Pro-face

Digital
Human Machine Interface

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.

<div style="background:black; color:white">

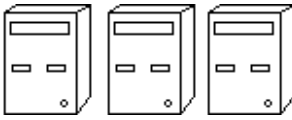**13.5**   **Hitachi Industrial Equipment System Inverters**

</div>

13.5.1 **System Structure**

The following table describes the system structure for connecting Hitachi Industrial Equipment System SJ300/L300P inverters to the GP.

⚠ **Important**

If communication is halted due to signal cable breakage, GP/GLC/ LT fault etc., the inverter may not detect a stop command. When this occurs, be sure to stop communication via the inverter's external terminals.

■ **SJ300 Series**

Inverter	Cable Diagram	Cable	GP/GLC/LT
SJ300-□□□■□F■	RS-422 (2-wire) (Cable Diagram 1)		GP/GLC/LT Type C/ ST Series Factory Gateway
	RS-422 (2-wire, 1:n communication) (Cable Diagram 2)		

* *The Inverter number may or may not contain the data indicated by ■, depending on the type of option. The data indicated by □ may vary, depending on the type of option selected.*

■ **L300P Series**

Inverter	Cable Diagram	Cable	GP/GLC/LT
L300P-□□□■□F□	RS-422 (2-wire) (Cable Diagram 1)		GP/GLC/LT Type C/ ST Series Factory Gateway
	RS-422 (2-wire, 1:n communication) (Cable Diagram 2)		

* *The Inverter number may or may not contain the data indicated by ■, depending on the type of option. The data indicated by □ may vary, depending on the type of option selected.*
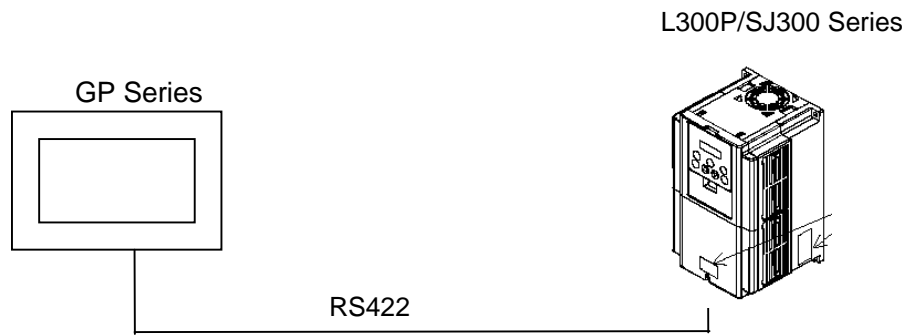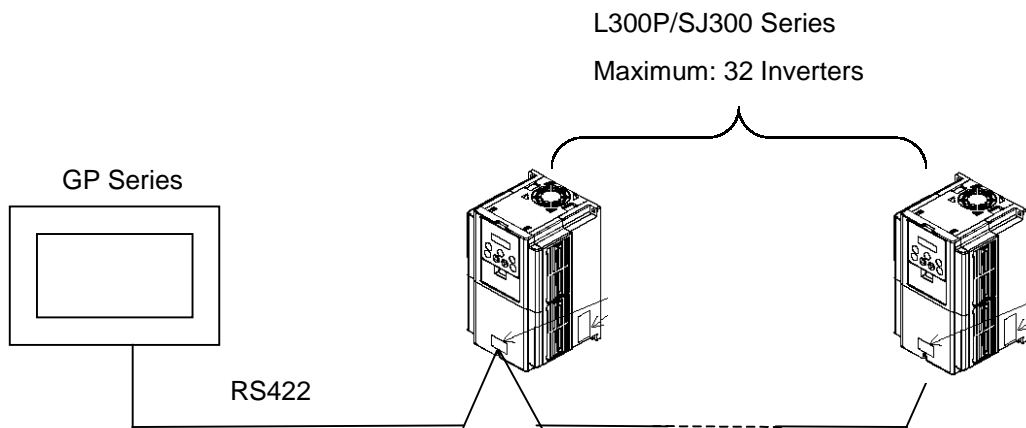
■ Connections

