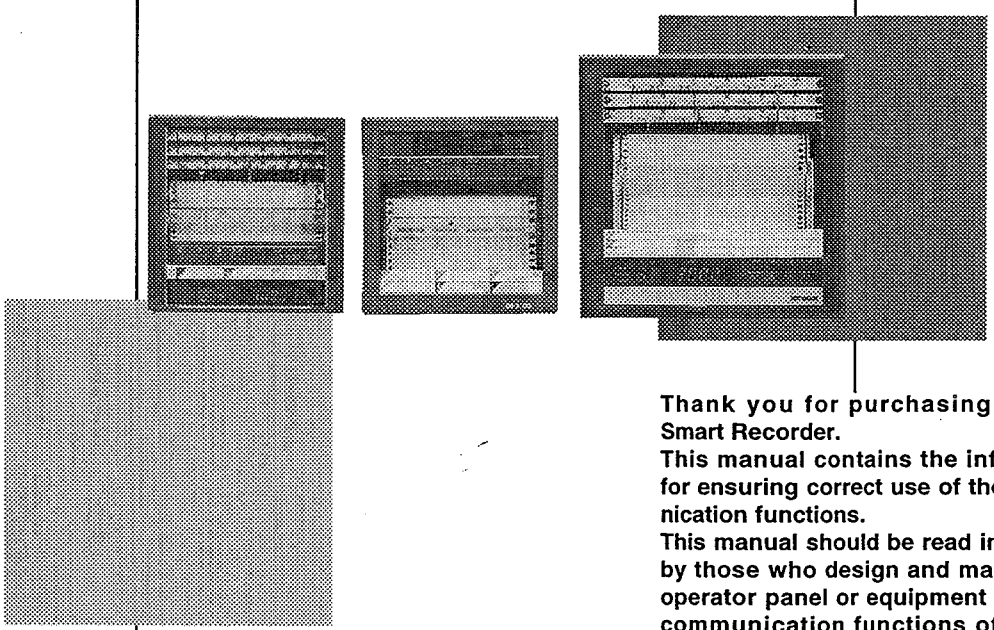
YAMATAKE

No. CP-UM-1668E

CPL Communications User's Manual

SRF101/102/103/106/201/202/203



Thank you for purchasing the SRF Smart Recorder.
This manual contains the information for ensuring correct use of the communication functions.
This manual should be read in advance by those who design and maintain the operator panel or equipment using the communication functions of the SRF Smart Recorder.
As this manual is required for installation, maintenance and troubleshooting, be sure to keep this manual nearby for handy reference.

Yamatake Corporation

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment.
Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

IMPORTANT

- If incoming data sent by communication does not match the EEPROM data from address 600 onwards (excluding addresses 603 to 606), the data is written in EEPROM.
- Writing to EEPROM addresses is guaranteed only up to 100,000 times.
- From address 600 onwards (excluding addresses 600 to 606), the response of a write command to the data which can be written is sent back at completion of RAM writing. Data is then internally written from RAM to EEPROM. When a large volume of data is written by communications, it may take several minutes to complete writing. If the power is turned OFF during writing, some of the data will not be stored in EEPROM, and therefore the operations expected by writing the full data will no longer be possible when power is restored.
- CPL communication is not possible on the SRF101/102/103/201/202/203 while the Smart Loader Package (SLP) is connected.

REQUEST

Ensure that this User's Manual is handed over to the user before the product is used.

Copying or duplicating this User's Manual in part or in whole is forbidden. The information and specifications in this User's Manual are subject to change without notice.

Considerable effort has been made to ensure that this User's Manual is free from inaccuracies and omissions.
If you should find any inaccuracies or omissions, please contact Yamatake Corporation.

In no event is Yamatake Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

SAFETY PRECAUTIONS

■ About Icons

Safety precautions are for ensuring safe and correct use of this product, and for preventing injury to the operator and other people or damage to property. You must observe these safety precautions. The safety precautions described in this manual are indicated by various icons.
As the following describes the icons and their meanings, be sure to read and understand the descriptions before reading this manual:

⚠WARNING	Warnings are indicated when mishandling this product might result in death or serious injury to the user.
⚠CAUTION	Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

■ Examples

	Triangles warn the user of a possible danger that may be caused by wrongful operation or misuse of this product. These icons graphically represent the actual danger. (The example on the left warns the user of the danger of electric shock.)
	White circles with a diagonal bar notify the user that specific actions are prohibited to prevent possible danger. These icons graphically represent the actual prohibited action. (The example on the left notifies the user that disassembly is prohibited.)
	Black filled-in circles instruct the user to carry out a specific obligatory action to prevent possible danger. These icons graphically represent the actual action to be carried out. (The example on the left instructs the user to remove the plug from the outlet.)

⚠WARNING

	Before removing or mounting the the SRF101/102/103/106/201/202/203, be sure to turn the power OFF. Failure to do so might cause electric shock.
	Ground the FG (Frame Ground) terminal to a terminal resistance of 100. or less before you connect the the SRF101/102/103/106/201/202/203 to the input circuit or control circuit. Failure to do so might cause electric shock or fire.
	Do not touch electrically charged parts such as power terminals. Doing so might cause electric shock.

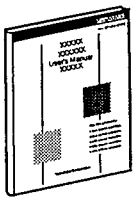
⚠CAUTION

	Wire the the SRF101/102/103/106/201/202/203 according to predetermined standards. Also wire the the SRF101/102/103/106/201/202/203 using specified power leads according to recognized installation methods. Failure to do might cause electric shock, fire or faulty operation.
	Use the the SRF101/102/103/106/201/202/203 within the operating ranges recommended in the specifications (temperature, humidity, voltage, vibration, shock, mounting direction, atmosphere, etc.).
	Do not block ventilation holes. Doing so might cause fire or faulty operation.
	Do not disassemble the SRF101/102/103/106/201/202/203. Doing so might cause electric shock or faulty operation.
	Do not touch internal components during use or immediately after turning the power OFF. Doing so might cause burns.
	Do not allow lead clippings or chips to enter controller case. Doing so might cause fire or faulty operation.
	Do not use unused terminals on the the SRF101/102/103/106/201/202/203 as relay terminals. Doing so might cause electric shock, fire or faulty operation.
	Do not touch moving parts during operation. Doing so might cause injury.
	Do not operate the console keys using a sharp-pointed object such as propelling pencil or needle. Doing so might damage the console.

The Role of This Manual

Five different manuals in total are available for the SRF101/102/103/106/201/202/203.
Read each manual according to specific requirements. Below table shows all the manuals that accompany the SRF recorder and gives a brief outline on each manual.
If any manual requested is not available, contact Yamatake Corporation or its dealer.

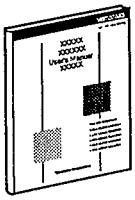
The SRF100 comes in two types, which are the SRF101/102/103 pen-printing type and the SRF106 dot-printing type. The SRF200 comes in one type, which is the SRF201/202/203 pen-printing type. Common specifications are described under SRF.
Specifications not common are described under individual model number.
For the SRF200 dot-printing type, refer to the User's Manual **"CPL Communications, Dot-Printing Model SRF206/212/224" (Manual No. CP-SP-1028E)**.



Smart Recorder Pen Printing Model SRF101/102/103
Installation/Operation **Manual No.CP-UM-1667E**

This manual is required reading for those who use the SRF101/102/103, those who design hardware for integrating the SRF101/102/103 into operator control panels, those who carry out maintenance, and those who operate instruments in which the SRF101/102/103 is integrated.

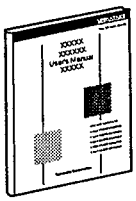
It describes how to install and wire the SRF101/102/103 for integrating into instruments, method of operation, maintenance and inspection, troubleshooting, and hardware specifications.



Smart Recorder Dot Printing Model SRF106
Installation/Operation **Manual No.CP-UM-1666E**

This manual is required reading for those who use the SRF106, those who design hardware for integrating the SRF106 into operator control panels, those who carry out maintenance, and those who operate instruments in which the SRF106 is integrated.

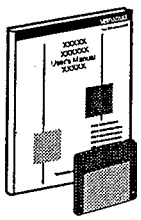
It describes how to install and wire the SRF106 for integrating into instruments, method of operation, maintenance and inspection, troubleshooting, and hardware specifications.



Smart Recorder Pen Printing Model SRF201/202/203
Installation/Operation **Manual No.CP-SP-1037E**

This manual is required reading for those who use the SRF201/202/203, those who design hardware for integrating the SRF201/202/203 into operator control panels, those who carry out maintenance, and those who operate instruments in which the SRF201/202/203 is integrated.

It describes how to install and wire the SRF201/202/203 for integrating into instruments, method of operation, maintenance and inspection, troubleshooting, and hardware specifications.

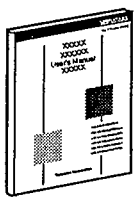


Smart Loader Package SLP-F10/F20
for Smart Recorder SRF100/200 **Manual No.CP-UM-5067E**

This manual is packaged with the SLP-F10/F20.

Running the SLP-F10/F20 package on a personal computer enables you to set up SRF100/200 parameters on the personal computer.
This manual describes operations on the personal computer.

This manual is the common manual of the SLP-F10 and the SLP-F20.



CPL Communications Manual
SRF101/102/103/106/201/202/203 **Manual No.CP-UM-1668E**

This Manual.
The SRF101/102/103/106/201/202/203 can communicate with other equipment via the RS-485 or RS-232C interfaces.

This manual is required reading for those who use the CPL communication functions of the SRF101/102/103/106/201/202/203.
It briefly describes CPL communications, how to wire the SRF101/102/103/106/201/202/203, communication procedures, communication data for the SRF101/102/103/106/201/202/203, troubleshooting and communication specifications.

Organization of this Manual

This manual is organized as follows.

Chapter 1 COMMUNICATION FUNCTIONS

This chapter lists communication functions and model numbers of SRF.

Chapter 2 WIRING

This chapter describes RS-232C and RS-485 wiring methods to enable communication between the SRF and other instruments.

Chapter 3 SETUP

This chapter describes SRF100 communication setup.

Chapter 4 COMMUNICATION PROCEDURE

This chapter describes communication procedures, message structure, data read/write and signal timing operations.

Chapter 5 COMMUNICATION DATA TABLES

This chapter gives various data tables for communication with SRF.

Chapter 6 COMMUNICATION PROGRAM FOR MASTER STATION

This chapter gives communication program examples for SRF using the PC-9800 series personal computer and N88BASIC.

Chapter 7 TROUBLESHOOTING

This chapter describes checkpoints to diagnose failures in SRF communication.

Chapter 8 SPECIFICATIONS

This chapter lists communication specifications for the SRF.

Appendices

The appendix gives code tables and network configurations using the CMC10L RS-232C/RS-485 converter.

Conventions Used in this Manual

This manual uses the following conventions to alert readers to important information.

: Cautions indicate a particularly important item. Cautions must be followed at all times.

[!] HANDLING PRECAUTIONS

: Handling Precautions indicate items that the user should pay attention to when handling the SRF.

NOTE : Notes indicate useful information that the user might benefit by knowing.

