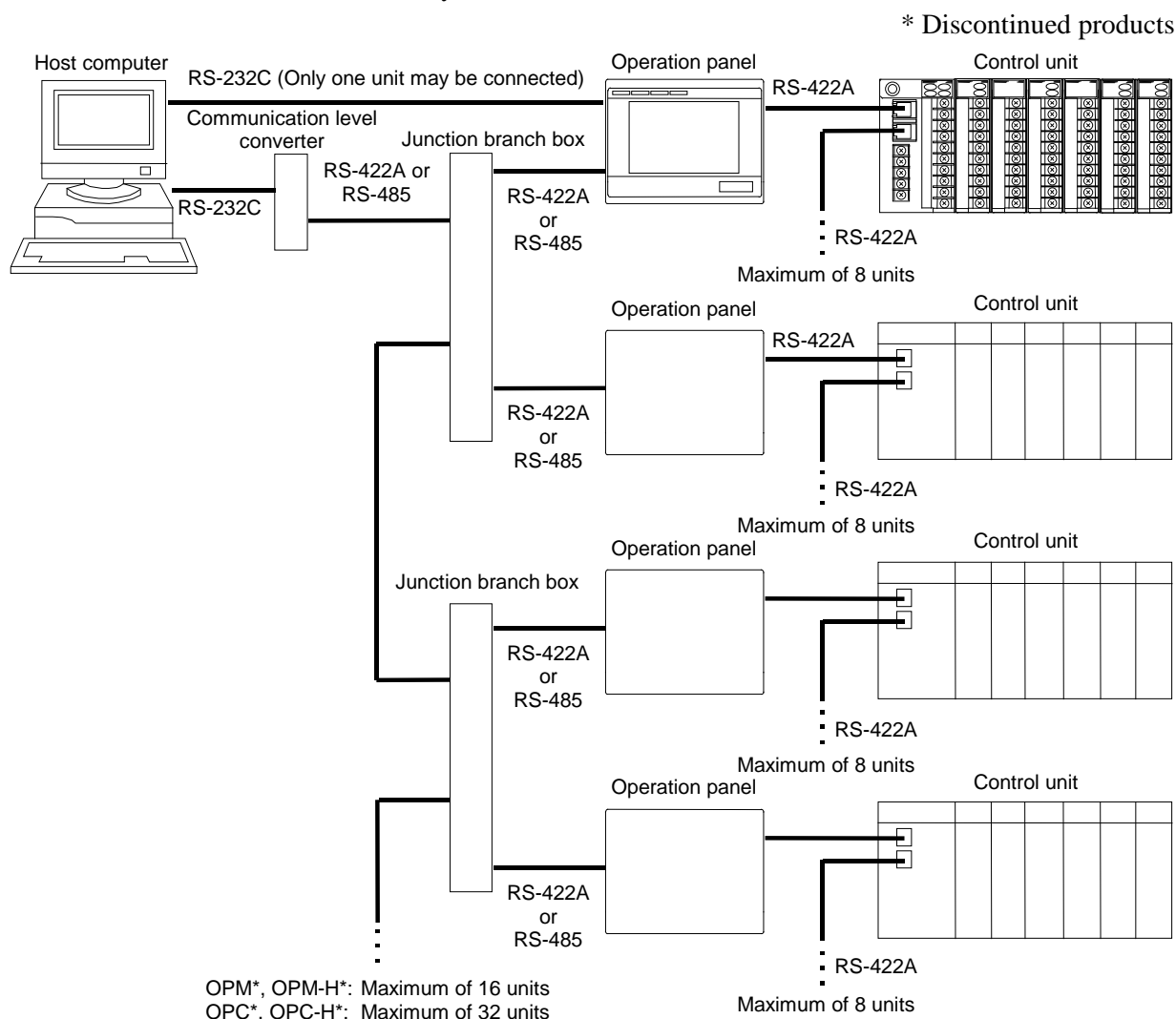
☞ Recommended RS-232C/RS-422A converter: **COM-A** (RKC product)
Recommended RS-232C/RS-485 converter: **COM-B** (RKC product)
For the COM-A,/B refer to **COM-A/COM-B Instruction Manual (IMSRM33-E□)**.

☞ Recommended Junction branch box:
BRA-100B-4 (RS-422A), **BRA-100B-2** (RS-485) (RKC product)
For the BRA-100B refer to **BRA-100B Instruction Manual (IM10BRA02-E□)**.

2.2 Connection between the control unit and a host computer

2.2.1 When the dedicated cable is not used

■ RS-422A
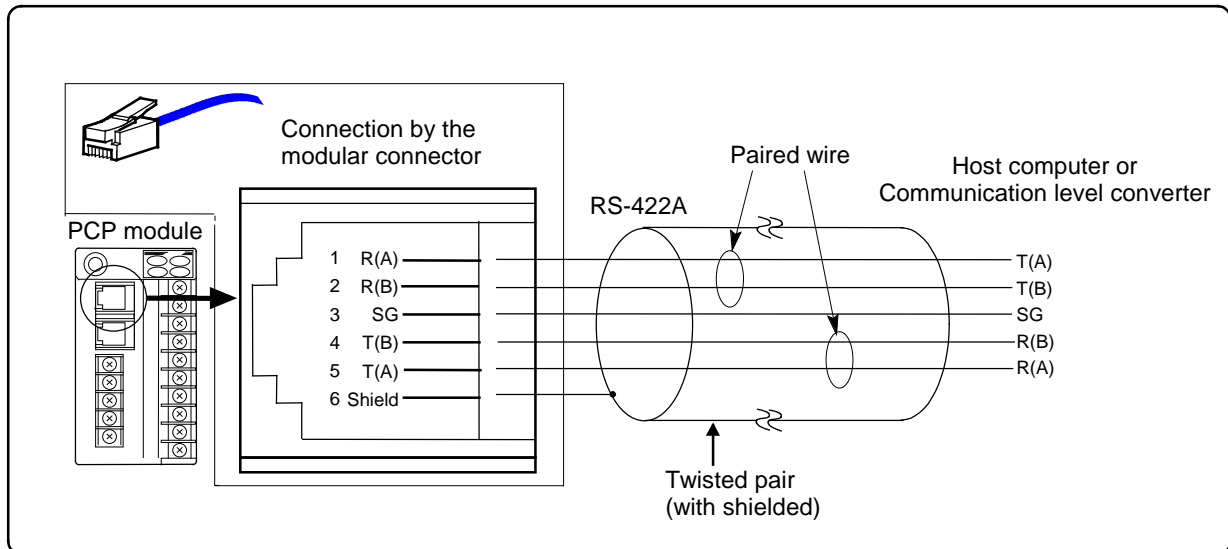
■ RS-232C
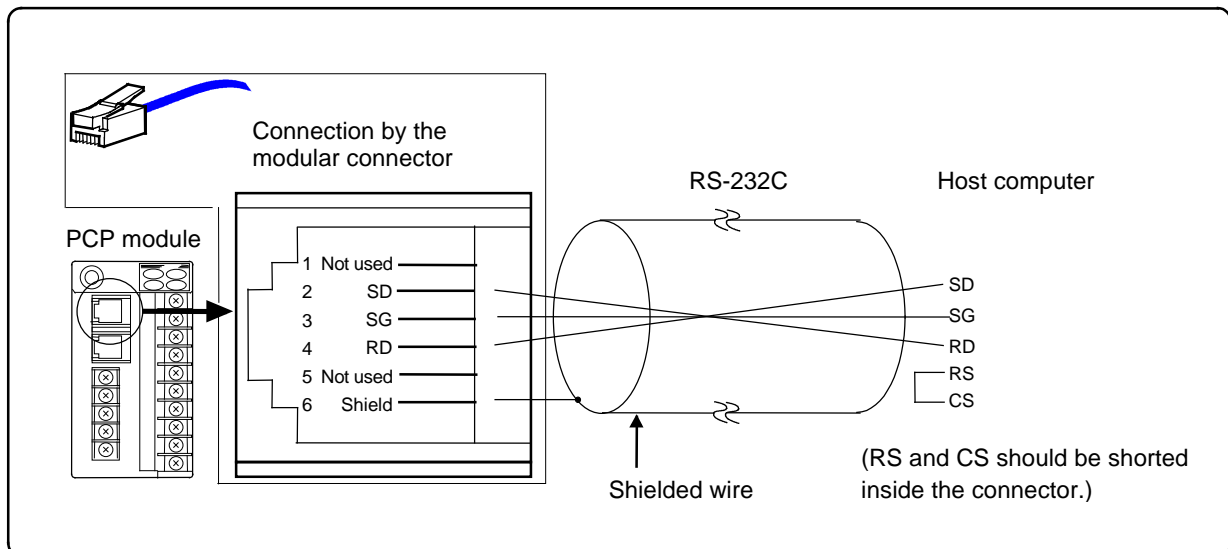
📖   The 6 pins type modular connector should be used.
(TM4P-66P to HEROSE ELECTRIC CO., LTD. or equivalent)

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2.2.2 When using the dedicated cable

📖 W-BF-01*, W-BF-02* or W-BF-28* communication cable (RKC product) can be used as communication cable (sold separately). If noise is a factor, customer should use a twisted pair cable (not included) or something to that effect.

∗ Shield of the cable are connected to SG (No. 6 pin) of the H-PCP module connector.

■ RS-422A

Communication level converter

Control unit

Connect to terminal block

RS-422A

Connect to the modular connector on the H-PCP module [COM.PORT1].

RS-232C

Connect according to the label names as they are without crossing the wires.

Host computer

Sybol lavel

R(B)
R(A)
T(B)
T(A)
SG

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

Connect to the communication connector

■ RS-232C

Control unit

Host computer

D-SUB 9P connector *

Connect to the modular connector on the H-PCP module [COM.PORT1].

RS-232C

Connect to the communication connector

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

* 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.

2.3 Connection between the operation panel and a host computer

2.3.1 OPM (operation panel)* connection

* Discontinued products

Operation panel (OPM)

RS-422A
RS-485   Specify when ordering
RS-232C

Host computer

Connect to the
host communication
connector [HOST]

Connect to the
communication
connector

Connector pin numbers

Connector used: SDBB-25S
(Manufactured by HIROSE ELECTRIC CO.,LTD.)

13 ——————— 1

25 ——————— 14

The customer must prepare the communication cables. These cables
(excluding RS-485) are also available from RKC.
Recommended connector type: SDBB-25P
(Manufactured by HIROSE ELECTRIC CO.,LTD.)

■ RS-422A

Pin No. and signal details

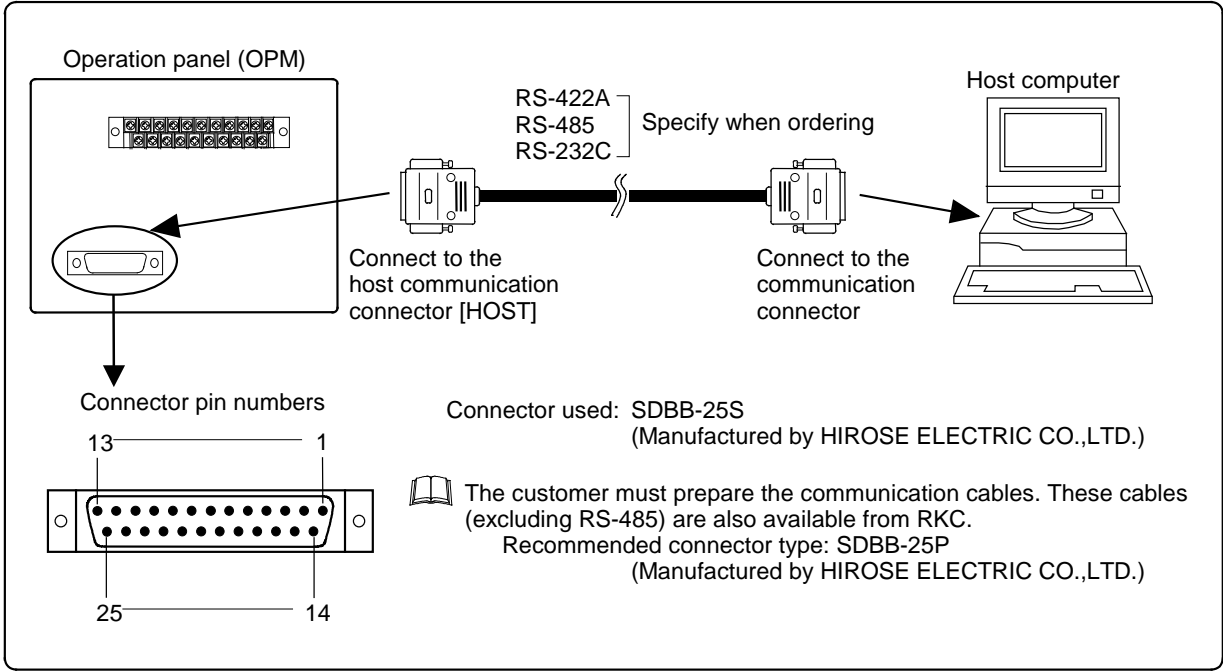| Pin No.	Signal name	Description	Signal direction Operation panel Host computer
2	T(A)	RS-422A send data	⟶
14	T(B)	RS-422A send data	⟶
8	SG	Signal ground	—
4	R(A)	RS-422A receive data	⟵
16	R(B)	RS-422A receive data	⟵
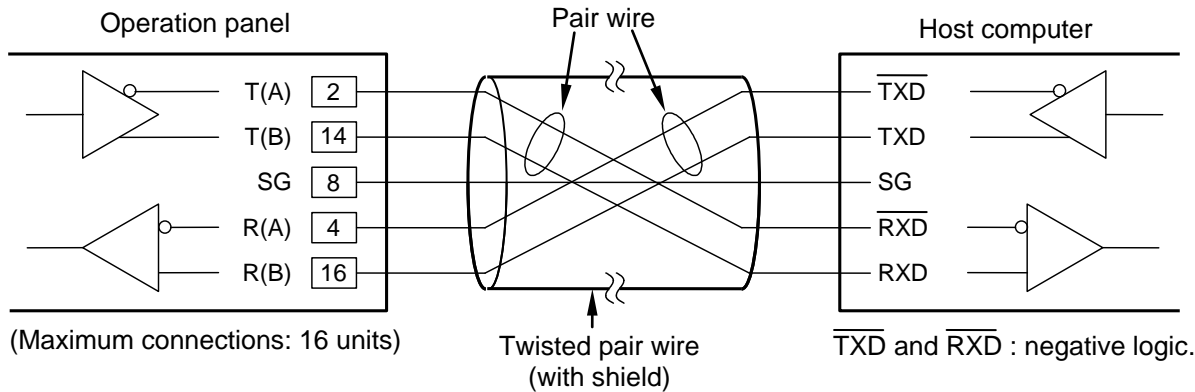
Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T(A) 2 $\overline{\text{TXD}}$
T(B) 14   TXD
SG   8   SG
R(A) 4 $\overline{\text{RXD}}$
R(B) 16   RXD

(Maximum connections: 16 units)

Twisted pair wire
(with shield)

$\overline{\text{TXD}}$ and $\overline{\text{RXD}}$: negative logic.

[OPM]

■ RS-485

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
2	T/R(A)	RS-485 send/receive data	←——→	
14	T/R(B)	RS-485 send/receive data	←——→	
8	SG	Signal ground	———	

Contents of communication cable wiring
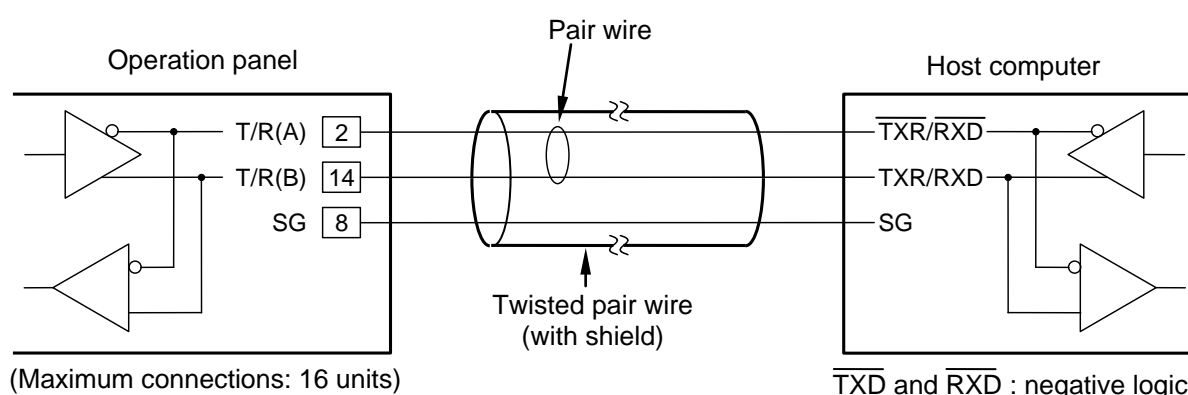
Operation panel
Pair wire
Host computer

T/R(A) [2]
T/R(B) [14]
SG [8]

$\overline{TXR/RXD}$
TXR/RXD
SG

Twisted pair wire
(with shield)

(Maximum connections: 16 units)

$\overline{TXD}$ and $\overline{RXD}$: negative logic.

■ RS-232C

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
2	SD(TXD)	RS-232C send data	——→	
3	RD(RXD)	RS-232C receive data	←——	
7	SG(GND)	Signal ground	———	
4	RS(RTS)	RS-232C request to send		
5	CS(CTS)	RS-232C clear to send		

Contents of communication cable wiring

Operation panel
Host computer

SD(TXD) [2]
RD(RXD) [3]
SG(GND) [7]
RS(RTS) [4]
CS(CTS) [5]

SD(TXD)
RD(RXD)
SG(GND)
RS(RTS)
* CS(CTS)

Shield wire

(Maximum connections: 1 unit)

∗ Short RS and CS within connector
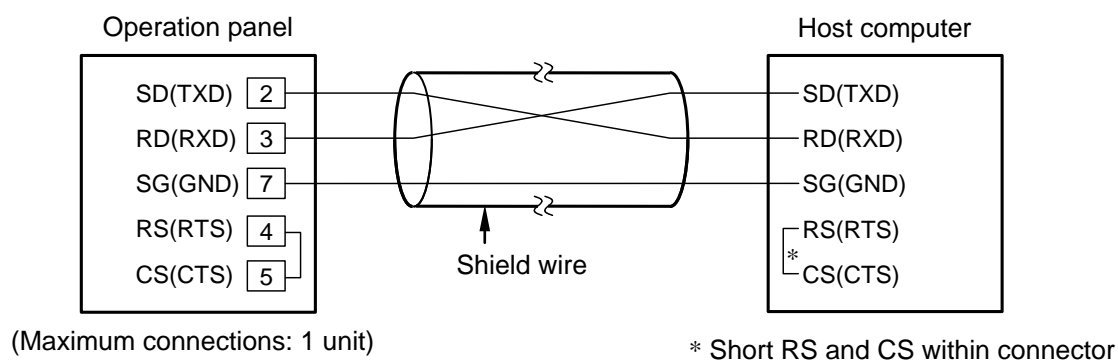
2.3.2 CE marked OPM (OPM-CL□＊□/□/CE)＊ connection

＊ Discontinued products

The connector for the connection with operation panel is attached to this instrument.

Operation panel (OPM)

Host computer

RS-422A
RS-485   Specify when ordering
RS-232C

Connect to the
host communication
connector [HOST]

Connect to the
communication
connector

Connector pin numbers

1 —— 5

6 —— 9

Connector used: SDEB-9P
(Manufactured by HIROSE ELECTRIC CO.,LTD.)

The customer must prepare the communication cables.
These cables (excluding RS-485) are also available from RKC.
Recommended connector type: SDEB-9S
(Manufactured by HIROSE ELECTRIC CO.,LTD.)

■ RS-422A

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction	
			Operation panel	**Host computer**
2	T(A)	RS-422A send data	→	
6	T(B)	RS-422A send data	→	
5	SG	Signal ground	——	
4	R(A)	RS-422A receive data	←	
8	R(B)	RS-422A receive data	←	

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T(A) 2
T(B) 6
SG   5
R(A) 4
R(B) 8

$\overline{\text{TXD}}$
TXD
SG
$\overline{\text{RXD}}$
RXD

(Maximum connections: 16 units)

Twisted pair wire
(with shield)

$\overline{\text{TXD}}$ and $\overline{\text{RXD}}$: negative logic.

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[CE marked OPM]

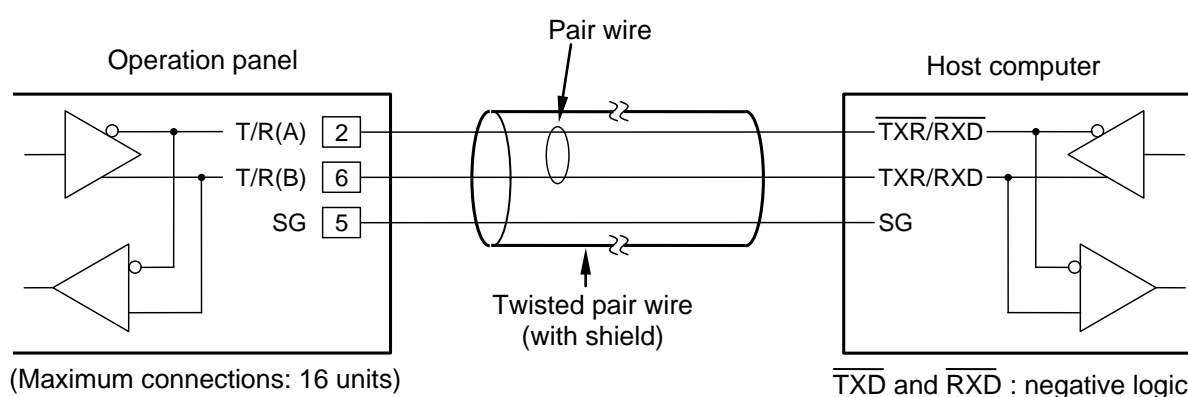## ■ RS-485

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
2	T/R(A)	RS-485 send/receive data	←————————→	
6	T/R(B)	RS-485 send/receive data	←————————→	
5	SG	Signal ground	————————	

Contents of communication cable wiring

(Maximum connections: 16 units)

$\overline{TXD}$ and $\overline{RXD}$: negative logic.

■ RS-232C

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
3	SD(TXD)	RS-232C send data	————————→	
2	RD(RXD)	RS-232C receive data	←————————	
5	SG(GND)	Signal ground	————————	

Contents of communication cable wiring

(Maximum connections: 1 unit)   Shield wire

∗ Short RS and CS within connector

2.3.3 OPC (operation panel)∗ connection

∗ Discontinued products

The connector for the connection with operation panel is attached to this instrument.

Operation panel (OPC)

RS-422A
RS-485
RS-232C } Specify when ordering

Host computer

Connect to the host communication connector [HOST]

Connect to the communication connector

Connector pin numbers

5 9
1 6

Connector used: SDEB-9P
Connector locking device type: HD-LN(4-40)(02)
         (Manufactured by HIROSE ELECTRIC CO.,LTD.)

The customer must prepare the communication cables.
These cables (excluding RS-485) are also available from RKC.
Recommended connector type: SDEB-9S
        (Manufactured by HIROSE ELECTRIC CO.,LTD.)

■ RS-422A

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer
2	T(A)	RS-422A send data	⟶
6	T(B)	RS-422A send data	⟶
5	SG	Signal ground	⸺
4	R(A)	RS-422A receive data	⟵
8	R(B)	RS-422A receive data	⟵

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T(A) 2 — $\overline{TXD}$
T(B) 6 — TXD
SG 5 — SG
R(A) 4 — $\overline{RXD}$
R(B) 8 — RXD

(Maximum connections: 32 units)

Twisted pair wire (with shield)

$\overline{TXD}$ and $\overline{RXD}$: negative logic.

[OPC]

■ RS-485

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
2	T/R(A)	RS-485 send/receive data	←——→	
6	T/R(B)	RS-485 send/receive data	←——→	
5	SG	Signal ground	———	

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T/R(A) 2

T/R(B) 6

SG 5

$\overline{TXR/RXD}$

TXR/RXD

SG

Twisted pair wire
(with shield)

(Maximum connections: 32 units)

$\overline{TXD}$ and $\overline{RXD}$: negative logic.

■ RS-232C

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
3	SD(TXD)	RS-232C send data	——→	
2	RD(RXD)	RS-232C receive data	←——	
5	SG(GND)	Signal ground	———	
7	RS(RTS)	RS-232C request to send		
8	CS(CTS)	RS-232C clear to send		

Contents of communication cable wiring

Operation panel

Host computer

SD(TXD) 3

RD(RXD) 2

SG(GND) 5

RS(RTS) 7

CS(CTS) 8

SD(TXD)

RD(RXD)

SG(GND)

RS(RTS)

* CS(CTS)

Shield wire

(Maximum connections: 1 unit)

∗ Short RS and CS within connector

2.3.4 OPM-H (operation panel)* connection

* Discontinued products

Operation panel (OPM-H)

The connector for the connection with operation panel is attached to this instrument.

Host computer

RS-422A
RS-485   Specify when ordering
RS-232C

Connect to the host communication connector [HOST]

Connect to the communication connector

Connector pin numbers

1 ——— 5

6 ——— 9

Connector used: SDEB-9P
Connector locking device type: HD-LN(4-40)(02)
          (Manufactured by HIROSE ELECTRIC CO.,LTD.)

The customer must prepare the communication cables.
These cables (excluding RS-485) are also available from RKC.
Recommended connector type: SDEB-9S
          (Manufactured by HIROSE ELECTRIC CO.,LTD.)

■ RS-422A

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel ———— Host computer	
2	T(A)	RS-422A send data	————→	
6	T(B)	RS-422A send data	————→	
5	SG	Signal ground	————	
4	R(A)	RS-422A receive data	←————	
8	R(B)	RS-422A receive data	←————	

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T(A) 2 $\overline{TXD}$
T(B) 6   TXD
SG 5   SG
R(A) 4 $\overline{RXD}$
R(B) 8   RXD

(Maximum connections: 16 units)

Twisted pair wire (with shield)

$\overline{TXD}$ and $\overline{RXD}$: negative logic.

■ RS-485

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
2	T/R(A)	RS-485 send/receive data	←	→
6	T/R(B)	RS-485 send/receive data	←	→
5	SG	Signal ground	—	—

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T/R(A) 2
T/R(B) 6
SG 5

$\overline{\text{TXR}/\text{RXD}}$
TXR/RXD
SG

Twisted pair wire
(with shield)

(Maximum connections: 16 units)

$\overline{\text{TXD}}$ and $\overline{\text{RXD}}$: negative logic.

■ RS-232C

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
3	SD(TXD)	RS-232C send data		→
2	RD(RXD)	RS-232C receive data	←	
5	SG(GND)	Signal ground	—	—
7	RS(RTS)	RS-232C request to send		
8	CS(CTS)	RS-232C clear to send		

Contents of communication cable wiring

Operation panel

Host computer

SD(TXD) 3
RD(RXD) 2
SG(GND) 5
RS(RTS) 7
CS(CTS) 8

SD(TXD)
RD(RXD)
SG(GND)
RS(RTS)
* CS(CTS)

Shield wire

(Maximum connections: 1 unit)

∗ Short RS and CS within connector

2.3.5 OPC-H (operation panel)* connection

* Discontinued products

The connector for the connection with operation panel is attached to this instrument.

Operation panel (OPC-H)

RS-422A
RS-485   Specify when ordering
RS-232C

Host computer

Connect to the host communication connector [CN7]

Connect to the communication connector

Connector pin numbers

1 ——— 5

6 ——— 9

The customer must prepare the communication cables.
These cables (excluding RS-485) are also available from RKC.
Recommended connector type: 17JE13090-02(D8A)
(Manufactured by DDK)

■ RS-422A

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction	
			Operation panel	Host computer
2	T(A)	RS-422A send data	——————→	
6	T(B)	RS-422A send data	——————→	
5	SG	Signal ground	———————	
4	R(A)	RS-422A receive data	←——————	
8	R(B)	RS-422A receive data	←——————	

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T(A) 2 $\overline{TXD}$
T(B) 6   TXD
SG   5   SG
R(A) 4 $\overline{RXD}$
R(B) 8   RXD

(Maximum connections: 32 units)

Twisted pair wire (with shield)

$\overline{TXD}$ and $\overline{RXD}$: negative logic.

[OPC-H]

■ RS-485

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
2	T/R(A)	RS-485 send/receive data	←——→	
6	T/R(B)	RS-485 send/receive data	←——→	
5	SG	Signal ground	———	

Contents of communication cable wiring

Operation panel

Pair wire

Host computer

T/R(A) [2]
T/R(B) [6]
SG [5]

$\overline{\text{TXR/RXD}}$
TXR/RXD
SG

Twisted pair wire (with shield)

(Maximum connections: 32 units)

$\overline{\text{TXD}}$ and $\overline{\text{RXD}}$: negative logic.

