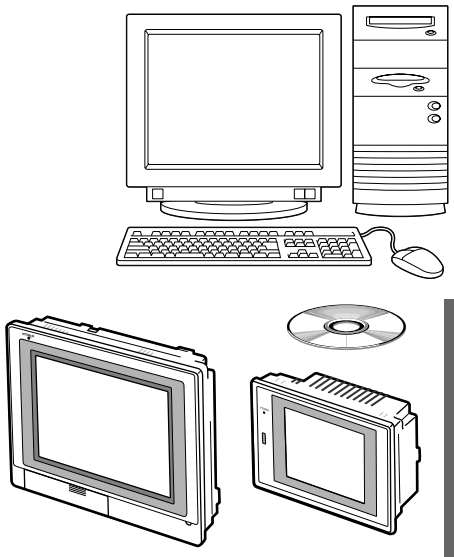
No. CP-SP-1090E

SMART TERMINAL EST-Z Series

User's Manual

Communications Connection



Thank you for purchasing the AP Editor for Smart Terminal EST-Z Series.
This manual contains information for ensuring correct use of the AP Editor for Smart Terminal EST-Z Series. It also provides necessary information for installation, maintenance, and troubleshooting.
This manual should be read by those who design and maintain devices that use the AP Editor for Smart Terminal EST-Z Series.
Be sure to keep this manual nearby for handy reference.

Yamatake Corporation

RESTRICTIONS ON USE

When using this product in applications that require particular safety or when using this product in important facilities, pay attention to the safety of the overall system and equipment. For example, install fail-safe mechanisms, carry out redundancy checks and periodic inspections, and adopt other appropriate safety measures as required.

REQUEST

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

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

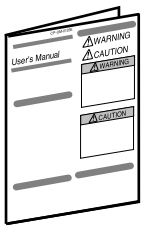
Considerable effort has been made to ensure that this User's Manual is free from inaccuracies and omissions.
If you should find any inaccuracies or omissions, please contact Yamatake Corporation.

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

The Role of This Manual

Outline of EST-Z Series Manuals

The below 9 manuals are provided to cover a range of EST-Z Series-related topics. Use the manual that best fits your application. In the event such a manual is not available, contact us or your local EST-Z Series dealer.

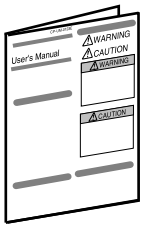


Smart Terminal EST240Z User's Manual Manual No.CP-UM-5145E

This manual is packaged with the EST240Z body.

This manual should be read by those who produce units that use the Smart Terminal.

This manual contains safety precautions when using the Smart Terminal, installation methods, and descriptions for wiring the power supply and signal lines.

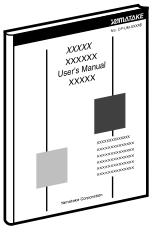


Smart Terminal EST555Z User's Manual Manual No.CP-UM-5229E

This manual is packaged with the EST555Z body.

This manual should be read by those who produce units that use the Smart Terminal.

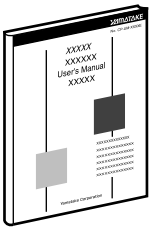
This manual contains safety precautions when using the Smart Terminal, installation methods, and descriptions for wiring the power supply and signal lines.



Smart Terminal EST240Z User's Manual Installation Manual No. CP-SP-1065E

This manual should be read by those who use the EST240Z to design units and those in charge of maintenance.

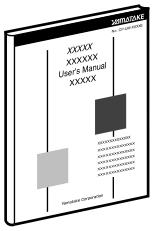
This manual describes safety cautions when using the Smart Terminal, how to install for incorporating into units, wiring methods, maintenance and inspection, troubleshooting, and hardware specifications.



Smart Terminal EST555Z User's Manual Installation Manual No. CP-SP-1103E

This manual should be read by those who use the EST555Z to design units and those in charge of maintenance.

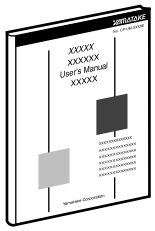
This manual describes safety cautions when using the Smart Terminal, how to install for incorporating into units, wiring methods, maintenance and inspection, troubleshooting, and hardware specifications.



Smart Terminal EST-Z Series User's Manual
Application Preparation **Manual No. CP-SP-1088E**

This manual should be read by those who design screens that are displayed on the EST-Z Series and operations.

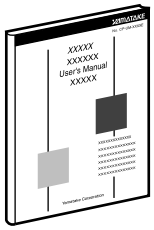
This manual describes the environment of the personal computer on which AP Editor can be used, installation methods, startup, system settings, file operations, printing, how to paste smart objects, and other AP Editor operations.



Smart Terminal EST-Z Series User's Manual
Smart Object Library **Manual No. CP-SP-1089E**

Graphic elements that have functions for displaying on the EST-Z Series are called “smart objects.”

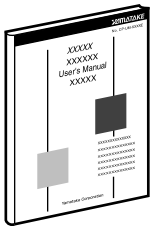
This manual describes the concept of smart objects and the functions of each smart object.



Smart Terminal EST-Z Series User's Manual
Communications Connection **Manual No. CP-SP-1090E**

This manual.

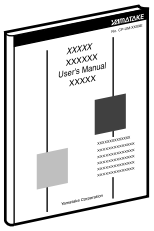
This manual should be read by those who combine the EST-Z Series with PLCs made by other manufacturers and dedicated board computers to build systems. This manual describes how to connect to PLCs, address maps that correspond to PLCs, how to paste smart objects, drawing, and other operations and settings required for making applications using PLCs.



Smart Terminal EST240Z User's Manual
DMC10 Package **Manual No. CP-SP-1091E**

This package is used when constructing systems by connecting the EST240Z to Yamatake’s Distributed Multi-channel Controller DMC10.

This manual describes the specifications of the software package, how to use the package, how to install the software, and how to operate the software.



Smart Terminal EST555Z User's Manual
DMC10 Package **Manual No. CP-SP-1124E**

This package is used when constructing systems by connecting the EST555Z to Yamatake’s Distributed Multi-channel Controller DMC10.

This manual describes the specifications of the software package, how to use the package, how to install the software, and how to operate the software.

Organization of This User's Manual

This manual is organized as follows:

Chapter 1. COMMUNICATIONS WITH PLCS

This chapter describes the settings that are required when reading from and writing to slave stations such as a PLC or temperature controller from the EST by communications.

Chapter 2. CONNECTING THE EST WITH OTHER MANUFACTURERS' PLCS

This chapter describes examples of how to connect external devices made by other manufacturers' to the EST, the setting item menus on the EST, and how to set these setting items.

Chapter 3. SERIAL SLAVE STATION COMMUNICATIONS

Serial slave station communications is a form of communications in which the user component for system control is defined as the master station so that data is exchanged with the EST.
This chapter describes how to set up for executing serial slave station communications, and how to read switch states.

Chapter 4. ADDRESS MAPS

This chapter describes device names and addresses, and how to use these names and addresses.

Chapter 5. SERIAL COMMANDS

This chapter describes the functions of each command when the EST is used as the serial slave station, and the command/response frame parameters.

Conventions Used in This Manual

The following conventions are used in this manual:

Handling Precautions : Handling Precautions indicate items that the user should pay attention to when handling the **EST-Z Series.**

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

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

[ABC] : This indicates a button or message displayed on the screen on the personal computer.

[A] [B] [C] etc. : This indicates a key on the personal computer's keyboard.

"Addr" This indicates a 7-segment display indicated on a Yamatake product.

Contents

Chapter 4. ADDRESS MAPS

Chapter 5. SERIAL COMMANDS

Chapter 1. COMMUNICATIONS WITH PLCS

■ What is the “PLC host link?”

The “PLC Host Link” is a function for reading from and writing to devices such as PLCs or temperature controllers that respond as slave devices to the EST communications.

■ EST application and PLC host link

Application data must be prepared to run the Smart Terminal EST-Z Series (simply referred to as “EST” in this manual).
The smart object library, that brings together functions in individual groups, is provided to facilitate creation of the application data.
For details on smart objects, refer to the Smart Terminal EST-Z Series Smart Object Library Manual No. CP-SP-1089E.
In using the PLC Host Link to be used by the EST application data, the following operations are involved including use of the smart objects.

- The PLC device is specified as the device to be entered in the smart object dialog box, and the PLC Host Link is used.
- The PLC device is specified as the contact device for monitoring in the alarm monitoring information, and the PLC Host Link is used.
- Yamatake temperature controller devices are specified as the device in the recipe settings in the setting information.
- The PLC device is specified as the sending side device and the receiving side device in the setting information gateway, and data exchange is performed automatically.

■ Setup required for using the PLC host link

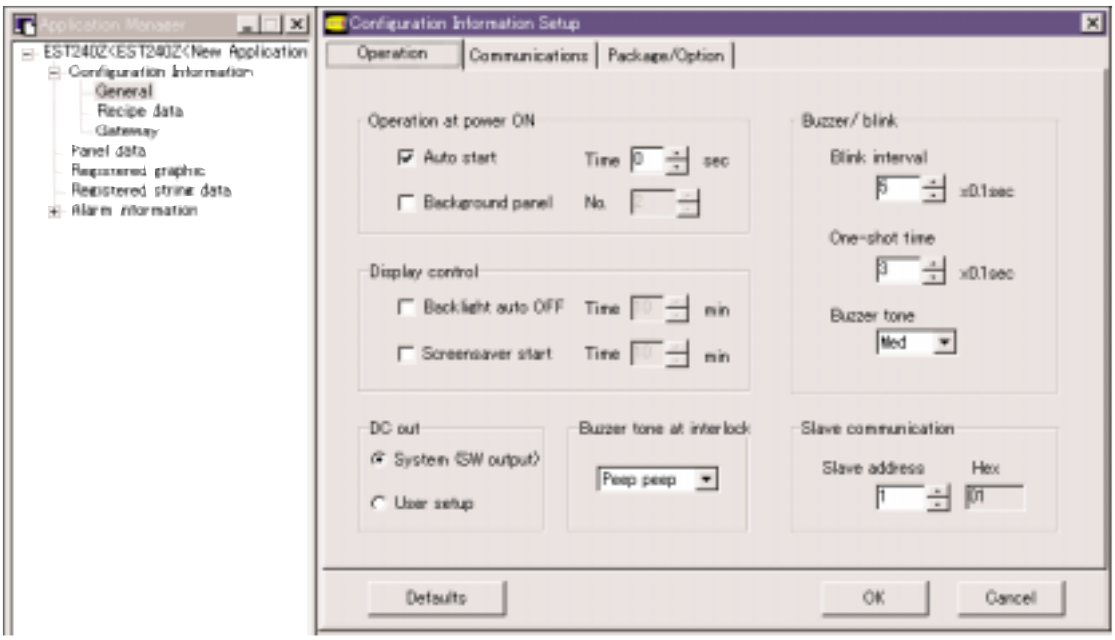
For details on the procedure for creating application data and operation methods, refer to the separate manual Smart Terminal EST-Z Series User's Manual Application Preparation Manual No. CP-SP-1088E.
The following setup operations are required for using the PLC Host Link:

- Setting of the driver for the target model PLC to the channel on which the PLC Host Link is to be used in the Setting information: communications settings of the basic settings
- Setting of the PLC device as the device in the device entry field in the smart object dialog box, for example

The following describes these two operations.

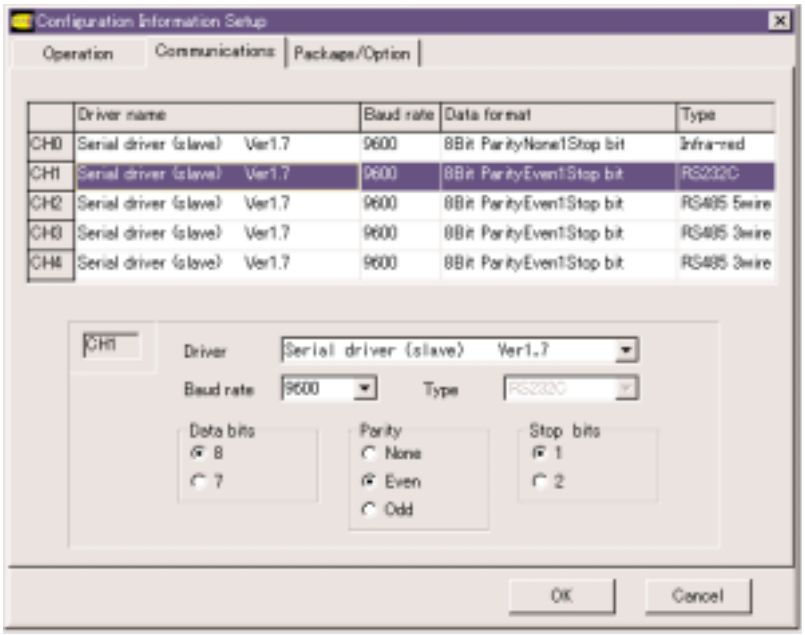
■ Configuration information: Configuration of the PLC driver in the communications settings of the general

(1) Double-click [General] under Configuration Information in the Application Manager.



(2) Click the [Communications] tab under Configuration Information.

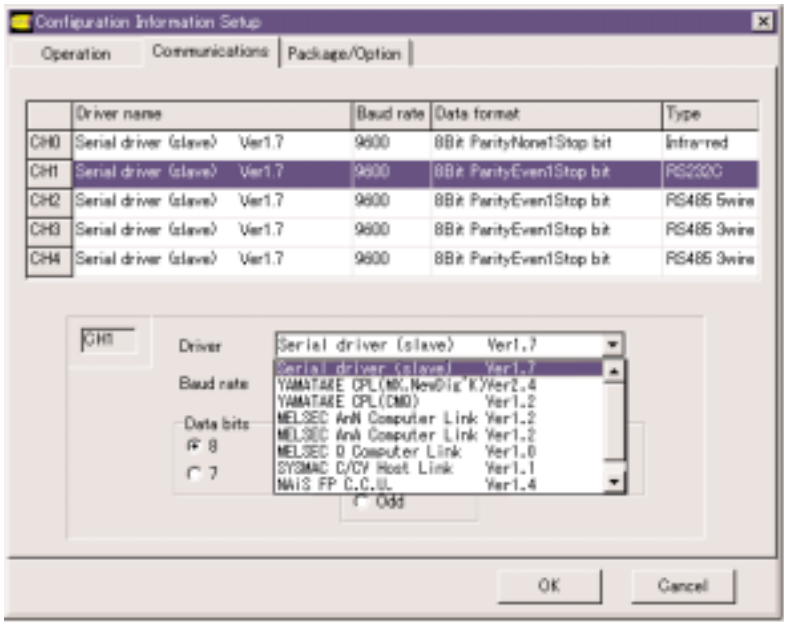
(3) Click the field for the channel on which communications is to be performed.



Four channel(CH)s 1 to 4 are provided. The mode of communications is fixed according to each channel.

CH1: 9-pin RS-232C D-Sub connector
CH2: 5-lead RS-485 terminal block
CH3, 4: 3-lead RS-485 terminal block. Mainly used for Yamatake temperature controllers.

(4) Select the PLC driver to be used for communications and set the communications format.



(5) Click [OK] at Configuration Information to apply the settings.

■ Configuration of the PLC device as the device

Conventions used for PLC devices are as follows:

Channel No.: device address No.@sub-address No.: device address

- Channel(CH) No.
  This is the channel number (1 to 4) described in the previous item. Communications are performed on the specified channel.
- Device address No.
  This is the device address of the PLC, Yamatake temperature controller, etc, connected to the specified channel. The device address range varies according to the particular device.
- Sub-address No.
  This is the device address of a unit connected on a separate communications channel/network of the communications controller connected on a specific channel of the EST.
- Device address
  This is the device address supported on the PLC, Yamatake temperature controller, etc. For details on device conventions, see "Chapter 2 CONNECTING THE EST WITH OTHER MANUFACTURERS' PLCS."

(Example) Enter the following if a Yamatake MX200 PLC, device address 1 is to be used on CH2: 2:1:123.4

Handling Precautions

- The sub-address No. is valid only on drivers that support sub-addresses. Do not set a sub-address No. if the driver does not support sub-addresses.
  The only driver that currently supports sub-addresses is "Yamatake CPU universal host link" in WinAPE versions 1.1 or later.
  (Example) If a DMC10 (device address 3) connected to a Yamatake CMC10B (device address 1) is to be used on CH4, enter the following: "4:1@3:3000"
- If CH3 is used simultaneously with IrDA(CH0), it is possible that communications errors may occur on CH3.

Chapter 2. CONNECTING THE EST WITH PLCS

2 - 1 List of supported PLCs

The following is a list of PLCs that can be connected to the EST:

Manufactures	PLC/controller	Driver Name
Yamatake Corporation	MA500	Yamatake CPL (MX, NewDig'K)
	CPL universal communications	
	MX series	
	CMQ	Yamatake CPL (CMQ)
Mitsubishi Electric	A❑N series computer link	MELSEC AnN computer link
	A❑A series computer link	MELSEC AnA computer link
	Q series computer link	MELSEC Q computer link
	MELSEC A CPU	MELSEC A CPU
	MELSEC FX	MELSEC FXn CPU
Omron	C/CV series	SYSMAC C/CV host link
Matsushita Electric Works	FP3/5/10 series	NAiS FP C.C.U

Handling Precautions

The EST does not check the range of usable addresses.
For details on the range of addresses, refer to the Instruction Manual for each manufacturers' PLCs.

2 - 2 Yamatake devices

■ Supported devices

● Yamatake

As much as possible group together devices to be used in smart display objects and assign them to continuous areas. Cyclic communications is performed on each area of a maximum 32 continuous words.
Data can be displayed most efficiently if the devices to be used on each panel are contained within a single continuous area.
Communications with devices used in smart switch objects is performed using demand communications. For this reason, special attention is not required in device allocation.

- MA500

Device Type	Address Range
Bit device	0.0 to 255.F
Word device	256 to 4095

On the MA500 personal computer loader, bit addresses are expressed as .00 to .15, but the form .0 to 0.F is used on the EST.
Annotation example 1:1:123.A
1:1:1320

- CPL universal communications, CMQ series

Device Type	Address Range
Bit device	0.0 to 65535.F
Word device	0 to 65535

Annotation example 1:1:534.2
1:1:236

- MX series (MX200, MX100, MX50, MX30, MX20)

Device Address	Device Type	Address Range	
		MX200/MX50	MX100/MX30/MX20
0.0 to 29.F	Input relay	X000 to X29F	X000 to X09F, X200 to X29F
50.0 to 79.F	Output relay	Y000 to Y29F	Y000 to Y09F, Y200 to Y29F
100.0 to 149.F	Latch relay	L000 to L49F	L000 to L49F
150.0 to 159.F	Special relay	M900 to M99F	M900 to M99F
200.0 to 289.F	Auxiliary relay	M000 to M89F	M000 to M49F
300.0 to 315.F	Timer/counter T/C contact	T000 to T255	T/C000 to T/C199
1000 to 1255	Timer/counter T/C PV	T000 to T255	T/C000 to T/C199
1400 to 1655	Timer/counter T/C SP	T000 to T255	T/C000 to T/C199
2000 to 2499	General-purpose data register	R0000 to R0499	R900 to R499
2500 to 2519	Word input register	R0500 to R0519	R500 to R519 (excluding MX30)
2600 to 2619	Word output register	R0600 to R0619	R600 to R619 (excluding MX30)
2900 to 2939	Special register	R0900 to R0999	R900 to R939
3000 to 6999	General-purpose data register	R1000 to R4999	–
10000 to 13999	Link register	P0000 to P3999	–

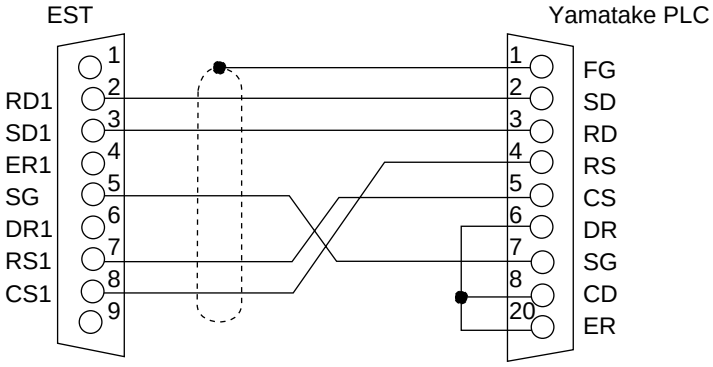
Annotation example 1:1:534.2
1:1:236

! Handling Precautions
Set the device address to within 1 to 31.

