TC/TS Series Ethernet Driver

Introduction

This manual describes how to connect the Display and the External Device (target PLC).

In this manual, the connection procedure is described in the sections identified below:
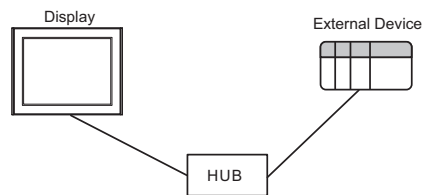
| 1 | System Configuration
This section lists the types of External Devices that you can connect. | ☞ "1 System Configuration" (page 3) |

| 2 | External Device Selection
Select a model (series) of the External Device to be connected and a connection method. | ☞ "2 External Device Selection" (page 4) |

| 3 | Communication Settings
This section shows setting examples for communicating between the Display and the External Device. | ☞ "3 Communication Settings" (page 5) |

| 4 | Setup Items
This section describes communication setup items on the Display.
Set communication settings of the Display with GP-Pro EX or in offline mode. | ☞ "4 Setup Items" (page 9) |

Operation

1   System Configuration

The following table lists system configurations for connecting SHIBAURA MACHINE CO., LTD. External Device and the Display.
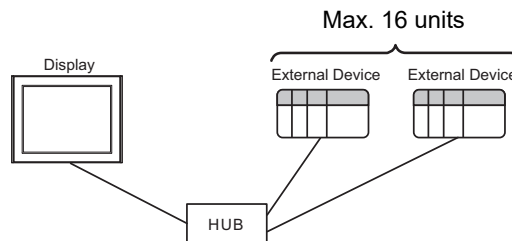
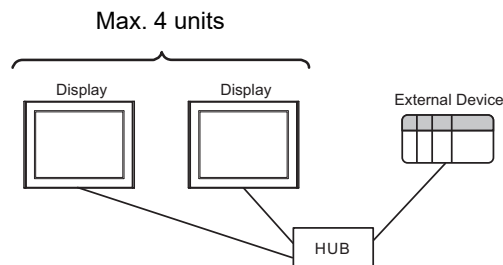| Series Name	CPU	Link I/F	Communication Method	Setting Example
TCmini Series	TC11-00	Ethernet port on CPU unit	Ethernet (TCP)	Setting Example 1 (page 5)
TS5000 Series	TS5000	CN7 on extra interface	Ethernet (TCP)	Setting Example 2 (page 7)

■ Connection Configuration

• 1:1 Connection

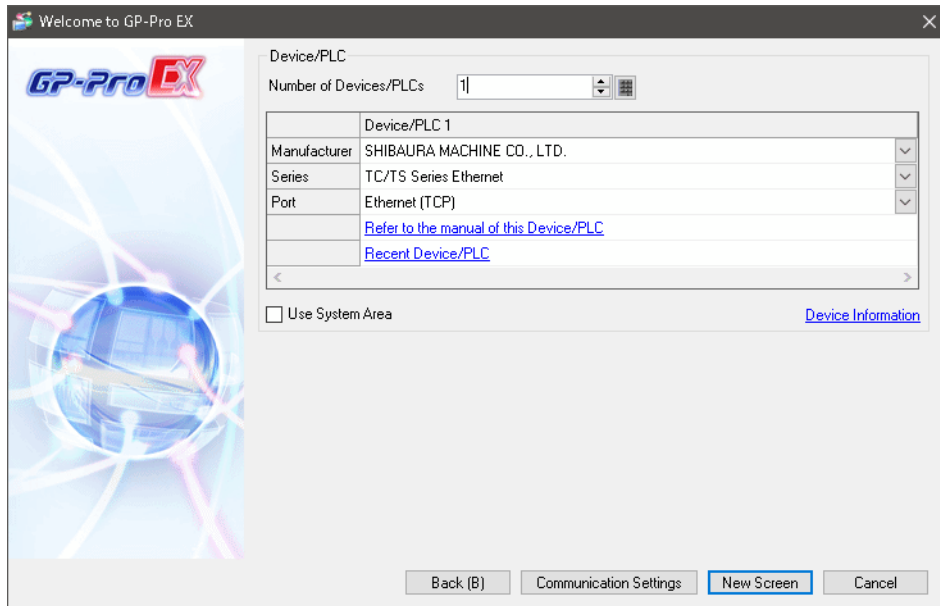Display   External Device

HUB

• 1:n Connection

Max. 16 units

Display   External Device   External Device

HUB

• n:1 Connection

Max. 4 units

Display   Display   External Device

HUB

2　　　External Device Selection

Select the External Device to be connected to the Display.