■ RS-232C

Pin No. and signal details

Pin No.	Signal name	Description	Signal direction Operation panel Host computer	
3	SD(TXD)	RS-232C send data	——→	
2	RD(RXD)	RS-232C receive data	←——	
5	SG(GND)	Signal ground	———	
7	RS(RTS)	RS-232C request to send		
8	CS(CTS)	RS-232C clear to send		

Contents of communication cable wiring

Operation panel

Host computer

SD(TXD) [3]
RD(RXD) [2]
SG(GND) [5]
RS(RTS) [7]
CS(CTS) [8]

SD(TXD)
RD(RXD)
SG(GND)
RS(RTS)
* CS(CTS)

Shield wire

(Maximum connections: 1 unit)

∗ Short RS and CS within connector

3. SETTING FOR COMMUNICATION

In order to make communication between the SR Mini HG SYSTEM and the host computer, it is necessary to set the communication speed, data configuration and address.

3.1 When connecting control unit with host computer directly

Host communication setting (data configuration, communication speed, unit address, etc.) are to be set by the H-PCP-A/B module of the control unit.

Set the same communication setting to both the control unit and connecting host computer.

Host computer   Control unit

Host communication setting
Data configuration,
Communication speed,
Unit address, etc.
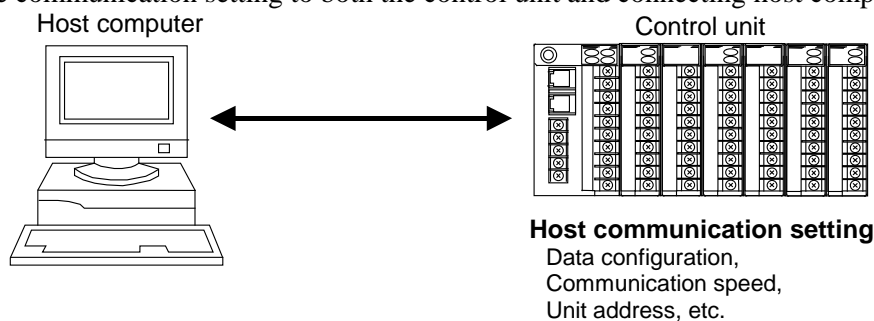
3.1.1 Setting the data configuration and communication speed

⚠ **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.

Mother block   Module mainframe

Module mainframe

Upper section

Lower section

Mother block

Press bottom of module
and lift upward to release
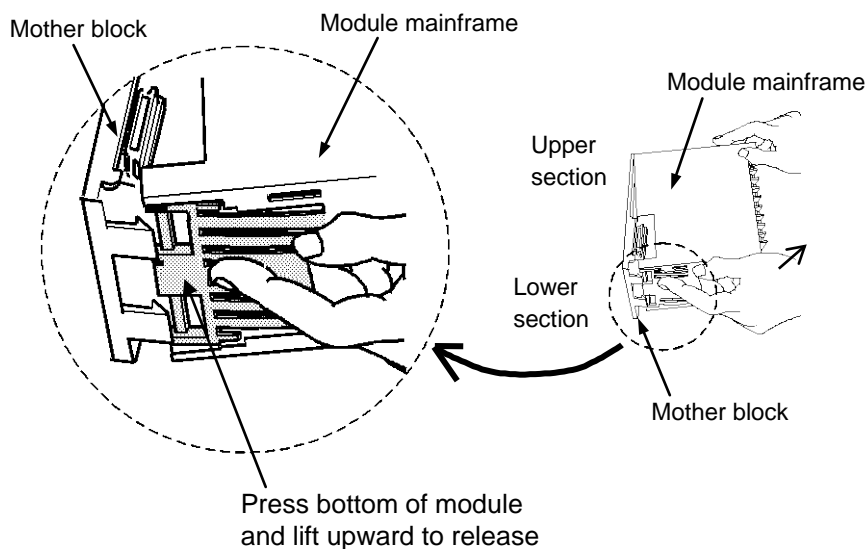
2. Set the desired data configuration and communication speed by the dip switches located in the H-PCP-A/B module.

Upper section

View from the rear with the mother block removed.
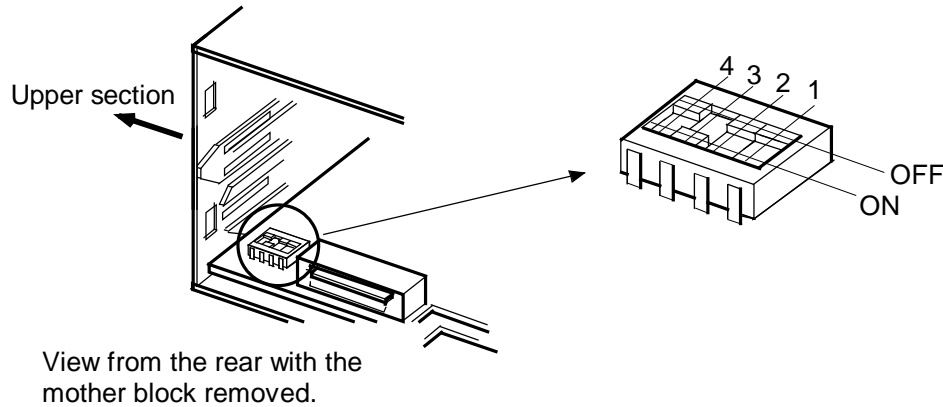
1	2	**Data configuration**
OFF	OFF	8-bit non parity
OFF	ON	7-bit even parity
ON	OFF	7-bit odd parity
ON	ON	Don't set this one

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 completing the setting, engage the upper connection of the mainframe with that of the mother block, then perform the reverse order of separation to engage the lower part of the mainframe with the mother block with the upper connection set to the fulcrum. Firmly engage the mainframe with the mother block until a click sound is produced.

3.1.2 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.

Setting procedure:
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.

Unit address setting switch

Setting range: 0 to F (hexadecimal)
* Addresses 0 to 15

PCP module
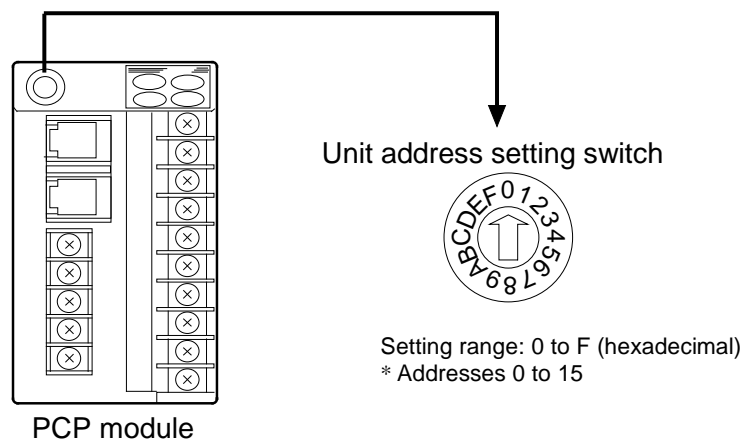
📖 **Set the unit address so that its setting is different from other address settings on the same line. Otherwise, problems or malfunction may result.**

3.2 When using operation panel

The host communication setting between the operation panel and host computer is made (on these operation panel and host computer); the communication setting between the operation panel and control unit is made (on these operation panel and control unit) and computer/local selection is made (on the operation panel).
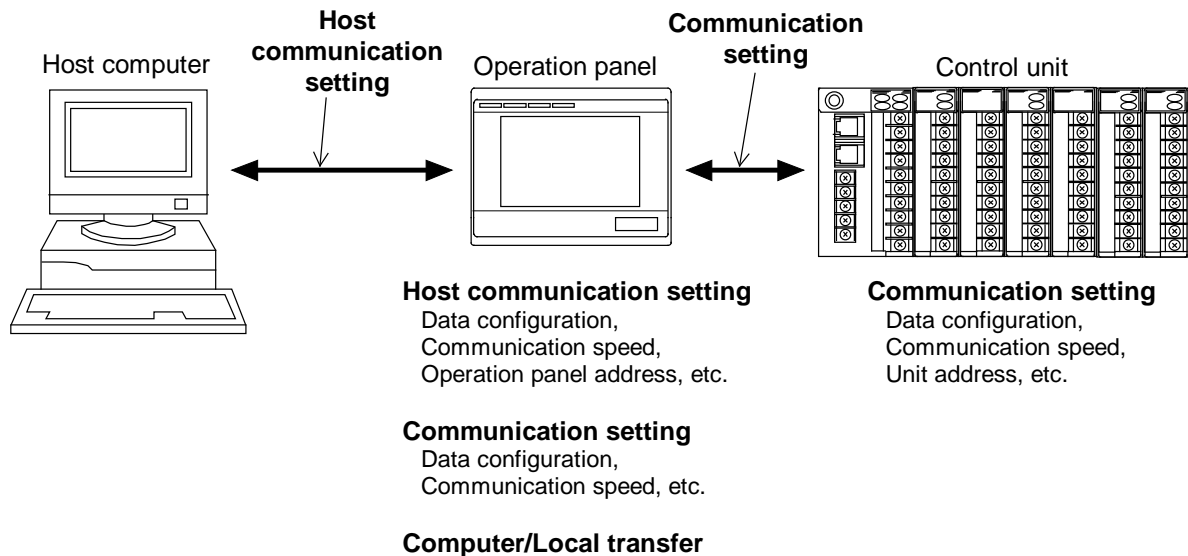
3.2.1 Host communication setting

Host communication setting (data configuration, communication speed, operation panel address, etc.) are to be set on the screen of the operation panel.
Set the same host communication setting to both the operation panel and connecting host computer.
For details on the setting and operating procedure, refer to the each operation panel instruction manuals.

OPM * : Refer to the "Host Communication Initialize" screen in the **Operation panel OPM Instruction Manual** (**IMSRM18-E□**).

OPC * : Refer to the "Host Communication" screen in the **Operation panel OPC Screen Operation Manual** (**IMSRM14-E□**).

OPM-H * : Refer to the "Host Communication Initialize" screen of the **Operation panel OPM-H Instruction Manual** (**IMSRM24-E□**).

OPC-H * : Refer to the "Host Communication" screen in the **Operation panel OPC-H Screen Operation Manual** (**IMSRM38-E□**).

* Discontinued products

3.2.2 Between operation panel and control unit communication setting

Set the same communication setting to both the control unit and connecting operation panel.

■ Operation panel

Communication setting (data configuration, communication speed, etc.) are to be set on the screen of the operation panel.

For details on the setting and operating procedure, refer to the each operation panel instruction manuals.

OPM * :　　Refer to the "Communication Initialize" screen in the **Operation panel OPM Instruction Manual** (**IMSRM18-E□**).

OPC * :　　Refer to the "Controller Communication" screen in the **Operation panel OPC Screen Supplementary Manual** (**IMSRM40-E□**).

OPM-H * :　Refer to the "Communication Initialize" screen of the **Operation panel OPM-H Instruction Manual** (**IMSRM24-E□**).

OPC-H * :　Refer to the "Controller Communication" screen in the **Operation panel OPC-H Screen Operation Manual** (**IMSRM38-E□**).

* Discontinued products

■ Control unit

Communication setting (data configuration, communication speed, unit address, etc.) are to be set by the H-PCP-A/B module of the control unit.

Dip switch

It refers to **3.1.1 Setting the data configuration and communication speed (P. 22)** and it sets data configuration and communication speed.

Unit address setting switch

It refers to **3.1.2 Unit address setting (P. 23)** and it sets unit address. Up to 8 control units can be connected to one operation panel.

　Setting range: 0 to 7

3.2.3 Computer/Local transfer

SR Mini HG SYSTEM has two communication modes: local mode and computer mode. The host computer can perform only monitoring (polling) in local mode. In computer mode, it can perform monitoring and setting (selecting).

These computer/local transfer can be selected on the screen of the operation panel. For details on the setting and operating procedure, refer to the each operation panel instruction manuals.

OPM＊: Refer to the "Computer/Local Selection" screen in the **Operation panel OPM Instruction Manual** (**IMSRM18-E□**).

OPC＊: Refer to the "Host Communication" screen in the **Operation panel OPC Screen Operation Manual** (**IMSRM14-E□**).

OPM-H＊: Refer to the "Computer/Local Selection" screen of the **Operation panel OPM-H Instruction Manual** (**IMSRM24-E□**).

OPC-H＊: Refer to the "Host Communication" screen in the **Operation panel OPC-H Screen Operation Manual** (**IMSRM38-E□**).

＊ Discontinued products

4. COMMUNICATION 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

📖   Data send/receive state (communication data monitoring and setting) of RKC communication can be checked by using the following software:

- Communication tool: PROTEM2

The software can be downloaded from the official RKC website:
  http://www.rkcinst.com.

4.1 Polling

Polling is an action that host computer requesting one of the device which selected among multidrop connected, to send the data. The polling procedure is as follows.

ID: Identifier

The above procedure is for SR Mini HG SYSTEM transmission control. However, the operation panel (OPC *) can correspond not only to SR Mini HG SYSTEM communication but also to programmable controller (PC) communication (option).

The PC 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 PC communication from SR Mini HG SYSTEM communication, the former uses the identifier (CP) dedicated to it. The PC communication protocol especially for the respective company is used after the identifier (CP).

In the following, the difference between the SR Mini HG SYSTEM communication (RKC standard) and PC communication procedures.

* Discontinued products

SR Mini HG SYSTEM communication

E O T					M	1	E N Q

Operation panel address — SR Mini HG address — Identifier

PC communication

E O T			C	P	PC communication protocol especially for the respective company

Operation panel address — PC Identifier

4.1.1 Polling procedure

(1) Data link initialize

In order to initialize the data link before sending the polling sequence, send [EOT] from the host computer.

(2) Polling sequence send

Send the polling sequence from the host computer in the following format.
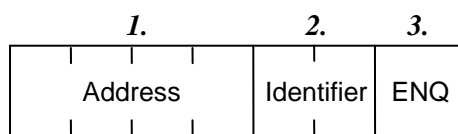
1. **Address**

This is the unit address of this device being polled.

It is expressed by a 4-digit decimal ASCII code.
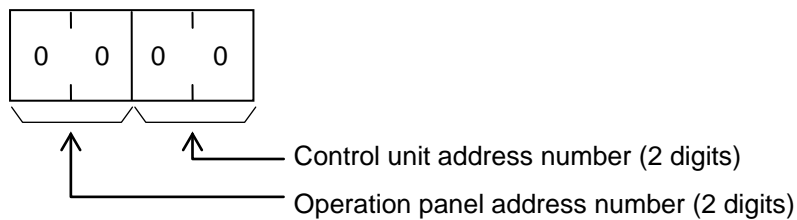
Control unit address number (2 digits)

Operation panel address number (2 digits)

When the connection is directly to the control unit and not to the operation panel, the operation panel address number is abbreviated into 2 digits.

2. **Identifier**

A code which identifies the data requested from this device.

It is expressed using a 2-digit alphanumeric ASCII code.

For details on the identifiers, refer to **5. COMMUNICATION IDENTIFIERS (P. 43)**.

3. **ENQ**

This transmission control character signifies the end of the polling sequence. After sending this, the host computer waits for a response from this device.

(3) Data send from this device

This device sends data in the following format if it received the polling sequence correctly.
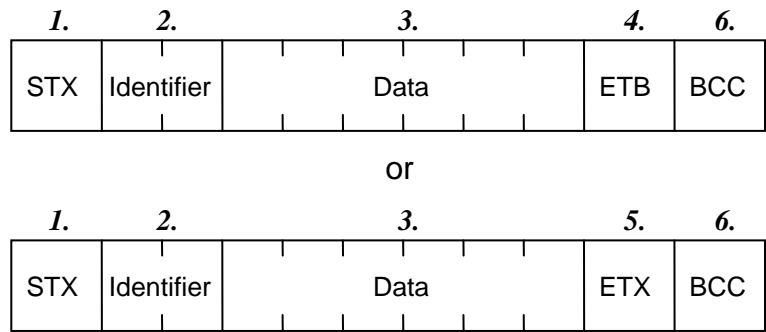
1.	2.	3.	4.	6.
STX	Identifier	Data	ETB	BCC

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**

Transmission control character showing the beginning of the text (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. The number of digits (length) and data configuration vary depending on the type of identifier.

☞ Refer to **4.3 Communication data configuration (P. 38)** and **5. COMMUNICATION IDENTIFIERS (P. 43)**.

3. **Data**

Data which is indicated by an identifier of this device, consisting of channel Nos., data, etc. Each channel No. and data are delimited by a space (20H). The data and the next channel No. are delimited by a comma (2CH).

Channel No.: 2-digit ASCII code, not zero-suppressed. Channels without channel Nos. 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**

Block check character for error-detection, uses horizontal parity. [BCC] is calculated by horizontal parity (even number).

Calculation method

[BCC] is obtained by EX-OR (exclusive OR) of all characters from the character next to [STX] to [ETB] or [ETX]. No [STX] is included.

- Example -

The calculation method for the following data is shown below.

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

(   ) : Hexadecimal number   □ : Space

BCC = 4DH⊕31H⊕30H⊕31H⊕20H⊕20H⊕31H⊕35H⊕30H⊕2EH⊕30H⊕03H
    = 54H (⊕ : EX-OR)

The value of BCC becomes 54H.

(4) End of data send by this device (EOT send)

This device sends EOT in the following cases to terminate the data link.

- When there is no specified identifier
- When the specified identifier is not valid
- When an error exists in the data format
- When all data have been sent

(5) No response of this device

If the polling sequence is not received correctly (if the address differs or if there is an error in the data), this device does not respond. In this case, take necessary measures for recovery by time-out on the host computer side if required.

(6) ACK (Acknowledge)

If the host computer receives data sent correctly from this device, send ACK. The device then sends data next to the identifier just sent . In order to stop sending data from this device, send EOT from the host computer to terminate the data link.

☞   For the identifier, refer to **5. COMMUNICATION IDENTIFIERS (P. 43)**.

(7) NAK (Negative acknowledge)

If the host computer does not correctly receive the data sent from this device, send NAK. The device then re-sends the same data. As the number of re-send times is not specified, take necessary measures for recovery on the host computer side if it does not recover.

(8) No response from host computer

If data sending from the host computer becomes no response, this device sends EOT after the time-out time (about 3 seconds) has elapsed to terminate the data link.

(9) Indefinite response from host computer

If the response from the host computer is indefinite, this device sends EOT to terminate the data link.

(10) EOT (Data link termination)

To terminate communication with this device or to terminate the data link as a result of no response from this device, send EOT from the host computer.

4.1.2 Polling procedure example
(When the host computer requests data)

■ **Normal transmission**
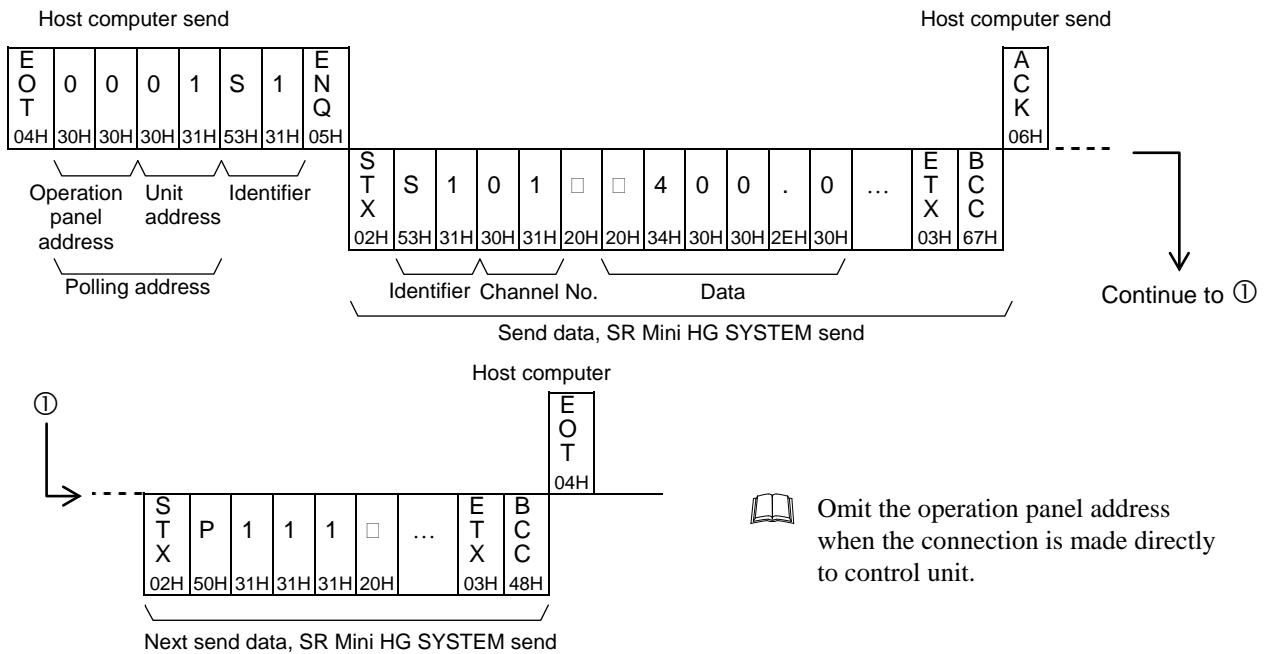
■ **If error exists in data**
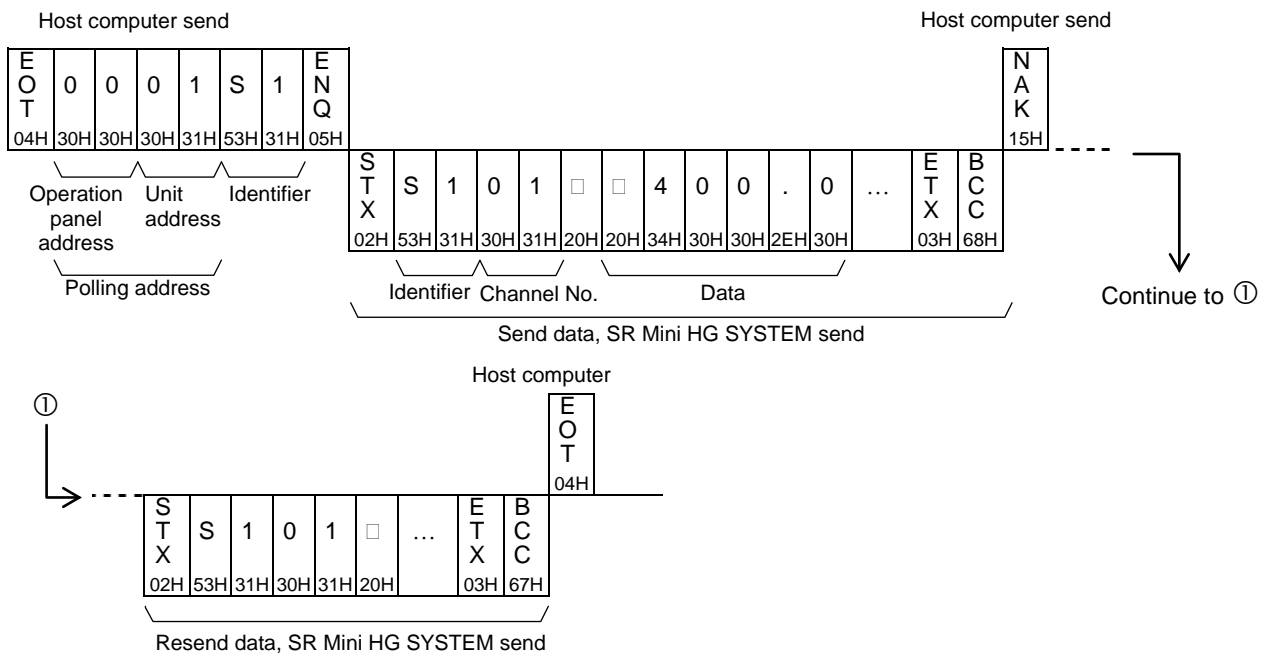
📖 Above example data is with 1 digit below decimal-point. The data sent from control unit is different from the specification of control unit.

4.2 Selecting

Selecting is an operation in which the host computer selects one set from among the devices multidrop connected and then of recommending data receive. The selecting procedure is as follows. As this device employs fast selecting, data is sent continuously to the selected address.

ID: Identifier

📖 The above procedure is for SR Mini HG SYSTEM transmission control. However, the operation panel (OPC *) can correspond not only to SR Mini HG SYSTEM communication but also to programmable controller (PC) communication (option).

The PC 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 PC communication from SR Mini HG SYSTEM communication, the former uses the identifier (CP) dedicated to it. The PC communication protocol especially for the respective company is used after the identifier (CP).

In the following, the difference between the SR Mini HG SYSTEM communication (RKC standard) and PC communication procedures.

* Discontinued products

SR Mini HG SYSTEM communication

PC communication

IMSRM09-E5
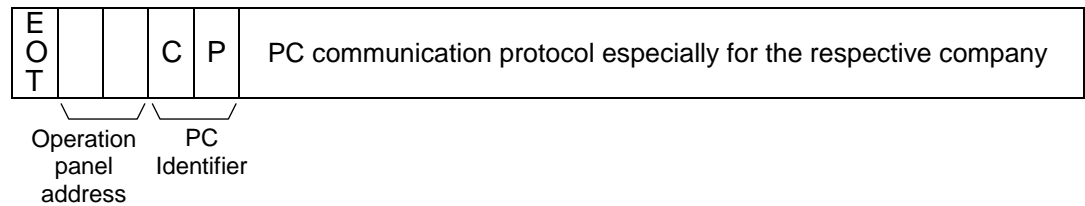
4.2.1 Selecting procedure

(1) Data link initialize

Send EOT from the host computer to initialize the data link before sending the selecting sequence.

(2) Selecting sequence send

Send the selecting address for the selecting sequence from the host computer.

Address

This is the unit address of this device to be selected.

It is expressed by a 4-digit decimal ASCII code.
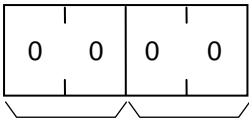
Control unit address number (2 digits)

Operation panel address number (2 digits)

📖 When the connection is directly to the control unit and not to the operation panel, the operation panel address number is abbreviated into 2 digits.

(3) Data send

Send data in the following formats following the selecting sequence. The data format is the same as that of polling.
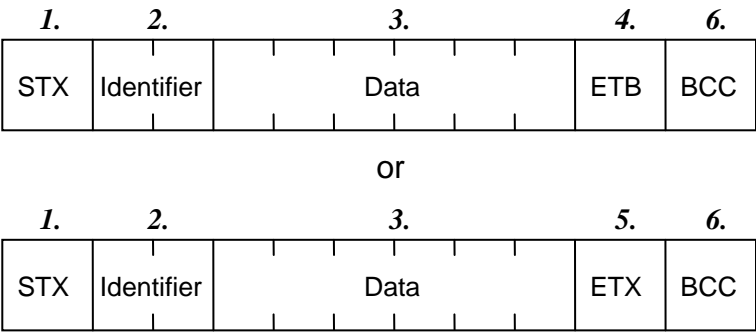
📖 If the length of send data (from STX to BCC) exceeds 128 bytes, it is divided into blocks by ETB. In this case, send the succeeding data divided into blocks after STX.

☞ For *1* to *6*, refer to **4.1.1 Polling procedure (P. 29)**.

(4) ACK (Acknowledge response)

If this device receives data sent correctly from the host computer, it sends ACK to the host computer. Then, if there is data to be sent next from the host computer, send it to the device. After the data has been sent, send EOT to terminate the data link.

(5) NAK (Negative acknowledge)

This device sends NAK in the following cases. In this case, take necessary measures for recovery such as re-sending the data on the host computer side.

- When an error occurs in the line (parity error or framing error)
- When a BBC check error occurs
- When there is no specified identifier
- When the specified identifier is not valid
- When an error exists in the data format
- When normal receive data exceeds the setting range

(6) No response

If this device does not receive the selecting address correctly, it is set to no response. Also, it is set to no response if it does not receive STX, ETB, ETX, or BCC correctly.

(7) EOT (Data link termination)

To terminate the data link when there is no more data to be sent from the host computer or this device is set to no response, send EOT from the host computer.

4.2.2 Selecting procedure example (When the host computer sends data)

CAUTION

The data (Input range, decimal point etc.) should be conformed to the specifications of the instruments to be used. (Above example is with 1 digit below decimal point). The SR Mini HG SYSTEM sends [NAK] if the receiving of different data to specification.

■ Normal transmission

Host computer send

E O T	0	0	0	1	S T X	S	1	0	1	□	□	4	0	0	.	0	…	E T X	B C C
04H	30H	30H	30H	31H	02H	53H	31H	30H	31H	20H	20H	34H	30H	30H	2EH	30H		03H	57H

→ Continue to ①

ACK 06H — SR Mini HG SYSTEM send

Operation panel address / Unit address / Identifier / Channel No. / Data
Selecting address / Send data

①

Host computer send

S T X	P	1	0	1	□	…	E T X	B C C
02H	50H	31H	30H	31H	20H		03H	49H

Host computer send

E O T
04H

ACK 06H

Next send data

SR Mini HG SYSTEM send

📖 Omit the operation panel address when the connection is made directly to control unit.

■ If error exists in data

Host computer send

E O T	0	0	0	1	S T X	S	1	0	1	□	□	4	0	0	.	0	…	E T X	B C C
04H	30H	30H	30H	31H	02H	53H	31H	30H	31H	20H	20H	34H	30H	30H	2EH	30H		03H	56H

→ Continue to ①

NAK 15H — SR Mini HG SYSTEM send

Operation panel address / Unit address / Identifier / Channel No. / Data
Selecting address / Send data

①

Host computer send

S T X	S	1	0	1	□	…	E T X	B C C
02H	53H	31H	30H	31H	20H		03H	57H

Host computer send

E O T
04H

ACK 06H

Resend data

SR Mini HG SYSTEM send

4.3 Communication data configuration

◼ Description of data (Transmission/receive data structure)

Part of the data above is shown below.

