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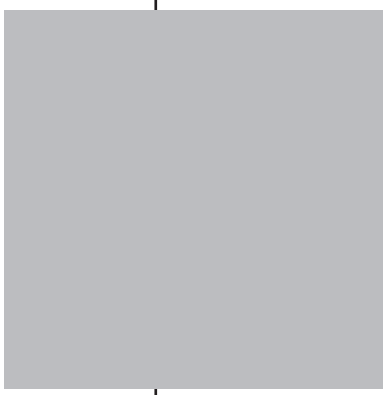
No. CP-SP-1028E

DIGITRONIK CPL Communications

User's Manual

Dot Printing Model

SRF206/212/224



Thank you for purchasing the SRF206 /212/224.
This manual contains information for ensuring correct use of the communication functions of the SRF206 /212/224. This manual should be read in advance by those who design and maintain the operator panel or equipment using the communication functions of the SRF206/212/224.
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 the 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

Writing to EEPROM address is guaranteed only up to 100,000 times.

NOTICE

Be sure that the user receives this manual 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 manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, 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

The safety precautions described in this manual are indicated by various icons. Please be sure you read and understand the icons and their meanings described below before reading the rest of the manual.

Safety precautions are intended to ensure the safe and correct use of this product, to prevent injury to the operator and others, and to prevent damage to property. Be sure to observe these safety precautions.

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

■ Examples

	Use caution when handling the product.
	The indicated action is prohibited.
	Be sure to follow the indicated instructions.

⚠WARNING

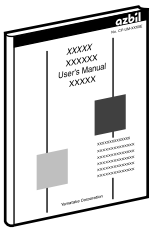
	**Ground the FG (Frame Ground) terminal to a terminal resistance of 100Ω or less before you connect the SRF206/212/224 to the input circuit or control circuit.** **Failure to do so might cause electric shock or fire.**
	**Be sure to turn the source power OFF before wiring the SRF206/212/224.** **Failure to do so might cause electric shock.**
	**Do not touch power terminals and other electrically charged parts.** **Doing so might cause electric shock.**
	**Do not disassemble the SRF206/212/224.** **Doing so might cause electric shock or faulty operation.**

⚠CAUTION

	**Wire the SRF206/212/224 according to predetermined standards. Also wire the SRF206/212/224 using specified power leads according to recognized installation methods.** **Failure to do might cause electric shock, fire or faulty operation.**
	**Use the SRF206/212/224 within the operating ranges recommended in the specifications (temperature, humidity, voltage, vibration, shock, atmosphere, etc.). Failure to do so might cause faulty operation.**
	**Do not allow lead scraps, chips or water to enter the SRF206/212/224.** **Doing so might cause fire or faulty operation.**
	**Tighten the terminal screws to the specification torque.** **Incomplete tightening might cause electric shock or fire.**
	**Do not use unused terminals on the SRF206/212/224 as relay terminals.** **Doing so might cause electric shock or fire.**
	**We recommend attaching the terminal covers after wiring the SRF206/212/224.** **Failure to do so might cause electric shock.**

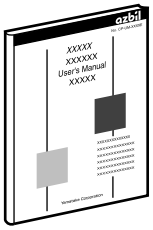
The Role of This Manual

In all, 2 manuals have been prepared for the SRF206/212/224. Read the manual according to your specific requirements.
The following lists all the manuals that accompany the SRF206/212/224 and gives a brief outline of the manual: If you do not have the required manual, contact Yamatake Corporation or your dealer.



Dot Printing Model Smart Recorder SRF206/212/224
Installation/Operation **Manual No.CP-SP-1027E**

This manual is required reading for those who use the SRF206/212/224, those who design hardware for integrating the SRF206/212/224 into operator control panels, those who carry out maintenance, and those who operate instruments in which the SRF206/212/224 is integrated. It outlines the hardware configuration, product features and the other products used in combination with the SRF206/212/224.
It also describes how to install and wire the SRF206/212/224 for integrating into instruments, method of operation, maintenance and inspection, troubleshooting, and hardware specifications.



DIGITRONIK CPL Communications Dot Printing Model
SRF206/212/224 **Manual No.CP-SP-1028E**

This manual.
This manual is required reading for those who use the CPL communication functions of the SRF206/212/224.
It briefly describes CPL communications, how to wire the SRF206/212/224, communication procedures, communication data for the SRF206/212/224, troubleshooting and communication specifications.

Organization of This User's Manual

This manual is organized as follows:

Chapter 1. COMMUNICATION FUNCTIONS

This chapter lists communication functions and model numbers of the SRF206/212/224.

Chapter 2. WIRING

This chapter describes RS-232C and RS-485 wiring methods to make a communication link between the SRF206/212/224 and other instruments.

Chapter 3. SETTINGS

This chapter describes SRF206/212/224 communication settings.

Chapter 4. COMMUNICATION PROCEDURE

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

Chapter 5. COMMUNICATION DATA TABLE

This chapter provides various data tables for communications on the SRF206/212/224.

Chapter 6. MAINTENANCE AND TROUBLESHOOTING

This chapter describes checkpoints to diagnose failures in SRF206/212/224 communications.

Chapter 7. SPECIFICATIONS

This chapter lists communication specifications for the SRF206/212/224.

Appendix

The appendix provides code tables and network configurations using the CMC10L RS-232C/RS485 converter.

Contents

Chapter 5. COMMUNICATION DATA TABLE

Chapter 6. MAINTENANCE AND TROUBLESHOOTING

Chapter 7. SPECIFICATIONS

APPENDIX

Conventions Used in This Manual

The following conventions are used in this manual:

! Handling Precaution
: Handling Precautions indicate items that the user should pay attention to when handling the xxx.

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

(1), (2), (3) : The numbers with the parenthesis indicate steps in a sequence or indicate corresponding parts in an explanation.

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.

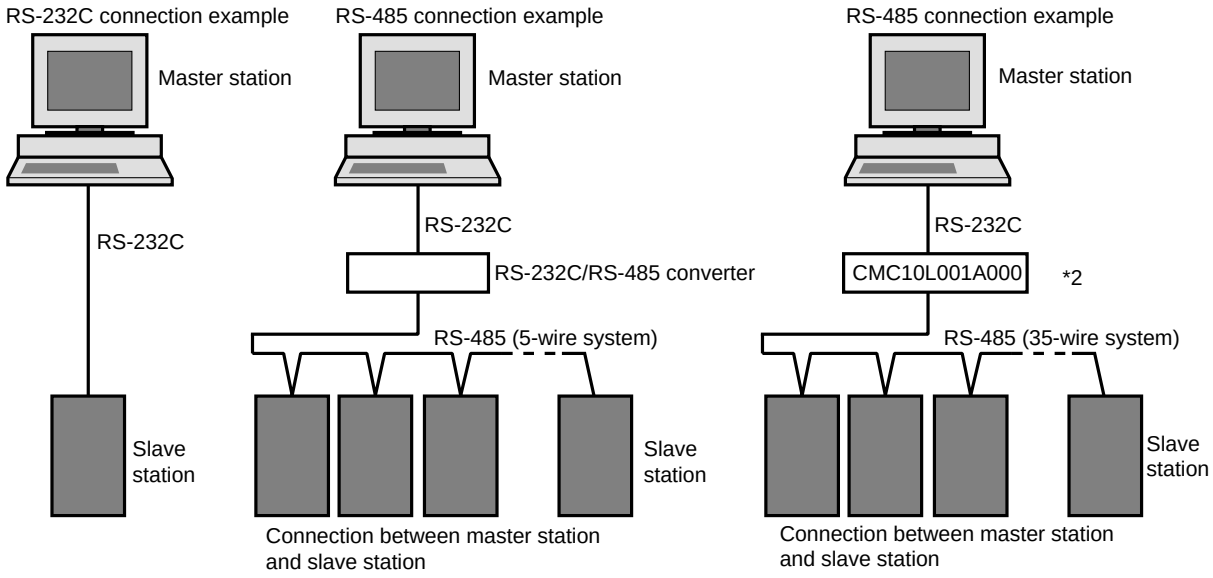
- The communication protocol and format conform to the RS-232C and RS-485 interfaces.

- 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 isYamatake host communication protocol.



- The high-performance communication controller CMC10L is available for conversion between the RS-232C and RS-485 interfaces.

*1 : When the master station is an MA500 DIM or CMC10L, it can be connected to up to 16 slave stations.

*2 : The communication adapter CMC10L is an RS-232C/RS-485 converter available from Yamatake .

Chapter 2. WIRING

2 - 1 RS-232C Connection

⚠WARNING

Ground the FG (Frame Ground) terminal to a terminal resistance of 100Ω or less before you connect the SRF206/212/224 to the input circuit or control circuit.
Failure to do so might cause electric shock or fire.

Be sure to turn the source power OFF before wiring the SRF206/212/224.
Failure to do so might cause electric shock.

Do not touch power terminals or other electrically charged parts.
Doing so might cause electric shock.

⚠CAUTION

Wire the SRF206/212/224 according to predetermined standards. Also wire the SRF206/212/224 using specified power leads according to recognized installation methods.
Failure to do might cause electric shock, fire or faulty operation.

Do not allow lead scraps, chips or water to enter the SRF206/212/224.
Doing so might cause fire or faulty operation.

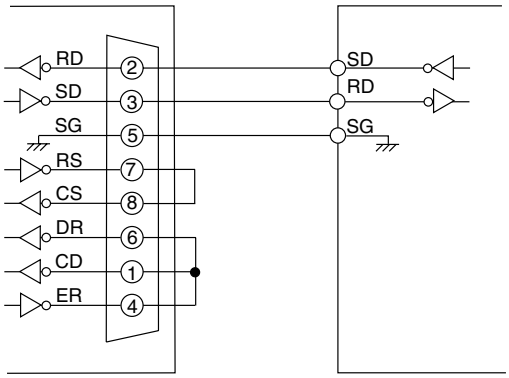
Tighten the terminal screws to the specification torque.
Incomplete tightening might cause electric shock or fire.

Do not use unused terminals on the SRF206/212/224 as relay terminals.
Doing so might cause electric shock or fire.

We recommend attaching the terminal covers after wiring the SRF206/212/224.
Failure to do so might cause electric shock.

An SRF206/212/224 supporting an RS-232C communication function is wired for communication as shown below.

- Communication with the master station in a point-to-point configuration
  The SRF206/212/224 is provided with three communication terminals (RD, SD and SG). 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.
  Usually, the pin array of the RS-232C connector of a PC is as shown in the figure on the next page (terminal mode). The locations of pins SD and RD, RS and CS and DR and ER may be reversed (MODEM mode), but this is rare.
  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 CBL232FNZ02

Note

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

- **RS-232C connector signals**

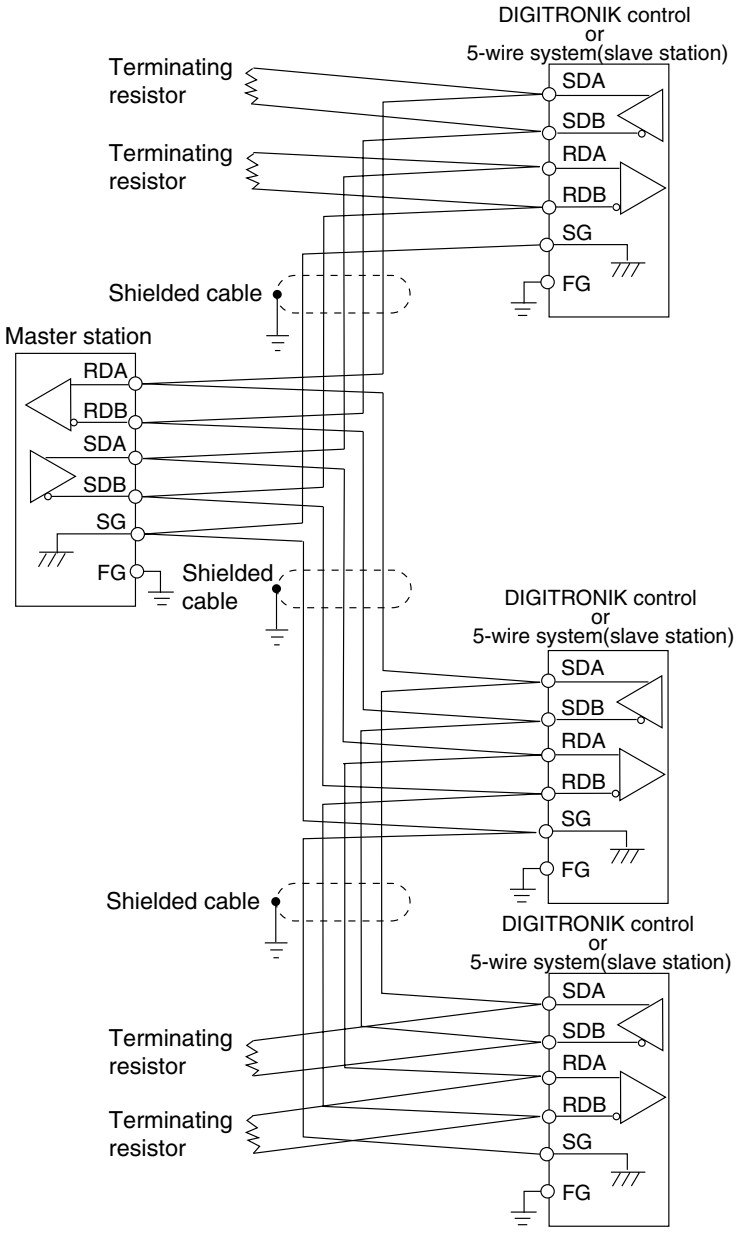
9 pins

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

■ Connection with 5-wire system

The following is an example of a system connection of a DIGITRONIK control supporting the RS-485 communication function using the 5-wire system:



Connect a terminating resistor 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.

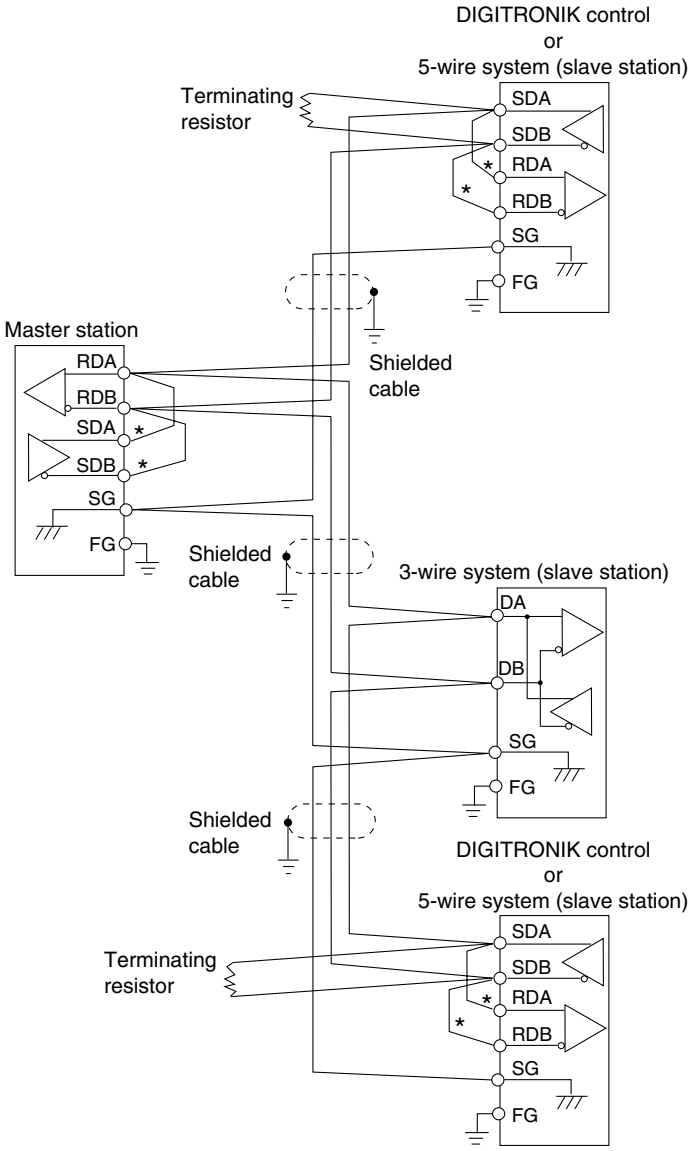
Other 3-wire system DIGITRONIK units of Yamatake can be used on the same communication line. Conduct the wiring shown at the item "■ 3-wire system used together" on next page.

