

# Device/PLC Connection Manuals

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## About the Device/PLC Connection Manuals

Prior to reading these manuals and setting up your device, be sure to read the "Important: Prior to reading the Device/PLC Connection manual" information. Also, be sure to download the "Preface for Trademark Rights, List of Units Supported, How to Read Manuals and Documentation Conventions" PDF file. Furthermore, be sure to keep all manual-related data in a safe, easy-to-find location.

## 12.5 Omron Controllers

### 12.5.1 System Structure

The following describes the system configuration used when connecting the GP/GLC to this Controller.





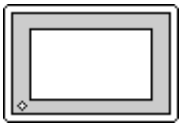
**Important**

- **GP/GLC's System Area (LS0 to LS19) Settings**

*The GP/GLC's system area (20 words) cannot be allocated to the Controller area. Even though you can enter the system area settings via the GP/GLC's screen creation software or via the GP's OFFLINE screen, be careful that you do not actually use the Controller area.*

#### ■ THERMAC NEO Electronic Temperature Controller




(1:1 communication)

Electronic *1 Temperature Controller	Cable Diagram	GP/GLC
		
E5EN-□□□□□-FLK E5AN-□□□□□-FLK	RS-232C <Cable diagram 1>	(GP or GLC series)
E5EN-□□□□□-FLK E5CN-□□□□□-FLK E5GN-□□□□□-FLK E5AN-□□□□□-FLK	RS-422 (2-wire type) <Cable diagram 2>	

\*1 The Controller's model number "□" will vary depending on each controller functionality specifications.

## ■ THERMAC NEO Electronic Temperature Controller

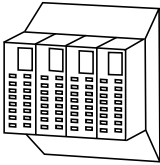


(1:n communication)

Electronic *1 Temperature Controller	Cable Diagram	GP/GLC
		
E5EN-□□□□-FLK E5CN-□□□□-FLK E5GN-□□□□-FLK E5AN-□□□□-FLK	RS-422 (2-wire type) <Cable diagram 3>	(GP or GLC series)

\*1 The Controller's model number "□" will vary depending on each controller functionality specifications.

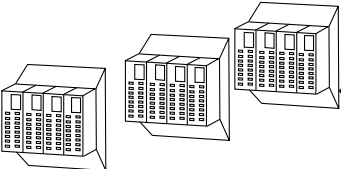

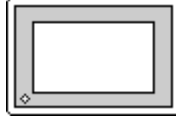
## ■ In-Panel NEO Temperature Controller

### ◆ 1:1 Connection

Temperature Controller *1	Cable Diagram	GP/GLC
		
E5ZN-□□□□-FLK	RS-422 (2-wire type) <Cable diagram 2>	GP Series or GLC Series

\*1 The Controller's model number "□" will vary depending on each controller functionality specifications.

### ◆ 1:n Connection

Temperature Controller *1	Cable Diagram	GP/GLC
		
E5ZN-□□□□-FLK	RS-422 (2-wire type) <Cable diagram 3>	GP Series or GLC Series

\*1 The Controller's model number "□" will vary depending on each controller functionality specifications.

### 12.5.2 Cable Diagrams

The cable diagrams shown below and the cable diagrams recommended by Omron Corporation may differ, however, using these cables for your Controller's operations will not cause any problems.



- **For an RS-232C cable, use a cable length of less than 15 meters. Also, be sure to connect its SG (signal ground) terminal.**
- **For an RS-422 cable, use a cable length less than 500 meters.**
- **Digital recommends the following RS-422 cables.**

#### ■ Recommended RS-422 Cable

No.	Model *1	Standard
1	E5EN-□□□□-FLK, E5CN-□□□□-FLK, E5AN-□□□□-FLK	AWG28 or above
2	E5GN-□□□□-FLK	AWG14 to AWG24

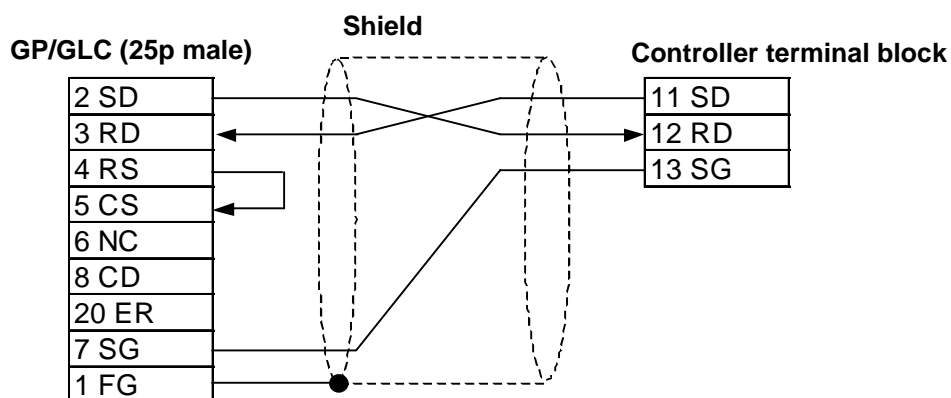
\*1 The Controller's model number "□" will vary depending on each controller functionality specifications.