Data length 6 digits
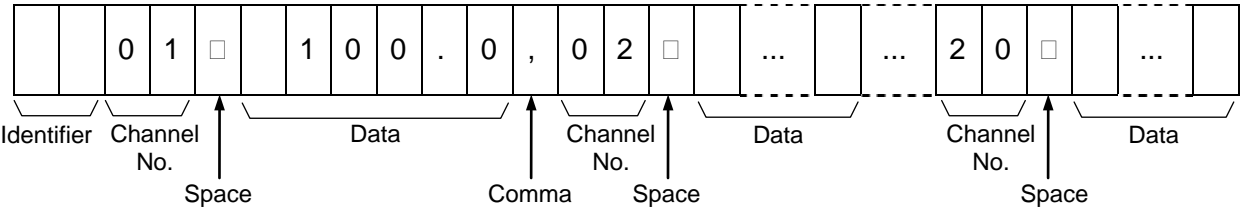
Data length is 6 digits fixed.

Data length 1 digit
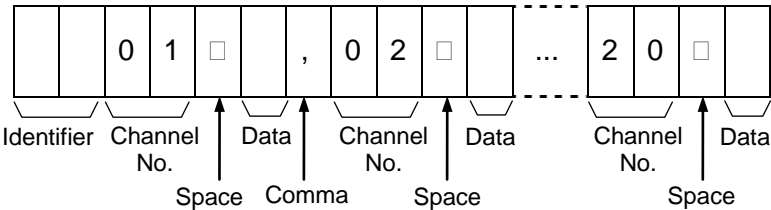
Data length is fixed at 1 digit.

Error code (Identifier: ER)
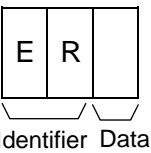
Error code data description

Data	Description
0	Operations normal
1	Back-up 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

4.4 Examples of selecting and polling check programs

The following is the sample program for NEC PC-9800 series computers in BASIC language for carrying out polling and selecting checking by RS-232C specification.

Please be noted that there will be some differences in the computer languages according to the type of computer.

Before executing the program, confirm that there is no mistake in the wiring of the communications cable and check that the control unit data bit structure is set to "8" for data bit and "None" for parity check. In addition, the communications speed setting should be set to match the host computer speed setting.

■ Example of temperature set values polling check program

```
1000 '-------------------- Identifier setting ----------------------
1010   ID$="S1"                                                     Identifier setting
1020 '
1030 '--------------- Communications initial setting ---------------
1040 CM$="N81NN"                                                    Communications data configuration setting
1050 INPUT "Control unit address=";ADD$                             Control unit address input
1060 STX$=CHR$(&H2) : EOT$=CHR$(&H4) : ENQ$=CHR$(&H5)               Communications character setting
1070 ACK$=CHR$(&H6) : NAK$=CHR$(&H15): ETX$=CHR$(&H3)
1080 OPEN "COM1:"+CM$   AS #1                                       Open RS-232C circuit
1090 CONSOLE ,,,1
1100 COLOR 7:CLS 3
1110 '
1120 '------------------ Program main routine ---------------------
1130 *POL
1140     PRINT "             (Polling check)                    "
1150     PRINT "*********Receiving the set values***********"
1160     PRINT "
1170     DT$=EOT$+ADD$+ID$+ENQ$                                     Data configuration setting
1180     GOSUB *TEXT
1190     GOSUB *RXDT
1200 '
1210 *J10
1220     J=0
1230 '
1240 *IF1
1250     IF LOC(1)=0 THEN J=J+1:IF J<500 THEN *IF1 ELSE PRINT "     Setting of the receiving waiting time *
TIME OUT ":END                                                      (Timeout processing)
1260 '
1270     K$=INPUT$(1,#1)
1280         IF K$=ETX$ GOTO *ETXRX                                 Communications condition checking
1290         IF K$=NAK$ THEN PRINT "    NAK":END
1300         IF K$=EOT$ THEN PRINT "    EOT":END
1310         IF K$=ACK$ THEN PRINT "    ACK":END
1320 '
1330     DT$=DT$+K$
1340     GOTO *J10
1350 '
```

```
1360 *ETXRX
1370    DT$=DT$+K$
1380        BCCRX$=INPUT$(1,#1)
1390        BCCRX=ASC(BCCRX$)                        BCC checking
1400        GOSUB *BCCCH
1410    IF BCC<>BCCRX THEN GOSUB *NAKTX
1420    IF BCC<>BCCRX THEN GOSUB *RXDT: GOTO *J10
1430 '
1440    PRINT "Data has been correctly received"      Display of received data and
1450    PRINT "Received data=";DT$ : END              closing of RS-232C circuit
1460 '
1470 '-------------------- Sub-routine ----------------------
1480 '
1490 *NAKTX                                           Processing on occurrence of a BCC error
1500    PRINT "BCC error"
1510    DT$=NAK$
1520        GOSUB *TEXT
1530    RETURN
1540 '
1550 *RXDT
1560    DT$=""                                        Clearing of circuit buffer
1570    RETURN
1580 '
1590 *TEXT
1600    PRINT #1,DT$;                                 Transfer of polling identifier
1610    RETURN
1620 '
1630 *BCCCH                                           BCC calculation
1640    FOR II=1 TO LEN(DT$)
1650        BCCA$=MID$(DT$,II,1)
1660        IF BCCA$=STX$ THEN BCC=0 : GOTO *IINEXT
1670        BCC=BCC XOR ASC(BCCA$)
1680 *IINEXT
1690    NEXT II
1700    RETURN
```

(The items after the mark of " ' " can be omitted.)

Setting of the receiving waiting time

If timeout occurs in using high speed computer (Except no response), the numeral value of "500" in the program should be changed to an appropriately-sized numeral value.

■ **Example of temperature set values selecting checking program**

```
1000 '-------------------- Identifier setting ---------------------
1010   ID$="S1"                                          Identifier setting
1020 '
1030 '--------------- Communications initial setting ---------------
1040 CM$="N81NN"                                          Communications data configuration setting
1050 STX$=CHR$(&H2) : EOT$=CHR$(&H4) : ENQ$=CHR$(&H5)     Communications character setting
1060 ACK$=CHR$(&H6) : NAK$=CHR$(&H15): ETX$=CHR$(&H3)
1070 OPEN "COM1:"+CM$   AS #1                             Opening of RS-232C circuit
1080 CONSOLE ,,,1
1090 COLOR 7:CLS 3
1100 '
1110 '----------------- Program main routine --------------------
1120 *SEL
1130      PRINT "               (Selection check)                "
1140      PRINT "********Transmission of set values*********"
1150      PRINT "
1160      INPUT "Unit No.=";ADD$:INPUT "Channel No.=";C$    Input of the unit and channel number,
         :INPUT "Set value=";S$                           and the temperature set value
1170      DT$=EOT$+ADD$+STX$+Z$+C$+" "+S$+ETX$            Data configuration setting 1
1180      PRINT "Transmitting data=";DT$                   Display of transmitting data
1190      GOSUB *BCCCH
1200      DT$=DT$+CHR$(BCC)                                Data configuration setting 2
1210      GOSUB *TEXT
1220      GOSUB *RXDT
1230 '
1240 *J20
1250      J=0
1260 '
1270 *IF2
1280      IF LOC(1)=0 THEN J=J+1:IF J<500 THEN *IF2 ELSE PRINT "   Setting of the receiving waiting time *
TIME OUT ":END                                           (Timeout processing)
1290 '
1300      K$=INPUT$(1,#1)
1310      IF K$=NAK$ THEN PRINT "    NAK":END             Communications condition check,
1320      IF K$=ACK$ THEN PRINT "Control unit has received the   Display of communication result,
data":END                                                and closing of RS-232C circuit
1330 '
1340 '
1350 '
1360 '-------------------- Sub-routine ---------------------
1370 '
1380 *RXDT
1390      DT$=""                                           Clearing of circuit buffer
1400      RETURN
1410 '
1420 *TEXT
1430      PRINT #1,DT$;                                    Transfer of selection data
1440      RETURN
```

```
1450 '
1460 *BCCCH
1470     FOR II=1 TO LEN(DT$)                              BCC calculation
1480         BCCA$=MID$(DT$,II,1)
1490         IF BCCA$=STX$ THEN BCC=0 : GOTO *IINEXT
1500         BCC=BCC XOR ASC(BCCA$)
1510 *IINEXT
1520     NEXT II
1530     RETURN
```

📖　Setting of the receiving waiting time

If timeout occurs in using high speed computer (Except no response), the numeral value of "500" in the program should be changed to an appropriately-sized numeral value.