⚠ Handling Precautions

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

■ 3-wire system used together

An SRF206/212/224 supporting the RS-485 communication function can also be used in a 3-wire system. The following is an example of such a connection:



Connect one terminating resistor 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.

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

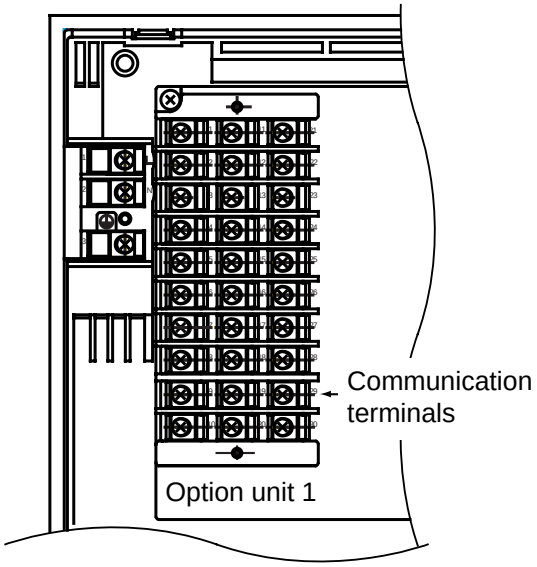
See, "■ Connection with CMC10L" (Page App.-3) for details.

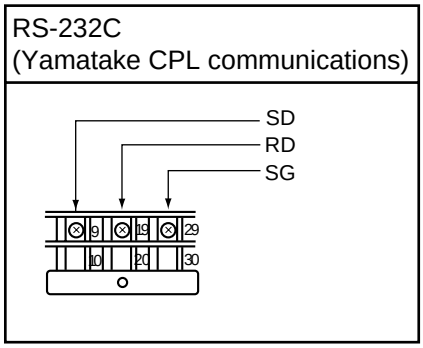
! Handling Precautions

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

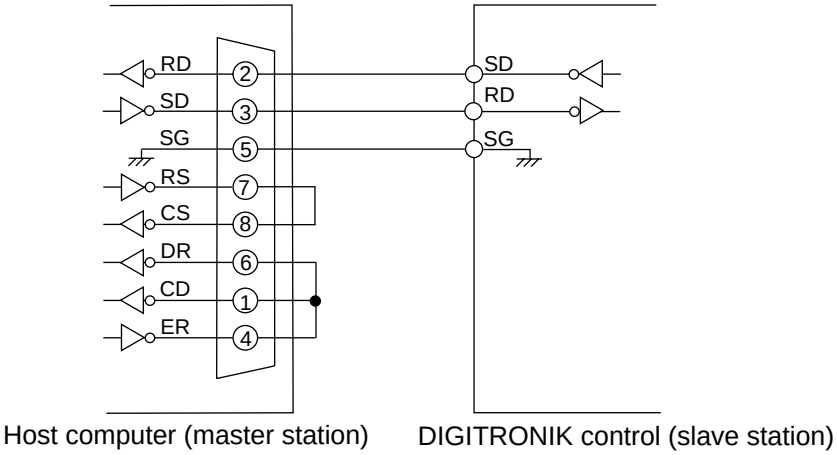
2 - 3 RS-232C Models

The communication terminal array of an RS-232C model supporting the communication function is as follows:





Connection example :

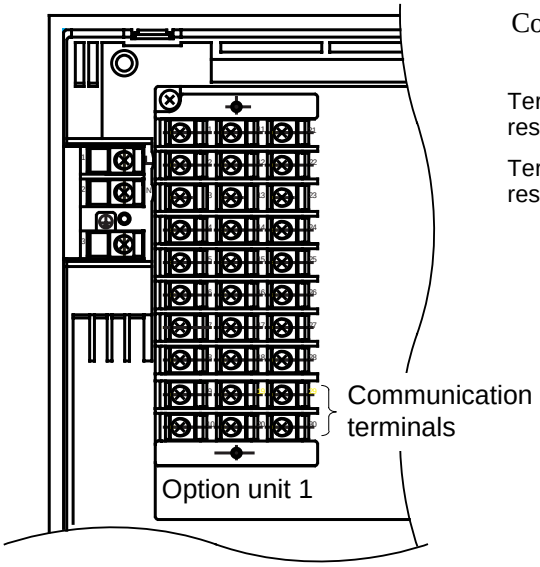


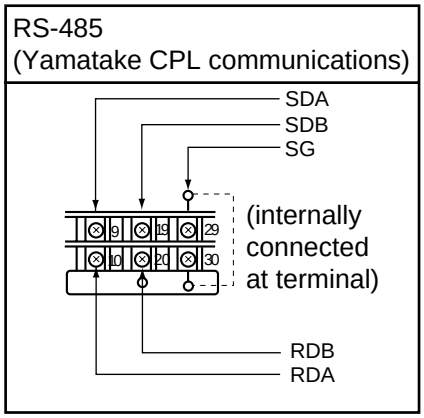
Note

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

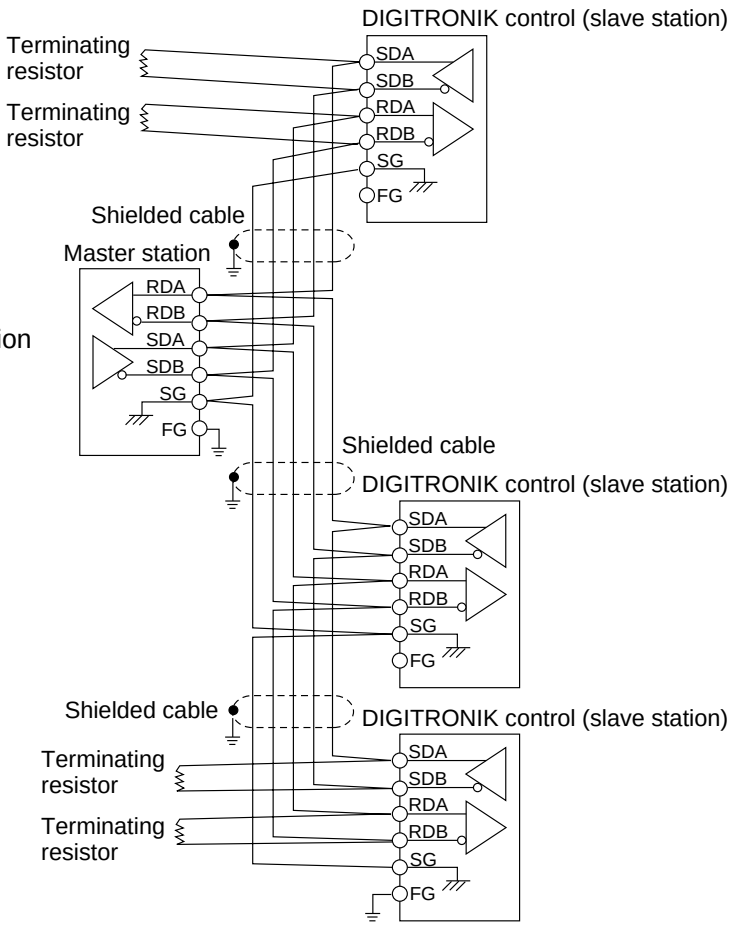
2 - 4 RS-485 Models

The communication terminal array of an RS-485 model supporting the communication function is as follows:





Connection example:



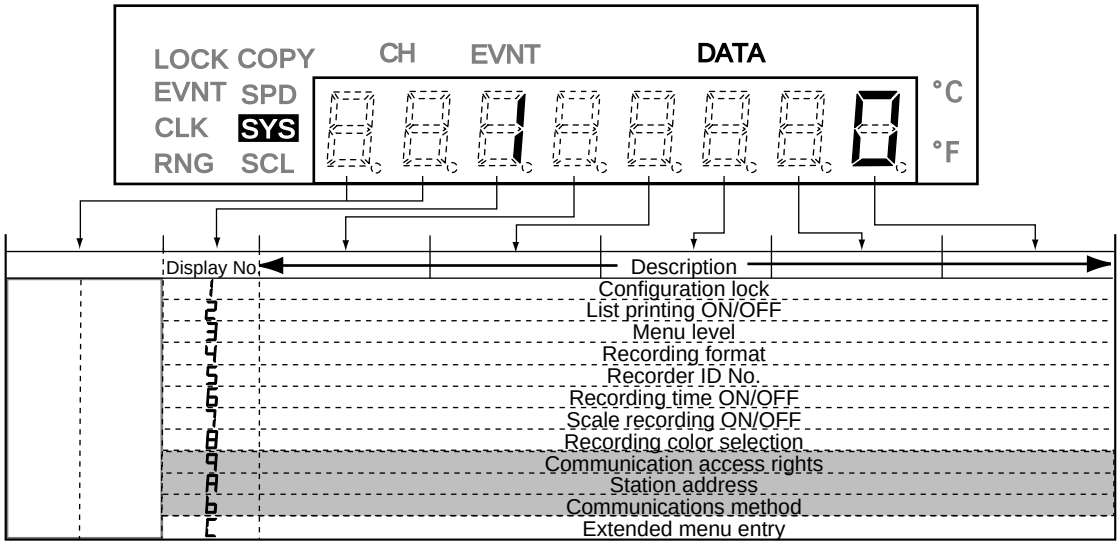
Connect a terminating resistor of 150Ω±5%, 1/2W min. to the station at each end of the transmission line. Connect only one end of the shielded wire to the frame ground.

Chapter 3. SETTINGS

3 - 1 Communication Setup Items

■ System Setup

Communication setup items are displayed in system setup screen Nos. "9", "A" and "b".
These setup items are not displayed on models that do not support the communications option.



◇Setup Details◇

Communication access rights : "1" read only
"2" read/write

Station address : "0 to 127". Communication is inhibited when set to "0".

Communication method : "1" 4800bps, 8bits, even parity, 1 stop bit
"2" 4800bps, 8bits, no parity, 2 stop bits
"3" 9600bps, 8bits, even parity, 1 stop bit
"4" 9600bps, 8bits, no parity, 2 stop bits

3 - 2 Initial Setup

Before starting communication, set up the communication conditions for the SRF206/212/224 and master station.

■ Station Address

Set a decimal numeric within the range “0” to “127” to system setup screen No. “A” on the SRF206/212/224.
Slave stations connected in a multi-drop configuration on the same transmission line in an RS-485 system must have unique addresses.
The default address is “0”.
Since the communication function is not activated at address “0”, be sure to set a value other than “0” to execute communication.

■ Transmission Rate and Data Format

Set a decimal numeric within the range “1” to “4” to system setup screen No. “b” on the SRF206/212/224.
Use the same transmission rate and data format as on the master station. The default is “1”.

1: 4800bps, 8bits, even parity, 1 stop bit
2: 4800bps, 8bits, no parity, 2 stop bits
3: 9600bps, 8bits, even parity, 1 stop bit
4: 9600bps, 8bits, no parity, 2 stop bits

Chapter 4. COMMUNICATION PROCEDURE

4 - 1 Outline of Communication Procedure and Messages

This chapter outlines communication procedures and the concept behind message configuration.

■ Communication Procedure

The following is a simple breakdown of the communication procedure:

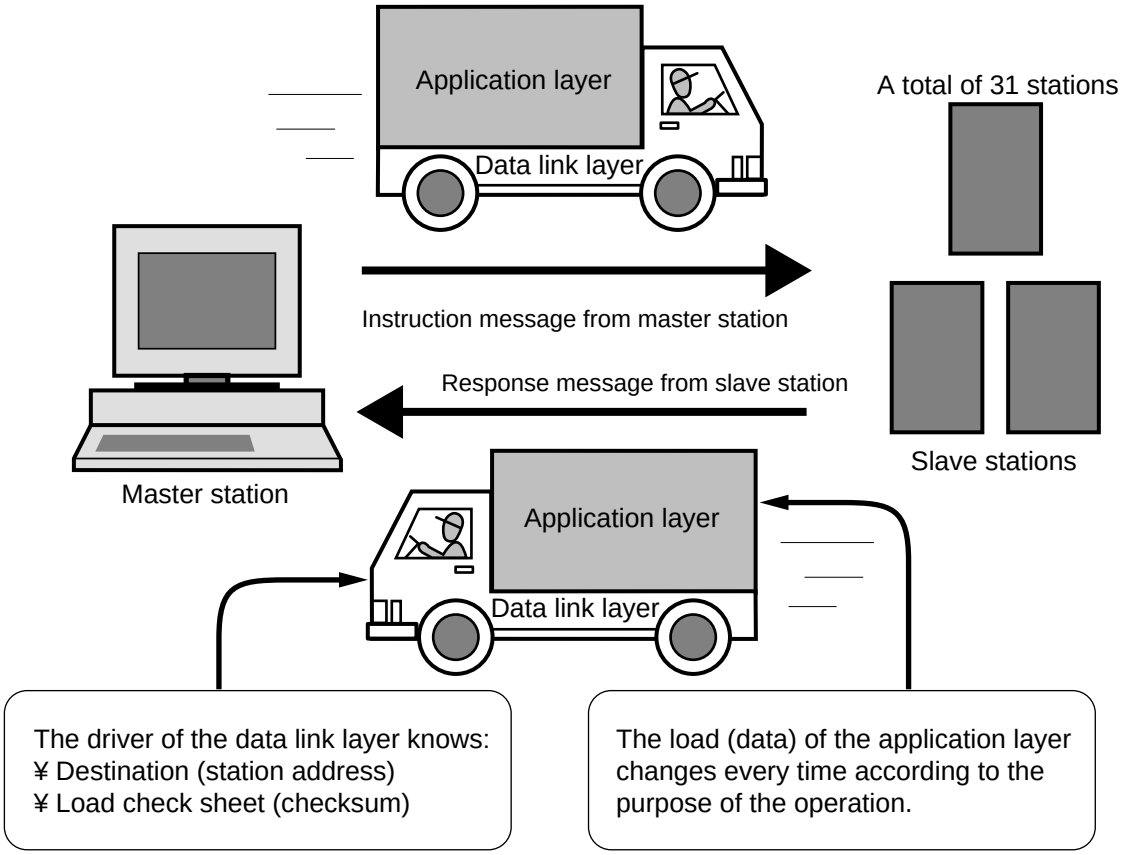
1. The master station transmits an instruction message to a slave station to specify a station for communication.
2. The slave station processes the instruction message, and executes read and write operations.
3. The slave station transmits a response message according to the contents of processing.
4. The master station receives the response message and executes processing.