#### ■ Recommended RS-232C Cable

No.	Model *1	Standard
1	E5EN-□□□□-FLK E5AN-□□□□-FLK	T twisted pair wire with shield, AWG28 or above

\*1 The Controller's model number "□" will vary depending on each controller functionality specifications.

#### Cable Diagram 1 (1:1) RS-232C



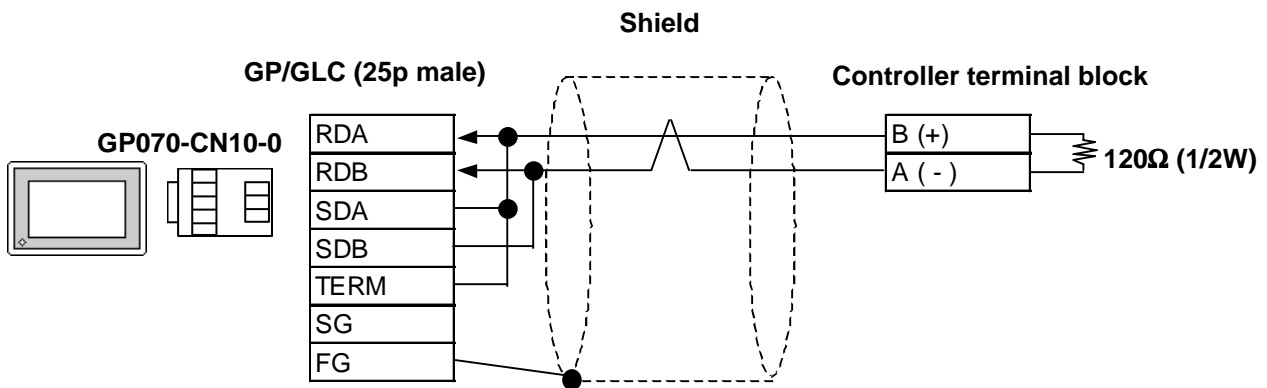
**Cable Diagram 2 (1:1) RS-422**

- **The Pin Nos. used with a RS-422 connection will vary depending on the type of controller used. Terminal numbers are not shown in the following RS-422 cable diagrams. Refer to the following tables and diagrams when making all wiring connections.**