5. COMMUNICATION IDENTIFIERS

5.1 List of communication identifiers

```
┌─────────────┐
│   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

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Temperature measured value (PV) [H-TIO-☐, H-CIO-A]	**M1**	6	RO	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.	—	P. 56
Alarm 1 status [H-TIO-☐, H-CIO-A]	**AA**	1	RO	0: OFF 1: ON	—	P. 57
Alarm 2 status [H-TIO-☐, H-CIO-A]	**AB**	1	RO	0: OFF 1: ON	—	P. 57
Burnout status [H-TIO-☐, H-CIO-A]	**B1**	1	RO	0: OFF 1: ON	—	P. 57
Heat-side manipulated output value [H-TIO-☐, H-CIO-A]	**O1**	6	RO	−5.0 to +105.0 %	—	P. 58

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Cool-side manipulated output value [H-TIO-□, H-CIO-A]	O2	6	RO	−5.0 to +105.0 %	—	P. 58
Heater break alarm status [H-TIO-A/C/D, H-CIO-A]	AC	1	RO	0: OFF 1: ON	—	P. 58
Current transformer input measured value 1 [H-TIO-A/C/D]	M3	6	RO	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	—	P. 59
Current transformer input measured value 2 [H-CT-A]	M4	6	RO	0.0 to 100.0 A or 0.0 to 30.0 A Current transformer (CT) input measured value of the H-CT-A module	—	P. 59
Set value monitor [H-TIO-□, H-CIO-A]	MS	6	RO	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.	—	P. 62
Temperature rise completion status [H-TIO-□, H-CIO-A]	HE	1	RO	0: Rise not complete 1: Rise complete	—	P. 63
Error code [H-PCP-A/B]	ER	1	RO	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	—	P. 67
PID/AT transfer [H-TIO-□, H-CIO-A]	G1	1	R/W	0: PID control operation 1: AT (Autotuning) operation	0	P. 68
Temperature set value (SV) ◆ [H-TIO-□, H-CIO-A]	S1	6	R/W	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	P. 70

◆ Item stored in the memory area.

Name	Identifier	Digits	Attribute	Data range	Factory set value	Reference page
Heat-side proportional band ◆ [H-TIO-□, H-CIO-A]	**P1**	6	R/W	0.1 to 1000.0 % of span	3.0	P. 71
Cool-side proportional band ◆ [H-TIO-□, H-CIO-A]	**P2**	6	R/W	0.1 to 1000.0 % of span	3.0	P. 71
Integral time ◆ [H-TIO-□, H-CIO-A]	**I1**	6	R/W	1 to 3600 seconds	240	P. 71
Derivative time ◆ [H-TIO-□, H-CIO-A]	**D1**	6	R/W	0 to 3600 second (0: PI action)	60	P. 71
Overlap/Deadband ◆ [H-TIO-□, H-CIO-A]	**V1**	6	R/W	−10.0 to +10.0 % of span	0.0	P. 71
Control response parameters ◆ [H-TIO-□, H-CIO-A]	**CA**	1	R/W	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.)	Heat control (H-TIO-□/ H-CIO-A): 0 Heat/Cool control (H-TIO-□/ H-CIO-A): 2 Position proportioning control (H-TIO-K): 0	P. 72

◆ Item stored in the memory area.

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Alarm 1 set value ◆ [H-TIO-□, H-CIO-A]	**A1**	6	R/W	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**	P. 73
Alarm 2 set value ◆ [H-TIO-□, H-CIO-A]	**A2**	6	R/W			P. 73
Heater break alarm set value 1 [H-TIO-A/C/D]	**A3**	6	R/W	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	P. 59
Heater break alarm set value 2 [H-CT-A]	**A4**	6	R/W	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	P. 59
Operation mode transfer [H-TIO-□, H-CIO-A]	**EI**	1	R/W	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	P. 75

◆ Item stored in the memory area.

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.

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Heat-side proportioning cycle time [H-TIO-□, H-CIO-A]	**T0**	6	R/W	1 to 100 seconds Setting will be invalid in voltage/current output.	Relay contact output: 20 Voltage pulse output, Open collector output, Triac output: 2	P. 76
Cool-side proportioning cycle time [H-TIO-□, H-CIO-A]	**T1**	6	R/W	1 to 100 seconds Setting will be invalid in voltage/current output and heat control.		P. 76
PV bias [H-TIO-□, H-CIO-A]	**PB**	6	R/W	−5.00 to +5.00 % of span	0.00	P. 77
Control RUN/STOP transfer [H-PCP-A/B]	**SR**	1	R/W	0: Control STOP 1: Control RUN Only when the init ial set mode is "0: Normal communication," control can be start.	0	P. 79
Initial setting mode [H-PCP-A/B]	**IN**	1	R/W	0: Normal communication Normal communication is possible. 1: Extended communication (Initialize setting mode) * Normal and initial setting communication are possible.	0	P. 80
Memory area number [H-TIO-□, H-CIO-A]	**ZA**	1	R/W	1 to 8	1	P. 81
Alarm interlock release [H-TIO-□, H-CIO-A, H-TI-□, H-AI-□]	**AR**	1	WO	1: Release (1 only)	—	P. 82
Auto/Manual transfer [H-TIO-□, H-CIO-A]	**J1**	1	R/W	0: Auto 1: Manual Setting will be invalid in ON/OFF control and Heat/Cool control.	0	P. 83

* 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:
URL: http://www.rkcinst.com/english/manual_load.htm
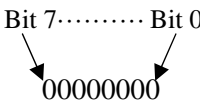
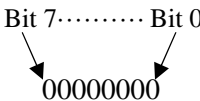| Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Manual output value [H-TIO-□, H-CIO-A]	**ON**	6	R/W	−5.0 to +105.0 % Setting will be invalid in ON/OFF control and Heat/Cool control. H-TIO-C/D [Z-1017 specification]: −105.0 to 0.0 % (cool-side) 0.0 to +105.0 % (heat-side)	0.0	P. 83
Temperature rise completion range [H-TIO-□, H-CIO-A]	**HD**	6	R/W	1 to 10 °C or 1 to 20 °F	TC/RTD input: 10 °C or 20 °F Voltage/ Current input: 10 % of display scale	P. 63
Temperature rise completion trigger [H-TIO-□, H-CIO-A]	**HS**	1	R/W	0: Unused 1: Used Do not set "1: Used" in H-TIO-H/J module, because temperature rise completion is not judged. 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.	0	P. 63
Temperature rise completion soak time [H-TIO-□, H-CIO-A]	**T3**	6	R/W	0 to 360 minutes	0	P. 63
AI measured value [H-AI-A/B]	**M5**	6	RO	Within display scale range The position of the decimal point differs depending on AI decimal point position setting.	—	P. 56
AI alarm 1 status [H-AI-A/B]	**AD**	1	RO	0: OFF 1: ON	—	P. 57
AI alarm 2 status [H-AI-A/B]	**AE**	1	RO	0: OFF 1: ON	—	P. 57

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
AI alarm 1 set value [H-AI-A/B]	**A5**	6	R/W	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	P. 73
AI alarm 2 set value [H-AI-A/B]	**A6**	6	R/W	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: 0.0	P. 73
AI zero point correction [H-AI-A/B]	**JI**	1	R/W	0: Cancel 1: Execution	0	P. 85
AI full scale correction [H-AI-A/B]	**JJ**	1	R/W	0: Cancel 1: Execution	0	P. 85

AI operation mode transfer [H-AI-A/B]	**NJ**	1	R/W	0: Unused
				  Neither monitor nor alarm monitor is done in this mode.
				1: Normal
				  Normal mode in which monitor and alarm are done.
					1	P. 87

Control loop break alarm (LBA) status [H-TIO-□, H-CIO-A]	**AP**	1	RO	0: OFF 1: ON	—	P. 88
LBA use selection [H-TIO-□, H-CIO-A]	**HP**	1	R/W	0: Unused 1: Used	0	P. 89
LBA time [H-TIO-□, H-CIO-A]	**C6**	6	R/W	1 to 7200 seconds	480	P. 89

LBA deadband [H-TIO-□, H-CIO-A]	**V2**	6	R/W	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	P. 89

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
AO output value monitor [H-AO-A/B]	**M6**	6	RO	Display scale range The position of the decimal point differs depending on AO decimal point position setting. Data will be valid in manual mode.	—	P. 94
AO output set value [H-AO-A/B]	**S6**	6	R/W	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	P. 94
AO function selection [H-AO-A/B]	**XO**	6	R/W	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	P. 95
AO corresponding channel setting [H-AO-A/B]	**OY**	6	R/W	1 to 20 (TIO and FBR input channel) 1 to 40 (AI and TI channel) Setting will be valid in recorder output mode.	1	P. 96
AO zooming high limit [H-AO-A/B]	**CV**	6	R/W	AO zooming low limit to 100.0 % Setting will be valid in recorder output mode.	100.0	P. 96
AO zooming low limit [H-AO-A/B]	**CW**	6	R/W	0.0 % to AO zooming high limit Setting will be valid in recorder output mode.	0.0	P. 96
AO zero point correction [H-AO-A/B]	**JK**	6	R/W	−5.00 to +5.00 %	0.00	P. 98
AO full scale correction [H-AO-A/B]	**JL**	6	R/W	−5.00 to +5.00 %	0.00	P. 98

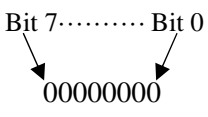| Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
H-DI-A module input status [H-DI-A]	**L1**	6	RO	0 to 255 [a] The contact input condition is expressed as a bit image in decimal numbers from 0 to 255.	—	P. 99
Event DO status [H-DO-C]	**Q3**	6	RO	0 to 255 [b] The contact output condition is expressed as a bit image in decimal numbers from 0 to 255.	—	P. 100
Event DO manual output value [H-DO-C]	**Q4**	6	R/W	0 to 255 [b] The contact output condition is expressed as a bit image in decimal numbers from 0 to 255.	0	P. 100

Event DO extension alarm set value [H-DO-C]	**A7**	6	R/W	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	P. 73

[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: CH4 (DI4)
Bit 4: CH5 (DI5)
Bit 5: CH6 (DI6)
Bit 6: CH7 (DI7)
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 7·········· Bit 0

Bit image: 00000000

Bit data   0: OFF   1: ON

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)

| Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Cascade monitor [H-CIO-A]	**KH**	6	RO	± 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.	—	P. 101
Cascade ON/OFF [H-CIO-A]	**KF**	1	R/W	0: OFF 1: ON Setting will be valid in master channel.	0	P. 102
Cascade gain [H-CIO-A]	**KG**	6	R/W	−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	P. 103
Cascade bias [H-CIO-A]	**KI**	6	R/W	−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	P. 103
TI measured value [H-TI-A/B/C]	**M7**	6	RO	Within input range The position of the decimal point differs depending on the input range.	—	P. 56
TI alarm 1 status [H-TI-A/B/C]	**AF**	1	RO	0: OFF 1: ON	—	P. 57
TI alarm 2 status [H-TI-A/B/C]	**AG**	1	RO	0: OFF 1: ON	—	P. 57
TI burnout status [H-TI-A/B/C]	**B2**	1	RO	0: OFF 1: ON	—	P. 57
TI alarm 1 set value [H-TI-A/B/C]	**A8**	6	R/W	Within input range The position of the decimal point differs depending on the input range.	Note 1	P. 73
TI alarm 2 set value [H-TI-A/B/C]	**A9**	6	R/W	Within input range The position of the decimal point differs depending on the input range.	Note 1	P. 73
PV bias [H-TI-A/B/C]	**PC**	6	R/W	−5.00 to +5.00 % of span	0.00	P. 73

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
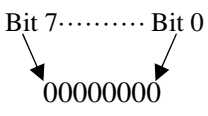
Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page

TI operation mode transfer [H-TI-A/B/C]	**EJ**	1	R/W	0: Unused
				   Neither monitor nor alarm monitor is done in this mode.
				1: Normal
				   Normal mode in which monitor and alarm are done.
					1	P. 87

PCP module DI condition [H-PCP-B]	**L3**	6	RO	0 to 7 [a] The contact input condition is expressed as a bit image in decimal numbers from 0 to 7.	—	P. 105
Event DI contact input monitor [H-DI-B]	**L4**	6	RO	0 to 255 [a] The contact input condition is expressed as a bit image in decimal numbers from 0 to 255.	—	P. 106

[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 0: CH1 (DI1)
Bit 1: CH2 (DI2)
Bit 2: CH3 (DI3)
Bit 3 to Bit 7: Unused

Bit data   0: OFF   1: ON

[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 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 data   0: OFF   1: ON

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Event DI logic input monitor [H-DI-B]	**L5**	6	RO	0 to 15 [a] The input condition in the logic section is expressed as a bit image in decimal numbers from 0 to 15.	—	P. 107
Event DI logic output monitor [H-DI-B]	**Q5**	6	RO	0 to 255 [b] The output condition in the logic section is expressed as a bit image in decimal numbers from 0 to 255.	—	P. 108

[a] 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: Unused.

[b] 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 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

Name	Iden-tifier	Digits	Attri-bute	Data range	Factory set value	Refer-ence page
Heater break alarm status [H-CT-A]	**AH**	1	RO	0: Normal 1: Break 2: Welding	—	P. 109
Comprehensive alarm status [H-PCP-A/B]	**AJ**	6	RO	0 to 2047 * Each alarm condition is expressed as a bit image in decimal numbers.	—	P. 110
Positioning monitor [H-TIO-K]	**M8**	6	RO	−5.0 to +105.0 %	—	P. 111
Positioning output neutral zone [H-TIO-K]	**V3**	6	R/W	0.1 to 10.0 % of motor time	2.0	P. 112
Motor time [H-TIO-K]	**TJ**	6	R/W	5 to 1000 seconds	10	P. 114
Integrated output limiter [H-TIO-K]	**OS**	6	R/W	100.0 to 200.0 % of motor time	150.0	P. 114
Manual positioning output value [H-TIO-K]	**OO**	6	R/W	−5.0 to +105.0 %	0.0	P. 114
Local/computer transfer [H-PCP-A/B]	**C1**	1	RO	0: Local mode 1: Computer mode (Only valid when connected with the operation panel)	—	P. 115

* 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: Unused.

5.2 Identifiers function explanation

Identifier M1: Measured value (PV) input
Identifier M5: AI measured value (PV) input
Identifier M7: TI measured value (PV) input

Read-only identifier which defines the input measured value from the control unit.

M1: Measured value (PV) input
   Data range: 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.

M7: TI measured value (PV) input
   Data range: Within input range
      The position of the decimal point differs depending on the input range.

M5: AI measured value (PV) input
   Data range: Within display scale range
      The position of the decimal point differs depending on AI decimal point position setting.

Polling example
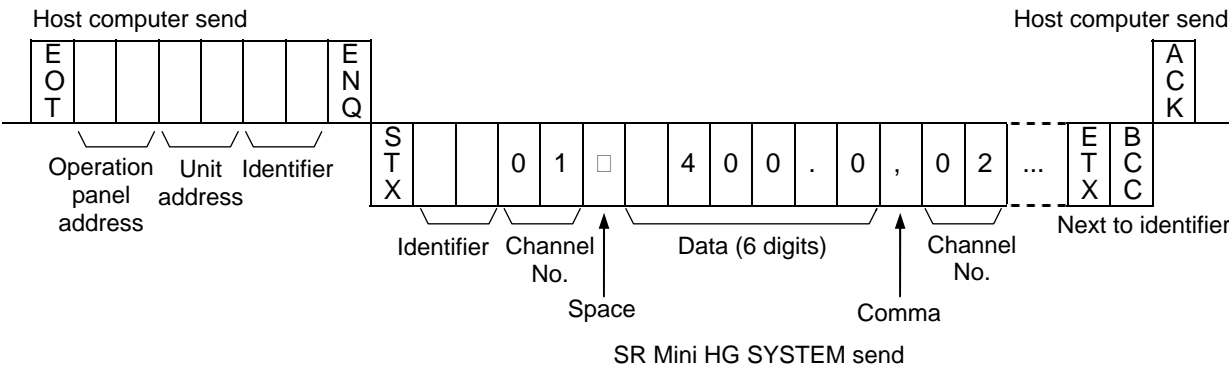
📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier AA: First alarm condition
Identifier AB: Second alarm condition
Identifier AD: AI first alarm condition
Identifier AE: AI second alarm condition
Identifier AF: TI first alarm condition