■ Message Configuration

A message consists of two layers as shown below. Both the instruction message from a master station and the response message from a slave station take this form.

- Data link layer
  - This layer contains the basic information required for communication.
  - It also contains message destination and check information.
- Application layer
  - This layer is where data read and write operations are executed.
  - The content of this layer varies according to the purpose of the operation.

The figure below shows the individual layers.



■ Examples

Messages have the following structure:

● Read instruction

・Instruction message

STX	0	1	0	0	X	R	S	,	1	0	0	1	W	,	2	ETX	9	A	CR	LF

Data link layer — Application layer — Data link layer

・Response message

STX	0	1	0	0	X	0	0	,	0	,	4	2	ETX	9	4	CR	LF

Data link layer — Application layer — Data link layer

● Write instruction

・Instruction message

STX	0	1	0	0	X	W	S	,	1	0	0	1	W	,	5	8	ETX	5	A	CR	LF

Data link layer — Application layer — Data link layer

・Response message

STX	0	1	0	0	X	0	0	ETX	8	2	CR	LF

Data link layer — Application layer — Data link layer

The following sections describe in detail the data link layer and application layer:

■ Data Address Concept

The SRF206/212/224 uses “data addresses” to read and write data. Data addresses allow data to be written and read to and from a corresponding address for the data.

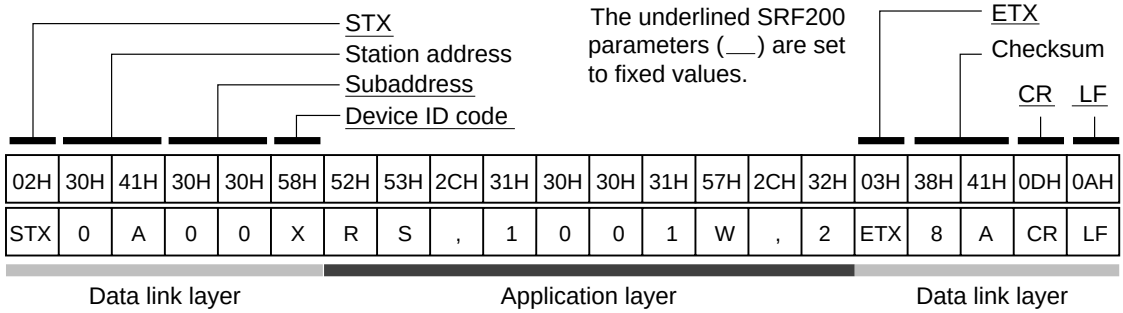
Data A	501W
Data B	502W
Data C	503W
:	:

See **Chapter 5. “COMMUNICATION DATA TABLE”** for information on the relationship between data and address.

4 - 2 Data Link Layer

■ Description

- The data link layer contains eight types of basic message transmission information.
- The instruction message and response message have the same structure in the data link layer.



The following describes each function of 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 with a message.

● Station address

◆ Role : Specifies the destination station, and allows communication with the specified station.

◇ Description
- If “0” is set as the station address, the communication function is stopped.
  So, to enable communication be sure to set an address value of “1” or more.
- Two hexadecimal characters. For details, see the example.
- See **Chapter 3. “SETTINGS”** for information on station address settings.

Example : When the station address of the other instrument is “10”:
1. 10 (decimal) = 0AH (hexadecimal)
2. This can be converted into character codes:
   0 = 30H, A = 41H
3. “0A” (30H, 41H) calculated in example 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 of the application layer.

● Subaddress

◇ Description : The subaddress is meaningless on the SRF206/212/224.
Be sure to set a subaddress of “00” (30H, 30H) that has the same format as the station address.

● Device ID code

◇ Description : Only character codes “X” (58H) or “x” (78H) can be set on the SRF206/212/224.

● **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 one byte each to the character codes of the message from STX to ETX.
2. Derive the two's complement of the result of this addition.
3. Convert the result into character codes.

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

1. Add one byte each to the character codes from STX to ETX. The lower-order one byte of the calculation result is 76H.
2. The result of two's complement addition is 8AH.
3. 85H is converted into character codes and used as the checksum value. The result is "8A", (38H) and (41H).
   See the station address example (on the preceding page) for information on character code conversion.

! Handling Precautions

The checksum in the instruction message can be omitted, but no checksum is then included in the response message. The checksum function should not be omitted to ensure proper message reception and transmission.

● **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 in pair.

! Handling Precautions

● If any of the following errors occur in the data link layer, the instrument respond:

- The communication conditions for both stations do not match (different transmission speeds or the occurrence of a parity error).
- The address of the transmitting station differs from the station address for the receiving station.
- 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, subaddress or checksum is not two charactersdoes not long.
- The calculation result of the checksum does not match the checksum of the message.
- Non-specified characters are included in the message.

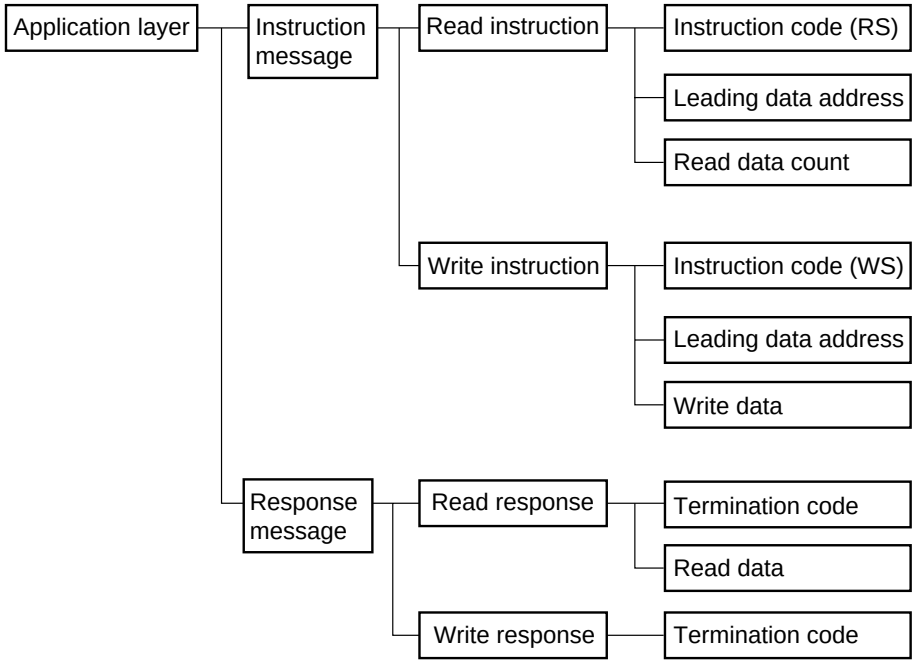
● The data link layer contains a response message which is identical to the instruction message except for the checksum function.

● Use upper-case characters "A" to "F" in the hexadecimal numerics for the station address and checksum.

4 - 3 Application Layer

■ Outline

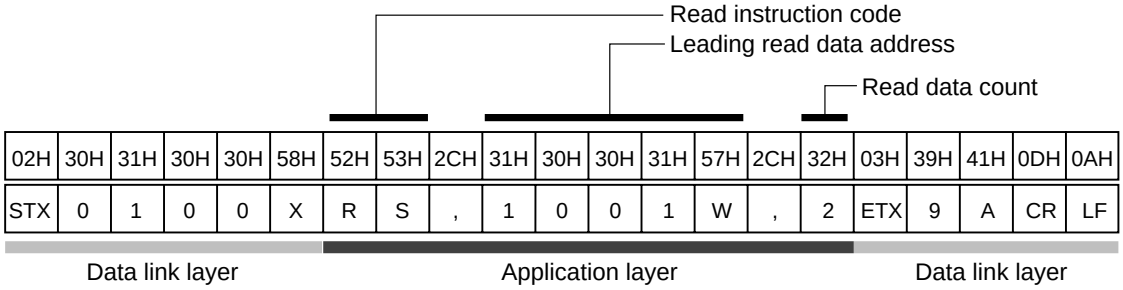
- The application layer contains instructions, data, data count and termination code.
- In the application layer, the instruction message and response message have a different structure.
- There are two types of instruction messages: read instructions and write instructions. Each of these instruction messages have their own responses.
- A termination code indicates how an instruction message has been processed.



4 - 4 Data Read

■ Description of Read Instruction

- This instruction permits the contents of continuous data addresses starting from the specified leading read data address to be read in one message.
- The application layer of a read instruction consists of the following three types of data:



- Individual data items are delimited by a comma "," (character code 2CH).
- An upper-case character code is used for each numeric or character in the application layer.
- A decimal number is used for each numeric.
- Additional "0"s or spaces cannot be added to each data item.

  Example : The underlined portion of "RS,01001W,2" is not allowed incorrect.

  Example : The underlined portions of "RS, 1001W,02" are not allowed incorrect.

  Example : The above example shows that two-data items are read from 1001W as one message.

● Read instruction code (RS)

◆ Role : A read command

◇ Description : Two "RS" (52H, 53H) characters

● Leading read data address

◆ Role : Specifies the leading read data address.

◇ Description
- See **Chapter 5. "COMMUNICATION DATA TABLE"** for information on the relationship between data addresses and read data.
- Be sure to append the numeric representing the data address with "W" (57H).

● Read data count

◆ Role : Specifies how many data items are read continuously, starting with the specified data address.

! Handling Precautions

See **Chapter 5."COMMUNICATION DATA TABLE"** for information on the upper limit of the read data count.

■ Read Response

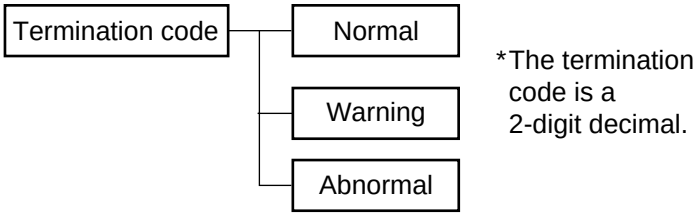
◆ Role : When the message in the data link layer is correct, a response message is sent back according to the contents of the instruction message.

◇ Description : All data in the application layer is expressed in decimal character code.

● Termination Code

◆ Role : A numeric which specifies how the instruction message has been processed by the instrument.
Different values are set according to the processing result.

◇ Description : The response message must include a termination code. The termination codes are classified as follows:



● Normal response/warning response

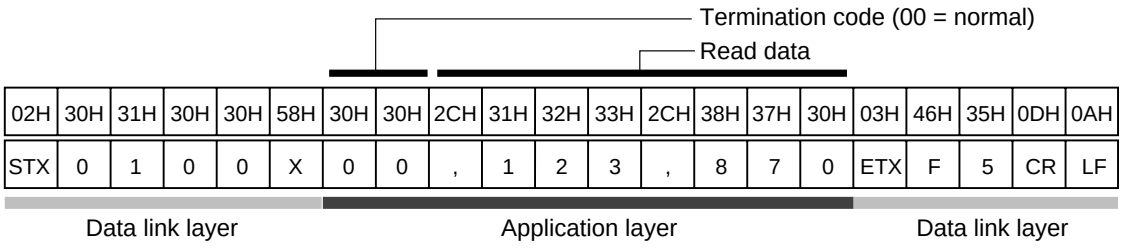
◆ Role : Sends back the read data.

◇ Description : Information in the application layer

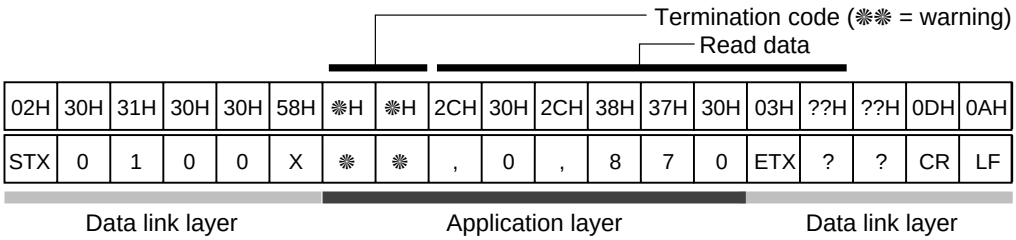
- Termination code : See **4-6 "Termination Code Table"** for information on termination codes.
- Read data : Only the specified number of data items are input.
  : The decimal point is removed from a numeric when it is entered.

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 warning code numeric.)



● **Abnormal response**

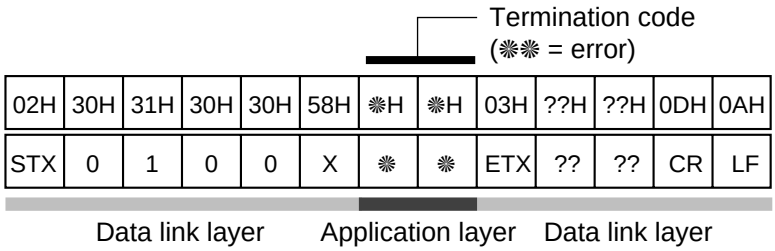
◆ Role : Indicates that there is an abnormality in an instruction message, which contains no data and cannot be normally read.

◇ Description : Information in the application layer

Termination code : Indicates an abnormality type.

: See **4-6 "Termination Code Table"** for details.

Example : An abnormal response



■ Decimal Numeric Expression (numeric data)

◆ Role : All the numerics, read count, write value (see the description of the WS command) and read data in the data address follow the rules given below.

(1) When a numeric is negative, prefix the numeric with a minus sign "-" (2DH).
Example : "-123" (2DH, 31H, 32H, 33H)

(2) When a numeric is "0", use one "0".
Example : "0" (30H)
Example : "00" (30H, 30H) is not allowed.

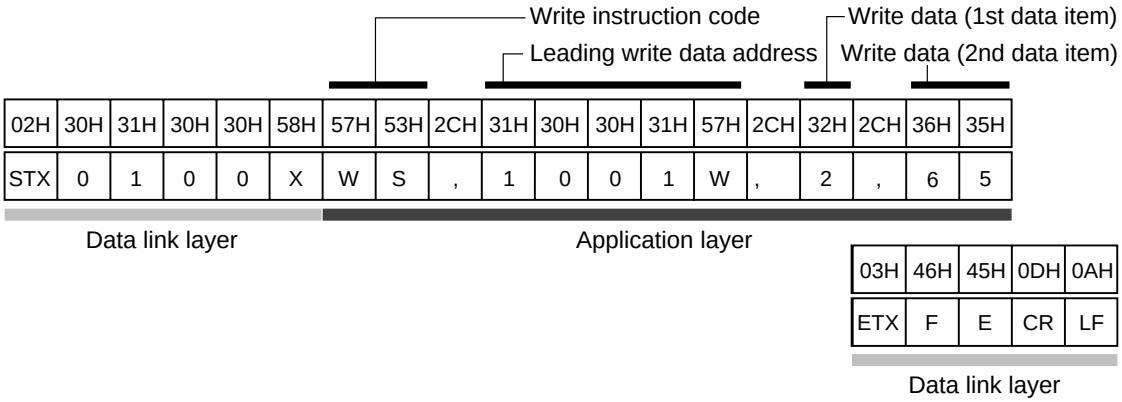
(3) When a numeric is positive, never prefix the numeric with a plus sign "+".

