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# Device/PLC Connection Manuals



## About the Device/PLC Connection Manuals

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

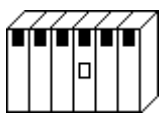



# Hitachi Ltd. PLC - 1:1

## 1 System Structure

The following describes the system structure for connecting the GP to Hitachi Ltd. PLCs.

**Reference** *The Cable Diagrams mentioned in the following tables are listed in the section titled "2.5.2 Cable Diagrams".*

### ■ HIDIC-S10α Series (using Link I/F)

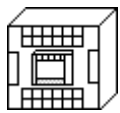

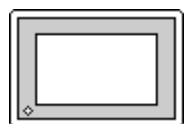
CPU	Link I/F	Cable Diagram	GP/GLC
	 Upper Link Module		
2a (LWP000) <sup>*1</sup> 2a E(LWP040) <sup>*1</sup> 2a H(LWP070) <sup>*1</sup>	CPU unit Link I/F	RS-422 (Hitachi H-7338 type; Cable Diagram 1)	GP/GLC Series
4a , 4aF	LWE805		

\* 1 Connect to the CPU Module's HOST LINK COMPUTER LINK Input/Output Terminal (Upper Calculation I/F).

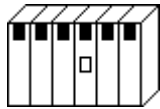
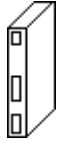


### ■ S10 mini Series (using Link I/F)

CPU	Link I/F	Cable Diagram	GP/GLC
Model S (LQP000)	LQE060	RS-232C	GP/GLC Series
Model H (LQP010)	LQE160	<Cable Diagram 3>	
Model F (LQP011)	LQE165	RS-244C	
Model D (LQP120)		<Cable Diagram 4>	
Model L (LQP800)			

### ■ HIZAC EC Series (CPU Direct Connection)

CPU	Cable Diagram	GP/GLC
		
EC-40HR	RS-232C <Cable Diagram 2>	GP/GLC Series

■ S10V Series

CPU	Link I/F	Cable Diagram	GP/GLC
			
LQP510 <sup>*1</sup>	UP LINK Connector on LPU Module	RS-422 <Cable Diagram 5>	GP/GLC Series
	LOE560 (CN1, CN2)	RS-232C <Cable Diagram 6>	
	LOE565 (CN1, CN2)	RS-422 <Cable Diagram 5>	

*\*1 To transfer data to/from the GP/GLC, LPU Module revision C or later is required. To identify your LPU unit's revision number, see the alphabet at the right end of the bar code seal (located on the LPU unit's top section).*

## 2 Cable Diagrams

The cable diagrams illustrated below and the cable diagrams recommended by Hitachi Ltd. may differ; however, using these cables for your PLC operations will not cause any problems.



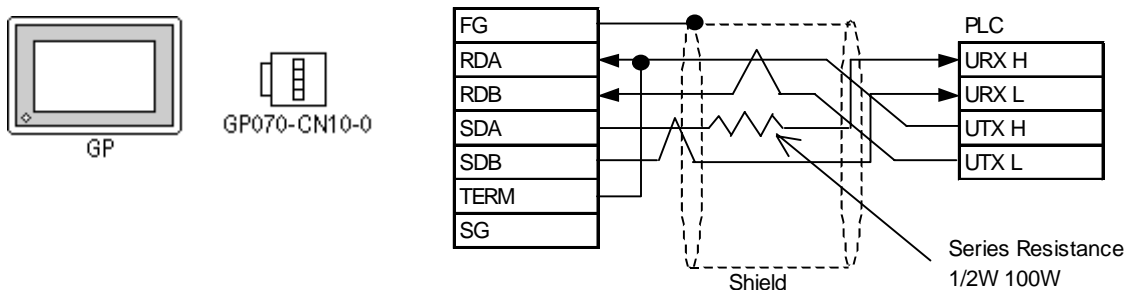
Ground your PLC's FG terminal according to your country's applicable standard. For details, refer to the corresponding PLC manual.