■ Connection examples

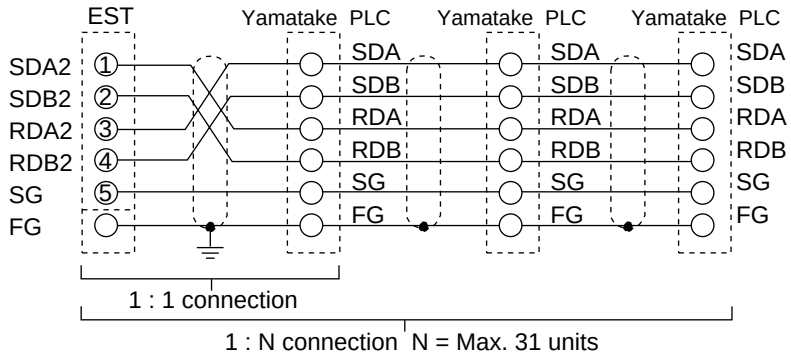
● RS-232C connection

Yamatake (host communications module) (1:1)

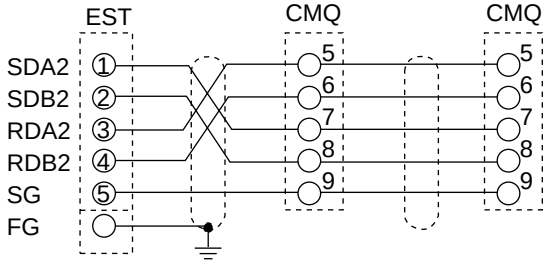


● RS-485 5-lead (CH2) connection

Yamatake (host communications module) (1:1, 1:N)

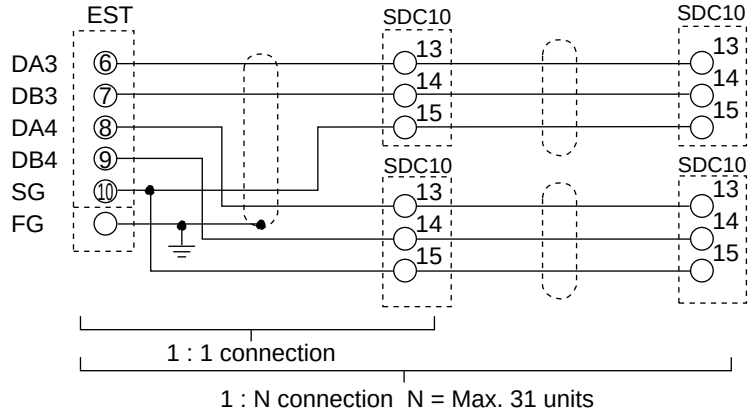


Yamatake (CMQ)

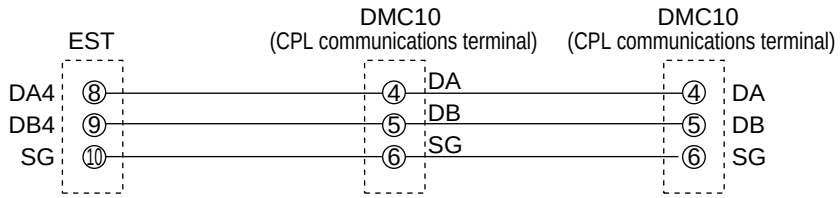


● RS-485 3-lead (CH3, 4) connection

Yamatake (SDC10) (1:1, 1:N)



● **RS-485 3-lead (CH3, 4) connection**
Yamatake (DMC10) (1:1, 1:N)

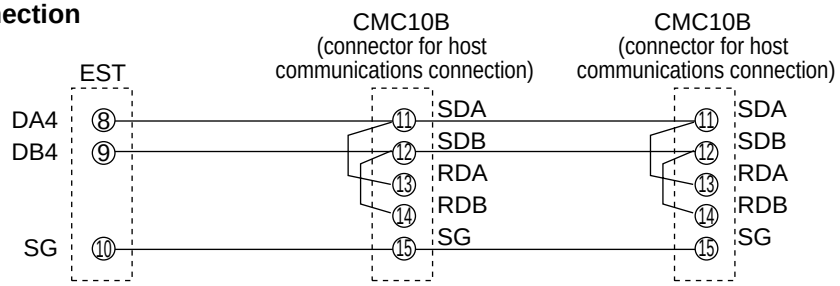


! Handling Precautions

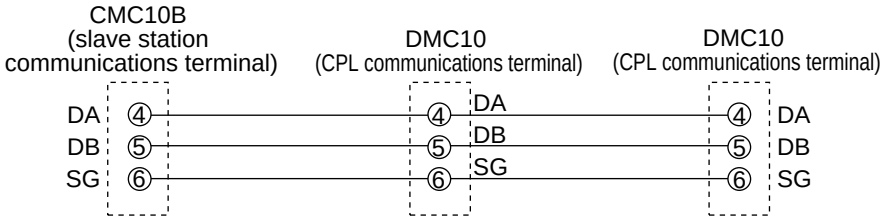
- When linking two or more DMC10s, ensure that the communications disconnection switch is set to the "CONNECT" side (factory default). Wiring is not needed in this case.
  For details, please look at the following Smart Terminal User's Manual "DMC10 Package Volume":
  EST240Z: Manual No. CP-SP-1091E
  EST555Z: Manual No. CP-SP-1124E
- The DMC10 has a built-in resistance equivalent to a terminator. Do not connect an external terminating resistor.

● **RS-485 3-lead (CH3, 4) connection**
Yamatake (CMC10) (1:1, 1:N)

- **EST to CMC10B connection**



- **CMC10B and DMC10 connection**



! Handling Precautions

- When linking the DMC10 to a CMC10B, or two or more DMC10s, ensure that the communications disconnection switch is set to the "CONNECT" side (factory default). Wiring is not needed in this case.
  For details, please look at the following Smart Terminal User's Manual "DMC10 Package Volume":
  EST240Z: Manual No. CP-SP-1091E
  EST555Z: Manual No. CP-SP-1124E
- Connect a terminator (120 to 150Ω, 1/2W) to both ends of the EST and CMC10B.
- The DMC10 has a built-in resistance equivalent to a terminator. Do not connect an external terminating resistor.

■ Environment configuration examples

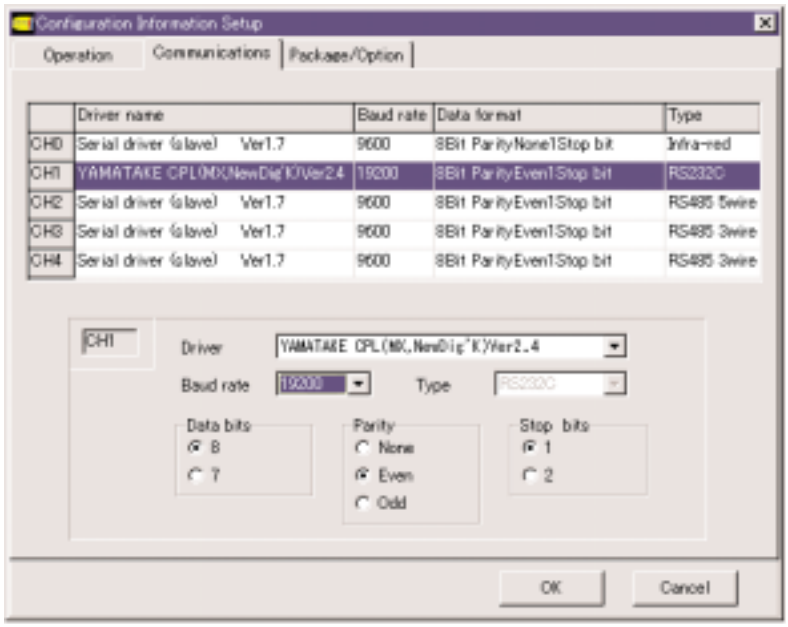
● MX200

The following table shows an example configuration for the MX200:

PLC/ controller	MX200
Communications unit	Direct link (ASCII connector)
Interface	RS-232C
Transmission speed	19200bps
Data type	8bits Even parity 1 stop bit

• EST configuration

• Communications channel configuration



• How to specify an address

1 : 1 : 01000

- 01000 — PLC device address
- 1 — PLC communications address (1 to 127)
  Set the PLC communications address to the same value as the station No. setting of the MX200 to be connected to the EST.
- 1 — EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-232C communications with a PLC, channel "1" would be used.

- **MX200 configuration**

  - Configuring the communications address

    (1) Press the [DISP] key.
    ▶ The display shows *"Addr"*.

    (2) Press the [ENTER] key twice.
    ▶ The address setting mode is entered.

    (3) Set the communications address (1 to 127) using the cursor keys, and press the [ENTER] key.

    (4) Last of all, press the [DISP] key twice.

  - Configuring the communications format

    (1) Press the [DISP] key.
    ▶ The display shows *"Addr"*.

    (2) Press the [←] key twice.
    ▶ The display shows *"SEtU"*.

    (3) Press the [ENTER] key.
    ▶ The display enters the processor module mode.
    If *"stop"* is not displayed, press the [ENTER] key, set to *"stop"* by the [↑] key and press the [ENTER] key again.

    (4) Press the [←] key once.
    ▶ *"0."* is displayed.

    (5) Press the [↑] key four times.
    If *"4.opl"* not *"4.ASC"* is displayed, set to *"ASC"* by operating the [ENTER], [↑] and [ENTER] keys.

    (6) Press the [←] key three times.
    ▶ *"0."* is displayed followed by the communications address.

    (7) Press the [↑] key.
    ▶ *"1."* is displayed followed by the transmission speed.

    (8) Set the transmission speed to *"192"* by operating the [ENTER], [↑] and [ENTER] keys.

    (9) Press the [↑] key.
    ▶ *"0."* is displayed followed by the communications format.

    (10) Set the communications format to *"8E1"* by operating the [ENTER], [↑] and [ENTER] keys.

    (11) Finally, press the [DISP] key three times.

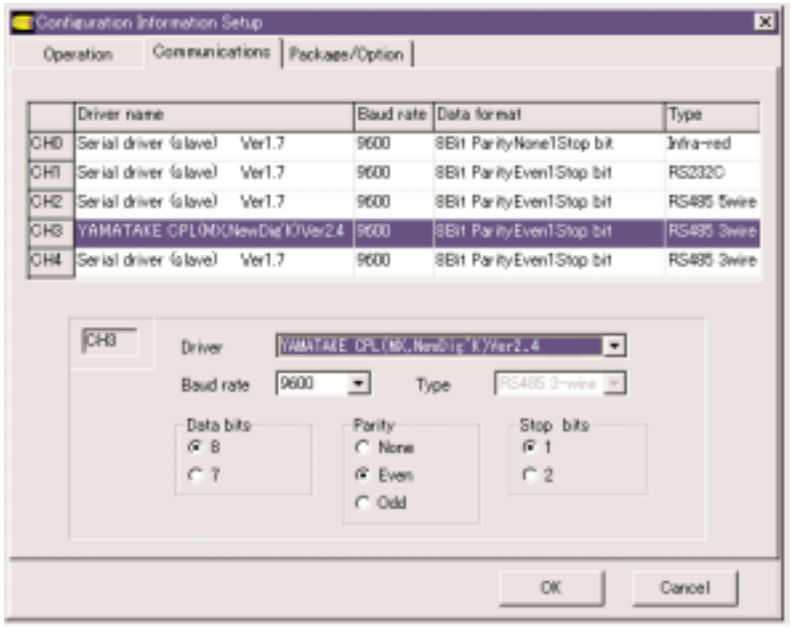
● SCD10

The following table shows an example configuration for the SDC10:

PLC/controller	SDC10
Communications unit	Direct link
Interface	RS-485
Transmission speed	9600bps
Data type	8bits Even parity 1 stop bit

• EST configuration

- Communications channel configuration



- How to specify an address

3 : 1 : 00507

- 00507: Temperature controller device address
- 1: Temperature controller device address (1 to 127)
  Set the device address of the SDC10 to the same value as the station No. setting of the temperature controller to be connected to the EST.
- 3: EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-485 (3-lead) communications, channel "3" would be used.

• SDC10 configuration

(1) Hold down the [PARA] key for three seconds.
▶ The parameter mode is entered.
(2) Hold down the [PARA] key for three seconds again.
▶ *"C01"* is displayed, and the setup mode is entered.
(3) Press the [PARA] key several times until *"C22"* is displayed.
(4) Set the device address (1 to 127) using the [↑] and [↓] keys.
(5) Press the [PARA] key until *"C23"* is displayed.
(6) Set the transmission speed and data format using the [↑] and [↓] keys to *"0"* (9600bps, 8 bits, even parity, 1 stop bit).

[!] Handling Precautions

When *"loc"* is displayed when setting *C22* and *C23*, set *C01* to *"0"*.

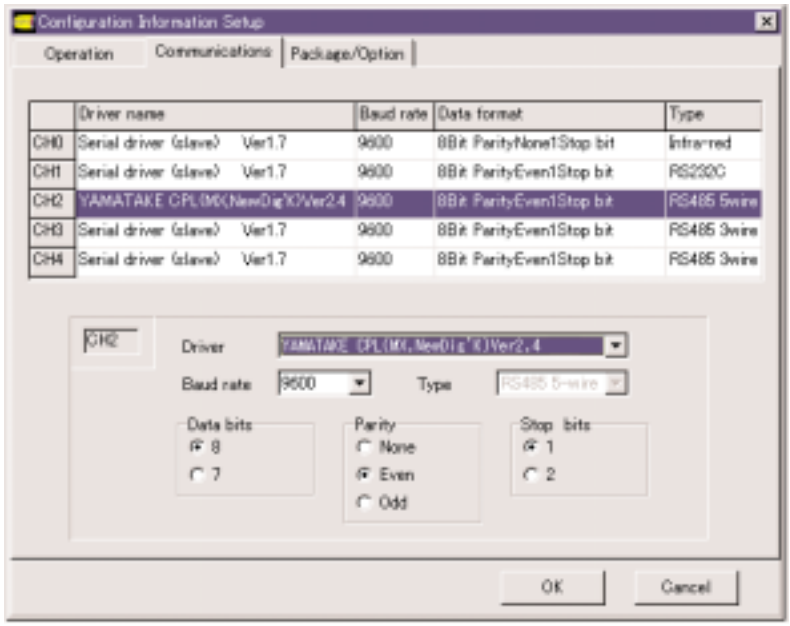
● SDC20/21, 30/31, 40A

The following table shows an example configuration for the SDC20/21, 30/31, 40A:

PLC/controller	SDC20/21, 30/31, 40A
Communications unit	Direct link
Interface	RS-485
Transmission speed	9600bps
Data type	8bits Even parity 1 stop bit

• EST configuration

- Communications channel configuration



- How to specify an address

2 : 1 : 00603

- Temperature controller device address
- Temperature controller device address (1 to 127)
  Set the device address of the temperature controller to the same value as the station No. setting of the temperature controller to be connected to the EST.
- EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-485 (5-lead) communications, channel "2" would be used.

• Configuration the temperature controller

- SDC20/21, 30/31

(1) Press the [DISP] key to set to the basic display.

(2) Hold down the [ENTER] key and the [↓] key simultaneously for three seconds.

▶ *"C01"* is displayed, and the setup item setting mode is entered.

(3) Press the [ENTER] key several times until *"C31"* is displayed.
Set the device address (1 to 127).

(4) Press the [ENTER] key until *"C32"* is displayed.
Set the transmission speed to *"0"* (9600 baud).

(5) Press the [ENTER] key until *"C33"* is displayed.
Set the communications code to *"0"* (8 bits, even parity, 1 stop bit).

(6) Last of all, press the [DISP] key.
▶ The basic display is returned to.

Handling Precautions

If *C31*, *C32* and *C33* are displayed but their settings cannot be changed, set *C01* to *"0"*.

• SDC40A

(1) Press the [PARA] key several times until *"SetUp"* is displayed.

(2) Press the [ENTER] key.
▶ *"C01"* is displayed, and the setup item change mode is entered.

(3) Display *"C84"* by the [↑], [↓], [←] and [→] keys.

(4) Press the [ENTER] key.
Set the device address (1 to 127).

(5) Press the [ENTER] key.
▶ This applies the setting.

(6) Display *"C85"* by the [↑], [↓], [←] and [→] keys.

(7) Press the [ENTER] key.
Set baud rate code to *"0"* (9600 baud, even parity, 1 stop bit).

(8) Press the [ENTER] key.
▶ This applies the setting.

(9) Last of all, press the [DISP] key.
▶ The basic display is returned to.

Handling Precautions

If *C84* and *C85* are displayed but their settings cannot be changed, set C01 to *"0"*.

● **DMC10**

Set the DMC10 using the Smart Loader Package SLP-D10.
For details, please look at the following Smart Terminal User's Manual "DMC10 Package Volume":
EST240Z: Manual No. CP-SP-1091E
EST555Z: Manual No. CP-SP-1124E
Also, refer to the Distributed Multi-channel Controller DMC10 User's Manual Description of Functions Manual No. CP-UM-5143E.

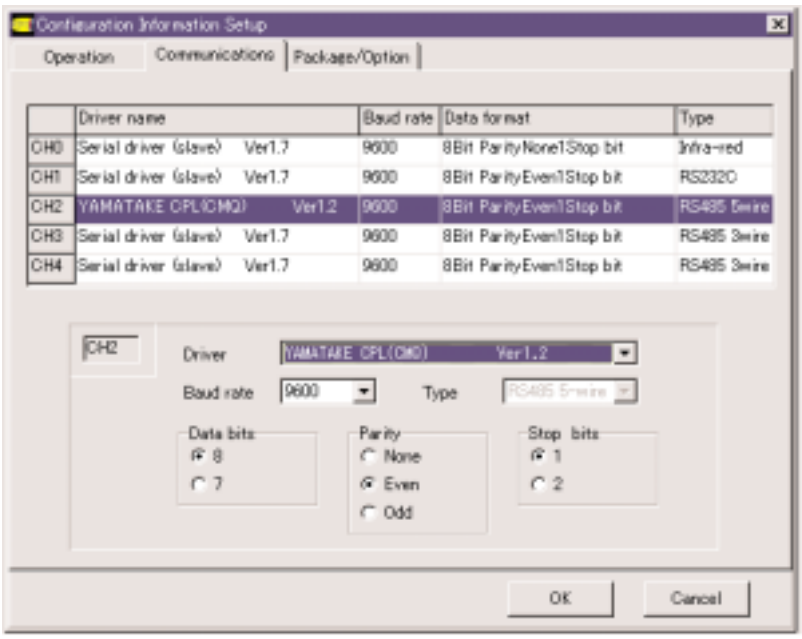
● CMQ

The following table shows an example configuration for the CMQ:

PLC/ controller	CMQ
Communications unit	Direct link
Interface	RS-485
Transmission speed	9600bps
Data type	8bits Even parity 1 stop bit

• EST configuration

- Communications channel configuration



- How to specify an address

2 : 1 : 00507

- CMQ device address
- CMQ device address (1 to 127)
  Set the device address of the CMQ to the same value as the station No. setting of the CMQ to be connected to the EST.
- EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-485 (5-lead) communications, channel "2" would be used.