① ② ③ : Circled numbers indicate steps in a sequence or indicate corresponding parts in an explanation.

Contents

Chapter 1. COMMUNICATION FUNCTIONS

- On a system operating on the RS-232C interface, a master station (a host computer, usually a PC) is connected to the instrument in a point-to-point configuration. At this time, only one instrument can communicate with the master station using a preset station address.

- On a system operating on the RS-485 interface, up to 31 instruments (see *1) can be connected to a master station. Station addresses are then used to identify other stations for communication.

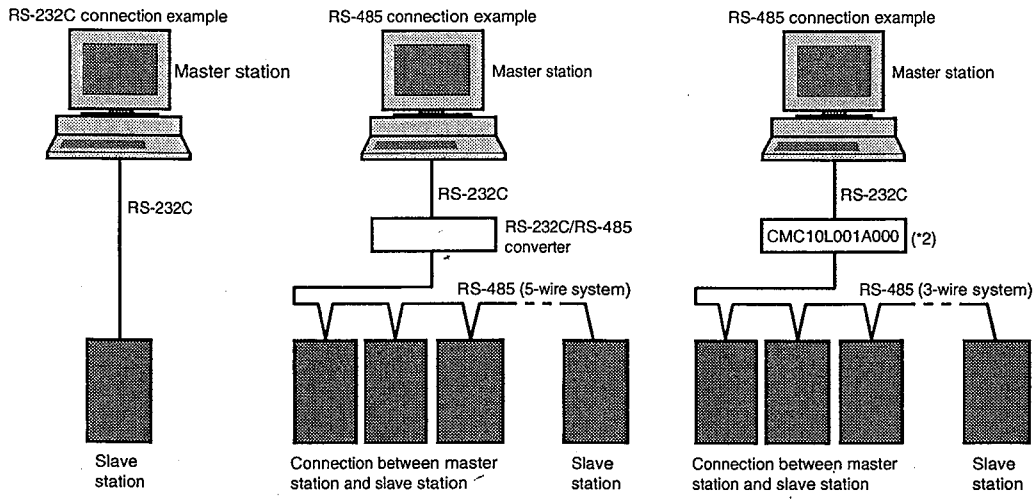
- The communication protocol and format conform to the RS-232C and RS-485 interfaces.

- When the following procedure is established during communication, instrument data can be read or written.
  1. The master station (host computer) transmits a request message to the slave station.
  2. The master station receives a response message from the slave station.

- The master station issues two types of requests to a slave station: read and write.

- The type of read/write data can be optionally selected with a data address.

- CPL(Controller Peripheral Link) communications is the Yamatake Corporation's host-communications.



- The high-performance communication controller CMC410A102 is available for conversion between the RS-232C and RS-485 interfaces.

(*1) When the master station is an MA500 DIM or CMC410, it can be connected to up to 16 slave stations.
(*2) The CMC10L001A000 communication controller is an RS-232C/RS-485 (3-wires type) converter available from Yamatake Corporation.

Chapter 2. WIRING

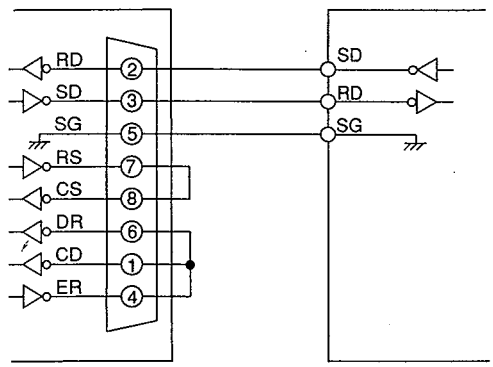
2 - 1 RS-232C Connection

The wiring of the SRF with communication functions supporting the RS-232C is shown below.

● Communication with the master station in a point-to-point configuration

Three communication terminals (RD, SD and SG) are provided. Data may not be output unless the other terminals of the master station RS-232C interface are short-circuited as shown in figure on the next page.

Check the RS-232C pin array in the host computer instruction manual.



Host computer (master station) DigitroniK control (slave station)

Example of connection using Yamatake Corporation CBL232FNZ02

Note

Cable catalog No. : CBL232FNZ02
(2m cable for RS-232C, 9-pin, D-Sub socket, contact - crimp style terminal)

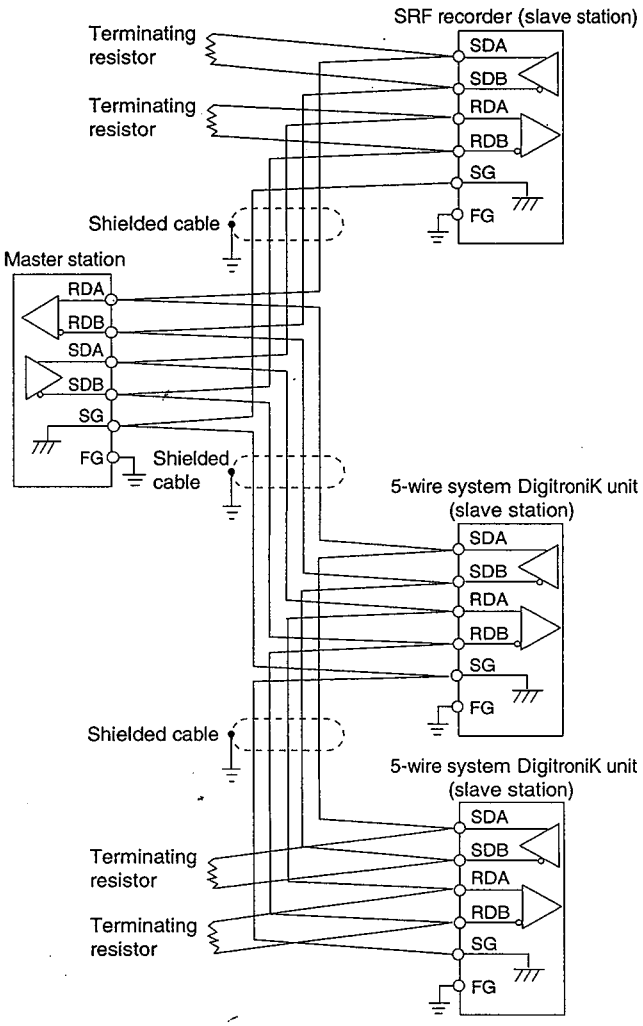
● RS-232C connector signals

Pin No.	JIS Code	Name	Signal Direction Host-station
1	CD	DCD	←
2	RD	RxD	←
3	SD	TxD	→
4	ER	DTR	→
5	SG	GND	
6	DR	DSR	←
7	RS	RTS	→
8	CS	CTS	←

2 - 2 RS-485 Connection

■ 5-wire system

An example of wiring with a 5-wire system unit is shown below.



Connect a terminating resistor of 150Ω±5%, 1/2W min. to the recorder at each end of the transmission line. Connect only one end of the shielded wire to the frame ground.

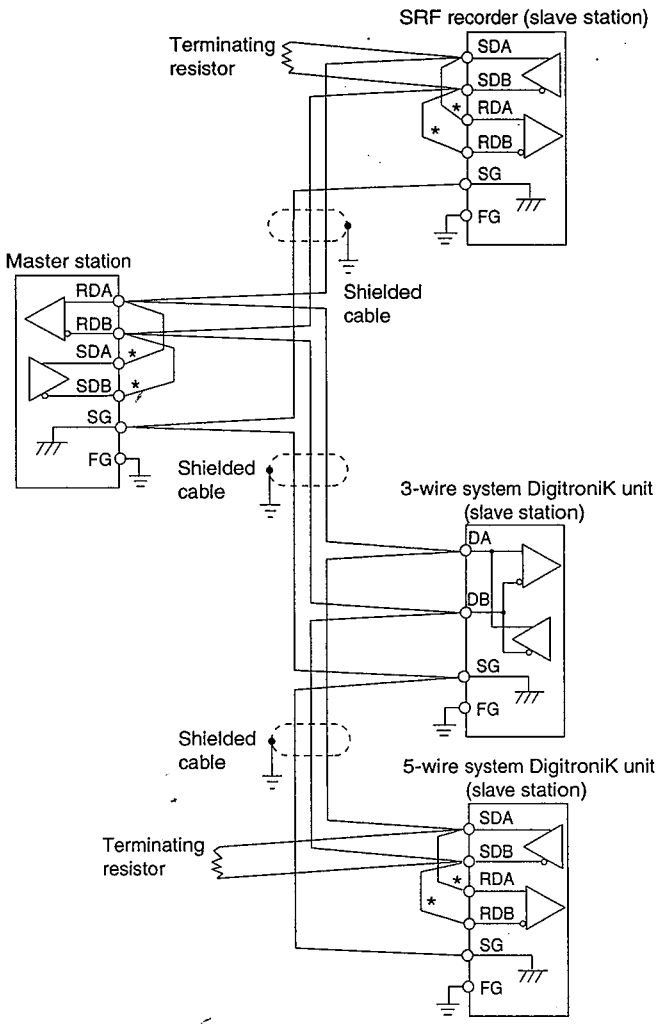
Other 3-wire system DigitroniK units of Yamatake Corporation can be used on the same communication line. Conduct the wiring shown at the item **"3-wire system" on page 2-3**.

[!] Handling Precautions

- Be sure to connect SG terminals each other.
  Failure to do so might cause unstable communications.

■ 3-wire system

An example of SRF wiring with a 3-wire system unit supporting the RS-485 is shown below.



Connect one terminating resistor of 150Ω±5% 1/2W min. at each end of the transmission line. Connect only one end of the shielded cable to the FG ground. Externally conduct the wiring for the wires marked with an asterisk.

On 3-wire system, the CMC10L001A000 of Yamatake Corporation can be used as a converter for master station.

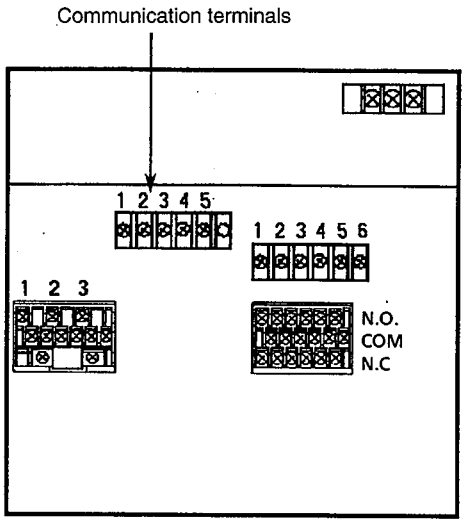
For the details, refer to the item **"Connection with CMC10L" on page Appendix-3.**

⚠ Handling Precautions

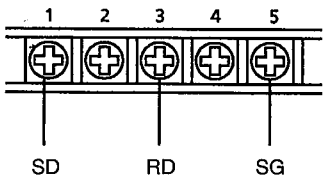
- Be sure to connect SG terminals each other.
  Failure to do so might cause unstable communications.