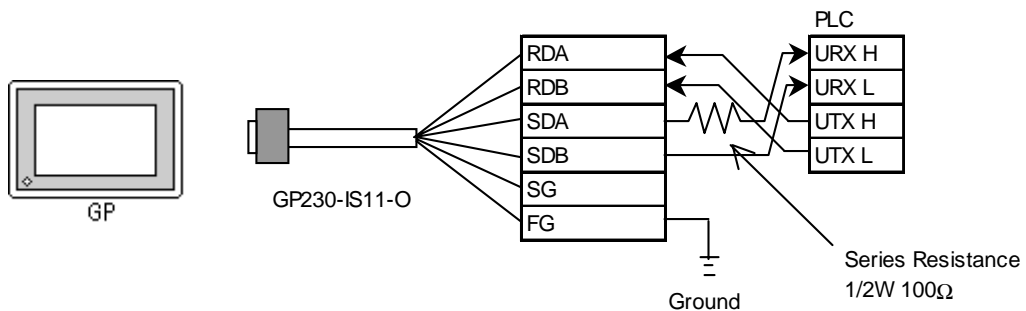
- **Connect the FG line of the Shield cable to either the GP or PLC, depending on your environment. When using a connector hood and grounding the FG line, be sure to use an electrical conductor. The following connection diagrams show examples for connecting a shielded cable to the PLC.**
- **For the RS-232C connection, use a cable length less than 15m.**
- **If a communications cable is used, it must be connected to the SG (signal ground).**
- **For the RS-422 connection, refer to Hitachi's PLC manual for the cable length.**

### Cable Diagram 1 (RS-422)

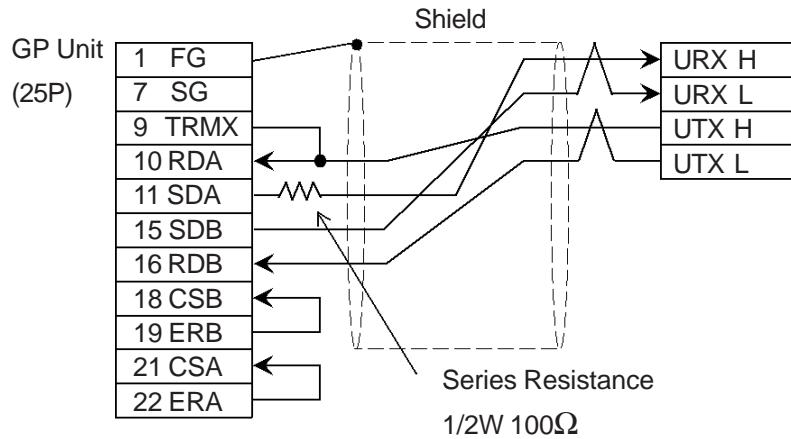
- When using Digital's RS-422 connector terminal adapter GP070-CN10-0



- When using Digital's RS-422 Cable, GP230-IS11-0



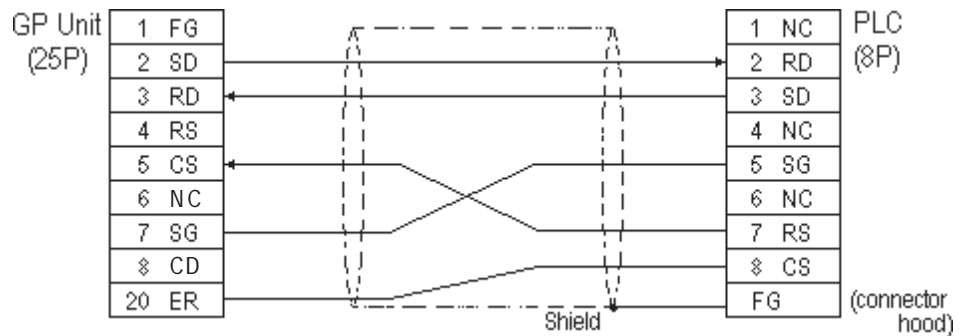
- When making your own cable connections



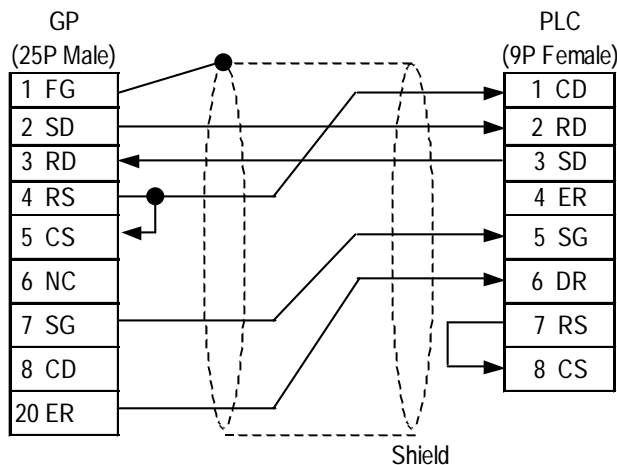
**Note:**

- When making your own connections, we recommend using Hitachi Densen's KPEV-SB-3P0.5mm<sup>2</sup> cable.
- When connecting the #9 and #10 pins in the GP Serial I/F, a termination resistance of 100Ω is added between RDA and RDB.