Setup Items	Setup Description
Number of Devices/ PLCs	Enter an integer from 1 to 4 to define the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to connect. Select "SHIBAURA MACHINE CO., LTD.".
Series	Select the External Device model (series) and the connection method. Select "TC/TS Series Ethernet". In System configuration, make sure the External Device you are connecting is supported by "TC/TS Series Ethernet".)"1 System Configuration" (page 3)
Port	Select the Display port to connect to the External Device.
Use System Area	Check this option to synchronize the system data area of the Display and the device (memory) of the External Device. When synchronized, you can use the External Device's ladder program to switch the display or display the window on the Display. 　Cf.　GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)" This feature can also be set in GP-Pro EX or in the Display's offline mode. 　Cf.　GP-Pro EX Reference Manual "System Settings [Display Unit] - [System Area] Settings Guide" 　Cf.　Maintenance/Troubleshooting Guide "Main Unit - System Area Settings"

3 Communication Settings

Examples of communication settings of the Display and the External Device, recommended by Pro-face, are shown.

3.1 Setting Example 1

■ GP-Pro EX Settings

◆ Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC].

◆ Device Setting

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] 📗.

To connect multiple External Devices, from [Device-Specific Settings] in the [Device/PLC] window, click [Add Device] to add another External Device.

■ External Device Settings

Use the ladder software (TC-WORX V1.01) for communication settings.

Please refer to the manual of the External Device for more details.

1. Click [Project].

2. Select the type of External Device and enter a project name.

3. From the [Communication] menu click [Configuration].

4. In the Configuration settings, set the IP address and port number of the External Device.

   The initial values of the External Device are as follows.

Setup Items	Setting Value
IP Address	192.168.100.1
Port	502

5. From the [Communication] menu, click [Connect] to connect to the External Device.

6. After the ladder software connects to the External Device, click [Register Data].

7. In the register data, display the B register.

8. Set register BE00 as 1 (Programming Tool) and set the following.

Register	Setting Value (HEX)	Setup Items
BE20	** **	Mac Address 00 0c 7b 3a ** **
BE21	7b 3a	
BE22	00 0c	
BE23	834	Port No. 2100
BE24	00 7C	IP Address 192.168.0.124
BE25	C0 A8	
BE26	FF 00	Sub net mask 255.255.255.0
BE27	FF FF	
BE28	00 01	Default Gateway 192.168.0.1
BE29	C0 A8	

9. After setup, restart the External Device.

◆ Notes

• Check with a network administrator about IP address. Do not set the duplicate IP address.

• Set IP address on the External Device for IP address in Device-specific settings.

• You need to set IP address on the Display in the offline mode of the Display.

3.2 Setting Example 2

■ GP-Pro EX Settings

◆ Communication Settings

To display the setup screen, from the [Project] menu, point to [System Settings] and select [Device/PLC].

| NOTE | • When using 1761-NET-ENI, you need to set the timeout to 6 seconds or more. |

◆ Device Setting

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] 🔧 .

To connect multiple External Devices, from [Device-Specific Settings] in the [Device/PLC] window, click [Add Device] to add another External Device.

■ External Device Settings

Use Teach Pendant (TP5000) for communication settings.

Please refer to the Teach Pendant (TP5000) manual for more details.

1. Change the TP5000 screen to TOP.

2. Change the master mode key to "Manual".

3. Touch the SETTING button.

4. Touch the PARAMETER button.

5. Touch the ETHERNET button.

6. Set the IP address, subnet mask, gateway, and so on.

7. After setup, restart the TP5000.

◆ Notes

• Check with a network administrator about IP address. Do not set the duplicate IP address.

