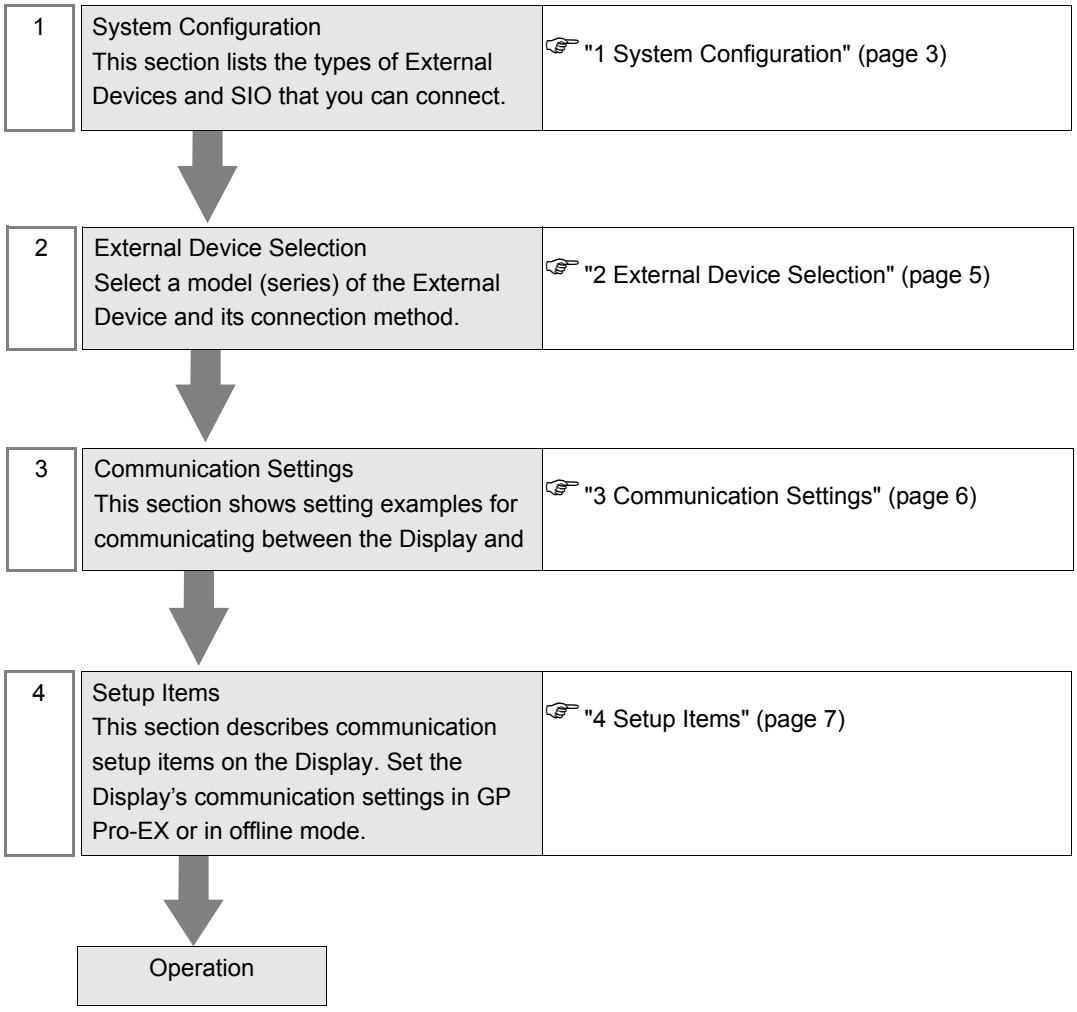
Train Real Time Data Protocol Driver

Introduction

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

In this manual, the connection procedure will be described in the sections identified below:



1 System Configuration

The system configuration in the case when the External Device of CRRC and the Display are connected is shown.

