

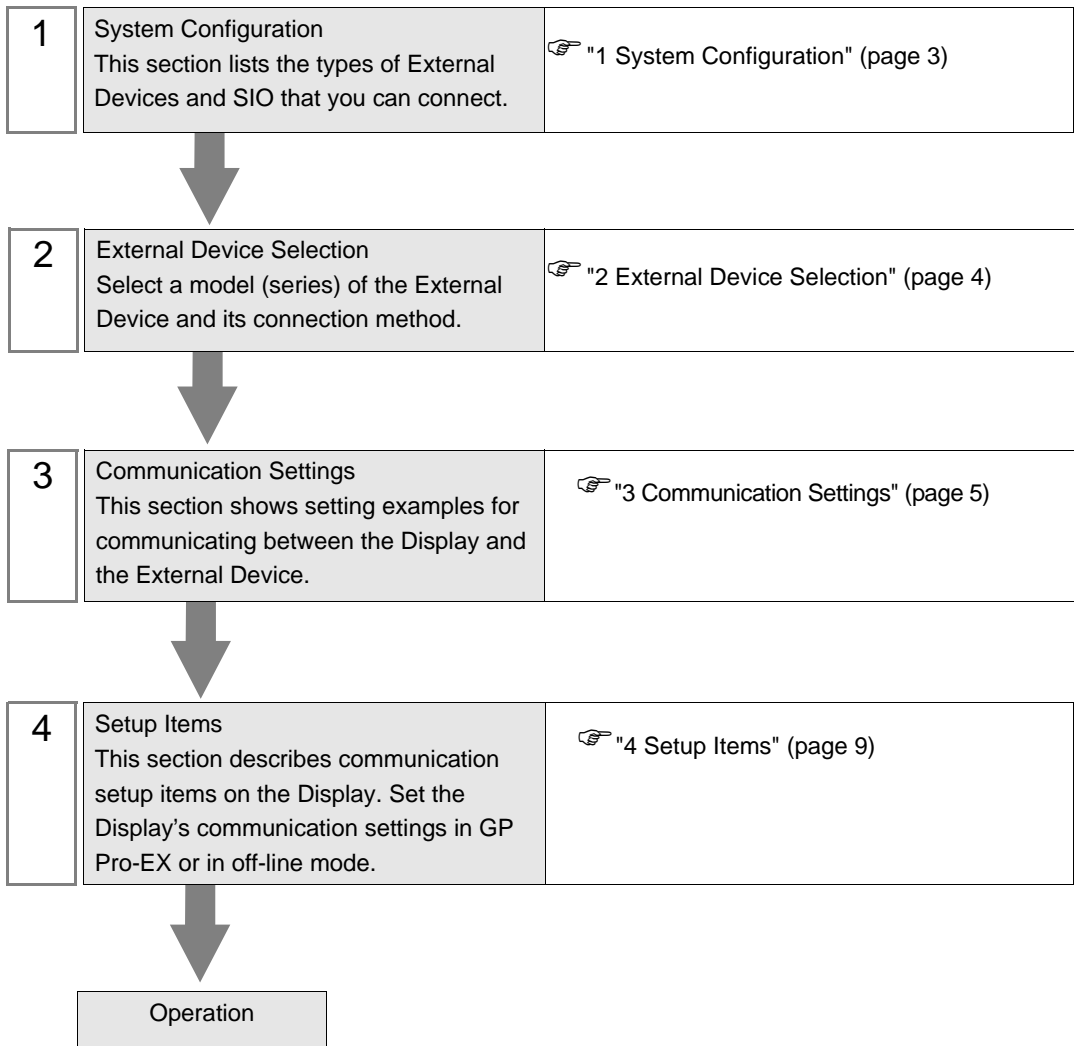
b-CAP Protocol (TCP) Driver

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Introduction

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

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



1 System Configuration

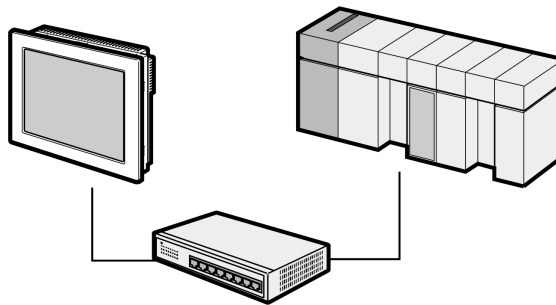
The system configuration for connecting DENSO WAVE INCORPORATED's External Device and the Display is shown below.

Series	Controller	Link I/F	SIO Type	Setting Example
RC7M ^{*1}	RC7M	Ethernet port on Controller	Ethernet (TCP)	"Setting Example 1" (page 5)
RC8	RC8	Ethernet port on Controller	Ethernet (TCP)	"Setting Example 2" (page 7)

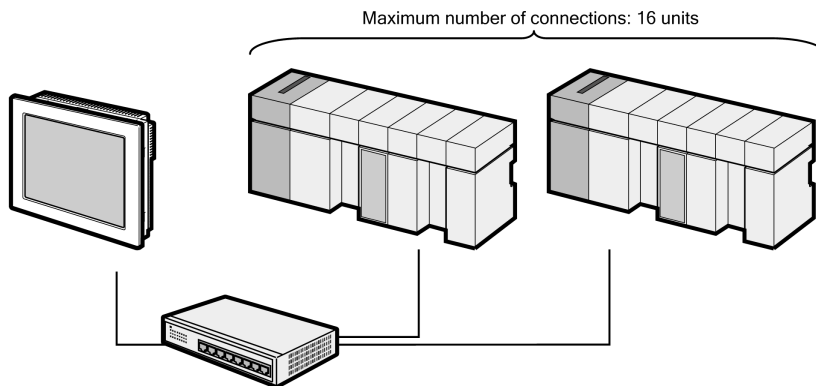
*1 Supports robot controller version 2.8 or later.

■ Connection Configuration

- 1:1 Connection



- 1:n Connection

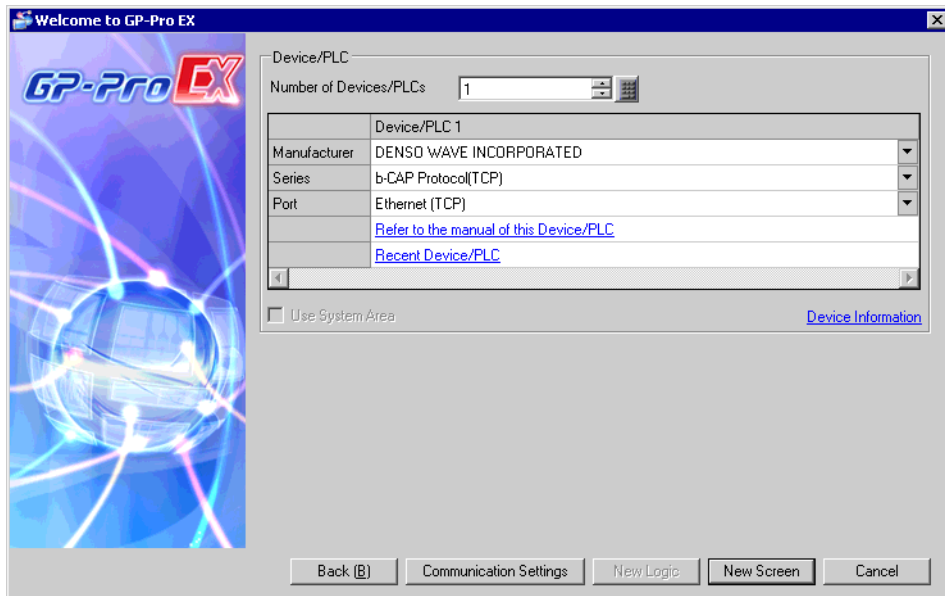


NOTE

- If you want to power down the system, end the communication first. You can end communication using one of the following methods.
 - View the offline mode screen on the Display.
 - Set the HMI system variable (#H_ScanOffControl) to ON.

2 External Device Selection

Select the External Device to be connected to the Display.



Setup Items	Setup Description
Number of Devices/PLCs	Use an integer from 1 to 4 to enter the number of Devices/PLCs to connect to the display.
Manufacturer	Select the manufacturer of the External Device to be connected. Select "DENSO WAVE INCORPORATED".
Series	Select a model (series) of the External Device to be connected and connection method. Select "b-CAP Protocol(TCP)". Use the system configuration to check which External Devices you can connect with "b-CAP Protocol(TCP)". ☞ "1 System Configuration" (page 3)
Port	Select the Display port to be connected to the External Device. Select "Ethernet (TCP)".
Use System Area	Not available in this driver.