■ SRF201/202/203

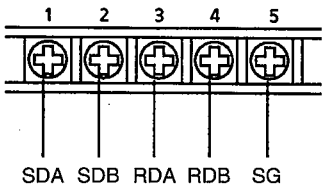
The communication terminal array of the SRF201/202/203 (pen printing type) is as follows:



● Terminal array of RS-232C



● Terminal array of RS-485



Chapter 3 SETUP

3-1 Communication Setup Items

The following items must be set up on the SRF to enable communication.

Item	Factory setting	Description
Communication access rights	1	1: Read only 2: Read/write
Station address	0	0 to 127
Communication system	1	1: 4800 bps 8 data bits, 1 stop bit, even parity 2: 4800 bps 8 data bits, 2 stop bits, no parity 3: 9600 bps 8 data bits, 1 stop bit, even parity 4: 9600 bps 8 data bits, 2 stop bits, no parity

- **Communication access rights**

  On the SRF101/102/103/201/202/203, set at system setup 1 (SYS).

  On the SRF106, set at system setup (SYS).

  Set either of Read only or Read/write.

- **Station address**

  On the SRF101/102/103/201/202/203, set at system setup 1 (SYS).

  On the SRF106, set at system setup (SYS).

  When connecting by the RS-485 interface, set a value that is different from other slave stations connected on the same transmission line in the multidrop network.

  Factory setting is "0" (zero) (communication disabled).

  To enable communication, set the station address to a value other than "0".

- **Communication system**

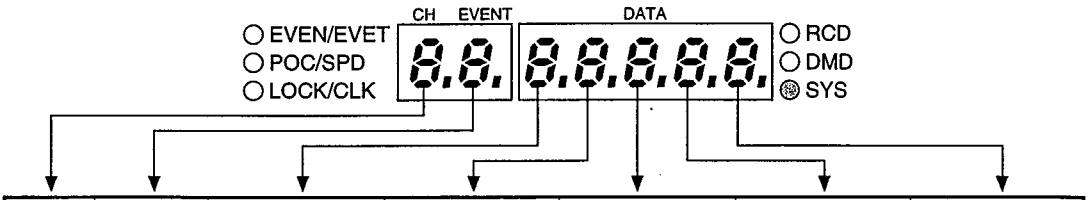
  Set the transmission speed and data format. On the SRF101/102/103/201/202/203, set at system setup 1 (SYS).

  On the SRF106, set at system setup (SYS).

  Set the master station to the same communication setup as the SRF.

3-2 Setup Procedure

■ SRF101/102/103/201/202/203 (pen printing type)



Channel No.	Setup step	Setup contents		
	1	Keylock		
	2	Print list start/stop		
	#*3	Communication access rights		
	#*4	Station address		Communication system
	*5	Recording format		
	*6	Recorder identification number		
	*7	Time recording ON/OFF		
	*8	Scale recording ON/OFF		
	*9	Pen phase sync selection		
	*A	Schedule demand ON/OFF		
	*B	No.1 schedule demand (Hour)		No.1 schedule demand (Minute)
	*C	No.2 schedule demand (Hour)		No.2 schedule demand (Minute)
	*D	No.3 schedule demand (Hour)		No.3 schedule demand (Minute)
	*E	No.4 schedule demand (Hour)		No.4 schedule demand (Minute)

Shaded areas (▒) are not displayed.

Items marked * are displayed when the extended menu is set to ON.

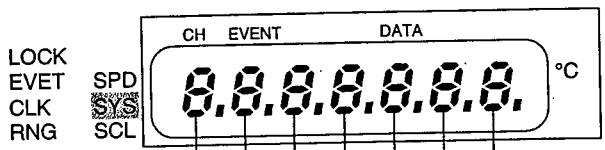
[!] HANDLING PRECAUTIONS

When the keylock is activated, you cannot change the setting.

Set the keylock to deactivated in step 1.

SRF106 (dot printing type)

Follow the procedure below to set up communication. Press the SET key to enter the system setup mode. Make sure that SYS is lit. Press the ENT key to proceed to setup step 9. The Communication setup item is A in step 9.



Channel No.	Setup step	Setup contents		
	1	Keylock		
	2	Print list start/stop		
	*3	Extended menu ON/OFF		
	*4	Recording format		
	*5	Recorder identification number		
	*6	Time recording ON/OFF		
	*7	Scale recording ON/OFF		
	*8	Select recording color		
	*9	Communication access rights		
	*A	Station address		Communication system
	*B	Schedule demand ON/OFF		
	*C	No.1 schedule demand (Hour)		No.1 schedule demand (Minute)
	*D	No.2 schedule demand (Hour)		No.2 schedule demand (Minute)
	*E	No.3 schedule demand (Hour)		No.3 schedule demand (Minute)
	*F	No.4 schedule demand (Hour)		No.4 schedule demand (Minute)

Items marked * are displayed when the extended menu is set to ON.

Shaded areas (▒) are not displayed.

[!] HANDLING PRECAUTIONS

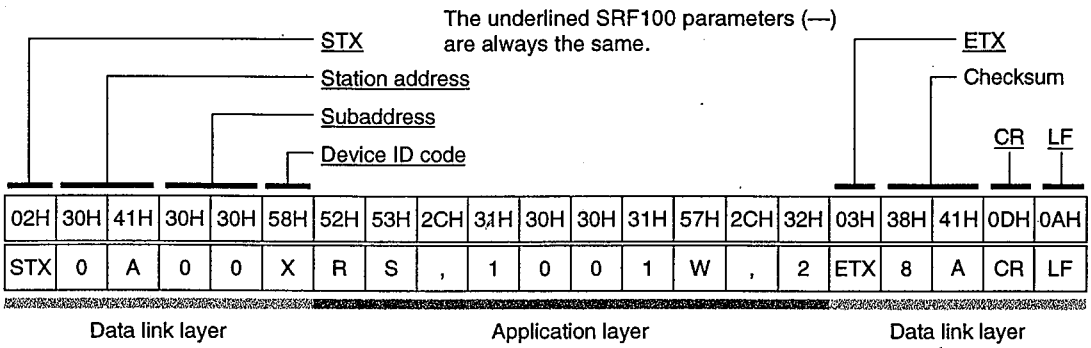
When the keylock is activated, you cannot change the setting.

Set the keylock to deactivated in step 1.

4-2 Data Link Layer

■ Description

- The data link layer contains eight basic items of information for transmitting messages.
- In the data link layer, the instruction message and response message share the same structure.



The following describes each function in the data link layer.

● STX (Start of TeXt)

Role : Indicates the beginning of a message.

Description
- Fixed at 02H.
- When the instrument receives an STX, it is identified as the first character of a new instruction message regardless of location.

● Station address

Role : Specifies the destination instrument and allows communication with the designated instrument.

Description
- If "0" (zero) is set as the station address, the communication function is stopped.

  So, to enable communication be sure to set an address value of one or more.
- Two hexadecimal characters. For details, see the example.
- For details on station address setups, see chapter 3. "Setup."

Example : When the station address of the other station is 10:

(1) 10 (decimal) = 0AH (hexadecimal)

(2) This can be converted to character codes;
0 = 30H, A = 41H

(3) "0A" (30H, 41H) calculated in (2) is used as the station address.

! HANDLING PRECAUTIONS

Note that the function of the station address differs entirely from that of the data address in the application layer.

- **Sub-address**

  Description : The sub-address is meaningless on this instrument. Be sure to set a sub-address of 00 (30H, 30H) that has the same format as the station address.

- **Device ID code**

  Description : Only character code X (58H) or x (78H) can be set on this instrument.

- **ETX (End of TeXt)**

  Role : Indicates the end of the application layer.

  Description : Fixed at 03H.

- **Checksum**

  Role : A value to be used to check whether or not a message has been corrupted by an error (such as noise) during communication.

  Description
  - Two hexadecimal characters
  - This function operates as follows:

    (1) Add the bytes in the character codes of the message from STX to ETX.

    (2) Derive 2's complement of the result of this addition.

    (3) Convert the result into character code.

  Example : The instruction message on the preceding page is used in the following example.

  (1) Add the bytes in the character codes from STX to ETX. The low-order 1 byte of the calculation result is 76H.

  (2) The result of 2's complement addition is 8AH.

(3) 8AH is converted to character codes, and is used as the checksum value. The result is 8A, (38H) and (41H).

For details on character code conversion, see the station address (on the preceding page) example.

[!] HANDLING PRECAUTIONS

The checksum in the request message can be omitted, but no checksum is then included in the response message. The checksum function should not be omitted to assure proper message reception.

- **CR and LF (Carriage Return/Line Feed)**

Role : Indicates the end of a message.

Description
- "CR" is (0DH), and "LF" is (0AH).
- Be sure to use CR and LF as a pair.

[!] HANDLING PRECAUTIONS

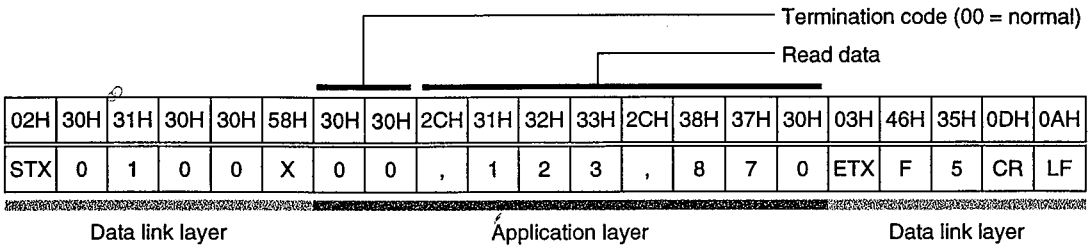
- If any of the following errors occur in the data link layer, the instrument does not respond.
  - The communication setups for both stations do not matched (different transmission speeds or the occurrence of a parity error).
  - The address of the transmitting station differs from the station address of the receiving instrument.
  - The station address is 00.
  - STX, ETX, CR and LF are not placed at the specified positions.
  - The device ID code is neither X nor x.
  - The station address, sub-address or checksum is not two characters long.
  - The calculation result of the checksum does not match the checksum of the message.
  - Non-designated characters are included in the messages.
- The data link layer contains a response message that is identical to the instruction message except for the checksum function.
- Use upper-case characters A to F in the hexadecimal numerics for station addresses and checksum.

Example : 55.6 is converted to 556 when entered.

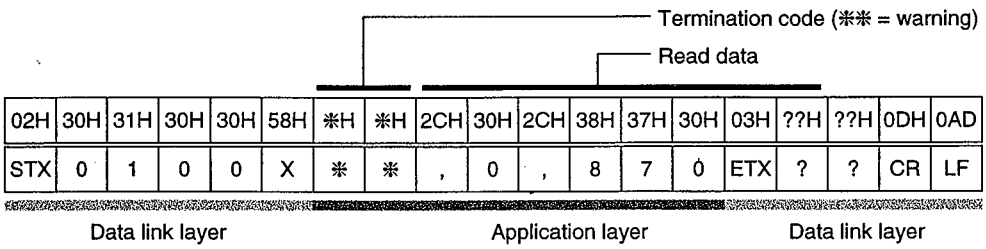
: Individual data items are delimited by a comma (2CH).

: The range and number of digits of each data item depend upon the read data.