(4) Never add additional "0"s or spaces before a numeric.
Example : "0123" (30H, 31H, 32H, 33H) is not allowed.
Example : " 123" (20H, 31H, 32H, 33H) is not allowed.

4 - 5 Data Write

■ Description of Write Instruction

- This instruction permits the contents of continuous data addresses starting with the specified leading write data address to be simultaneously written in one message.
- The application layer of a write instruction consists of the following three types of data:



- Individual data items are delimited with a comma "," (character code 2CH).
- The write data count need not be specified.
- An upper-case character code is used for each numeric or character in the application layer.
- A decimal number is used for each numeric.
- Additional "0"s (30H) or spaces cannot be added to each data item.

Example : The underlined portion of "WS,01001W,2" is not allowed.
Example : The underlined portions of "WS, 1001W,02" are not allowed.
Example : The above example shows that "2" and "65" are written at address 1001W and 1002W in one message.

● Write instruction code (WS)

◆ Role : A write command
◇ Description : Two "WS" (57H, 53H) characters

● Leading write data address

◆ Role : Specifies the leading write data address.
- See **Chapter 5. "COMMUNICATION DATA TABLE"** for information on the relationship between data addresses and write data.
- Be sure to append the numeric representing the data address with "W" (57H).

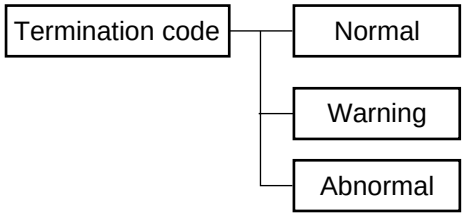
● Write data

◆ Role : Data to be written to continuous addresses starting with the specified data address.
◇ Description
- The range of a numeric to be written differs according to each data address.
- Individual data are delimited by a comma "," (2CH).
- The data address at which the corresponding data is written is incremented by 1 sequentially, starting with the leading data address (see the example given on the preceding page).
- The number of data item which can be written in one message is limited. See **Chapter 5. "COMMUNICATION DATA TABLE"** for details.

■ Write Response

◆ Role : When the message in the data link layer is correct, only the termination code is sent back.

◇ Description : The termination codes are classified as follows:



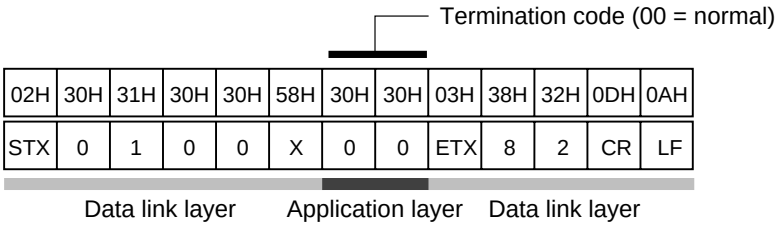
● Normal response/warning response

◆ Role : Returns how the write instruction message has been processed. Only a normal termination code or warning termination code is returned.

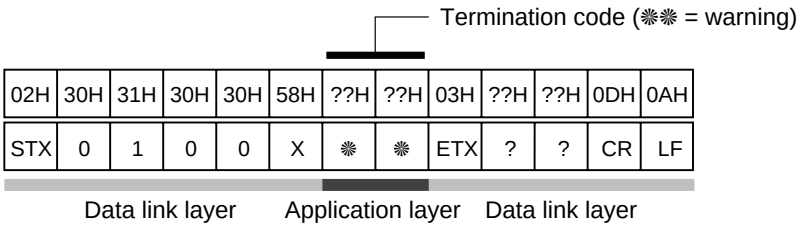
◇ Description : Information in the application layer

Termination code : A numeric specifying how the instruction message has been processed by the instrument.

Example : Normal response (when all data items are correctly written)



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



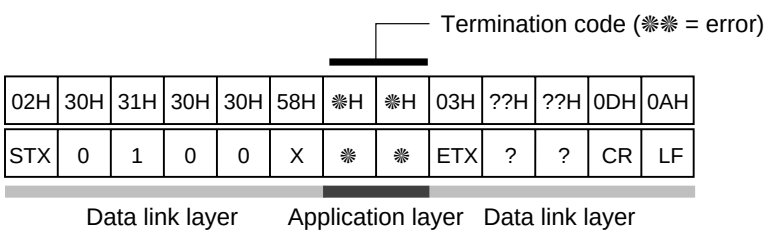
● Abnormal response

◆ Role : Only the abnormal termination code is returned.

◇ Description : Information in the application layer

Termination code : Indicates that there is an abnormality in the instruction message, and that write processing cannot be executed. See **4-6 "Termination Code Table"** for details.

Example : An abnormal response (❋❋ indicates an abnormal response.)



4 - 6 Termination Code Table

■ Normal and Abnormal Termination

Type	Response Code	Description	Reason for Occurrence	Read Data
Normal	00	Normal termination	Command has been processed normally.	Present
Abnormal	99	Command error	Undefined command has been received.	Not present
Abnormal	40	Format error	CPL application error	Not present
Abnormal	41	Data item number error	Too many or too few read data items	Not present
Abnormal	42	Address range error	Write address contains access inhibit flag.	—
Abnormal	43	Numeric abnormality error	Write data whose value is not within range -32768 to +32767 is included.	—
Abnormal	44	Numeric value range abnormal error	Write data other than the specified value is included.	—
Warning	46	Write inhibit status error	The write command was received in a write inhibit status.	—
Warning	81	Write inhibit data error	Write address contains a read-only address or an address relating to an unmounted channel.	—
Warning	30	Instrument control error	A nonexecutable control command has been received.	—
Warning	31	Write busy error	The write command was received during writing on the instrument.	—

* A “nonexecutable control command” is a control command that cannot be executed depending to the operating status of the recorder such as a feed request issued during printing.

* When two or more errors occur simultaneously, the response code having the higher priority is returned first.

4 - 7 Timing Specifications

■ Timing Specifications for Instruction and Response Messages

When a slave station is connected with the master station directly via the RS-232C interface, 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 the instruction message transmission by the master station until when the master station receives a response message from the slave station is one second ((1) in figure). So, the response time-out should be set to one second.

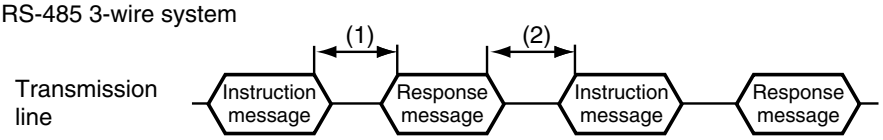
Generally, when a response time-out occurs, the instruction message is resent.

For details, see **Chapter 6. "COMMUNICATION PROGRAM FOR MASTER STATION."**

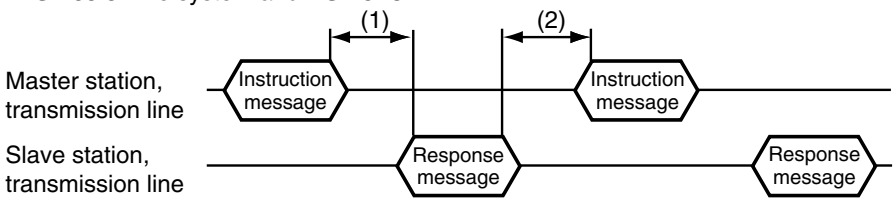
● Transmission start time

A wait time of 10ms 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 ((2) in figure).

• RS-485 3-wire system



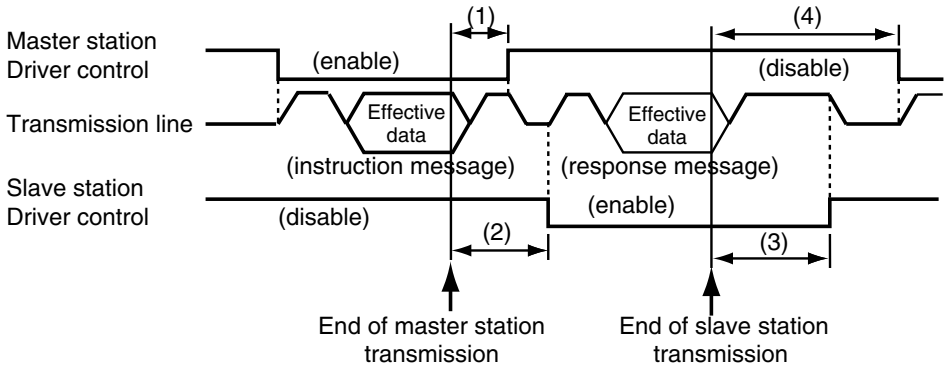
• RS-485 5-wire system and RS-232C



(1) End of master station transmission - Transmission start time of slave station = 1s max.
(2) End of slave station transmission - Transmission start time of master station = 10ms min.

■ RS-485 Driver Control Timing Specifications

When the transmission/reception on the RS-485 3-wire system is directly controlled by the master station, care should be paid to the following timing:



(1) End of master station transmission - Driver disable time = 500μs max.
(2) End of slave station reception - Driver enable time = 1ms min.
(3) End of slave station transmission - Driver disable time = 10ms max.
(4) End of master station reception - Driver enable time = 10ms min.

Chapter 5. COMMUNICATION DATA TABLE

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 (PV, event, etc.) of the instrument.
- Configuration: Data (event setting values, etc.) 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.). Bit data must be composed by transmission and decomposed by reception.
- Text data: Data indicating text.
  Text data (unit, tag name, etc.) must be converted according to the character code table.
  For details on character data, see **■SRF Character Code Table (App.-2)**.

IMPORTANT

Writing to EEPROM addresses is guaranteed only up to 100,000 times.

■ Communication Data Storage Memory

● Memory type

The communication data handled on the SRF206/212/224 (excluding some data items such as time data) is stored in the following two types of memory:

- 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 owing to device characteristics.

When data is written to RAM by communications on the SRF206/212/224, the data is also automatically written to EEPROM excluding control data and other data items.

● Communication memory devices

Data is transferred automatically between RAM and EEPROM as required. For this reason, there is no need to be conscious of these two types of memory.

■ Data Address

The data addresses are allocated as in the table below.

Communication Data	Address
Control data	300 to 399
Process data	400 to 449
Event data	450 to 499
Digital I/O	500 to 599
Common data	600 to 999
Segment table data	1000 to 1099
Channel data	nn00 to nn99 *
Communication data	3500 to 3999

* Address “nn” is a value obtained by adding “10” to channels “1” to “24”.
For example, “nn” becomes “11” in the case of channel 1.

■ Data Read/Write Count

The number of data items that can be read and written continuously in a single communication operation is determined within a range in which the command frame length is less than 256bytes.
Data in the continuous data that does not exist due to differences in model Nos. is handled as follows:

- Reading: “0” is read as dummy data (warning response is returned).
- Writing: Data is not written (warning response is returned).

! Handling Precautions

Command frames up to 256bytes in length sometimes cannot be handled depending on the hardware and software of the master station in use. (For example, N88 BASIC can handle only up to 255bytes.) If this happens, limit the command frame length to match the limitations of the master station.

■ Data Unit and Decimal Point Position

Read/write data is not appended with a decimal point.
The unit and decimal point position is determined for each data item.
For details on the data unit and decimal point position, see the SRF206/212/224 Installation/Operation Manual.

Example:
Let’s assume that the data to be read and written is numeric data “105”. The data unit and decimal point position is automatically determined by the data address and instrument setup items.
So, the numeric data “105” can have various meaning such as 10.5% and 105°C depending on the data address to be read and written.

5 - 2 Communication Data Table

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

Meaning of R/W column symbol
○ R/W enabled
X R/W disabled

■ Control Data

Item	Address	R	W	Meaning of Data
Recording start/stop	300	X	○	Starts/stops recording. 0: Stop recording 1: Start recording
• If “1” is written before a complete recording stop status (wire dot head is at home position) after “0” is written, response code 30 is returned. • If a write is carried out during chart feeding, response code 30 is returned. • If “1” is written during printing, the recording standby status is entered, and recording is resumed when printing ends. If “1” is written during recording standby, response code 30 is returned. • An error response is not returned even if “1” is written in a recording start status.				
Demand printing start/stop	301	X	○	Starts/stops demand printing. 0: Stop demand printing 1: Start demand printing
• If “1” is written during printing or chart feeding, response code 30 is returned.				
List printing start/stop	302	X	○	Starts/stops list printing. 0: Stop list printing 1: Start specified list printing 2: Start range/scale settings printing 3: Start event and DI/DO settings printing 4: Start MSG, S.DMD, UF and communications settings printing 5: Start segment table settings printing 6: Start all list printing 7: Start communications list printing
• If “1” to “7” is written during printing, chart feeding or recording, response code 30 is returned.				
Chart feed	303	X	○	Feeds chart by about 40mm. 0: Feed OFF 1: Starts chart feed
• Chart feed automatically stops when chart is fed 40mm. • Chart feed does not stop even if “0” is written during feeding. • If “1” is written during printing, chart feeding and recording, response code 30 is returned. • When the feed key on the instrument body is manipulated during chart feeding by this command, feed stops when the key is released.				
Start message printing	304	X	○	Prints eight messages 0: Printing OFF 1 to 8: Starts printing of No.1 to No.8 messages.
• Printing does not stop even if “0” is written during message printing. • If “1” is written with the message print buffer full, response code 30 is returned.				
Chart feed speed/scale selection	305	X	○	Switches chart feed speed/scale. 1: No.1 chart feed speed/No.1 scale 2: No.2 chart feed speed/No.2 scale
• The scale is switched according to the channel whose scale switching method is preset to contact input/communications. • When the power is turned OFF, this item is reset to 1 (No.1 chart feed speed/No.1 scale).				