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/PLC 1

Summary [Change Device/PLC](#)

Manufacturer: DENSO WAVE INCORPORATED Series: b-CAP Protocol(TCP) Port: Ethernet (TCP)

Text Data Mode: 2 [Change](#)

Communication Settings

Port No.: 1024 Auto

Timeout: 3 (sec)

Retry: 0

Wait To Send: 0 (ms) [Default](#)

Device-Specific Settings

Allowable Number of Devices/PLCs: 16 [Add Device](#)

No.	Device Name	Settings	Add Indirect Device
1	RC1	Series=RC7M,IP Address=192.168.0.001,Port No.=!	

◆ 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.

Individual Device Settings

RC1

Series: RC7M

Please reconfirm all of address settings that you are using if you have changed the series.

IP Address: 192.168.0.1

Port No.: 5007

[Default](#)

[OK \(O\)](#) [Cancel](#)

NOTE

- Check with a network administrator about IP address.
- Do not set the duplicate IP address in the same network.
- Set IP address and Port Number on the External Device in the [Individual Device Settings] dialog box.
- You need to set IP address on the Display in offline mode.

■ Settings of External Device

Use the Teaching Pendant for communication settings.

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

- 1 Change the External Device to manual mode.
- 2 On the main screen, press [Set F6].
- 3 Press [Options. F7]-[Extnsion F8]. Type "1214" to enable the ORiN option.
- 4 Press [Set Com. F5]-[Permit. F1].
- 5 Select "Ethernet", and press [Change. F5].
- 6 Select "Read/write". Press [OK] to return to the Communications Setting Menu.
- 7 Press [Ext. Run F6].
- 8 Select "Ethernet", and press [IP Set].

NOTE

- To start a robot from the Display, set the startup authority to "Ethernet". When this setting is made, however, startup from other devices than the Display become disabled.
-

- 9 Set the IP address (192.168.0.2) of the Display. Press [OK] to return to the Communications Setting Menu.
- 10 Press [Address F4].
- 11 Set the IP address of the External Device.

Setup Items	Setup Description
IP address	192.168.0.1
Subnet mask	255.255.255.0

- 12 Press [OK].

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].

◆ 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.

NOTE

- Check with a network administrator about IP address.
- Do not set the duplicate IP address in the same network.
- Set IP address and Port Number on the External Device in the [Individual Device Settings] dialog box.
- You need to set IP address on the Display in offline mode.

■ Settings of External Device

Use the Teaching Pendant for communication settings.

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

- 1 Change the External Device to manual mode.
- 2 On the main screen, press [Setting].
- 3 Press [Communication and Token F5]-[Network and Permission F2].
- 4 Select "Ethernet", and press [Edit].
- 5 Set the following, and press [OK].

Setup Items	Setup Description
Permission	Read/Write
DHCP	Disable
IP address	192.168.0.1
Subnet mask	255.255.255.0

- 6 Press [Executable Token F1].
- 7 Select "Ethernet", and press [Edit].

NOTE


- To start a robot from the Display, set the startup authority to "Ethernet". When this setting is made, however, startup from other devices than the Display become disabled.
-

- 8 Set the IP address (192.168.0.2) to Display, and press [OK].

4 Setup Items

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

The setting of each parameter must match the External Device.

 "3 Communication Settings" (page 5)

NOTE

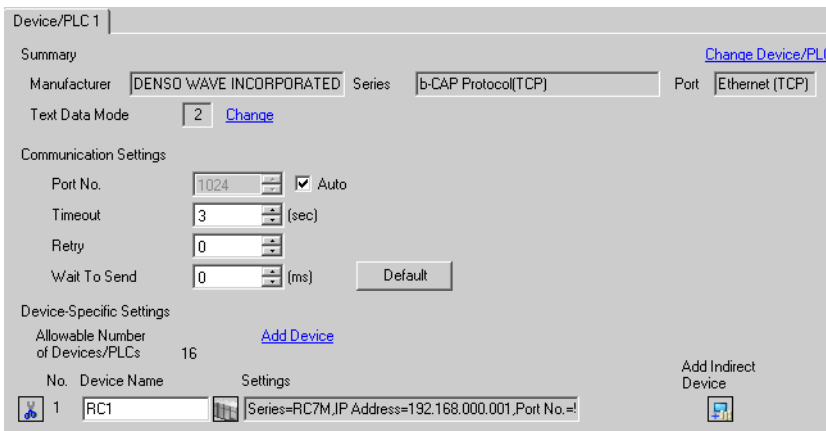
- Set the Display's IP address in off-line mode.

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].



Device/PLC 1

Summary [Change Device/PLC](#)

Manufacturer: DENSO WAVE INCORPORATED Series: b-CAP Protocol(TCP) Port: Ethernet (TCP)

Text Data Mode: 2 [Change](#)

Communication Settings

Port No.: 1024 Auto


Timeout: 3 (sec)

Retry: 0

Wait To Send: 0 (ms) [Default](#)

Device-Specific Settings

Allowable Number of Devices/PLCs: 16 [Add Device](#)

No.	Device Name	Settings	Add Indirect Device
1	RC1	Series=RC7M,IP Address=192.168.000.001,Port No.=	


Setup Items	Setup Description
Port No.	Enter the Display's port number, from 1024 to 65535. Select the [Auto] check box to set the port number automatically.
Timeout	Use an integer from 1 to 127 to enter the time (seconds) the Display waits for a response from the External Device.
Retry	When 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 how much time (ms) the Display waits after receiving packets until it transmits the next command.

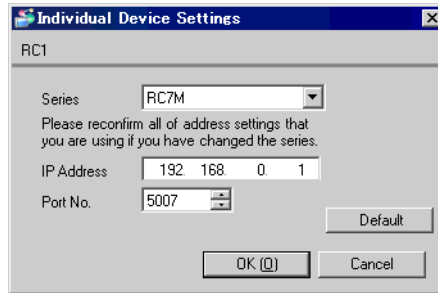
NOTE

- Refer to the GP-Pro EX Reference Manual for information about Indirect Devices.

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

■ 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 the series of the External Device.
IP Address	Set the IP address of the External Device. <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">NOTE</div> <ul style="list-style-type: none"> Check with a network administrator about IP address. Do not set the duplicate IP address.
Port No.	Enter a port number of the External Device, from 1 to 65535. For this driver, however, set the default setting of "5007".

4.2 Setup Items in Offline Mode

NOTE

- Please refer to the Maintenance/Troubleshooting Guide for more information on how to enter offline mode or about operations.
Cf. Maintenance/Troubleshooting Guide "Offline Mode"
- The number of setup items that can display on one page in offline mode depends on the Display in use. Please refer to the Reference manual for details.

■ Communication Settings

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

Comm.	Device			
b-CAP Protocol(TCP)			[TCP]	Page 1/1
Port No.	<input type="radio"/> Fixed <input checked="" type="radio"/> Auto	<input type="text" value="1024"/> ▼ ▲		
Timeout(s)	<input type="text" value="3"/> ▼ ▲			
Retry	<input type="text" value="0"/> ▼ ▲			
Wait To Send(ms)	<input type="text" value="0"/> ▼ ▲			
Exit		Back		2011/11/17 04:44:24

Setup Items	Setup Description
Port No.	Set the Port No. of the Display. Select either of [Fixed] or [Auto]. When you select [Fixed], use an integer from "1024 to 65535" to enter the port number of the Display. When you select [Auto], the port number will be automatically assigned regardless of the entered value.
Timeout	Use an integer from 1 to 127 to enter the time (seconds) the Display waits for a response from the External Device.
Retry	When 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 how much time (ms) the Display waits after receiving packets until it transmits the next command.

■ 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].

Comm.	Device			
b-CAP Protocol(TCP)		[TCP]	Page 1/1	
Device/PLC Name		RC1		
Series	RC7M			
IP Address	192 168 0 1			
Port No.	5007			
Exit		Back		2011/11/17 04:44:30

Setup Items	Setup Description
Series	Select the series of the External Device.
IP Address	Set the IP address of the External Device. NOTE <ul style="list-style-type: none"> Check with a network administrator about IP address. Do not set the duplicate IP address.
Port No.	Enter a port number of the External Device, from 1 to 65535. For this driver, however, set the default setting of "5007".