◆ 1:1 connection

L300P/SJ300 Series

GP Series

RS422

◆ 1:n Connection

L300P/SJ300 Series

Maximum: 32 Inverters

GP Series

RS422

13.5.2 Cable Diagrams
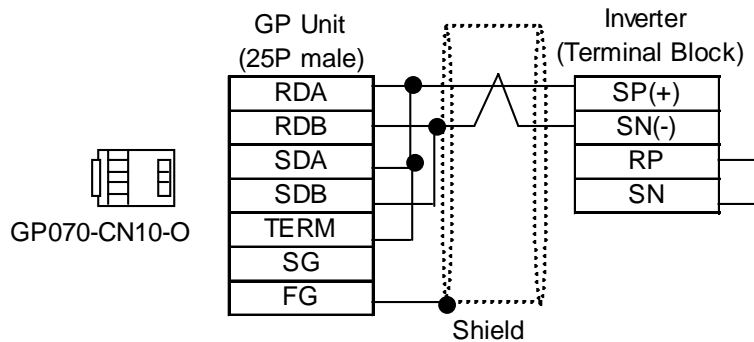
⚠️ **Important**

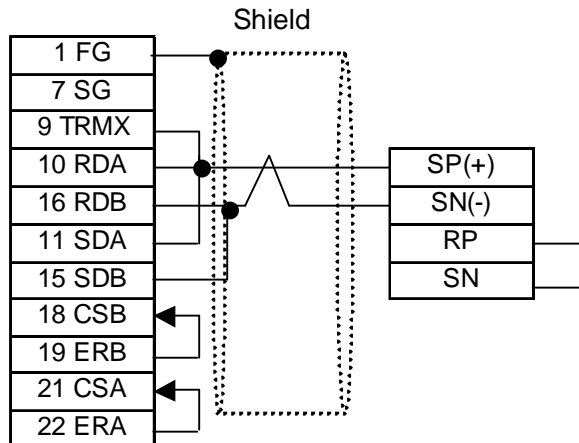***Separate the communication wiring from the main circuit wiring and other power lines.***

📝 **Note:**

- **Be sure the cable length is 250m or less.**

- **Shorting the Inverter interface's RP and SN pins introduces a termination resistance of 100Ω.**

Cable Diagram 1   RS-422

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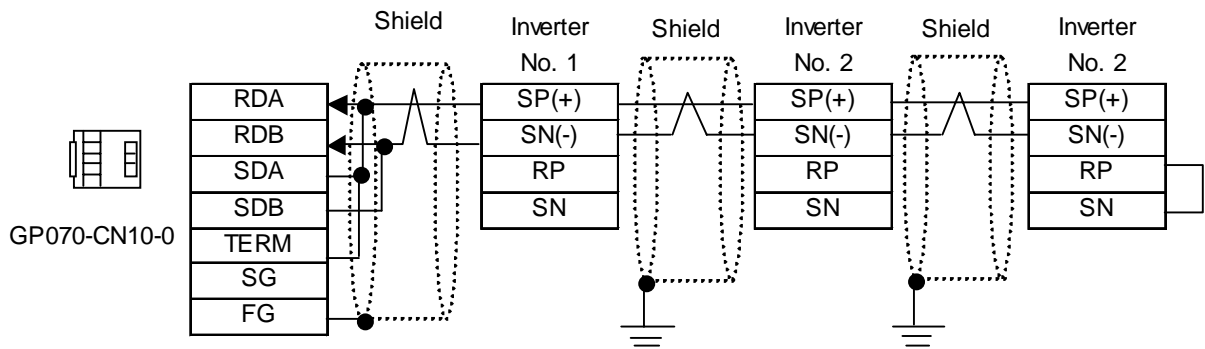