• Set IP address on the External Device for IP address in Device-specific settings.

• You need to set IP address on the Display in the offline mode of the Display.

4   Setup Items

Set up the Display's communication settings in GP-Pro EX or in the Display's offline mode.

The setting of each parameter must match that of the External Device.

☞ "3 Communication Settings" (page 5)

NOTE	• Set the Display's IP address in offline mode.
	Cf. Maintenance/Troubleshooting Guide "Ethernet Settings"

4.1   Setup Items in GP-Pro EX

■ Communication Settings

To display the setting screen, from the [System Settings] workspace, select [Device/PLC].

Setup Items	Setup Description
Port No.	Use an integer from 1024 to 65535 to enter the port number of the Display. When you check the option of [Auto Assign], the port number will be automatically set.
Timeout	Use an integer from 1 to 127 to enter the time (s) for which the Display waits for the response from the External Device.
Retry	If there is no response from the External Device, use an integer from 0 to 255 to enter how many times the Display retransmits the command.
Wait To Send	Use an integer from 0 to 255 to enter the amount of standby time (ms) the Display counts from the time it receives a packet to the time it transmits the next packet.

■ Device Setting

To display the [Individual Device Settings] dialog box, from [Device-Specific Settings] in the [Device/PLC] window, select the external device and click [Settings] 🔣 .

To connect multiple External Devices, from [Device-Specific Settings] in the [Device/PLC] window, click [Add Device] to add another External Device.

Setup Items	Setup Description
Series	Select a series of the External Device.
Port No.	Use an integer from 1024 to 65534 to enter the port number of the External Device.
IP Address	Set IP address of the External Device. **NOTE** • Check with a network administrator about IP address. Do not set the duplicate IP address.

Alarm Date	Select the Alarm Date display format.
	  Mon-DD-YYYY: Month - Date - Year
	  YYYY-MM-DD: Year - Month - Date
	  DD-MM-YYYY: Date - Month - Year

4.2 Offline Mode Settings

NOTE • Refer to the Maintenance/Troubleshooting guide for information on how to enter offline mode or about the operation.

Cf. Maintenance/Troubleshooting Guide "Offline Mode"

■ Communication Settings

To display the setting screen, touch [Device/PLC Settings] from [Peripheral Settings] in the offline mode. Touch the External Device you want to set from the displayed list.

Setup Items	Setup Description
Port No.	Set the Port No. of the Display. Select either [Fixed] or [Auto]. When you select [Fixed], use an integer from 1024 to 65535 to enter the port No. of the Display. When you select [Auto], the port No. will be automatically assigned regardless of the entered value.
Timeout	Use an integer from 1 to 127 to enter the time (s) for which the Display waits for the response from the External Device.
Retry	If there is no response from the External Device, use an integer from 0 to 255 to enter how many times the Display retransmits the command.
Wait To Send	Use an integer from 0 to 255 to enter the amount of standby time (ms) the Display counts from the time it receives a packet to the time it transmits the next packet.

■ Device Setting

To display the setting screen, from [Peripheral Settings] touch [Device/PLC Settings]. Touch the External Device you want to set from the displayed list, and touch [Device Settings].

Comm.	Device			

TC/TS Series Ethernet   [TCP]   Page 1/1

Device/PLC Name |PLC1   ▼|

Series   TC200/TCmini Series
IP Address |192 168 0 124|
Port No. |2100| ▼ | ▲ |
Alarm Date |Mon-DD-YYYY ▼|

	Exit		Back	2020/08/25 11:16:33

Setup Items	Setup Description
Device name	Select the device name for device setting. Device name is a title of the External Device set with GP-Pro EX.(Initial value [PLC1])
Series	Displays the External Device series.
IP Address	Set IP address of the External Device. **NOTE** • Check with a network administrator about IP address. Do not set the duplicate IP address.
Port No.	Use an integer from 1024 to 65534 to enter the port number of the External Device.