Identifier AG: TI second alarm condition

Read-only identifier which defines each channel alarm condition of the control unit.
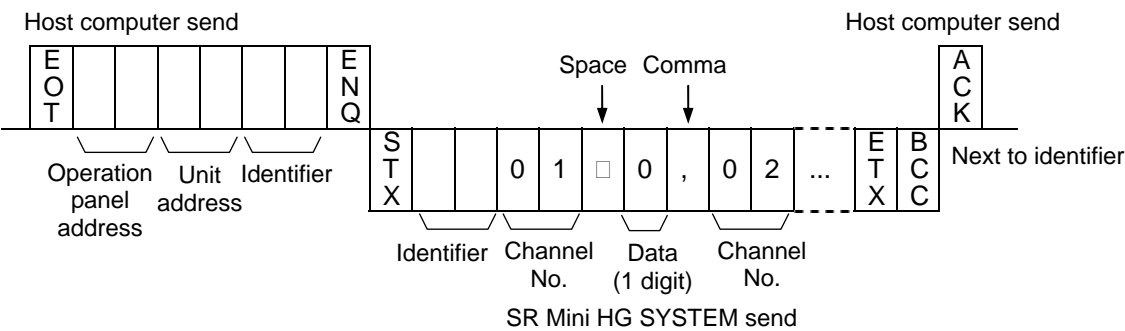
Data range: 0: OFF   1: ON

Polling example

📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier B1: Burnout alarm condition
Identifier B2: TI burnout alarm condition

Read-only identifier which defines each channel burnout condition of the control unit.
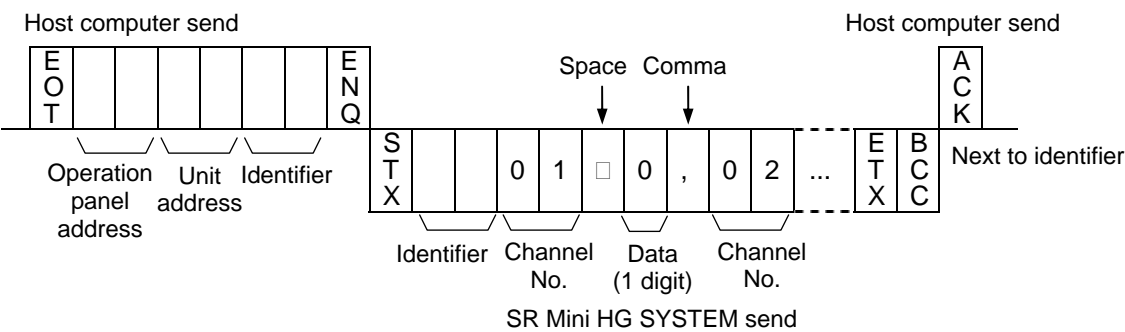
Data range: 0: OFF   1: ON

Polling example

📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier O1: Manipulated output (Heat-side)
Identifier O2: Manipulated output (Cool-side)

Read-only identifier which defines the manipulated output value from the control unit.

Data range: -5.0 to +105.0 %
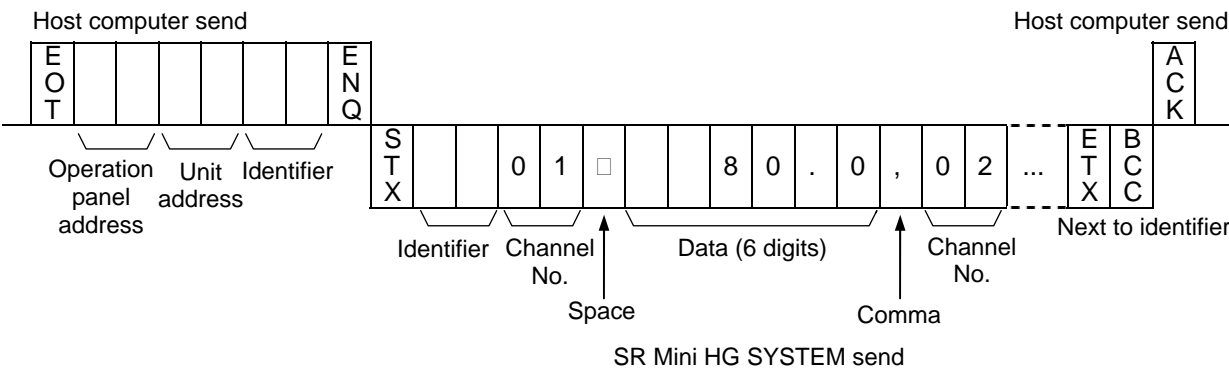
Polling example

📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier AC: Heater break alarm status
(H-TIO-A/C/D module, H-CIO-A module)

Read-only identifier which defines the heater break alarm condition.

Data range: 0: OFF   1: ON
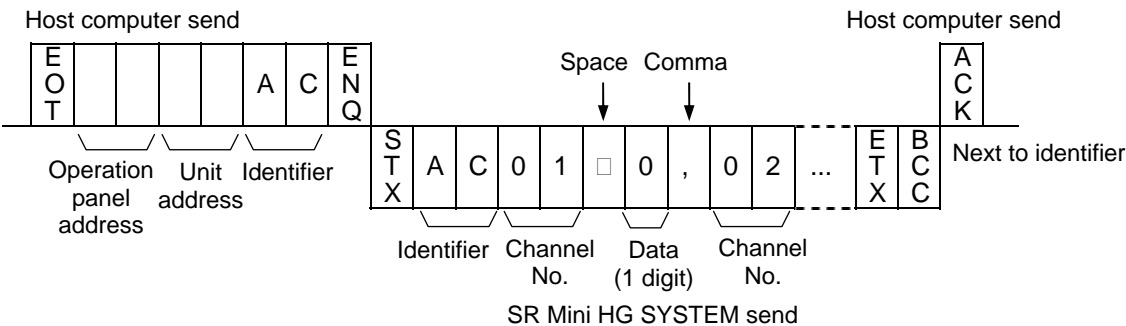
Polling example

📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier M3: CT input measured value 1
Identifier M4: CT input measured value 2
Identifier A3: Heater break alarm (HBA) set value 1
Identifier A4: Heater break alarm (HBA) set value 2

Identifier used when the heater break alarm function is used.

M3: CT input measured value 1, A3: Heater break alarm set value 1

The CT input measured value 1 indicates the measured current value detected by the CT sensors of each channel of the H-TIO module that is optionally set to the heater break alarm function. The heater break alarm set value 1 is the set value of the heater break alarm of each of these channels.

Data range: 0.0 to 100.0 A or 0.0 to 30.0 A

M4: CT input measured value 2, A4: Heater break alarm set value 2

The CT input measured value 2 indicates the measured current value detected by the CT sensors of each channel of the H-CT module. The heater break alarm set value 2 is the set value of the heater break alarm of each of these channels.

Data range: 0.0 to 100.0 A or 0.0 to 30.0 A

- CT input measured values 1 and 2 : Read only
- Heater break alarm set values 1 and 2 : Read and write
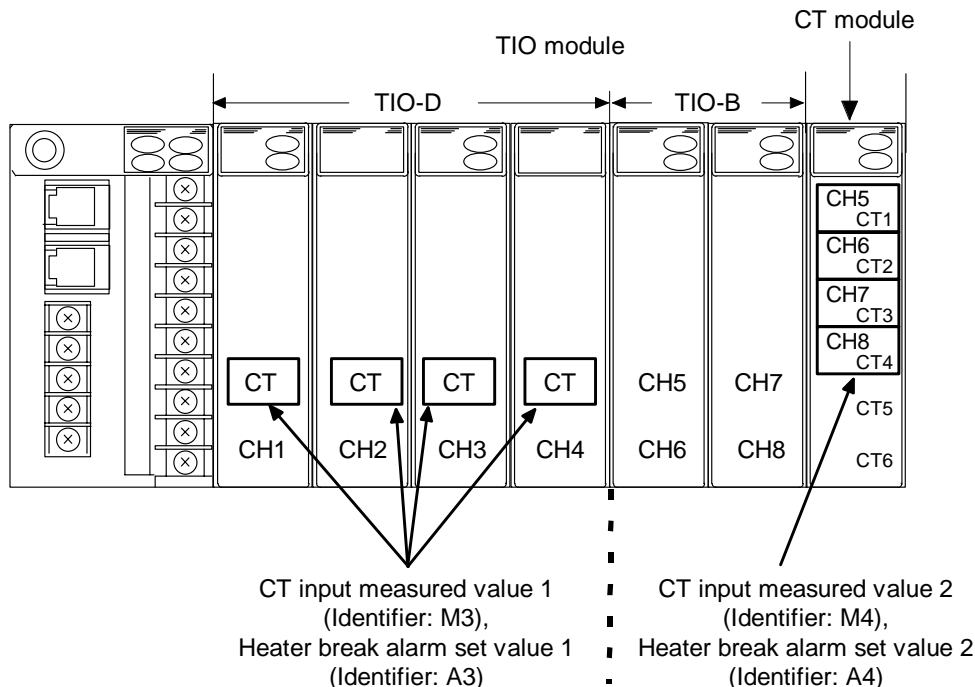
When sending and receiving data, note that identifiers M3 and A3 will be the channel numbers of the H-TIO module and that M4 and A4 will be the channel numbers of the H-CT module.

☞ For the details of the form to allocate each CT input of the H-CT module to the H-TIO module channels, refer to the separate **Hardware Instruction Manual** (**IMSRM15-E☐**). Further, for the allocation method, refer to the Supplementary Information for **Initialize Settings (Extended Communications)** (**IMSRM07-E☐**).

■ Heater break alarm

This function determination whether or not there is a break in the heater by comparing the value of the current flowing through the heater with the previously set current value that is considered to be abnormal.

📖 **The heater break alarm function in this instrument can not be used with continuous analog output.**
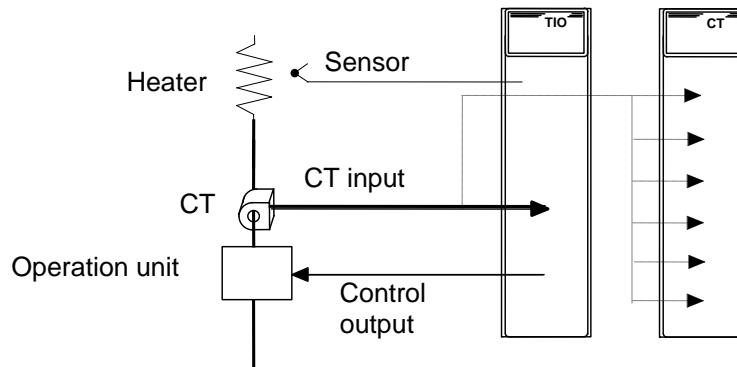
Heater break detection:
When the CT input measured value (heater current) read from the CT is less than the currently set heater break alarm set value even if a control signal is output, a heater break alarm is output.

Welding detection:
When the CT input measured value (heater current) read from the CT is more than the currently set heater break alarm set value even if a control signal is not output, a heater break alarm is output.

[Setting example]
A numerical value of approx. 85% of the CT input measured value (Identifiers: M3 or M4) should be set as the heater break alarm set value (Identifiers: A3 or A4).
However, for a heater with the characteristic of a slight delay in the rise of the current, change the set value such as to reduce if necessary.

Polling example

Host computer send   Host computer send

| E O T | | | | | E N Q | | S T X | | 0 | 1 | ☐ | | 1 | 5 | . | 0 | , | 0 | 2 | ... | E T X | B C C | | A C K |

Operation panel address | Unit address | Identifier

Identifier | Channel No.

Space

Data (6 digits)

Comma

Channel No.

Next to identifier

SR Mini HG SYSTEM send
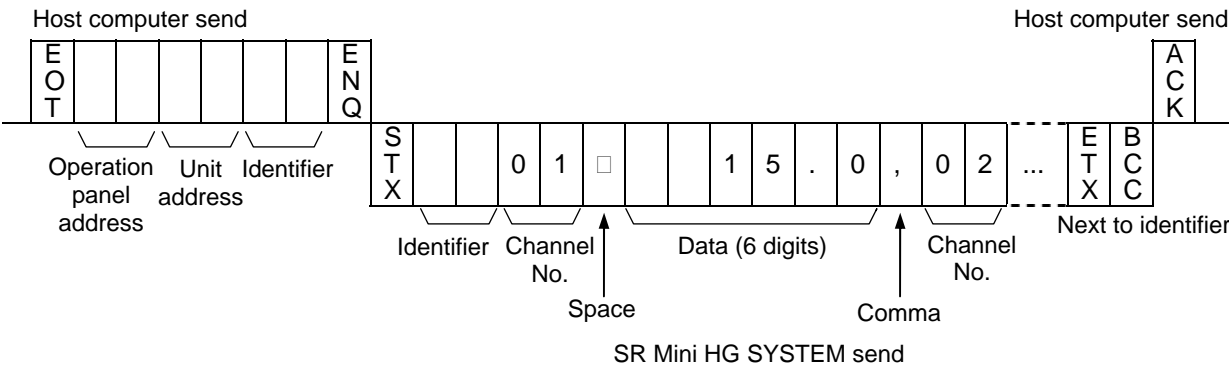
Selecting example (Heater break alarm set value 1 and Heater break alarm set value 2 only)
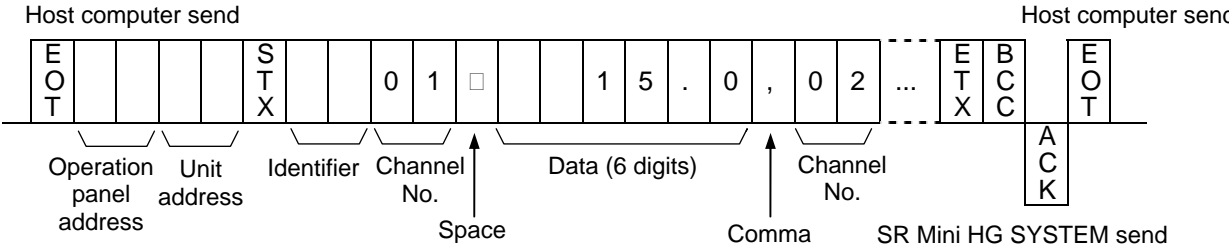
Host computer send   Host computer send

| E O T | | | S T X | | 0 | 1 | ☐ | | 1 | 5 | . | 0 | , | 0 | 2 | ... | E T X | B C C | | E O T |

Operation panel address | Unit address

Identifier | Channel No.

Space

Data (6 digits)

Comma

Channel No.

ACK

SR Mini HG SYSTEM send

📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier MS: Set value monitor

Read-only identifier which defines the set value now used for control.

Data range: 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.

Polling example

Host computer send   Host computer send

Operation panel address   Unit address   Identifier

Identifier   Channel No.   Data (6 digits)   Channel No.   Next to identifier

Space   Comma

SR Mini HG SYSTEM send
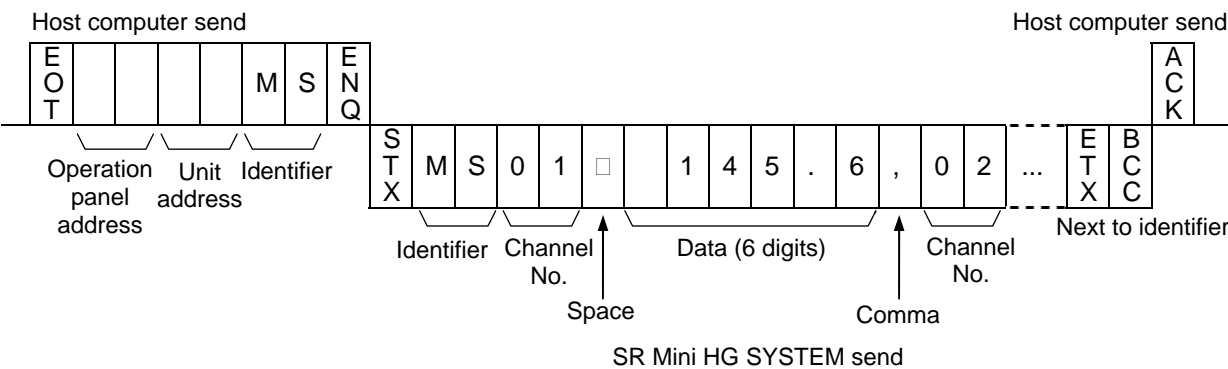
📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier HE: Temperature rise completion condition
Identifier HD: Temperature rise completion range
Identifier HS: Temperature rise completion trigger
Identifier T3: Temperature rise completion soak time

Identifier used for each setting related to the presence or absence of the temperature rise completion trigger function.

HE: Temperature rise completion condition (Read only)
   Data range: 0: Rise not complete   1: Rise completed

HD: Temperature rise completion range (Read and write)
   Data range: 1 to 10 °C or 1 to 20 °F

HS: Temperature rise completion trigger (Read and write)
   Data range: 0: Unused   1: Used

   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.

T3: Temperature rise completion soak time (Read and write)
   Data range: 0 to 360 min.

■ Temperature rise completion condition, temperature rise completion trigger and temperature rise completion range

Used when a temperature rise is assumed to be completed when the temperature set value (PV) is within the width set on both sides from the temperature set value (SV).
The width from the temperature set value at this time becomes the temperature rise completion range, and thus the temperature rise completion condition can be checked by the output. "Used/Unused" of the temperature rise completion function can be selected depending on whether the temperature rise completion trigger.

📖   If the function is set to two or more channels, the temperature rise is completed when the temperature rise in all the channels in which this function is set has been completed. In addition, even when the measured temperature is finally within the temperature rise completion range as a result of a temperature drop, if the measured temperature is first higher than the set temperature, this is determined to be in the temperature rise completion condition.
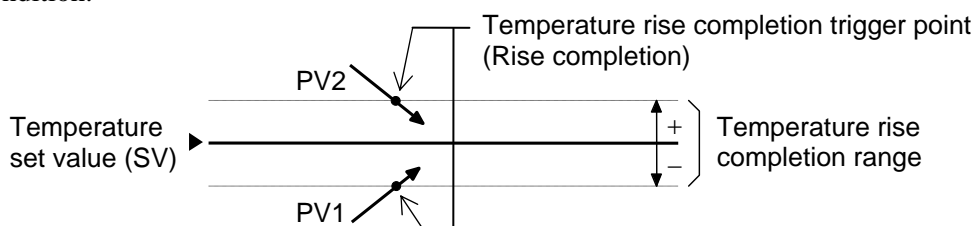
■ Temperature rise completion soak time

Time (min.) until the temperature rise completion state is output after all channels reach the temperature set value.
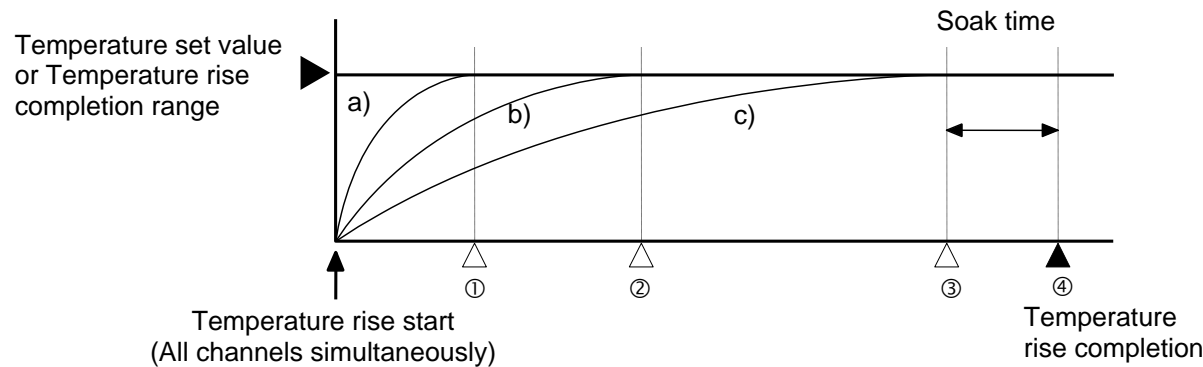
① The a) channel has reached the temperature rise completion range.

② The b) channel has reached the temperature rise completion range.

③ The c) channel has reached the temperature rise completion range.

④ Temperature rise completion is assumed for the first time after the soak time has elapsed.

☞ For the allocation of the temperature rise completion condition output to the H-PCP module for DO output, refer to the separate **Hardware Instruction Manual** (**IMSRM15-E□**).

Polling example (Temperature rise completion condition)

📖 Omit the operation panel address when the connection is made directly to control unit.

Polling example (Temperature rise completion range)

Host computer send

E O T			H	D	E N Q

Operation panel address — Unit address — Identifier

S T X	H	D	0	1	□				5	,	0	2	...	E T X	B C C

Identifier — Channel No. — Space — Data (6 digits) — Comma — Channel No. — Next to identifier

SR Mini HG SYSTEM send

Host computer send

A C K

Selecting example (Temperature rise completion range)

Host computer send

E O T				S T X	H	D	0	1	□				5	,	0	2	...	E T X	B C C	E O T

Operation panel address — Unit address — Identifier — Channel No. — Space — Data (6 digits) — Comma — Channel No.

ACK

SR Mini HG SYSTEM send

Host computer send

Polling example (Temperature rise completion trigger)

Host computer send

E O T			H	S	E N Q

Operation panel address — Unit address — Identifier

Space Comma

S T X	H	S	0	1	□	0	,	0	2	...	E T X	B C C

Identifier — Channel No. — Data (1 digit) — Channel No. — Next to identifier

SR Mini HG SYSTEM send

Host computer send

A C K

Selecting example (Temperature rise completion trigger)

Space Comma

Host computer send

E O T				S T X	H	S	0	1	□	0	,	0	2	...	E T X	B C C	E O T

Operation panel address — Unit address — Identifier — Channel No. — Data (1 digit) — Channel No.

ACK

Host computer send

SR Mini HG SYSTEM send

Omit the operation panel address when the connection is made directly to control unit.

Polling example (Temperature rise completion soak time)

Host computer send   Host computer send

E O T				T	3	E N Q

	S T X	T	3					0	E T X	B C C

| A C K |

Operation panel address   Unit address   Identifier

Identifier   Data (6 digits)

Next to identifier

SR Mini HG SYSTEM send

Selecting example (Temperature rise completion soak time)

Host computer send   Host computer send

E O T				S T X	T	3					0	E T X	B C C

| E O T |

| A C K |

Operation panel address   Unit address   Identifier   Data (6 digits)

SR Mini HG SYSTEM send

📖   **The temperature rise completion function will be effective even if "Unused" is selected in the operation mode transfer for each channel on the operation mode screen. If the operation mode is selected as unused and if the temperature rise completion function is also required to be made invalid, set the above-mentioned temperature rise completion trigger selection to "None."**

📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier ER: Error code

If the system abnormality occurs during operation or power on, error data is transmitted from the control unit or Operation Panel.

Error code data description

Data	Description
0	Operations normal
1	Back-up 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

Polling example
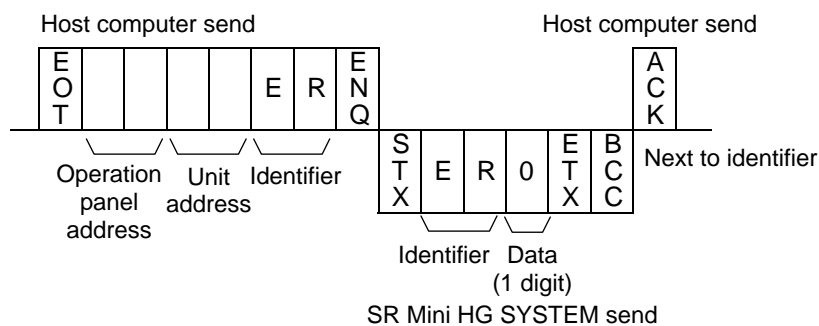
Omit the operation panel address when the connection is made directly to control unit.

Identifier G1: PID/AT transfer

Identifier which defines the transfer to either PID (Normal control) and AT (Autotuning) mode.

Data range: 0: PID control operation
1: Autotuning execution operation

Polling example
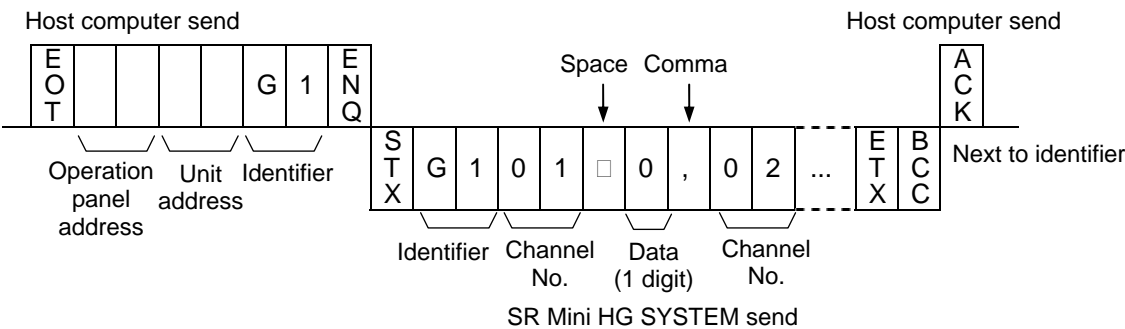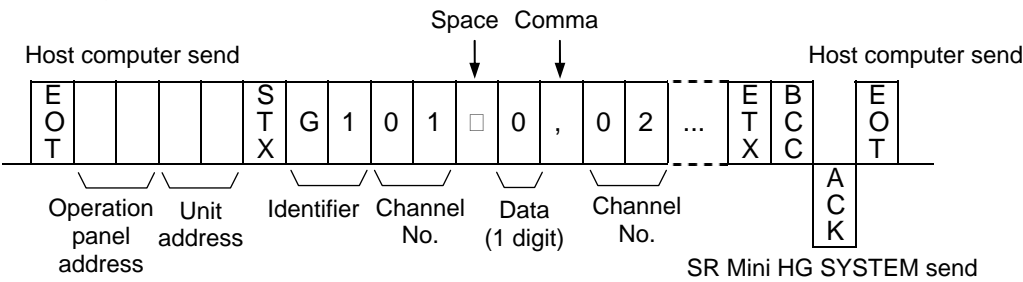
Selecting example

📖 Omit the operation panel address when the connection is made directly to control unit.

IMSRM09-E5

■ Autotuning conditions

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:

(1) Operation mode conditions:
- Auto/Manual transfer (Identifier: J1):　Auto mode
- PID/AT transfer (Identifier: G1):　　　PID mode
- Control Run/Stop (Identifier: SR):　　Control Run mode

(2) The input value should not be an underscale or overscale displayed.

(3) The output limiter high limit should be more than 0.1% and the output limiter low limit should be less than 99.9%. (Setting by "Initialize set communication")

(4) When operation mode is set to "Normal."

When the autotuning is finished, the mode display of each channel automatically returns to "PID."

Conditions which will cause the autotuning to stop:

- When the 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 input value becomes an underscale or overscale display.
- 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 module.
- When transfer to the PID mode by the PID/AT transfer.
- When operation mode is set to "Normal."
- 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 (PID control) mode. The PID constants return to the values at the start of the autotuning.**

Identifier S1: Temperature set value

Identifier which defines the temperature set value.

Data range: 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.
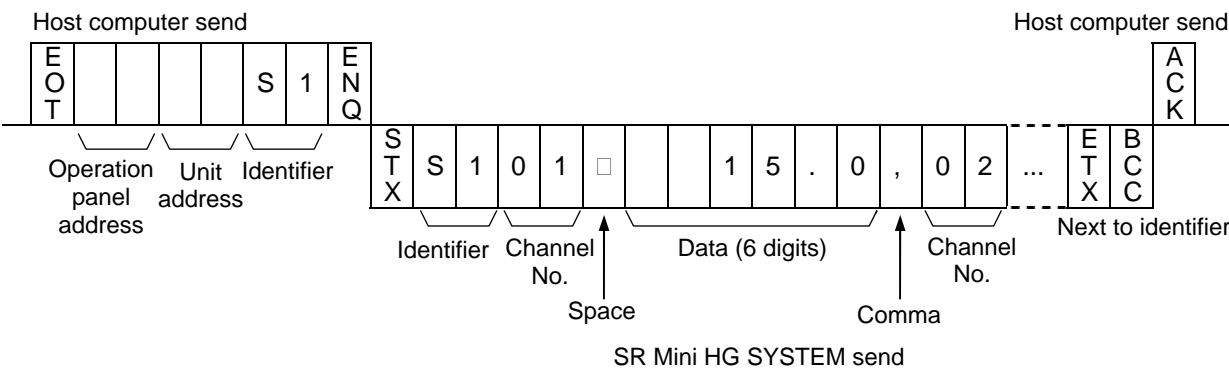
Polling example
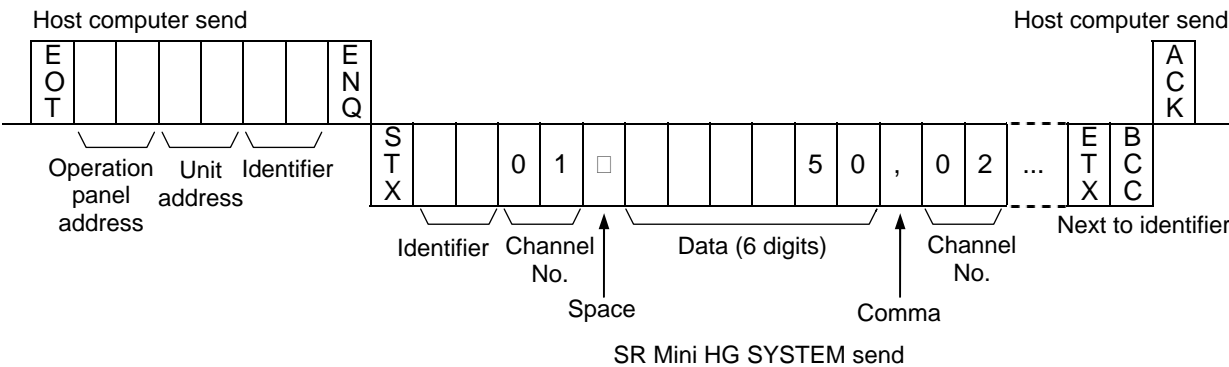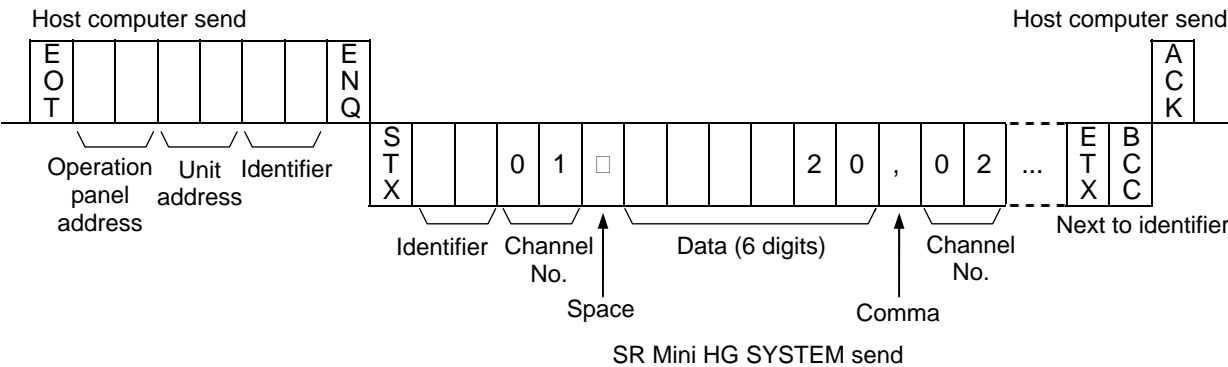

Selecting example
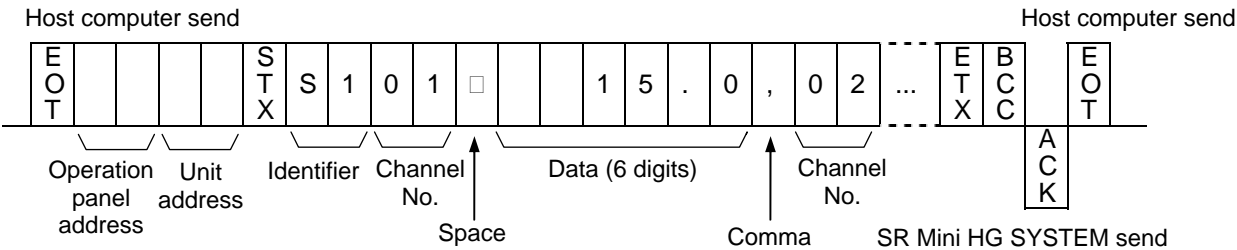
Omit the operation panel address when the connection is made directly to control unit.

Identifier P1: Heat-side proportional band
## Identifier P2: Cool-side proportional band
Identifier I1: Integral time
Identifier D1: Derivative time
Identifier V1: Overlap/Deadband

Identifier which defines the temperature control parameter.

P1 : Heat-side proportional band, P2 : Cool-side proportional band
   Data range: 0.1 to 1000.0 % of span

I1 : Integral time
   Data range: 1 to 3600 seconds

D1 : Derivative time
   Data range: 0 to 3600 seconds

V1 : Overlap/Deadband
   Data range: -10.0 to +10.0 % of span