Example : A normal response (when two data items are read properly)



Example : A warning response (✻✻ indicates the corresponding warning code numeric.)



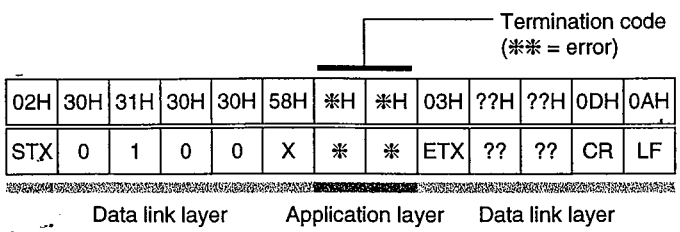
● **Abnormal response**

Role : Indicates that there is an error in an instruction message, that is, that there is no data and cannot be normally read.

Description : Information in the application layer

• Termination code : Indicates the error type. For details, see the 4-6 "Termination Code Table."

Example : An error response



4-7 Timing Specifications

■ Timing specifications for instruction and response messages

When a slave station is connected with the master station directly, the following precautions regarding the transmission timing of instruction messages from the master station and response messages from the slave station should be observed.

● Response time-out

The maximum response time from the end of response message transmission by the master station and until it receives a response message from the slave station is two sec (section ①). So, the response time-out should be set to two sec.

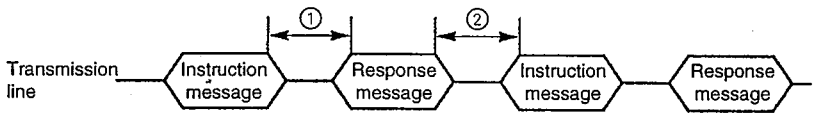
Generally, when a response time-out occurs, the instruction message is re-sent.

For details, see the Chapter 6 "Communication Program for Master Station."

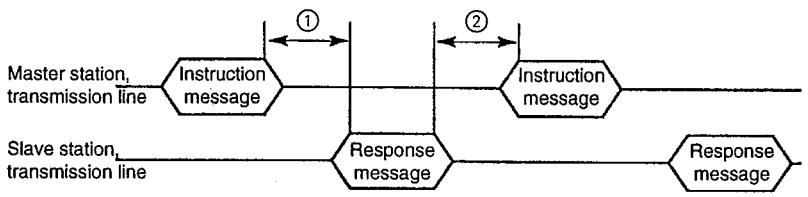
● Transmission start time

A wait time of 10 ms or more is required before the master station starts to transmit the next instruction message (to the same slave station or a different slave station) after the end of receiving a response message (section ②).

• RS-485 3-wire system



• RS-485 5-wire system and RS-232C



① End of master station transmission - Request interval time of slave station = 200 ms max.

② End of slave station transmission - Request interval time of master station = 10 ms min.

Chapter 5 COMMUNICATION DATA TABLES

5-1 Basic Communication Data Processing

■ Communication data types and formats

● Types of communication data

There are two types of communication data:

- Run status : Data indicating the run status (e.g. PV, event) of instrument.
- Configuration : Data (e.g. event setting values) for setting the instrument status.

● Format of communication data

Communication data is classified into the following formats.

- Numeric data : Data indicating a numeric value (PV, etc.)
- Bit data : Data where each bit is significant (alarms, etc.).

  The bit data must be composed during transmission, and be decomposed during reception.
- Text data : Data indicating text

  Text data (e.g. unit, tag name) must be converted according to the character code table.

■ Communication data storage memory

● Memory type

Communication data is stored in the memory (storage device) of the instrument. The following two types of memory are used by this instrument.

- RAM : Stored data is cleared when the power is turned OFF. However data can be written to this memory any number of times.
- EEPROM : Stored data is retained even when the power is turned OFF, whereas data write operations are limited to a total of 100,000 times.

The SRF writes configuration data from EEPROM to RAM when the power is turned ON, and operates using the RAM data. When data is written to the SRF using the communications functions described in this manual, data is temporarily stored in RAM before it is copied to EEPROM.

[!] HANDLING PRECAUTIONS

An EEPROM can be written to a total of 100,000 times.

■ Data addresses

The data addresses are allocated as shown in the table below.

Communications data	Address	Remarks
Control data	300 to 399	—
Process data	400 to 499	—
Event data	500 to 599	—
Common data	600 to 699	—
CH1 data	1100 to 1199	—
CH2 data	1200 to 1299	Not available on SRF101/201
CH3 data	1300 to 1399	Not available on SRF101/102/201/202
CH4 data	1400 to 1499	Not available on SRF101/102/103/201/202/203
CH5 data	1500 to 1599	Not available on SRF101/102/103/201/202/203
CH6 data	1600 to 1699	Not available on SRF101/102/103/201/202/203

■ Data read/write count

The maximum number of data items that can be read and written continuously in a single communication session is 32. For details of data being read or written that contains non-existing data as a result of a different catalog No., for example, refer to the response code and data when multiple words are read/written (page 4-15).

■ Data unit and decimal point position

A decimal point is not added to read/write data.

The unit or decimal point position is determined for each data item.

For details on data units, refer to the user's manual.

(For PV and event setting data units, the unit data can be referenced.)

For details on the decimal point position of each data item, refer to the decimal point data.

Example

For details on the unit of PV value (address 401) of channel 1, see addresses 1168 to 1173.

The decimal point position can be found out by referring to the following addresses:

Address 1108 When the input range can be scaled
Address 1105 When the input range cannot be scaled

5-2 Communication Data Tables

The address and read/write (R/W) enable status of each data item is determined as shown in the table below.

- Meaning of R/W column symbol
  - ○ R/W enabled
  - x R/W disabled

Special attention need not be paid to data items common to dot printing type (SRF106) and pen printing type (SRF101/102/103/201/202/203).
SRF101/201 (1-pen model) Only the addresses of channel 1 are valid.
SRF102/202 (2-pen model) Only the addresses of channels 1 and 2 are valid.
SRF103-203 (3-pen model) Only the addresses of channels 1, 2 and 3 are valid.

■ Control data

For details on items indicated by an asterisk "*", see bit information data.

Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Recording start/stop	300	X	○	Starts/stops recording. 0: Stop recording 1: Start recording	Common
• When this address is read, the response becomes error code 80. • When 1 (starts recording) is written after 0 (stops recording) is written to this address and before the instrument enters the recording stopped state, the response becomes error code 30.					
Demand printing start/stop	301	X	○	Carries out demand printing. 0: Cancel demand printing 1: Start demand printing	
• When this address is read, the response becomes error code 80. • When 1 (start demand printing) is received during demand printing, the response code becomes error code 30. • When 1 (start demand printing) after demand printing has ended and before sufficient recording paper has been fed, the response becomes error code 30. • When this command is received while another print job is printing, the response code becomes error code 30. • When this command is received during chart feed, the response code becomes error code 30.					
List printing start cancel	302	X	○	Carries out list printing. 0: Cancels list printing. 1: Starts printing of partial list. 2: Starts printing of entire list.	Dot printing only
• When this address is read, the response becomes error code 80. • When this command is received when recording is ON, the response becomes error code 30. • When this command is received while another print job is printing, the response code becomes error code 30. • When this command is received during chart feed, the response code becomes error code 30. • In the case of SRF101/102/103/201/202/203 (pen printing models), the response is normal even if data is written to this address.					
Chart feed ON/OFF	303	X	○	Feed the chart paper about 40 mm. 1: Chart feeding in progress	Common
• When this address is read, the response becomes error code 80. • When this command is received when recording is ON, the response becomes error code 30. • When this command is received while another print job is printing, the response code becomes error code 30. • When FEED key on the instrument is pressed during execution of chart feed by communications, FEED key operations take priority, and feeding is ended when the key is released.					

Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Message printing	304	X	○	Carries out message printing. 1: Start printing of #1 message 2: Start printing of #2 message 3: Start printing of #3 message 4: Start printing of #4 message	Common
• When this address is read, the response becomes error code 80. • When this command is received with the message print buffer full, the response becomes error code 30. • When this command is received while another print job is printing, the response code becomes error code 30. • When this command is received during chart feed, the response code becomes error code 30.					
Chart feed speed scale switching	305	X	○	Switches the chart feed speed. 1: #1 chart feed speed #1 scale 2: #2 chart feed speed #2 scale	Dot printing only
• When this address is read, the response becomes error code 80. • The scale to be switched to when this address has been written to is the scale that is set when the scale switching method has been set to external contact. • In the case of SRF101/102/103/201/202/203 (pen printing models), the response is normal even if data is written to this address.					
Recording start/stop status	310	○	X	Reads recording start/stop status. 0: Recording stopped 1: Recording	Common
Demand printing start/stop status	311	○	X	Reads demand printing start/stop. 0: Demand printing stopped 1: Demand printing in progress	
List printing start/stop status	312	○	X	Reads list printing start/stop status. 0: List printing canceled 1: Partial list printing in progress 2: Entire list printing in progress	Dot printing only
Chart feed spacing start/stop status	313	○	X	Reads chart feed spacing start/stop status. 0: Chart feed stopped 1: Chart feed in progress	Common
Message printing start/stop status	314	○	X	Reads message printing start/stop status. 0: Message printing stopped 1: Message printing in progress	
Chart feed speed selection status	315	○	X	Reads the selected chart speed. 1: #1 chart feed speed selected 2: #2 chart feed speed selected	Dot printing only
Basic catalog No. information	397	○	X	Reads the basic catalog No. 1: SRF101 201: SRF201 2: SRF102 202: SRF202 3: SRF103 203: SRF203 6: SRF106	Common
* Option information bitmap data	398	○	X	Reads the instrument option information. Bitmap data (See page 5-23.)	
Software information	399	○	X	Reads the software ROM version No. Indicated in decimal. So, 256 becomes 100H. Ver.1.00 is indicated as 1.00 at this time.	
When addresses 310 to 399 are written to, the response becomes error code 81.					

■ Process data

Item	RAM/EEPROM Address	R	W	Meaning of Data
PV value (channel 1)	401	○	X	-19999 to 29999 : Normal value
PV value (channel 2)	402	○	X	-20000 : -OL
PV value (channel 3)	403	○	X	30000 : +OL
PV value (channel 4)	404	○	X	-32767 : Recording mode OFF or non-existent channel
PV value (channel 5)	405	○	X	32767 : Unmeasured data
PV value (channel 6)	406	○	X	

- When this address is written to, the response becomes error code 81.
- For details on the decimal point in the case of the linear scaling range, see the engineering unit decimal point (address: 1108, 1208, 1308, 1408, 1508, 1608).
  For details on the decimal point in the case of other ranges, see measurement range decimal point (1105, 1205, 1305, 1405, 1505, 1605).

■ Event data

For details on items indicated by as asterisk "*", see Bitmap Data.