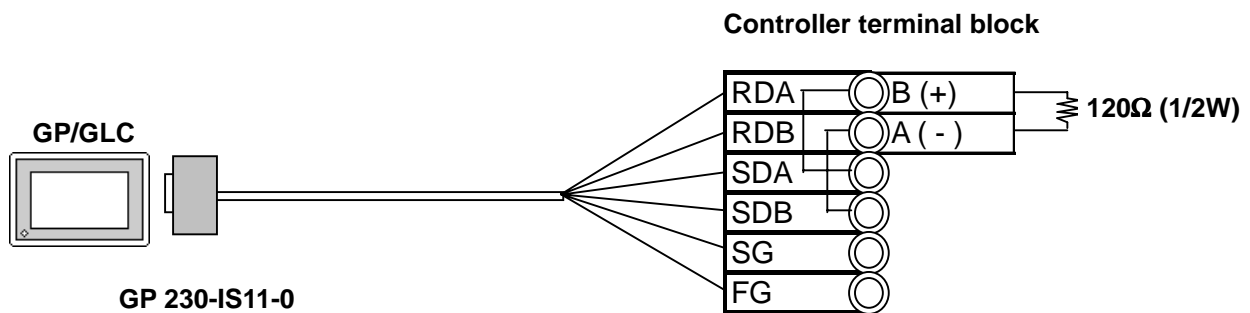
**■ Pin No.**

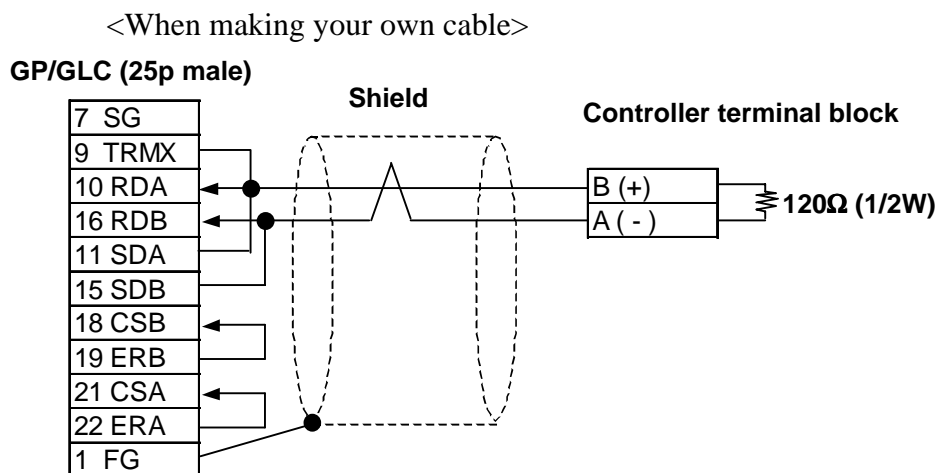
Abbreviation	E5EN/E5CN/E5AN	E5GN	E5ZN
A (-)	12	6	24
B (+)	11	5	23

<When using Digital's RS-422 connector terminal adapter GP070-CN10-0>



<When using Digital's RS-422 cable, GP230-IS11-0>





Cable Diagram 3 (1:n) RS-422 2 Wires



- The Pin Nos. used with a RS-422 connection will vary depending on the type of controller used. Terminal numbers are not shown in the following RS-422 cable diagrams. Refer to the following tables and diagrams when making all wiring connections.

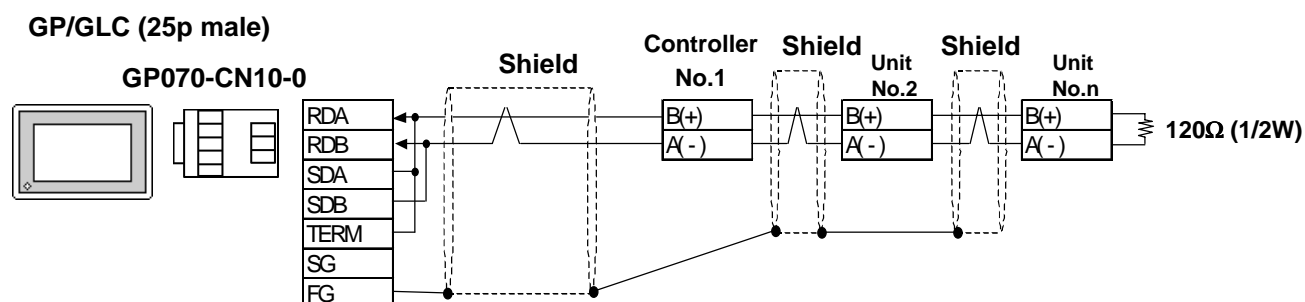
### Pin No.

Abbreviation	E5EN/E5CN/E5AN	E5GN	E5ZN
A (-)	12	6	24
B (+)	11	5	23

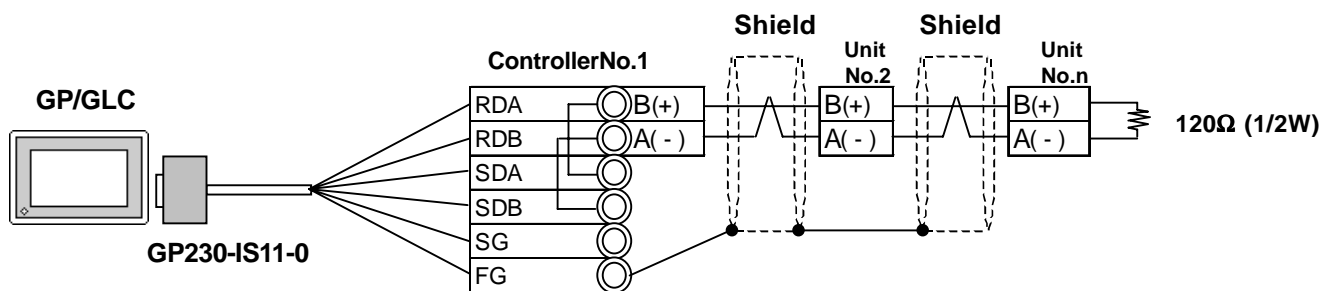


- For the shield wire grounding, be sure to use dispersion grounding, parallel grounding or series grounding (shown below), depending on your electrical equipment conditions.