Polling example
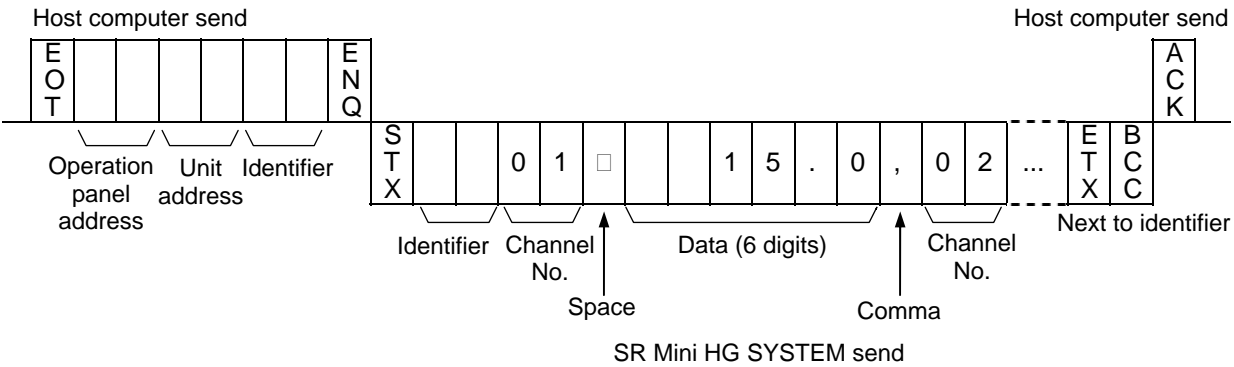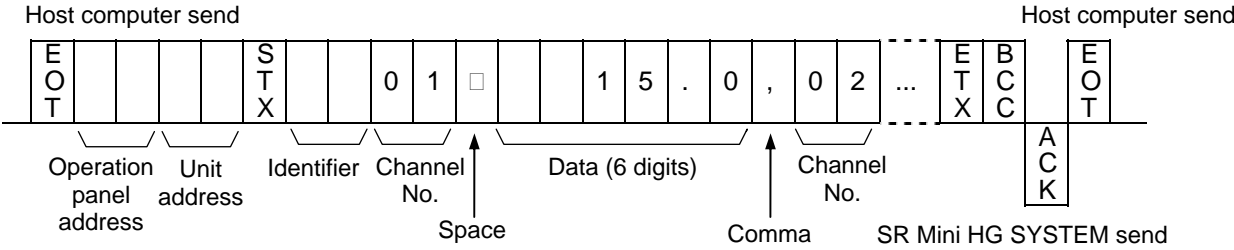
Selecting example

Omit the operation panel address when the connection is made directly to control unit.

Identifier CA: Control response parameters

Identifier which defines the control response parameters.

Data range: 0: Slow
　　　　　　 1: Medium
　　　　　　 2: Fast

Polling example
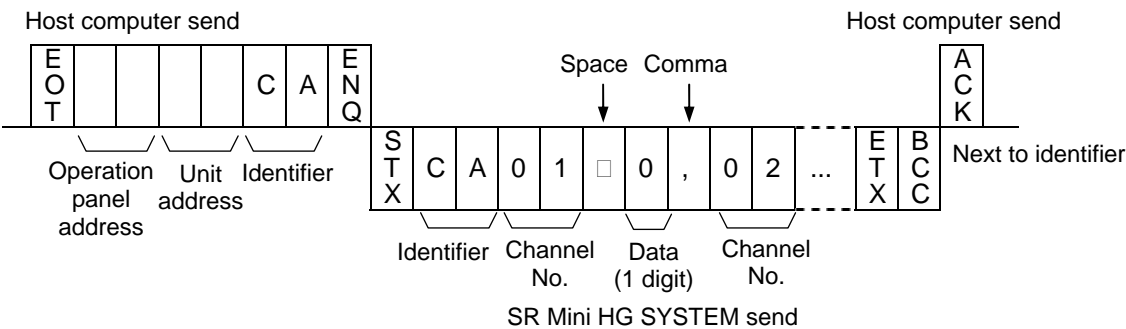
Selecting example
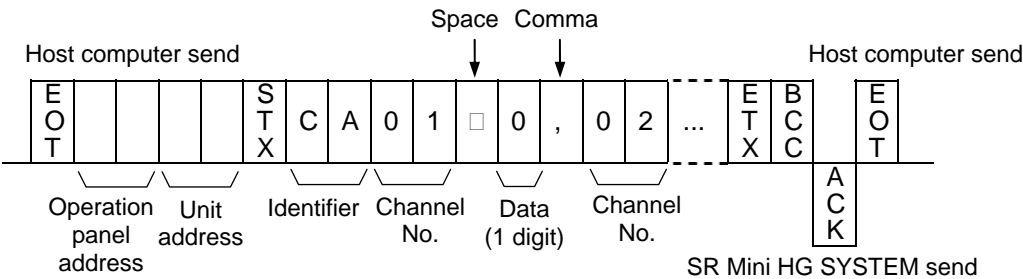
📖　Omit the operation panel address when the connection is made directly to control unit.

📖　In order to perform PID control by using the fussy function, specify "FAST." The fuzzy function is effective to restrict overshoot or undershoot occurring at operation start, or resulting from set value changes. (H-TIO-P, H-TIO-R module only)

Identifier A1: First alarm set value
Identifier A2: Second alarm set value
Identifier A5: AI first alarm set value
Identifier A6: AI second alarm set value
Identifier A7: Event DO extension alarm set value
Identifier A8: TI first alarm set value
Identifier A9: TI second alarm set value

Identifier which defines each channel alarm set value.

A1 : First alarm set value, A2 : Second alarm set value, A7 : Event DO extension alarm set value

   Data range: 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.

A5 : AI first alarm set value, A6 : AI second alarm set value

   Data range: Within display scale rang

      The position of the decimal point differs depending on AI decimal point position setting.

A8 : TI first alarm set value, A9 : TI second alarm set value

   Data range: Within input range

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

Polling example

Host computer send — Host computer send

EOT | Operation panel address | Unit address | Identifier | ENQ

STX | Identifier | Channel No. 0 1 | Space □ | Data (6 digits) 5 0 | , Comma | Channel No. 0 2 ... | ETX | BCC | ACK

Next to identifier

SR Mini HG SYSTEM send

   Omit the operation panel address when the connection is made directly to control unit.

Selecting example

Host computer send   Host computer send

| E O T | | | S T X | | 0 | 1 | □ | | | | 5 | 0 | , | 0 | 2 | ... | E T X | B C C | | E O T |

Operation panel address — Unit address — Identifier — Channel No. — Space — Data (6 digits) — Comma — Channel No. — ACK — SR Mini HG SYSTEM send
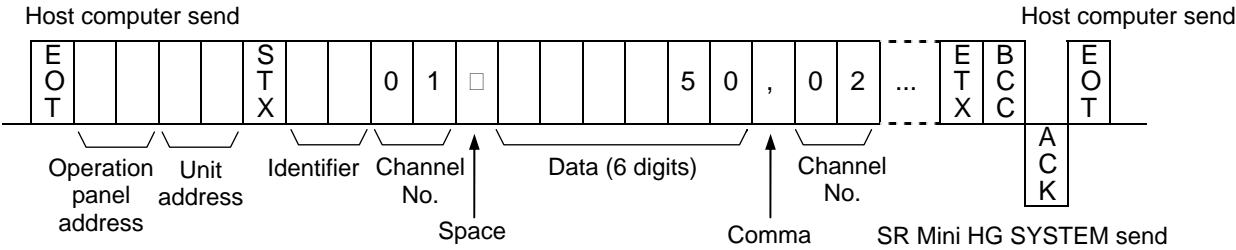
📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier EI: Operation mode transfer

Changes each channel operation mode of H-TIO module.

[Data range]

0: Unused mode

  If set to "Unused," no control, monitor or alarm monitor is performed. Use this when replacing the module, or during equipment maintenance and inspection.

1: Monitor mode

  If set to "Monitor," only the operation relating to monitor is performed. (capture of measured value (PV)). No control or alarm monitor is performed. Use this when equipment operation is temporarily stopped.

2: Alarm mode

  If set to "Alarm," monitor or alarm monitor is performed, but no normal mode to perform control, monitor or alarm monitor. No control is performed. Use this mode when stopping equipment operation temporarily.

3: Normal mode

  Selected to normal mode to perform control, monitor or alarm monitor.

Polling example
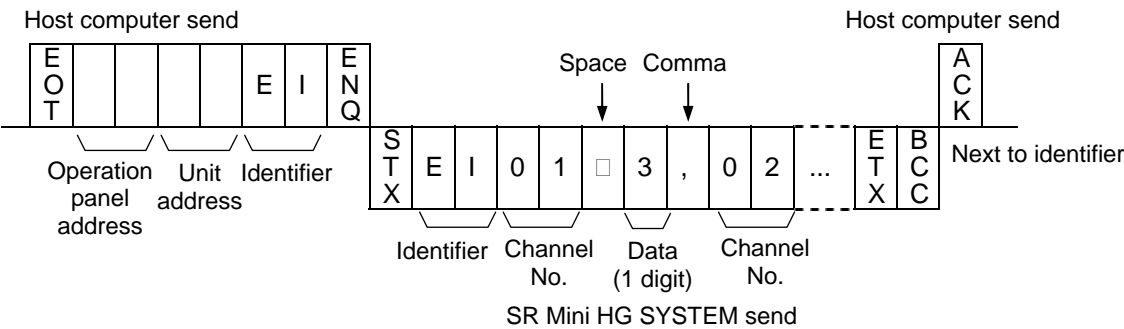
Selecting example
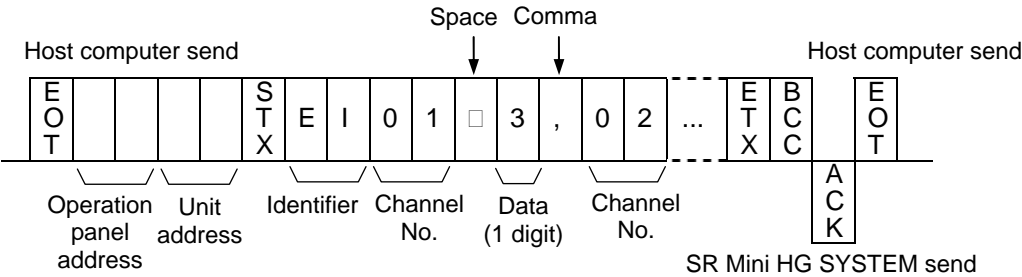
📖 **Even if the temperature rise completion function is set to the Unused mode, it will continue to be effective. If the temperature rise completion function is also to be made invalid, change the setting of the temperature rise completion trigger function to "No."**

📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier T0: Heat-side proportioning cycle
Identifier T1: Cool-side proportioning cycle

Identifier which defines the heat-side proportioning cycle and cool-side proportioning cycle.

Data range: 1 to 100 seconds

Setting will be invalid in continuous output of current and voltage.

Cool-side proportioning cycle: Setting will be invalid in heat control.

Polling example

Selecting example
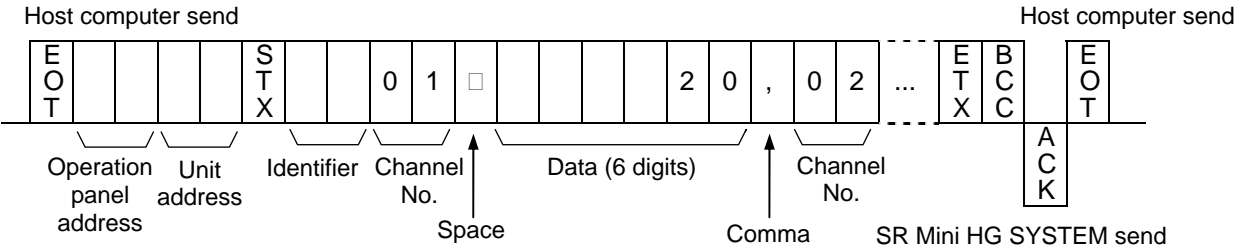
📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier PB: PV bias
Identifier PC: TI module PV bias

Identifier which defines data to forcibly change (increase or decrease in displayed value) the measured value (PV).

The value set in the PV bias is added to the actual input value to correct the input value. The PV bias is used to correct the individual variations in the sensors or when there is difference between the measured values (PV) of other instruments.

[Example]   When the temperature is measured by two instruments.

When the measured values (PV) are as shown in the diagram :
    Main unit = 198 °C
    Recorder = 200 °C
If a PV bias correction value of +2 °C is added to the measured value the main unit, the displayed value become:
    Displayed value = Measured value (PV) + PV bias = 198 °C + 2 °C = 200 °C

In this instrument, for a span of 400 °C, the PV bias should be set to:
    PV bias = 0.5 % (400 °C × 0.5 % = 2 °C)

Main unit = 198 °C   Recorder = 200 °C
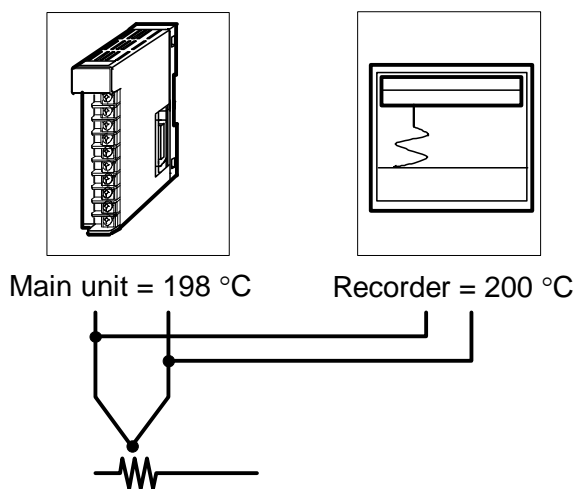
    Data range: -5.00 to +5.00 % of span

Polling example
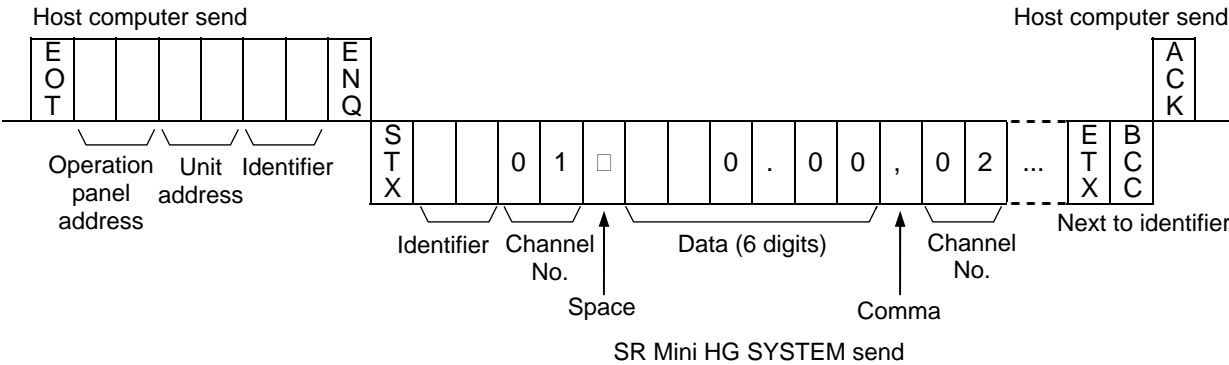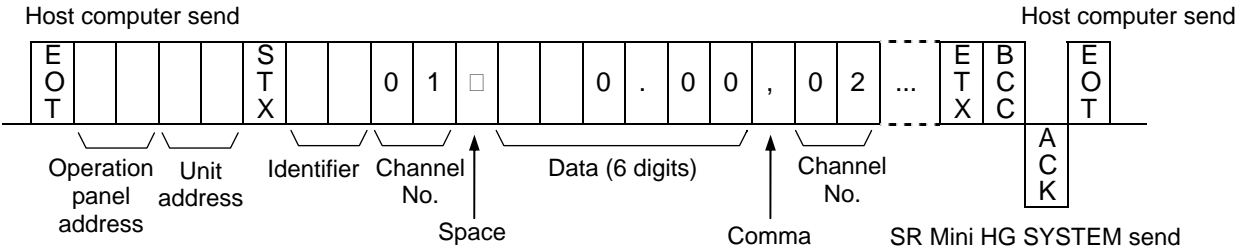
Host computer send   Host computer send

Selecting example

Host computer send   Host computer send

Omit the operation panel address when the connection is made directly to control unit.

Identifier SR: Control Run/Stop

Identifier which defines data to start or stop control.

Data range: 0: Control STOP

1: Control RUN

Only when the init ial set mode is "0: Normal communication," control can be start.

Polling example
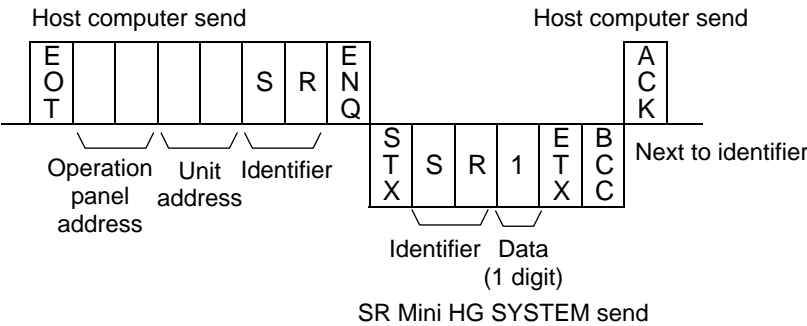
Selecting example
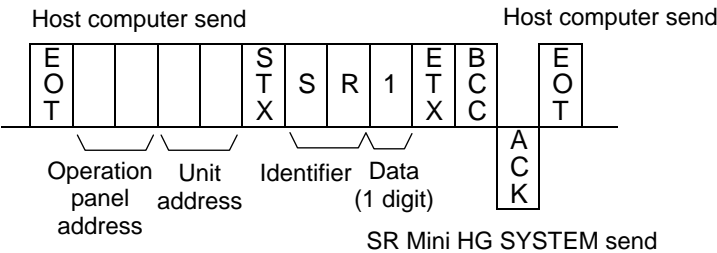
Omit the operation panel address when the connection is made directly to control unit.

If this identifier is changed to control stop, both control and alarm outputs are turned OFF.

Identifier IN: Initialize setting mode

Identifier which defines data to select initialize mode (extended communication).

If initialize mode is selected, the content of each identifier described in the separate Supplementary Information for **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. For the change to the extended communications, the control must be first stopped by the control Run/Stop (Identifier: SR).**

📖 **It is impossible to start the control in the extended communication mode. For the re-start of the control change to the normal communications mode beforehand.**

📖 **Initialize settings cannot be made via the operation panel.**

📖 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

Data range: 0: Normal communication
   Normal communication is possible.
   1: Extended communication (Initialize setting mode)
   Normal and initial setting communication are possible.
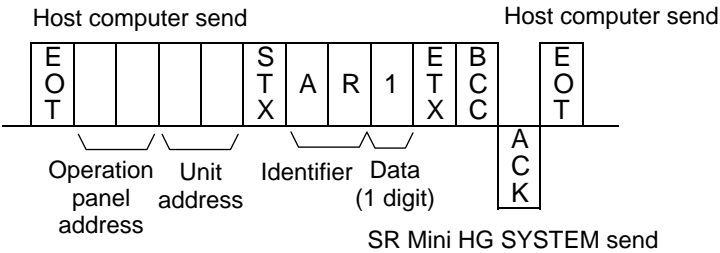
Polling example
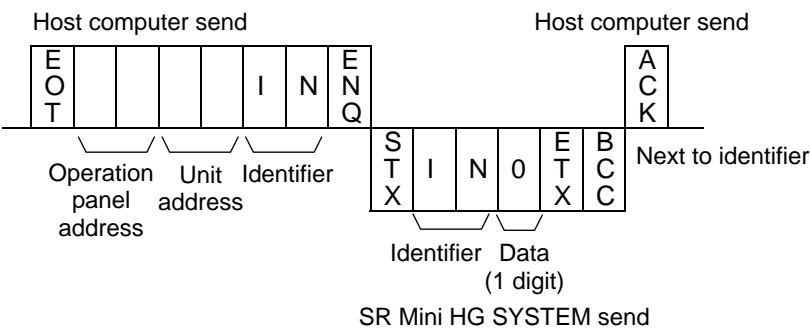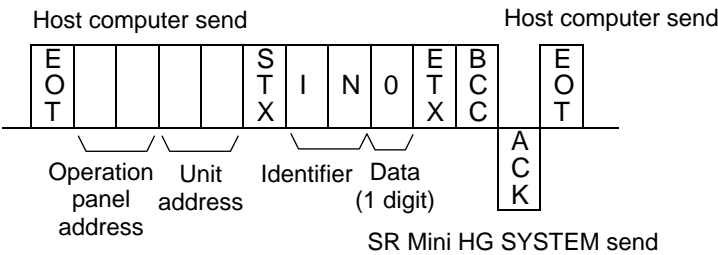
Selecting example

📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier ZA: Memory area number

Identifier which defines the memory area number of the control unit.

The memory area function is the function which stores the parameter values such as the set value (SV) etc. in up to 8 memories. When required, read in the appropriate 1 memory out of the 8 memories and to use its parameters for the control. The memory area which is used for the control is defined as "Control area."

The parameter values to be stored in one memory

Temperature set value: S1	Integral time: I1
First alarm set value: A1	Derivative time: D1
Second alarm set value: A2	Control response parameter: CA
Heat-side proportional band: P1	Overlap/deadband: V1
Cool-side proportional band: P2	

Data range: 1 to 8

Polling example
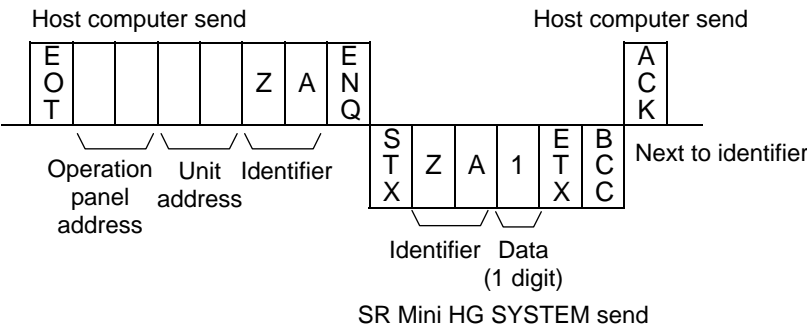
📖   Omit the operation panel address when the connection is made directly to control unit.

Selecting example

Host computer send   Host computer send

E O T				S T X	Z	A	1	E T X	B C C		E O T

Operation panel address Unit address   Identifier Data (1 digit)

ACK

SR Mini HG SYSTEM send
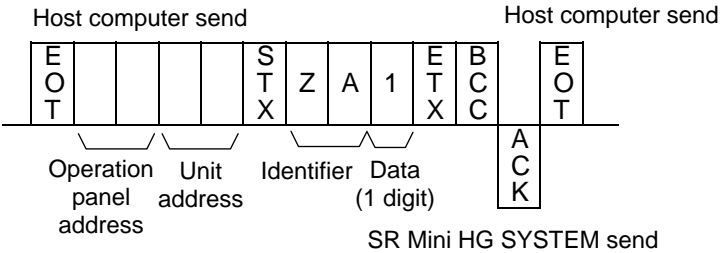
📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier AR: Alarm interlock release

Identifier which release the alarm interlock.

Data range: 1: Release (1 only)

Selecting example

Host computer send   Host computer send

E O T				S T X	A	R	1	E T X	B C C		E O T

Operation panel address Unit address   Identifier Data (1 digit)

ACK

SR Mini HG SYSTEM send

📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier J1: Auto/Manual transfer
Identifier ON: Manual output value

Identifier which defines auto (Normal automatic control operation) or manual (Manual operation) transfer and control output value during manual operation.

When you switch over to the manual mode, set the control output value with the manually output value (Identifier: ON).

J1: Auto/Manual transfer

   Data range: 0: Auto   1: Manual

                Setting will be invalid in ON/OFF control and Heat/Cool control.

ON: Manual output value

   Data range: -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)

Polling example (Auto/Manual transfer)
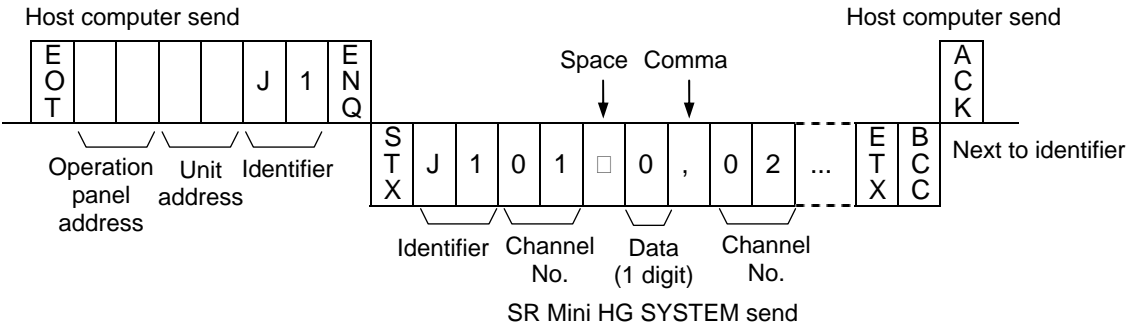
Selecting example (Auto/Manual transfer)
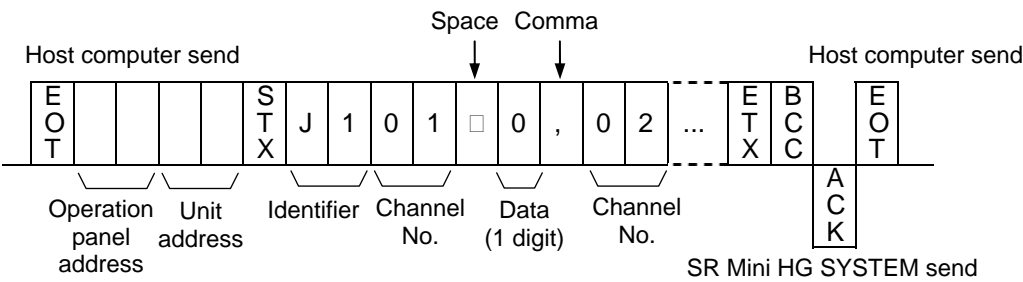
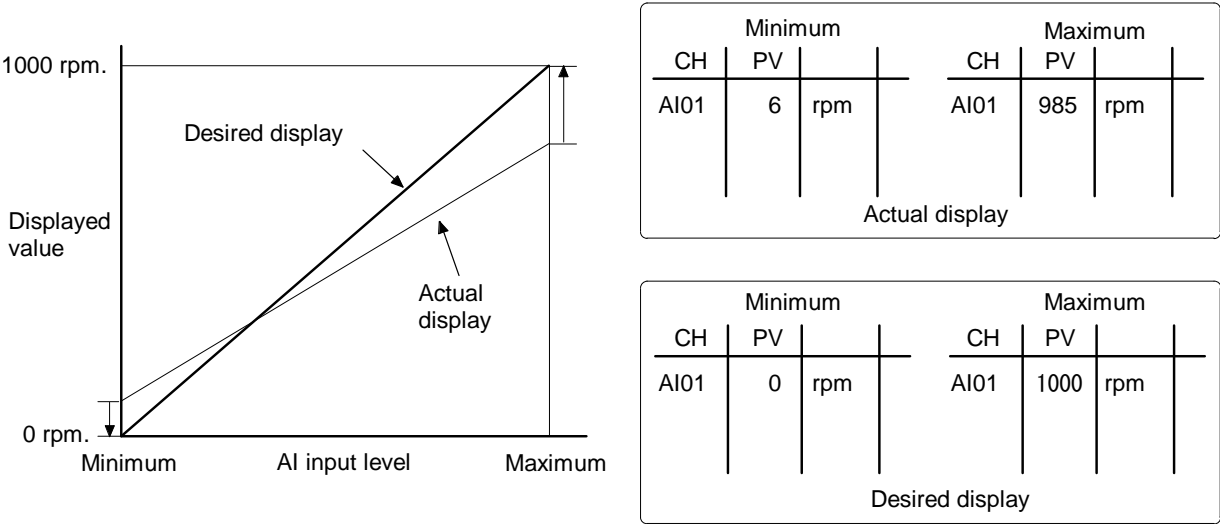   Omit the operation panel address when the connection is made directly to control unit.

Polling example (Manual output value)
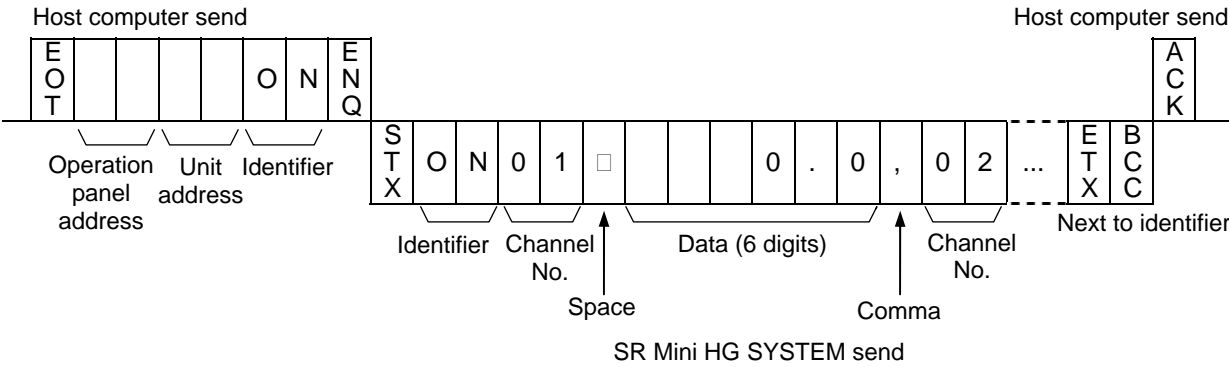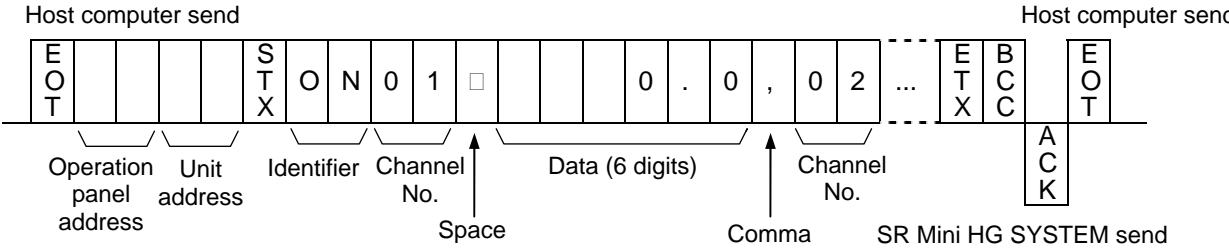
Host computer send | Host computer send

EOT | | | O N | ENQ

Operation panel address | Unit address | Identifier

STX | O N | 0 1 | □ | | | 0 . 0 , | 0 2 | ... | ETX | BCC | ACK

Identifier | Channel No. | Data (6 digits) | Channel No.

Space | Comma | Next to identifier

SR Mini HG SYSTEM send

Selecting example (Manual output value)

Host computer send | Host computer send

EOT | | | STX | O N | 0 1 | □ | | | 0 . 0 , 0 2 | ... | ETX | BCC | EOT

Operation panel address | Unit address | Identifier | Channel No. | Data (6 digits) | Channel No. | ACK

Space | Comma | SR Mini HG SYSTEM send

Omit the operation panel address when the connection is made directly to control unit.

Identifier JI: AI zero point correction
Identifier JJ: AI full scale correction

Identifier to specify the data for the indication correction each of the zero and full scale points of AI input.

This function is used to forcibly match the displayed value with the zero or full scale point for the purpose of correcting the AI zero or full scale point.
If the displayed value deviates from the AI module input value, the displayed value is calibrated (corrected) at its zero and full scale points so as to match the AI module input value.

[Example]   Display of motor rpm.

The displayed value may deviate from the desired value if there is an input error. At this time, the displayed value can be forcibly matched to the input corresponding to the maximum or minimum value.

  Data range: 0: Cancel   1: Execution

Polling example
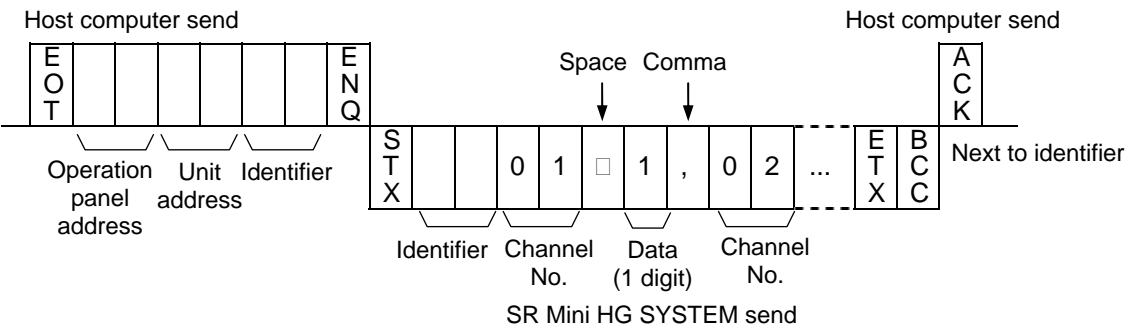
📖   Omit the operation panel address when the connection is made directly to control unit.

Selecting example

Space   Comma

Host computer send   Host computer send

| E O T | | | | S T X | | | 0 | 1 | □ | 1 | , | 0 | 2 | ... | E T X | B C C | | E O T |

Operation   Unit   Identifier Channel   Data   Channel
panel   address   No.   (1 digit) No.
address

ACK

SR Mini HG SYSTEM send
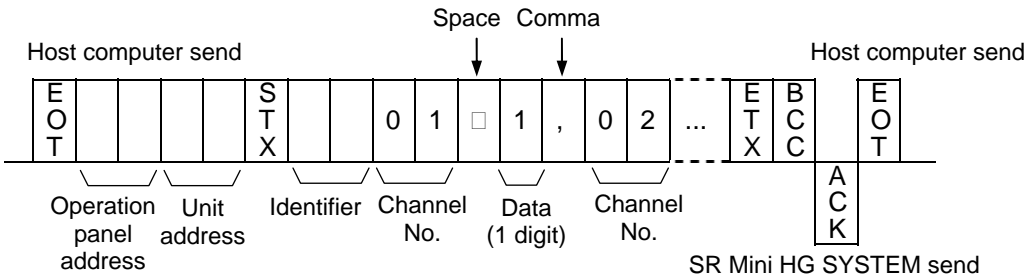
📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier NJ: AI operation mode transfer
Identifier EJ: TI operation mode transfer

Changes each channel operation mode of AI module and TI module.
[Data range]

0: Unused mode

Neither monitoring nor alarm monitoring is done in this mode.

To be assigned on the replacement of modules and the maintenance of equipment.

1: Normal mode

Normal mode in which monitoring and alarm are done.

Polling example
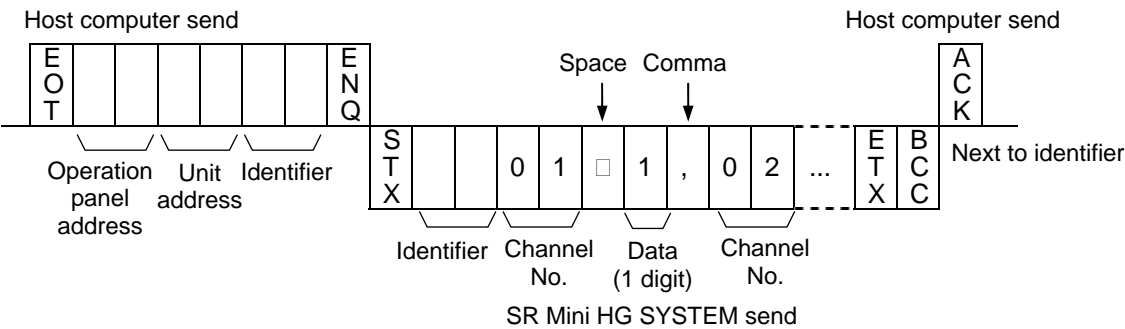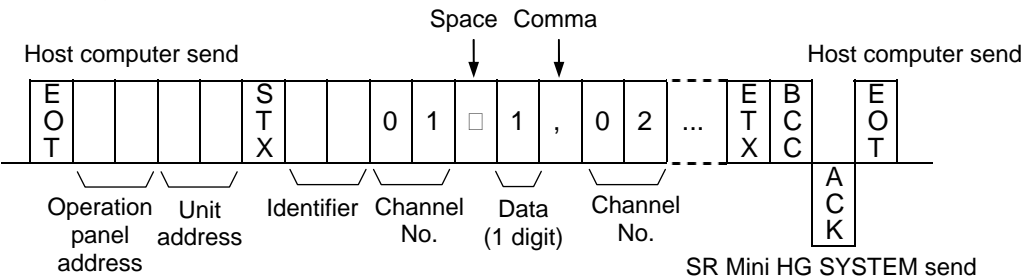
Selecting example

📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier AP: LBA alarm condition

Read-only memory which defines the LBA (Loop break alarm) state

Data range: 0: OFF   1: ON
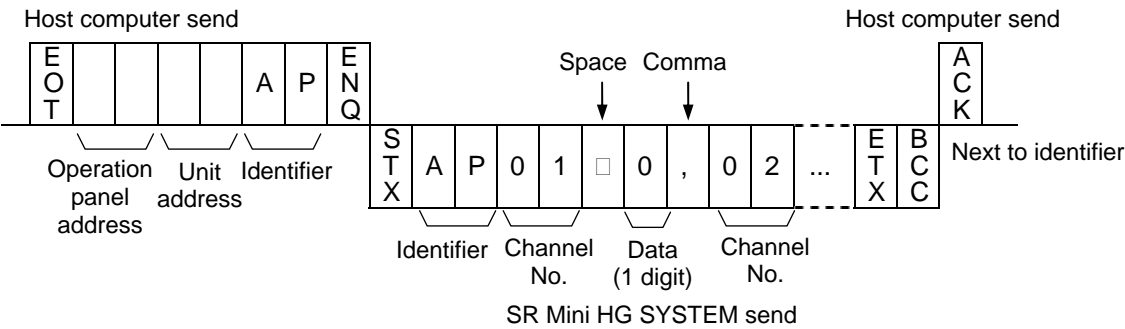
Polling example

Omit the operation panel address when the connection is made directly to control unit.

Identifier HP: LBA use selection
Identifier C6: LBA time
Identifier V2: LBA deadband

Identifier used to select "used" or "unused" of LBA and to set LBA.

HP: LBA use selection
Data range: 0: Unused   1: Used

C6: LBA time
Data range: 1 to 7200 seconds

V2: LBA deadband
Data range: 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.

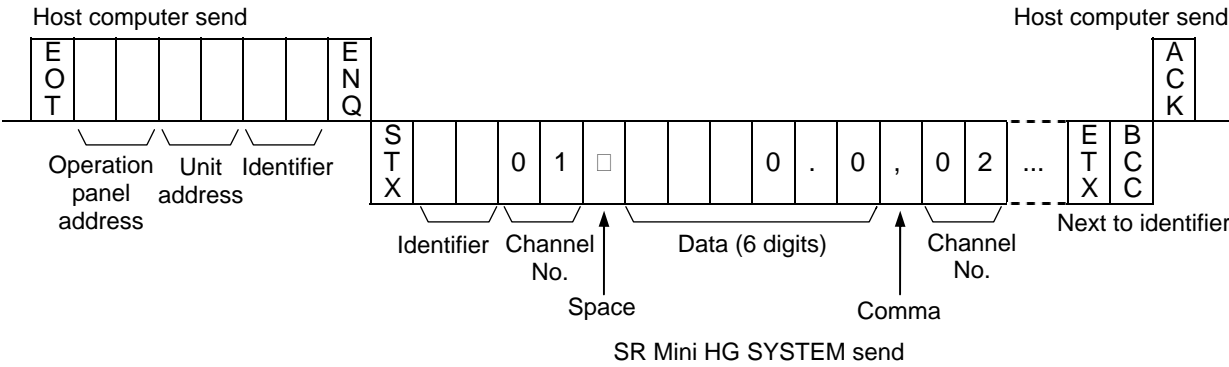**Polling example (LBA use selection)**
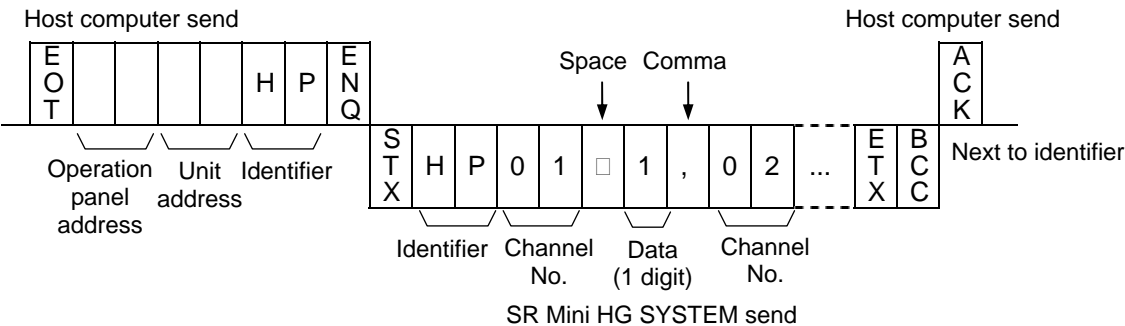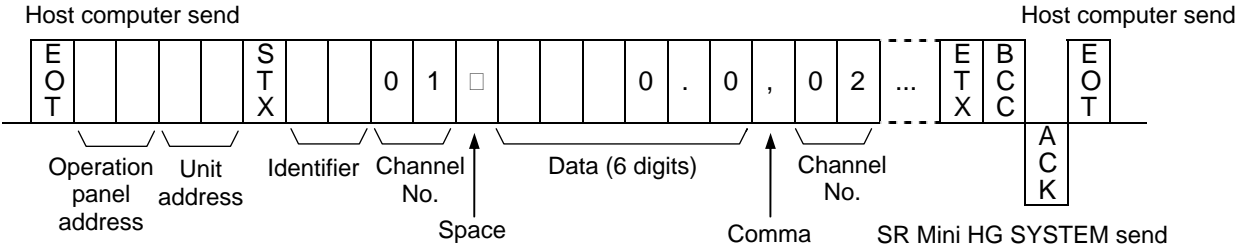

Selecting example (LBA use selection)
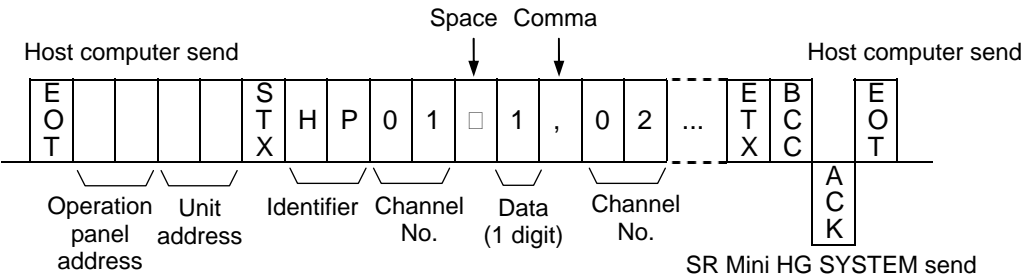
    Omit the operation panel address when the connection is made directly to control unit.

Polling example (LBA time, LBA deadband)

Host computer send

| E O T | | | | E N Q |