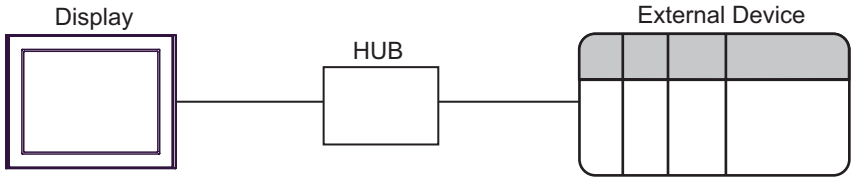
Series	CPU	Link I/F	SIO Type	Setting Example
TRDP	Publisher	-	Ethernet (UDP)	"3.1 Setting Example 1" (page 6)
	Subscriber	-	Ethernet (UDP)	"3.1 Setting Example 1" (page 6)

NOTE

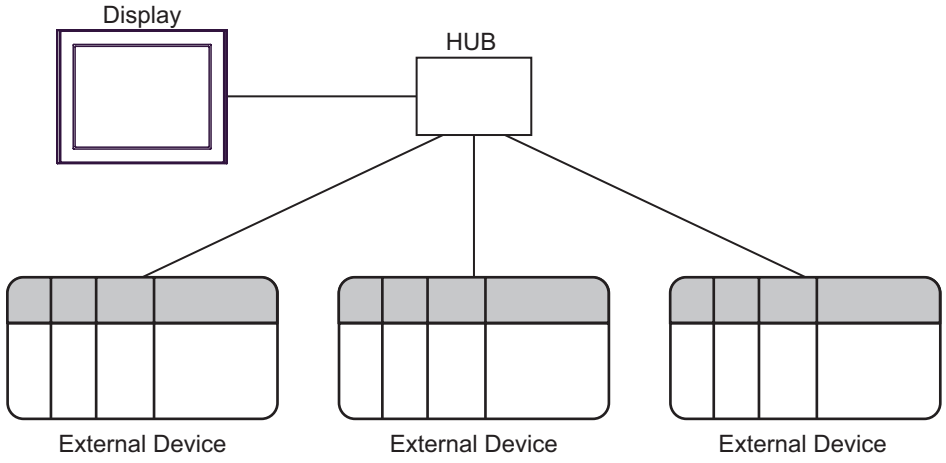
- This driver supports the PD-PDU PUSH pattern only.
- As the Dataset part of the specification depends on the External Device in use, refer to your External Device manual.