5 Supported Device Addresses

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

5.1 RC7M Series

I00000 This address can be specified as system data area.

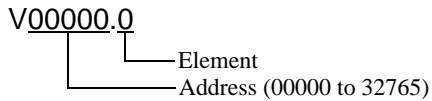
Device	Bit Address	Word Address	32bits	Notes
Variable I	-	I00000 - I32765	H / L	
Variable F	-	F00000 - F32765		
Variable V	-	V00000.0 - V32765.2		*1 *2
Variable P	-	P00000.0 - P32765.6		*1 *3
Variable J	-	J00000.0 - J32765.5		*1 *4
Variable T	-	T00000.0 - T32765.9		*1 *5
Variable S	-	S00000 - S32765		*6
Variable IO	-	IO00000 - IO00511		*7
TOOL settings	-	TOOL00.0 - TOOL63.5		*1 *8
WORK settings	-	WORK0.0 - WORK7.5		*1 *9
AREA settings	-	AREA00.00 - AREA31.12		*1 *10
Using condition parameter	-	SPDCNF0000 - SPDCNF0474		
Special register 1 Controller	-	CREG0 - CREG4		*11 *12
Error code	-	CODE0		*11 *13
Error message	-	ERR0		*11 *14
Version string	-	VER0		*11 *15
Auto mode	-	AUTO0		*16 *17
Error clear	-	ERRCLR0		*16 *18
Number of programs	-	PMAX0		*11
Program name	-	PNAME001 - PNAME256		*11
Current robot position	-	CPOS0 - CPOS6		*11 *19
Current robot position (each axis value)	-	CANG0 - CANG7		*11 *20
Current robot position expressed (T type)	-	CTRN0 - CTRN9		*11 *21
Special register 2 Robot	-	RREG0 - RREG9	*11 *22	
Change the Tool coordinates	-	TOOLN0	*16 *23	

Device	Bit Address	Word Address	32bits	Notes
Change the Work coordinates	-	WORKN0	H/L	*16 *23
Special register 3 Program	-	PREG001.0 - PREG256.3		*11 *24
Program start	-	PSTR001 - PSTR256		*16 *25
Program stop	-	PSTP001 - PSTP256		*16 *26
Motor ON/OFF	-	MTON0		*16 *27
Reboot	REBOOT	-	-	*16 *28
Directory name	-	PNAMED001 - PNAMED256	H/L	*11 *29
File name	-	PNAMEN001 - PNAMEN256		*11 *30
Program refresh	PREFRESH	-	-	*16 *31

*1 Read / write in word units.

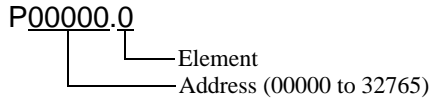
Writing data to the External Device involves defined structural units. The Display reads the structural unit from the External Device, changes the targeted word data only, then writes the data back to the External Device. When the write operation occurs on the External Device to the word address during the read/write process, the resulting data may be incorrect.

*2 The address structure of Variable V is as follows.

V00000.0


Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float

*3 The address structure of Variable P is as follows.



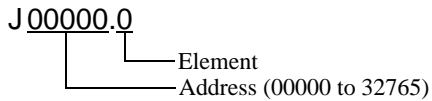
6-Axis

Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float
6	Fig	32	Read/Write	Int

4-Axis

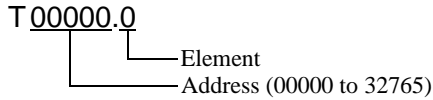
Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	T	32	Read/Write	Float
4	unused	32	Read/Write	Float
5	unused	32	Read/Write	Float
6	Fig	32	Read/Write	Int

*4 The address structure of Variable J is as follows.



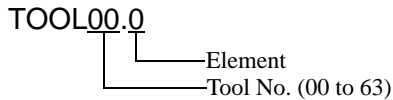
Element	Register	Size	Attribute	Type
0	J1	32	Read/Write	Float
1	J2	32	Read/Write	Float
2	J3	32	Read/Write	Float
3	J4	32	Read/Write	Float
4	J5	32	Read/Write	Float
5	J6	32	Read/Write	Float

- *5 The address structure of Variable T is as follows.



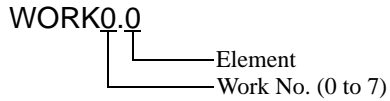
Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	Ox	32	Read/Write	Float
4	Oy	32	Read/Write	Float
5	Oz	32	Read/Write	Float
6	Ax	32	Read/Write	Float
7	Ay	32	Read/Write	Float
8	Az	32	Read/Write	Float
9	Fig	32	Read/Write	Int

- *6 You can write up to 254 single-byte characters to the S device.
- *7 The IO device range is the range normally accessible by the External Device.
When you add an expansion board to the External Device, add the number of points on the expansion board to the accessible range.
Read takes place when the IO status is either 0 (OFF) or 1 (ON). IO changes when you write either 0 (OFF) or 1 (ON) to IO. When you write a value other than 0 or 1, uses the value written to the least significant bit.
- *8 The address structure of TOOL settings is as follows.



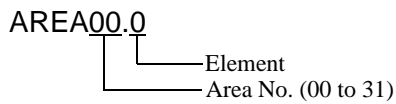
Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float

- *9 The address structure of WORK settings is as follows.



Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float

- *10 The address structure of AREA settings is as follows.



Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float
6	DX	32	Read/Write	Float
7	DY	32	Read/Write	Float
8	DZ	32	Read/Write	Float
9	IO	32	Read/Write	Int
10	POS	32	Read/Write	Int
11	Err	32	Read/Write	Int
12	Enable	32	Read/Write	Int

- *11 Write disabled.

*12 The address structure of Special register 1 Controller is as follows.

CREG0

└── Element

Element	Register	Size	Attribute	Type
0	Operation mode	16	Read	Short 1: manual, 2: teach check, 3: auto, 4: external auto
1	Emergency stop	16	Read	Short 1:ON, 0:OFF
2	Auto enable status	16	Read	Short 1:ON, 0:OFF
3	Protective stop	16	Read	Short 1:ON, 0:OFF
4	Deadman switch status	16	Read	Short 1:ON, 0:OFF

*13 Stores the error code of the External Device's latest error.

*14 Stores the error message of the External Device's latest error.

*15 Stores the version of the External Device.

*16 Read disabled.

*17 Writes 1 for internal auto mode, writes 2 for external auto mode.

*18 You can clear errors on the External Device by writing a value.

*19 The address structure of Current robot position is as follows.

CPOS0

└── Element

Element	Register	Size	Attribute	Type
0	X	32	Read	Float
1	Y	32	Read	Float
2	Z	32	Read	Float
3	RX	32	Read	Float
4	RY	32	Read	Float
5	RZ	32	Read	Float
6	Fig	32	Read	Int

*20 The address structure of Current robot position (each axis value) is as follows.

CANGO

└── Element

Element	Register	Size	Attribute	Type
0	J1	32	Read	Float
1	J2	32	Read	Float
2	J3	32	Read	Float
3	J4	32	Read	Float
4	J5	32	Read	Float
5	J6	32	Read	Float
6	J7	32	Read	Float
7	J8	32	Read	Float

*21 The address structure of Current robot position expressed(T type) is as follows.

CTRNO

└── Element

Element	Register	Size	Attribute	Type
0	X	32	Read	Float
1	Y	32	Read	Float
2	Z	32	Read	Float
3	Ox	32	Read	Float
4	Oy	32	Read	Float
5	Oz	32	Read	Float
6	Ax	32	Read	Float
7	Ay	32	Read	Float
8	Az	32	Read	Float
9	Fig	32	Read	Int

*22 The address structure of Special register 2 Robot is as follows.

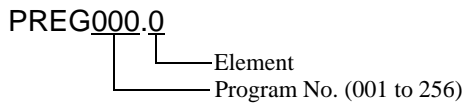
RREG0

└── Element

Element	Register	Size	Attribute	Type
0	Currently used tool number	32	Read	Int
1	Currently used work number	32	Read	Int
2	Internal speed	32	Read	Float
3	Internal acceleration	32	Read	Float
4	Internal deceleration	32	Read	Float
5	External speed	32	Read	Float
6	External acceleration	32	Read	Float
7	External deceleration	32	Read	Float
8	Servo status	32	Read	Int 1:ON, 0:OFF
9	Robot type data	32	Read	Int ^{*1}

*1 Robot controller version 2.9 or later is required to use RREG9.