### Cable Diagram 2 (RS-232C)

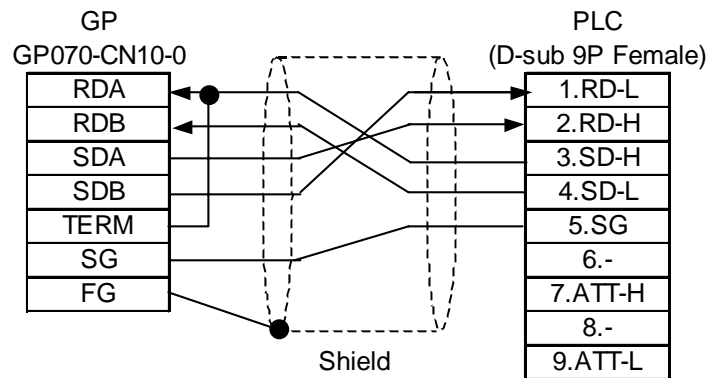


### Cable Diagram 3 (RS-232C)

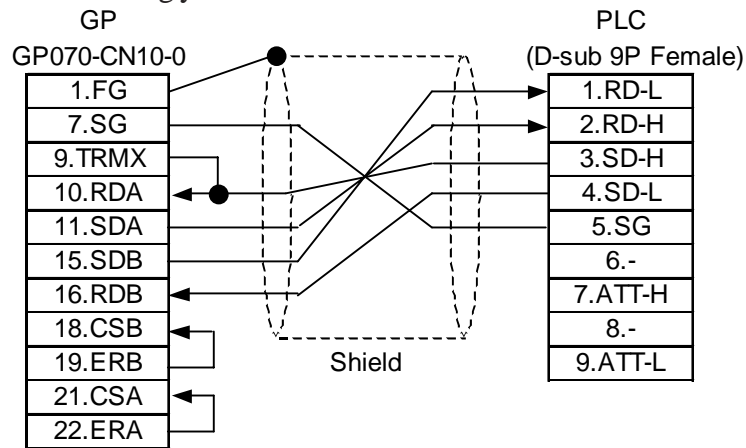


**Cable Diagram 4 (RS-422, 4-wire)**

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

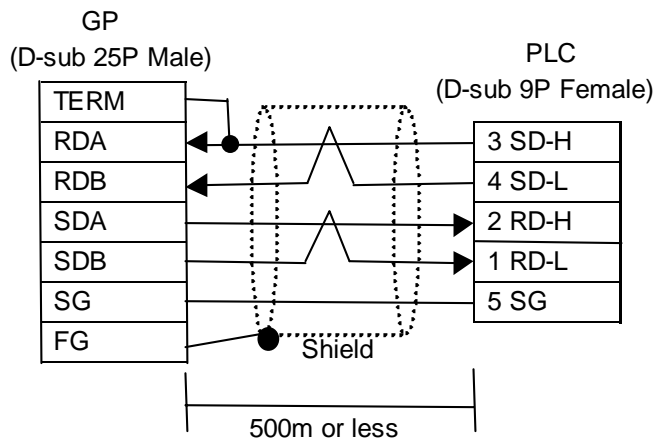


- When making your own cable connections



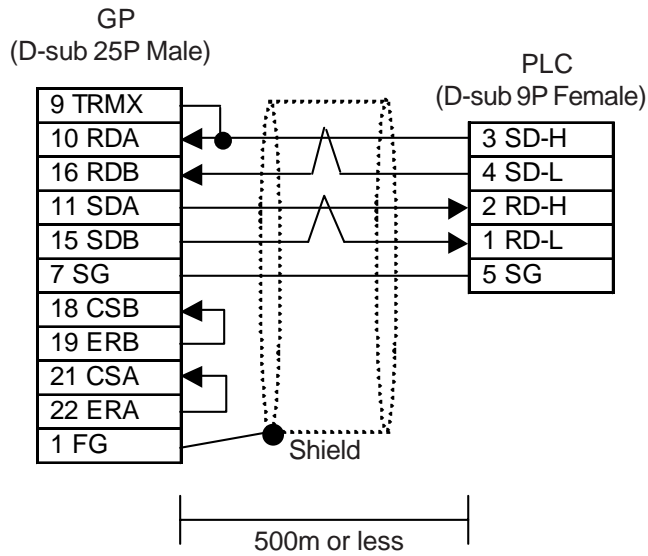
**Cable Diagram 5 (RS-422, 4-wire)**

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



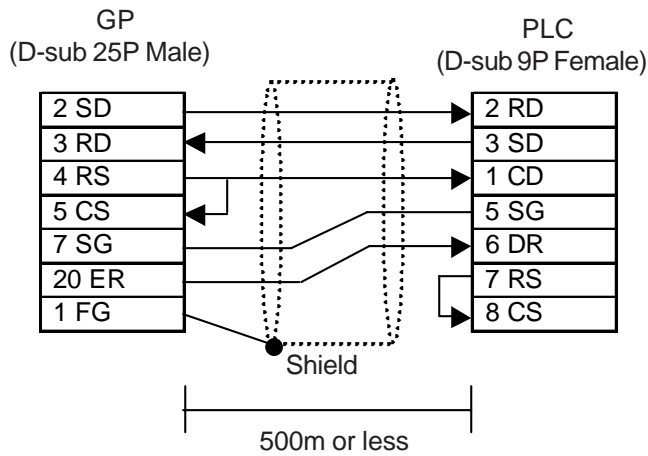
**Note:** A termination resistance of 100Ω (between RD-H and RD-L) is built into both the LPU module and LQE565 on the PLC unit.

- When making your own cable connections



**Note:** A termination resistance of 100Ω (between RD-H and RD-L) is built into both the LPU module and LQE565 on the PLC unit.

**Cable Diagram 6 (RS-232C)**




















### 3 Supported Devices

The following describes the range of devices supported by the GP.

#### ■ HIDIC S10α Series

 Setup System Area here.

Device	Bit Address	Word Address	Particulars	
Input Relay	X000 ~ XFFF	XW000 ~ XWFFF		H/L
Output Relay	Y000 ~ YFFF	YW000 ~ YWFFF		
Internal Relay	R000 ~ RFFF	RW000 ~ RWFFF		
Global Link	G000 ~ GFFF	GW000 ~ GWFFF		
System Register	S000 ~ SBFF	SW000 ~ SWBFF		
E Word	EW400 ~ EWFFF	EW400 ~ EWFFF		