■ Connection Configuration

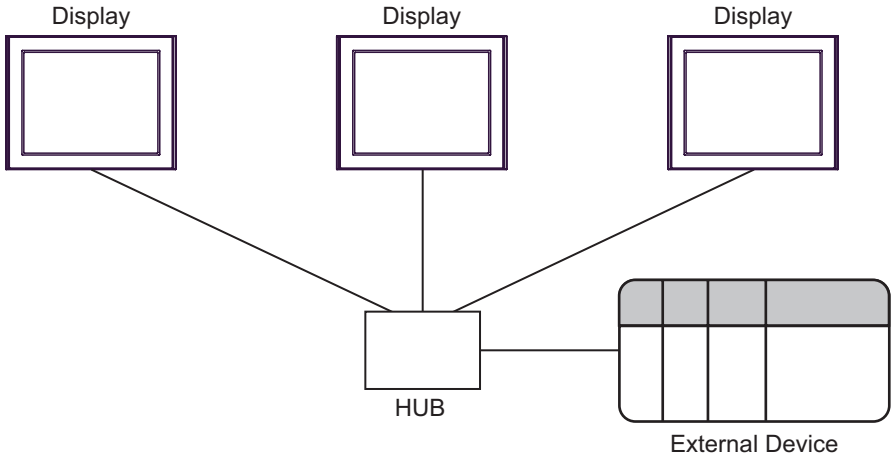
- 1:1 Connection



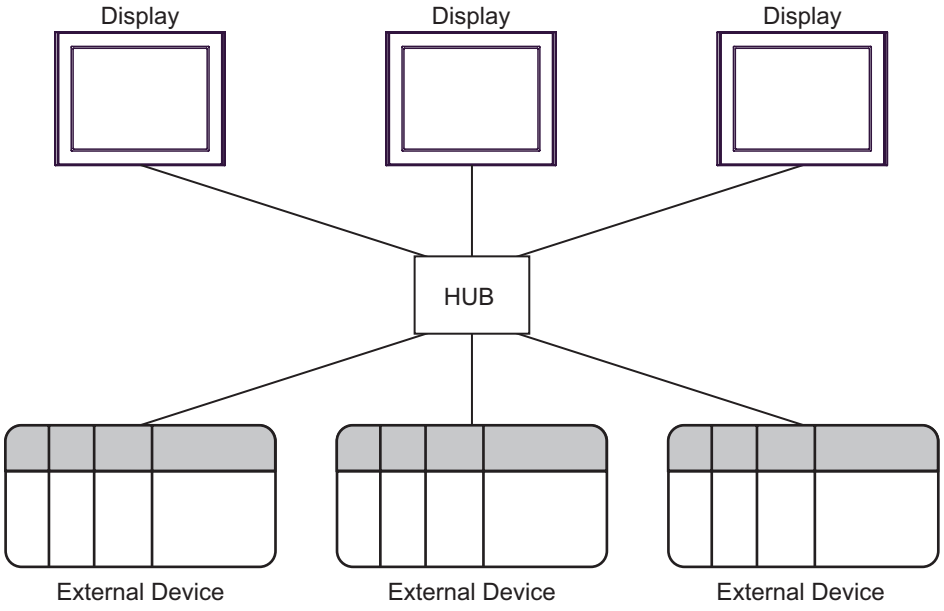
- 1:n Connection



- n:1 Connection

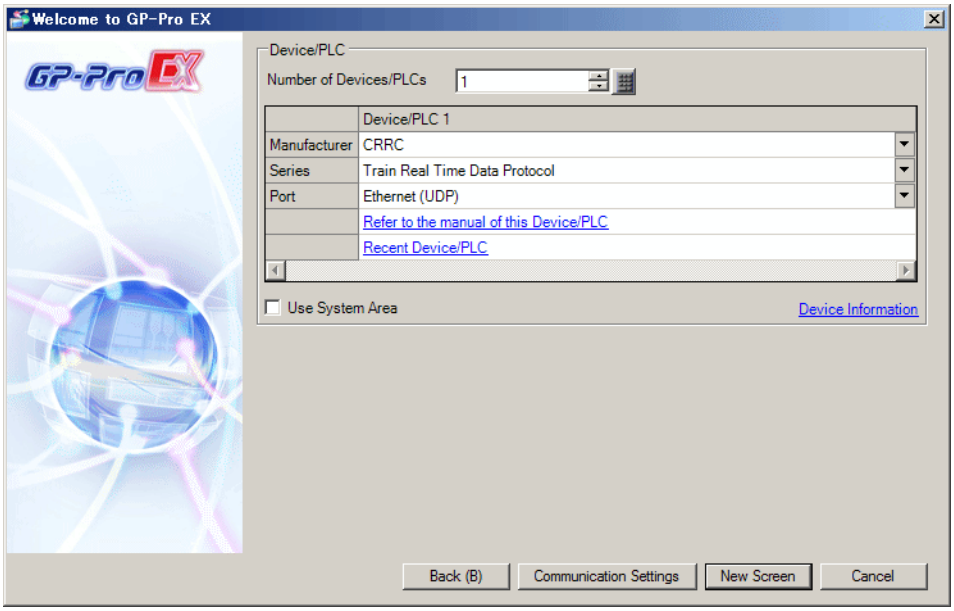


- n:m Connection



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 "CRRC".
Series	Select the External Device model (series) and the connection method. Select "Train Real Time Data Protocol". In System configuration, make sure the External Device you are connecting is supported by "Train Real Time Data Protocol". ☞ "1 System Configuration" (page 3)
Port	Select the Display port to be connected 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

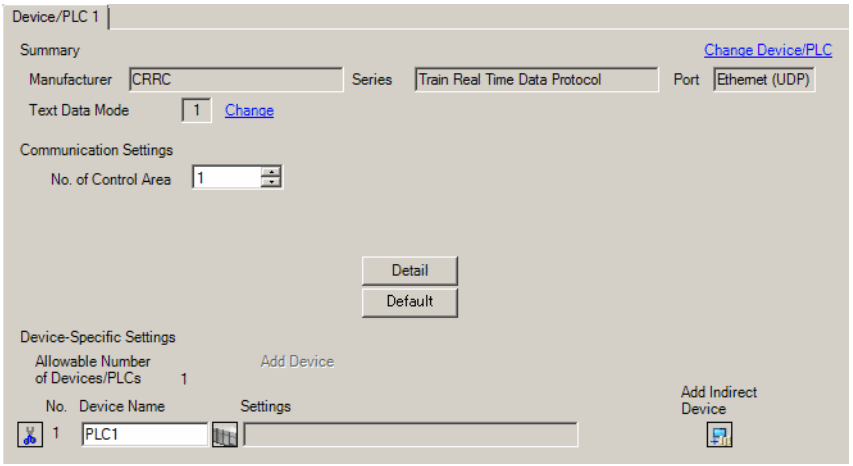
This section provides examples of communication settings recommended by Pro-face for the Display and the External Device.