- *23 To run this device, run the RoboSlave.pac.
- *24 The address structure of Special register 3 Program is as follows.




Element	Register	Size	Attribute	Type
0	Status of task	32	Read	Int 1:DORMANT, 2:READY, 3:RUN, 4:WAIT, 6:SUSPEND, 0:NON_EXISTENT
1	Priority of task	32	Read	Int
2	Line number of currently running main program	32	Read	Int
3	One cycle execution time of task	32	Read	Int 0...9999999 (ms)


- *25 This driver executes only tasks without arguments. Before executing tasks, perform the following operations.
 1. Transfer RoboSlave.pac, RoboSlave.h and userextension.pac to the External Device.
 2. Use the Teaching Pendant to set communication and startup settings.
 3. Set 2 to the AUTO device.
 While executing tasks on the External Device, if you run PSTR the Teaching Pendant will display the message, "The same program is running." To prevent running two instances of PSTR, use PREG***.0 to check the task status, and then run PSTR.
 Write values and operations are as follows.
 1. Run 1 cycle
 2. Run continuously
 3. 1 Step
 4. Not supported
 5. Retry (available when continue stopped)
 Other than above: Not supported (error will display.)
- *26 Before executing tasks, use the Teaching Pendant to change the External Device to Auto Mode.
 Write values and operations are as follows.
 - 0: Stop (default)
 - 1: Pause
 - 2: Step stop
 - 3: Cycle Stop
 - 4: Reset
 - 5: Continue stopped
 Other than above: Not supported (error will display.)
- *27 Adjust the timeout value to use this command. The External Device will not respond until motor operation is complete.
- *28 This device restarts the Display.
 When you restart the Display from the External Device, do not use the Special Switch's Reset operation. If you do, you will not be able to reconnect to the External Device.
 Communication is not possible as this is an internal device.
 When executed, connections with all devices are terminated and the Display restarts. To shut down only the Display, do so only after entering the offline menu or after off-scanning all devices.
- *29 Gets the program name (full path) string, minus the file name.
- *30 Gets the program name (full path) string, minus the folder name.
- *31 To refresh the task name, execute the task after setting up the task name in the PNAME device.

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 RC8 Series

 This address can be specified as system data area.

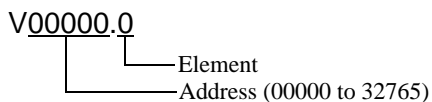
Device	Bit Address	Word Address	32bits	Notes
Variable I	-	I00000 - I32765	H/L	
Variable F	-	F00000 - F32765		
Variable V	-	V00000.0 - V32765.2		*1 *2
Variable P	-	P00000.0 - P32765.6		*1 *3
Variable J	-	J00000.0 - J32765.7		*1 *4
Variable T	-	T00000.0 - T32765.9		*1 *5
Variable S	-	S00000 - S32765		*6
Variable IO	-	IO00000 - IO00511		*7
TOOL settings	-	TOOL00.0 - TOOL63.5		*1 *8 *9
WORK settings	-	WORK0.0 - WORK7.6		*1 *8 *10
AREA settings	-	AREA00.00 - AREA31.33		*1 *8 *11
Special register 1 Controller	-	CREG0 - CREG5		*12 *13
Error code	-	CODE0		*12 *14
Error message	-	ERR0		*12 *15
Version string	-	VER0		*12 *16
Error clear	-	ERRCLR0		*17 *18
Number of programs	-	PMAX0	*12	
Program name	-	PNAME001 - PNAME256	-	*12
Current robot position	-	CPOS0 - CPOS6	-	*8 *12 *19
Current robot position (each axis value)	-	CANG0 - CANG7	-	*8 *12 *20
Current robot position expressed (T type)	-	CTRN0 - CTRN9	-	*8 *12 *21
Special register 2 Robot	-	RREG00 - RREG10	-	*22
Change the Tool coordinates	-	TOOLN0	-	*17
Change the Work coordinates	-	WORKN0	-	*17
Special register 3 Program	-	PREG001.0 - PREG256.5	-	*23
Program start	-	PSTR001 - PSTR256	-	*17 *24
Program stop	-	PSTP001 - PSTP256	-	*17 *25
Motor ON/OFF	-	MTON0	-	*17 *26

Device	Bit Address	Word Address	32bits	Notes
Directory name	-	PNAMED001 - PNAMED256	H/L	*12 *27
File name	-	PNAMEN001 - PNAMEN256		*12 *28
Request to get control authority	-	TAKEARM00 - TAKEARM31	-	*17 *29
Release robot control priority	GIVEARM	-	-	*17
Calculates destination coordinates TOOL coordinates	-	DEVH000 - DEVH299	-	*8 *30 *31
Motion skip	-	MSKIP00 - MSKIP31	-	*17 *32
Move specified coordinates	-	MOVE000 - MOVE199	-	*31 *33
Relative movement WORK coordinate	-	DRAW000 - DRAW199	-	*31 *34
Absolute motion each axis	-	DRIVEEX000 - DRIVEEX199	-	*31 *35
Select area interference check is performed	-	SETAREA0	-	*17 *36
Initializes interference check	-	RSTAREA0	-	*17 *36
Program refresh	PREFRESH	-	-	*17 *37
File read	-	FILEREAD0	-	*17 *38
File write	-	FILEWRITE0	-	*17 *38 *39
File list	-	FILELIST0	-	*17 *38
VARLEN	-	VARLEN0 - VARLEN7		*12 *40
RBTNAME	-	RBTNAME0		*12 *41

*1 Read / write in word units.

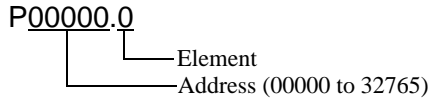
Writing data to the External Device involves defined structural units. The Display reads the structural unit from the External Device, changes the targeted word data only, then writes the data back to the External Device. When the write operation occurs on the External Device to the word address during the read/write process, the resulting data may be incorrect.

*2 The address structure of Variable V is as follows.



Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float

*3 The address structure of Variable P is as follows.



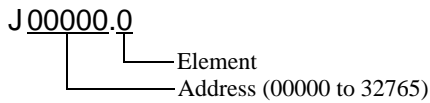
6-Axis

Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float
6	Fig	32	Read/Write	Int

4-Axis

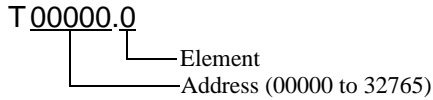
Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	T	32	Read/Write	Float
4	unused	32	Read/Write	Float
5	unused	32	Read/Write	Float
6	Fig	32	Read/Write	Int

*4 The address structure of Variable J is as follows.



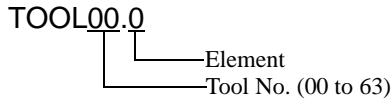
Element	Register	Size	Attribute	Type
0	J1	32	Read/Write	Float
1	J2	32	Read/Write	Float
2	J3	32	Read/Write	Float
3	J4	32	Read/Write	Float
4	J5	32	Read/Write	Float
5	J6	32	Read/Write	Float
6	J7	32	Read/Write	Float
7	J8	32	Read/Write	Float

- *5 The address structure of Variable T is as follows.



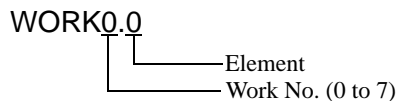
Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	Ox	32	Read/Write	Float
4	Oy	32	Read/Write	Float
5	Oz	32	Read/Write	Float
6	Ax	32	Read/Write	Float
7	Ay	32	Read/Write	Float
8	Az	32	Read/Write	Float
9	Fig	32	Read/Write	Int

- *6 You can write up to 254 single-byte characters to the S device.
- *7 The IO device range is the range normally accessible by the External Device.
When you add an expansion board to the External Device, add the number of points on the expansion board to the accessible range.
Read takes place when the IO status is either 0 (OFF) or -1 (ON). IO changes when you write either 0 (OFF) or 1 (ON) to IO. When you write a value other than 0 or 1, uses the value written to the least significant bit.
- *8 This device is treated as a 64-bit double-precision floating-point number on the External Device. However, the Display processes this device as a 32-bit single-precision floating-point number.
- *9 The address structure of TOOL settings is as follows.



Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float

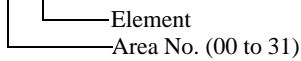
*10 The address structure of WORK settings is as follows.



Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float
6	Attribute	32	Read/Write	Float

*11 The address structure of AREA settings is as follows.

AREA00.0



Element	Register	Size	Attribute	Type
0	X	32	Read/Write	Float
1	Y	32	Read/Write	Float
2	Z	32	Read/Write	Float
3	RX	32	Read/Write	Float
4	RY	32	Read/Write	Float
5	RZ	32	Read/Write	Float
6	DX	32	Read/Write	Float
7	DY	32	Read/Write	Float
8	DZ	32	Read/Write	Float
9	IO	32	Read/Write	Int
10	POS	32	Read/Write	Int
11	Err	32	Read/Write	Int
12	Time	32	Read/Write	Int
13	DRX	32	Read/Write	Float
14	DRY	32	Read/Write	Float
15	DRZ	32	Read/Write	Float
16	Margin	32	Read/Write	Float
17	Position1	32	Read/Write	Float
18	Margin1	32	Read/Write	Float
19	Position2	32	Read/Write	Float
20	Margin2	32	Read/Write	Float
21	Position3	32	Read/Write	Float
22	Margin3	32	Read/Write	Float
23	Position4	32	Read/Write	Float
24	Margin4	32	Read/Write	Float
25	Position5	32	Read/Write	Float
26	Margin5	32	Read/Write	Float
27	Position6	32	Read/Write	Float
28	Margin6	32	Read/Write	Float
29	Position7	32	Read/Write	Float
30	Margin7	32	Read/Write	Float
31	Position8	32	Read/Write	Float
32	Margin8	32	Read/Write	Float
33	Enable	32	Read/Write	Int

*12 Write disabled.

- *13 The address structure of Special register 1 Controller is as follows.

CREG0

└── Element

Element	Register	Size	Attribute	Type
0	Operation mode	16	Read	Short 1: manual, 2: Teach check 3: auto, 4: external auto
1	Emergency stop	16	Read	Short -1:ON, 0:OFF
2	Auto enable status	16	Read	Short -1:ON, 0:OFF
3	Protective stop	16	Read	Short -1:ON, 0:OFF
4	Deadman switch status	16	Read	Short -1:ON, 0:OFF
5	Busy status	16	Read	Short -1: Program running, 0: Program stopped

- *14 Stores the error code of the External Device's latest error.
 *15 Stores the error message of the External Device's latest error.
 *16 Stores the version of the External Device.
 *17 Read disabled.
 *18 You can clear errors on the External Device by writing a value.
 *19 The address structure of Current robot position is as follows.

CPOS0

└── Element

Element	Register	Size	Attribute	Type
0	X	32	Read	Float
1	Y	32	Read	Float
2	Z	32	Read	Float
3	RX	32	Read	Float
4	RY	32	Read	Float
5	RZ	32	Read	Float
6	Fig	32	Read	Int

*20 The address structure of Current robot position (each axis value) is as follows.

CANGO

└── Element

Element	Register	Size	Attribute	Type
0	J1	32	Read	Float
1	J2	32	Read	Float
2	J3	32	Read	Float
3	J4	32	Read	Float
4	J5	32	Read	Float
5	J6	32	Read	Float
6	J7	32	Read	Float
7	J8	32	Read	Float

*21 The address structure of Current robot position expressed (T type) is as follows.

CTRNO

└── Element

Element	Register	Size	Attribute	Type
0	X	32	Read	Float
1	Y	32	Read	Float
2	Z	32	Read	Float
3	Ox	32	Read	Float
4	Oy	32	Read	Float
5	Oz	32	Read	Float
6	Ax	32	Read	Float
7	Ay	32	Read	Float
8	Az	32	Read	Float
9	Fig	32	Read	Int

*22 The address structure of Special register 2 Robot is as follows.

RREG0

└── Element

Element	Register	Size	Attribute	Type
0	Currently used tool number	32	Read/Write	Int
1	Currently used work number	32	Read/Write	Int
2	Internal speed	32	Read/Write	Float
3	Internal acceleration	32	Read/Write	Float
4	Internal deceleration	32	Read/Write	Float
5	External speed	32	Read/Write	Float
6	External acceleration	32	Read/Write	Float
7	External deceleration	32	Read/Write	Float
8	Servo status	32	Read	Int -1:ON, 0:OFF
9	Robot type data	32	Read	Int
10	Busy status	32	Read	Int -1: Arm moving, 0: Arm stopped

*23 The address structure of Special register 3 Program is as follows.

PREG000.0

└── Element
└── Program No. (001 to 256)

Element	Register	Size	Attribute	Type
0	State of task	32	Read	Int 1:DORMANT, 2:READY, 3:RUN, 4:WAIT, 6:SUSPEND, 0:NON_EXISTENT
1	Priority of task	32	Read/Write	Int
2	Line number of currently running main program	32	Read	Int
3	One cycle execution time of task	32	Read	Int 0-9999999 (ms)
4	File ID of currently running main program	32	Read	Int
5	Detail task status information	32	Read	Int 1:TASK_SUSPEND, 2:TASK_READY, 3:TASK_RUN, 4:TASK_STEPSTOP, 5:TASK_CNTSTP, 6:TASK_PEND, 7:TASK_DELAY, 0:TASK_NON_EXISTENT

- *24 This driver executes only tasks without arguments. Before executing tasks, perform the following operations.
1. Use the Teaching Pendant to set communication and startup settings.
 2. Use the Teaching Pendant to change to Auto Mode.
- While executing tasks on the External Device, if you run PSTR the Teaching Pendant will display the message, "The same program is running." To prevent running two instances of PSTR, use PREG***.0 to check the task status, and then run PSTR.
- Write values and operations are as follows.
1. Run 1 cycle
 2. Run continuously
 3. 1 Step
 4. Not supported
 5. Retry (available when continue stopped)
- Other than above: Not supported (error will display.)
- *25 Before executing tasks, use the Teaching Pendant to change the External Device to Auto Mode.
- Write values and operations are as follows.
- 0: Stop (default)
 - 1: Pause
 - 2: Step stop
 3. Cycle stop
 - 4: Reset
 - 5: Continue stopped
- Other than above: Not supported (error will display.)
- *26 Adjust the timeout value to use this command. The External Device will not respond until the motor operation is complete.
- *27 Gets the program name (full path) string, minus the file name.
- *28 Gets the program name (full path) string, minus the folder name.
- *29 Using the Request to get control authority device
- Device address for the arm group number. Use the device address associated with the arm group you want to set up, and run a word-write operation to initialize its value.
- If another device has control authority, you cannot get access to the device.
- If a timeout occurs while the Display has control authority, you need to restart the External Device as the connection is terminated without control authority.

- *30 The address structure of Calculates destination coordinates TOOL coordinates is as follows.
The address where coordinates are stored depends on the DEVH100 and DEVH109 settings.

DEVH000

└── Element

Element	Register	Size	Attribute	Type
000	Command trigger	32	Write	Int 2:Read, 4:Clear
001-099	Reserved	32	Read/Write	
100	Pn1 argument setting	32	Read/Write	Int 0: Variable type, 1: Element
101	Variable number	32	Read/Write	Int
102	Pn1X	32	Read/Write	Float
103	Pn1Y	32	Read/Write	Float
104	Pn1Z	32	Read/Write	Float
105	Pn1RX	32	Read/Write	Float
106	Pn1RY	32	Read/Write	Float
107	Pn1RZ	32	Read/Write	Float
108	Pn1FIG	32	Read/Write	Int
109	Pn2 argument setting	32	Read/Write	Int 0: Variable type, 1: Element
110	Variable number	32	Read/Write	Int
111	Pn2X	32	Read/Write	Float
112	Pn2Y	32	Read/Write	Float
113	Pn2Z	32	Read/Write	Float
114	Pn2RX	32	Read/Write	Float
115	Pn2RY	32	Read/Write	Float
116	Pn2RZ	32	Read/Write	Float
117	Pn2FIG	32	Read/Write	Int
118-199	Reserved	32	Read/Write	
200	P type X element calculate result	32	Read/Write	Float
201	P type Y element calculate result	32	Read/Write	Float
202	P type Z element calculate result	32	Read/Write	Float
203	P type RX element calculate result	32	Read/Write	Float
204	P type RY element calculate result	32	Read/Write	Float
205	P type RZ element calculate result	32	Read/Write	Float
206	P type FIG element calculate result	32	Read/Write	Int
207-299	Reserved	32	Read/Write	

- *31 Before executing tasks, use the Teaching Pendant to change the External Device to Auto Mode.
- *32 Using Motion skip:
The device address shows the arm group number. Write the Motion skip algorithm setting to the same device address as the arm group you want to set up.