Event	E000 ~ E0FF	EW000 ~ EW0FF		
Keep Relay	K000 ~ KFFF	KW000 ~ KWFFF		
On-Delay Timer	T000 ~ T1FF	TW000 ~ TW1FF		
One Shot Timer	U000 ~ U0FF	UW000 ~ UW0FF		
Up/Down Counter	C000 ~ C0FF	CW000 ~ CW0FF		
Transfer Register	J000 ~ JFFF	JW000 ~ JWFFF		
Receive Register	Q000 ~ QFFF	QW000 ~ QWFFF		
Extended Internal Register	M000 ~ MFFF	MW000 ~ MWFFF		
On-Delay Timer (Elapsed Value)	---	TC000 ~ TC1FF		L/H
On-Delay Timer (Setup Value)	---	TS000 ~ TS1FF		
One Shot Timer (Elapsed Value)	---	UC000 ~ UC0FF		
One Shot Timer (Setup Value)	---	US000 ~ US0FF		
Up/Down Counter (Elapsed Value)	---	CC000 ~ CC0FF		
Up/Down Counter (Setup Value)	---	CS000 ~ CS0FF		
Data Register	---	DW000 ~ DWFFF		H/L
Work Register	---	FW000 ~ FWBFF		
Extended Register	---	MS000 ~ MSFFF Address on GP-PRO/PBIII		

\* 1 Cannot perform data write.


















\* 2 Point of Contact.

\* 3 Access is possible for 4K words of Extended Memory (8 bits per address). The top address of the Extended Memory to be accessed is set in the [SET UP OPERATION SURROUNDINGS] area of the INITIALIZE menu. (Refer to "Extended Memory Top Address Setup.") Be sure to set the address(es) accessed by the GP within the limits of the PLC's specified Extended Memory address area. For PLC Extended Memory address setting procedures, refer to the PLC maker's manual.