- **CMQ configuration**

(1) Press the DISP key to display instantaneous PV. (The "PV" and "L/min" lamps light.)

(2) Hold down the ▼ key and ENT key simultaneously for three seconds. The item No. *"C-01"* is displayed on the 7-segment display, and the function setting mode is entered.

(3) Press the ▲ or ▼ key to select *"C-30"* and press the ENT key.

(4) The current setting is displayed blinking on the 7-segment display. Press the ▲ or ▼ key to select the device address.

(5) When you have selected the desired setting, press the ENT key to apply the setting. The setting is updated at this moment. (The item No. display is returned to after about one second.)

(6) Press the ▲ or ▼ key to select *"C-31"* and press the ENT key.

(7) The current setting is displayed blinking on the 7-segment display. Press the ▲ or ▼ key to select transmission speed 0: 9600bps.

(8) When you have selected the desired setting, press the ENT key to apply the setting. The setting is updated at this moment. (The item No. display is returned to after about one second.)

(9) Press the ▲ or ▼ key to select *"C-32"* and press the ENT key.

(10) The current setting is displayed blinking on the 7-segment display. Press the ▲ or ▼ key to select communications condition 0: 8 bits, even parity and 1 stop bit.

(11) When you have selected the desired setting, press the ENT key to apply the setting. The setting is updated at this moment. (The item No. display is returned to after about one second.)

(12) Press the DISP key to return to the instantaneous PV display from the function settings mode.

! Handling Precautions

- If you do not perform any operation for one minute after entering the function configuration mode, the regular display (instantaneous PV display) is automatically returned to.
- If you press the [DISP] key without pressing the [ENT] key after the operations in steps (4), (7) and (10), the settings revert to their previous values without being updated.

2 - 3 MITSUBISHI MELSEC PLCs (Computer Link)

■ Supported devices

● MITSUBISHI Electric A❑N series/A❑A series/Q series computer link

The continuity of devices need not be taken into account as communication between discrete areas is used for up to 20 devices on the A❑N series and up to 32 devices on the A❑A series.

When this limitation is exceeded, communications become cyclic within a continuous area for the number of devices exceeding this limitation. When this maximum number of devices is exceeded, the upper limit of the address range in the table below is set to a larger value as the order of priority for performing discrete communications.

Communications with devices used in smart switch objects is performed using demand communications. For this reason, special attention is not required in device allocation.

Device Type	Address Range		
	A❑N series	A❑A series	Q series
Input relay	X0000 to X0FFF	X000000 to X00FFFF	X00000 to X0FFFF
Output relay	Y0000 to Y0FFF	Y000000 to Y00FFFF	Y00000 to Y0FFFF
Internal relay	M0000 to M8999	M000000 to M008999	M00000 to M08191
Special relay	M9000 to M9999	M009000 to M009999	SM00000 to SM02047
Step relay	S0000 to S8191	S000000 to S008191	S00000 to S08191
Link relay	B0000 to B0FFF	B000000 to B000FFF	B00000 to B01FFF
Latch relay	L0000 to L4095	L000000 to L004095	L00000 to L08191
Annunciator	F0000 to F9999	F000000 to F009999	F00000 to F002047
Timer (contact)	TS0000 to TS4095	TS00000 to TS04095	TS00000 to TS02047
Timer (coil)	TC0000 to TC4095	TC00000 to TC04095	TC00000 to TC02047
Total timer (contact)	–	–	SS00000 to SS02047
Total timer (coil)	–	–	SC00000 to SC02047
Counter (contact)	CS0000 to CS4095	CS00000 to CS04095	CS00000 to CS01023
Counter (coil)	CC0000 to CC4095	CC00000 to CC04095	CC00000 to CC01023
Data register	D0000 to D9999	D000000 to D009999	D00000 to D12287
Link register	W0000 to WFFFF	W000000 to W00FFFF	W00000 to W01FFF
File register	R0000 to R9999	R000000 to R009999	ZR00000 to ZRFE7FF
Special register	D9000 to D9999	D009000 to D009999	SD00000 to SD02047
Timer PV	TN0000 to TN9999	TN00000 to TN09999	TN00000 to TN02047
Total timer PV	–	–	SN00000 to SN02047
Counter PV	CN0000 to CN9999	CN00000 to CN09999	CN0000 to CN01023
Other devices	Not supported		

Annotation example 1:1:M123
1:1:D236

Handling Precautions

- The communications station No. of the Computer Link Unit A1SJ71C24-R2 and A1SJ71C24-PRF is fixed at "0".
  Annotation example 1:0:M123
  1:0:D236

- MITSUBISHI communications protocol [3C frames, format4] is used for the Computer Link Unit.
  Set the MODE setting switch as follows:

Computer Link Unit	Port Type	MODE Setup Switch
AJ71C24 AJ71C24-S3	RS-232C	4
AJ71C24-S6 AJ71C24-S8 AJ71UC24 AJ71QC24N	RS-422	8
A1SJ71C24-R2 A1SJ71C24-PRF	RS-232C	4
A1SJ71C24-R4	RS-422/RS-485	8

- Be sure to set the checksum setting switch on the Computer Link Unit to "ON".

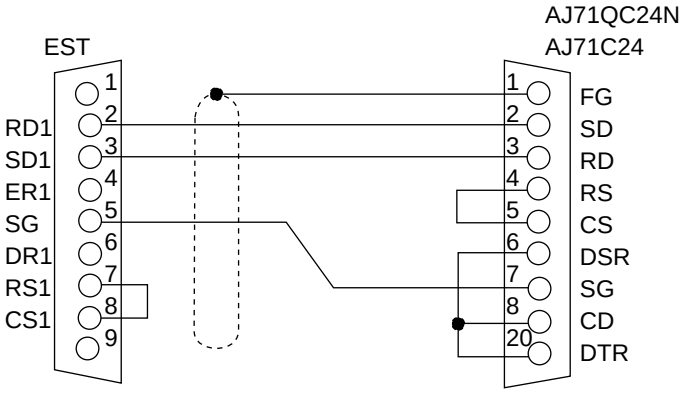
- Two discrete areas on the A❑N are occupied for input relay X. For this reason, when number of input relays n are located in discrete areas, the total number of devices between which discrete communications is performed becomes 20-n.
  (Example)
  Input relay X 5
  Number of discrete communications devices to be occupied 10
  Output relay Y 10
  Number of discrete communications devices to be occupied 10
  Device total 15
  Number of discrete communications devices to be occupied 20
- Select one of the following under the communications driver configuration section of the configuration information when a MITSUBISHI Electric MELSEC PLC is to be used.

Series Name	Driver Name
MELSEC A❑N	MELSEC AnN Computer Link
MELSEC A2C	
MELSEC A1S	
MELSEC A2S	
MELSEC A❑A	MELSEC AnA Computer Link
MELSEC A❑U	
MELSEC A2US	
MELSEC Q❑❑CPU	MELSEC Q Computer Link
MELSEC Q❑❑HCPU	

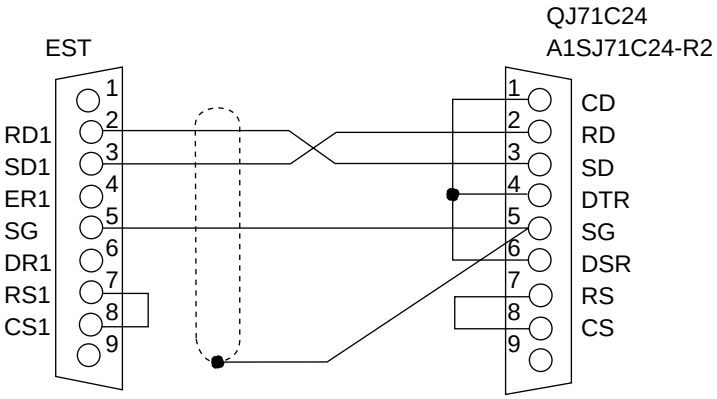
■ Connection examples

● RS-232C connection

MITSUBISHI (MELSEC-A series) (1:1)

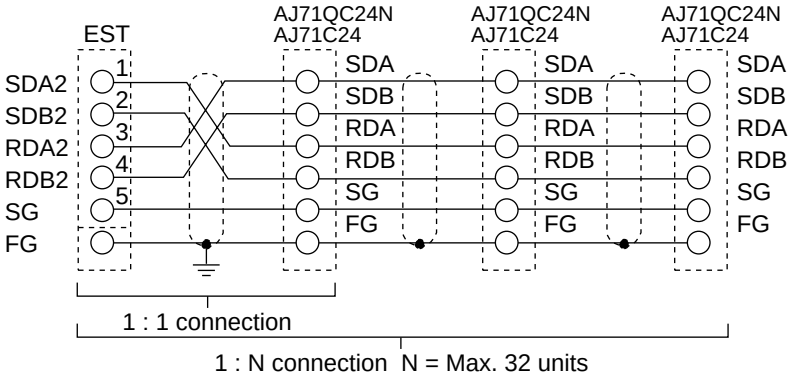


MITSUBISHI (MELSEC-A1S series/Q series) (1:1)



● RS-485 5-lead (CH2) connection

MITSUBISHI (MELSEC-A series/Q series) (1:1, 1:N)



■ Environment configuration examples

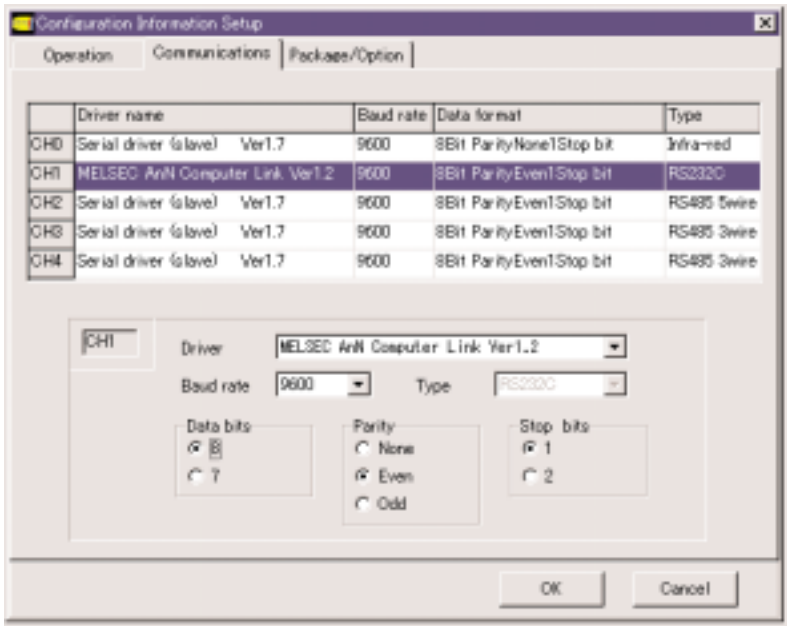
● A❑N series

The following table shows an example configuration for the A❑N series:

PLC	A2SH/A2S/A1SH/A1S/A1SJH/A1SJ
Communications unit	A1SJ71UC24-R2/A1SJ71UC24-PRF
Interface	RS-232C
Transmission speed	9600bps
Data type	8bits Even parity 1 stop bit

• EST configuration

• Communications channel configuration



! Handling Precautions

Select "MELSEC AnN Computer Link" as the Communications Driver setting. Communications will not be possible if "MELSEC AnA Computer Link" is selected.

• How to specify an address

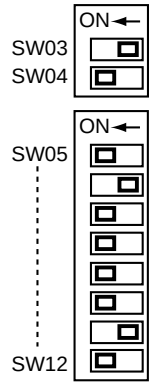
1 : 0 : D100

- PLC device address
- PLC communications address (fixed to "0")
  Set the PLC communications address to "0".
  The station No. of the Computer Link Unit (A1SJ71UC24-R2/-PRF) is fixed to "0".
- EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-232C communications with a PLC, channel "1" would be used.

- **PLC configuration (A1SJ71UC24-R2/-PRF)**
  - Station No. switch configuration

    There is no switch for setting the station No. The station No. is fixed to "0".
  - Mode switch configuration

    Set the rotary switch No. to "4" (format 4 protocol mode).
  - Communications configuration

Setup Switch Settings	Setup Switch	Setting Item	Setup Switch States		
			ON		OFF
	SW03	Not used	—		—
	SW04	Write in Run mode	Possible		Not possible
		Baud rate	4800	9600	19200
	SW05	Transmission speed	OFF	ON	OFF
	SW06		OFF	OFF	ON
	SW07		ON	ON	ON
	SW08	Data bit	8bits		7bits
	SW09	Parity bit	Available		None
	SW10	Parity	Even		Odd
	SW11	Stop bit	2bits		1bit
	SW12	Checksum	Available		Not available

The following setting items must be set:

- Write in Run mode: ON (possible)
- Checksum: ON (available)

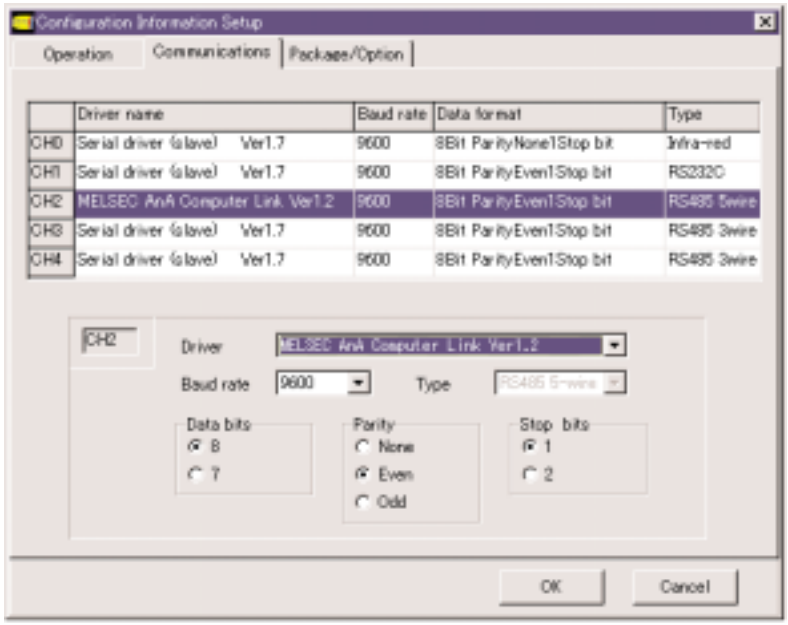
● A❑A series

The following table shows an example configuration for the A❑A series:

PLC	A3A/A2A-S1/A2A
Communications unit	AJ71UC24
Interface	RS-485
Transmission speed	9600bps
Data type	8bits Even parity 1 stop bit

• EST configuration

• Communications channel configuration



! Handling Precautions

Select "MELSEC AnA Computer Link" as the Communications Driver setting. If "MELSEC AnN Computer Link" is selected, the range of communicable devices is restricted to the same range as the A3HCPU, and the extended device range of the AnACPU cannot be accessed.

• How to specify an address

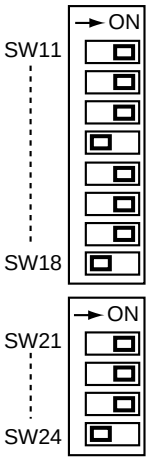
2 : 1 : D100

- PLC device address
- PLC communications address (0 to 31)
  Set the PLC communications address to the same value as the station No. setting of the Computer Link Unit (AJ71UC24) to be connected to the EST.
- EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-485 (5-lead) communications, channel "2" would be used.

- **PLC configuration (AJ71UC24)**
  - Station No. switch configuration

    Set the Station No. of the AJ71UC24 to within the range 0 to 31.
  - Mode switch configuration

    Set the rotary switch No. to "8" (RS-485 side, format 4 protocol mode).
  - Communications configuration

Setup Switch Settings	Setup Switch	Setting Item	Setup Switch States		
			OFF		ON
	SW11	Main channel	RS-232C		RS-422/485
	SW12	Data bit	7bits		8bits
		Baud rate	4800	9600	19200
	SW13	Transmission speed	OFF	ON	OFF
	SW14		OFF	OFF	ON
	SW15		ON	ON	ON
	SW16	Parity bit	None		Available
	SW17	Parity	Odd		Even
	SW18	Stop bit	1bit		2bits
	SW19, 20	Not used	—		—
	SW21	Checksum	Not available		Available
	SW22	Write in Run mode	Not possible		Possible
	SW23	Computer/multidrop link	Multidrop link		Computer link
	SW24	Not used	—		—

The following setting items must be set:

- Write in Run mode: ON (possible)
- Checksum: ON (available)
- Computer/multidrop link: ON (computer link)

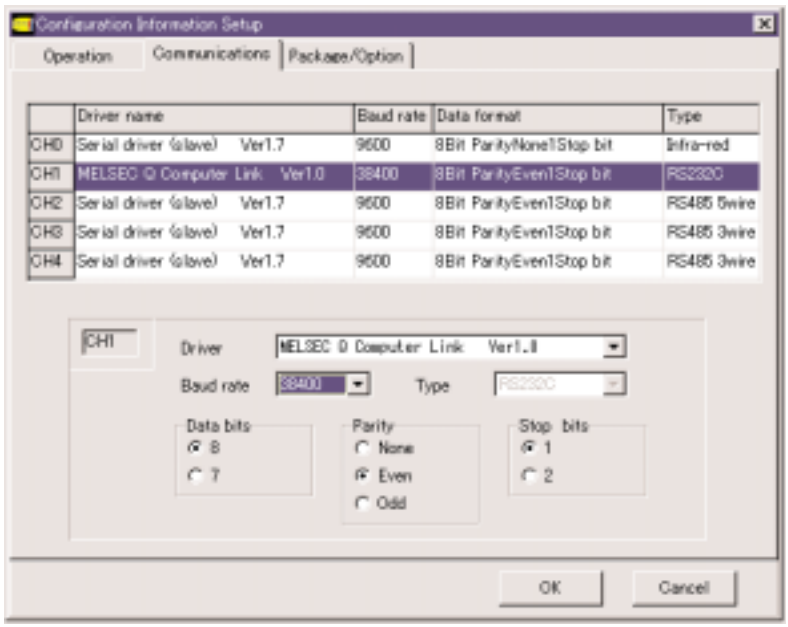
● Q series

The following table shows an example configuration for the Q series:

PLC	Q02/Q02H/Q06H/Q12H/Q25H
Communications unit	QJ71C24
Interface	RS-232C
Transmission speed	38400bps
Data type	8bits Even parity 1 stop bit

• EST configuration

• Communications channel configuration



Handling Precautions

Select "MELSEC Q Computer Link" as the Communications Driver setting.

• How to specify an address

1 : 0 : D100

- PLC device address
- PLC communications address (0 to 31)
  Set the PLC communications address to the same value as the station No. setting of the Computer Link Unit (QJ71C24) to be connected to the EST.
- EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-232C communications with a PLC, channel "1" would be used.

- **PLC configuration (QJ71C24)**

Set the following items on the PLC according to MITSUBISHI GPPW:

(1) I/O assignments

[GPPW] → [PC Parameters] → [Set I/O Assignments]

* For details on how to display screens, refer to the GPPW Operating Manual.