Operation panel address | Unit address | Identifier

| S T X | | 0 | 1 | □ | | | 0 | . | 0 | , | 0 | 2 | ... | E T X | B C C |

Identifier | Channel No. | Data (6 digits) | Channel No.

Space

Comma

SR Mini HG SYSTEM send

Host computer send

| A C K |

Next to identifier

Selecting example (LBA time, LBA deadband)

Host computer send

| E O T | | | | S T X | | 0 | 1 | □ | | | 0 | . | 0 | , | 0 | 2 | ... | E T X | B C C | | E O T |

Operation panel address | Unit address | Identifier | Channel No. | Data (6 digits) | Channel No.

Space

Comma

Host computer send

| A C K |

SR Mini HG SYSTEM send

📖   Omit the operation panel address when the connection is made directly to control unit.

■ Control loop break alarm (LBA) function

The LBA function detects the abnormality in the control loop such as the break of load (heater), the abnormality of external operating unit (magnet relay etc.), the break of input (sensors), etc.

When the output reaches 100 % or 0 % (or output limiter low limit) the LBA function starts to monitor periodically the change of measured value (PV) at previously set time and detects the break of heater and input. For the H-TIO-K module (Position proportioning control), LBA functions with the opening value set to output.

(1) LBA alarm condition

For heat control

	When output becomes less than 0 % (or output limiter low limit)	When output becomes more than 100 % (or output limiter high limit)
For reverse action	When measured value (PV) does not fall below the variation width determined by the LBA within the LBA set time.	When measured value (PV) does not rise beyond the variation width determined by the LBA within the LBA set time.
For direct action	When measured value (PV) does not rise beyond the variation width determined by the LBA within the LBA set time.	When measured value (PV) does not fall below the variation width determined by the LBA within the LBA set time.

The variation width determined by the LBA : Fixed 2 °C (°F)

For heat/cool control

	When the output on the heat-side becomes more than 100 % (or output limiter high limit) and the output on the cool-side becomes less than 0 %	When the output on the heat-side becomes less than 0 % and the output on the cool-side becomes more than 100 % (or output limiter low limit)
For heat/cool control	When measured value (PV) does not rise beyond the variation width deter-mined by the LBA within the LBA set time.	When measured value (PV) does not fall below the variation width determined by the LBA within the LBA set time.

The variation width determined by the LBA : Fixed 2 °C (°F)

For H-TIO-K module (Position proportional control)

	When the opening becomes less than 0 % (or output limiter low limit)	When the opening becomes more than 100 % (or output limiter high limit)
For H-TIO-K module (Position proportional control)	When measured value (PV) does not fall below the variation width determined by the LBA within the LBA set time.	When measured value (PV) does not rise beyond the variation width deter-mined by the LBA within the LBA set time.

The variation width determined by the LBA: Fixed 2 °C (°F)

The output limiter setting functions as the LBA high and low limits. (The output limiter does not function as the control limiter.)

📖 When autotuning is used, the LBA set time which is twice the integral time thus set is automatically set. (No LBA set time changes even if the integrated value is changed.)

(2) Detected errors

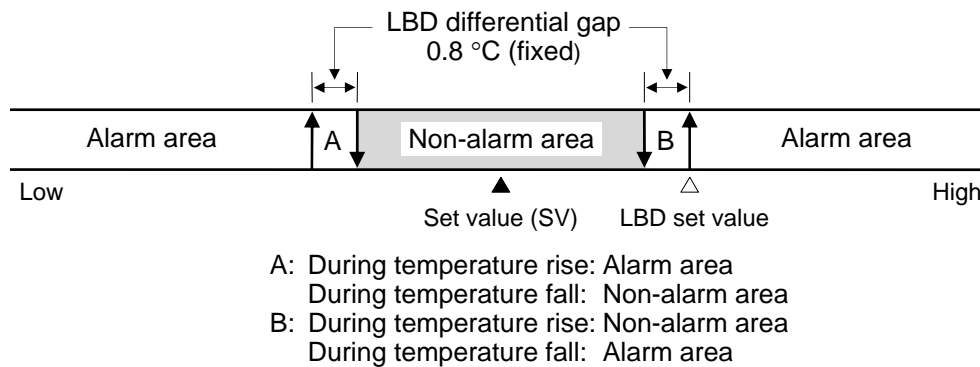LBA output is turned on if any of the following errors are detected.

Error activating LBA function
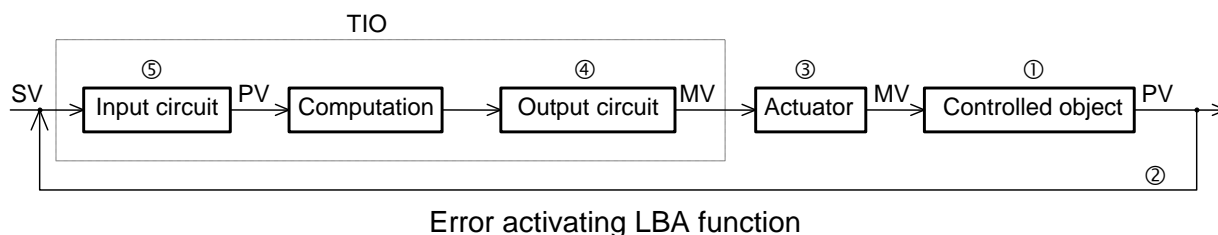
① Controlled object trouble ... Heater break, no power supply, incorrect wiring, etc.

② Sensor trouble .... Sensor disconnected, shorted, etc.

③ Actuator trouble .... Weld relay contact, incorrect wiring, relay contact not closed, etc.

④ Output circuit trouble .... Weld internal relay contact, relay contact not open or closed, etc.

⑤ Input circuit trouble .... The measured value does not change even if input changes, etc.

📖 **However, the cause of the above trouble cannot be identified, so check the control system step by step.**

(3) LBA deadband (LBD)

The LBA may enter the alarm condition due to a disturbance (Other heat sources, etc.) even if there is no error in the control system. In this case, an area in which no alarm occurs can be set by setting the LBA deadband (LBD). Set the LBD carefully because no alarm occurs even if alarm conditions occur while the measured value (PV) is within the LBD area.


A: During temperature rise: Alarm area
   During temperature fall: Non-alarm area
B: During temperature rise: Non-alarm area
   During temperature fall: Alarm area

(4) Precautions for LBA

- The LBA function detects the occurrence of an error in the control loop, but cannot locate the error point. Therefore in this case, check each control system in order.

- No LBA function is activated in the following cases.
  - While autotuning is being executed
  - If operation mode is set to any mode other than "Normal."

- If the LBA set time is shorter than anticipated or it does not match the controlled object, the LBA may not turn ON or OFF. In this case, change the LBA set time depending on the situation.

- LBA output turns OFF in the following cases with LBA output turned ON.
  - When measured value (PV) rises (or falls) beyond (or below) the variation width determined by the LBA within the LBA set time.
  - When measured value (PV) enters the LBA deadband

Identifier M6: AO output value monitor
# Identifier S6: AO set value output

When 1 (manual mode) is selected for AO function selection, the present output state is monitored. In addition, in manual mode if "stop" is selected for control Run/Stop selection, the output is turned OFF. (The output can be always turned ON in recorder mode.)

Data range: Display scale range (in manual mode)
The position of the decimal point differs depending on AO decimal point position setting.
Data will be valid in manual mode.

Polling example
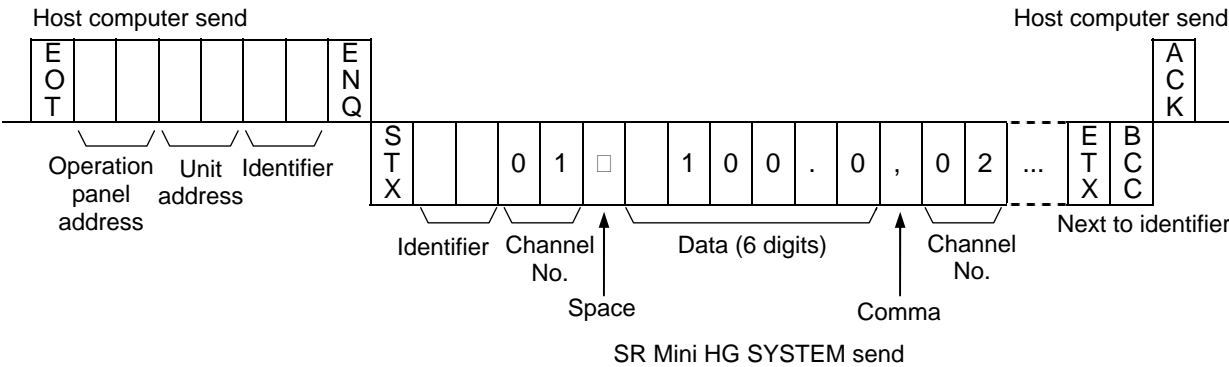
Selecting example (AO set value output only)
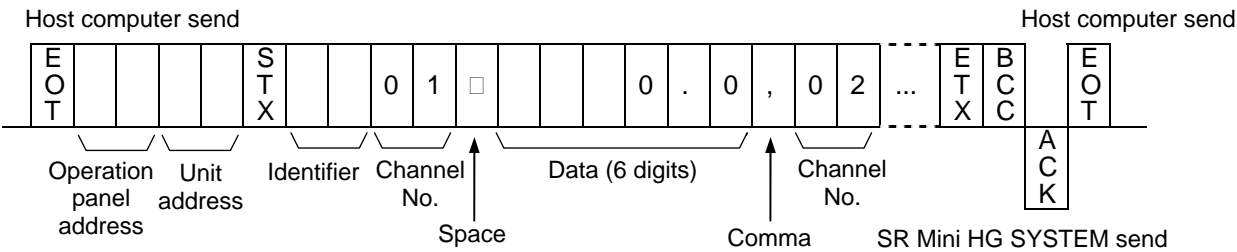
📖 Omit the operation panel address when the connection is made directly to control unit.

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Identifier XO: AO function selection
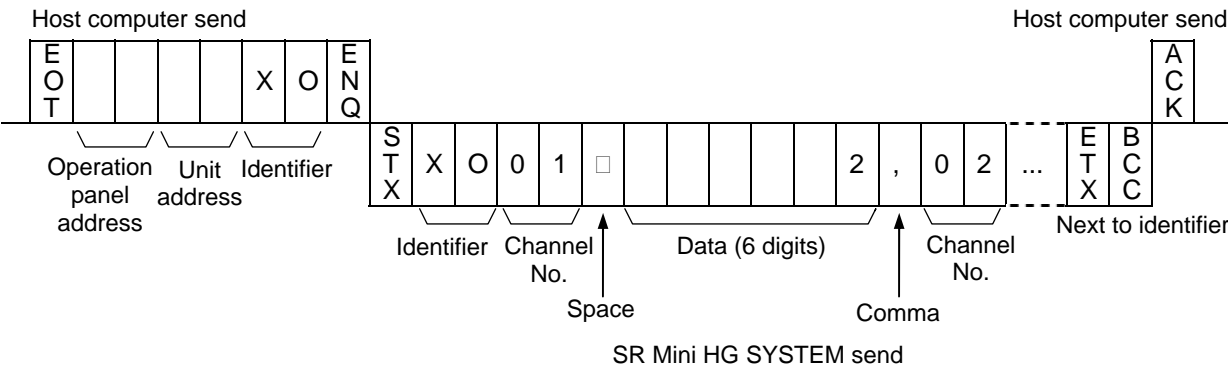
Selects data output from the AO module.

[Data range]

0: OFF (No AO function)
1: Manual mode (Outputs data given by the AO output setting)
2: Measured value (PV) input
3: Set value monitoring
4: Temperature deviation
5: Manipulated output (Heat-side)
6: Manipulated output (Cool-side)
7: AI displayed value
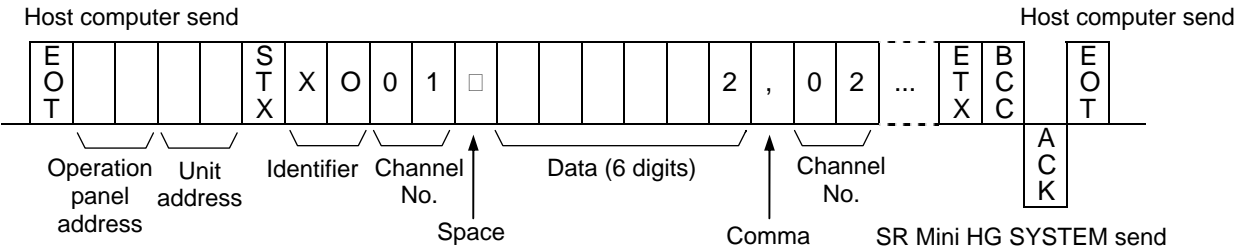8: TI displayed value
9: Opening monitor

Recorder output mode

Polling example

Selecting example

📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier OY: Setting of CH corresponding to AO
Identifier CV: AO zooming high limit
Identifier CW: AO zooming low limit

The respective setting becomes valid in recorder output mode. (Invalid in manual mode)

OY: Setting of CH corresponding to AO

As CH corresponding to AO, temperature-controlled CH to be output or AI CH is selected.

Data range: 1 to 20 (TIO and FBR input channel)
　　　　　　1 to 40 (AI and TI channel)
　　　　　　Setting will be valid in recorder output mode.

CV: AO zooming high limit, CW: AO zooming low limit

The AO zooming high limit or AO zooming low limit output range is percent-set.

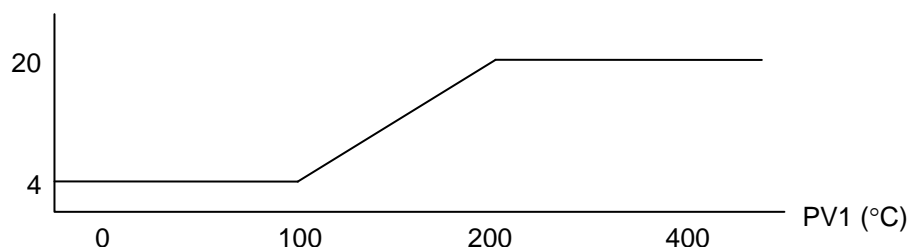Data range: 0.0 to 100.0 % (AO zooming high limit ≥ AO zooming low limit)
　　　　　　Setting will be valid in recorder output mode.

For example, assuming the following conditions when PV1 is recorded between 100 to 200 °C:
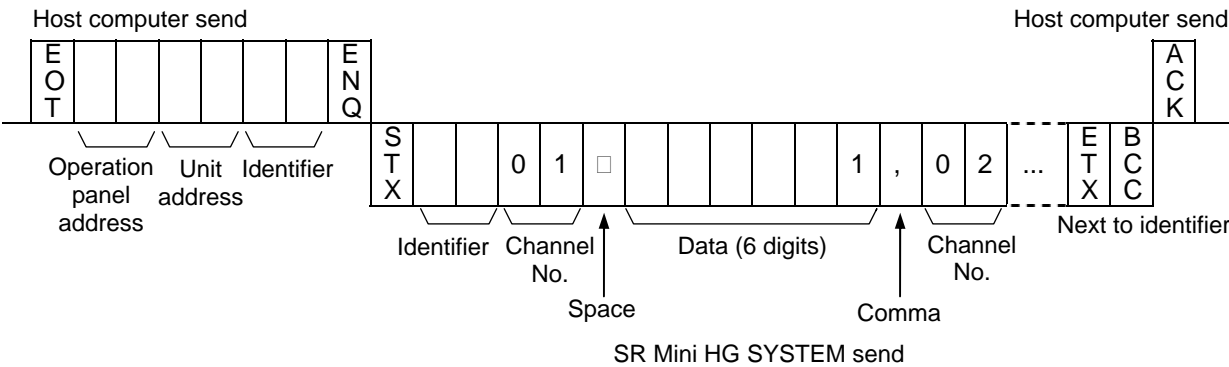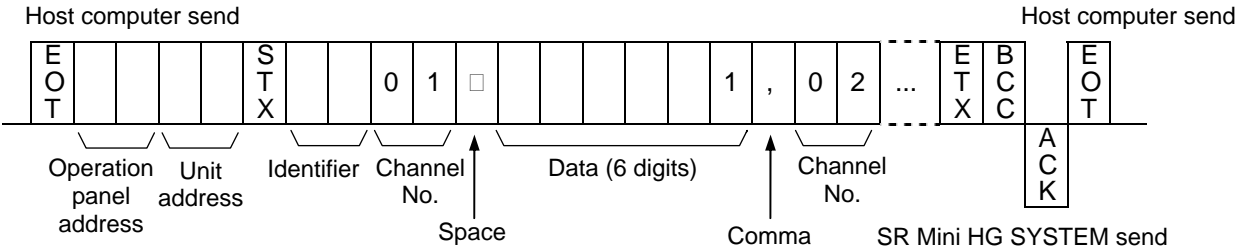
AO1 function selection:	2
Setting of CH corresponding to AO1:	1
AO1 zooming high limit:	50 %
AO1 zooming low limit:	25 %
Input span:	0 to 400 °C
Output type (Hardware fixed):	4 to 20 mA

Output from AO1 as shown in the following graph.

AO1 output (mA)

Polling example

Host computer send

Host computer send

E O T				E N Q

Operation panel address — Unit address — Identifier

S T X		0	1	□					1	,	0	2	...	E T X	B C C

A C K

Identifier — Channel No. — Data (6 digits) — Channel No.

Space

Comma

Next to identifier

SR Mini HG SYSTEM send

Selecting example

Host computer send

Host computer send

E O T				S T X		0	1	□				1	,	0	2	...	E T X	B C C	E O T

A C K

Operation panel address — Unit address — Identifier — Channel No. — Data (6 digits) — Channel No.
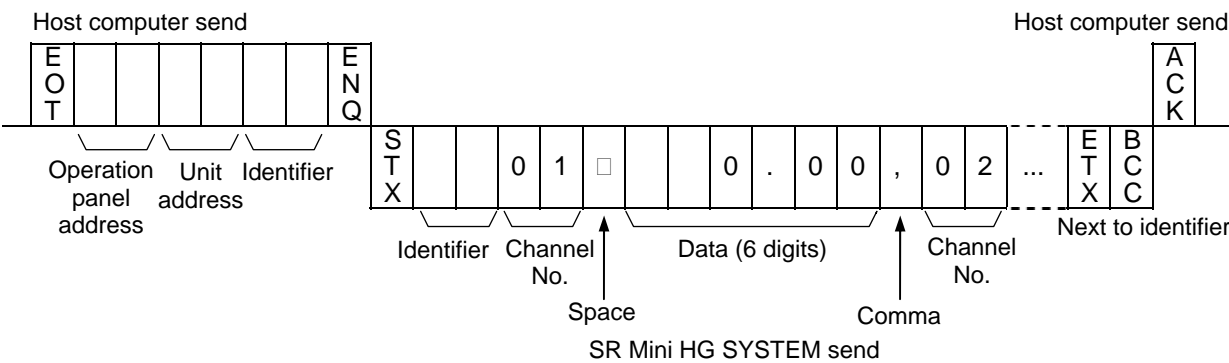
Space

Comma

SR Mini HG SYSTEM send

Omit the operation panel address when the connection is made directly to control unit.

Identifier JK: AO zero point adjustment setting
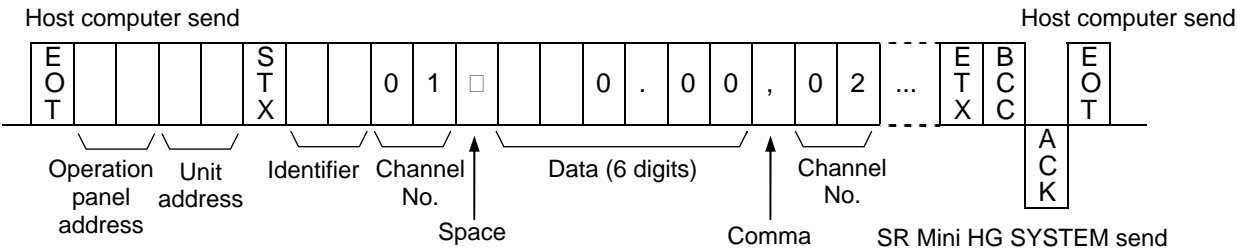## Identifier JL: AO full scale adjustment setting

Identifier to define data to correct the display at the AO zero or full scale point.

Each of output zero and full scale points is calibrated (corrected).
The zero point is adjusted while the zero signal is being output, then the output full scale is adjusted.

  Data range: -5.00 to +5.00 %

Polling example

Selecting example

📖   Omit the operation panel address when the connection is made directly to control unit.

IMSRM09-E5

Identifier L1: DI module input condition (H-DI-A module)

The contact input condition is expressed as a bit image in decimal numbers from 0 to 255.

Data range: 0 to 255

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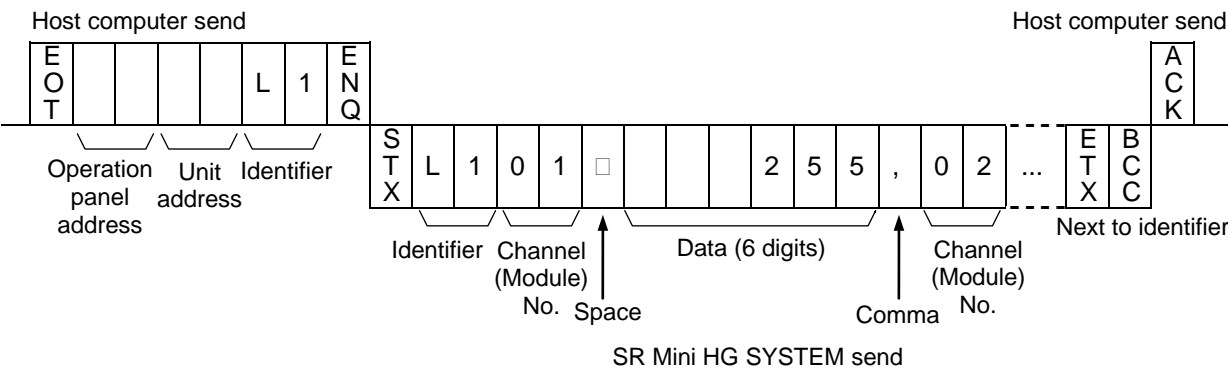Bit 1: CH2 (DI2)
Bit 2: CH3 (DI3)
Bit 3: CH4 (DI4)
Bit 4: CH5 (DI5)
Bit 5: CH6 (DI6)
Bit 6: CH7 (DI7)
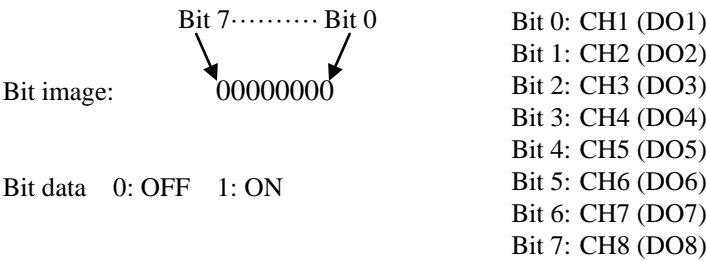Bit 7: CH8 (DI8)

Polling example

Omit the operation panel address when the connection is made directly to control unit.

Identifier Q3: Event DO condition (H-DO-A module)
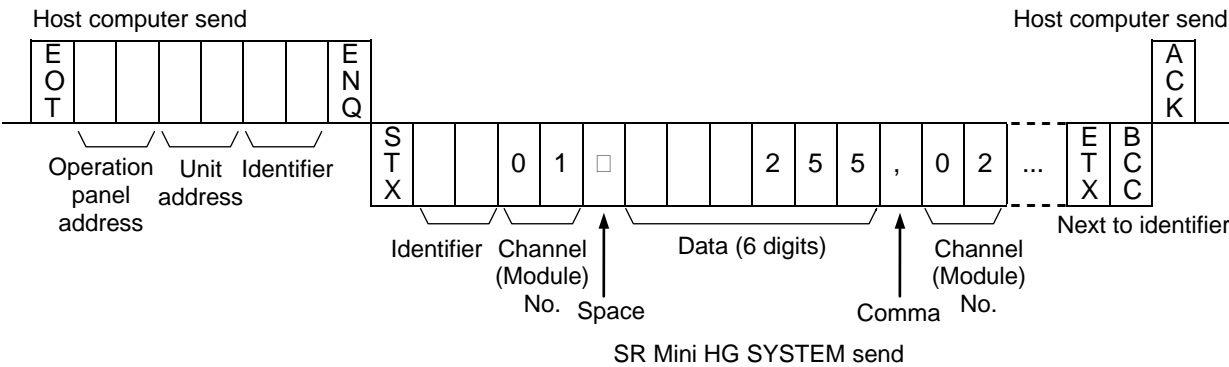## Identifier Q4: Event DO manual output value (H-DO-C module)

The contact output condition is expressed as a bit image in decimal numbers from 0 to 255.
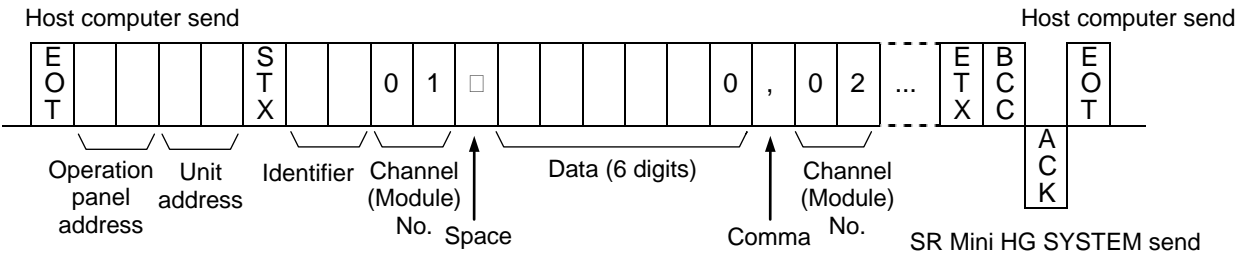
Data range: 0 to 255

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 7·········· Bit 0

Bit image: 00000000

Bit data   0: OFF   1: ON

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)

Polling example

Selecting example (Event DO manual output value only)

Omit the operation panel address when the connection is made directly to control unit.

Identifier KH: Cascade monitor

Cascade data monitored value (slave only).

Data range: ± 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.
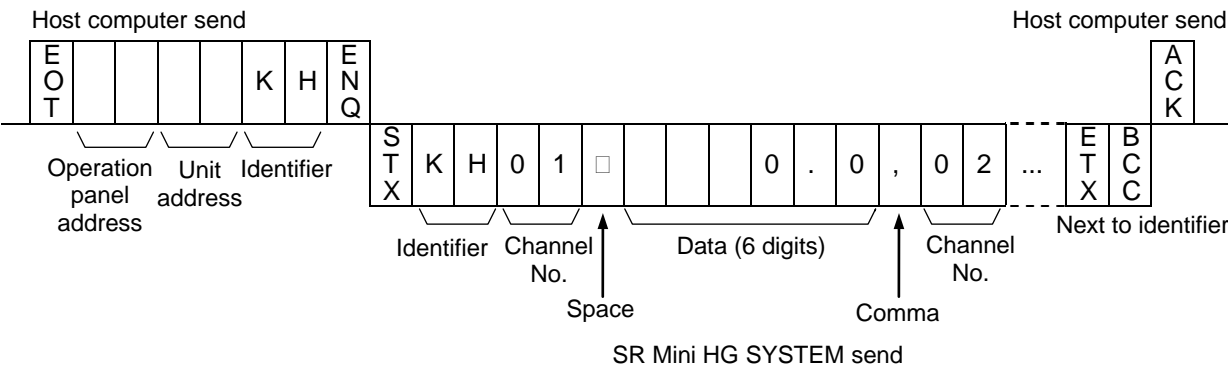
Polling example

 Omit the operation panel address when the connection is made directly to control unit.

Identifier KF: Cascade ON/OFF

The cascade module cascade state is selected (Setting will be valid in master channel).

Data range: 0: OFF   1: ON
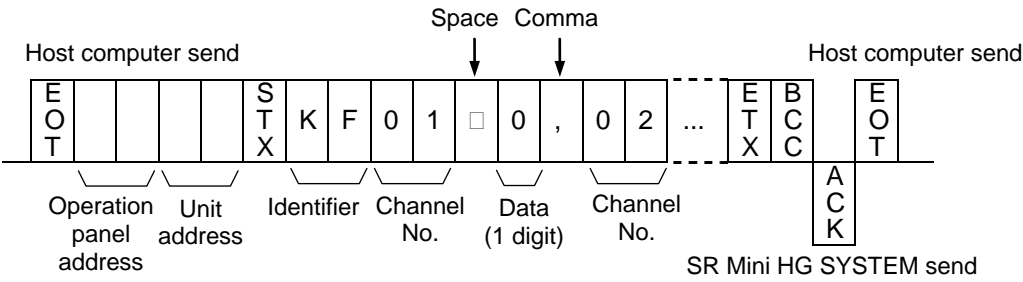
Polling example
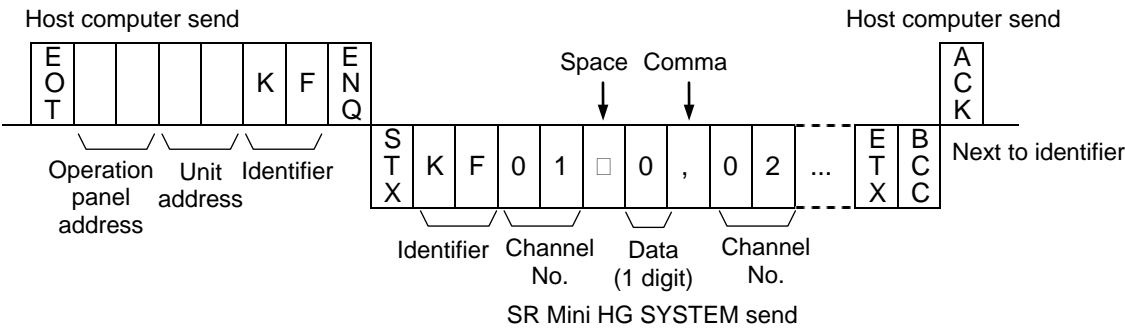

Selecting example

Omit the operation panel address when the connection is made directly to control unit.

Identifier KG: Cascade gain
Identifier KI: Cascade bias

Identifier which defines the cascade bias and cascade gain (Setting will be valid in slave channel).

KG: Cascade gain
Data range: -9.999 to +10.000

KI: Cascade bias
Data range: -99.99 to +100.00

Polling example
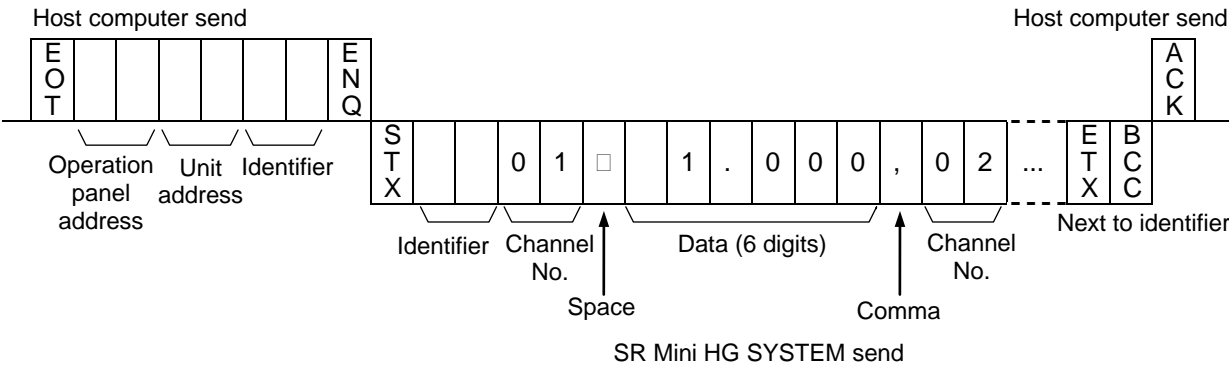
Selecting example
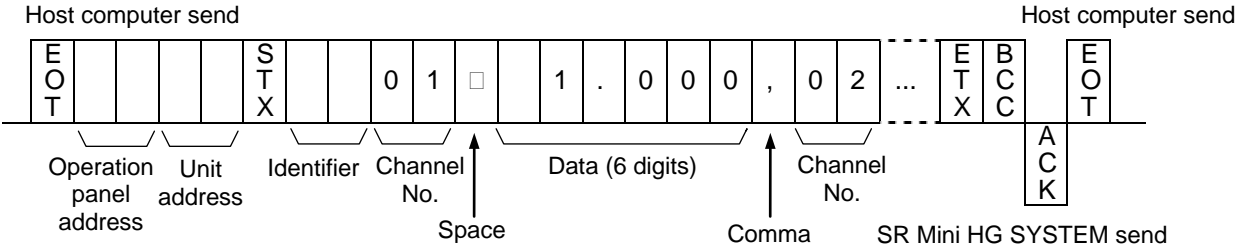
📖 Omit the operation panel address when the connection is made directly to control unit.

📖 As the cascade gain and bias are effective only in the slave channel, the polling or selecting of the same value is made also in the master channel.

■ Configuration diagram of cascade module function
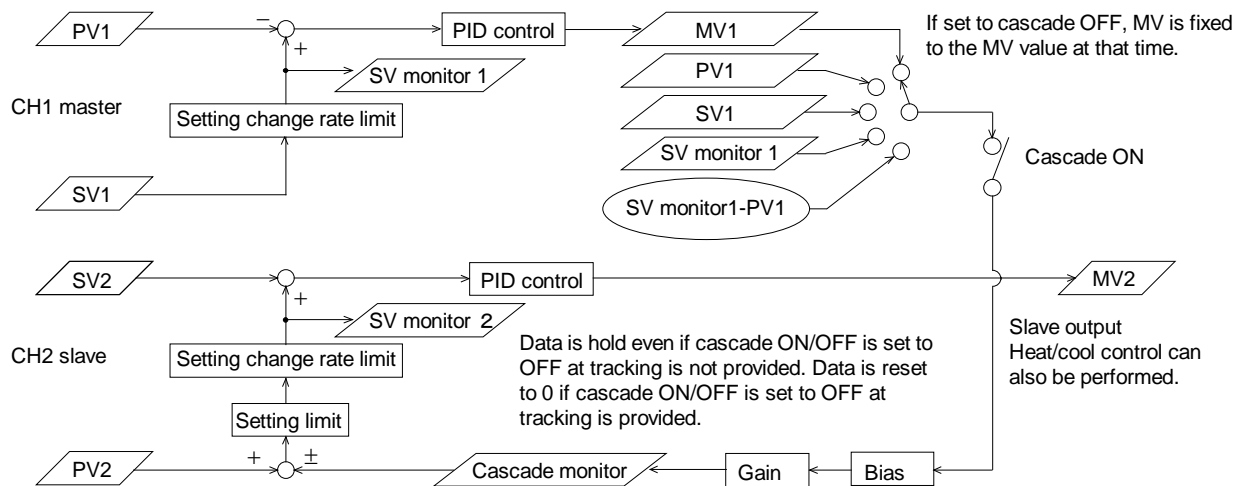
■ Gain/bias action example

Gain output is limited within the range of ± input span, and the temperature set value is within the setting limit range.
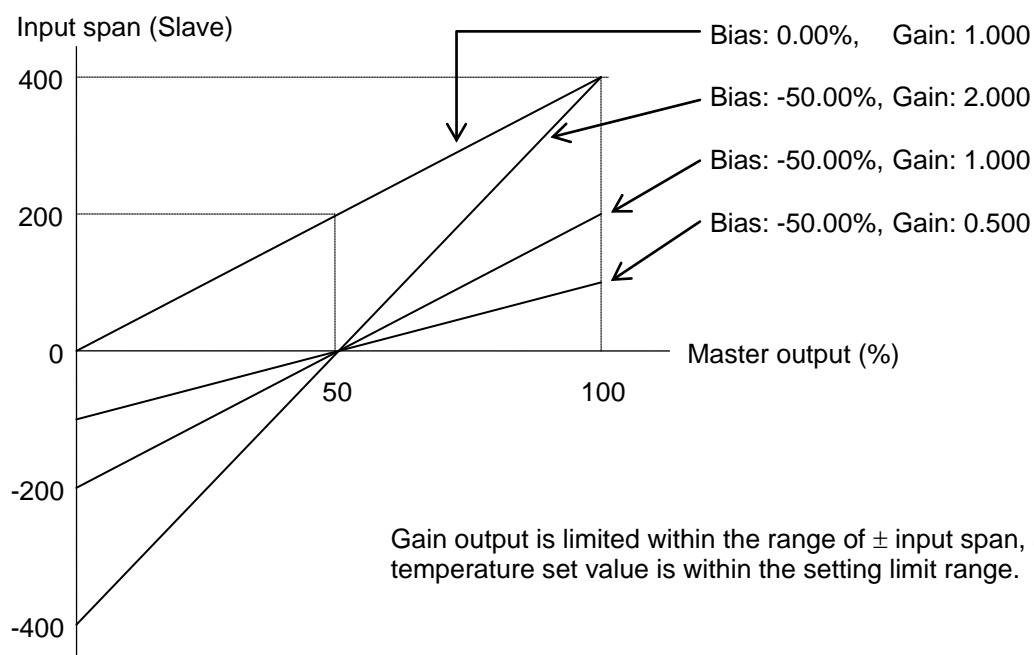
Identifier L3: PCP module DI condition (H-PCP-B module)

The contact input condition is expressed as a bit image in decimal numbers from 0 to 7.

   Data range: 0 to 7

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: Unused
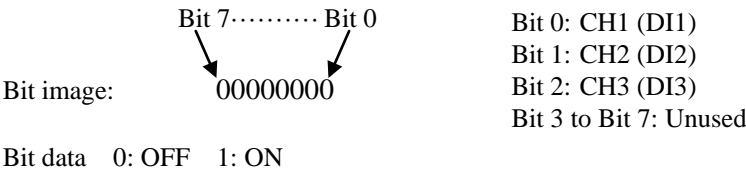
Polling example

Omit the operation panel address when the connection is made directly to control unit.

Identifier L4: Event DI input logic input monitor (H-DI-B module)

The contact input condition is expressed as a bit image in decimal numbers from 0 to 255.

   Data range: 0 to 255

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: CH4 (DI4)
Bit 4: CH5 (DI5)
Bit 5: CH6 (DI6)
Bit 6: CH7 (DI7)
Bit 7: CH8 (DI8)

Polling example

Host computer send

| E O T | | | L | 4 | E N Q |

Operation panel address   Unit address   Identifier

Host computer send

| A C K |

| S T X | L | 4 | 0 | 1 | □ | | | 2 | 5 | 5 | , | 0 | 2 | ... | E T X | B C C |

Identifier   Channel (Module) No.   Space   Data (6 digits)   Comma   Channel (Module) No.   Next to identifier

SR Mini HG SYSTEM send

Omit the operation panel address when the connection is made directly to control unit.

Identifier L5: Event DI input logic input monitor