Item	RAM/EEPROM Address	R	W	Meaning of Data
* Event status summary	400 500	○	X	Reads a summary of the event status of channels 1 to 6. Bitmap data 0 to 63 (See page 5-25, 26.)
* Event status (channel 1)	501	○	X	Reads the event status. Bitmap data 0 to 255 (See page 5-25, 26.)
* Event status (channel 2)	502	○	X	
* Event status (channel 3)	503	○	X	
* Event status (channel 4)	504	○	X	
* Event status (channel 5)	505	○	X	
* Event status (channel 6)	506	○	X	
* Event relay status summary	550	○	X	Reads a summary of the event relay status of #1 to #6. Bitmap data 0 to 63 (See page 5-25, 26)
* #1 Event relay status	551	○	X	Reads the event relay status. 0: Event relay OFF 1: Event relay ON
* #2 Event relay status	552	○	X	
* #3 Event relay status	553	○	X	
* #4 Event relay status	554	○	X	
* #5 Event relay status	555	○	X	
* #6 Event relay status	556	○	X	

Addresses, 400, 500 to 506, 551 to 556
- When this address is written, the response becomes error code 81.

Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Recording color selection	613	○	○	Reads and writes the recording color selection. 1: Select standard type 2: Select DIN type	Dot printing only
Pen phase cycle selection	613	○	○	Reads and writes pen phase compensation 1: Compensate between all pens (standard is printing pen) 2: Compensate between all pens (standard is standard trend pen) 3: No compensation	Pen printing only
Standard contact compensation ON/OFF	614	○	○	Reads and writes standard contact compensation start/stop. 0: Standard contact compensation OFF 1: Standard contact compensation ON	Dot printing only
Communications access rights	615	○	X	Reads CPL communications access rights. 1: Read only 2: Read/write	Common
Communications address	616	○	X	Reads the CPL communications address. 0 to 127 Note that address 0 means "communications inhibited."	
Communications system	617	○	X	Reads the CPL communications system. 1: 4800 bps, 8 bits, even parity, 1 stop bit 2: 4800 bps, 8 bits, no parity, 2 stop bits 3: 9600 bps, 8 bits, even parity, 1 stop bit 4: 9600 bps, 8 bits, no parity, 2 stop bits	
Addresses 615 to 617 • When this address is written to, the response becomes error code 81.					

■ Common data (schedule demand printing)

Item	RAM/EEPROM			Meaning of Data
	Address	R	W	
Schedule command printing setup	620	○	○	Reads and writes time setup start/stop. 0: Do not print schedule command 1: Print at #1 time 2: Print at #1 and #2 times 3: Print at #1, #2 and #3 times 4: Print at #1, #2, #3 and #4 times
#1 Time setup: hour	621	○	○	Reads and writes time (hour:minute) when printing schedule command printing. Time: hour: 0 to 23 Time: minute : 0 to 59
#1 Time setup: minute	622	○	○	
#2 Time setup: hour	623	○	○	
#2 Time setup: minute	624	○	○	
#3 Time setup: hour	625	○	○	
#3 Time setup: minute	626	○	○	
#4 Time setup: hour	627	○	○	
#4 Time setup: minute	628	○	○	

■ Common data (external contact input)

For details on items indicated by an asterisk "*", see bit information data.

Item	RAM/EEPROM Address	R	W	Meaning of Data
#1 DI function setup	640	○	○	Reads and writes the external contact input function setup. 0: No function setup 1: Start/stop recording 2: Demand printing 3: Chart feed 4: Print #1 message 5: Print #2 message 6: Print #3 message 7: Print #4 message 8: Switch chart speed/scale (multipoint printing only)
#2 DI function setup	641	○	○	
#3 DI function setup	642	○	○	
#4 DI function setup	643	○	○	
#1 Message (1st character)	644	○	○	Refer to Appendix, Character Codes.
#1 Message (2nd character)	645	○	○	
#1 Message (3rd character)	646	○	○	
#1 Message (4th character)	647	○	○	
#1 Message (5th character)	648	○	○	
#1 Message (6th character)	649	○	○	
#2 Message (1st character)	650	○	○	Refer to Appendix, Character Codes.
#2 Message (2nd character)	651	○	○	
#2 Message (3rd character)	652	○	○	
#2 Message (4th character)	653	○	○	
#2 Message (5th character)	654	○	○	
#2 Message (6th character)	655	○	○	
#3 Message (1st character)	656	○	○	Refer to Appendix, Character Codes.
#3 Message (2nd character)	657	○	○	
#3 Message (3rd character)	658	○	○	
#3 Message (4th character)	659	○	○	
#3 Message (5th character)	660	○	○	
#3 Message (6th character)	661	○	○	
#4 Message (1st character)	662	○	○	Refer to Appendix, Character Codes.
#4 Message (2nd character)	663	○	○	
#4 Message (3rd character)	664	○	○	
#4 Message (4th character)	665	○	○	
#4 Message (5th character)	666	○	○	
#4 Message (6th character)	667	○	○	
* DI input status summary	690	○	X	Reads a summary of the external contact input status. Bitmap data 0 to 15 (See page 5-27)
*1 DI input status	691	○	X	Reads #1 to #4 external contact input status. 0: Stop 1: Start
*2 DI input status	692	○	X	
*3 DI input status	693	○	X	
*4 DI input status	694	○	X	
Addresses 690 to 694 • When this address is written to, the response becomes error code 81.				

■ Data by channel (range)

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Channel 1	Recording mode	1100	○	○	Reads and writes the recording mode. 0: Stop mode 1: Display mode 2: Display/recording mode	Common
	Range code	1101	○	○	Range Code Table (see pages 5-21, 22, 23)	
	Input operation type	1102	○	○	Reads and writes the input operation type. 1: PV value 2: Channel deviation (1) (standard Ch - self Ch) 3: Channel deviation (2) (self Ch - standard Ch) 4: Fixed value deviation (1) (fixed value - self Ch) 5: Fixed value deviation (2) (self Ch - fixed value)	
	Standard channel	1103	○	○	Reads and writes standard channel. 1 to 6: Indicate standard channel No.	
	Burnout	1104	○	○	Reads and writes burnout. 0: Stop 1: Up 2: Down	Dot printing only
	Input filter	1104	○	○	Reads and writes input filter function. 0: Input filter NO 1: Input filter YES	Pen printing only
	Measurement range decimal point	1105	○	X	Reads the measurement range decimal point. 0: No decimal point □□□□□ 1: 1 digit past the decimal point □□□□.□ 2: 2 digits past the decimal point □□□.□□ 3: 3 digits past the decimal point □□.□□□ 4: 4 digits past the decimal point □.□□□□	Common
	• When this address 1105 is written to, the response becomes error code 81.					

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Channel 1	Measurement range lower limit	1106	○	○	Reads and writes the measurement range lower limit. Voltage input: Measurement range lower limit to measurement range upper limit Thermocouple input: Measurement range lower limit to measurement range upper limit Resistance thermometer input: Measurement range lower limit to measurement range upper limit Linear scaling input: Measurement range lower limit to measurement range upper limit	Common
	Measurement range upper limit	1107	○	○	Reads and writes the measurement range upper limit. Voltage input: Measurement range lower limit to measurement range upper limit Thermocouple input: Measurement range lower limit to measurement range upper limit Resistance thermometer input: Measurement range lower limit to measurement range upper limit Linear scaling input: Measurement range lower limit to measurement range upper limit	
	Addresses 1106, 1107 • For details on the decimal point, see measurement range decimal point (address: 1105).					
	Engineering unit range decimal point	1108	○	○	Reads and writes the engineering unit range decimal point. 0: No decimal point □□□□□ 1: 1 digit past the decimal point □□□□.□ 2: 2 digits past the decimal point □□□.□□ 3: 3 digits past the decimal point □□.□□□ 4: 4 digits past the decimal point □.□□□□	
	• When the range code is outside of the linear scaling range, the data is meaningless.					
	Engineering unit range lower limit	1109	○	○	-19999 to 29999	
	Engineering unit range upper limit	1110	○	○	-19999 to 29999	
	Fixed value for deviation	1111	○	○	-19999 to 29999	
	PV bias	1112	○	○	-19999 to 29999	
	Addresses 1109 to 1112, 1209 to 1212, 1309 to 1312 • For details on the decimal point, see engineering unit range decimal point (address 1n08).					

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Channel 2	Recording mode	1200	O	O	See address 1100.	Common
	Range code	1201	O	O	See range code table.	
	Input operation type	1202	O	O	See address 1102.	
	Standard channel	1203	O	O	See address 1103.	
	Burnout	1204	O	O	See address 1104.	Dot printing
	Input filter	1204	O	O	See address 1104.	Pen printing
	Measurement range decimal point	1205	O	X	See address 1105.	Common
	Measurement range lower limit	1206	O	O	See address 1106.	
	Measurement range upper limit	1207	O	O	See address 1107.	
	Engineering unit range decimal point	1208	O	O	See address 1108.	
	Engineering unit range lower limit	1209	O	O	-19999 to 29999	
	Engineering unit range upper limit	1210	O	O	-19999 to 29999	
	Fixed value for deviation	1211	O	O	-19999 to 29999	
	PV bias	1212	O	O	-19999 to 29999	
Channel 3	Recording mode	1300	O	O	See address 1100.	
	Range code	1301	O	O	See range code table.	
	Input operation type	1302	O	O	See address 1102.	
	Standard channel	1303	O	O	See address 1103.	
	Burnout	1304	O	O	See address 1104.	Dot printing
	Input filter	1304	O	O	See address 1104.	Pen printing
	Measurement range decimal point	1305	O	X	See address 1105.	Common
	Measurement range lower limit	1306	O	O	See address 1106.	
	Measurement range upper limit	1307	O	O	See address 1107.	
	Engineering unit range decimal point	1308	O	O	See address 1108.	
	Engineering unit range lower limit	1309	O	O	-19999 to 29999	
	Engineering unit range upper limit	1310	O	O	-19999 to 29999	
	Fixed value for deviation	1311	O	O	-19999 to 29999	
	PV bias	1312	O	O	-19999 to 29999	
Channel 4	Recording mode	1400	O	O	See address 1100.	
	Range code	1401	O	O	See range code table.	
	Input operation type	1402	O	O	See address 1102.	
	Standard channel	1403	O	O	See address 1103.	
	Burnout	1404	O	O	See address 1104.	Dot printing
	Input filter	1404	O	O	See address 1104.	Pen printing
	Measurement range decimal point	1405	O	X	See address 1105.	Common
	Measurement range lower limit	1406	O	O	See address 1106.	
	Measurement range upper limit	1407	O	O	See address 1107.	
	Engineering unit range decimal point	1408	O	O	See address 1108.	
	Engineering unit range lower limit	1409	O	O	-19999 to 29999	
	Engineering unit range upper limit	1410	O	O	-19999 to 29999	
	Fixed value for deviation	1411	O	O	-19999 to 29999	
	PV bias	1412	O	O	-19999 to 29999	