Set as follows:

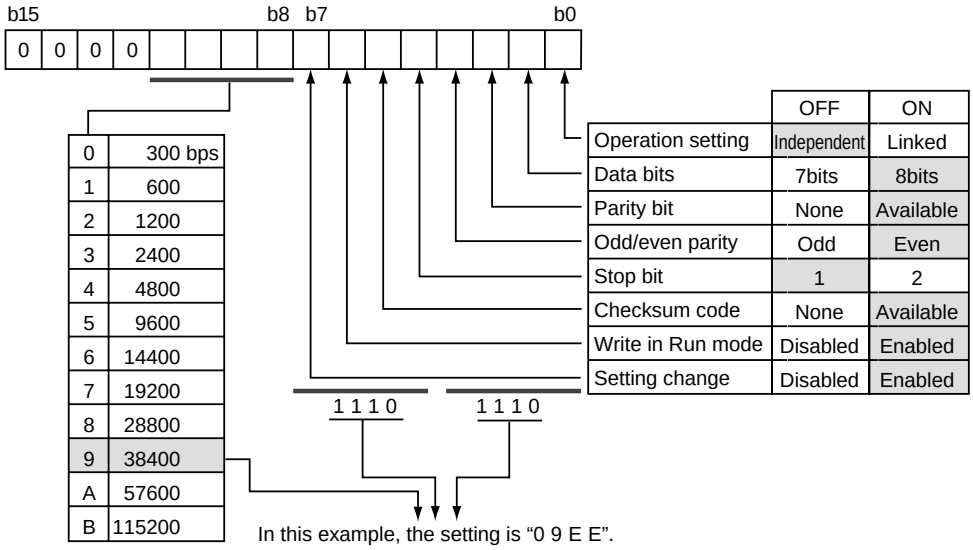
Type	"Intelligent"
Model name	"QJ71C24"
Number of points	"32"

(2) Switches

[GPPW] → [PC Parameters] → [Set I/O Assignments] → [Set Switches]

- Switch 1 (CH1 baud rate setting, CH1 transmission setting)

  Bit assignments are as follows:



	OFF	ON
Operation setting	Independent	Linked
Data bits	7bits	8bits
Parity bit	None	Available
Odd/even parity	Odd	Even
Stop bit	1	2
Checksum code	None	Available
Write in Run mode	Disabled	Enabled
Setting change	Disabled	Enabled

- Switch 2 (CH1 communications protocol setting)

  Set to "4".
- Switch 3 (CH2 baud rate setting, CH2 transmission setting)

  Set to "0".
- Switch 4 (CH2 communications protocol setting)

  Set to "0".
- Switch 5 (station No. setting)

  Set to "0".

2 - 4 MITSUBISHI PLCs (Direct Link)

■ Supported devices

● MITSUBISHI Electric A Series/FX series direct link

As much as possible group together devices to be used in smart display objects and assign them to continuous areas.
Communications is performed on each area of a maximum 32 continuous words. Data can be displayed most efficiently if the devices used on each panel are contained within a single continuous area.
Communications with devices on smart switch objects is performed using demand communications. For this reason, special attention is not required in device allocation.

• A series CPU Direct Link

Device Type	Address Range
Input relay	X00000 to X007FF
Output relay	Y00000 to Y007FF
Internal relay	M00000 to M08191
Special relay	M09000 to M09255
Step relay	S00000 to S08191
Link relay	B00000 to B01FFF
Latch relay	L00000 to L02047
Annunciator	F00000 to F02047
Timer (contact)	TS0000 to TS2047
Timer (coil)	TC0000 to TC2047
Counter (contact)	CS0000 to CS1023
Counter (coil)	CC0000 to CC1023
Data register	D00000 to D08191
Link register	W00000 to W01FFF
File register	R00000 to R09999
Special register	D09000 to D09255
Timer PV	TN0000 to TN2047
Counter PV	CN0000 to CN1023
Other devices	Not supported

• FX series CPU Direct Link

Device Type	Address Range
Input relay	X0000 to X0337
Output relay	Y0000 to Y0337
Auxiliary relay	M0000 to M3071
State	S0000 to S0999
Timer relay	TS0000 to TS0255
Counter relay	CS0000 to CS0255
Data register	D0000 to D0999
	D1000 to D2999
	D3000 to D5999 (FX2N only)
	D6000 to D7999
(special)	D8000 to D8255
Timer register	TN0000 to TN0255
Counter register	CN0000 to CN0199
	CN0200 to CN0255
Index Reg Z	Z
V	V

Annotation example
2:0:M123
2:0:D236

! Handling Precautions

Select one of the following for the CH2 driver configuration of the configuration information when a MITSUBISHI Electric MELSEC PLC is to be used.

Series Name	Driver
MELSEC A CPU	MITSUBISHI A series CPU direct link
MELSEC FX2C, FX0N	MITSUBISHI FXn CPU direct link
MELSEC FX2N	MITSUBISHI FX2N CPU direct link

The devices are supported on IPL version 13.2.1 or later and Win APE version of 1.1 or later.

The following table shows PLC models made by MITSUBISHI Electric for which operation has been confirmed.

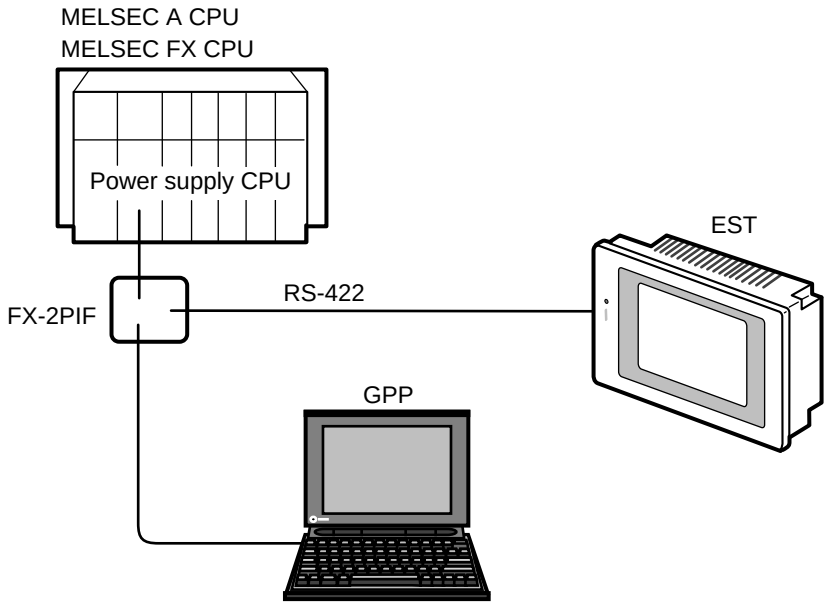
Type	Model No.	Compatibility
CPU unit for AQ U	A2UCPU	Confirmed
CPU unit for AQ A	A3ACPU, A3ACPUP21, A3ACPUR21, A2ACPU A2ACPUP21, A2ACPUR21, A2ACPU-S1 A2ACPUP21-S1, A2ACPUR21-S1	Confirmed
CPU unit for AQ N	A3NCPU, A3NCPUP21, A3NCPUR21, A2NCPU A2NCPUP21, A2NCPUR21, A2NCPU-S1 A2NCPUP21-S1, A2NCPUR21-S1, A1NCPU A1NCPUP21, A1NCPUR21	Confirmed
CPU unit for AQ S	A1SCPU, A2SCPU, A1SJCPU	Confirmed
CPU unit for AQ US	A2USCPU, A2USCPU-S1	Confirmed
FX CPU unit	FX2C, FX0N, FX2N	Confirmed

The following table shows PLC models made by MITSUBISHI Electric for which operation has not been confirmed.

Type	Model No.	Compatibility
A2C CPU unit	A2CCPU, A2CCPU-DC24V, A2CCPUC24 A2CCPUC24-PRF, A2CCPUP21, A2CCPUR21	Unconfirmed
A2CJ CPU unit	A2CJCPU	Unconfirmed
A0J2H CPU unit	A0J2HCPU, A0J2HCPU-DC24V, A0J2HCPUP21 A0J2HCPUR21	Unconfirmed
A0J2 CPU unit	A0J2CPU, A0J2CPU-DC24V A0J2CPUP23, A0J2HCPUR23	Unconfirmed

■ Using the 2-port adapter

Use the MITSUBISHI Electric 2-port adapter (FX-2PIF) to use the EST simultaneously with the GPP during system debugging.

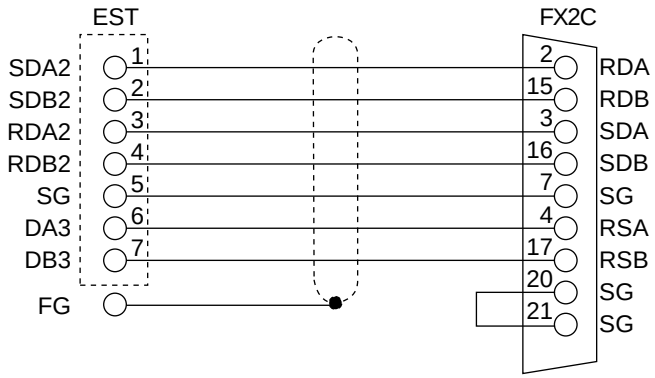


! Handling Precautions

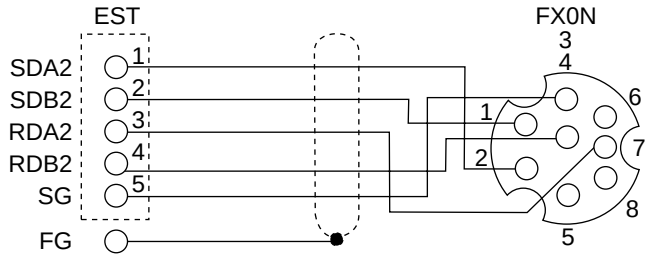
EST response slows down when the 2-port adapter (FX-2PIF) is used.

■ Connection examples

● MELSEC-A CPU/FX2C connection



● MELSEC FX0N, FX2N CPU connection



■ Environment configuration examples

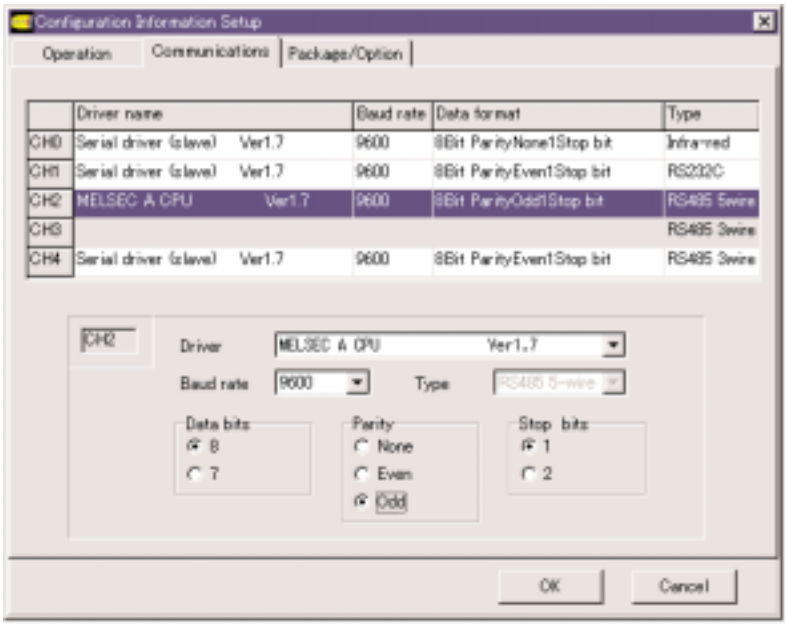
● MITSUBISHI Electric A Series CPU direct link

The following table shows an example configuration for the MITSUBISHI Electric A Series CPU direct link:

PLC	MELSEC A CPU
Communications unit	Direct link
Interface	RS-485
Transmission speed	9600bps
Data type	8bits Odd parity 1 stop bit

• EST configuration

• Communications channel configuration



Handling Precautions

This driver requires the two ports, channels 2 and 3, for communications.

Set "MELSEC A CPU" to channel 2 after "Serial driver (slave)" has been set to channel 3.

The transmission speed and communications format are 9600bps, 8 bits, odd parity and 1 stop bit.

• How to specify an address

2 : 0 : D100

- D100 — PLC device address
- 0 — PLC communications address (fixed to 0)
  The PLC communications address need not be set. However, use 0.
- 2 — EST communications channel
  The communications channel when connected directly to a Mitsubishi Electric A Series CPU is 2.

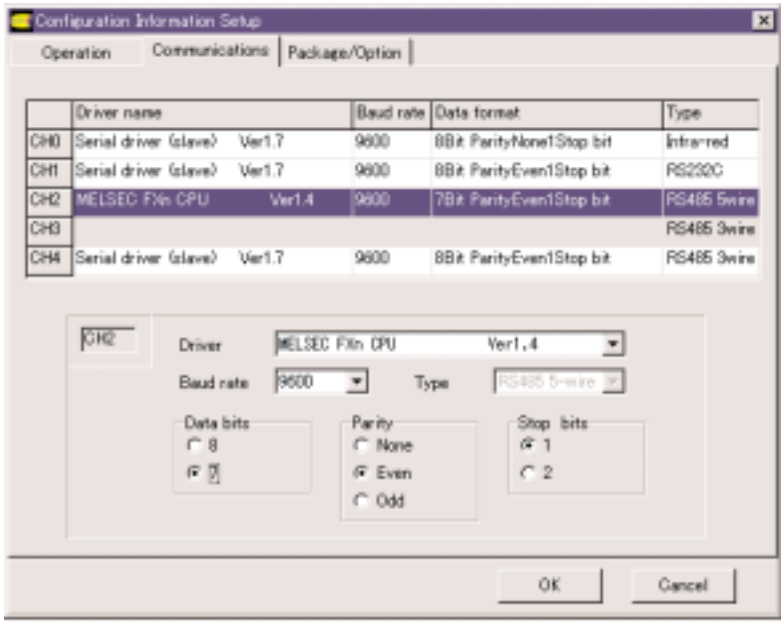
● FX-0N/FX-2C direct link configuration

The following table shows an example configuration for the FX-0N/FX-2C direct link:

PLC	FX0N/FX2C
Communications unit	Direct link
Interface	RS-485
Transmission speed	9600bps
Data type	7bits Even parity 1 stop bit

• EST configuration

• Communications channel configuration



! Handling Precautions

This driver requires the two ports, channels 2 and 3, for communications.
Set "MELSEC FXnCPU" to channel 2 after "Serial driver (slave)" has been set to channel 3.
The transmission speed and communications format are 9600bps, 7 bits, even parity and 1 stop bit.

• How to specify an address

2 : 0 : D100

- D100 — PLC device address
- 0 — PLC communications address (fixed to 0)
  The PLC communications address need not be set.
  However, use 0.
- 2 — EST communications channel
  The communications channel when connected directly to a Mitsubishi Electric FX Series CPU is 2.

2 - 5 Omron PLCs

■ Supported devices

● Omron C/CV series

As much as possible group together devices to be used in smart display objects and assign them to continuous areas.
Cyclic communications is performed on each area of a maximum 32 continuous words.
Data can be displayed most efficiently if the devices used on each panel are contained within a single continuous area.
Communications with devices used in smart switch objects is performed using demand communications. For this reason, special attention is not required in drevice allocation.

Device Type	Address Range	
	C Series	CV Series
Input relay Output relay Internal auxiliary relay Special auxiliary relay	0000 to 409515	0000 to 409515 (including hold relay on CV series)
Link relay	LR0000 to LR409515	–
Auxiliary storage relay	AR0000 to AR409515	–
Hold relay	HR0000 to HR409515	–
Timer	T0000 to T4095	T0000 to T4095
Counter	C0000 to C4095	C0000 to C4095
Data register	DM0000 to DM9999	DM0000 to DM9999
Timer (PV)	DT0000 to DT4095	DT0000 to DT4095
Counter (PV)	DC0000 to DC4095	DC0000 to DC4095
Other registers	Not supported	Not supported

Annotation example 1:1:02311
1:1:DM236

! Handling Precautions

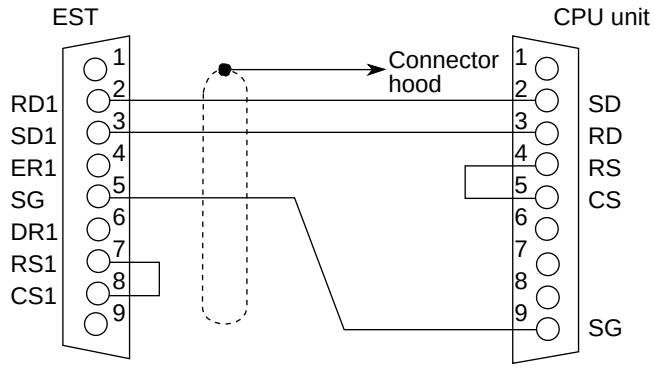
- SYSMAC C series protocol is used for host link communications.
- Select one of the following under the communications driver configuration section of the configuration information when an Omron PLC is to be used.

Series Name	Driver Name
C Series	Omron C/CV host link
CV Series	

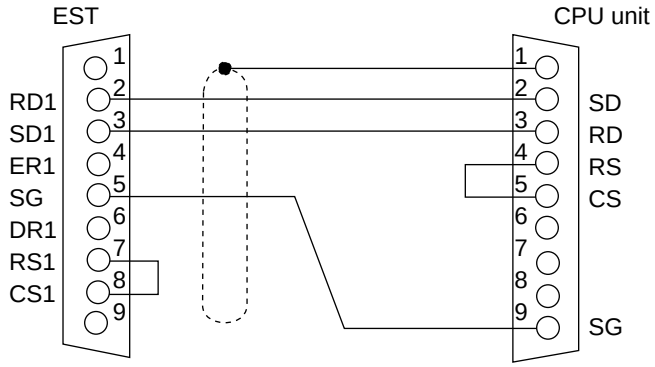
■ Connection examples

● RS-232C connection

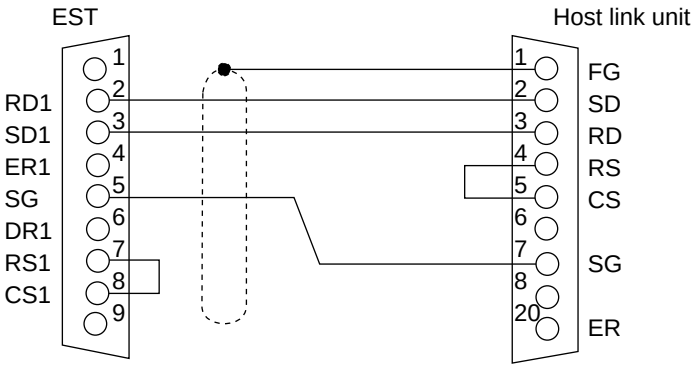
Omron (CV series) (1:1)



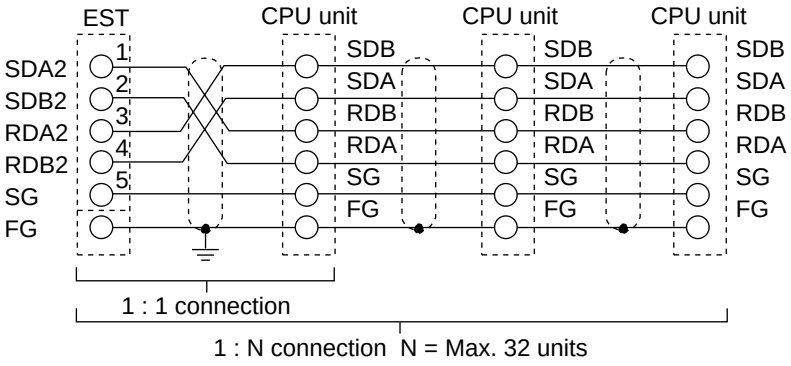
Omron (CPU built-in RS-232C port on C200HS, CQM1 series, C200HX, C200HG, C200HE) (1:1)



Omron (C series) (1:1)



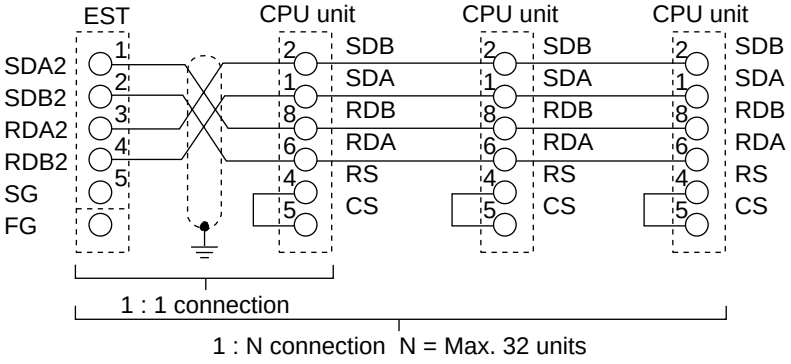
● **RS-485 5-lead (CH2) connection**
Omron (C series) (1:1, 1:N)



Handling Precautions

Leave SG on the EST open when SG is not provided according to the model No.