GP070-CN10-O

<When making your own cable>

Cable Diagram 2   RS-422, 1:n Communication

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

<When making your own cable>
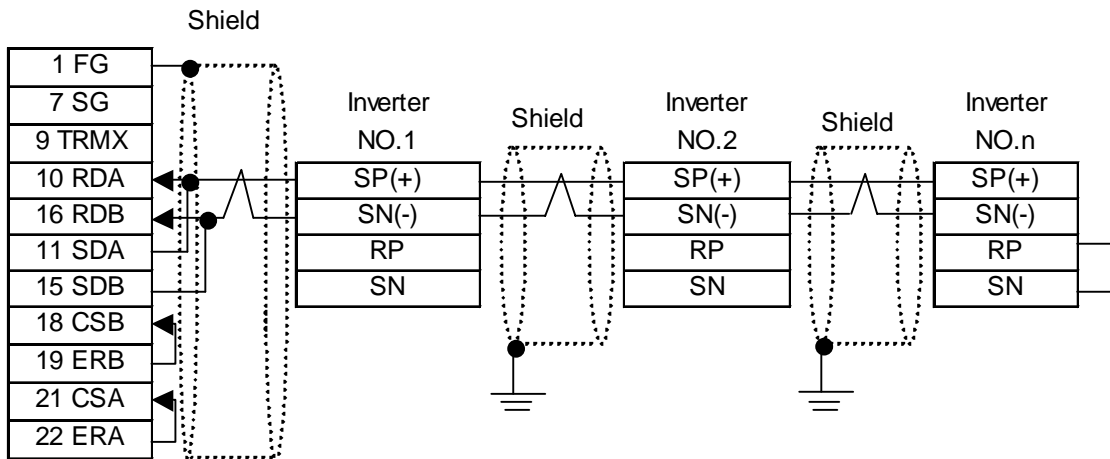
The pin number assigned to each connector pin on the ST's interface will differ from that of other GP series units. Be sure to use the following pin comparison table when creating a cable.

ST Unit Pin No.	ST Signal Name	GP Series Unit Pin No.
1	RDA	10
2	RDB	16
3	SDA	11
4	ERA	22
5	SG	7
6	CSB	18
7	SDB	15
8	CSA	21
9	ERB	19
Connector Shell	FG	1

13.5.3 Supported Devices

■ SJ300 Series

Device	Bit Address	Word Address	Particulars	
Normal Operation/Reverse Operation/Stop Command	————	00_00	Bit 15	*1
Frequency Value Setup	————	01_00		*1,*3
Intelligent Terminal Status Setup	————	02_00 ~ 02_01	Bit 3	*1,*3,*5
Monitor Data Batch Read	————	03_00 ~ 03_12	Bit 3	*2,*3
Read Inverter Status	————	04_00 ~ 04_03	Bit 15	*2
Read Trip History	————	05_00 ~ 05_54	Bit 3	*2,*3
Read/Set Setting Fields	————	A_001 ~ A_393	Bit 3	*3
	————	b_001 ~ b_313	Bit 3	*3
	————	C_001 ~ C_123	Bit 3	*3 H/L
	————	F_002 ~ F_303	Bit 3	*3
	————	H_003 ~ H_306	Bit 3	*3
	————	P_001 ~ P_049	Bit 3	*3
Re-initilaize Setting Values	————	08_00		*1,*4
Check if Setting Value can be saved to EEPROM or not	————	09_00	Bit 15	*2
Save Setting Value to EEPROM	————	0A_00		*1,*4
Re-calculate Internal Constant	————	0B_00		*1,*4
Read Output Frequency Setting Value	————	0E_00	Bit 3	*2

*1 Write-only. Trying to read data displays an error message "Higher Communication error (02:FA)".

*2 Read-only. Trying to write data displays an error message "Higher Communication error (02:FA)".

*3 32-bit Address.

*4 This command executes when writing arbitrary data to the word address 08_00..