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Channel 5	Recording mode	1500	○	○	See address 1100.	Common
	Range code	1501	○	○	See range code table.	
	Input operation type	1502	○	○	See address 1102.	
	Standard channel	1503	○	○	See address 1103.	
	Burnout	1504	○	○	See address 1104.	Dot printing
	Input filter	1504	○	○	See address 1104.	Pen printing
	Measurement range decimal point	1505	○	X	See address 1105.	Common
	Measurement range lower limit	1506	○	○	See address 1106.	
	Measurement range upper limit	1507	○	○	See address 1107.	
	Engineering unit range decimal point	1508	○	○	See address 1108.	
	Engineering unit range lower limit	1509	○	○	-19999 to 29999	
	Engineering unit range upper limit	1510	○	○	-19999 to 29999	
	Fixed value for deviation	1511	○	○	-19999 to 29999	
	PV bias	1512	○	○	-19999 to 29999	
Channel 6	Recording mode	1600	○	○	See address 1100.	
	Range code	1601	○	○	See range code table.	
	Input operation type	1602	○	○	See address 1102.	
	Standard channel	1603	○	○	See address 1103.	
	Burnout	1604	○	○	See address 1104.	Dot printing
	Input filter	1604	○	○	See address 1104.	Pen printing
	Measurement range decimal point	1605	○	X	See address 1105.	Common
	Measurement range lower limit	1606	○	○	See address 1106.	
	Measurement range upper limit	1607	○	○	See address 1107.	
	Engineering unit range decimal point	1608	○	○	See address 1108.	
	Engineering unit range lower limit	1609	○	○	-19999 to 29999	
	Engineering unit range upper limit	1610	○	○	-19999 to 29999	
	Fixed value for deviation	1611	○	○	-19999 to 29999	

■ Data area by channel (scale)

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Channel 1	#1 Scale lower limit value	1120	○	○	Reads and writes the #1 scale lower limit value. -19999 to 29999	Common
	#1 Scale upper limit value	1121	○	○	Reads and writes the #1 scale upper limit value. -19999 to 29999	
	Addresses 1120 to 1121 • For details on the decimal point in the case of the linear scaling range, see the engineering unit decimal point (address: 1□08). For details on the decimal point in the case of other ranges, see measurement range decimal point (1105, 1205, 1305, 1405, 1505, 1605).					
	Scale switching method	1122	○	○	Reads and writes the scale switching method. 0: No switching 1: Auto-switching 2: Switching by external contact input	Dot printing only
	#2 Scale lower limit value	1123	○	○	Reads and writes #2 scale lower limit value. -19999 to 29999	
	#2 Scale upper limit value	1124	○	○	Reads and writes #2 scale upper limit value. -19999 to 29999	
	Auto-switching point	1125	○	○	Reads and writes the auto-switching point. -19999 to 29999	
	Auto-switching differential	1126	○	○	Reads and writes the auto-switching differential. 0 to 29999	
	Addresses 1123 to 1126 • For details on the decimal point in the case of the linear scaling range, see the engineering unit decimal point (address: 1□08).					Common
	Scale selection status	1127	○	X	Reads and writes the scale selection status. 1: #1 scale selected 2: #2 scale selected	
	• When this address is written to, the response becomes error code 81.					
Channel 2	#1 Scale lower limit value	1220	○	○	See address 1120.	
	#1 Scale upper limit value	1221	○	○	See address 1121.	
	Scale switching method	1222	○	○	See address 1122.	Dot printing only
	#2 Scale lower limit value	1223	○	○	See address 1123.	
	#2 Scale upper limit value	1224	○	○	See address 1124.	
	Auto-switching point	1225	○	○	See address 1125.	
	Auto-switching differential	1226	○	○	See address 1126.	
	Scale selection status	1227	○	X	See address 1127.	Common

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data	Model
Channel 3	#1 Scale lower limit value	1320	○	○	See address 1120.	Common
	#1 Scale upper limit value	1321	○	○	See address 1121.	
	Scale switching method	1322	○	○	See address 1122.	Dot printing only
	#2 Scale lower limit value	1323	○	○	See address 1123.	
	#2 Scale upper limit value	1324	○	○	See address 1124.	
	Auto-switching point	1325	○	○	See address 1125.	
	Auto-switching differential	1326	○	○	See address 1126.	
	Scale selection status	1327	○	X	See address 1127.	Common
Channel 4	#1 Scale lower limit value	1420	○	○	See address 1120.	
	#1 Scale upper limit value	1421	○	○	See address 1121.	
	Scale switching method	1422	○	○	See address 1122.	Dot printing only
	#2 Scale lower limit value	1423	○	○	See address 1123.	
	#2 Scale upper limit value	1424	○	○	See address 1124.	
	Auto-switching point	1425	○	○	See address 1125.	
	Auto-switching differential	1426	○	○	See address 1126.	
	Scale selection status	1427	○	X	See address 1127.	Common
Channel 5	#1 Scale lower limit value	1520	○	○	See address 1120.	
	#1 Scale upper limit value	1521	○	○	See address 1121.	
	Scale switching method	1522	○	○	See address 1122.	Dot printing only
	#2 Scale lower limit value	1523	○	○	See address 1123.	
	#2 Scale upper limit value	1524	○	○	See address 1124.	
	Auto-switching point	1525	○	○	See address 1125.	
	Auto-switching differential	1526	○	○	See address 1126.	
	Scale selection status	1527	○	X	See address 1127.	Common
Channel 6	#1 Scale lower limit value	1620	○	○	See address 1120.	
	#1 Scale upper limit value	1621	○	○	See address 1121.	
	Scale switching method	1622	○	○	See address 1122.	Dot printing only
	#2 Scale lower limit value	1623	○	○	See address 1123.	
	#2 Scale upper limit value	1624	○	○	See address 1124.	
	Auto-switching point	1625	○	○	See address 1125.	
	Auto-switching differential	1626	○	○	See address 1126.	
	Scale selection status	1627	○	X	See address 1127.	Common

■ Data area by channel (event)

* Only multipoint printing is available for events #3 and #4.

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data
Channel 1	#1 Event setting value	1140	○	○	Reads and writes the event setup value. Data range is -19999 to 29999.
	#2 Event setting value	1141	○	○	
	#3 Event setting value*	1142	○	○	
	#4 Event setting value*	1143	○	○	
	Addresses 1140 to 1143 • For details on the decimal point in the case of the linear scaling range, see the engineering unit decimal point (address: 1□08).				
	#1 Event type	1144	○	○	Reads and writes the event type. 0: OFF 1: Event LOW 2: Event HIGH
	#2 Event type	1145	○	○	
	#3 Event type*	1146	○	○	
	#4 Event type*	1147	○	○	
	#1 Event differential	1148	○	○	Reads and writes the event differential. Data range is 0 to 29999.
	#2 Event differential	1149	○	○	
	#3 Event differential*	1150	○	○	
	#4 Event differential*	1151	○	○	
	Addresses 1148 to 1151 • For details on the decimal point in the case of the linear scaling range, see the engineering unit decimal point (address: 1□08).				
	#1 Event recording ON/OFF	1152	○	○	Reads and writes event recording ON/OFF. 0: Recording OFF 1: Recording ON
	#2 Event recording ON/OFF	1153	○	○	
	#3 Event recording* ON/OFF	1154	○	○	
	#4 Event recording* ON/OFF	1155	○	○	
	#1 Event relay No.	1156	○	○	Reads and writes the event relay No. Data range is 0 to 6.
	#2 Event relay No.	1157	○	○	
	#3 Event relay No.*	1158	○	○	
	#4 Event relay No.*	1159	○	○	
Channel 2	#1 Event setting value	1240	○	○	See address 1140.
	#2 Event setting value	1241	○	○	See address 1141.
	#3 Event setting value*	1242	○	○	See address 1142.
	#4 Event setting value*	1243	○	○	See address 1143.
	#1 Event type	1244	○	○	See address 1144.
	#2 Event type	1245	○	○	See address 1145.
	#3 Event type*	1246	○	○	See address 1146.
	#4 Event type*	1247	○	○	See address 1147.
	#1 Event differential	1248	○	○	See address 1148.
	#2 Event differential	1249	○	○	See address 1149.
	#3 Event differential*	1250	○	○	See address 1150.
	#4 Event differential*	1251	○	○	See address 1151.
	#1 Event recording start/stop	1252	○	○	See address 1152.
	#2 Event recording start/stop	1253	○	○	See address 1153.
	#3 Event recording start/stop	1254	○	○	See address 1154.
	#4 Event recording start/stop	1255	○	○	See address 1155.
	#1 Event relay No.	1256	○	○	See address 1156.

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data
Channel 2	#2 Event relay No.	1257	○	○	See address 1157.
	#3 Event relay No.*	1258	○	○	See address 1158.
	#4 Event relay No.*	1259	○	○	See address 1159.
	#1 Event setting value	1340	○	○	See address 1140.
Channel 3	#2 Event setting value	1341	○	○	See address 1141.
	#3 Event setting value*	1342	○	○	See address 1142.
	#4 Event setting value*	1343	○	○	See address 1143.
	#1 Event type	1344	○	○	See address 1144.
	#2 Event type	1345	○	○	See address 1145.
	#3 Event type*	1346	○	○	See address 1146.
	#4 Event type*	1347	○	○	See address 1147.
	#1 Event differential	1348	○	○	See address 1148
	#2 Event differential	1349	○	○	See address 1149.
	#3 Event differential*	1350	○	○	See address 1150.
	#4 Event differential*	1351	○	○	See address 1151.
	#1 Event recording start/stop	1352	○	○	See address 1152.
	#2 Event recording start/stop	1353	○	○	See address 1153.
	#3 Event recording start/stop*	1354	○	○	See address 1154.
	#4 Event recording start/stop*	1355	○	○	See address 1155.
	#1 Event relay No.	1356	○	○	See address 1156.
	#2 Event relay No.	1357	○	○	See address 1157.
	#3 Event relay No.*	1358	○	○	See address 1158.
	#4 Event relay No.*	1359	○	○	See address 1159.
Channel 4	#1 Event setting value	1440	○	○	See address 1140.
	#2 Event setting value	1441	○	○	See address 1141.
	#3 Event setting value*	1442	○	○	See address 1142.
	#4 Event setting value*	1443	○	○	See address 1143.
	#1 Event type	1444	○	○	See address 1144.
	#2 Event type	1445	○	○	See address 1145.
	#3 Event type*	1446	○	○	See address 1146.
	#4 Event type*	1447	○	○	See address 1147.
	#1 Event differential	1448	○	○	See address 1148.
	#2 Event differential	1449	○	○	See address 1149.
	#3 Event differential*	1450	○	○	See address 1150.
	#4 Event differential*	1451	○	○	See address 1151.
	#1 Event recording start/stop	1452	○	○	See address 1152.
	#2 Event recording start/stop	1453	○	○	See address 1153.
	#3 Event recording start/stop*	1454	○	○	See address 1154.
	#4 Event recording start/stop*	1455	○	○	See address 1155.
	#1 Event relay No.	1456	○	○	See address 1156.
	#2 Event relay No.	1457	○	○	See address 1157.
	#3 Event relay No.*	1458	○	○	See address 1158.
	#4 Event relay No.*	1459	○	○	See address 1159.