3.1 Setting Example 1

■ Settings of GP-Pro EX

◆ Communication Settings

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



■ External Device Settings

For details on communication settings, please refer to the manual of the External Device.

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 6)

NOTE

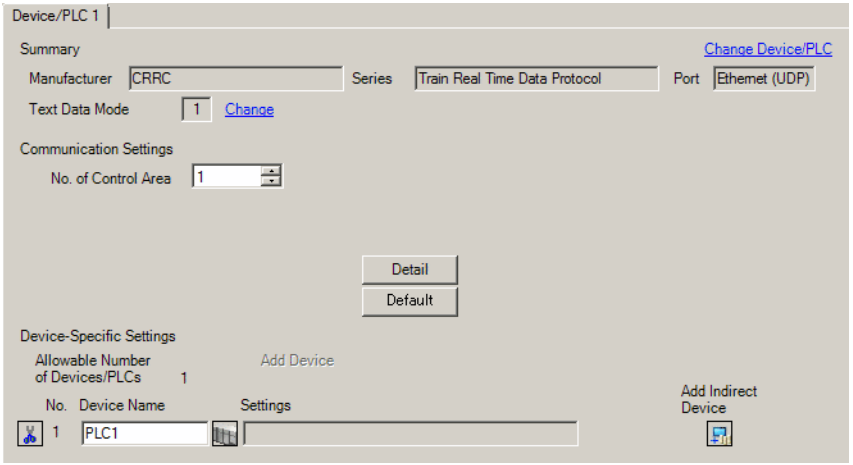
- Set the Display's IP address in offline mode.

  Cf. Maintenance/Troubleshooting Guide "Ethernet Settings"

4.1 Setup Items in GP-Pro EX

■ Communication Settings

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



Setup Items	Setup Description
No. of Control Area	Set the number of groups to use.

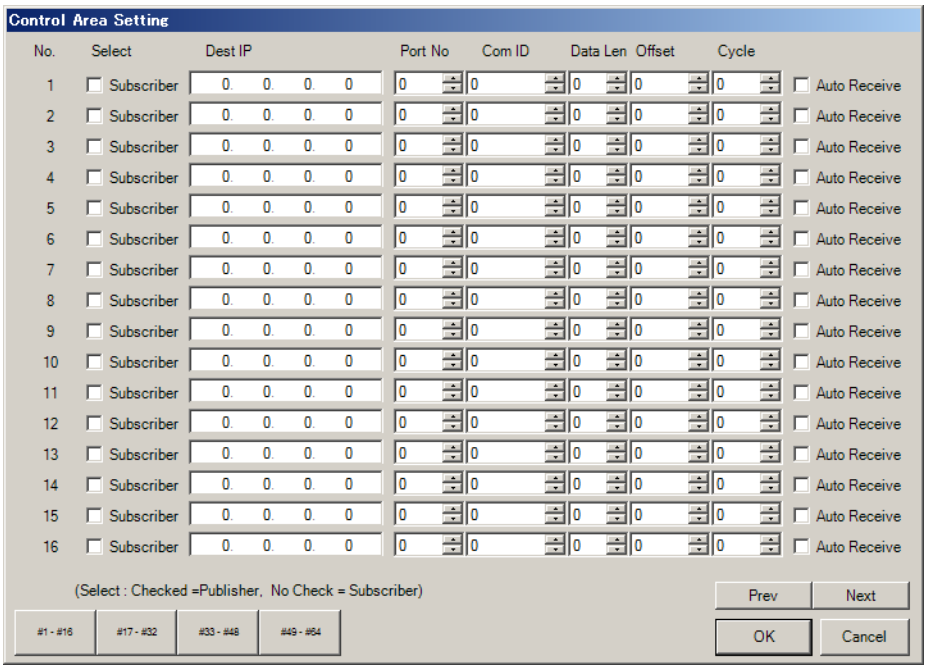
NOTE

- Refer to the GP-Pro EX Reference Manual for Indirect Device.