Omron (CV series) (1:N)



■ Environment configuration examples

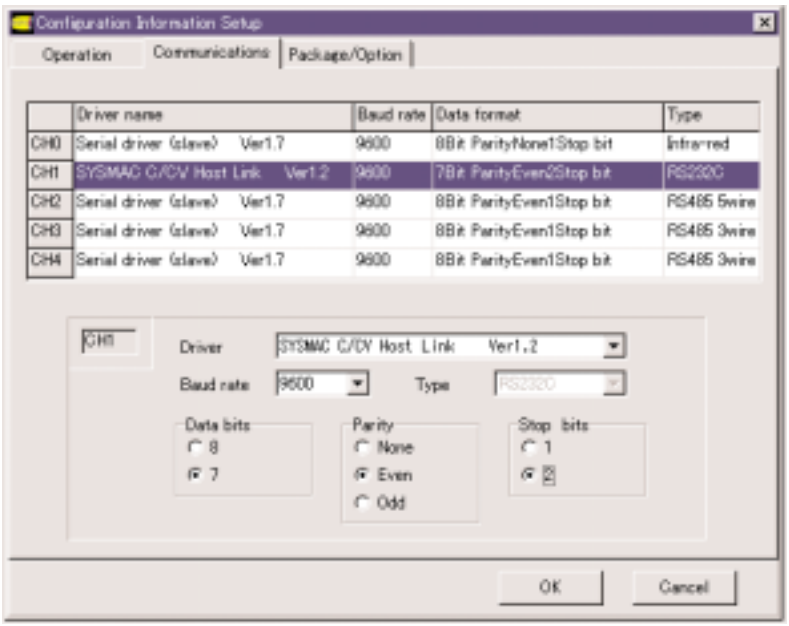
● CV series

The following table shows an example configuration for the CV series:

PLC	CVM1/CV500/CV1000/CV2000
Communications unit	Connector for CPU host link connection
Interface	RS-232C
Transmission speed	9600bps
Data type	7bits Even parity 2 stop bits

• EST configuration

• Communications channel configuration



! Handling Precautions

Select "SYSMAC C/CV Host Link" as the Communications Driver setting.

• How to specify an address

1 : 0 : DM100

- PLC device address
- PLC communications address (0 to 31)
  Set the PLC communications address to the same value as the unit No. setting of the CPU unit to be connected to the EST.
- EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-232C communications with a PLC, channel "1" would be used.

- **CPU unit configuration**
  - Communications path selector switch
    (host link RS-422/RS-232 selector switch)
    Set to "RS-232C".

  - DIP switch settings
    Open the cover of the memory card storage unit to set the DIP switch.
    Set switch Nos. 3 and 4 to "OFF".

  - Host link setting
    Set at "Host Link Setting" in the "PC System Settings" in FIT.

Setting Item	Description
Unit No.	Set within range 0 to 31
Transmission speed	9600bps
Data length	7bits
Parity	Even parity
Stop bit	2bits

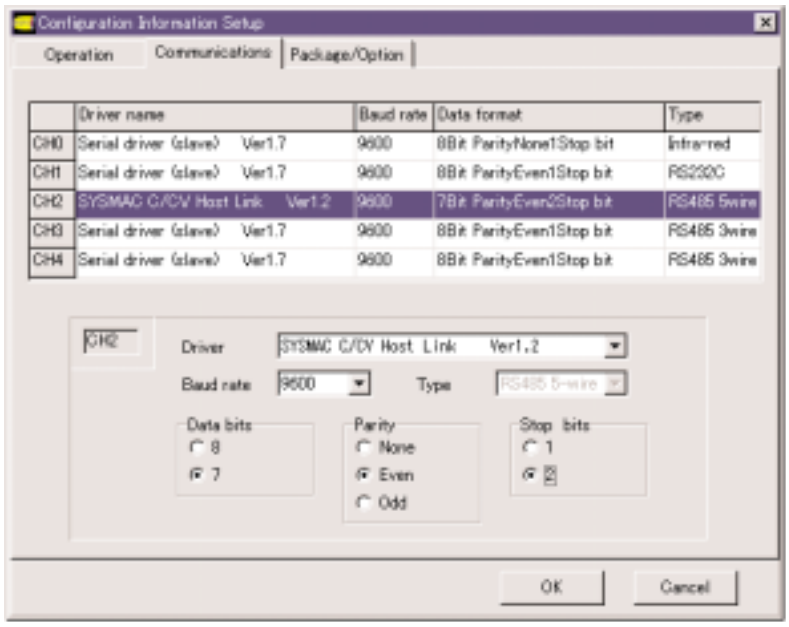
● C series (host link unit)

The following table shows an example configuration for the C series (host link unit):

PLC	C200HX/HG/HE, C200HS, C200H
Communications unit	C500-LK202V1
Interface	RS-485
Transmission speed	9600bps
Data type	7bits Even parity 2 stop bits

• EST configuration

• Communications channel configuration



Handling Precautions

Select "SYSMAC C/CV Host Link" as the Communications Driver setting.

• How to specify an address

2 : 1 : DM100

- DM100 — PLC device address
- 1 — PLC communications address (0 to 31)
  Set the PLC communications address to the same value as the station No. setting of the host link unit (C200H-LK202-V1) to be connected to the EST.
- 2 — EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-485 (5-lead) communications, channel "2" would be used.

- **PLC configuration (C200H-LK202-V1)**
  - Station No. setting (SW1, SW2)

    Set the unit No. of the C200H-LK202 within the range 0 to 31.

  - Transmission speed setting (SW3)

SW3	Transmission speed
4	4800bps
5	9600bps
6	19200bps

Factory settings: 9600bps

  - Command level/parity/transmission code setting (SW4)

SW4	Command Level	Parity	Transmission Code
0	Only level 1 enabled	Even	ASCII 7bits 2 Stop bits
4	Only level 1 enabled	Odd	ASCII 7bits 2 Stop bits
8	Only level 1 enabled	Even	JIS 8bits 1 Stop bit
C	Only level 1 enabled	Odd	JIS 8bits 1 Stop bit

Factory settings: SW4-0

  - Rear panel switch settings

Setting Item	ON	OFF
Communications procedure	1:1 procedure	1:N procedure
Terminator connection	Available	Not available

Factory settings: OFF

Set the terminator as necessary.

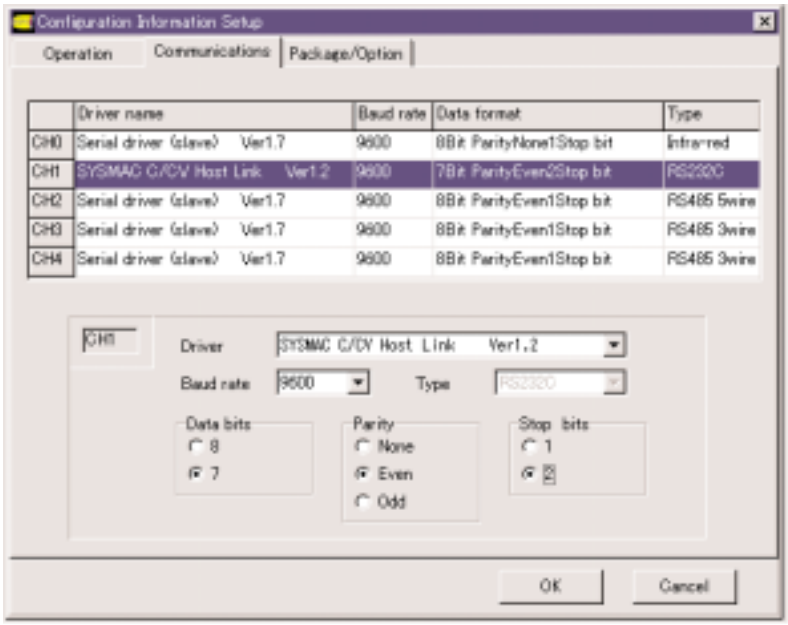
● C series (CPU unit)

The following table shows an example configuration for the C series (CPU unit):

PLC	C200HX/HG/HE, C200HS
Communications unit	CPU RS-232C port
Interface	RS-232C
Transmission speed	9600bps
Data type	7bits Even parity 2 stop bits

• EST configuration

• Communications channel configuration



Handling Precautions

Select "SYSMAC C/CV Host Link" as the Communications Driver setting.

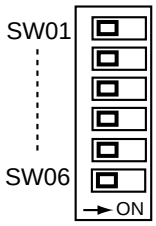
• How to specify an address

1 : 0 : DM100

- DM100 — PLC device address
- 0 — PLC communications address (0 to 31)
  Set the PLC communications address to the same value as the unit No. setting of the CPU unit to be connected to the EST.
- 1 — EST communications channel
  The type of communications to the external device will be determined according to which channel is used.
  For RS-232C communications with a PLC, channel "1" would be used.

- **CPU configuration**

  - DIP switch configuration

Setup Switch Settings	Setup Switch	Setting Item	Setup Switch States	
			OFF	ON
	SW01	Write to user memory area	Possible	Not possible
	SW02	Memory cassette operation at power ON	Automatic reading OFF	Automatic reading ON
	SW03	PLC messages	Japanese	English
	SW04	Application instruction setting function	Disabled	Enabled
	SW05	Communications port setting	Fixed settings canceled	Fixed settings
	SW06	PLC	Console mode	Extended terminal mode

Set switch No.5 to "OFF".

  - RS-232C port configuration

Channel No.	Bits	Functions	Setting	Description
DM6645	00 to 03	Communications format	0	0: 9600bps 7bits Even 2 Stop bits 1: According to DM6646 settings
	04 to 07	CTS control	0	None
	08 to 11	1:1 link	0	–
	12 to 15	Mode setting	0	Host link
DM6646	00 to 07	Baud rate	03	02: 4800bps 03: 9600bps 04: 19200bps
	08 to 15	Format setting	03	00: 7bits Even 1 Stop bit 03: 7bits Even 2 Stop bits 06: 8bits Even 1 Stop bit
DM6647	00 to 15	Transmission delay	0000	0000 to 9999 (BCD: X10ms)
DM6648	00 to 07	Unit No. setting	00	00 to 31 (BCD)

The default PLC communications configuration is as follows:

- Mode :Host link
- Unit No. :0
- Communications format :9600bps, 7 bits, even parity, 2 stop bits

When a connection is made using configuration is other than the above, set the communications format (DM6645) to "1", and set the baud rate, format (DM6646) and unit No. (DM6648).

2 - 6 Matsushita Electric Works PLCs

■ Supported devices

● Matsushita Electric Works FP3/5/10 series

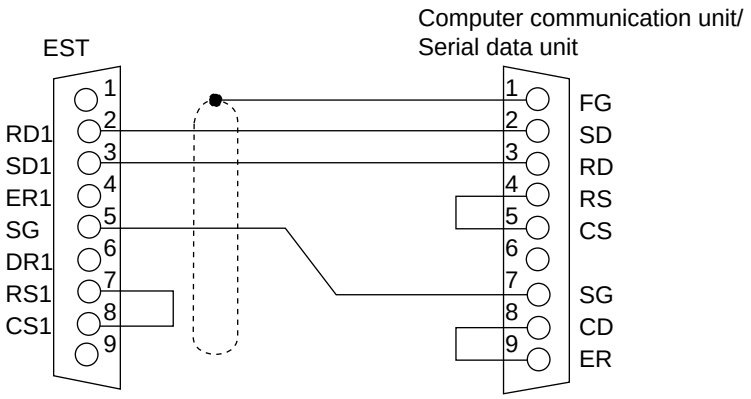
As much as possible group together devices to be used in smart display objects and assign them to continuous areas.
Communications is performed on each area of a maximum 32 continuous words. Data can be displayed most efficiently if the devices used on each panel are contained within a single continuous area.
Communications with devices used in smart switch objects is performed using demand communications. For this reason, special attention is not required in device allocation.

Device Type	Address Range
External input	X0000 to X255F
External output	Y0000 to Y255F
Timer relay	T0000 to T1999
Counter relay	C0000 to C2047
Special internal relay	R9000 to R910F
Internal relay	R0000 to R875F
Link relay	L0000 to L639F
Data register	DT00000 to DT10239
External input	WX000 to WX255
External output	WY000 to WY255
Internal relay	WR000 to WR875
Link relay	WL000 to WL639
Link register	LD0000 to LD8447
File register	FL00000 to FL32764
Timer, counter SP	SV0000 to SV2047
Timer, counter PV	EV0000 to EV2047
Index register	IX IY
Special data register	DT90000 to DT90255

Annotation example
1:1: Y002D
1:1: DT00125

■ Connection examples

Matsushita Electric Works (FP3/FP5/FP10/FP10SH series) (1:1)



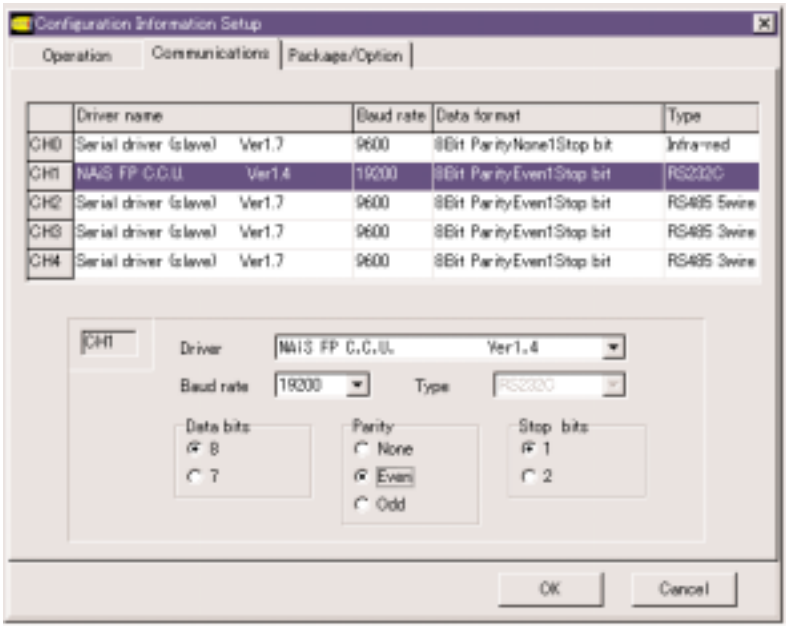
■ Environment configuration example

● Matsushita Electric Works FP3/5/10 series

PLC	FP10SH
Communications unit	C.C.U
Interface	RS-232C
Transmission speed	19200bps
Data type	8bits Even parity 1 stop bit

• EST configuration

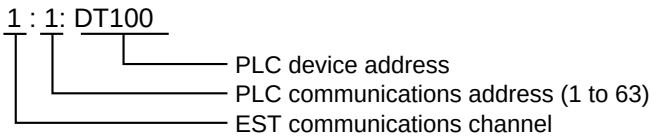
• Communications channel configuration



Handling Precautions

Select "NAiS FP C.C.U." as the Communications Driver setting.

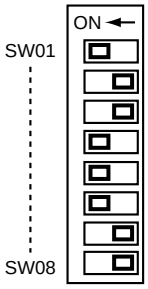
• How to specify an address



Handling Precautions

In the case of 1:1 C.C.U. communications, set the PLC communications address to "1".

- **C.C.U. configuration**
  - DSW configuration

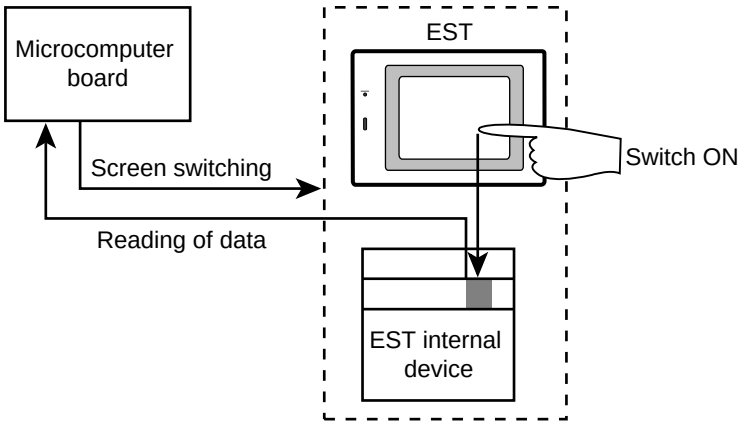
Setup Switch Settings	Setup Switch	Setting Item	Description		
	SW01 to SW03	Transmission speed	SW01	SW02	SW03
		19200bps	ON	OFF	OFF
		9600bps	OFF	ON	OFF
		4800bps	ON	ON	OFF
		2400bps	OFF	OFF	ON
		1200bps	ON	OFF	ON
		600bps	OFF	ON	ON
		300bps	ON	ON	ON
			OFF		ON
	SW04	Data length	7bits		8bits
	SW05	Parity check	Not available		Available
	SW06	Parity setting	Odd		Even
	SW07	Stop bit	1bit		2bits
	SW08	Control signals	CS, CD disabled		CS, CD enabled

Chapter 3. SERIAL SLAVE STATION COMMUNICATIONS

3 - 1 What is “Serial slave communications?”

When the EST performs communications with a PLC (Programmable Logic Controller), this mode of communications is referred to as “host link communications.” Whereas, when data is exchanged between the EST and a microcomputer board, or personal computer (collectively referred to as "microcomputer board" hereinafter) designed by the user as a communications master system for system control, then the mode of communications is referred to as “Serial Slave communications.”

If the microcomputer board is assumed to be a virtual PLC, then communications with the PLC can be performed in the same way. However, it is usually the case that the instrumentation takes the microcomputer board as the master station for communication. This is because it is difficult to define the microcomputer board as a virtual PLC (for reasons of producing command interpretation software and response speed), and control is performed by the timing of the software on the microcomputer board.



There are two ways of using EST internal devices as the serial slave station when the board is used by the EST application:

- Specify EST internal devices as the devices which are entered in the smart object dialog box.
- Specify EST internal devices as the contact devices to be monitored by the alarm monitoring information.

Handling Precautions

Sometimes responses to command are not returned due to noise on the communications path or the power ON timing. If this happens, processing (retry processing) must be performed when the response is not returned normally.

■ Retry processing

In serial communications, noise on the communications path or a power disruption to the peer device could prevent responses from being returned to commands, or corrupt responses. For this reason, the command frame must be re-issued if a response has not been returned after a preset time out period has elapsed. Generally, this re-issuing of the command frame is called “retry processing.” Yet, if retry processing commences too soon, the returned response may be corrupted, responses to previous commands may be received by mistake (*), or other abnormalities may occur.
The standard wait time (time-out period) of the EST is three seconds. Note, however, that an even longer time is required if you are processing complex drawing or communicating large amounts of data. The time-out period must be fully confirmed and tested after preparing actual applications before the application is used.

Note

(*) These abnormalities occur as the instruction message/response message pair is unclear in the EST’s serial slave station communications protocol. This is a common limitation of simple communications protocols.