Alarm Date	Select hoe to display the Alarm Date.
	   Mon-DD-YYYY: Month - Date - Year
	   YYYY-MM-DD: Year - Month - Date
	   DD-MM-YYYY: Date - Month - Year

5 Supported Devices

The following table shows the range of supported device addresses.

5.1 TCmini Series

☐ This address can be specified as system data area.

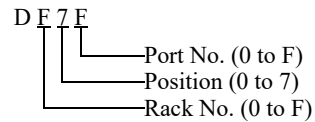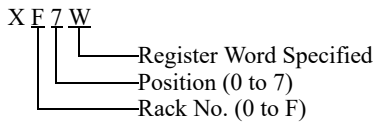| Device	Bit Address	Word Address	32 bit	Remarks
Input Relay 1	X000 - XF7F	X00W - XF7W		*1
Output Relay 1	Y000 - YF7F	Y00W - YF7W		*1
Internal Relay	R000 - R77F	R00W - R77W		*1
Extended Internal Relay 1	G000 - GF7F	G00W - GF7W		*1
Extended Internal Relay 2	H000 - HF7F	H00W - HF7W		*1
Special AUX Relay	A000 - A16F	A00W - A16W		*1
Latch Relay	L000 - L07F	L00W - L07W	[L / H]	*1
Edge Relay	E000 - E77F	E00W - E77W		*1
Timer (contact)	T000 - T77F	T00W - T77W		*1
Counter (contact)	C000 - C77F	C00W - C77W		*1
Timer/Counter (current value)	-	P000 - P77F		Bit **F** *1
Timer/Counter (setup value)	-	V000 - V77F		Bit **F** *1
Generic Register 1	-	D000 - DF7F		Bit **F** *1
Generic Register 2	-	B000 - BF7F		Bit **F** *1

*1 The device format is as follows:
  Please refer to the manual of the External Device for more details.

```
X F 7 W                         D F 7 F
    │ │ └─ Register Word Specified       │ │ └─ Port No. (0 to F)
    │ └─── Position (0 to 7)             │ └─── Position (0 to 7)
    └───── Rack No. (0 to F)             └───── Rack No. (0 to F)
```

NOTE
• Please refer to the GP-Pro EX Reference Manual for system data area.

  Cf. GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"

• Please refer to the precautions on manual notation for icons in the table.

  ☞ "Manual Symbols and Terminology"

5.2　　　　TS5000 Series

▭▭▭ This address can be specified as system data area.

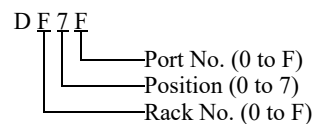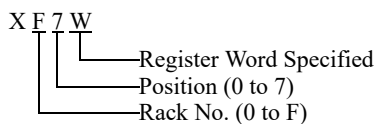| Device		Bit Address	Word Address	32 bit	Remarks
Input Relay 1		X000 - XF7F	X00W - XF7W		*1
Output Relay 1		Y000 - YF7F	Y00W - YF7W		*1
Internal Relay		R000 - R77F	R00W - R77W		*1
Extended Internal Relay 1		G000 - GF7F	G00W - GF7W		*1
Extended Internal Relay 2		H000 - HF7F	H00W - HF7W		*1
Special AUX Relay		A000 - A16F	A00W - A16W		*1
Latch Relay		L000 - L07F	L00W - L07W		*1
Edge Relay		E000 - E77F	E00W - E77W		*1
Timer (contact)		T000 - T77F	T00W - T77W		*1
Counter (contact)		C000 - C77F	C00W - C77W		*1
Timer/Counter (current value)		-	P000 - P77F		Bit F *1
Timer/Counter (setup value)		-	V000 - V77F		Bit F *1
Generic Register 1		-	D000 - DF7F	L/H	Bit F *1
Alarm History	Reset	ARH	-		*2 *3
	Get Messages	ALH	-		*2 *4
	Alarm Count	-	ACH		*2 *5 *6
	Alarm Number	-	ANH0000 - ANH1023		*2 *5 *7
	Message	-	AMH0000 - AMH1023		*2 *5 *8
	Date	-	ADH0000 - ADH1023		*2 *5 *9
	Time	-	ATH0000 - ATH1023		*2 *5 *10
Current Alarm	Reset	ARN	-		*2 *3
	Get Messages	ALN	-		*2 *4
	Alarm Count	-	ACN		*2 *5 *6
	Alarm Number	-	ANN00 - ANN09		*2 *5 *7
	Message	-	AMN00 - AMN09		*2 *5 *8
	Date	-	ADN00 - ADN09		*2 *5 *9
	Time	-	ATN00 - ATN09		*2 *5 *10
Alarm Buzzer OFF		BOF	-		*2 *11
Robot Controller Language Type		-	LANG		*12