Item	Address	R	W	Meaning of Data
Reset integrating calculation	306	X	○	Clears integrating calculation or F value calculation Bitmap data No.1 (see page 5-27) 0 to 63
• If “0” is written, the reset status stays as it is, and integrating calculation is not started unless “1” is written. • The initial status after the power is turned ON is “0” (reset). • If one of internal DI, external DI or communications is continuing when a DI function is set to integrating calculation reset, the integrating calculation is continued. (Integrating calculation is reset by all reset.)				
Clear batch counter	307	X	○	Clears the batch count to “0” 0: Continues count. 1: Clears count.
• If “1” is written, the count status is automatically returned to after it is cleared. • By clearing the batch counter, the batch count value is cleared to “0”. • If the batch count value is read before start of recording immediately after the batch counter is cleared, “0” is read. • The counter is incremented by “1” when recording is started. So, batch count “0” is never printed by recording printing.				
Recording status	310	○	X	Reads recording status. 0: Recording stopped 1: Recording in progress
• When recording is stopped during movement of the wire dot head, “0” is read even if a complete recording status is not entered.				
Demand printing status	311	○	X	Reads the demand printing status. 0: Demand printing stopped 1: Demand printing in progress
• When printing is stopped during movement of the wire dot head, “0” is read even if a complete printing status is not entered.				
List printing status	312	○	X	Reads the list printing status. 0: Stop list printing 1: Specified list printing 2: Range/scale settings printing 3: Event and DI/DO settings printing 4: MSG, S.DMD, UF and communications settings printing 5: Segment table settings printing 6: All list printing 7: Communications list printing
Chart feed status	313	○	X	Reads the chart feed status. 0: Chart feed stopped 1: Chart feed in progress
Message print status	314	○	X	Reads the message printing status. 0: Message printing stopped 1 to 8: No.1 to No.8 message printing in progress
Chart feed speed/ scale selection status	315	○	X	Reads the currently selected chart feed speed. 1: No.1 chart feed speed/No.1 scale 2: No.2 chart feed speed/No.2 scale
Integrating calculation status	316	○	X	Reads integrating calculation or F value calculation Bitmap data No.2 (see page 5-27) 0 to 16191
• Bits b0 to b5 indicate the status of integrating calculation reset (306W) that is written by communications. Integrating calculation sometimes is continued by DI even these bits are in a reset status. • Bits b8 to b13 indicate the status of the actual integrating calculation. These become “1” when one of communications, internal DI and external DI.				

Item	Address	R	W	Meaning of Data
Batch count value	317	○	X	Reads the current batch count value. 0 to 99
• By clearing the batch counter, the batch count value is cleared to “0”. • If the batch count value is read before the start of recording, immediately after the batch counter is cleared, “0” is read. • The counter is incremented by “1” when recording is started. So, batch count “0” is never printed by recording printing.				
Binary count value	318	○	X	Reads the binary count value. 0 to 99
Instrument alarm status	380	○	X	Reads the information of alarms that occur on the instrument. Bitmap data No.3 (see page 5-27) -32768 to +32767
Basic catalog No. information	397	○	X	Reads the basic catalog No. information of the instrument. 206: 6-dot model 212: 12-dot model 224: 24-dot model
Option information	398	○	X	Reads options that can be operated on the instrument. Bitmap data No.4 (see page 5-28) 0 to 254
• Optional functions that can be operated on the instrument may vary from the currently mounted optional functions.				
Software information	399	○	X	Reads the software version. 100h onwards The software version is expressed in Hexadecimal. For example: Version 1.13 = 113h, Version 0.25 = 25h

■ Process Data Area

Item	Address	R	W	Meaning of Data
Event status summary	400 401	❍	X	Reads the summary of the event occurrence status of channels 1 to 24. Bitmap data No.5 (see page 5-28) -32768 to +32767 Bitmap data No.6 (see page 5-28) 0 to 256
• Even if one of the upper and lower limit events of events No.1 to No.4 occurs, the assigned bit becomes “1”.				
PV value (channel 1)	411	❍	X	Reads the PV values of channels 1 to 24. -32767: Recording mode OFF -32768: Relative humidity calculation error -20000: Minus-side overload or overflow -19999 to +29999: Normal input 30000: Plus-side overload or overflow 32767: Non-measured data
PV value (channel 2)	412	❍	X	
PV value (channel 3)	413	❍	X	
PV value (channel 4)	414	❍	X	
PV value (channel 5)	415	❍	X	
PV value (channel 6)	416	❍	X	
PV value (channel 7)	417	❍	X	
PV value (channel 8)	418	❍	X	
PV value (channel 9)	419	❍	X	
PV value (channel 10)	420	❍	X	
PV value (channel 11)	421	❍	X	
PV value (channel 12)	422	❍	X	
PV value (channel 13)	423	❍	X	
PV value (channel 14)	424	❍	X	
PV value (channel 15)	425	❍	X	
PV value (channel 16)	426	❍	X	
PV value (channel 17)	427	❍	X	
PV value (channel 18)	428	❍	X	
PV value (channel 19)	429	❍	X	
PV value (channel 20)	430	❍	X	
PV value (channel 21)	431	❍	X	
PV value (channel 22)	432	❍	X	
PV value (channel 23)	433	❍	X	
PV value (channel 24)	434	❍	X	
• The PV value after calculation is read when the calculation has been set. • In the case of the ON/OFF range, 0 = OFF and 1 = ON. • For details on the decimal point in linear scale ranging, refer to the engineering range decimal point (page 5-21).				

Note : The content of the event status summary in the process data area (address 400W) is same as the event status summary in the event data (address 450W). And the content of the event status summary in the process data area (address 401W) is same as the event status summary in the event data (address 451W).

■ Event Data

Item	Address	R	W	Meaning of Data
Event status summary	450 451	❍	X	Reads the summary of the event occurrence status of channels 1 to 24. Bitmap data No.5 (see page 5-28) -32768 to +32767 Bitmap data No.6 (see page 5-28) 0 to 256
• Even if one of the upper and lower limit events of events No.1 to No.4 occurs, the assigned bit becomes “1”.				
Event status (channel 1)	461	❍	X	Reads the event occurrence status of channels 1 to 24. Bitmap data No.7 (see page 5-29) If the upper limit event or the lower limit event of No.1 to No.4 of each channel occurs, the assigned bit becomes "1".
Event status (channel 2)	462	❍	X	
Event status (channel 3)	463	❍	X	
Event status (channel 4)	464	❍	X	
Event status (channel 5)	465	❍	X	
Event status (channel 6)	466	❍	X	
Event status (channel 7)	467	❍	X	
Event status (channel 8)	468	❍	X	
Event status (channel 9)	469	❍	X	
Event status (channel 10)	470	❍	X	
Event status (channel 11)	471	❍	X	
Event status (channel 12)	472	❍	X	
Event status (channel 13)	473	❍	X	
Event status (channel 14)	474	❍	X	
Event status (channel 15)	475	❍	X	
Event status (channel 16)	476	❍	X	
Event status (channel 17)	477	❍	X	
Event status (channel 18)	478	❍	X	
Event status (channel 19)	479	❍	X	
Event status (channel 20)	480	❍	X	
Event status (channel 21)	481	❍	X	
Event status (channel 22)	482	❍	X	
Event status (channel 23)	483	❍	X	
Event status (channel 24)	484	❍	X	

Note : The content of the event status summary in the process data area (address 400W) is same as the event status summary in the event data (address 450W). And the content of the event status summary in the process data area (address 401W) is same as the event status summary in the event data (address 451W).

■ Digital I/O Area (data area)

Item	Address	R	W	Meaning of Data
External switch input status summary	500	○	X	Reads the summary of No.1 to No.12 external switch input status. Bitmap data No.8 (see page 5-29) 0 to 4095
No.1 external switch input	501	○	X	Reads the status of No.1 to No.12 external switch input status. 0: OFF 1: ON
No.2 external switch input	502	○	X	
No.3 external switch input	503	○	X	
No.4 external switch input	504	○	X	
No.5 external switch input	505	○	X	
No.6 external switch input	506	○	X	
No.7 external switch input	507	○	X	
No.8 external switch input	508	○	X	
No.9 external switch input	509	○	X	
No.10 external switch input	510	○	X	
No.11 external switch input	511	○	X	
No.12 external switch input	512	○	X	
Internal contact input status summary	520	○	X	Reads the summary of No.1 to No.12 internal switch input status. Bitmap data No.8 (see page 5-29) 0 to 4095
No.1 internal contact input	521	○	X	Reads the No.1 to No.12 internal contact input status. 0: OFF 1: ON
No.2 internal contact input	522	○	X	
No.3 internal contact input	523	○	X	
No.4 internal contact input	524	○	X	
No.5 internal contact input	525	○	X	
No.6 internal contact input	526	○	X	
No.7 internal contact input	527	○	X	
No.8 internal contact input	528	○	X	
No.9 internal contact input	529	○	X	
No.10 internal contact input	530	○	X	
No.11 internal contact input	531	○	X	
No.12 internal contact input	532	○	X	

Item	Address	R	W	Meaning of Data
Relay output status summary	540	○	X	Reads the summary of the No.1 to No.12 relay output status. Bitmap data No.8 (see page 5-29) 0 to 4095
No.1 relay output	541	○	X	Reads the No.1 to No.12 relay output status. 0: OFF 1: ON
No.2 relay output	542	○	X	
No.3 relay output	543	○	X	
No.4 relay output	544	○	X	
No.5 relay output	545	○	X	
No.6 relay output	546	○	X	
No.7 relay output	547	○	X	
No.8 relay output	548	○	X	
No.9 relay output	549	○	X	
No.10 relay output	550	○	X	
No.11 relay output	551	○	X	
No.12 relay output	552	○	X	
Open collector output status summary	560	○	X	Reads the summary of the No.1 to No.12 open collector output status. Bitmap data No.8 (see page 5-29) 0 to 4095
No.1 open collector output	561	○	X	Reads the No.1 to No.12 open collector output status. 0: OFF 1: ON
No.2 open collector output	562	○	X	
No.3 open collector output	563	○	X	
No.4 open collector output	564	○	X	
No.5 open collector output	565	○	X	
No.6 open collector output	566	○	X	
No.7 open collector output	567	○	X	
No.8 open collector output	568	○	X	
No.9 open collector output	569	○	X	
No.10 open collector output	570	○	X	
No.11 open collector output	571	○	X	
No.12 open collector output	572	○	X	

■ Common Data Area (common setup items)

Item	Address	R	W	Meaning of Data
No.1 chart feed speed	600	○	○	Sets and reads the No.1 chart feed speed. 1 to 480 (mm/h)
No.2 chart feed speed	601	○	○	Sets and reads the No.2 chart feed speed. 1 to 480 (mm/h)
Fixed date interval timer	602	○	○	Sets and reads the fixed date interval timer. 1: 10min 2: 20min 3: 30min 4: 1h 5: 2h 6: 3h 7: 6h 8: 12h 9: 24h
Fixed time interval timer (h)	603	○	○	Sets and reads the fixed time interval timer. H: 0 to 23 Min: 0 to 59
Fixed time interval timer (min)	604	○	○	
The possible setting range is 00:05 to 23:59. If an attempt is made to set less than 5min, a numerical value range error (response code 44) is returned.				
Clock: Year	605	○	○	Sets and reads the clock date and time. Year: 0 to 99 Month: 1 to 12 Day: 1 to 31 H: 0 to 23 Min: 0 to 59
Clock: Month	606	○	○	
Clock: Day	607	○	○	
Clock: H	608	○	○	
Clock: Min	609	○	○	
• Non-existent dates (e.g. February 30th) cannot be set. • If an attempt is made to set a non-existent date, a numerical value range error (response code 44) is returned. • If “0” to “89” is written, the year becomes 2000 onwards, and if “90” to “98” is written, the year becomes 1990 onwards.				
Configuration lock	610	○	○	Reads the setting inhibited (lock), setting permitted (unlock) and configuration lock setup on the SRF display setup unit. 0: Unlock 1: Lock
Menu level	611	○	○	Sets and reads the menu level. 0: Level 0 displayed 1: Levels 0 and 1 displayed 2: All items displayed
Recording format	612	○	○	Sets and reads the recording format. 1: Trend 2: Trend + tabulation 3: Trend + schedule demand 4: Fixed interval tabulation 5: Fixed time tabulation
Recorder ID No.	613	○	○	Writes and reads the recorder ID No. 0 to 99

Item	Address	R	W	Meaning of Data
Recording time ON/OFF	614	○	○	Sets and reads recording time ON/OFF. 0: OFF 1: ON
Scale recording ON/OFF	615	○	○	Sets and reads scale recording ON/OFF. 0: OFF 1: ON
Recording color selection	616	○	○	Selects and reads the recording color. 1: Standard type 2: DIN type
Communications access rights	617	○	X	Reads the communications access rights when the area is accessed by CPL communications. 1: Read only 2: Read/Write
• Only during reading, writing is not possible even on write-accessible areas. • Even during reading and writing, writing is not possible on only read-accessible areas, and reading is not possible on only write-accessible areas.				
Station address	618	○	X	Reads the communications address used in CPL communications. 0 to 127
• When “0” is set, CPL communications is not possible.				
Communications method	619	○	X	Reads the communications method for CPL communications. 1: 4800bps, even parity, 1 stop bit 2: 4800bps, no parity, 2 stop bits 3: 9600bps, even parity, 1 stop bit 4: 9600bps, no parity, 2 stop bits

■ Common Data Area (schedule demand printing)

Item	Address	R	W	Meaning of Data
Time setup ON/OFF	630	○	○	Sets and reads the No.1 to No.8 time setup used in schedule demand printing. 0: OFF 1: No.1 time setup ON (enabled) 2: No.1 and No.2 time setup ON (enabled) 3: No.1 to No.3 time setup ON (enabled) 4: No.1 to No.4 time setup ON (enabled) 5: No.1 to No.5 time setup ON (enabled) 6: No.1 to No.6 time setup ON (enabled) 7: No.1 to No.7 time setup ON (enabled) 8: No.1 to No.8 time setup ON (enabled)
No.1 time setup: h	631	○	○	Sets and reads the time when schedule demand printing is carried out. h: 0 to 23 min: 0 to 59
No.1 time setup: min	632			
No.2 time setup: h	633			
No.2 time setup: min	634			
No.3 time setup: h	635			
No.3 time setup: min	636			
No.4 time setup: h	637			
No.4 time setup: min	638			
No.5 time setup: h	639			
No.5 time setup: min	640			
No.6 time setup: h	641			
No.6 time setup: min	642			
No.7 time setup: h	643			
No.7 time setup: min	644			
No.8 time setup: h	645			
No.8 time setup: min	646			
• If the time setup is not set to ON by 630W, demand printing is not carried out at the set time.				