3 - 2 Setup required for using serial slave communications

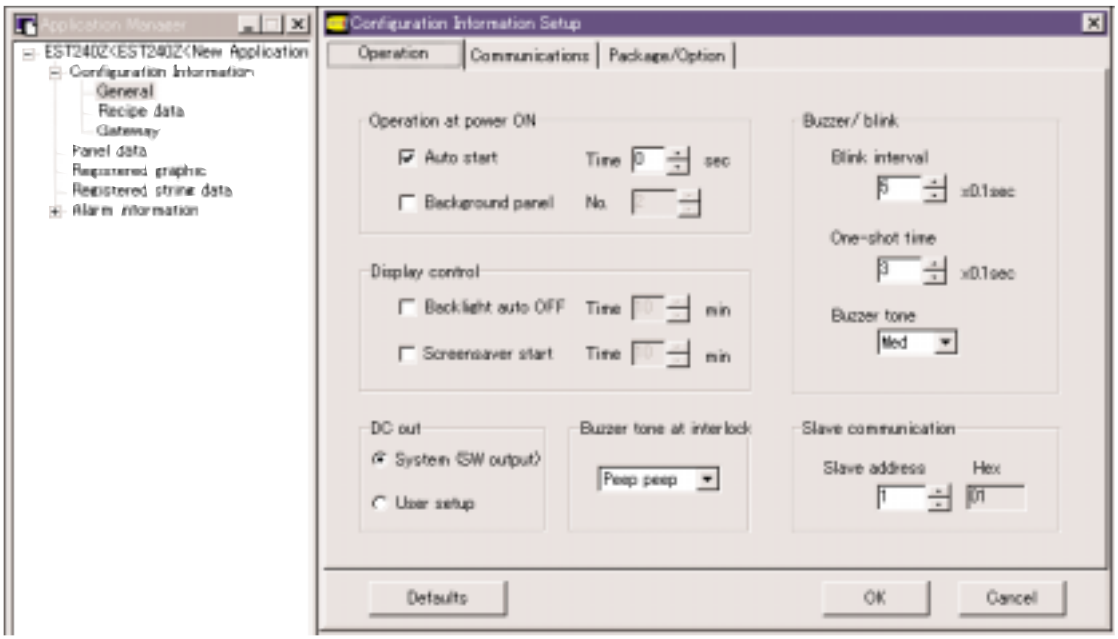
For details on the procedure for making application data and operation methods, refer to the separate manual Smart Terminal EST-Z Series User's Manual Application Preparation Manual No. CP-SP-1088E.
The following two setup operations are required for using serial slave station communications:

- Configuration of the communications parameters of the channel on which serial slave station communications is to be used in the communications tab of the general section of the configuration information.
- Using EST internal device as the device in the device entry field in the smart object dialog box, etc.

The following describes these two operations:

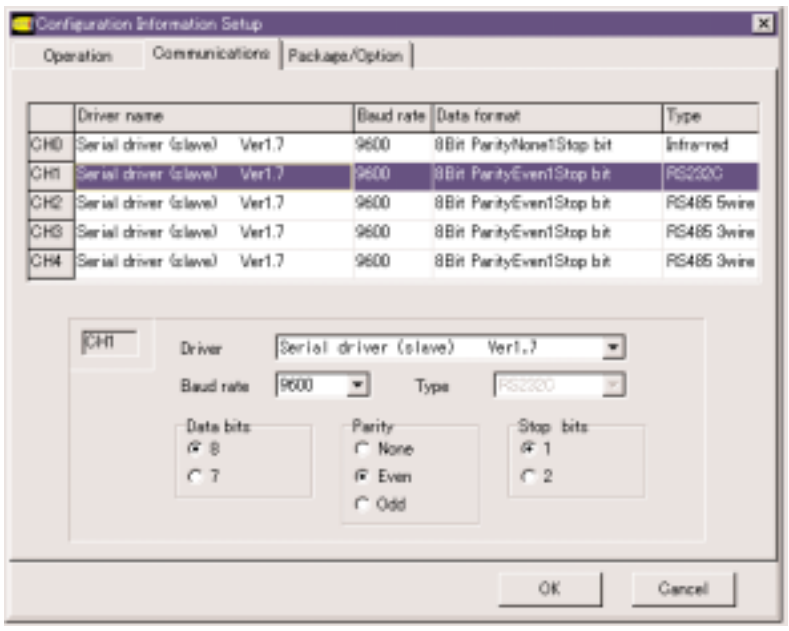
■ Configuration information: Configuring communications parameters in the communications section of the general configuration information

(1) Double-click [General] under [Configuration Information] in the Application Manager.



(2) Click the [Communications] tab under [Configuration Information].

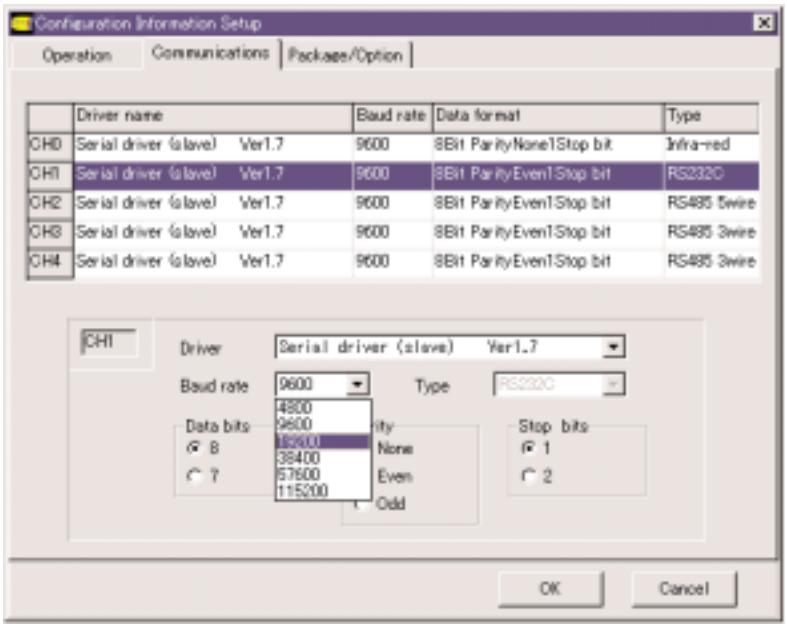
(3) Click the field for the channel on which communications is to be performed.



Four channels, 1 to 4 are provided. The type of communications is fixed according to each channel.

CH1: 9-pin RS-232C D-Sub connector
CH2: 5-lead RS-485 terminal block
CH3, 4: 3-lead RS-485 terminal block. Mainly used for Yamatake temperature controllers.

(4) Communications channel configuration.



(5) Click [OK] to apply the configuration.

■ Using EST Internal Devices

For details on EST internal devices, see “Chapter 4. ADDRESS MAPS”. This section gives a brief description of internal devices.
There are two types of EST internal devices: 1-word, 16-bit long word devices (internal registers) and 1-bit, bit devices (internal contacts).

● Internal registers

Internal registers are annotated as NR00000, etc, and are expressed in decimal. When entering an internal register, 0’s preceding numerical values other than 0 can be omitted.
Special registers SR90000 onwards are also provided as auxiliary registers.

[!] Handling Precautions

These NR registers are not backed up. So, the data must be initialized, since the contents of the NR registers are reset to 0 when the power is turned ON.

● Internal contacts

Internal contacts are annotated as NM000.0, etc. The 3-digit numerical value is expressed in decimal, and the following 1-digit numerical value is expressed in Hex.
When entering the 3-digit numerical value, 0's preceding numerical values other than 0 can be omitted.
Special registers SM900.0 onwards are also provided as auxiliary registers.
The following section describes how to read switch states. Though the EST is the slave device when it is used as the serial slave station, the EST can also generate output communications data for switches.

Handling Precautions

In the same way as NR registers, NM contacts are not backed up. So, the data must be initialized after the power is turned ON.

3 - 3 Reading switch states

There are three ways of monitoring the switch states of the EST from the microcomputer board:

(1) By communicating switch inputs from the slave station in an RS-232C 1:1 connection
(2) By outputting DC outputs from the EST so that the switch states are read by the microcomputer board
(3) By monitoring the switch states at all times by communications

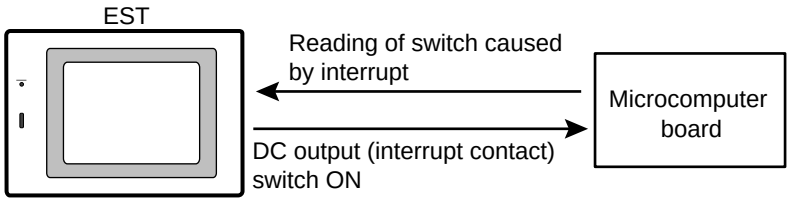
The following describes methods (1) and (2):

■ Communicating switch inputs from the slave station

When creating panels, select [Use SW Communications] for the smart switch object, enter the switch code and set switch notification. When this smart object is used, the EST issues communications instructions to the microcomputer board even though it is the slave device in communications.
Differentiation between communication responses to commands from the microcomputer board for data exchange /panel control, and these of switch operations is performed by strings in the command frames.
Create programs so that the communications master device can judge switches by switch codes.
In communications of switch inputs, switch operations are simultaneously output to all serial slave station communications channels.

■ How to read switches by DC output

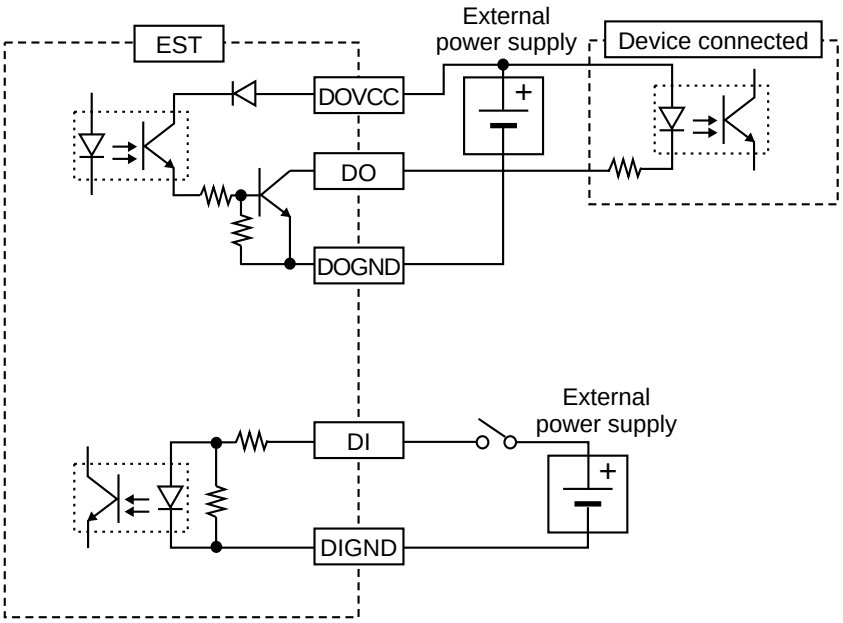
The communications load on the microcomputer board increases if EST switch states are read by the microcomputer board. This is because the microcomputer board must read the state of EST switches by communications at all times when the EST is the serial slave station.
A standard specification EST has 1-bit switch indicating output. When a touch switch is touched, the DC output turns ON.
When creating panels, select [Use SW Communications] for the switch smart object, and set the switch code and [SW Communications Functions].
Create the program on the microcomputer board so that a software interrupt is generated when DC output turns ON to issue the switch communications buffer read command. The contact turns OFF when the switch communications buffer is read.



! Handling Precautions

- Check the following settings when using DC output for switch indication.
  switches
  Application data setting information (operation setting)
  Selection of the system (SW output) by using DC output
  These settings are made on AP Editor.
- When the switch is a 2-touch switch, the switch code is stored to 2-touch switch communications buffer.
  Read the switch communications buffer until the DC output turns OFF.
  DC output is ON for the duration that the switch communications buffer contains a switch code.

■ How to wire DC outputs



3 - 4 Retry Processing

In serial communications, noise on the communications path or a power disruption to the peer device could prevent responses from being returned to commands, or corrupt responses. For this reason, the command frame must be re-issued if a response has not been returned after a preset time out period has elapsed.

Generally, this re-issuing of the command frame is called “retry processing.”

Yet, if retry processing commences too soon, the returned response may be corrupted, responses to previous commands may be received by mistake or other abnormalities may occur. This is because the instruction message/response message pair is unclear in the EST’s serial slave station communications protocol, which is a general feature of simple communications.

The standard wait time (time-out period) of the EST is three seconds. Note, however, that an even longer time is required if you are processing complex drawing or communicating large amounts of data. The time-out period must be fully confirmed and tested after preparing actual applications before the application is used.

Chapter 4. ADDRESS MAPS

4 - 1 Names and Addresses of Areas

■ Device Name/Address allocation table

O : Possible **X** : Not possible

Device Name	Device No.		R	W
Input contact area	SX00.0 (EST240Z)		**O**	**X**
Output contact area	SY00.0 (EST240Z) SY00.0 to SY0.1(EST555Z)		**O**	**O**
Physical switch monitor area	TS00.0 to TS22.F (touch switch)		**O**	**X**
Special contact area	SM900.0 to SM963.F	64 words	**O**	**O**
	SM9064.0 to SM9255.5F	192 words	**O**	**O**
Internal contact area	NM000.0 to NM255.F	256 words	**O**	**O**
Special register area	SR90000 to SR98191	8192 words	**O**	**O**
Internal register area	NR00000 to NR32767	32768 words	**O**	**O**
Backup contact area	SM000.0 to SM255.F	256 words	**O**	**O**
Backup register area (EST555Z)	SR00000 to SR32767	32768 words	**O**	**O**
Backup register area (EST240Z) *	SR00000 to SR16383	16384 words	**O**	**O**

* This area supported on Win APE version of 3.0.00 or later.

Handling Precautions

- Writing to the special register area is performed by the WH and WI commands described later. However, two or more words cannot be written in a single operation by these commands.
- Writing to special contacts and special areas is performed by the WM command described later. However, two or more bits cannot be written in a single operation by this command.
- Some items cannot be written to within the special contacts and special register areas.
- The contents of the special contacts and special register areas are held when the power is turned OFF.

4 - 2 How to use each of the fevices

■ Input contact area

This area is used to read the DC input contacts mounted on the EST. Writing to this area is not possible.
One point, SX00.0, is available in this area.

■ Output contact area

This area is used to turn contacts ON and OFF by writing bits to the DC output contacts mounted on the EST.
Output states can also be read.
One point, SY00.0, is available in this area.

■ Physical switch monitor area

This area is for enabling monitoring the ON/OFF states of EST switches. Writing to this area is not possible.

! Handling Precautions

The size of dots on the LCD display is 20 dot x 20 dots.
Number of touch switches: 16 × 12
Only even addresses are valid.

TS00.0	TS00.1	• • • • • • • • • • • • •	TS00.F
TS02.0	TS02.1	• • • • • • • • • • • • •	TS02.F
• •	• •	• •	• •
TS22.0	TS22.1	• • • • • • • • • • • • •	TS22.F

■ Internal contact area

This area is used by the EST application as bit memory for storing status information, etc, and for handing status information over to the EST from external units.
NM000.0 to NM255.F are available in this area. Reading and writing are possible in this area.

■ Internal register area

This area is used by the EST application as word memory for storing data, etc, and for handing data over to the EST from external units.
NR00000 to NR32767 are available in this area.
Reading and writing are possible in this area.

■ Special contacts

EST internal status and alarm information are stored to special contacts. Special contacts are automatically rewritten by the system.
All special contacts can be read, however, only some special contacts can be written.

The table below shows the main contacts.

O : Possible **X** : Not possible

Address	Name	Description of Operation	W
SM900.B	Battery alarm	Low battery voltage	**X**
SM902.0	ON in Run mode	ON in the Run mode	**X**
SM905.0	ON at all times	ON at all times	**X**
SM905.1	1s clock	ON/OFF switching is repeated at 1s cycles.	**X**
SM905.2	5s clock	ON/OFF switching is repeated at 5s cycles.	**X**
SM905.3	10s clock	ON/OFF switching is repeated at 10s cycles.	**X**
SM905.F	OFF at all times	OFF at all times	**X**
SM907.0	Touch switch indication contact	ON while one of the touch switches is physically ON.	**X**
SM907.3	All switches indication contact	ON while any one of the switches is physically ON.	**X**
SM915.0	Alarm being monitored	The alarm is being monitored.	**X**
SM915.1	History being prepared	The alarm history is being prepared.	**X**
SM915.6	Alarm generated	Some error has occurred.	**X**
SM915.7	New alarm generated	New alarm has occurred. Turns ON for one scan.	**X**
SM916.0	Alarm 1	Monitor contact of alarm No. 1	**O**
• •	• •	• •	• •
SM947.F	Alarm 512	Monitor contact of alarm No. 512	**O**
SM952.0	Light ON	Backlight turns ON when ON.	**O**
SM953.0	Sound ON	Sound turns ON when ON.	**O**
SM953.1	Intermittent sound	Sound beeps on/off with blink setting when on.	**O**

⚠ Handling Precautions

SM900.0 to 963.F onwards are used by the system.
Do not use contact Nos. not listed in the above table.
Unit operation can not be guaranteed if contact Nos. other than those listed are used.

■ Special registers

EST configuration information, operation mode and active panel Nos. are stored in special registers. Though special registers are overwritten by the system, some settings can be rewritten by serial commands.

The table below shows the main registers.

O : Possible **X** : Not possible

Address	Size (W)	Name	Description of Operation	W
SR90024	1	Auto run time	Wait time before operation after power ON (s)	**X**
SR90025	1	Light OFF time	Wait time before when backlight automatically turns OFF (min)	**O**
SR90026	1	Saver setting	Screen saver startup time (min)	**O**
SR90028	1	Blink interval	Screen and sound blink interval (X 100ms)	**O**
SR90029	1	One-shot	Sound and screen reversal time when switch is ON (X 100ms)	**O**
SR90030	1	Tone setting	3 = Low, 2 = Medium, 1 = High, 0 = OFF	**O**
SR90040	1	Back No.	Indicates the No. of the background panel.	**X**
SR90041	1	Number of active panels	Indicates the number of active panels excluding the background panel.	**X**
SR90042	1	Panel 1	Active panel No. 1	**X**
SR90043	1	Panel 2	Active panel No. 2	**X**
SR90044	1	Panel 3	Active panel No. 3	**X**
SR90045	1	Panel 4	Active panel No. 4	**X**
SR90046	1	Panel 5	Active panel No. 5	**X**
SR90047	1	Panel 6	Active panel No. 6	**X**
SR90048	1	Panel 7	Active panel No. 7	**X**
SR90050	3	Scan time	Execution time of conditional operation (previous/max./min.). (X 10ms)	**O**
SR90143	7	Clock	Indicates the date (year/month/day/day of week) and time (hours/minutes/seconds). (See page 5-14.)	**X**
SR90300	1	Number of alarms occurred	Number of ON alarms within alarms 1 to 512	**X**
SR90301	100	Current Alarms	Currently occurring alarm Nos. are stored in ascending order.	**X**

! Handling Precautions

SR90000 to 98191 onwards are used by the system.
Do not use registers not listed in the above table.
Unit operation can not be guaranteed if registers other than those listed are used.

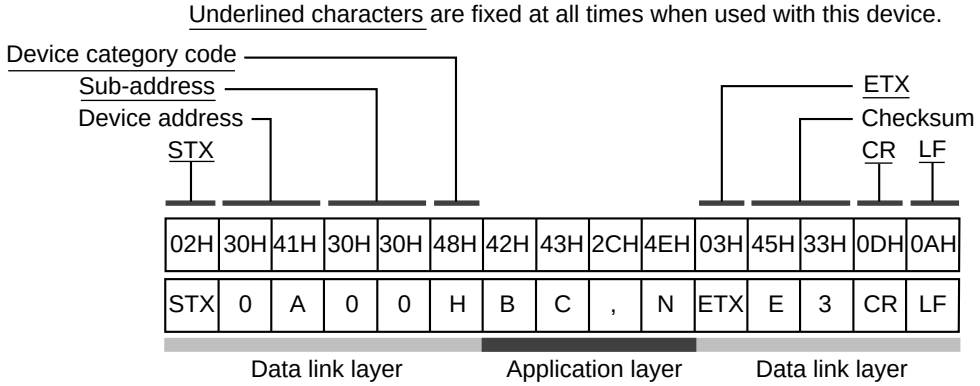
Chapter 5. SERIAL COMMANDS

5 - 1 Communications frame

This item describes the structure of the communications frame.