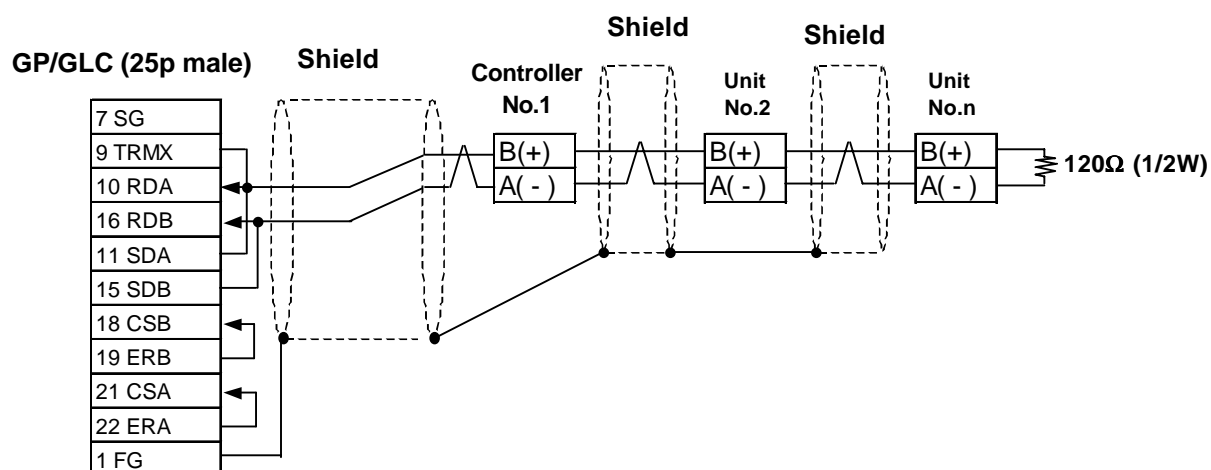
<When using Digital's RS-422 connector terminal adapter GP070-CN10-0>  
(An example of series grounding)



<When using Digital's RS-422 cable, GP230-IS11-0>  
(An example of series grounding)



<When making your own cable>  
(An example of series grounding)



### 12.5.3 Supported Devices

The following list shows the range of devices supported by the GP/GLC.

#### ■ THERMAC NEO Electronic Temperature Controller

Device	Bit Addresses	Word Addresses	Remarks	
Variable Areas	C0000000 to C0000531	C00000 to C00005	Double word device (write disabled) *1	H/L
	C1000000 to C1001C31	C10000 to C1001C	Double word device	
	C3000000 to C3003531	C30000 to C30035	Double word device	
Operation Commands	A000000 to A000815	A0000 to A0008	Word device	

\*1 Data write is not possible.

#### ■ In-Panel NEO Temperature Controller

Device	Bit Addresses	Word Addresses	Remarks	
Variable Areas	C0000000 to C0000631	C00000 to C00006	Double word device *1	H/L
	C0010000 to C0010631	C00100 to C00106		
	C1000000 to C1001931	C10000 to C10019	Double word device	
	C1010000 to C1011931	C10100 to C10119		
	C3000000 to C3002E31	C30000 to C3002E	Double word device *2	
	C3010000 to C3012E31	C30100 to C3012E		
Operation Commands	A000000 to A000B15	A0000 to A000B	Word device *3*4	

\*1 No data can be written.

\*2 Switch over to the setup area 1 when writing data. If not, the upper communication error (02:22:03:\*\*\*) message will appear on the GP screen.

▼ **Reference** ▲ 11.5.5. "Error Codes."

\*3 No data can be read out.

\*4 To execute the operation command (write), specify the command code at the device address. For the value to be written, specify related information. To specify related information, use a hexadecimal number, e.g., 0x00, 0x01, 0x10, or 0x11.

▼ **Reference** ▲ Omron Corporation "User's Manual for Model E5ZN Temperature Controller - Communication"

E.g.) When the command code is "00"

Command code	Description	Related information		GP Setup
"00"	Communication write	"00" or "10": OFF (write protected)	←→	0x00 or 0x10
		"01" or "11": ON (write unprotected)		0x01 or 0x11





GP-PRO/PBIII for Windows' Simulation feature is not available with this protocol. To avoid a possible GP/GLC malfunction, do not use this feature.