## ■ S10 mini Series

 Setup System Area here.

Device	Bit Address	Word Address	Remarks
External Input	X000 - XFFF	XW000 - XWFF0	 *1 *3
External Output	Y000 - YFFF	YW000 - YWFF0	 *1
Internal Register	R000 - RFFF	RW000 - RWFF0	 *1
Global Link Register	G000 - GFFF	GW000 - GWFF0	 *1
Event Register	E000 - E0FF	EW000 - EW0F0	 *1
Event Register	———	EW400 - EWFF0	 *1 *2 *5 *6
Keep Relay	K000 - KFFF	KW000 - KWFF0	 *1
System Register	S000 - SBFF	SW000 - SWBF0	 *1 *3
On-Delay Timer	T000 - T1FF	TW000 - TW1F0	 *1
One Shot Timer	U000 - U0FF	UW000 - UW0F0	 *1
Up/Down Counter	C000 - C0FF	CW000 - CW0F0	 *1
Transfer Register	J000 - JFFF	JW000 - JWFF0	 *1
Receive Register	Q000 - QFFF	QW000 - QWFF0	 *1
Extended Internal Register	M000 - MFFF	MW000 - MWFF0	 *1
On-Delay Timer (Current Value)	———	TC000 - TC1FF	
On-Delay Timer (Setup Value)	———	TS000 - TS1FF	
One Shot Timer (Current Value)	———	UC000 - UC0FF	
One Shot Timer (Setup Value)	———	US000 - US0FF	
Up/Down Counter (Current Value)	———	CC000 - CC0FF	
Up/Down Counter (Setup Value)	———	CS000 - CS0FF	
Work Register	———	FW000 - FWBFF	
Data Register	———	DW000 - DWFFF	
Extended Register	———	MS000 - MSFFF	 *4

\*1 Because of the PLC specifications, the highest bit has been designated as 0 and the lowest bit as 15. Therefore, when Bit 0 turns ON, “32768” will be written to the top Word.

\*2 The higher and lower bit order will be reversed. When EW400 is turned ON, E40F will be turned ON on the PLC.

\*3 Data cannot be written.

\*4 In expansion memory (1 address = 8 bits), 4K Words can be accessed. Designate the top address of the expansion memory to be accessed, via [Default Settings] - [Set Up Operation Surroundings] (see the following page). The GP's access address will then be designated within the range of expansion memory address range set up in the PLC. For the detailed information about how to set up the PLC's expansion memory address range, refer to that PLC's manual.



Depending on your CPU, the usable device type and range may differ. Before using only a CPU, refer to your CPU User Manual.

## Cautions when using HIDIC S10α and S10 mini

### ◆ Accessed Extended Memory Address

Access Address = Top Address + Device Address set by GP-PRO/PBIII for Windows

E.g. When the Top Address = 180000 and the Device Address is MS 1FF:

$$180000 + \underline{3FE} = 1803FE$$

Since the PLC uses 8 bits for its extended memory addresses, this number is doubled.

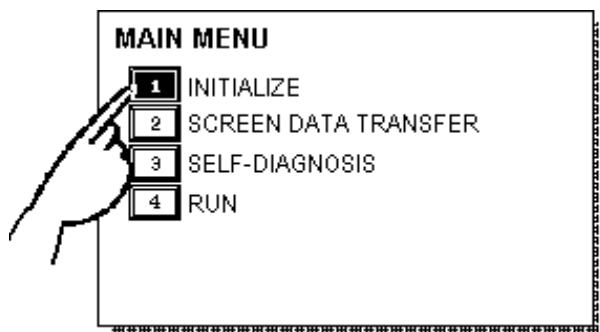
### ◆ Extended Memory Top Address Setup

Specify the extended memory address at the initial setup when the GP is in the OFFLINE mode.