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data
Channel 5	#1 Event setting value	1540	○	○	See address 1140.
	#2 Event setting value	1541	○	○	See address 1141.
	#3 Event setting value*	1542	○	○	See address 1142.
	#4 Event setting value*	1543	○	○	See address 1143.
	#1 Event type	1544	○	○	See address 1144.
	#2 Event type	1545	○	○	See address 1145.
	#3 Event type*	1546	○	○	See address 1146.
	#4 Event type*	1547	○	○	See address 1147.
	#1 Event differential	1548	○	○	See address 1148
	#2 Event differential	1549	○	○	See address 1149.
	#3 Event differential*	1550	○	○	See address 1150.
	#4 Event differential*	1551	○	○	See address 1151.
	#1 Event recording start/stop	1552	○	○	See address 1152.
	#2 Event recording start/stop	1553	○	○	See address 1153.
	#3 Event recording start/stop*	1554	○	○	See address 1154.
	#4 Event recording start/stop*	1555	○	○	See address 1155.
	#1 Event relay No.	1556	○	○	See address 1156.
	#2 Event relay No.	1557	○	○	See address 1157.
	#3 Event relay No.*	1558	○	○	See address 1158.
	#4 Event relay No.*	1559	○	○	See address 1159.
Channel 6	#1 Event setting value	1640	○	○	See address 1140.
	#2 Event setting value	1641	○	○	See address 1141.
	#3 Event setting value*	1642	○	○	See address 1142.
	#4 Event setting value*	1643	○	○	See address 1143.
	#1 Event type	1644	○	○	See address 1144.
	#2 Event type	1645	○	○	See address 1145.
	#3 Event type*	1646	○	○	See address 1146.
	#4 Event type*	1647	○	○	See address 1147.
	#1 Event differential	1648	○	○	See address 1148.
	#2 Event differential	1649	○	○	See address 1149.
	#3 Event differential*	1650	○	○	See address 1150.
	#4 Event differential*	1651	○	○	See address 1151.
	#1 Event recording start/stop	1652	○	○	See address 1152.
	#2 Event recording start/stop	1653	○	○	See address 1153.
	#3 Event recording start/stop*	1654	○	○	See address 1154.
	#4 Event recording start/stop*	1655	○	○	See address 1155.
	#1 Event relay No.	1656	○	○	See address 1156.
	#2 Event relay No.	1657	○	○	See address 1157.
	#3 Event relay No.	1658	○	○	See address 1158.
	#4 Event relay No.	1659	○	○	See address 1159.

■ Data area by channel (tag name/unit)

* Tag names supported only with multipoint printing.

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data
Channel 1	* Tag name (1st character)	1160	○	○	Reads and writes the tag name. 32 to 131 Converts 20h to 83h hexadecimal character codes to decimal. (See Character Code Table.)
	* Tag name (2nd character)	1161	○	○	
	* Tag name (3rd character)	1162	○	○	
	* Tag name (4th character)	1163	○	○	
	* Tag name (5th character)	1164	○	○	
	* Tag name (6th character)	1165	○	○	
	Engineering unit (1st character)	1168	○	○	Reads and writes the engineering unit. 32 to 131 Converts 20h to 83h hexadecimal character codes to decimal. (See Character Code Table.)
	Engineering unit (2nd character)	1169	○	○	
	Engineering unit (3rd character)	1170	○	○	
	Engineering unit (4th character)	1171	○	○	
	Engineering unit (5th character)	1172	○	○	
	Engineering unit (6th character)	1173	○	○	
Channel 2	* Tag name (1st character)	1260	○	○	See address 1160.
	* Tag name (2nd character)	1261	○	○	See address 1161.
	* Tag name (3rd character)	1262	○	○	See address 1162.
	* Tag name (4th character)	1263	○	○	See address 1163.
	* Tag name (5th character)	1264	○	○	See address 1164.
	* Tag name (6th character)	1265	○	○	See address 1165.
	Engineering unit (1st character)	1268	○	○	See address 1168.
	Engineering unit (2nd character)	1269	○	○	See address 1169.
	Engineering unit (3rd character)	1270	○	○	See address 1170.
	Engineering unit (4th character)	1271	○	○	See address 1171.
	Engineering unit (5th character)	1272	○	○	See address 1172.
	Engineering unit (6th character)	1273	○	○	See address 1173.
Channel 3	* Tag name (1st character)	1360	○	○	See address 1160.
	* Tag name (2nd character)	1361	○	○	See address 1161.
	* Tag name (3rd character)	1362	○	○	See address 1162.
	* Tag name (4th character)	1363	○	○	See address 1163.
	* Tag name (5th character)	1364	○	○	See address 1164.
	* Tag name (6th character)	1365	○	○	See address 1165.
	Engineering unit (1st character)	1368	○	○	See address 1168.
	Engineering unit (2nd character)	1369	○	○	See address 1169.
	Engineering unit (3rd character)	1370	○	○	See address 1170.
	Engineering unit (4th character)	1371	○	○	See address 1171.
	Engineering unit (5th character)	1372	○	○	See address 1172.
	Engineering unit (6th character)	1373	○	○	See address 1173.

CH	Item	RAM/EEPROM Address	R	W	Meaning of Data
Channel 4	* Tag name (1st character)	1460	○	○	See address 1160.
	* Tag name (2nd character)	1461	○	○	See address 1161.
	* Tag name (3rd character)	1462	○	○	See address 1162.
	* Tag name (4th character)	1463	○	○	See address 1163.
	* Tag name (5th character)	1464	○	○	See address 1164.
	* Tag name (6th character)	1465	○	○	See address 1165.
	Engineering unit (1st character)	1468	○	○	See address 1168.
	Engineering unit (2nd character)	1469	○	○	See address 1169.
	Engineering unit (3rd character)	1470	○	○	See address 1170.
	Engineering unit (4th character)	1471	○	○	See address 1171.
	Engineering unit (5th character)	1472	○	○	See address 1172.
	Engineering unit (6th character)	1473	○	○	See address 1173.
Channel 5	* Tag name (1st character)	1560	○	○	See address 1160.
	* Tag name (2nd character)	1561	○	○	See address 1161.
	* Tag name (3rd character)	1562	○	○	See address 1162.
	* Tag name (4th character)	1563	○	○	See address 1163.
	* Tag name (5th character)	1564	○	○	See address 1164.
	* Tag name (6th character)	1565	○	○	See address 1165.
	Engineering unit (1st character)	1568	○	○	See address 1168.
	Engineering unit (2nd character)	1569	○	○	See address 1169.
	Engineering unit (3rd character)	1570	○	○	See address 1170.
	Engineering unit (4th character)	1571	○	○	See address 1171.
	Engineering unit (5th character)	1572	○	○	See address 1172.
	Engineering unit (6th character)	1573	○	○	See address 1173.
Channel 6	* Tag name (1st character)	1660	○	○	See address 1160.
	* Tag name (2nd character)	1661	○	○	See address 1161.
	* Tag name (3rd character)	1662	○	○	See address 1162.
	* Tag name (4th character)	1663	○	○	See address 1163.
	* Tag name (5th character)	1664	○	○	See address 1164.
	* Tag name (6th character)	1665	○	○	See address 1165.
	Engineering unit (1st character)	1668	○	○	See address 1168.
	Engineering unit (2nd character)	1669	○	○	See address 1169.
	Engineering unit (3rd character)	1670	○	○	See address 1170.
	Engineering unit (4th character)	1671	○	○	See address 1171.
	Engineering unit (5th character)	1672	○	○	See address 1172.
	Engineering unit (6th character)	1673	○	○	See address 1173.

■ Range code tables

● SRF106 (dot printing type)

Address	Channel
Address 1101	Channel 1
Address 1201	Channel 2
Address 1301	Channel 3
Address 1401	Channel 4
Address 1501	Channel 5
Address 1601	Channel 6

Range code	Range	
0	±20 mV Linear scaling range	
1	±40 mV Linear scaling range	
2	±60 mV Linear scaling range	
3	±200 mV Linear scaling range	
4	±2V Linear scaling range	
5	±5V Linear scaling range	
6	0 to 10V Linear scaling range	
10	±20 mV Direct-reading range	
11	±40 mV Direct-reading range	
12	±60 mV Direct-reading range	
13	±200 mV Direct-reading range	
14	±2V Direct-reading range	
15	±5V Direct-reading range	
16	0 to 10V Direct-reading range	
20/50	Thermocouple (R)	°C/°F
21/51	Thermocouple (S)	°C/°F
22/52	Thermocouple (B)	°C/°F
23/53	Thermocouple (K)	°C/°F
24/54	Thermocouple (E)	°C/°F
25/55	Thermocouple (J)	°C/°F
26/56	Thermocouple (T)	°C/°F
27/57	Thermocouple (N)	°C/°F
28/58	Thermocouple (Wre0-26)	°C/°F
29/59	Thermocouple (Wre5-26)	°C/°F
30/60	Thermocouple (PR40-20)	°C/°F
31/61	Thermocouple (PL II)	°C/°F
32/62	Thermocouple (Ni-NiMo)	°C/°F
33	Thermocouple (KP vs Au7Fe)	K
40/70	Resistance thermometer (Pt100)	°C/°F
41/71	Resistance thermometer (JPT100)	°C/°F

● SRF101/102/103/201/202/203 (pen printing type)

Address	Channel	Caution
Address 1101	Channel 1	
Address 1201	Channel 2	In the case of 1-pen models, this address is handled as an option address.
Address 1301	Channel 3	In the case of 1- and 2-pen models, this address is handled as an option address.

Thermocouple, dc voltage group

Range code	Range	
100	±14.00 mV	
101	±25.00 mV	
102	±70.00 mV	
105	±5.000 mV	
200/500	Thermocouple (R)	°C/°F
210/510	Thermocouple (S)	°C/°F
220/520	Thermocouple (B)	°C/°F
230/530 231/531 232/532	Thermocouple (K)	°C/°F
240/540 241/541	Thermocouple (E)	°C/°F
250/550 251/551	Thermocouple (J)	°C/°F
260/560 261/561	Thermocouple (T)	°C/°F
270/570 271/571 272/572	Thermocouple (N)	°C/°F
280/580	Thermocouple (Wre0-26)	°C/°F
290/590	Thermocouple (Wre5-26)	°C/°F
310/610 311/611 312/612	Thermocouple (PL II)	°C/°F
320/620	Thermocouple (Ni-NiMo)	°C/°F

Resistance thermometer, dc voltage group

Range code	Range		
100	±14.00 mV		
101	±25.00 mV		
102	±70.00 mV		
105	±5.000 mV		
410	Resistance thermometer	Pt100	-200.0 to +300.0 °C/°F
402	Resistance thermometer	Pt100	-140.0 to +150.0 °C/°F
403	Resistance thermometer	Pt100	-100.0 to +100.0 °C/°F
411	Resistance thermometer	JPt100	-200.0 to +300.0 °C/°F
412	Resistance thermometer	Pt100	-140.0 to +150.0 °C/°F
413	Resistance thermometer	Pt100	-100.0 to +100.0 °C/°F
701	Resistance thermometer	Pt100	-328.0 to +572.0 °C/°F
702	Resistance thermometer	Pt100	-220.0 to +302.0 °C/°F
703	Resistance thermometer	Pt100	-148.0 to +212.0 °C/°F
711	Resistance thermometer	JPt100	-328.0 to +572.0 °C/°F
712	Resistance thermometer	Pt100	-220.0 to +302.0 °C/°F
713	Resistance thermometer	Pt100	-148.0 to +212.0 °C/°F