■ Common Data Area (messages)

Item	Address	R	W	Meaning of Data
No.1 message (1st character) to (12th character)	650 to 661	○	○	Character codes by which 12 characters used for printing messages are set and read Refer to Appendix, SRF Character Codes.
No.2 message (1st character) to (12th character)	662 to 673			
No.3 message (1st character) to (12th character)	674 to 685			
No.4 message (1st character) to (12th character)	686 to 697			
No.5 message (1st character) to (12th character)	698 to 709			
No.6 message (1st character) to (12th character)	710 to 721			
No.7 message (1st character) to (12th character)	722 to 733			
No.8 message (1st character) to (12th character)	734 to 745			

■ Common Data Area (digital input)

Item	Address	R	W	Meaning of Data
No.1 external switch input	751	○	○	Sets and reads the No.1 to No.12 external switch inputs. 0: Function setup OFF 1: Recording ON/OFF (all channels unconditionally) 2: Print on demand 3: Print all lists 4: Print specified lists 5: Chart feed 6: Print communications list 7: Chart feed speed/scale selection 8: Clear batch counter 11 to 16: Clear integrating calculation No.1 to No.6 21 to 28: Print No.1 to No.8 messages 31: Recording ON/OFF (channels 1 to 3) 32: Recording ON/OFF (channels 4 to 6) 33: Recording ON/OFF (channels 7 to 9) 34: Recording ON/OFF (channels 10 to 12) 35: Recording ON/OFF (channels 13 to 18) 36: Recording ON/OFF (channels 19 to 24) 40: BIN code input (bit 0) 41: BIN code input (bit 1) 42: BIN code input (bits 2) 43: BIN code input (bits 3) 44: BIN code input (bits 4) 45: BIN code input (bits 5)
No.2 external switch input	752			
No.3 external switch input	753			
No.4 external switch input	754			
No.5 external switch input	755			
No.6 external switch input	756			
No.7 external switch input	757			
No.8 external switch input	758			
No.9 external switch input	759			
No.10 external switch input	760			
No.11 external switch input	761			
No.12 external switch input	762			
• Channels in which the scale is selected by digital inputs is set by the scale switching method for each channel.				
No.1 internal contact input	771	○	○	Sets and reads the No.1 to No.12 internal switch inputs. 0: Function setup OFF 1: Recording ON/OFF (all channels unconditionally) 2: Print on demand 3: Print all lists 4: Print specified lists 5: Chart feed 6: Print communications list 7: Chart feed speed/scale selection 8: Clear batch counter 11 to 16: Clear integrating calculation No.1 to No.6 21 to 28: Print No.1 to No.8 messages 31: Recording ON/OFF (channels 1 to 3) 32: Recording ON/OFF (channels 4 to 6) 33: Recording ON/OFF (channels 7 to 9) 34: Recording ON/OFF (channels 10 to 12) 35: Recording ON/OFF (channels 13 to 18) 36: Recording ON/OFF (channels 19 to 24) 40: BIN code input (bit 0) 41: BIN code input (bit 1) 42: BIN code input (bits 2) 43: BIN code input (bits 3) 44: BIN code input (bits 4) 45: BIN code input (bits 5)
No.2 internal contact input	772			
No.3 internal contact input	773			
No.4 internal contact input	774			
No.5 internal contact input	775			
No.6 internal contact input	776			
No.7 internal contact input	777			
No.8 internal contact input	778			
No.9 internal contact input	779			
No.10 internal contact input	780			
No.11 internal contact input	781			
No.12 internal contact input	782			
• Channels in which the scale is selected by digital inputs is set by the scale switching method for each channel.				

■ Common Data Area (digital output)

Item	Address	R	W	Meaning of Data
No.1 relay output	801	○	○	Sets and reads the No.1 to No.12 relay outputs. 0: OR action/excitation/non-hold 1: OR action/excitation/hold 2: OR action/non-excitation/non-hold 3: OR action/non-excitation/hold 4: AND action/excitation/non-hold 5: AND action/excitation/hold 6: AND action/non-excitation/non-hold 7: AND action/non-excitation/hold 8: OR action/excitation/non-hold/event re-output 9: OR action/non-excitation/non-hold/event re-output
No.2 relay output	802			
No.3 relay output	803			
No.4 relay output	804			
No.5 relay output	805			
No.6 relay output	806			
No.7 relay output	807			
No.8 relay output	808			
No.9 relay output	809			
No.10 relay output	810			
No.11 relay output	811			
No.12 relay output	812			
No.1 open collector output	821	○	○	Sets and reads the No.1 to No.12 open collector outputs. 0: OR action/excitation/non-hold 1: OR action/excitation/hold 2: OR action/non-excitation/non-hold 3: OR action/non-excitation/hold 4: AND action/excitation/non-hold 5: AND action/excitation/hold 6: AND action/non-excitation/non-hold 7: AND action/non-excitation/hold 8: OR action/excitation/non-hold/event re-output 9: OR action/non-excitation/non-hold/event re-output
No.2 open collector output	822			
No.3 open collector output	823			
No.4 open collector output	824			
No.5 open collector output	825			
No.6 open collector output	826			
No.7 open collector output	827			
No.8 open collector output	828			
No.9 open collector output	829			
No.10 open collector output	830			
No.11 open collector output	831			
No.12 open collector output	832			

■ Common Data Area (user functions)

Item	Address	R	W	Meaning of Data
User function 1 key basic registration	850	○	○	Sets and reads the basic registration of the user function 1 key. 0: OFF 1: Output to internal contact input No.1 2: Call up setup items
User function 1 assignment 1	851			Sets and reads the user function 1 key. Value obtained by adding the following cardinal numbers to the screen No. of the setup to be registered as “0”. Setup 0: No assignment Setup Item ..... Cardinal Number Event ..... 1nn00 Chart feed speed ..... 1000 Date/time ..... 1500 System ..... 2000 Range ..... 2nn00 (Calculation setup is range setup + 5000) Scale ..... 3nn00 Copy ..... 6500 Schedule demand ..... 2500 Message ..... 3000 Extended ..... 3500 External switch input ..... 4000 Internal contact input ..... 4100 Relay output ..... 4200 Open collector output ..... 4300 Segment 1 X-axis ..... 5000 Segment 1 Y-axis ..... 5100 Segment 2 X-axis ..... 5200 Segment 2 Y-axis ..... 5300 Segment 3 X-axis ..... 5400 Segment 3 Y-axis ..... 5500 “nn” indicates the channel No. Values converted to decimal from hexadecimal are used for the screen No.
User function 1 assignment 2	852			
User function 1 assignment 3	853			
User function 1 assignment 4	854			
User function 1 assignment 5	855			
User function 1 assignment 6	856			
User function 1 assignment 7	857			
User function 1 assignment 8	858			
User function 2 key basic registration	860	○	○	Sets and reads the basic registration of the user function 2 key. 0: OFF 1: Output to internal contact input No.2 2: Call up setup items
User function 2 assignment 1	861	○	○	Same as user function 1 assignment
User function 2 assignment 2	862			
User function 2 assignment 3	863			
User function 2 assignment 4	864			
User function 2 assignment 5	865			
User function 2 assignment 6	866			
User function 2 assignment 7	867			
User function 2 assignment 8	868			
The calculation setup cardinal number is the value obtained by adding “5000” to the range setup cardinal number.				

■ Common Data Area (copy)

Item	Address	R	W	Meaning of Data
Copy source channel	900	○	○	Sets and reads the copy source channel in channel data copying. 1 to number of channels
Copy destination channel lower limit	901	○	○	Sets and reads the copy destination channel lower limit in channel data copying. 1 to (902W) value
• When 901W and 902W are written simultaneously by a single write command, the 902W data to be written simultaneously is written normally, if it is greater than the 901W data to be written, even if the 901W data to be written is greater than the 902W data before it is written. For example, when 901W=1 and 902W=2, 901W=3/902W=4 can be written simultaneously.				
Copy destination channel upper limit	902	○	○	Sets and reads the copy destination channel upper limit in channel data copying. (901W) value to number of channels
Copy execution	903	○	○	Executes copying and reads the copy state. 0: Execution OFF/end copy 1: Copy all data 2: Copy range, calculation and scale data 3: Copy event data 4: Copy tag data 5: Copy engineering unit data
• When writing to EEPROM is started by copy execution, the response is returned before writing is completed. If the command (even other than the copy execution command) for writing to EEPROM is received before writing is completed, response code 31 is returned. • When a read is carried out, “0” is always read. Accordingly, read does not become an error response. However, it is meaningless. • When addresses 900W to 903W contain erroneous data, not all data from 900W to 903W is written, and an error is returned. • The data (0 to 5) to be written to 903W is not written to EPPROM. However, the data to be copied is written to EEPROM. • When the values of the upper and lower limits of the copy destination channel are inverted, a numerical value range error (response code 44) is returned.				

■ Common Data Area (extended setup)

Item	Address	R	W	Meaning of Data
Initial printing ON/OFF	910	○	○	Switches initial printing (printing of various parameters carried out when recording is started) ON/OFF. 0: OFF 1: ON
Count function switching	911	○	○	Switches the type of count to be printed. 0: Batch count 1: BIN code
Date type selection	912	○	○	Selects the format of the date to be printed. 0: JP (YY, MM, DD) 1: US (MM, DD, YY) 2: EU (DD, MM, YY)
• JP (Japanese format): The date is printed out as “1997/09/29” • US (American format): The date is printed out as “SEP,29,'97”. • EU (European format): The date is printed out as “29,09,1997”.				
Atmosphere	913	○	○	Sets and reads the atmospheric pressure of the parameters used for calculating the relative humidity. 670 to 1330 (hPa)
Thermal resistance	914	○	○	Sets and reads the resistance of the parameters used for calculating the F value. 10 to 200
Reference contact compensation	915	○	○	Sets reference contact compensation inside the instrument. 0: Internally OFF 1: Internally ON

■ Segment Table Area

Item	Address	R	W	Meaning of Data
Segment table 1 X-axis point 01	1000	○	○	Sets and reads the break points in the segment table. -1000 to +11000 -1000 means -10.00%, and 11000 means 110.00%
Segment table 1 X-axis point 02	1001			
Segment table 1 X-axis point 03	1002			
Segment table 1 X-axis point 04	1003			
Segment table 1 X-axis point 05	1004			
Segment table 1 X-axis point 06	1005			
Segment table 1 X-axis point 07	1006			
Segment table 1 X-axis point 08	1007			
Segment table 1 X-axis point 09	1008			
Segment table 1 X-axis point 10	1009			
Segment table 1 X-axis point 11	1010			
Segment table 1 X-axis point 12	1011			
Segment table 1 X-axis point 13	1012			
Segment table 1 X-axis point 14	1013			
Segment table 1 X-axis point 15	1014			
• Writing is possible even if the segment table is not used (nn19W=0).				
Segment table 1 Y-axis point 01	1015	○	○	Sets and reads the break points in the segment table. -1000 to +11000 -1000 means -10.00%, and 11000 means 110.00%
Segment table 1 Y-axis point 02	1016			
Segment table 1 Y-axis point 03	1017			
Segment table 1 Y-axis point 04	1018			
Segment table 1 Y-axis point 05	1019			
Segment table 1 Y-axis point 06	1020			
Segment table 1 Y-axis point 07	1021			
Segment table 1 Y-axis point 08	1022			
Segment table 1 Y-axis point 09	1023			
Segment table 1 Y-axis point 10	1024			
Segment table 1 Y-axis point 11	1025			
Segment table 1 Y-axis point 12	1026			
Segment table 1 Y-axis point 13	1027			
Segment table 1 Y-axis point 14	1028			
Segment table 1 Y-axis point 15	1029			
• Writing is possible even if the segment table is not used (nn19W=0).				

Item	Address	R	W	Meaning of Data
Segment table 2 X-axis point 01	1030	○	○	Sets and reads the break points in the segment table. -1000 to +11000 -1000 means -10.00%, and 11000 means 110.00%
Segment table 2 X-axis point 02	1031			
Segment table 2 X-axis point 03	1032			
Segment table 2 X-axis point 04	1033			
Segment table 2 X-axis point 05	1034			
Segment table 2 X-axis point 06	1035			
Segment table 2 X-axis point 07	1036			
Segment table 2 X-axis point 08	1037			
Segment table 2 X-axis point 09	1038			
Segment table 2 X-axis point 10	1039			
Segment table 2 X-axis point 11	1040			
Segment table 2 X-axis point 12	1041			
Segment table 2 X-axis point 13	1042			
Segment table 2 X-axis point 14	1043			
Segment table 2 X-axis point 15	1044			
• Writing is possible even if the segment table is not used (nn19W=0).				
Segment table 2 Y-axis point 01	1045	○	○	Sets and reads the break points in the segment table. -1000 to +11000 -1000 means -10.00%, and 11000 means 110.00%
Segment table 2 Y-axis point 02	1046			
Segment table 2 Y-axis point 03	1047			
Segment table 2 Y-axis point 04	1048			
Segment table 2 Y-axis point 05	1049			
Segment table 2 Y-axis point 06	1050			
Segment table 2 Y-axis point 07	1051			
Segment table 2 Y-axis point 08	1052			
Segment table 2 Y-axis point 09	1053			
Segment table 2 Y-axis point 10	1054			
Segment table 2 Y-axis point 11	1055			
Segment table 2 Y-axis point 12	1056			
Segment table 2 Y-axis point 13	1057			
Segment table 2 Y-axis point 14	1058			
Segment table 2 Y-axis point 15	1059			
• Writing is possible even if the segment table is not used (nn19W=0).				

Item	Address	R	W	Meaning of Data
Segment table 3 X-axis point 01	1060	○	○	Sets and reads the break points in the segment table. -1000 to +11000 -1000 means -10.00%, and 11000 means 110.00%
Segment table 3 X-axis point 02	1061			
Segment table 3 X-axis point 03	1062			
Segment table 3 X-axis point 04	1063			
Segment table 3 X-axis point 05	1064			
Segment table 3 X-axis point 06	1065			
Segment table 3 X-axis point 07	1066			
Segment table 3 X-axis point 08	1067			
Segment table 3 X-axis point 09	1068			
Segment table 3 X-axis point 10	1069			
Segment table 3 X-axis point 11	1070			
Segment table 3 X-axis point 12	1071			
Segment table 3 X-axis point 13	1072			
Segment table 3 X-axis point 14	1073			
Segment table 3 X-axis point 15	1074			
• Writing is possible even if the segment table is not used (nn19W=0).				
Segment table 3 Y-axis point 01	1075	○	○	Sets and reads the break points in the segment table. -1000 to +11000 -1000 means -10.00%, and 11000 means 110.00%
Segment table 3 Y-axis point 02	1076			
Segment table 3 Y-axis point 03	1077			
Segment table 3 Y-axis point 04	1078			
Segment table 3 Y-axis point 05	1079			
Segment table 3 Y-axis point 06	1080			
Segment table 3 Y-axis point 07	1081			
Segment table 3 Y-axis point 08	1082			
Segment table 3 Y-axis point 09	1083			
Segment table 3 Y-axis point 10	1084			
Segment table 3 Y-axis point 11	1085			
Segment table 3 Y-axis point 12	1086			
Segment table 3 Y-axis point 13	1087			
Segment table 3 Y-axis point 14	1088			
Segment table 3 Y-axis point 15	1089			
• Writing is possible even if the segment table is not used (nn19W=0).				

■ Channel Data (range)

Address "nn" is a value obtained by adding "10" to channels "1" to "24".
For example, "nn" becomes "11" in the case of channel 1.

Item	Address	R	W	Meaning of Data
Recording mode	nn00	❍	❍	Sets and reads the recording mode. 0: OFF 1: Display 2: Display + recording 3: Digital input-dependent
Range code	nn01	❍	❍	Sets and reads the range codes to be used. See Range Code Table (page 5-30).
• If the range code is written, the following are initialized to their defaults: measurement range decimal point/lower limit/upper limit, engineering range decimal point/lower limit/upper limit, PV bias value, No.1 and No.2 scale lower limit/upper limit, scale switching method, auto-switching point and auto-switching differential. • When the range code is set to the communications input B or ON/OFF, a sub-code number is required.				
Sub-code No.	nn02	❍	❍	If set for ON/OFF input range; Sets and reads the sub-code No. See table for "Digital data acquisition point address" (page 5-31). If set for communications input B; Sets and reads the sub-code No. See table for "PV data acquisition point address" (page 5-31).
• Settings are enabled only in the case of the communications input B or ON/OFF input range.				
Burnout	nn03	❍	❍	Sets and reads operation at burnout. 0: OFF 1: UP 2: DOWN
Measurement range decimal point	nn04	❍	X	Reads the measurement range decimal point. 0: No digits past the decimal point XXXXX 1: 1 digit past the decimal point XXXX.X 2: 2 digits past the decimal point XXX.XX 3: 3 digits past the decimal point XX.XXX 4: 4 digits past the decimal point X.XXXX
Measurement range lower limit	nn05	❍	❍	Sets and reads the measurement range lower limit. -19999 to +29999
• Set the measurement range lower limit so that it is smaller than the measurement range upper limit. • When the range code is changed, settings are initialized to their defaults. • For details on the decimal point, refer to the measurement range decimal point (address: nn04W).				
Measurement range upper limit	nn06	❍	❍	Sets and reads the measurement range upper limit. -19999 to +29999
• Set the measurement range lower limit so that it is smaller than the measurement range upper limit. • When the measurement range lower limit is set so that it is equal to or greater than the measurement range upper limit, a numerical value range error (response code 44) is returned. • When the range code is changed, settings are initialized to their defaults. • For details on the decimal point, refer to the measurement range decimal point (address: nn04W).				