■ Description of data link layer

- The data link layer contains eight basic types of information for transmitting messages.
- The structure of instruction messages and response messages is the same in the data link layer.



The following describes each of the functions of the data link layer:

● **STX (Start of TeXt)**

Role:
- This indicates the start of the text.

Description:
- Fixed as 02 Hex.
- When the device receives “STX”, STX is judged as the first character of a new instruction message, even if it is received midway through a message.

● **Device address**

Role:
- This specifies the transmission destination device. Communications is possible with only one specified device.

Description:
- Set the device address as a value within the range 01 to 7E. 00 is invalid.
- Set the address as two characters in Hex according to the following example.

Example:
- When the device address of the peer communications device was 10:
  1. 10 (decimal) = 0A Hex
  2. Convert the device address to character codes.
     0 = 30
     A = 41 Hex
  3. “0A” (30 Hex, 41 Hex) calculated in 2. is used as the device address.

Handling Precautions

The function of this command is completely different from the data address in the application layer. Be aware of this difference.

● **Sub-address**

Description:
- Be sure to set “00” (30 Hex, 30 Hex) in the same format as the device address.

- **Device type code**

  Description:
  - Only character code “H” (48 Hex) or “h” (68 Hex) can be specified with the EST.

- **ETX (End of TeXt)**

  Role:
  - This indicates the end of the application layer part of the communications frame.

  Description:
  - ETX is fixed as 03 Hex.

- **Checksum**

  Role:
  - Checksum is a value for checking if the message was corrupted (e.g. noise) during communications.

  Description:
  - Set the checksum as two characters in Hex.
  - How to prepare the checksum
    1. Add the message from STX through to ETX in single byte units.
    2. Take the 2’s complement of the addition result.
    3. Convert the result to character codes.

  Example:
  - The following describes an example taking the instance of the instruction message on the previous page.
    1. Add the character codes from STX through to ETX one byte at a time.
       02+30+41+30+30+48+42+43+2C+4E+03=21D
       The lower 1 byte of the calculation result is 1D Hex.
    2. Take the 2’s complement of the addition result.
       The result is E3 Hex.
    3. Convert the result to character codes.
       The result is (45 Hex) and (33 Hex) as “E3”.

    For details on conversion to character codes, refer to the device address example.

! Handling Precautions

The checksum of instruction messages can be omitted. However, the checksum will not be included in the response to such messages. We recommend using the checksum to ensure correct reception and transmission of messages.

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

  Role:
  - CR and LF indicate the end of a message.

  Description:
  - “CR” is (0D Hex) and “LF” is (0A Hex).
  - CR and LF must be used as a pair.

! Handling Precautions

- The device will not respond if the following kind of inconsistency are seen in the contents of the data link layer:
  - The communications conditions do not match. (For example, the transmission speed does not match, or a parity error occurred.)
  - The transmitted device address differs from the device address of the target device.

- The device address is set to “00”.
- The sub-address is not “00”.
- STX, ETX, CR or LF are not at the determined positions.
- The device type code is not “H” or “h”.
- The device address, sub-address and checksum are not two characters.
- Calculation of the checksum does not match the checksum of the message.
- The communications frame contains invalid characters.

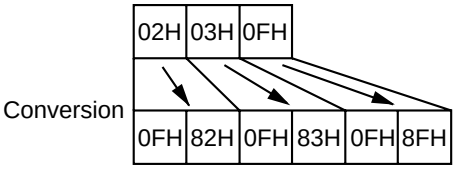
• The response message should have the same data link layer contents (excluding the checksum) as the instruction message.

• Use upper case characters “A” to “F” in the Hex numeric sections used for the device address and checksum.

■ Processing of Binary Data Shift Codes

Convert shift codes as follows to distinguish STX (02 Hex) and ETX (03 Hex) when the binary data 02 Hex, 03 Hex or 0F Hex is included in the message.

02 Hex → 0F Hex, 82 Hex
03 Hex → 0F Hex, 83 Hex
0F Hex → 0F Hex, 8F Hex
(example)



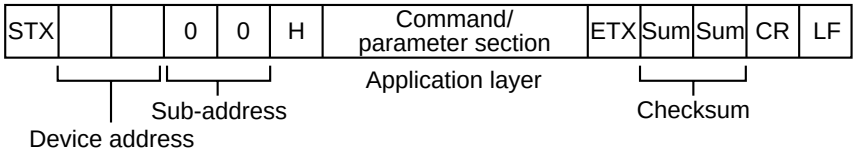
Handling Precautions

The previously described checksum is calculated as 02 Hex even if the 0F, 82 Hex pair is transmitted. Ensure that the communications are configured for 8bits when the RI and WI commands are used.

■ Communications format

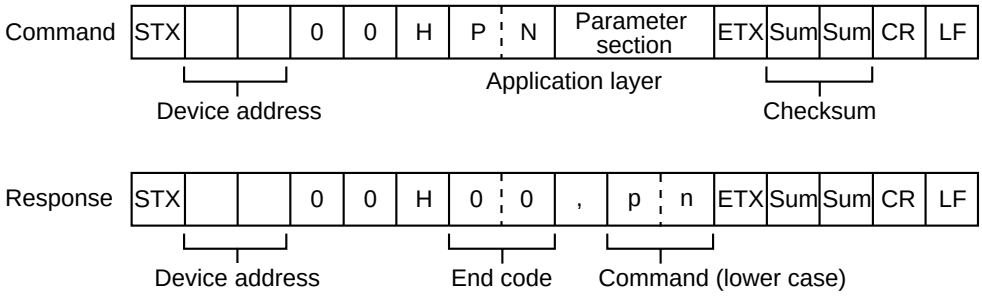
The communications format is as follows:

- The communications format is the same for both reception and transmission.
- The sub-address is fixed at “00”.
- Limit communications to 256bytes from the STX to LF.



The response is returned after the command is received.
If the data requested by the command is available, it is included in the response message,
Subsequent commands are not accepted until transmission of the response message has been completed.
The end code is a numeric value for learning how the command was processed on the EST.
For details on end codes, see “5-3 Command Descriptions” (page 5-7).

(Example) When the response does not contain data.



5 - 2 Communications command tables

■ By function

Command	Command Name	Command Function	Page
PN	Select panel	Switches to the specified panel No.	5-7
BJ	Set block constant	Sets the constants from the smallest address towards the largest in the specified continuous register.	5-9
FK	Call registered graphic	Displays the registered graphic at any screen coordinates.	5-10
BC	Sound control	Sets sound ON/OFF, or to an intermittent beep.	5-11
BK	Set blink interval	Sets the screen region, sound, and display object blink interval.	5-12
LC	Backlight control	Controls ON/OFF of the LCD backlight.	5-13
RC	Read clock	Reads the contents of the EST internal calendar clock.	5-14
WC	Adjust clock	Adjusts the time of the EST internal calendar.	5-15
MD	Mode change	Application run/stop mode change.	5-16
sw	Switch notification (response only)	Notifies (outputs) the ON/OFF state of a switch specified in the application data.	5-17
SW	Read switch communications buffer	Reads the ON/OFF state of a switch specified in the application data.	5-18
RH	Read continuous area communications ASCII	Reads the specified continuous area data (ASCII) in word units.	5-19
WH	Write continuous area communications ASCII	Writes the specified continuous area data (ASCII) in word units.	5-20
RI	Read continuous area communications binary	Reads the specified continuous area binary data in word units.	5-21
WI	Write continuous area communications binary	Writes the specified continuous area binary data in word units.	5-22
WM	Manipulate continuous area communications bits	Manipulates (sets, resets) the bits of the specified continuous area data of the bit device in internal devices.	5-23

■ In alphabetical order

Command	Command Name	Command Function	Page
BC	Sound control	Sets sound ON/OFF, or to an intermittent beep.	5-11
BJ	Set block constant	Sets the constants from the smallest address towards the largest in the specified continuous register.	5-9
BK	Set blink interval	Sets the screen region, sound, and display object blink interval.	5-12
FK	Call registered graphic	Displays the registered graphic at any screen coordinates.	5-10
LC	Backlight control	Controls ON/OFF of the LCD backlight.	5-13
MD	Mode change	Application run/stop mode change.	5-16
PN	Select panel	Switches to the specified panel No.	5-7
RC	Read clock	Reads the contents of the EST internal calendar clock.	5-14
RH	Read continuous area communications ASCII	Reads the specified continuous area data (ASCII) in word units.	5-19
RI	Read continuous area communications binary	Reads the specified continuous area binary data in word units.	5-21
sw	Switch notification (response only)	Notifies (outputs) the ON/OFF state of a switch specified in the application data.	5-17
SW	Read switch communications buffer	Reads the ON/OFF state of a switch specified in the application data.	5-18
WC	Adjust clock	Adjusts the time of the EST internal calendar.	5-15
WH	Write continuous area communications ASCII	Writes the specified continuous area data (ASCII) in word units.	5-20
WI	Write continuous area communications binary	Writes the specified continuous area binary data in word units.	5-22
WM	Manipulate continuous area communications bits	Manipulates (sets, resets) the bits of the specified continuous area data of the bit device in internal devices.	5-23

5 - 3 Command descriptions

■ Select panel (PN)

● Function

This command is for switching to the specified panel No.

✦ Command frame

STX	Device address		Sub-address		H	P	N	,	2	,	1	,	9	9	9	,	4	0	,	2	0	ETX			CR	LF
						Command							Panel No.				X coord			Y coord			Sum			
02	??	??	30	30	48	50	4E	2C	32	2C	31	2C	39	39	39	2C	34	30	2C	32	30	03	??	??	0D	0A

Switching method — Redraw setting — May be omitted

Parameter description

Panel No.	Panel No.: 1 ≤ Panel No. ≤ 999
X coordinate	X coordinate of top left of screen to be displayed: 0 ≤ X ≤ 319
Y coordinate	Y coordinate of top left of screen to be displayed: 0 ≤ Y ≤ 239
Redraw ON/OFF	Redraw specification when updating panel
0	: Redraw OFF (Other panels are displayed as they are.)
1	: Redraw ON (All displays are cleared and then redisplayed.)

The required parameter items change as shown in the following table according to the selection method.

Switching Method	Description	Parameter Specification (**O** : Specification required, –: Specification not required)			
		Redraw ON/OFF	Panel No.	X coordinate	Y coordinate
1	The specified panel is started up, and the currently active panels are stopped.	**O**	**O**	**O**	**O**
		O	**O**	**O**	**O**
2	The specified panel is started up.	**O**	**O**	–	–
3	The specified panel is stopped.				
6	The specified panel is made the background panel and started up.	**O**	**O**	**O**	**O**
7	The background panel is stopped.	**O**	–	–	–
9	All currently active panels are restarted.	–	–	–	–

✧ Response frame

STX	Device address		Sub-address		H	End code		,	p	n	ETX	Sum		CR	LF
02	??	??	30	30	48			2C	70	6E	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error 12: Mode error 13: Command execution error

Operation/processing when an error occurs

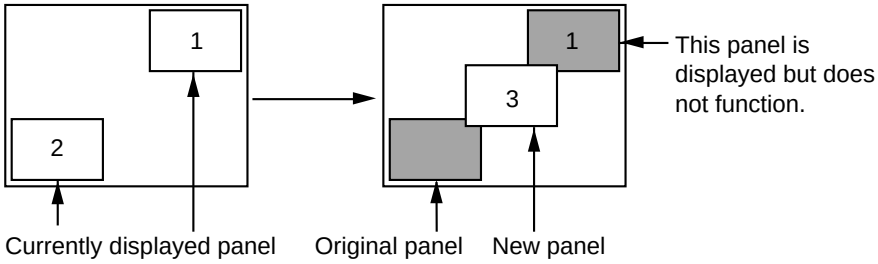
- If this command is executed while the EST is stopped, a mode error occurs in the end code of the response frame.
- If this command is executed while a pop-up display is active on the EST, a command execution error occurs in the end code of the response frame.

⚠ Handling Precautions

- Two or more of the same panel cannot be made active.
- The maximum number of active panels is seven. When an already active panel is specified, that panel is stopped once and then restarted.

● How to use the select panel command

• Panel selector



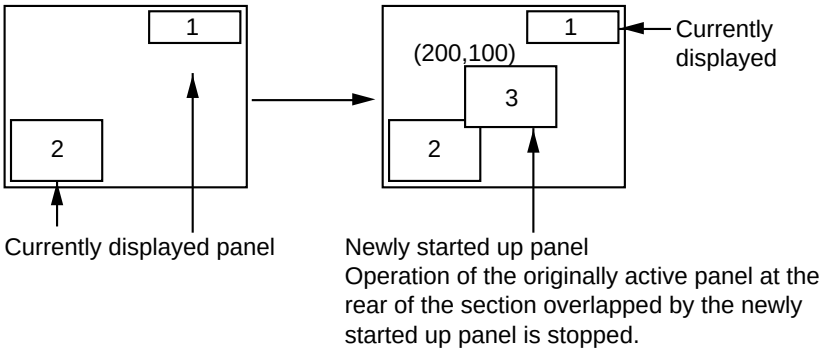
Command: PN, 1, 0, 3, 200, 100

Switching method	0	Specified panel 3 is started up, and currently active panels 1 and 2 are stopped.
Redraw	1	Redraw OFF

Note

When redraw is set to ON (1), panels 1 and 2 are cleared.

• Panel overlay display



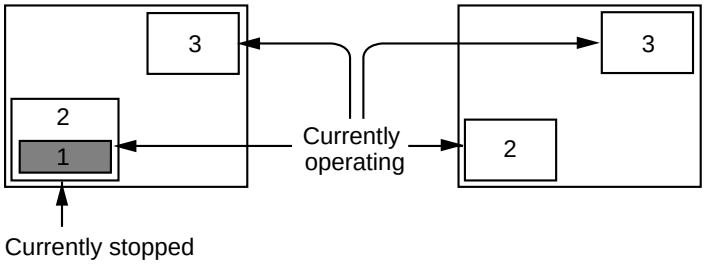
Command: PN, 2, 0, 3, 200, 100

Switching method	2	Specified panel 3 is started up.
Redraw	0	Redraw OFF

• Pop-up display

Pop-up displays cannot be started up by serial commands.

• Clearing panels whose operation has stopped



Command: PN, 9

Switching method	9	The currently active panels are restarted.

■ Set block constant (BJ)

● Function

This command sets constant values into the specified continuous register area from the lowest address towards the highest.

✥ Command frame

STX	Device address	Sub-address	H	B	J	,	1	,	N	R	2	0	0	0	0	,	N	R	2	9	9	9	9	,	≀
				Command					Address 1								Address 2								
02	??	??	30	30	48	42	4A	2C	31	2C	53	52	32	30	30	30	30	2C	53	52	32	39	39	39	39	2C	≀

≀	D	,	1	0	0	0	5	,	-	3	2	7	6	8	ETX			CR	LF
			Constants						Increments							Sum			
≀	44	2C	31	30	30	30	35	2C	2D	33	32	37	36	38	43	??	??	0D	0A

└ Decimal/Hex

└ May be omitted

Parameter description

Execution timing	This parameter specifies the execution timing. 0: Execution at the end of the conditional operation scan of all active panels. 1: Execution after the end of the currently executing conditional operation command.
Address 1	Write destination address 1. Zero suppress is not allowed.
Address 2	Write destination address 2. Zero suppress is not allowed.
Decimal/Hex	This parameter specifies the write data format. D: Decimal H: Hex
Constant	1-word constant Decimal –32768 ≤ constant ≤ +32767 Hex 0000 ≤ constant ≤ FFFF
Increment	Increment for constants from address 1 to address 2 Decimal –32768 ≤ increment ≤ +32767 Hex 0000 ≤ increment ≤ FFFF When 0 or when omitted, the same constant is set to all addresses.

✧ Response frame

STX	Device address	Sub-address	H	End code	,	b	j	ETX	Sum		CR	LF
02	??	??	30	30	48	2C	62	6A	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error

Operation/processing when an error occurs

A parameter error occurs if an out-of-range parameter is specified.

! Handling Precautions

- The increment can be omitted. When the increment is omitted, the same constant is set. (The increment is interpreted as being “0”.)
- In the case of bit devices, the bit specification is ignored, and the constant is written in word units (specified device bits 0 to F).
- Calculation of the increment is performed by calculating the 2’s complement of one word, and increases and decreases in the number of digits are ignored.

■ Call registered graphic (FK)

● Function

This command displays the registered graphic at the specified screen coordinates.

❖ Command frame

STX	Device address		Sub-address		H	F	K	,	9	9	9	,	1	0	0	,	2	0	0	,	N	N	ETX	Sum		CR	LF
						Command			Registered graphic No.				X coord				Y coord										
02	??	??	30	30	48	46	4B	2C	39	39	39	2C	33	32	30	2C	32	30	30	2C	4E	4E	03	??	??	0D	0A

Display method

May be omitted

Parameter description

Registered graphic No.	Registered graphic No. to be displayed: 1 ≤ registered graphic No. ≤ 999
X coordinate	X coordinate of top left of screen to be displayed: 0 ≤ X ≤319
Y coordinate	Y coordinate of top left of screen to be displayed: 0 ≤ Y ≤ 239
Display method	This parameter specifies the screen update method. (The area to be cleared is the area in which the registered graphic is displayed.) NN: Display after the entire screen is cleared NV: Display with an overwrite image on the current screen RN: Display after the entire screen is cleared in a reverse state RV: Display with an overwrite image on the current screen in a reverse state

✧ Response frame

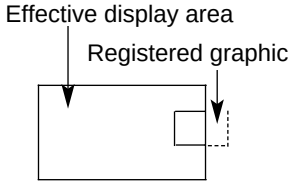
STX	Device address		Sub-address		H	End code	,	f	k	ETX	Sum		CR	LF
02	??	??	30	30	48		2C	66	6B	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error 12: Mode error

Operation/processing when an error occurs

- A parameter error occurs if an out-of-range parameter is specified.
- If the registered graphic is displayed at the specified coordinates, and the registered graphic protrudes from the effective display area, the registered graphic is displayed at the display able area.
- If this command is executed while the EST is stopped, a mode error occurs in the end code of the response frame.



■ Sound control (BC)

● Function

This command sets sound ON, OFF, or to an intermittent beep.

❖ Command frame

STX	Device address		Sub-address		H	B	C	,	N	ETX	Sum		CR	LF
						Command								
02	??	??	30	30	48	42	43	2C	4E	03	??	??	0D	0A

Operation specification

May be omitted

Parameter description

Operation specification	This parameter sets sound ON/OFF or to intermittent beep. N: Sound ON F: Sound OFF B: Intermittent beep

✧ Response frame

STX	Device address		Sub-address		H	End code	,	b	c	ETX	Sum		CR	LF
02	??	??	30	30	48		2C	62	63	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error

! Handling Precautions

Intermittent beeping is performed at the rate set by the Set blink interval (BK) command.

■ Set blink interval (BK)

● Function

This command sets, sound, and smart display object blink interval.