● **Bit information data**

No.1 SRF101/102/103/201/202/203 option information (address 398)

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
⑯	⑮	⑭	⑬	⑫	⑪	⑩	⑨	⑧	⑦	⑥	⑤	④	③	②	①

① : RS-485 communication option
0: Communication option not supported
1: Communication option supported

② : RS-232C communication option
0: Communication option not supported
1: Communication option supported

③ : DI option supported
0: DI option supported not supported
1: DI option supported

④ : DO option supported
0: DO option supported not supported
1: DO option supported

⑤ : —

⑥ : —

⑦ : —

⑧ : —

⑨ : No.3 pen RTD, voltage input
0: Not supported 1: Supported

⑩ : No.3 pen thermocouple, voltage input
0: Not supported 1: Supported

⑪ : No.2 pen RTD, voltage input
0: Not supported 1: Supported

⑫ : No.2 pen thermocouple, voltage input
0: Not supported 1: Supported

⑬ : No.1 pen RTD, voltage input
0: Not supported 1: Supported

⑭ : No.1 pen thermocouple, voltage input
0: Not supported 1: Supported

⑮ : —

⑯ : —

Chapter 6 COMMUNICATION PROGRAM FOR MASTER STATION

6-1 Programming Precautions

- The maximum response time-out of the instrument is one second. Therefore, set the response time-out to one second.
- If no response is obtained within one second, resend the same message. When there is no response even after two resends, assume that a communication error has occurred.
- The above resend is required since a message may not be property transmitted due to noise or the like during communication.

NOTE Use the "X" and "x" device ID codes alternately during message resend from the master station, to make it easier to identify whether the received response message is the latest message or the preceding one.

Chapter 7 TROUBLESHOOTING

■ Check items in case communication is disabled

① Make sure that RS-232C connections are correctly wired.

② Make sure tht the communication conditions for the SRF100 match those of the host computer.

If any one of the following settings between stations differ, communication is disabled. The setting that can be used on the SRF100 is underlined.

Transmission rate : 1200, 2400, 4800, 9600 bps

Data length : 7, 8 bits

Stop bit : 1 stop bit, 2 stop bits

Parity : Non parity, odd parity, even parity

③ Check that the destination address of the command frame transmitted from the host computer matches the station address of the SRF.

The SRF default station address is 0. The instrument will not respond even when the destination address of the command frame is set to 00 (30H, 30H).

④ Use the upper case for all characters other than the device ID code ("X" or "x" with this instrument).

APPENDIX

■ Character Code Table

Upper Bits / Lower Bits	2	3	4	5	6	7	8
0		0	@	P	`	p	³
1	!	1	A	Q	a	q	°
2	"	2	B	R	b	r	₀
3	#	3	C	S	c	s	•
4	$	4	D	T	d	t	
05	%	5	E	U	e	u	
6	&	6	F	V	f	v	
7	´	7	G	W	g	w	
8	(	8	H	X	h	x	
9	)	9	I	Y	i	y	
A	*	:	J	Z	j	z	
B	+	;	K	[	k	Ω	
C	,	<	L	¥	l	ʊ	
D	—	=	M	]	m	μ	
E	.	>	N	^	n	²	
F	/	?	O	_	o	₂	

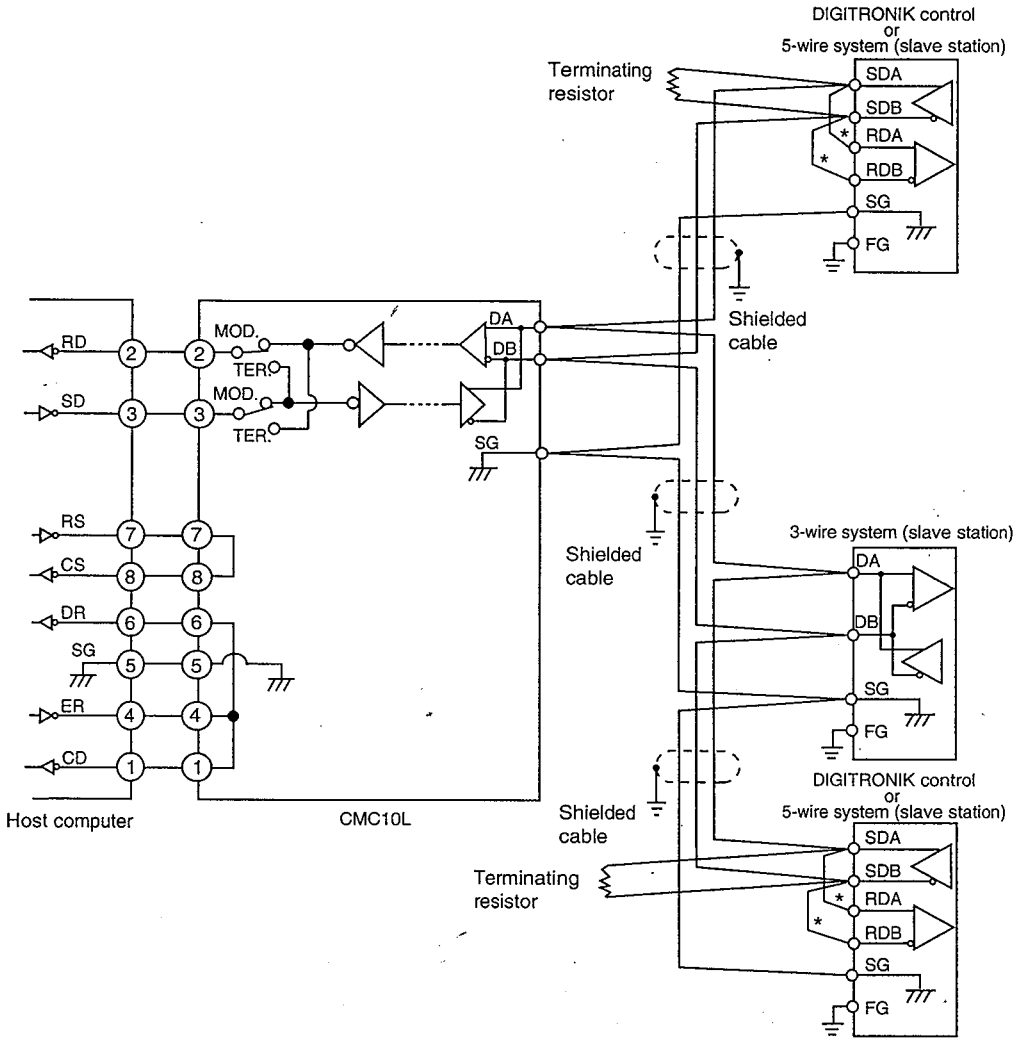
■ Code Table

Upper Bits / Lower Bits	0	1	2	3	4	5	6	7
0			SPACE	0	@	P	`	p
1			!	1	A	Q	a	q
2	STX		"	2	B	R	b	r
3	ETX		#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	¥	l	|
D	CR		—	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

The shaded areas (▒) are not used by this communication system. (The codes depend on the station.)

■ Connection with CMC10L

The CMC10L001A000 is available as an RS-232C/RS-485 (3-wire system) converter from Yamatake Corporation. The following diagram shows an example of wiring using a straight cable for a host computer in the terminal mode:



Connect two terminating resistors of 150Ω±5%, 1/2W min. to the instrument at each end of the transmission line.

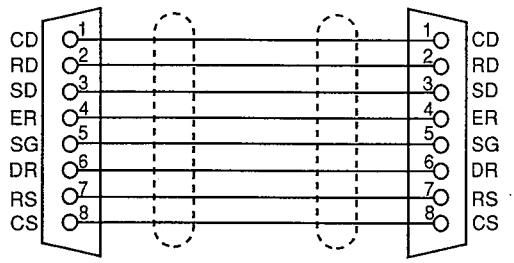
Connect only one end of the shielded wire to the frame ground (*) must be wired externally.

Connect the master station SD to the slave station RD, and the master station RD to the slave station SD.
To execute this connection, set the MODE switch provided in the CMC10L as shown in the following table in accordance with the host computer side RS-232C connector pin arrangement (modem/terminal) and the type of cable (cross/straight) used:

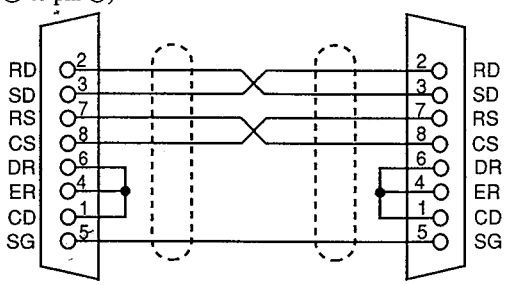
RS-232C	Cable type	MODE switch
TERMINAL	Straight	MODEM
TERMINAL	Cross	TERMINAL
MODEM	Straight	TERMINAL
MODEM	Cross	MODEM

● RS-232C cable

Straight: An RS-232C cable with a D-Sub (9-pin) connector at each end where pins with the same number are mutually connected (for example, pin ② to pin ②, and pin ③ to ③)

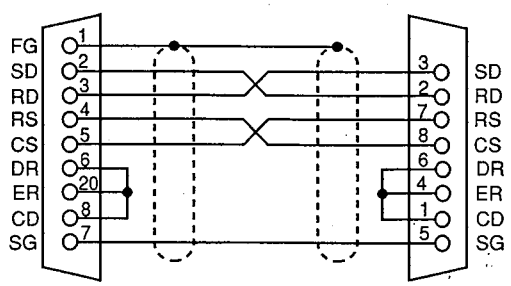


Cross: An RS-232C cable with a D-Sub (9-pin) connector at each end where different number pins are connected (for example, pin ② to pin ③, and pin ③ to pin ②)



D-Sub (25-pin) – D-Sub (9-pin) conversion cable:

An RS-232C cable for conversion between D-Sub (25-pin) and D-Sub (9-pin)



Revision History

Printed Date	Manual Number	Edition	Revised pages	Description
97-01	**CP-UM-1668E**	**1st Edition**		
01-02		**2nd Edition**		Overall revision
04-03		**3rd Edition**	ii,iii 1-1 2-1 2-2,2-3 5-5 5-11 6-1 Appendix-3 Appendix-4	RESTRICTIONS ON USE changed description of WARNING and CAUTION changed description of CPL changed diagram of terminal No.2 and 3 changed part No. 81408811-001 deleted RS-232C connector signal tables (25pins and 14pins) deleted HANDLING PRECAUTON added Event data's note changed Meaninng of Data at Address 1108 changed note changed time-out: two seconds to one second changed diagram changed RS-232C cable Straight,Cross: pin No.2 and 3 changed

YAMATAKE

Specifications are subject to change without notice.

Yamatake Corporation
Advanced Automation Company
International Business Headquarters
Totate International Building
2-12-19 Shibuya Shibuya-ku
Tokyo 150-8316 Japan
URL: http://www.yamatake.com

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