Item	Address	R	W	Meaning of Data
Engineering range decimal point	nn07	○	○	Sets and reads the engineering range decimal point. 0: No digits past the decimal point XXXXX 1: 1 digit past the decimal point XXXX.X 2: 2 digits past the decimal point XXX.XX 3: 3 digits past the decimal point XX.XXX 4: 4 digits past the decimal point X.XXXX
• If the scaling is not linear the range code setting is disabled. • When the range code is changed, settings are initializ ed to their defaults.				
Engineering range lower limit	nn08	○	○	Sets and reads the engineering range lower limit. -19999 to +29999
• For details on the decimal point, refer to the engineering range decimal point (address: nn07W). • When the range code is changed, settings are initializ ed to their defaults.				
Engineering range upper limit	nn09	○	○	Sets and reads the engineering range upper limit. -19999 to +29999
• For details on the decimal point, refer to the engineering range decimal point (address: nn07W). • When the range code is changed, settings are initializ ed to their defaults.				
PV filter	nn10	○	○	Sets and reads the PV filter. 0 to 15
• Settings are disabled in the case of the communications input range and ON/OFF input range.				
PV bias	nn11	○	○	Sets and reads the PV bias. -19999 to +29999
• Settings are disabled in the case of the communications input range and ON/OFF input range. • When the range code is changed, settings are initializ ed to their defaults.				

■ Channel Data (calculation)

Address "nn" is a value obtained by adding "10" to channels "1" to "24".
For example, "nn" becomes "11" in the case of channel 1.

Item	Address	R	W	Meaning of Data
Input calculation type	nn15	❍	❍	Sets and reads the input calculation type. 0: OFF (PV value) 1: Channel A - channel B 2: Fixed value - current channel 3: Current channel - fixed value 4: Integrating calculation 5: F value calculation 6: Relative humidity calculation
• When the input calculation type is changed, calculation parameters 1 to 3 are initialized to their defaults.				
Calculation parameter 1	nn16	❍	❍	Sets and reads calculation parameter 1. • When input calculation type is set to "1": 1 to number of channels: Ach of inter-channel deviation • When input calculation type is set to "2": -19999 to +29999:fixed value of fixed value deviation • When input calculation type is set to "3": -19999 to +29999:fixed value of fixed value deviation • When input calculation type is set to "4": 0: Integrating unit set to "s" 1: Integrating unit set to "min" 2: Integrating unit set to "h" • When input calculation type is set to "5": 0 to 2000: Value 10 times the standard reference temperature of F value calculation (Example: "121.1°C" becomes "1211".) • When input calculation type is set to "6": 1 to number of channels: dry-bulb temperature input channel
• This setting is disabled when the input calculation type is set to OFF. In this case, the numerical value range is in error if a value other than "0" is written. • When the input calculation type is changed, the settings are initialized to their defaults.				
Calculation parameter 2	nn17	❍	❍	Sets and reads the calculation parameter 2. • When input calculation type is set to "1": 1 to number of channels: Bch of inter-channel deviation • When input calculation type is set to "4": 1 to 6: reset number of integrating calculation • When input calculation type is set to "5": 1 to 6: reset number of F value calculation • When input calculation type is set to "6": 0: Large wind speed (2.5m/s or more) 1: Medium wind speed (0.5 to 2.5m/s) 2: Small wind speed (0.5m/s or less)
• This setting is disabled when the input calculation type is set to OFF or fixed value deviation. In this case, the numerical value range is in error if a value other than "0" is written. • When the input calculation type is changed, the settings are initialized to their defaults.				
Calculation parameter 3	nn18	❍	❍	Sets and reads integrating parameter 3. 0 to 10: Integration weighting
• This setting is disabled when the input calculation type is set to other than integrating type. In this case, "0" to "10" can be written. • When the input calculation type is changed, the settings are initialized to their defaults.				
Segment table use	nn19	❍	❍	Sets and reads segment table use. 0: Use disabled 1: Use segment table 1 2: Use segment table 2 3: Use segment table 3

■ Channel Data (scale)

Address “nn” is a value obtained by adding “10” to channels “1” to “24”.
For example, “nn” becomes “11” in the case of channel 1.

Item	Address	R	W	Meaning of Data
No.1 scale lower limit	nn20	❍	❍	Sets and reads the No.1 scale lower limit value. -19999 to +29999
• When the range code is changed, settings are initialized to their defaults. • For details on the decimal point, refer to the engineering range decimal point (address: nn07W).				
No.1 scale upper limit	nn21	❍	❍	Sets and reads the No.1 scale upper limit value. -19999 to +29999
• When the range code is changed, settings are initialized to their defaults. • For details on the decimal point, refer to the engineering range decimal point (address: nn07W).				
Scale switching method	nn22	❍	❍	Sets and reads the scale switching method 0: OFF 1: Automatic 2: External switch input, internal contact input or CPL communications
• When the range code is changed, settings are initialized to their defaults.				
No.2 scale lower limit	nn23	❍	❍	Sets and reads the No.2 scale lower limit value. -19999 to +29999
• When the range code is changed, settings are initialized to their defaults. • For details on the decimal point, refer to the engineering range decimal point (address: nn07W).				
No.2 scale upper limit	nn24	❍	❍	Sets and reads the No.2 scale upper limit value. -19999 to +29999
• When the range code is changed, settings are initialized to their defaults. • For details on the decimal point, refer to the engineering range decimal point (address: nn07W).				
Auto-switching point	nn25	❍	❍	Sets and reads the auto-switching point. -19999 to +29999
• When the range code is changed, settings are initialized to their defaults. Settings are not initialized even if the scale switching method is changed. • For details on the decimal point, refer to the engineering range decimal point (address: nn07W)				
Auto-switching differential	nn26	❍	❍	Sets and reads the auto-switching differential. 0 to 29999
• When the range code is changed, settings are initialized to their defaults. Settings are not initialized even if the scale switching method is changed. • For details on the decimal point, refer to the engineering range decimal point (address: nn07W)				
Scale selection status	nn27	❍	❍	Reads the scale selection status. 1: No.1 scale 2: No.2 scale

■ Channel Data (event)

- Address “nn” is a value obtained by adding “10” to channels “1” to “24”. For example, “nn” becomes “11” in the case of channel 1.
- For details on the decimal point, refer to the engineering range decimal point (address: nn07W).

Item	Address	R	W	Meaning of Data
No.1 event setting value	nn40	❍	❍	Sets and reads the No.1 to No.4 event setting values. -19999 to +29999
No.2 event setting value	nn41			
No.3 event setting value	nn42			
No.4 event setting value	nn43			
No.1 event type selection	nn44	❍	❍	Sets and reads the No.1 to No.4 event type selection. 0: OFF 1: LOW 2: HIGH
No.2 event type selection	nn45			
No.3 event type selection	nn46			
No.4 event type selection	nn47			
No.1 event differential	nn48	❍	❍	Sets and reads the No.1 to No.4 event differential value. 0 to 29999
No.2 event differential	nn49			
No.3 event differential	nn50			
No.4 event differential	nn51			
No.1 event recording ON/OFF	nn52	❍	❍	Sets and reads the No.1 to No.4 event recording ON/OFF. 0: OFF 1: ON
No.2 event recording ON/OFF	nn53			
No.3 event recording ON/OFF	nn54			
No.4 event recording ON/OFF	nn55			
No.1 event output destination	nn56	❍	❍	Sets and reads the No.1 to No.4 event output destination. 0: OFF 1 to 12: No.1 to No.12 relay output 13 to 24: No.1 to No.12 open collector output 25 to 36: No.1 to No.12 internal contact input
No.2 event output destination	nn57			
No.3 event output destination	nn58			
No.4 event output destination	nn59			
Tag (1st character) to (12th character)	nn60 to nn71	❍	❍	Writes and reads the tag character string (12 characters). Refer to Appendix, SRF Character Codes.
Engineering unit (1st character) to (6th character)	nn80 to nn85	❍	❍	Writes and reads the engineering unit string (6 characters). Refer to Appendix, SRF Character Codes.

■ Communication Data Area

Item	Address	R	W	Meaning of Data
Communications PV value (communications input A *1 or communications input B *2)	3500 to 3523	○	○	Writes and reads the communications PV value. -19999 to +29999
• The communications PV value becomes “not fixed” when the power is turned ON again.				
Communication list 1st line (1st character) to (85th character)	3600 to 3684	○	○	Writes and reads the printed characters on the 1st and 3rd lines of the communications list. Refer to Appendix, SRF Character Codes.
Communication list 2nd line (1st character) to (85th character)	3700 to 3784	○	○	
Communication list 3rd line (1st character) to (85th character)	3800 to 3884	○	○	
• The 1st to the 3rd line are printed together. • If a complete line is not all characters (20H, 84H to 8FH, A0H), that line is not printed, and the next line is printed pushed up.				

*1 Communications input A

Range code	PV data acquisition point address (CPL address)
80	3500W
81	3501W
82	3502W
83	3503W
84	3504W
85	3505W
86	3506W
87	3507W

*2 Communications input B

Range code	Sub-code No.	PV data acquisition point address (CPL address)
88	0	3500W
	1	3501W
	2	3502W
	3	3503W
	4	3504W
	5	3505W
	6	3506W
	7	3507W
	8	3508W
	9	3509W
	10	3510W
	11	3511W

Range code	Sub-code No.	PV data acquisition point address (CPL address)
88	12	3512W
	13	3513W
	14	3514W
	15	3515W
	16	3516W
	17	3517W
	18	3518W
	19	3519W
	20	3520W
	21	3521W
	22	3522W
	23	3523W

See "■ Range code tables" (Page 5-30) for details.

■ Bitmap Data

No.1 Clear integrating calculation (address: 306W)

										b5	b4	b3	b2	b1	b0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : Clear integrating calculation No.1
2 : Clear integrating calculation No.2
3 : Clear integrating calculation No.3
4 : Clear integrating calculation No.4
5 : Clear integrating calculation No.5
6 : Clear integrating calculation No.6
7 to 16 : —

No.2 Integrating calculation status (address: 316W)

										b5	b4	b3	b2	b1	b0
		b13	b12	b11	b10	b9	b8								
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : 0 to 5 : Clear integration by communications No.1
2 : 0 to 5 : Clear integration by communications No.2
3 : 0 to 5 : Clear integration by communications No.3
4 : 0 to 5 : Clear integration by communications No.4
5 : 0 to 5 : Clear integration by communications No.5
6 : 0 to 5 : Clear integration by communications No.6
7, 8: —
9 : Clear integration by DI and communications No.1
10 : Clear integration by DI and communications No.2
11 : Clear integration by DI and communications No.3
12 : Clear integration by DI and communications No.4
13 : Clear integration by DI and communications No.5
14 : Clear integration by DI and communications No.6
15, 16: —

No.3 Instrument alarm information (address: 380W)

b15	b14	b13	b12	b11	b10	b9	b8		b6	b5	b4	b3	b2		b0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : ROM diagnosis
2 : —
3 : EEPROM diagnosis
4 : Calibration data diagnosis
5 : Configuration data diagnosis
6 : Auto-z ero input diagnosis
7 : Reference voltage diagnosis
8 : —
9 : Reference contact temperature diagnosis
10 : Model No. information diagnosis
11 : A/D converter diagnosis
12 : Printer position diagnosis
13 : Ribbon position diagnosis
14 : Mode selection pin diagnosis
15 : Clock backup battery diagnosis
16 : Processing cycle diagnosis

No.4 Option information (address: 398W)

								b7	b6	b5	b4	b3	b2	b1	b0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : RS-485 communication
2 : RS-232C communication
3 : No.1 to No.4 external switch input
4 : No.5 to No.8 external switch input
5 : No.9 to No.12 external switch input
6 : No.1 to No.6 relay output
7 : No.7 to No.12 relay output
8 : No.1 to No.12 open collector output
9 to 16 : —

No.5 Event status summary (address: 400, 450W)

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : Channel 1
2 : Channel 2
3 : Channel 3
4 : Channel 4
5 : Channel 5
6 : Channel 6
7 : Channel 7
8 : Channel 8
9 : Channel 9
10 : Channel 10
11 : Channel 11
12 : Channel 12
13 : Channel 13
14 : Channel 14
15 : Channel 15
16 : Channel 16

No.6 Event status summary (address: 401, 451W)

								b23	b22	b21	b20	b19	b18	b17	b16
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : Channel 17
2 : Channel 18
3 : Channel 19
4 : Channel 20
5 : Channel 21
6 : Channel 22
7 : Channel 23
8 : Channel 24
9 to 16 : —

No.7 Event status (address: 461 to 484W)

								b7	b6	b5	b4	b3	b2	b1	b0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

1 : No.1 lower-limit event status
2 : No.1 upper-limit event status
3 : No.2 lower-limit event status
4 : No.2 upper-limit event status
5 : No.3 lower-limit event status
6 : No.3 upper-limit event status
7 : No.4 lower-limit event status
8 : No.4 upper-limit event status
9 to 16 : —

No.8 External switch input status summary (address: 500W)
Internal contact input status summary (address: 520W)
Relay output status summary (address: 540W)
Open collector output status summary (address: 560W)

				b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

	External Switch Input Status Summary	Internal Contact Input Status Summary	Relay Output Status Summary	Open Collector Output Status Summary
1	No.1 external switch input	No.1 internal switch input	No.1 relay output	No.1 open collector output
2	No.2 external switch input	No.2 internal switch input	No.2 relay output	No.2 open collector output
3	No.3 external switch input	No.3 internal switch input	No.3 relay output	No.3 open collector output
4	No.4 external switch input	No.4 internal switch input	No.4 relay output	No.4 open collector output
5	No.5 external switch input	No.5 internal switch input	No.5 relay output	No.5 open collector output
6	No.6 external switch input	No.6 internal switch input	No.6 relay output	No.6 open collector output
7	No.7 external switch input	No.7 internal switch input	No.7 relay output	No.7 open collector output
8	No.8 external switch input	No.8 internal switch input	No.8 relay output	No.8 open collector output
9	No.9 external switch input	No.9 internal switch input	No.9 relay output	No.9 open collector output
10	No.10 external switch input	No.10 internal switch input	No.10 relay output	No.10 open collector output
11	No.11 external switch input	No.11 internal switch input	No.11 relay output	No.11 open collector output
12	No.12 external switch input	No.12 internal switch input	No.12 relay output	No.12 open collector output
13 to 16	—			

■ Range Code Tables

Input Type		Range Code	Measurement Range	
DC voltage Linear scaling range	mV	00	-20.00 to +20.00	
		01	-40.00 to +40.00	
		02	-60.00 to +60.00	
		03	-200.0 to +200.0	
	V	04	-2.000 to +2.000	
		05	-5.000 to +5.000	
		06	0.000 to 10.000	
DC voltage Input voltage direct-reading range *1	mV	10	-20.00 to +20.00	
		11	-40.00 to +40.00	
		12	-60.00 to +60.00	
		13	-200.0 to +200.0	
	V	14	-2.000 to +2.000	
		15	-5.000 to +5.000	
		16	0.000 to 10.000	
Thermocouple	R	20/50	0.0 to 1760.0°C	32 to 3200°F
	S	21/51	0.0 to 1760.0°C	32 to 3200°F
	B	22/52	0.0 to 1820.0°C	32 to 3308°F
	K	23/53	-200.0 to +1370.0°C	-328 to +2498°F
	E	24/54	-220.0 to +800.0°C	-328 to +1472°F
	J	25/55	-200.0 to +1100.0°C	-328 to +2012°F
	T	26/56	-200.0 to +400.0°C	-328 to +752°F
	N	27/57	0.0 to 1300.0°C	32 to 2372°F
	WRe0-26	28/58	0.0 to 2320.0°C	32 to 4208°F
	WRe5-26	29/59	0.0 to 2320.0°C	32 to 4208°F
	PR40-20	30/60	0.0 to 1880.0°C	32 to 3416°F
	PLII	31/61	0.0 to 1290.0°C	32 to 2354°F
	Ni-Ni•Mo	32/62	0.0 to 1200.0°C	32 to 2192°F
Resistance temperature detector	Pt100	40/70	-200.0 to +650.0°C	-328.0 to +1202.0°F
	JPt100	41/71	-200.0 to +550.0°C	-328.0 to +1022.0°F
	JPt50	42/72	-200.0 to +550.0°C	-328.0 to +1022.0°F
	Ni508	43/73	-50.0 to +150.0°C	-58.0 to +302.0°F
Communications input A *2	No sub-code setting required	80 to 87	-19999 to +29999	
Communications input B *2	Sub-code setting required	88	-19999 to +29999	
ON/OFF *3	—	90		

*1 Voltage value can be read directly without linear scaling.