❖ Command frame

Parameter description

STX	Device address		Sub-address		H	B	K	,	2	5	5	ETX			CR	LF
						Command							Sum			
02	??	??	30	30	48	42	4B	2C	32	35	35	03	??	??	0D	0A

Interval

May be omitted

✧ Response frame

Interval	This parameter sets the blink interval time. The blink interval is set in units of 100ms. Range: 1 to 255 (100ms to 25.5s)

Parameter description

STX	Device address		Sub-address		H	End code	,	b	k	ETX			CR	LF
											Sum			
02	??	??	30	30	48		2C	62	6B	03	??	??	0D	0A

End code	00: Normal end 10: Parameter error

! Handling Precautions

- The blink state is as follows after the blink interval is set by the set blink interval (BK) command:

  (1) Blinks stays stopped and does not change when blinking is in a stopped state.

  (2) During blinking, blinking is performed at the specified blink interval.

- Blinking start/stop control is performed by the buzzer control (BC) command.
- The interval is set to 5 (blink interval 500ms) when the power is turned ON.
- When the blink interval time is set to “0”, the blink ON/OFF specification is ignored, and blinking is stopped until a value other than “0” is specified.

■ Backlight control (LC)

● Function

This command controls the ON/OFF state of the LCD backlight.

❖ Command frame

STX	Device address		Sub-address		H	L	C	,	N	ETX	Sum		CR	LF
						Command								
02	??	??	30	30	48	4C	43	2C	4E	03	??	??	0D	0A

Operation specification

May be omitted

Parameter description

Interval	This parameter specifies the ON/OFF state of the LCD backlight. N: Backlight ON F: Backlight OFF

✧ Response frame

STX	Device address		Sub-address		H	End code	,	l	c	ETX	Sum		CR	LF
02	??	??	30	30	48		2C	6C	63	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error

! Handling Precautions

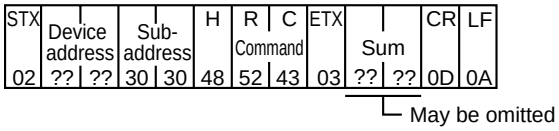
- The backlight goes ON when the power is turned ON.
- If the backlight is made to go OFF using this command, automatic lighting by touching a switch is not performed, in addition, touch switch input is not accepted.

■ Read Clock (RC)

● Function

This command reads the contents of the EST internal calendar clock.

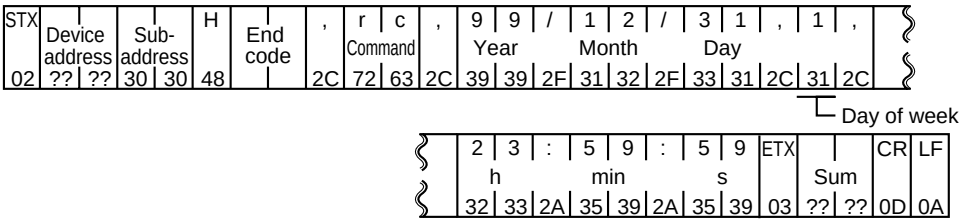
❖ Command frame



Parameter description

None

✧ Response frame



Parameter description

End Code	00: Normal end 10: Parameter error	
Year	Lower 2 digits of calendar year	Range: (19) 50 to (20) 49
Month	Month	Range: 01 to 12 (month)
Day	Day	Range: 01 to 31 (day)
Day of week	Day of week	Range: 0 to 6
	Code: 0 1 2 3 4 5 6	
	Day of week: Sun Mon Tue Wed Thu Fri Sat	
h	Hours	Range: 00 to 23
min	Minutes	Range: 00 to 59
s	Seconds	Range: 00 to 59

⚠ Handling Precautions

- Year/month/day/day-of-week/hours/minutes/seconds are stored as continuous 7-word BCD starting from internal device SR90143.
- Response parameters are returned in two digits. For example, “9 minutes” is returned as “09”. Note, however, that the day of the week is returned in one digit.

■ Adjust clock (WC)

● Function

This command adjusts the EST internal calendar time.

✥ Command frame

STX	Device address		Sub-address		H	W	C	,	9	9	/	1	2	/	3	1	,	2	3	:	5	9	:	5	9	ETX	Sum		CR	LF
						Command			Year			Month			Day				h			min			s						
02	??	??	30	30	48	57	43	2C	39	39	2F	31	32	2F	33	31	2C	32	33	2A	35	39	2A	35	39	03	??	??	0D	0A

May be omitted

Parameter description

Year	Lower 2 digits of calendar year	Range: (19) 50 to (20) 49
Month	Month	Range: 01 to 12 (month)
Day	Day	Range: 01 to 31 (day)
h	Hours	Range: 00 to 23
min	Minutes	Range: 00 to 59
s	Seconds	Range: 00 to 59

✧ Response frame

STX	Device address		Sub-address		H	End code	,	w	c	ETX	Sum		CR	LF
02	??	??	30	30	48		2C	77	63	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error

⚠ Handling Precautions

- The day of the week is automatically calculated by the EST unit, and the day of the week code on the previous page is set to the internal device.
- Year/month/day/day of week/hours/minutes/seconds are stored as continuous 7-word BCD starting from internal device SR90143.
- Ensure that each command parameter is specified with two digits.

■ Mode change(MD)

● Function

This command changes the mode of the application between run/stop.

✥ Command frame

STX	Device address		Sub-addres		H	M	D	,	S	ETX	Sum		CR	LF
						Command								
02	??	??	30	30	48	4D	44	2C	4F	03	??	??	0D	0A

Mode specification — May be omitted

Parameter description

Mode specification	This parameter runs/stops the application. S: Stop R: Run

✧ Response frame

STX	Device address		Sub-address		H	End code	,	m	d	ETX	Sum		CR	LF
02	??	??	30	30	48		2C	61	6C	03	??	??	0D	0A

Parameter description

End code	00: Normal end 10: Parameter error 12: Mode error 13: Command execution error

Operation/processing when an error occurs

- If run is specified while the application is running, a mode error is returned.
- If stop is specified while the application has stopped, a mode error is returned.

! Handling Precautions

- The current mode can be learned by referencing the ON contact (SM902.0) while the application is running.
  SM902.0 = 0: The application has stopped.
  SM902.0 = 1: The application is running.
- The next command sometimes cannot be answered for 200ms after a normal response to the MD command has been received.

■ Switch notification (response only) (sw)

● Function

This command notifies (outputs) the ON/OFF state of a switch specified in the application data.

✦ Command frame

There is no command frame.

✧ Response frame

STX	Device address		Sub-address		H	End code		,	s	w	,	+	Switch code					,	N	ETX	Sum		CR	LF
02	??	??	30	30	48	00	00	2C	53	77	2C	2B	33	32	37	36	37	2C	4E	03	??	??	0D	0A

Event

Parameter description

Switch Code	Switch code specified in the application data Decimal values are zero-suppressed. Range: –32768 to +32767
Event	N: ON state (switch touched) F: OFF state (switch released)
End Code	00: Normal end

ⓘ Handling Precautions

- The response is generated by the ON edge and OFF edge when the switch is touched regardless of the switch mode.
- Specify “Switch Notification” in the application data. Otherwise, notification (output) is not generated.
- Set ⊙ ON switch notification or ⊙ ON/OFF switch notification in the smart switch object parameter settings when configuring smart switch objects.
- The checksum is always appended to the response.
- The switch code is prefixed with + (plus number, zero) or – (minus number) depending on its value.
- Switch communications are only performed if serial slave communications has been selected.

■ Read switch communications buffer (SW)

● Function

This command reads the ON/OFF state of a switch specified in the application data.

✦ Command frame

STX	Device address		Sub-address		H	S	W	ETX	Sum		CR	LF
						Command						
02	??	??	30	30	48	53	57	03	??	??	0D	0A

May be omitted

Parameter description

None

✧ Response frame

STX	Device address		Sub-address		H	End code	,	s	w	,	+	3	2	7	6	7	,	N	ETX	Sum		CR	LF
											Switch code													
02	??	??	30	30	48		2C	53	77	2C	2B	33	32	37	36	37	2C	4E	03	??	??	0D	0A

Event

Parameter description

Switch Code	Switch code specified in the application data Decimal values are zero-suppressed. Range: –32768 to +32767
Event	N: ON state (switch touched) F: OFF state (switch released) E: FIFO empty state
End Code	00: Normal end 10: Parameter error

⚠ Handling Precautions

- The switch code is prefixed with + (plus number, zero) or – (minus number) depending on its value.
- If the switch communications buffer is empty, <event> becomes E and <switch code> is undefined.
- Set ⊙ ON switch notification or ⊙ ON/OFF switch notification in the smart switch object parameter settings when configuring smart switch objects.
- After the data has been read, that data is deleted from the switch communications buffer.
- If there is data in the switch communications buffer, the DC output turns ON.

■ Read continuous area communications ASCII (RH)

● Function

This command reads the specified continuous area of EST internal devices in word units. (ASCII)

✦ Command frame

STX	Device address		Sub-address		H	R	H	,	1	,	N	R	2	9	0	0	0	,	3	2	,	D	ETX			CR	LF
						Command					Read start address								Number of reads					Sum			
02	??	??	30	30	48	52	48	2C	31	2C	4F	52	32	39	30	30	30	2C	33	32	2C	44	03	??	??	0D	0A

Execution timing — Decimal/Hex — May be omitted

Parameter description

Execution timing	This parameter specifies the execution timing. 0: Execution at the end of the conditional operation scan of all active panels 1: Execution after the end of the currently executing conditional operation command
Number of reads	Number of data items to read Range: 1 to 32
Read start address	Start address of read source Zero suppression is not allowed.
Decimal/Hex	This parameter specifies the write data format. D: Decimal H: Hex

✧ Response frame

STX	Device address		Sub-address		H	End code		,	r	h	,	+	1	2	3	4	,	-	9	9	9	9	ETX			CR	LF
												Read data						Read data						Sum			
02	??	??	30	30	48			2C	61	68	2C	2B	31	32	33	34	2C	2D	39	39	39	39	03	??	??	0D	0A

Parameter description

End Code	00: Normal end 10: Parameter error
Data	Read data (ASCII) Decimal –32768 ≤ data ≤ +32767 Hex 0000 ≤ data ≤ FFFF

⚠ Handling Precautions

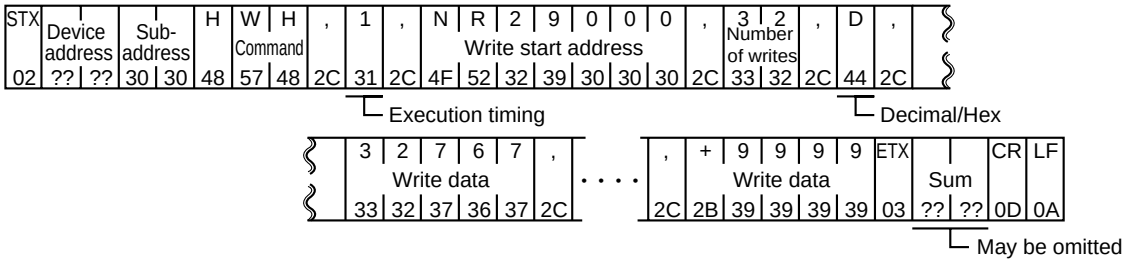
- In the case of bit devices, the bit specification is ignored, and the data is read in word units (specified device bits 0 to F).
- If decimal is specified, the data is prefixed with + (plus number, zero) or – (minus number) depending on its value.

■ Write continuous area communications ASCII (WH)

● Function

This command writes the specified continuous area of EST internal devices in word units. (ASCII)

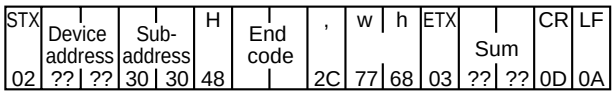
✦ Command frame



Parameter description

Execution timing	This parameter specifies the execution timing. 0: Execution at the end of the conditional operation scan of all active panels 1: Execution after the end of the currently executing conditional operation command
Number of writes	Number of data items to write Range: 1 to 32
Write start address	Write start address Zero suppression is not allowed.
Decimal/Hex	This parameter specifies the write data format. D: Decimal H: Hex
Write data	Input data (ASCII) Decimal –32768 ≤ data ≤ +32767 Hex 0000 ≤ data ≤ FFFF

✧ Response frame



Parameter description

End code	00: Normal end 10: Parameter error 12: Mode error

! Handling Precautions

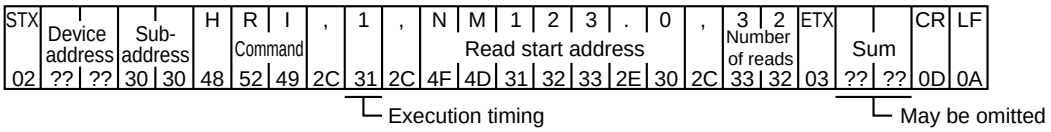
- In the case of bit devices, the bit specification is ignored, and the data is read in word units (specified device bits 0 to F).
- The + (plus number) sign for decimal write data can be omitted, and zero can be suppressed.
  Note, however, that when the value is 0, it is expressed as “+0”.
  Be sure to prefix negative data with the – (minus) sign.

■ Read continuous area communications binary (RI)

● Function

This command reads the specified continuous area of EST internal devices in word units.(binary)

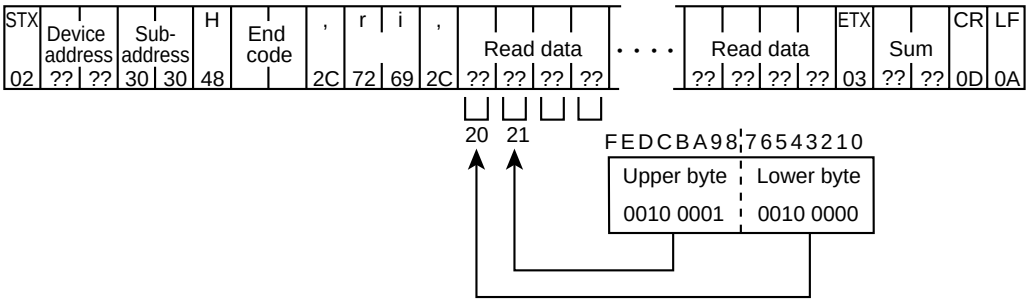
✦ Command frame



Parameter description

Execution timing	This parameter specifies the execution timing. 0: Execution at the end of the conditional operation scan of all active panels 1: Execution after the end of the currently executing conditional operation command
Number of reads	Number of words in data to read Range: 1 to 99
Read start address	Start address of read source Zero suppression is not allowed.

✧ Response frame



Parameter description

End Code	00: Normal end 10: Parameter error
Data	Read data (binary processed by shift code) 1-word data is output as it is in byte units.

! Handling Precautions

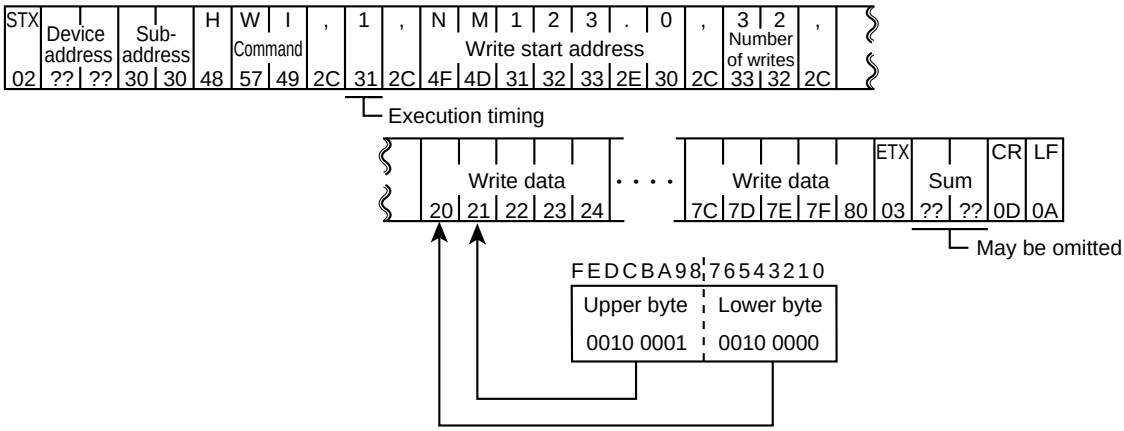
- In the case of bit devices, the bit specification is ignored, and the data is read in word units (specified device bits 0 to F).
- For details on processing shift codes, see “■ Processing of binary data shift codes” (page 5-3).
- When the RI command is used, ensure that the communications are configured for 8bits.

■ Write continuous area communications binary (WI)

● Function

This command writes the specified continuous area of EST internal devices in word units. (binary)

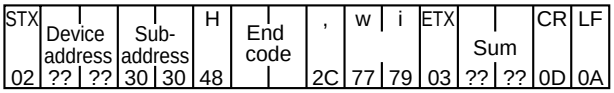
✦ Command frame



Parameter description

Execution timing	This parameter specifies the execution timing. 0: Execution at the end of the conditional operation scan of all active panels 1: Execution after the end of the currently executing conditional operation command
Number of writes	Number of words in data to write Range: 1 to 99
Write start address	This parameter specified the write data format. Zero suppression is not allowed.
Write data	Write data (binary processed by shift code) 2 bytes × <number of writes> 1-word data is input in binary as it is in byte units.

✧ Response frame



Parameter description

End code	00: Normal end 10: Parameter error 12: Mode error

! Handling Precautions

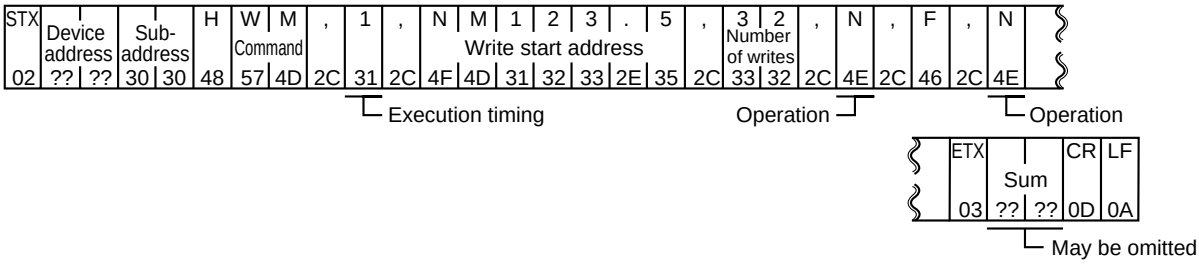
- In the case of bit devices, the bit specification is ignored, and the data is read in word units (specified device bits 0 to F).
- For details on processing shift codes, see "■ Processing of binary data shift codes" (page 5-3).
- When the WI command is used, ensure that the communications are configured for 8bits.

■ Manipulate continuous area communications bits (WM)

● Function

This command manipulates (sets, resets) bits in the specified continuous area of EST internal bit devices.

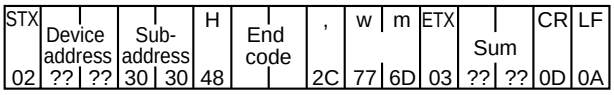
✦ Command frame



Parameter description

Execution timing	This parameter specifies the execution timing. 0: Execution at the end of the conditional operation scan of all active panels 1: Execution after the end of the currently executing conditional operation command
Number of writes	Number of bits to write Range: 1 to 32
Write start address	Start address of data write destination internal device Zero suppression is not allowed.
Operation	Bit manipulation operation N: Bit ON The specified bit is set to “1”. F: Bit OFF The specified bit is set to “0”. T: Toggle The specified bit is reversed/toggled.

✧ Response frame



Parameter description

End code	00: Normal end 10: Parameter error 12: Mode error

Revision History

Printed Date	Manual Number	Edition	Revised pages	Description
01-01	**CP-SP-1090E**	**1st Edition**		
01-03		**2nd Edition**		Fonts changed
01-09		**3rd Edition**	 2-21, 22, 23 4-1	Book title and Model name changed EST240Z to EST-Z Series. Applicatable PLS Series added. Backup devices added.

Specifications are subject to change without notice.

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