*1　　The device format is as follows:
　　　Please refer to the manual of the External Device for more details.

X F 7 W
└─────── Rack No. (0 to F)
　└───── Position (0 to 7)
　　└─── Register Word Specified

D F 7 F
└─────── Rack No. (0 to F)
　└───── Position (0 to 7)
　　└─── Port No. (0 to F)

*2　　The format of alarm device names is as follows:
　　　Please refer to the manual of the External Device for more details.

A x y
└───── Device Type　　A: Alarm (Fixed)
　└─── Parameter　　　R: Reset, L: List, C: Count, N: Number, M: Message, D: Date, T: Time
　　└─ Alarm Type　　H: History, N: Current
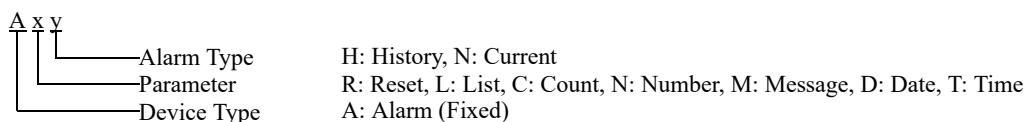
*3   ARH resets the alarm history. Additionally, ARN resets the current alarms.
Write "1" to the address to perform the reset operation, and when the process is complete its value changes to "0".
Write operation: Read operation:
  0: No action   0: Complete
  1: Reset   1: In progress

*4   ALN retrieves alarm history messages. Additionally, ALN retrieves the current alarm messages.
Write "1" to the address perform the retrieve operation, and when the process is complete its value changes to "0".
Write operation: Read operation:
  0: No action   0: Complete
  1: Reset   1: In progress

*5   Write disabled

*6   Stores the number of alarms received from the External Device.
This value is updated whenever executing a device with messages.

*7   Alarm number codes received from the External Device are stored, in order, from address 0.
For example, the first alarm number code in the alarm history is stored in ANH0000.
The alarm number code cannot be accessed from the middle of the text string.
This device is a text string of up to 8 bytes.

*8   Alarm messages received from the External Device are stored, in order, from address 0.
For example, the first alarm message in the alarm history is stored in AMH0000.
The alarm message cannot be accessed from the middle of the text string.
This device is a text string of up to 64 bytes.

*9   Dates received from the External Device are stored, in order, from address 0.
For example, the first date in the alarm history is stored in ADH0000.
The date display format is set in the [Individual Device Settings] dialog box's [Alarm Date] field.
This device is a text string of up to 12 bytes.

*10   Times received from the External Device are stored, in order, from address 0.
For example, the time of the first alarm in the alarm history is stored in ATH0000.
Times cannot be accessed from the middle of the text string.
This device is a text string of up to 8 bytes.

*11   Turn off the buzzer.
Write "1" to the address to turn the buzzer off, and when the process is complete, its value changes to "0".
Write operation: Read operation:
  0: No action   0: Complete
  1: Buzzer off   1: In progress

*12   The language type retrieved from the external device when the display unit is started is stored in the address.
The language of messages for the alarm history and currently active alarms depend on the language type stored in the address. To retrieve the language type again, write 0xFFFF in the address.
Retrieved values:
  0x0000: English
  0x0001: Japanese
  0x0002: Simplified Chinese
  0x0003: Korean
  0x8000: Unknown language
  0x8001: Unknown format

NOTE   • Please refer to the GP-Pro EX Reference Manual for system data area.