*2 The value acquired by CPL communications is handled as a PV input value, and is processed for recording in the same way as in usual processing.
Acquisition point address of the communications input data is set as follows:

Communications input A : If the communications input is used in less than 8 channels, the PV data acquisition point address can be designated by setting the range codes from "80" through to "87". Sub-code setting is not required.

Range code	PV data acquisition point address (CPL address)
80	3500W
81	3501W
82	3502W
83	3503W
84	3504W
85	3505W
86	3506W
87	3507W

Communications input B : The PV data acquisition point address can be set by selecting the range code "88" and setting the sub-code when the communications input is used in more than 9 channels.

Range code	Sub-code No.	PV data acquisition point address (CPL address)
88	0	3500W
	1	3501W
	2	3502W
	3	3503W
	4	3504W
	5	3505W
	6	3506W
	7	3507W
	8	3508W
	9	3509W
	10	3510W
	11	3511W

Range code	Sub-code No.	PV data acquisition point address (CPL address)
88	12	3512W
	13	3513W
	14	3514W
	15	3515W
	16	3516W
	17	3517W
	18	3518W
	19	3519W
	20	3520W
	21	3521W
	22	3522W
	23	3523W

*3 ON/OFF type digital signal is recorded as an input. The ON/OFF input data acquisition point address is designated by setting the range code "90" and by the following sub-code No.:

Sub-code No.	Digital data acquisition point address	Supplement
0	OFF	A digital data acquisition point address can be designated regardless of the presence of actual digital input and output. However, the "OFF" status is fixed when a digital input that is not installed is designated.
1 to 12	Relay output No.1 to No.12	
13 to 24	Open collector output No.1 to No.12	
31 to 42	External switch input No.1 to No.12	
51 to 62	Internal contact input No.1 to No.12	

Chapter 6. TROUBLESHOOTING

■ Check Items in Case Communication is Disabled

1. Make sure that the RS-232C and RS-485 connections are correctly wired.

2. Make sure that the communication conditions for the SRF206/212/224 match those of the host computer.
   If any one of the below settings between stations differ, communication is disabled.
   Settings that can be used on the SRF206/212/224 are underlined.

Transmission speed:	4800, 9600bps
Data length:	8bits
Parity:	No parity, even parity
Stop bit:	1 stop bit, 2 stop bits

3. Make sure that the destination address of the command frame transmitted from the host computer matches the address of the SRF206/212/224.
   The SRF206/212/224 default address is “0”. The SRF206/212/224 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” on the SRF206/212/224).

Chapter 7. SPECIFICATIONS

■ RS-232C Specifications

Name	Remarks
Transmission mode	Unbalanced
Transmission line	3-wire system
Transmission speed (bps)	1200, 2400, 4800, 9600
Transmission distance	15m max.
Communications flow	Half duplex
Synchronization	Start-stop synchronization
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, checksum
Station address	0 to 127 (Communication function is inhibited when set to “0”.)
Network type	1-to-1
Other	Conforms to RS-232C interface specifications.

■ RS-485 Specifications

Name	Remarks
Transmission mode	Balanced
Transmission line	5-wire system/3-wire system
Transmission speed (bps)	1200, 2400, 4800, 9600
Transmission distance	500m max. (300m when connected with the MA500DIM and CMC410.)
Communications flow	Half duplex
Synchronization	Start-stop synchronization
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, checksum
Station address	0 to 127 (Communication function is inhibited when set to “0”.)
Network type	1-to-N (31 units or less, however 16 units or less for MA500 DIM or CMC410)
Other	Conforms to RS-485 interface specifications.

APPENDIX

■ Code Table

	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	^

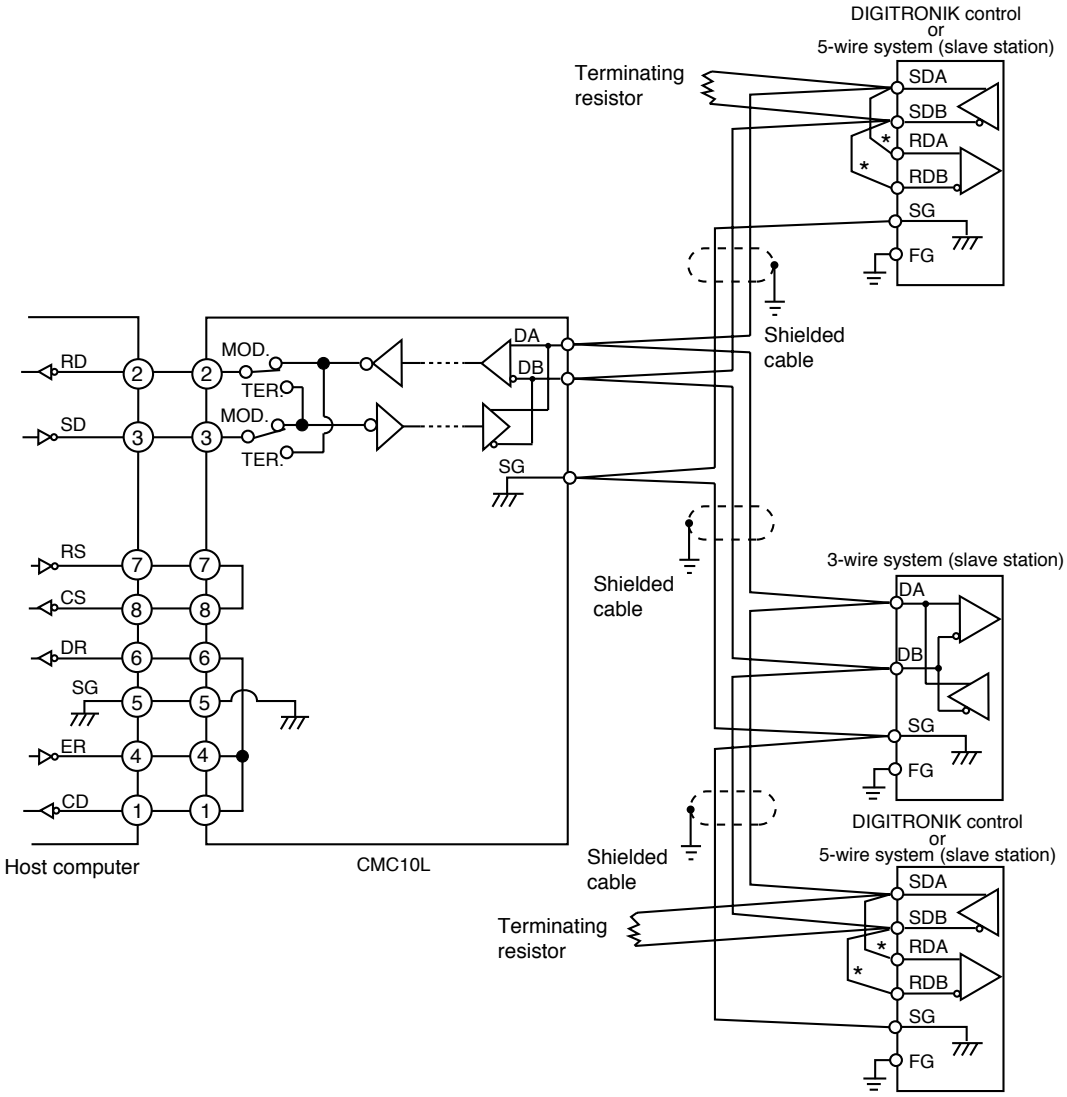
The shaded areas ( ) are not used by this communication system. (The codes depend on the station.)

■ SRF Character Code Table

Upper Bits / Lower Bits	2	3	4	5	6	7	8
0	(32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	³ (128)
1	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	° (129)
2	“ (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	₀ (130)
3	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	• (131)
4	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	(132)
5	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	(133)
6	& (38)	6 (54)	F (70)	V (86)	f (102)	v (118)	(134)
7	´ (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	(135)
8	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	(136)
9	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	(137)
A	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	(138)
B	+ (43)	; (59)	K (75)	[(91)	k (107)	Ω (123)	(139)
C	, (44)	< (60)	L (76)	¥ (92)	l (108)	(124)	(140)
D	— (45)	= (61)	M (77)	] (93)	m (109)	μ (125)	(141)
E	. (46)	> (62)	N (78)	^ (94)	n (110)	² (126)	(142)
F	/ (47)	? (63)	O (79)	_ (95)	o (111)	₂ (127)	(143)

■ Connection With CMC10L

The CMC10L001A000 is available as an RS-232C/RS-485 (5-wire system) converter from Yamatake. 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.

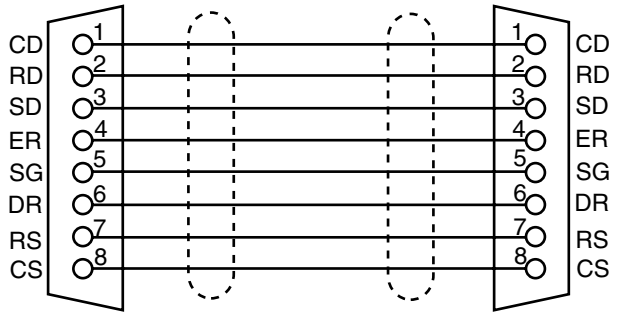
(⋆) must be wired externally.

Connect the master station SD to the slave station RD, and the master station RD to the slave station SD.
So, set the MODE switch on the front of the CMC10L as (MODEM/TERMINAL) of the host computer RS-232C connector and the type of cable (crossover/straight) used.

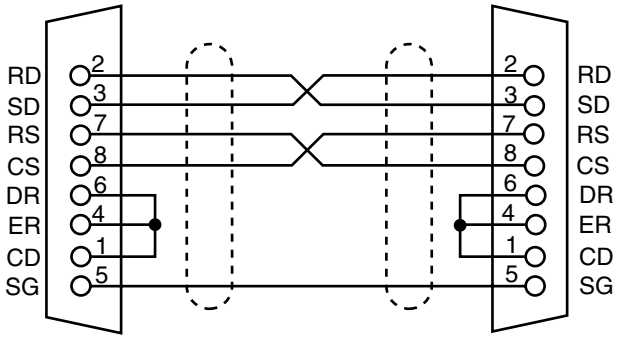
RS-232C	Cable type	MODE switch
TERMINAL	Straight	MODEM
TERMINAL	Crossover	TERMINAL
MODE	Straight	TERMINAL
MODE	Crossover	MODEM

● 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 pin 3).

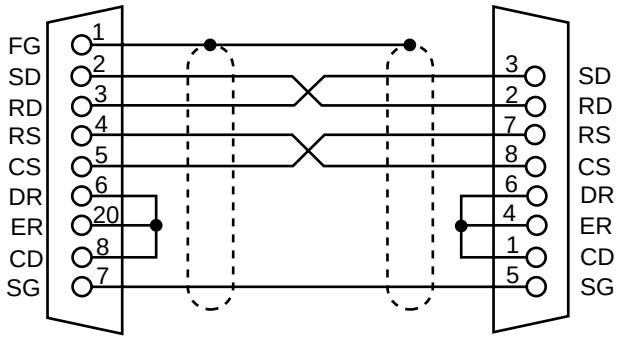


Crossover: An RS-232C cable with a D-Sub (9-pin) connector at each end where different number pins are connected (for example, pin 2 to pin 3, and pin 3 to pin 2).



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
98-08	**CP-SP-1028E**	**1st Edition**		
99-11		**2nd Edition**	4-3 4-4 Appendix-2	Communication frame changed from 5 35H to A 41H. Checksum Example changed: 7BH→76H, 85H→8AH, “85”, (38H) and (35H)Æ“8A”, (38H) and (41H) Character code ∝°(124) removed.
02-08		**3rd Edition**	1-4 2-1 2-2 2-3, 2-4 2-5 2-6 4-2 4-12 4-13 5-21 5-26 5-30, 5-31 Chapter 6 Chapter 7 App.-3 App.-4, App.-5	Description of CPL communications changed, Figure changed. Description changed, Handling Precautions deleted. Figure of Example of connection using changed, Layout of RS-232C connector signals changed. Section 2-2 RS-485 Connection Overall changed. Figure of connection example changed, Cable model No.changed. Description changed. Frame of Read instruction, EXT→ETX changed. Item of Priority deleted. CMA50 deleted. Address of Range code "nn00"→"nn01" changed, Digital signal No.→Sub-code No. changed, description of Digital signal No.chaged, Description of communication input B added. Address of communication PV value 3500 to 3507→3500 to 3523 changed, Description of communication input A and communication input B added. Description of communication input A and communication input B added. Old chapter 6. COMMUNICATION PROGRAM FOR MASTER STATION deleted, old chapter 7. TROUBLESHOOTING. Old chapter 8. SPECIFICATIONS. Description of connection with CMA50→ connection with CMC10L changed. Description of RS-232C cable changed.
08-03		**4th Edition**	2-2 2-3, 2-4, 2-6 5-6, 5-7 App.-2 App.-4	Signal table (25 pins, 14 pins) deleted. Handling Precautions added. Note and comment added. Upper bits row and lower bits column corrected. Assigned signals RD and SD changed.

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