- ***The system area (20 words) of GP/GLC cannot be used. Although it is possible to set addresses for this area with the GP screen editor software, or via the GP/GLC's OFFLINE mode, it is impossible to actually allocate the system area to the controller's data area.***
- ***Be careful as the Device fields differ depending on the type of Controller. Refer to the Controller's manual for the range allowed for the device address area.***



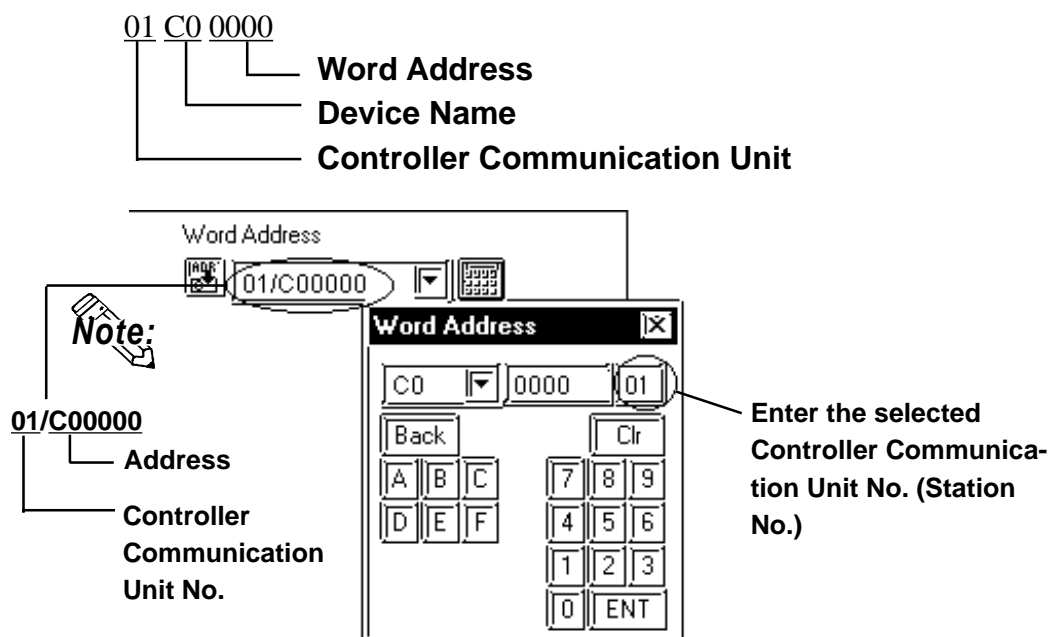
- ***After screen data is converted from a different type of Controller, be sure to check if the device addresses used are correct.***
- ***Be sure to check that the device addresses are supported before using. Trend graphs or tags in your screens which use multiple words over continuous addresses.***
- ***When using the GLC, Pro-Control Editor Ver. 2.0 or higher is required.***
- ***When using Pro-Server Ver. 2.0, be careful about the following points.***
  - 1) ***The Status Monitor feature cannot be used to monitor Tag scan time, communication cycle time, token circulation speed maximum/minimum values, and communication error codes.***
  - 2) ***LS devices cannot be monitored or written to.***



- Note:**
- This protocol's LS area uses a 32-bit device.
  - When setting Tags in the screen editor software, the Controller communication unit No. can be specified during address input. If a communication unit No. is not indicated, the previously entered communication unit No. is automatically used. (The default value is 1.)

E.g. When entering Device Address C00000

Enter the Device Name "C0", and the Word Address "0000".



- Note:**
- After the Controller's power is turned ON, it may take a few seconds until the Controller starts. Therefore, if the GP/GLC and the Controller are turned ON at the same time, there may be a delay of several seconds until communication starts.

## ■ Operation Commands

Command codes 00 to 08 are used for operation command service (command) to provide a total of 9 write commands.

Certain command operations are identical, and the result (arbitrary value) is written to a variable area.

Device code	Word address	Command code	Meaning
A	0000	00	Data Transfer Write
	0001	01	RUN / STOP
	0002	02	Multi-SP
	0003	03	AT RUN / STOP
	0004	04	Write mode
	0005	05	Store RAM data
	0006	06	Software reset
	0007	07	Setting area shift 1
	0008	08	Protection level shift



- When a write command is performed, the device code used in the screen creation software is 'A', and that command code is entered instead of the device address.