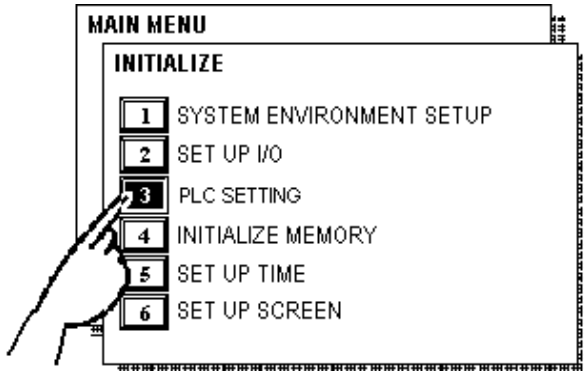
**Reference** *OFFLINE mode* → Refer to → *User's Manuals (sold separately), Chapter 4 "OFFLINE Mode"*



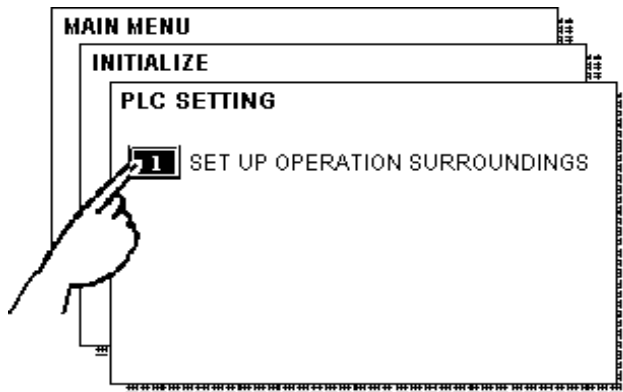
- For the input range (values) 0HEX to FE00HEX, be sure to add the offset value (10000HEX) to the range values to create the actual address setting. If, however, the GP does not access Extended Memory, these addresses do not need to be set.
- If the GP uses tags or parts to access the PLC's program area, errors in either the PLC or the GP may occur. Therefore, it is recommended that the [Extended Memory Addresses] in an area not used by the PLC.



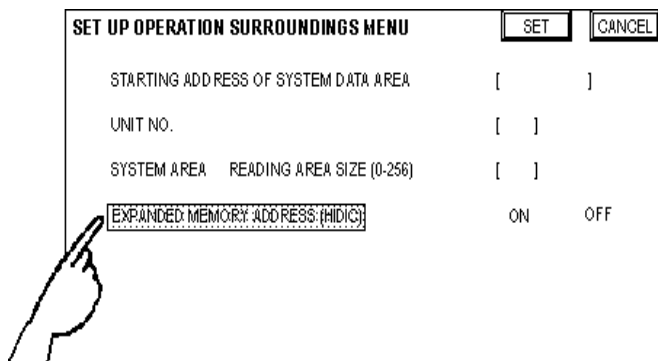
- ① Touch item #1, INITIALIZE. The INITIALIZE menu will appear.



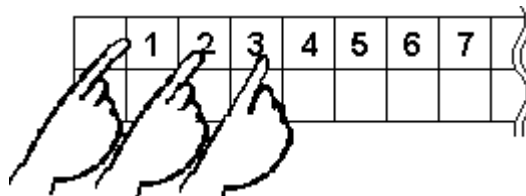
② Touch item #3, PLC SETTING. The PLC SETTING menu will appear.



③ Touch item #1, SET UP OPERATION SURROUNDINGS. The SET UP OPERATION SURROUNDINGS menu will appear.



④ Touch the “EXPANDED MEMORY ADDRESS (HIDIC)” selection. The selected item is highlighted.







⑤ Use the Touch Keys at the bottom of the screens to enter the desired value.

<Example> When setting the value of 180000, enter [80000].

## ■ HIZAC EC Series

 Setup System Area here.

Device	Bit Address	Word Address	Vertical Address	Particulars
External Input	X000 - X015	WX000 - WX014	VX000	 *1 *3 (Only for Vertical Address)
	X020 - X035	WX020 - WX034	VX020	
	X040 - X055	WX040 - WX054	VX040	
	X060 - X075	WX060 - WX074	VX060	
	X080 - X095	WX080 - WX094	VX080	
	X100 - X115	WX100 - WX114	VX100	
	X120 - X135	WX120 - WX134	VX120	
	X140 - X155	WX140 - WX154	VX140	
	X160 - X175	WX160 - WX174	VX160	
	X180 - X195	WX180 - WX194	VY180	
External Output	Y200 - Y215	WY200 - WY214	VY200	 *2 *3 (Only for Vertical Address)
	Y220 - Y235	WY220 - WY234	VY220	
	Y240 - Y255	WY240 - WY254	VY240	
	Y260 - Y275	WY260 - WY274	VY260	
	Y280 - Y295	WY280 - WY294	VY280	
	Y300 - Y315	WY300 - WY314	VY300	
	Y320 - Y335	WY320 - WY334	VY320	
	Y340 - Y355	WY340 - WY354	VY340	
	Y360 - Y375	WY360 - WY374	VY360	
	Y380 - Y395	WY380 - WY394	VY380	
Internal Output	M400 - M655	WM400 - WM654	VM400 - VM640	  (Only for Vertical Address)
	M700 - M955	WM700 - WM954	VM700 - VM940	
	M960 - M991	WM960 - WM990	VM960 - VM976	
Timer/Counter (contact, or coil)	TC000 - TC095	---	---	
Timer/Counter (elapsed time)	---	TC100 - TC195	---	
Timer/Counter (setup value)	---	TC200 - TC295	---	*4