- *33 The address structure of Move specified coordinates is as follows.
 The address where coordinates are stored depends on the MOVE101 and MOVE104 settings.
 Adjust the timeout value to use this device. The External Device will not respond until the move operation is complete.

MOVE000

└── Element

Element	Register	Size	Attribute	Type
000	Command trigger	32	Write	Int 1:Write, 4:Clear
001-099	Reserved	32	Read/Write	
100	Interpolation	32	Read/Write	Int 1:MOVE P, 2:MOVE L
101	Pose 1 argument setting	32	Read/Write	Int 0: Variable type, 1: Element
102	Reserved	32	Read/Write	
103	Pass start displacement	32	Read/Write	Int 0: omitted, 1:@P, 2:@E, 3:@0
104	Variable type	32	Read/Write	Int 0: omitted, 1:P type, 2:T type, 3:J type
105	Pose 1 variable number	32	Read/Write	Int
106-107	Reserved	32	Read/Write	
108	NEXT option	32	Read/Write	Int 0:Not exist, 1:Exist
109	Pose 1 P type X element	32	Read/Write	Float
110	Pose 1 P type Y element	32	Read/Write	Float
111	Pose 1 P type Z element	32	Read/Write	Float
112	Pose 1 P type RX element	32	Read/Write	Float
113	Pose 1 P type RY element	32	Read/Write	Float
114	Pose 1 P type RZ element	32	Read/Write	Float
115	Pose 1 P type FIG element	32	Read/Write	Int
116	Pose 1 J type J1 element	32	Read/Write	Float
117	Pose 1 J type J2 element	32	Read/Write	Float
118	Pose 1 J type J3 element	32	Read/Write	Float
119	Pose 1 J type J4 element	32	Read/Write	Float
120	Pose 1 J type J5 element	32	Read/Write	Float
121	Pose 1 J type J6 element	32	Read/Write	Float
122	Pose 1 J type J7 element	32	Read/Write	Float
123	Pose 1 J type J8 element	32	Read/Write	Float
124	Pose 1 T type X element	32	Read/Write	Float
125	Pose 1 T type Y element	32	Read/Write	Float
126	Pose 1 T type Z element	32	Read/Write	Float
127	Pose 1 T type OX element	32	Read/Write	Float
128	Pose 1 T type OY element	32	Read/Write	Float
129	Pose 1 T type OZ element	32	Read/Write	Float
130	Pose 1 T type AX element	32	Read/Write	Float
131	Pose 1 T type AY element	32	Read/Write	Float
132	Pose 1 T type AZ element	32	Read/Write	Float
133	Pose 1 T type FIG element	32	Read/Write	Int
134-199	Reserved	32	Read/Write	

- *34 The address structure of Relative movement WORK coordinate is as follows.
 The address where coordinates are stored depends on the DRAW101 settings.
 Adjust the timeout value to use this device. The External Device will not respond until the move operation is complete.

DRAW000

└── Element

Element	Register	Size	Attribute	Type
000	Command trigger	32	Write	Int 1:Write, 4:Clear
001-099	Reserved	32	Read/Write	
100	Interpolation	32	Read/Write	Int 1:PTP motion, 2:CP motion
101	Argument setting	32	Read/Write	Int 0: Variable type, 1: Element
102	Pass start displacement	32	Read/Write	Int 0: omitted, 1:@P, 2:@E, 3:@0
103	Parallel movement distance	32	Read/Write	Int
104	V type X element	32	Read/Write	Float
105	V type Y element	32	Read/Write	Float
106	V type Z element	32	Read/Write	Float
107	NEXT option	32	Read/Write	Int 0:Not exist, 1:Exist
108-199	Reserved	32	Read/Write	

- *35 The address structure of Absolute motion each axis is as follows.
To set "Exist" for DRIVEEX109–DRIVEEX111, write values to the associated address in DRIVEEX113–115.
Adjust the timeout value to use this device. The External Device will not respond until the move operation is complete.

DRIVEEX000

└── Element

Element	Register	Size	Attribute	Type
000	Command trigger	32	Write	Int 1:Write, 4:Clear
001-099	Reserved	32	Read/Write	
100	Pass start displacement	32	Read/Write	Int 0: omitted, 1:@P, 2:@E, 3:@0
101	Axis 1 distance	32	Read/Write	Float
102	Axis 2 distance	32	Read/Write	Float
103	Axis 3 distance	32	Read/Write	Float
104	Axis 4 distance	32	Read/Write	Float
105	Axis 5 distance	32	Read/Write	Float
106	Axis 6 distance	32	Read/Write	Float
107	Axis 7 distance	32	Read/Write	Float
108	Axis 8 distance	32	Read/Write	Float
109	SPEED option	32	Read/Write	Int 0:Not exist, 1:Exist
110	ACCEL option	32	Read/Write	Int 0:Not exist, 1:Exist
111	DECEL option	32	Read/Write	Int 0:Not exist, 1:Exist
112	NEXT option	32	Read/Write	Int 0:Not exist, 1:Exist
113	SPEED	32	Read/Write	Float
114	ACCEL	32	Read/Write	Float
115	DECEL	32	Read/Write	Float
116-199	Reserved	32	Read/Write	

- *36 Using Select area interference check is performed and Initializes interference check:
Set the area number as the data, then run word write operation.
- *37 To refresh the task name, execute the task after setting up the task name in the PNAME device.
- *38 Using File read (FILEREAD), File write (FILEWRITE) and File list (FILELIST):
Set the control address number as the data, then run word write operation.
You can define the control address as USR memory only. (USR00000...USR29000)
- *39 In automatic mode, External Device operation will stop when you run a write program file operation. Check whether the CREG0 (Operation mode) device is writable, and design the system to prevent unintentional file writes.

*40 The VARLEN device address structure is as follows.

VARLENO
└── Element

Element	Size	Attribute	Type
0	32	Read	Number of Variable I
1	32	Read	Number of Variable F
2	32	Read	Number of Variable V
3	32	Read	Number of Variable J
4	32	Read	Number of Variable P
5	32	Read	Number of Variable T
6	32	Read	Number of Variable S
7	32	Read	Number of Variable IO

*41 The robot name device address structure is as follows. If more than 256 characters are stored, the Display shows up to the 256th character.

RBTNAME0
└── Element

Element	Size	Attribute	Number of Word	Type
0	16	Read	128	String Robot model

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"

■ Settings for File Reading Device, File Writing Device and File List Device

Read and write files by setting the operating status on the control address.

You can use the USR area only as the control address.

You can run operations on the following file types.

- PacScript source (*.PCS)
- PacScript header (*.H)
- Operation panel source (*.PNS)

- File reading

Reads the specified file to the Display from the External Device.

The file is saved to an internal device or external storage.

To run the read operation, write the control address' start address to the FILEREAD device.

Address	Items	Description
+0000	Status	0: Initial value, 1: Execute, 16: In progress, 256: Complete (No error), 4096: Error After setting the required parameter, set the status to 1 (Execute), then write the control address' start address to the FILEREAD device. The operation will not run if the status is any other value than 1.
+0001	Line number	The number of rows to read in the file. After receive is complete, the protocol is updated.
+0003	File type	1: Text file
+0004	Start address	Specify the destination USR area address. The text string that is read-in is stored according to the text string mode settings. This is used for saving to internal devices.
+0005	Start line	Specify the starting row number (0..4999) of the file to read into the Display's internal memory. In the file, CRLF indicates a row separator. If you specify a row that does not exist, loads "0x00". This is used for saving as text data to internal devices.
+0006	Number of character	Specify the maximum number of single-byte characters per row. When the number of characters is less than the maximum, the character "0x00" is loaded, up to the maximum number of characters. Characters that exceed the maximum number of characters are dropped. This is used for saving as text data to internal devices.
+0007	Output line number	Specify the row number (0...5000) of the file to read into the Display's internal memory. If you specify a row that does not exist, loads "0x00". This is used for saving as text data to internal devices.
+0008 - +0263	File name	Using up to 256 single-byte characters, specify the file name (including the extension) to read into the Display's internal memory. When the file name is less than 256 characters, the remaining characters are populated with "0x00". You can also use this for defining the file name when saving to external storage.
+0264 - +0519	Controller folder name	Specify the folder name of the External Device with up to 256 single-byte characters. When the folder name is less than 256 characters, the remaining characters are populated with "0x00". Enter backslash "\" as the last character in the folder name.