  Cf. GP-Pro EX Reference Manual "Changing the Device/PLC at Runtime (Indirect Device)"

- Control Area Setting

  To display the setup screen, from the Communication Settings click [Detail].



NOTE

- Refer to the Group Setting Area for the control area settings.

  ☞ " ■ Group Setting Area" (page 12)

- Although this driver supports 255 groups in the Group Setting Area, from the [Control Area Setting] dialog box you can set a maximum 64 groups. To set groups in the Group Setting Area beyond 64 groups, use the control area.

4.2 Setup Items in Offline Mode

NOTE

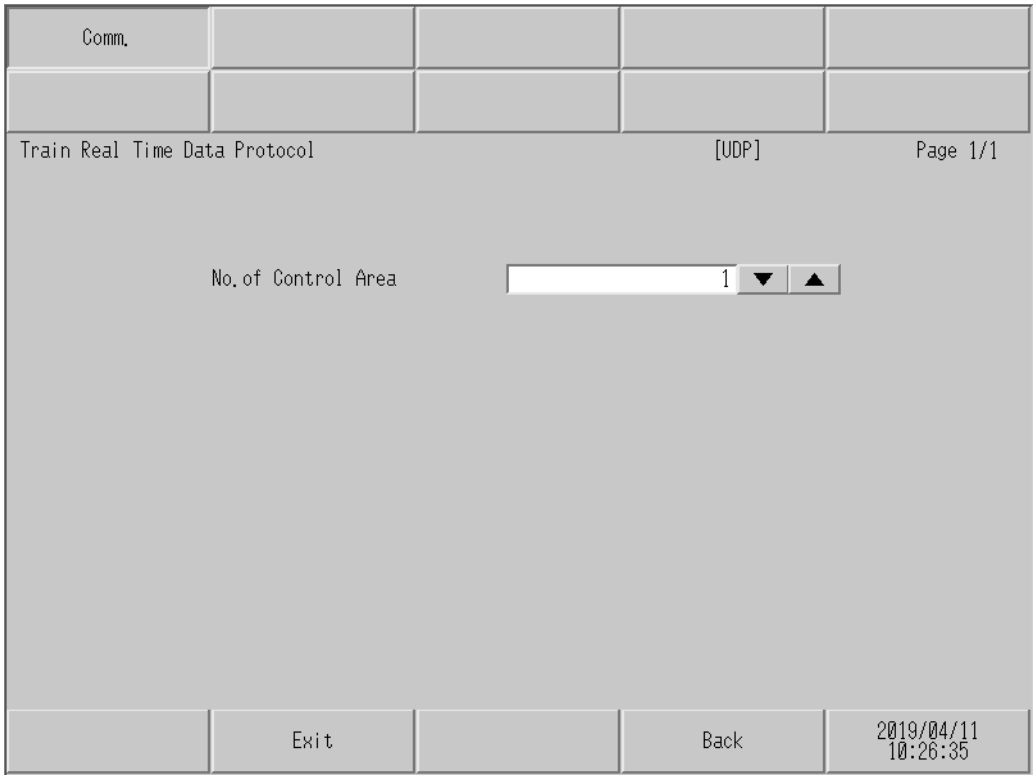
- Refer to the Maintenance/Troubleshooting guide for information on how to enter offline mode or about the operation.

  Cf. Maintenance/Troubleshooting Guide "Offline Mode"

- In offline mode, the number of settings you can view on one screen varies depending on the Display in use. Please refer to the Reference Manual for more details.

◆ Communication Settings

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



Setup Items	Setup Description
No. of Control Area	Set the number of groups to use.

5 Supported Devices

The following table shows the range of supported device addresses. Please note that the actual supported range of the devices varies depending on the External Device to be used. Please check the actual range in the manual of your External Device.

: This address can be specified as system data area.