*5 When writing data, be sure to set data for word addresses 02_00 and 02_01 simultaneously. For details, ▼Reference◢ ■ Parameter Numbers

■ **L300P Series**

Device	Bit Address	Word Address	Particulars	
Normal Operation / Reverse Operation / Stop Command	————	00_00	Bit 15 *1	
Frequency Value Setup	————	01_00	*1,*3	
Intelligent Terminal Status Setup	————	02_00 ~ 02_01	Bit 31 *1,*3,*5	
Monitor Data Batch Read	————	03_00 ~ 03_12	Bit 31 *2,*3	
Read Inverter Status	————	04_00 ~ 04_03	Bit 15 *2	
Read Trip History	————	05_00 ~ 05_54	Bit 31 *2,*3	
Read/Set Setting Fields	————	A_001 ~ A_296	Bit 31 *3	
	————	b_001 ~ b_213	Bit 31 *3	
	————	C_001 ~ C_123	Bit 31 *3	H/L
	————	F_002 ~ F_203	Bit 31 *3	
	————	H_003 ~ H_206	Bit 31 *3	
	————	P_001 ~ P_049	Bit 31 *3	
Re-initialize Setting Values	————	08_00	*1,*4	
Check if Setting Values can be saved to EEPROM or not	————	09_00	Bit 15 *2	
Save Setting Values to EEPROM	————	0A_00	*1,*4	
Re-calculate Internal Constant	————	0B_00	*1,*4	
Read Output Frequency Setting Value	————	0E_00	Bit 31 *2	

*1 Write-only. Trying to read data displays an error message "Higher Communication error (02:FA)".

*2 Read-only. Trying to write data displays an error message "Higher Communication error (02:FA)".

*3 32-bit Address.

*4 This command executes when writing arbitrary data to the word address 08_00..

*5 When writing data, be sure to set data for word addresses 02_00 and 02_01 simultaneously. For details, ▼ Reference ◣ ■ Parameter Numbers

Note: *Inverter parameters are allocated to the device and address, as shown below. The command number or the parameter's function code is displayed in the device. For details,*

▼**Reference**▲ ■ *Inverter Commands*
▼**Reference**▲ ■ *Parameter Function Codes*
▼**Reference**▲ ■ *Parameter Numbers*
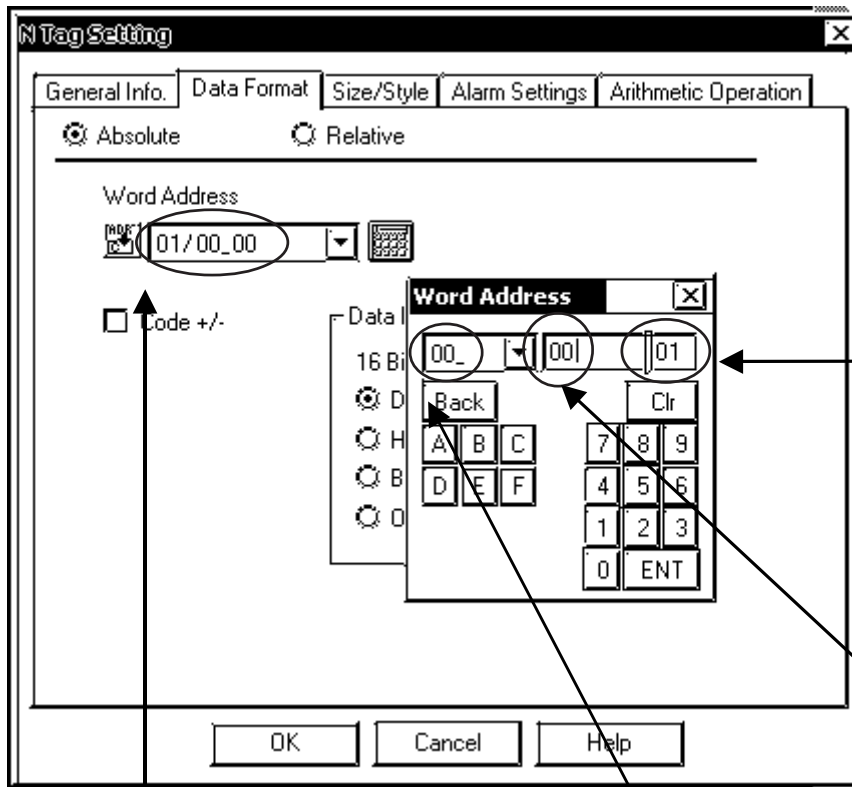
Enter the unit no. of the inverter you wish to designate