Address	Items	Description
+0520 -	Storage folder name	Specify the destination path name on external storage (CF card/SD card/USB memory) with up to 256 single-byte characters. Enter backslash "\" as the last character in the folder name. Enter "0x00" at the end of a text string. CF card default route path: "\CFA00\ SD card default route path: "\SD\ USB memory default route path: "\USBHD\00\ This is used for saving to external storage.

- File writing

Writes the specified file to the External Device from the Display.

The write file is saved to external storage.

To run the write operation, write the control address' start address to the FILEWRITE device.

Address	Items	Description
+0000	Status	0: Initial value, 1: Execute, 16: In progress, 256: Complete (No error), 4096: Error After setting the required parameter, set the status to 1 (Execute), then write the control address' start address to the FILEWRITE device. The operation will not run if the status is any other value than 1.
+0001 - +0256	File name	Using up to 256 single-byte characters, specify the file name (including the extension) to read into the Display's internal memory. When the file name is less than 256 characters, the remaining characters are populated with "0x00". You can also use this for defining the file name when saving to external storage.
+0257 - +0512	Controller folder name	Specify the folder name of the External Device with up to 256 single-byte characters. When the folder name is less than 256 characters, the remaining characters are populated with "0x00". Enter backslash "\" as the last character in the folder name.
+0513 -	Storage folder name	Specify the destination path name on external storage (CF card/SD card/USB memory) with up to 256 single-byte characters. Enter backslash "\" as the last character in the folder name. Enter "0x00" at the end of a text string. CF card default route path: "\CFA00\ SD card default route path: "\SD\ USB memory default route path: "\USBHD\00\

- File list

Outputs the list of files stored on the External Device.

The output list is saved to the specified address.

To run the output operation, write the control address' start address to the FILELIST device.

Address	Items	Description
+0000	Status	0: Initial value, 1: Execute, 16: In progress, 256: Complete (No error), 4096: Error After setting the required parameter, set the status to 1 (Execute), then write the control address' start address to the FILELIST device. The operation will not run if the status is any other value than 1.
+0001	Number of list	The number of files for each file type.
+0002	File type	0: *.* 1:*.PCS PacScript source 2: *.H PacScript header 4: *.PNS Operation panel source
+0003	Start address	Specify the destination USR area address.
+0004	Start line	Specify the starting row number (0..4999) of the output file list. If you specify a row that does not exist, outputs "0x00".
+0005	Number of character	Specify the maximum number (even number) of single-byte characters in the file name. When the file name is less than the maximum, the remaining characters are populated with "0x00". Characters that exceed the maximum number of characters are dropped.
+0006	Number of output	Specifies the number of files to output to the file list in 0 to 5000. If you specify a row that does not exist, outputs "0x00".
+0007 -	Controller folder name	Specify the folder name of the External Device with up to 256 single-byte characters. Enter backslash "\" as the last character in the folder name. Enter "0x00" as the last character in the text string.

6 Device Code and Address Code

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

6.1 RC7M Series

Device	Device Name	Device Code (HEX)	Address Code
Variable I	I	0060	Word address
Variable F	F	0061	Word address
Variable V	V	0000	Word address x 3
Variable P	P	0001	Word address x 7
Variable J	J	0002	Word address x 6
Variable T	T	0003	Word address x 10
Variable S	S	0062	Word address x 128 ^{*1}
Variable IO	IO	00E0	Word address
TOOL settings	TOOL	0005	Word address x 6
WORK settings	WORK	0006	Word address x 6
AREA settings	AREA	0007	Word address x 13
Using condition parameter	SPDCNF	0068	Word address
Special register 1 Controller	CREG	0080	Word address
Error code	CODE	006B	Word address
Error message	ERR	006C	Word address x 64 ^{*2}
Version string	VER	006D	Word address x 64 ^{*2}
Auto mode	AUTO	006E	Word address
Error clear	ERRCLR	006F	Word address
Number of programs	PMAX	0070	Word address
Program name	PNAME	0071	(Word address - 1) x 128 ^{*1}
Current robot position	CPOS	0072	Word address x 7
Current robot position (each axis value)	CANG	0073	Word address x 8
Current robot position expressed (T type)	CTRN	0074	Word address x 10
Special register 2 Robot	RREG	0075	Word address x 10
Change the Tool coordinates	TOOLN	0076	Word address
Change the Work coordinates	WORKN	0077	Word address
Special register 3 Program	PREG	0078	Word address x 4

Device	Device Name	Device Code (HEX)	Address Code
Program start	PSTR	0079	Word address - 1
Program stop	PSTP	007A	Word address - 1
Motor ON/OFF	MTON	007B	Word address
Directory name	PMAMED	007D	(Word address - 1) x 128 ^{*1}
File name	PNAMEN	007E	(Word address - 1) x 128 ^{*1}

*1 When the External Device returns more than 256 bytes of text data, the Display stores 256 bytes of text.

*2 When the External Device returns more than 128 bytes of text data, the Display stores 128 bytes of text.

6.2 RC8 Series

Device	Device Name	Device Code (HEX)	Address Code
Variable I	I	0060	Word address
Variable F	F	0061	Word address
Variable V	V	0000	Word address x 3
Variable P	P	0001	Word address x 7
Variable J	J	0002	Word address x 8
Variable T	T	0003	Word address x 10
Variable S	S	0062	Word address x 128 *1
Variable IO	IO	00E0	Word address
TOOL settings	TOOL	0005	Word address x 6
WORK settings	WORK	0006	Word address x 7
AREA settings	AREA	0007	Word address x 34
Special register 1 Controller	CREG	0080	Word address
Error code	CODE	006B	Word address
Error message	ERR	006C	Word address x 64 *2
Version string	VER	006D	Word address x 64 *2
Error clear	ERRCLR	006F	Word address
Number of programs	PMAX	0070	Word address
Program name	PNAME	0071	(Word address - 1) x 128 *1
Current robot position	CPOS	0072	Word address x 7
Current robot position (each axis value)	CANG	0073	Word address x 8
Current robot position expressed (T type)	CTRN	0074	Word address x 10
Special register 2 Robot	RREG	0075	Word address x 11
Change the Tool coordinates	TOOLN	0076	Word address
Change the Work coordinates	WORKN	0077	Word address
Special register 3 Program	PREG	0078	(Word address - 1) x 6
Program start	PSTR	0079	Word address - 1
Program stop	PSTP	007A	Word address - 1
Motor ON/OFF	MTON	007B	Word address
Directory name	PNAMED	007D	(Word address - 1) x 128 *1
File name	PNAMEN	007E	(Word address - 1) x 128 *1
Request to get control authority	TAKEARM	0090	Word address

Device	Device Name	Device Code (HEX)	Address Code
Calculates destination coordinates TOOL coordinates	DEVH	0091	Word address
Motion skip	MSKIP	00AE	Word address
Move specified coordinates	MOVE	0092	Word address
Relative movement WORK coordinate	DRAW	0093	Word address
Absolute motion each axis	DRIVEEX	0094	Word address
Select area interference check is performed	SETAREA	0095	Word address
Initializes interference check	RSTAREA	0096	Word address
File read	FILEREAD	0099	Word address
File write	FILEWRITE	009A	Word address
File list	FILELIST	009B	Word address
VARLEN	VARLEN	00AF	Word address
RBTNAME	RBTNAME	00B7	Word address ^{*1}

*1 When the External Device returns more than 256 bytes of text data, the Display stores 256 bytes of text.

*2 When the External Device returns more than 128 bytes of text data, the Display stores 128 bytes of text.

7 Error Messages

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

Item	Description
No.	Error No.
Device Name	Name of External Device where error occurs. Device name is a title of 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 External Device where error occurs, or error codes received from External Device. <div style="border: 1px solid black; padding: 2px; margin: 5px 0;">NOTE</div> <ul style="list-style-type: none"> 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: 4 [04H])"

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.