Device	Bit Address	Word Address	32 bits	Notes
Control area	-	CT0000 - DT5619	L / H	Bit 15 *1
Data area	-	DT00000 - DT71599		Bit 15

*1 Control area details

Control Area Address	Name
CT0000-CT0519	Overall setting area
CT0520-CT0539	Group 1 setting area
CT0540-CT0559	Group 2 setting area
:	:
CT5580-CT5599	Group 254 setting area
CT5600-CT5619	Group 255 setting area

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)"
- Refer to the precautions on manual notation for icons in the table.
  ☞ "Manual Symbols and Terminology"

■ Overall Setting Area

Control Area Address		Name	Description
CT0000		Effectiveness of UDP communication (Enable / disable)	Enable or disable UDP communication. 1 = Enable, 0 = Disabled ☞ "• Changing Communication Settings" (page 15)
CT0001		HMI port number for Subscriber.	Port number the Display uses for Subscriber.
Multicast setting	CT0002	HMI IP address bound to Multicast (Upper 2Bytes)	IP address of the Display assigned to multicast. (top 2 bytes) "192.168.0.100" is "C0A8h" (C0h = 192, A8h = 168).
	CT0003	HMI IP address bound to Multicast (Under 2Bytes)	IP address of the Display assigned to multicast. (bottom 2 bytes) "192.168.0.100" is "0064h" (00h = 0, 64h = 100).
	CT0004	Join Multicast address1 (Upper 2Bytes)	Multicast address joined by the Subscriber. (top 2 bytes) "239.1.1.5" is "EF01h" (EFh = 239, 01h = 1).
	CT0005	Join Multicast address1 (Under 2Bytes)	Multicast address joined by the Subscriber. (bottom 2 bytes) "239.1.1.5" is "0105h" (01h=1, 05h=5).
	:	:	:
	CT0514	Join Multicast address256 (Under 2Bytes)	Same as "Join Multicast address1".
	CT0515	Join Multicast address256 (Under 2Bytes)	Same as "Join Multicast address1".
CT0516 - CT0519		Reserved	Reserved

■ Group Setting Area

The Group Setting Area is as follows.

"a" indicates the Group Setting Area start address (CT0520, CT0540 to CT5600)

Control Area Address ex: Group 1 setting area		Name	Description	Setting Items on GP-Pro EX
a+00	CT0520	Effectiveness of setting items	Enable or disable setting item. 1 = Enabled, 0 = Disabled ☞"• Changing Communication Settings" (page 15)	-
a+01	CT0521	Roles (Publisher/ Subscriber)	Set either Publisher or Subscriber. 1 = Publisher, 0 = Subscriber	Select
a+02	CT0522	Connection destination IP (Upper 2Bytes)	Setting for the IP address to connect. (top 2 bytes) "192.168.0.100" is "C0A8h" (C0h = 192, A8h = 168). Publisher: Set the destination address. (E.g. 192.168.1.255, 239.1.1.5) Subscriber: Set the source address.	Dest IP
a+03	CT0523	Connection destination IP (Under 2Bytes)	Setting for the IP address to connect. (bottom 2 bytes) "192.168.0.100" is "0064h" (00h = 0, 64h = 100).	Dest IP
a+04	CT0524	period	Setting for the communication period. The minimum value is 100 ms. The setting interval is 10 ms. (E.g. 100, 110, 120, ...) There may be an error variation of about 10 ms.	Cycle
a+05	CT0525	Communication control area	Communication control area. ☞"• Data setting and receiving procedure" (page 14)	-
a+06	CT0526	ComId (Upper 2Bytes)	Setting for communication ID (top or bottom 2 bytes). 0 to 4294967295 (0000 0000 h to FFFF FFFF h)	Com ID
a+07	CT0527	ComId (Under 2Bytes)		Com ID
a+08	CT0528	Dataset Length	Setting for the dataset length. 0 to 1432 (0000h to 0598h)	Data Len
a+09	CT0529	Data area Address (Upper 2Bytes)	Setting for the data area address (top and bottom 2 bytes). The Subscriber cannot overlap setting areas.	Offset
a+10	CT0530	Data area Address (Under 2Bytes)		Offset
a+11	CT0531	Driver Status	Driver status 2 = Busy, 1 = Enabled, 0 = Disabled	-
a+12	CT0532	Publisher's destination port number	Destination port number for the Publisher. For Subscribers, this setting is ignored .	Port No