Related data (2 bytes) is designated by each write tag's setting value. Since this device is a write-only device, readout is disabled. If used for readout, i.e. an N-tag, a host communication error (02:F0:\*\*) (\*\* is set tag unit No.) will appear in the lower left corner of the GP/GLC screen.

- Device "C0, C1, C3"  
C0, C1 and C3 devices are not used as device symbols. Instead they identify a variable area's data type.



**Reference** User Manual (SGTD-706) for OMRON's E5AN/E5EN/E5CN/E5GN Electronic Temperature Controller

### 12.5.4 Environment Setup

The following table lists the recommended Controller and GP/GLC communication settings.

#### ■ THERMAC NEO Controller

GP/GLC Settings		Controller Settings	
Baud Rate	9600 bps	Baud Rate	9600 bps
Data Length	7 bits	Data Length	7 bits
Stop Bit	2 bits	Stop Bit	2 bits
Parity Bit	Even	Parity Bit	Even
Data Flow control	ER	-----	-----
Communication Format (using RS-232C) <sup>*1</sup>	RS-232C	-----	-----
Communication Format (using RS-422 - 4-line)	4 wire type	-----	-----
Communication Format (using RS-422 - 2-line)	2 wire type	-----	-----
Unit No. <sup>*2</sup>	1 to 32	Unit No.	1 to 32

*\*1 The E5EN and the E5AN use an RS-232C connection.*

*\*2 It is possible to set a Controller communication unit No. from 0 to 99, however, the GP/GLC can only be set from 1 to 32.*

*With a 1:n connection, up to 31 controllers can be connected to a single GP.*

#### ■ In-Panel NEO Temperature Controller

GP or GLC Setup		Temperature Controller Setup	
Baud Rate	9600 bps	Baud Rate	9600 bps
Data Length	7 bits	Data Length	7 bits
Stop Bit	2 bits	Stop Bit	2 bits
Parity Bit	Even	Parity Bit	Even
Data Flow control	ER Control	-----	-----
Communication Format	RS-422 (2-Wire Type)	-----	-----
Unit No. <sup>*1</sup>	1 to 15	Communication Unit No.	1 to 15

*\*1 Even though the communication unit number may be specified in a range between 0 and F on the temperature controller, only a range between 1 and F can be used on the GP/GLC unit. To load data to the GP unit, match the GP unit number with the converted decimal number of the controller address where the data to be loaded is stored.*

*In case of 1:n, a maximum of 15 temperature controllers may be connected.*

### 12.5.5 Error Codes

#### ■ GP/GLC Error Codes

Error codes are indicated in the left lower corner of the GP/GLC screen.

Error codes consist of three types. When an error occurs, the corresponding error code and GP station number (where the error occurred) are saved either in LS2039 or LS2070. Since the method used will vary depending on the error type, refer to the following list for details. (Data saved in LS2039 or LS2070 is shown using hexa-decimal characters.)

1. Error Code (02:12) – 2 units
 

Error Code	0x12
Data saved in LS2039	0x12 (error code)
Data saved in LS2070	0 (fixed as “0”)
2. Error Code (02:12:34) – 3 units
 

Error Code	0x12. The GP station number where the error occurred is 34(0x22)
Data saved in LS2039	0x1222 (The two digits shown here by “12” represent the error code, and the last two digits “22” represent the station no. Note that “0x” is not shown on the display.)
Data saved in LS2070	0 (fixed as “0”)
3. Error Code (02:12:34:56) – 4 units
 

Error Code	0x1234. The GP unit number where the error occurred is 56(0x38)
Data saved in LS2039	0x1234 (error code)
Data saved in LS2070	0x38 (station no.)

#### <Temperature Controller Error Codes>

Any error code specific to the temperature controller is displayed at the lower left part of the GP screen, e.g. “Host Communication Error (02:○○:△△:□□).”

○○:△△ stands for the error code specific to the temperature controller, and □□ indicates the temperature controller number.

Error Code	Error Name	Cause
11:03	Starting Address Error	An address outside the range was specified at drawing
11:04	Ending Address Error	The range of writing consecutive addresses with the K-tag or the like exceeds the setting range of the controller.
11:00	Parameter Error	The data written from the GP exceeds the setting range of the controller.
30:03	Read Only	An attempt was made to write data to “C0 Device” in the write protected range.
22:03	Operation Error	<ul style="list-style-type: none"> <li>• An attempt was made to write data when writes were disabled on the controller.</li> <li>• The temperature controller malfunctions.</li> </ul>