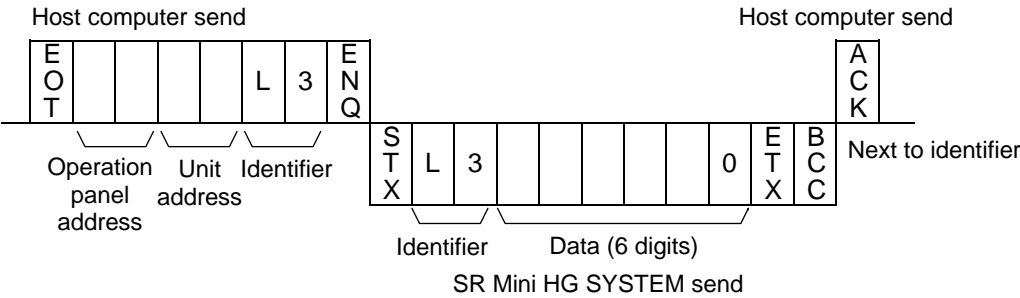The input condition in the logic section is expressed as a bit image in decimal numbers from 0 to 15.

Data range: 0 to 15

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

Bit data　0: OFF　1: ON

Polling example
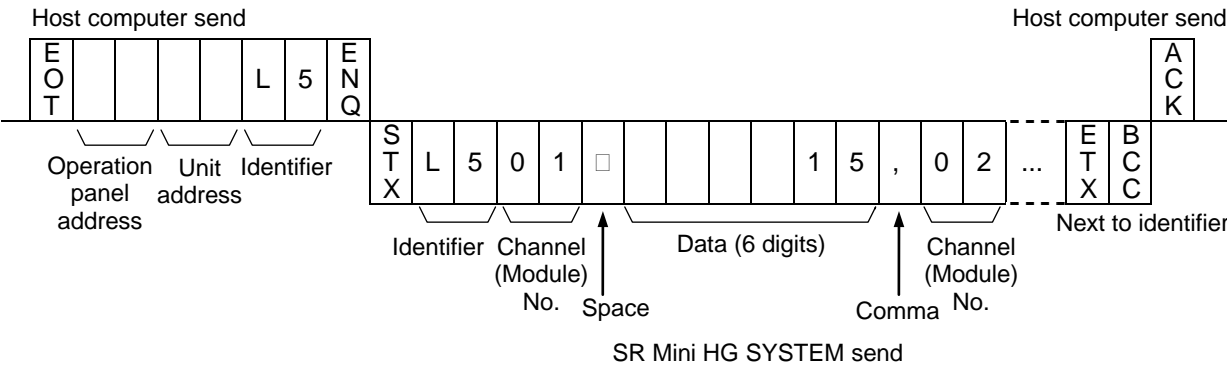
Omit the operation panel address when the connection is made directly to control unit.

Identifier Q5: Event DI input logic output monitor

The output condition in the logic section is expressed as a bit image in decimal numbers from 0 to 255.

Data range: 0 to 255

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
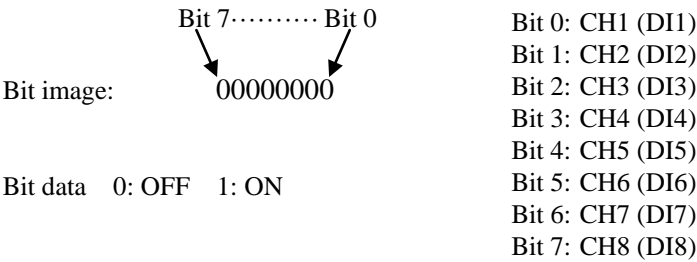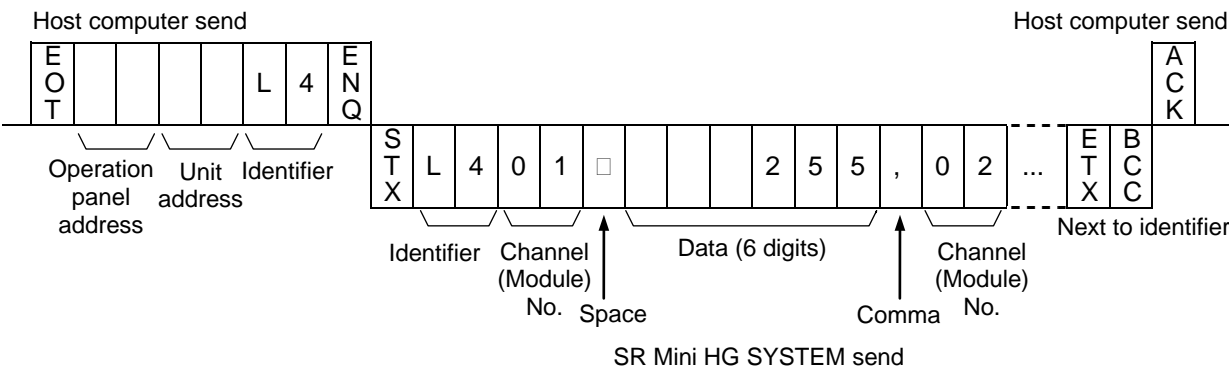
Bit image: 00000000

Bit data　0: OFF　1: ON

Bit 0: Logic output 1
Bit 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

Polling example
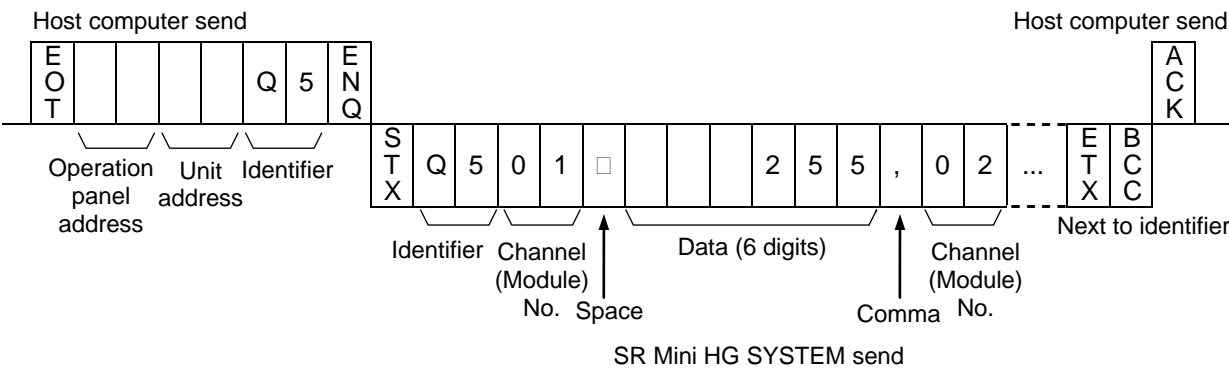
Omit the operation panel address when the connection is made directly to control unit.

Identifier AH: CT module heater break alarm condition
(H-CT-A module)

Read-only identifier which defines the heater break alarm condition.

[Data range]

0: Normal

1: When the current transformer input value (CT) is less than the heater break alarm setting with the control output turned ON (break)

2: When the current transformer input value (CT) is more than the heater break alarm setting with the control output turned OFF (welding)

Polling example
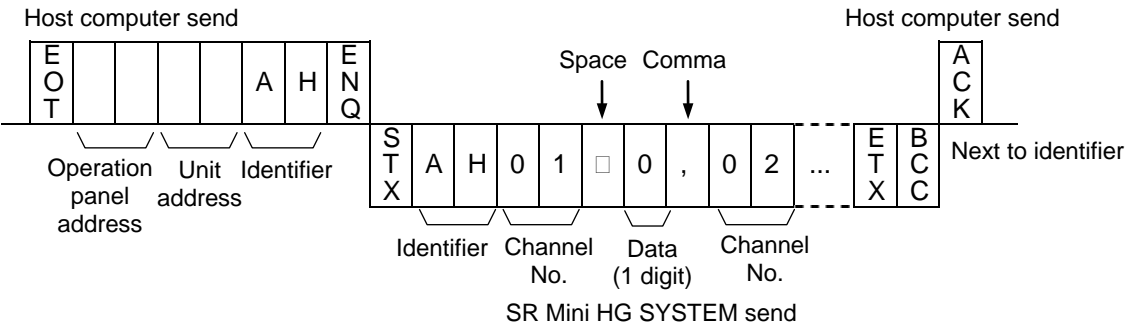
📖   Omit the operation panel address when the connection is made directly to control unit.

Identifier AJ: Overall alarm condition

Each alarm condition is expressed as a bit image in decimal numbers.

   Data range: 0 to 2047

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.
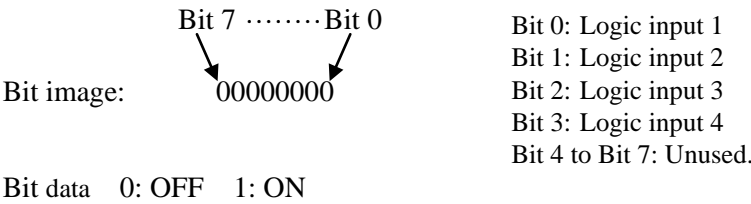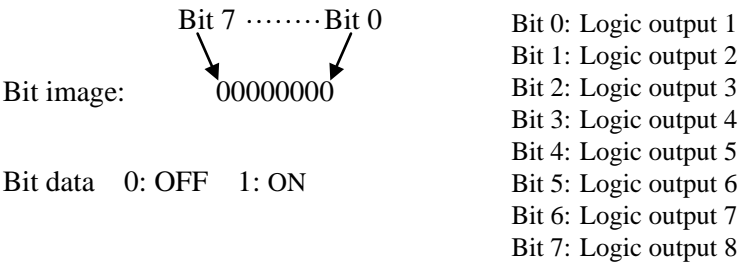
Bit 0: Logical OR of alarm 1 status in all channels
Bit 1: Logical OR of alarm 2 status in all channels
Bit 2: Logical OR of burnout alarm status in all channels
Bit 3: Logical OR of heater break alarm status in all channels
Bit 4: Temperature rise completion status
Bit 5: Logical OR of AI alarm 1 status 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: Unused.

Bit 15   Bit 0

Bit image: 0000000000000000

Bit data   0: OFF   1: ON

Polling example

Host computer send

| E O T | | | A J | E N Q |

Operation panel address   Unit address   Identifier

| S T X | A J | | | | | | 0 | E T X | B C C |

Host computer send

| A C K |

Next to identifier

Identifier   Data (6 digits)

SR Mini HG SYSTEM send

   Omit the operation panel address when the connection is made directly to control unit.

Identifier M8: Positioning monitor

The present control motor positioning is expressed as -5.0 to +105.0 %.

Data range: -5.0 to +105.0 %

📖 If the feedback resistance value is not appropriate or is not correctly adjusted, the monitored value becomes indefinite.

Polling example
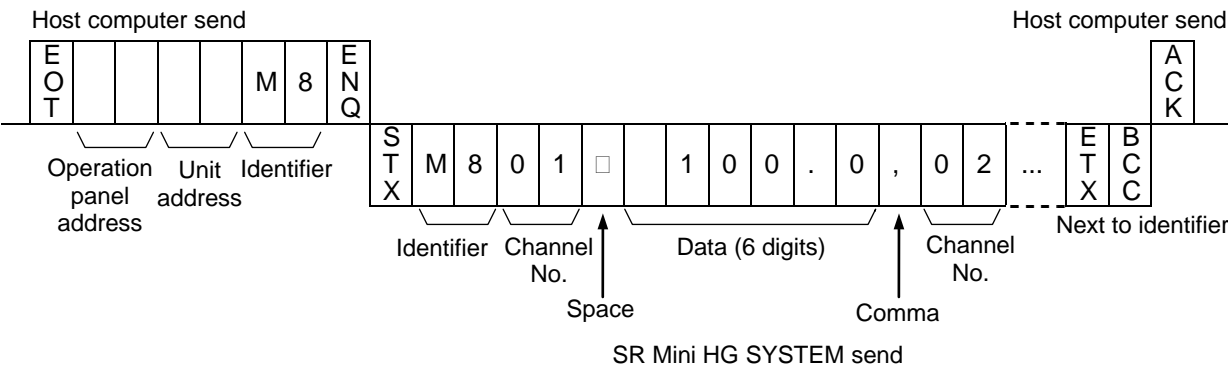
📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier V3: Positioning output neutral-zone

Frequent output to the control motor is prevented (0.1 to 10.0 % of motor time).
The output addition value within the neutral zone is temporarily held, and the output to the control motor condition being generated for the exit from the neutral zone.
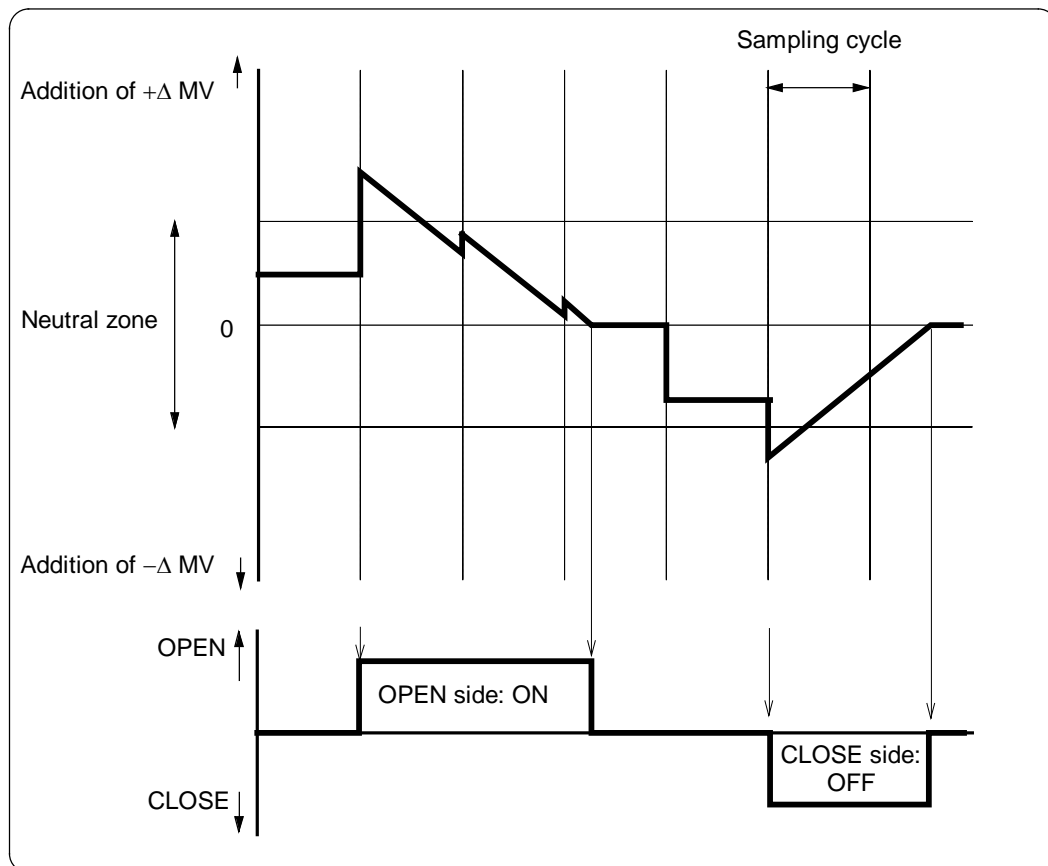
Data range: 0.1 to 10.0 % of motor time

Polling example
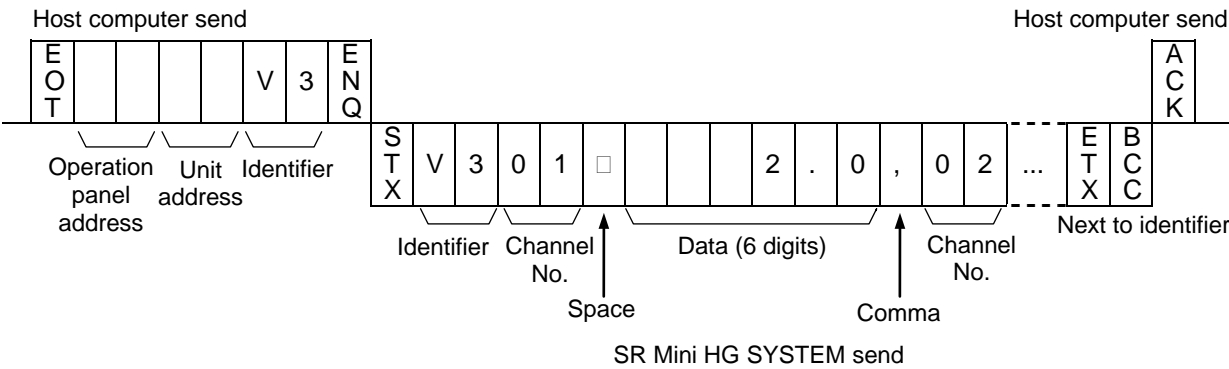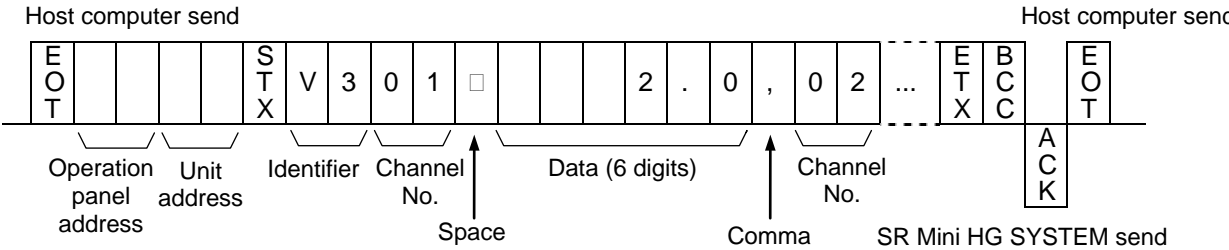
Host computer send   Host computer send

E O T			V	3	E N Q

Operation panel address | Unit address | Identifier

| S T X | V | 3 | 0 | 1 | □ | | | 2 | . | 0 | , | 0 | 2 | ... | E T X | B C C |

Identifier | Channel No. | Data (6 digits) | Channel No.

Space

Comma

Next to identifier

| A C K |

SR Mini HG SYSTEM send

Selecting example

Host computer send   Host computer send

| E O T | | | S T X | V | 3 | 0 | 1 | □ | | | 2 | . | 0 | , | 0 | 2 | ... | E T X | B C C | E O T |

Operation panel address | Unit address | Identifier | Channel No. | Data (6 digits) | Channel No.

Space

Comma

| A C K |

SR Mini HG SYSTEM send

Omit the operation panel address when the connection is made directly to control unit.

Identifier TJ: Motor time
Identifier OS: Integrated output limit
Identifier OO: Manual positioning output value

Identifier which defines the motor time, integrated output limit and manual positioning output value for the control motor. For control output, the motor time is set to 100 %.

Identifier TJ: Motor time

Data range: 5 to 1000 seconds

Identifier OS: Integrated output limit

When the OPEN side is output continuously, its output is integrated. If the integrated value reaches the setting, the OPEN side output is not turned ON hereafter (Same for the CLOSE side). Once the opposite side is output, the integrated value is reset.

Data range: 100.0 to 200.0 % of motor time

Identifier OO: Manual positioning output value

Output is generated so that the positioning monitored value reaches the set value. The output is generated in manual mode when this setting is changed; when the power is turned on; or STOP is changed to RUN. The output is also generated when auto mode is changed to manual mode. However, when the positioning motor or motor time setting is abnormal, the normal output can not be generated.

The output action is performed twice or three times.

Data range: -5.0 to +105.0 %
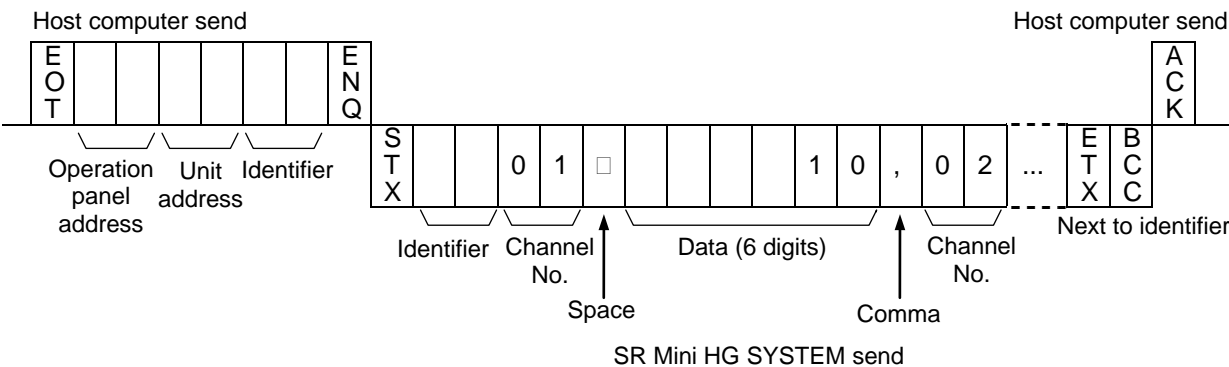
Polling example

Omit the operation panel address when the connection is made directly to control unit.

Selecting example

Host computer send   Host computer send

E O T			S T X		0	1	□			1	0	,	0	2	...	E T X	B C C		E O T

Operation panel address — Unit address — Identifier — Channel No. — Space — Data (6 digits) — Comma — Channel No. — ACK — SR Mini HG SYSTEM send
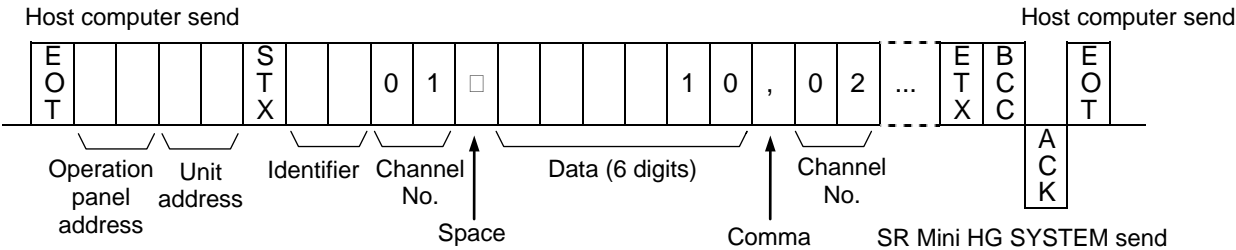
📖 Omit the operation panel address when the connection is made directly to control unit.

Identifier C1: Local/computer transfer

When the operation panel is located between the host computer and the control unit, this identifier which defines the settings by the operation panel (Local mode) or by the computer (Computer mode). Only valid when connected with the Operation Panel.

Data range: 0: Local mode
1: Computer mode
Only valid when connected with the operation panel.

Polling example

Host computer send   Host computer send

E O T			C	1	E N Q

Operation panel address — Identifier

S T X	C	1	0	E T X	B C C

A C K

Next to identifier

Identifier — Data (1 digit)
SR Mini HG SYSTEM send
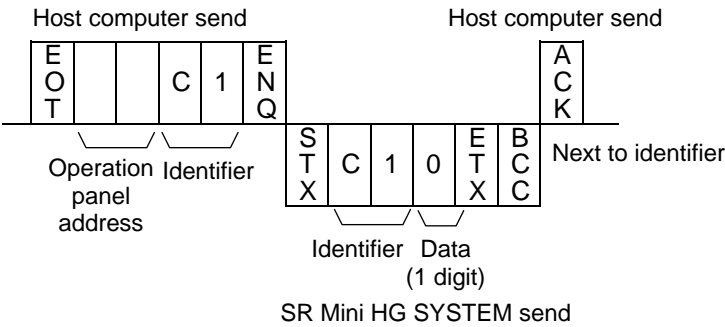
📖 **In the computer mode, the host computer has the priority for the settings and all changes on the operation panel for the settings becomes invalid. (Except for the local/computer mode transfer setting.)**

6. TROUBLESHOOTING

6.1 Troubleshooting

⚠ **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.

In this section, an explanation is given of the possible causes and measures of general problems when transmission can not be carried out correctly.

When abnormalities are suspected in the control, operation, operation panel or control unit (Hardware related problems), refer to the troubleshooting items in the appropriate separate Operation Panel Instruction Manual or Hardware Instruction Manual.

■ 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	Re-examine 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	The block data length of the transmission exceeds 128 bytes	Divide the block using ETB before sending it
	Error occurs on the line (parity bit error, framing error, etc.)	Confirm the cause of error, and solve the problem appropriately. (Confirm the transmitting data, and resend data)
	BCC error	
	The data exceeds the setting range	Confirm the setting range and transmit correct data
	The specified identifier is invalid	Confirm the identifier is correct or that with the correct function is specified. Otherwise correct it
	The transmission mode of the operation panel is set to local mode	Change to computer mode
An error code has been transmitted	Refer to **6.2 Error code descriptions (Identifier: ER) (P.118)**.	

6.2 Error code descriptions (Identifier: ER)

When the following errors have occurred, replace or request repair for the controller in which the error has occurred. (The module that has the FAIL lamp lit.)

Error code data

Data	Description	Explanation
0	Operations normal	
1	Back-up data check error	The control data has been destroyed or written wrongly
2	RAM read/write error	Problem with the system RAM
3	System structure error	The system structure has been changed
4	Internal communications error	Abnormality in the internal communications
5	A/D converter error	Problem with the A/D converter
6	Adjustment data error	The adjustment data has been written wrongly

Probable causes of occurrence:

a) When errors 1, 2 or 5 have occurred, a breakdown in the RAM, ROM or A/D converter should be suspected.

b) 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.

c) Error 4 occurs in the situation where a module is removed while the power is still on, etc.

d) 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.

7. ASCII CODE TABLE (Reference)

b5 to b7	b4	b3	b2	b1	b7→0 b6→0 b5→0 = 0	b7→0 b6→0 b5→1 = 1	b7→0 b6→1 b5→0 = 2	b7→0 b6→1 b5→1 = 3	b7→1 b6→0 b5→0 = 4	b7→1 b6→0 b5→1 = 5	b7→1 b6→1 b5→0 = 6	b7→1 b6→1 b5→1 = 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

MEMO

Supplementary Manual

Operation Panel OPC/OPC-H Host Communication (Name Setting)

Notice of production discontinuation

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

📖　　When the name is set by the host computer, "Host communication" must be provided in the operation　panel as an optional function.

1. IDENTIFIER LIST OF SETTABLE DATA

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

📖 Attributes

R/W: Read and Write

SR Mini HG SYSTEM ↔ Host computer

Name	Iden-tifier	Channel digits	Data digits	Attri-bute	Data range
Unit name	NU	None	12	R/W	ASCII code
Memory area name	NM	2	12	R/W	ASCII code
Temperature control channel name	N1	2	8	R/W	ASCII code
AI channel name	N2	2	8	R/W	ASCII code
AI channel engineering unit	NT	2	8	R/W	ASCII code
Extension alarm channel name	NQ	2	8	R/W	ASCII code
PC data name (Sequence item name) *	NR	3	10	R/W	ASCII code
TI channel name	N5	2	8	R/W	ASCII code
AO channel name	N4	2	8	R/W	ASCII code
AO channel engineering unit	NS	2	8	R/W	ASCII code
Alarm message setting	NA	2	32	R/W	ASCII code

* The PC data name function is only for the OPC.

2. DATA CONSTRUCTION

Identifier NU: Unit name

Polling example

Host computer send   Host computer send

| E O T | | | N | U | E N Q |
Operation panel address — Unit address — Identifier

| S T X | N | U | | | | | | | | | E T X | B C C |
Identifier — Data (12 digits)

SR Mini HG SYSTEM send

| A C K |
Next to identifier

Selecting example

Host computer send   Host computer send

| E O T | | | S T X | N | U | | | | | | | | E T X | B C C | E O T |
Operation panel address — Unit address — Identifier — Data (12 digits)

| A C K |
SR Mini HG SYSTEM send
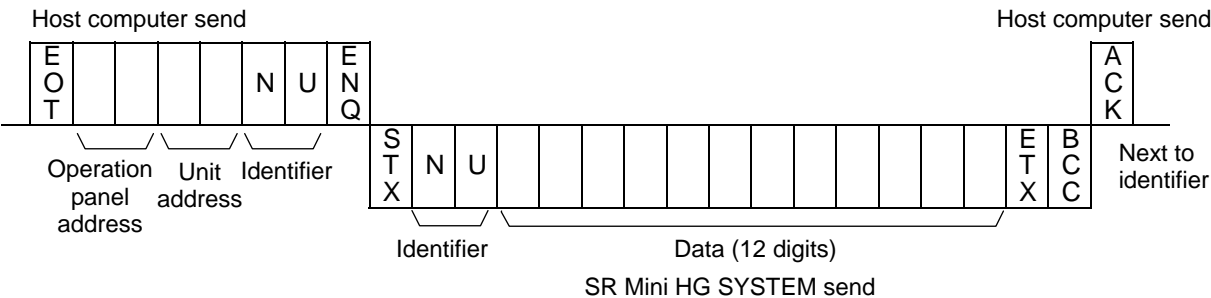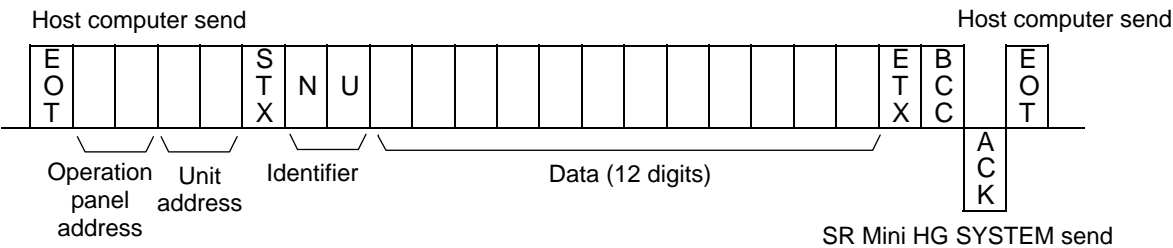
Identifier NR: PC data name

Polling example

Host computer send   Host computer send

| E O T | | 9 | 9 | N | R | E N Q |
Operation panel address — Unit address — Identifier

| S T X | N | R | 0 | 0 | 1 | □ | ... | | , | 0 | 0 | 2 | ... | E T X | B C C |
Identifier — Channel No. — Space — Data (10 digits) — Comma — Channel No.

Next to identifier

| A C K |

SR Mini HG SYSTEM send

Selecting example

Host computer send   Host computer send

| E O T | | 9 | 9 | S T X | N | R | 0 | 0 | 1 | □ | ... | | , | 0 | 0 | 2 | ... | E T X | B C C | E O T |
Operation panel address — Unit address — Identifier — Channel No. — Space — Data (10 digits) — Comma — Channel No.

| A C K |
SR Mini HG SYSTEM send

📖 Set the unit address to "99."

Identifier NA: Alarm message setting

Polling example

Host computer send   Host computer send

E O T			9	9	N	A	E N Q

Operation panel address | Unit address | Identifier

SR Mini HG SYSTEM send

S T X	N	A	0	1	□	...		,	0	2	...	E T X	B C C

A C K

Next to identifier

Identifier | Channel No. | Data (32 digits) | Channel No.

Space   Comma

Selecting example

Host computer send   Host computer send

E O T			9	9	S T X	N	A	0	1	□	...		,	0	2	...	E T X	B C C	E O T

A C K

Operation panel address | Unit address | Identifier | Channel No. | Data (32 digits) | Channel No.
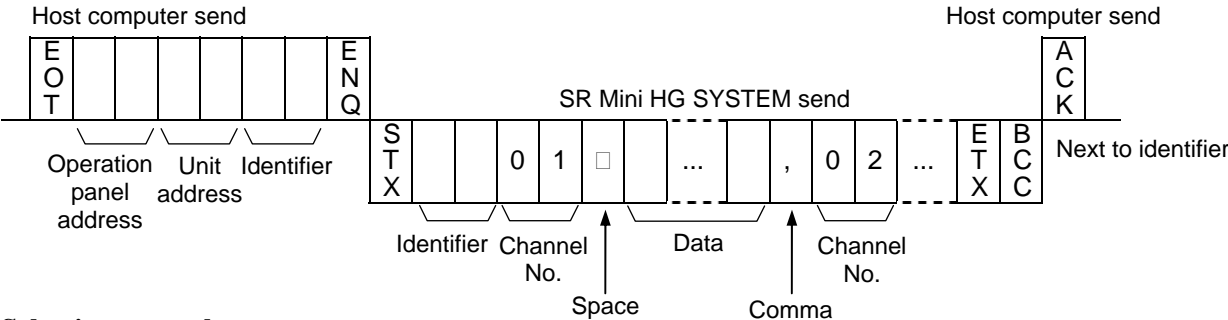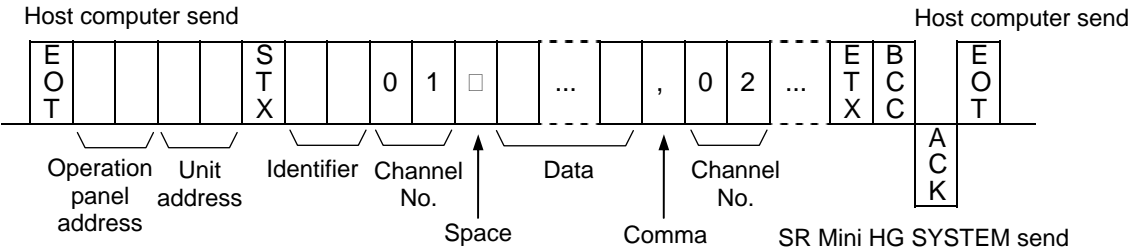
Space   Comma   SR Mini HG SYSTEM send

📖 Set the unit address to "99."

Setting of data other than unit name (NU), PC data name (NR) and alarm message (NA).

Polling example

Host computer send   Host computer send

E O T						E N Q

Operation panel address | Unit address | Identifier

SR Mini HG SYSTEM send

S T X			0	1	□	...		,	0	2	...	E T X	B C C

A C K

Next to identifier

Identifier | Channel No. | Data | Channel No.

Space   Comma

Selecting example

Host computer send   Host computer send

E O T				S T X			0	1	□	...		,	0	2	...	E T X	B C C	E O T

A C K

Operation panel address | Unit address | Identifier | Channel No. | Data | Channel No.

Space   Comma   SR Mini HG SYSTEM send

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