■ Error Messages Unique to External Device

Message ID	Error Message	Description
RHxx128	(Node Name): Error has been responded for initial communication command(Error Code: [0x80004001] Not implement(Robot Controller))	Check the External Device type and version.
RHxx129	(Node Name): Error has been responded for initial communication command (Error Code: [0x80004004] Function abort(Robot Controller))	Check the External Device program.
RHxx130	(Node Name): Error has been responded for initial communication command(Error Code: [0x80004005] Function fail(Robot Controller))	Check the External Device program.
RHxx131	(Node Name): Error has been responded for initial communication command(Error Code: [0x8000FFFF] Fatal error(Robot Controller))	Check the External Device program.

Message ID	Error Message	Description
RHxx132	(Node Name): Error has been responded for initial communication command(Error Code: [0x800100001] Invalid receive packet(Robot Controller))	The External Device received a packet with invalid data. When this error occurs, the External Device automatically breaks the connection. Confirm the content of packets sent to the External Device.
RHxx133	(Node Name): Error has been responded for initial communication command(Error Code: [0x800100002] Invalid send packet(Robot Controller))	Please contact the Digital Customer Center.
RHxx134	(Node Name): Error has been responded for initial communication command(Error Code: [0x800100003] Invalid argument type(Robot Controller))	Please contact the Digital Customer Center.
RHxx135	(Node Name): Error has been responded for initial communication command(Error Code: [0x800100004] Robot is busy(Robot Controller))	Check the operation end and run the PSTR.
RHxx136	(Node Name): Error has been responded for initial communication command(Error Code: [0x800100005] Invalid command(Robot Controller))	Please contact the Digital Customer Center.
RHxx137	(Node Name): Error has been responded for initial communication command(Error Code: [0x800100011] Packet size over(Robot Controller))	Please contact the Digital Customer Center.
RHxx138	(Node Name): Error has been responded for initial communication command(Error Code: [0x80010012] Argument size over(Robot Controller))	Please contact the Digital Customer Center.
RHxx139	(Node Name): Error has been responded for initial communication command(Error Code: [0x80070005] Access denied(Robot Controller))	When occurs in PSTR, the Display's IP address is not registered in the controller's startup authority IP.
RHxx140	(Node Name): Error has been responded for initial communication command(Error Code: [0x80070006] Illegal handle(Robot Controller))	Address may be outside the supported address range. Check the device address.
RHxx141	(Node Name): Error has been responded for initial communication command(Error Code: [0x8007000E] Out of memory(Robot Controller))	Insufficient memory in RC7M.
RHxx142	(Node Name): Error has been responded for initial communication command(Error Code: [0x80070057] Invalid argument(Robot Controller))	Data written to a write disabled address.
RHxx143	(Node Name): Error has been responded for initial communication command(Error Code: [0x????????] Unknown Error(Robot Controller))	Unknown error. ([0x????????] is undefined)
RHxx144	(Node Name): Shutdown...(Code: [0x0])	REBOOT device has been run.

Message ID	Error Message	Description
RHxx145	(Node Name): It was not possible to execute it by out of range data	Out of range data was written to DEVH, MOVE, DRAW, DRIVEEX devices.
RHxx146	(Node Name): Error has been responded for device read command(Error Code: [0x80004001] Not implement(Robot Controller))	Check the External Device type and version.
RHxx147	(Node Name): Error has been responded for device read command(Error Code: [0x80004004] Function abort(Robot Controller))	Check the External Device program.
RHxx148	(Node Name): Error has been responded for device read command(Error Code: [0x80004005] Function fail(Robot Controller))	Check the External Device program.
RHxx149	(Node Name): Error has been responded for device read command(Error Code: [0x8000FFFF] Fatal error(Robot Controller))	Check the External Device program.
RHxx150	(Node Name): Error has been responded for device read command(Error Code: [0x800100001] Invalid receive packet(Robot Controller))	The External Device received a packet with invalid data. When this error occurs, the External Device automatically breaks the connection. Confirm the content of packets sent to the External Device.
RHxx151	(Node Name): Error has been responded for device read command(Error Code: [0x800100002] Invalid send packet(Robot Controller))	Please contact the Digital Customer Center.
RHxx152	(Node Name): Error has been responded for device read command(Error Code: [0x800100003] Invalid argument type(Robot Controller))	Please contact the Digital Customer Center.
RHxx153	(Node Name): Error has been responded for device read command(Error Code: [0x800100004] Robot is busy(Robot Controller))	Confirm the operation has ended, then run PSTR.
RHxx154	(Node Name): Error has been responded for device read command(Error Code: [0x800100005] Invalid command(Robot Controller))	Please contact the Digital Customer Center.
RHxx155	(Node Name): Error has been responded for device read command(Error Code: [0x800100011] Packet size over(Robot Controller))	Please contact the Digital Customer Center.
RHxx156	(Node Name): Error has been responded for device read command(Error Code: [0x80010012] Argument size over(Robot Controller))	Please contact the Digital Customer Center.
RHxx157	(Node Name): Error has been responded for device read command(Error Code: [0x80070005] Access denied(Robot Controller))	When occurs in PSTR, the Display's IP address is not registered in the controller's startup authority IP.

Message ID	Error Message	Description
RHxx158	(Node Name): Error has been responded for device read command(Error Code: [0x80070006] Illegal handle(Robot Controller))	Address may be outside the supported address range. Check the device address.
RHxx159	(Node Name): Error has been responded for device read command(Error Code: [0x8007000E] Out of memory(Robot Controller))	Insufficient memory in RC7M.
RHxx160	(Node Name): Error has been responded for device read command(Error Code: [0x80070057] Invalid argument(Robot Controller))	Data written to a write disabled address.
RHxx161	(Node Name): Error has been responded for device read command(Error Code: [0x????????] Unknown Error(Robot Controller))	Unknown error. ([0x????????] is undefined)
RHxx162	(Node Name): Error has been responded for device write command(Error Code: [0x80004001] Not implement(Robot Controller))	Check the External Device type and version.
RHxx163	(Node Name): Error has been responded for device write command(Error Code: [0x80004004] Function abort(Robot Controller))	Check the External Device program.
RHxx164	(Node Name): Error has been responded for device write command(Error Code: [0x80004005] Function fail(Robot Controller))	Check the External Device program.
RHxx165	(Node Name): Error has been responded for device write command(Error Code: [0x8000FFFF] Fatal error(Robot Controller))	Check the External Device program.
RHxx166	(Node Name): Error has been responded for device write command(Error Code: [0x800100001] Invalid receive packet(Robot Controller))	The External Device received a packet with invalid data. When this error occurs, the External Device automatically breaks the connection. Confirm the content of packets sent to the External Device.
RHxx167	(Node Name): Error has been responded for device write command(Error Code: [0x800100002] Invalid send packet(Robot Controller))	Please contact the Digital Customer Center.
RHxx168	(Node Name): Error has been responded for device write command(Error Code: [0x800100003] Invalid argument type(Robot Controller))	Please contact the Digital Customer Center.
RHxx169	(Node Name): Error has been responded for device write command(Error Code: [0x800100004] Robot is busy(Robot Controller))	Confirm the operation has ended, then run PSTR.

Message ID	Error Message	Description
RHxx170	(Node Name): Error has been responded for device write command(Error Code: [0x800100005] Invalid command(Robot Controller))	Please contact the Digital Customer Center.
RHxx171	(Node Name): Error has been responded for device write command(Error Code: [0x800100011] Packet size over(Robot Controller))	Please contact the Digital Customer Center.
RHxx172	(Node Name): Error has been responded for device write command(Error Code: [0x80010012] Argument size over(Robot Controller))	Please contact the Digital Customer Center.
RHxx173	(Node Name): Error has been responded for device write command(Error Code: [0x80070005] Access denied(Robot Controller))	When occurs in PSTR, the Display's IP address is not registered in the controller's startup authority IP.
RHxx174	(Node Name): Error has been responded for device write command(Error Code: [0x80070006] Illegal handle(Robot Controller))	Address may be outside the supported address range. Check the device address.
RHxx175	(Node Name): Error has been responded for device write command(Error Code: [0x8007000E] Out of memory(Robot Controller))	Insufficient memory in RC7M.
RHxx176	(Node Name): Error has been responded for device write command(Error Code: [0x80070057] Invalid argument(Robot Controller))	Data written to write disabled address.
RHxx177	(Node Name): Error has been responded for device write command(Error Code: [0x????????] Unknown Error(Robot Controller))	Unknown error. ([0x????????] is undefined)