     Cf.   GP-Pro EX Reference Manual "LS Area (Direct Access Method Area)"

  • Please refer to the precautions on manual notation for icons in the table.

    ☞ "Manual Symbols and Terminology"

6   Device Code and Address Code

Use device code and address code when you select "Device Type & Address" for the address type in data displays.

6.1   TCmini Series

Device	Device Name	Device Code (HEX)	Address Code[1]
Input Relay 1	X	0080	Rack No. × 0x08 + Position
Output Relay 1	Y	0082	Rack No. × 0x08 + Position
Internal Relay	R	0084	Rack No. × 0x08 + Position
Extended Internal Relay 1	G	0085	Rack No. × 0x08 + Position
Extended Internal Relay 2	H	0086	Rack No. × 0x08 + Position
Latch Relay	L	008A	Rack No. × 0x08 + Position
Edge Relay	E	008C	Rack No. × 0x08 + Position
Timer (contact)	T	008D	Rack No. × 0x08 + Position
Counter (contact)	C	008E	Rack No. × 0x08 + Position
Timer/Counter (current value)	P	0002	Rack No. × 0x08 + Position
Timer/Counter (setup value)	V	0003	Rack No. × 0x08 + Position
Generic Register 1	D	0000	Rack No. × 0x08 + Position
Generic Register 2	B	0001	Rack No. × 0x08 + Position

*1   Please refer to the *1 in "5.1 TCmini Series" (page 13) for the Rack No. and the Position.

6.2　　　　TS5000 Series

Device		Device Name	Device Code (HEX)	Address Code[1]
Input Relay 1		X	0080	Rack No. × 0x08 + Position
Output Relay 1		Y	0082	Rack No. × 0x08 + Position
Internal Relay		R	0084	Rack No. × 0x08 + Position
Extended Internal Relay 1		G	0085	Rack No. × 0x08 + Position
Extended Internal Relay 2		H	0086	Rack No. × 0x08 + Position
Latch Relay		L	008A	Rack No. × 0x08 + Position
Edge Relay		E	008C	Rack No. × 0x08 + Position
Timer (contact)		T	008D	Rack No. × 0x08 + Position
Counter (contact)		C	008E	Rack No. × 0x08 + Position
Timer/Counter (current value)		P	0002	Rack No. × 0x08 + Position
Timer/Counter (setup value)		V	0003	Rack No. × 0x08 + Position
Generic Register 1		D	0000	Rack No. × 0x08 + Position
Alarm History	Alarm Count	ACH	0060	Word Address × 0x100
	Message	AMH	0063	Word Address × 0x100
	Date	ADH	0064	Word Address × 0x100
	Time	ATH	0065	Word Address × 0x100
	Alarm Number	ANH	0066	Word Address × 0x100
Current Alarm	Alarm Count	ACN	0068	Word Address × 0x100
	Message	AMN	006B	Word Address × 0x100
	Date	ADN	006C	Word Address × 0x100
	Time	ATN	006D	Word Address × 0x100
	Alarm Number	ANN	006E	Word Address × 0x100

*1　　Please refer to the *1 in "5.2 TS5000 Series" (page 14) for the Rack No. and the Position.

7 Error Messages

Error messages are displayed on the screen of the Display as follows: "No. : Device Name: Error Message (Error Location)". Each description is shown below.

Item	Requirements
No.	Error No.
Device Name	Name of the External Device where error occurs. Device name is a title of the External Device set with GP-Pro EX.
Error Message	Displays messages related to the error which occurs.
Error Location	Displays IP address or device address of the External Device where error occurs, or error codes received from the External Device. **NOTE** • IP address is displayed such as "IP address (Decimal): MAC address (Hex)". • Device address is displayed such as "Address: Device address". • Received error codes are displayed such as "[Hex]".

Display Examples of Error Messages

"RHAA130:PLC1: Error has been responded for device write command (Encapsulation Error Code:[00000002H])"

NOTE
• Refer to your External Device manual for details on received error codes.
• Refer to "Display-related errors" in "Maintenance/Troubleshooting Guide" for details on the error messages common to the driver.