Control Area Address ex: Group 1 setting area		Name	Description	Setting Items on GP-Pro EX
a+13	CT0533	Force update mode in Subscriber.	1=Enabled, 0=Disabled When set to Enabled, the Subscriber continues to receive even without Communication control area operations. For Publisher, this setting is ignored.	Auto Receive
a+14	CT0534	Reserved	Reserved	-
:	:	:	:	
a+19	CT0539	Reserved	Reserved	-

■ Example of Device Usage

- Data setting and receiving procedure

Send/Receive Status	Setting Value	Description
Data not set/receive (Initial value)	0	The communication driver waits for a set of data.
Data is set	0 → 1	After setting data, the set data side writes "1".
Data is received	1 → 0	After receiving data, writes "0".

For Group1 Publisher

1 User (data setting side) confirms the “Communication control area (CT0525)” value is “0”.
2 User sets transmission data to the DT area.
3 User sets the “Communication control area (CT0525)” value “0 → 1”, and notifies the driver (data receiving side) of the transmission data update.
4 When the driver detects the "Communication control area (CT0525)" value has changed "0 → 1", the driver updates the transmission data.
5 After updating the transmission data, the driver resets the "Communication control area (CT0525)" value "1 → 0".
6 The driver continues sending packets at the interval specified in "period (CT0524)".

For Group1 Subscriber

1 Driver (data setting side) confirms the “Communication control area (CT0525)” value is “0”.
2 Driver sets received data to the DT area.
3 Driver sets the “Communication control area (CT0525)” value “0 → 1” and notifies user (data receiving side) that receive is complete.
4 User confirms the "Communication control area (CT0525)" value has changed "0 → 1", then uses the received data.
5 To continue receiving data, reset the “Communication control area (CT0525)” value “1 → 0”.

- Changing Communication Settings

  To make changes to the communication settings, first stop TRDP communication then make your changes. If you make changes in the middle of communication, operation will not be normal.

  Change communication by using both the Effectiveness of UDP communication setting (CT0000) and the Effectiveness of setting items (example: CT0520) addresses.

Effectiveness of UDP communication setting (CT0000)	Effectiveness of setting items (CT a+00) ex: CT0520	TRDP communication
0 (Disable)	0 (Disable)	Not Performed
0 (Disable)	1 (Enable)	Not Performed
1 (Enable)	0 (Disable)	Not Performed
1 (Enable)	1 (Enable)	Performed

To change Group 1 settings:

1 Set “Effectiveness of setting items (C0520)” to “0”.

2 Confirm "Driver Status (CT0531)" changes to "0".

3 Update settings such as "Roles (Publisher / Subscriber) (C0521)".

4 Set “Effectiveness of setting items (C0520)” to “1”.

5 Confirm “Driver Status (CT0531)” changes to “1”.

NOTE

- In the overall setting area, if setting "Effectiveness of UDP communication" to "1 = Enable" occurs before "HMI port number for Subscriber", "Join Multicast address", and "HMI IP address bound to Multicast", operation will not be normal. Make sure the overall setting area is set last.
- When changing settings in the overall setting area, make the change only after setting "Effectiveness of UDP communication" to "0 = Disable", and confirming the "Driver Status" in the communication setting control of all the groups is "0 = Disable".
- Make sure you complete all the settings before you set the "Effectiveness of setting items" to "1 = Enable" in the communication setting control of all the groups.
- In the communication setting control of all the groups, when you set the "Effectiveness of setting items" to "1 = Enable", confirm the "Driver Status" becomes "1 = Enable". Publisher transmission and Subscriber receipt do not work until "Driver Status" is "1 = Enable".

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.

Device	Device Name	Device Code (HEX)	Address Code
Control area	CT	0000	Word Address
Data area	DT	0001	Word Address

7 Error Messages

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

Item	Description
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. (Initial value [PLC1])
Error Message	Displays messages related to the error which occurs.
Error Occurrence Area	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 "Decimal[Hex]".

Display Examples of Error Messages

"RHAA035: PLC1: Error has been responded for device write command (Error Code: 2 [02H])"

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.