\*1 Due to the hardware structure, I/O numbers without the external terminals are OFF during RUN mode.

\*2 Due to the hardware structure, the I/O numbers without the external terminals will have the same feature as the Internal Output (M).

\*3 When writing word data, more than two consecutive word addresses cannot be written.

\*4 Even if you change a value using a T/W/K-tag in the middle of running the PLC, restarting the PLC initializes using the values setup in the ladder program.



**A maximum of 108 words from WM400, WM700 can be used as the Read Area. However, Word Addresses from EM960 cannot be used as the Read Area. If any address from EM960 is used as the Read Area, the "PLC COM. ERROR(02:FA)" message will appear.**



- **Bit Address**

A bit address (1 point) uses the data area of one byte. The bit address turns the highest bit (b7) on/off in the corresponding data area.

<b>M400</b>	b7	b6	b5	b4	b3	b2	b1	b0
<b>M401</b>	b7	b6	b5	b4	b3	b2	b1	b0

- **Word Address**

Word address uses the data area of 2 bytes. For example, selecting M400 causes the setup of the next address, M401, as well.

<b>M400</b>	b15	b14	b13	b12	b11	b10	b9	b8
<b>M401</b>	b7	b6	b5	b4	b3	b2	b1	b0

- **Vertical Address**

Uses the highest bit (b7) of 16 consecutive addresses to form word data.

<b>M400</b>	b7	b6	b5	b4	b3	b2	b1	b0	<b>M400</b>	b0
<b>M401</b>	b7	b6	b5	b4	b3	b2	b1	b0	<b>M401</b>	b1
<b>M415</b>	b7	b6	b5	b4	b3	b2	b1	b0	<b>M415</b>	b15

The Vertical Address can only use numbers divisible by 16.

- **The Internal Output (bit address) functions as listed below.**

- M400~M655**      Data not preserved when powered off
- M700~M955**      Data preserved when powered off
- M960~M991**      Special Area

## ■ S10V Series

Device	Bit Address	Word Address	Particulars	
External Input	X000 ~ XFFF	XW000 ~ XWFFF	*1	H/L
External Output	Y000 ~ YFFF	YW000 ~ YWFFF	*1	
Internal Register	R000 ~ RFFF	RW000 ~ RWFFF	*1	
Global Link Register	G000 ~ GFFF	GW000 ~ GWFFF	*1	
Event Register	E000 ~ E0FF	EW000 ~ EW0FF	*1	
Event Register	EW400 ~ EWFFF	EW400 ~ EWFFF	*2	
Keep Relay	K000 ~ KFFF	KW000 ~ KWFFF	*1	
System Register	S000 ~ SBFF	SW000 ~ SWBFF	*1 *3	
On-delay Timer	T000 ~ T1FF	TW000 ~ TW1FF	*1	
One-shot Timer	U000 ~ U0FF	UW000 ~ UW0FF	*1	
Up-down Counter	C000 ~ C0FF	CW000 ~ CW0FF	*1	
Transfer Register	J000 ~ JFFF	JW000 ~ JWFFF	*1	
Receive Register	Q000 ~ QFFF	QW000 ~ QWFFF	*1	
Extended Internal Register	M000 ~ MFFF	MW000 ~ MWFFF	*1	
Timer (Elapsed Value)	———	TC000 ~ TC1FF		L/H
Timer (Setup Value)	———	TS000 ~ TS1FF		
One-shot Timer (elapsed value)	———	UC000 ~ UC0FF		
One-shot Timer (Setup Value)	———	US000 ~ US0FF		
Counter (elapsed value)	———	CC000 ~ CC0FF		
Counter (Setup Value)	———	CS000 ~ CS0FF		
Work Register	———	FW000 ~ FWBFF		H/L
Data Register	———	DW000 ~ DWBFF		
Work Register	LB0000 ~ LBFFFF	LBW0000 ~ LBWFFFF	*1	
Work Register for Ladder Converter	LR0000 ~ LR0FFF	LRW0000 ~ LRW0FFF	*1	
Work Register for Ladder Converter (Edge)	LV0000 ~ LV0FFF	LVW0000 ~ LVW0FFF	*1	
Work Register for Word	———	LWW0000 ~ LWWFFFF		
Work Register for Long Word	———	LLL0000 ~ LLL1FFF	*4	
Work Register for Floating Point	———	LF0000 ~ LF1FFF	*4 *5	
Work Register for Word (Save during power OFF)	———	LXW0000 ~ LXW3FFF		
Work Register for Long Word (Save during power OFF)	———	LML0000 ~ LML1FFF	*4	
Work Register for Floating Point (Save during power OFF)	———	LG0000 ~ LG1FFF	*4 *5	

*\*1 Because of the PLC specifications, the highest bit has been designated as 0 and the lowest bit as 15. Therefore, when Bit 0 turns ON, "32768" will be written to the top Word.*

*E.g.) Turning ON Bit Address X000 using GP bit designation turns PLC bit device X000 ON. "32768" will be written to the word device XW000 on both the GP and the PLC.*

*\*2 The higher and lower bit order will be reversed. When EW400 is turned ON, E40F will be turned ON on the PLC.*

*E.g.) Turning ON GP bit device EW400 turns ON PLC bit device E40F. "1" will be written to the word device EW400 on both the GP and the GLC.*

*\*3 Data cannot be written.*

*\*4 32-bit device.*

*\*5 Floating-point device. To be used via E-tag and K-tag's 32-bit Float designation.*

## 4 Environment Setup

The following tables list Digital's recommended PLC and GP communication settings.

### ■ HIDIC S10 $\alpha$ Series

GP Setup		Upper Computer I/F, Upper Link Module Setup	
Baud Rate	19200 bps	Baud Rate	19200 bps <sup>*1</sup>
Data Length	8 bits (fixed)	_____	
Stop Bit	1 bit (fixed)	_____	
Parity Bit	Odd (fixed)	_____	
Data Flow Control	ER Control	_____	
Communication Format	4-wire type	_____	
Unit No.	0	_____	

*\*1 LWP000 is fixed (setup is unnecessary).*

### ■ S10 mini Series

GP Setup		Upper Computer I/F, Upper Link Module Setup	
Baud Rate	19200 bps	Baud Rate	19200 bps
Data Length	8 bits (fixed)	_____	
Stop Bit	1 bit (fixed)	_____	
Parity Bit	Odd (fixed)	_____	
Data Flow Control	ER Control	_____	
Communication Format (RS-232C)	RS-232C	Communication Format Protocol setting switch	RS-232C 8 or 9 <sup>*1</sup>
Communication Format (RS-422)	4-wire type	Communication Format Protocol setting switch	RS-422 A or B <sup>*1</sup>
Unit No.	0	_____	

*\*1 When using CN1 and CN2 simultaneously, set them so that their numbers will not duplicate.*



■ HIZAC EC Series

GP Setup		PLC Setup	
Baud Rate	9600 bps	Baud Rate	9600 bps
Data Length	7 bits	Data Bit	7 bits
Stop Bit	1 bit	Stop Bit	1 bit
Parity Bit	Even	Parity On/Off Parity	On Even
Data Flow Control	ER Control	Data Flow Control	DTR Control
Communication Format	RS-232C	Communication Mode	COM2 Mode (Command mode)
_____		Sum Check	Yes
Unit No.	0 (fixed)	_____	

■ S10V Series

GP Setup		PLC Setup	
Baud Rate	19200 bps	Baud Rate	19200 bps (Fixed)
Data Length	8 bits	Data Length	8 bits (Fixed)
Stop Bit	1 bit	Stop Bit	1 bit (Fixed)
Parity Bit	Odd	Parity Bit	Odd (Fixed)
Data Flow Control	ER Control	Protocol	H-7338 **1
Communication Format	RS-232C 4-wire type	_____	_____
Unit No.	0 (Fixed)	_____	_____

*\*1 Depending on the protocol selected via the module front section's rotary switch, other PLC settings (Baud Rate, Data Length, Stop Bit, Parity Bit) are fixed.*