Displays the parameter number

Displays the command number or the parameter function code

01 / 00_00

Parameter Number

Command Number or Parameter Function Code

Inverter Unit No.
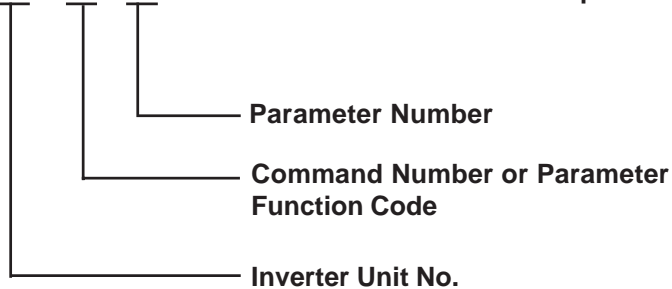
GP/GLC/LT System Data Area (LS0 to LS19)

The system area (LS0 to LS19) of the GP/GLC/LT cannot be allocated to the data area available on the inverter. Even if the system area is set using GP-PRO/PBIII or the GP/GLC/LT offline mode, this allocation cannot be made. For the following and later system versions, system area data cannot be sent to the inverter even though the system data area has been allocated (selected) to the data area available on the inverter.

GP/GLC/LT Model	GP77R Series	GP377 Series	GLC300 Series	GLC2000 Series	GP2000 Series	LT Type C
System Version	Ver. 2.60	Ver. 2.60	Ver. 2.60	Ver. 2.45	Ver. 3.10	Ver. 2.69b

■ Inverter Commands

Command	Command Description	Data
00	Normal Operation / Reverse Operation / Stop Command	16-bit Integer
01	Frequency Value Setup	32-bit Integer
02	Intelligent Terminal Status Setup	32-bit Integer
03	Monitor Data Batch Read	32-bit Integer
04	Read Inverter Status	16-bit Integer
05	Read Trip History	32-bit Integer
08	Re-initialize Setting Values	16-bit Integer
09	Check if Setting Values can be saved to EEPROM or not	16-bit Integer
0A	Save Setting Values to EEPROM	16-bit Integer
0B	Re-calculate Internal Constant	16-bit Integer
0E	Read Output Frequency setting Value	32-bit Integer

■ Parameter Function Codes

Function Code	Description	Data
A	Function Code A001 ~ Read/Write	32-bit Integer
b	Function Code b001 ~ Read/Write	32-bit Integer
C	Function Code C001 ~ Read/Write	32-bit Integer
F	Function Code F002 ~ Read/Write	32-bit Integer
H	Function Code H003 ~ Read/Write	32-bit Integer
P	Function Code P001 ~ Read/Write	32-bit Integer

*   *For Function Code details,*

▼**Reference**◢ *Your Inverter Installation Guide's "Functions" section.*

■ **Parameter Numbers**

◆ **Command 00**

The following table describes Command 00's Write-only parameter number. In a GP Series unit, it is treated as 16-bit data.

GP Address	Description
00_00	Normal Operation / Reverse Operation / Stop command

◆ **Command 01**

The following table describes Command 01's Write-only parameter number. In a GP Series unit, it is treated as 32-bit data.

GP Address	Description
01_00	Frequency Value Setup

◆ **Command02**

The following table describes Command 02's Write-only parameter number. In the inverter, it is a 64-bit data. However, in a GP Series unit, it is separated into two units, each being 32-bit data.

GP Address	Description
02_00	Lower 32 bits of 64-bit Intelligent Terminal Status data
02_01	Higher 32 bits of 64-bit Intelligent Terminal Status data

The following table defines inverter setting values. For inverter setting value details,
▼*Reference*▲ *Your Inverter Manual*

Data	Description
0x0000000000000001	Normal Operation command
0x0000000000000002	Reverse Operation command
0x0000000000000004	Multi-level Speed 1 (Binary Operation)
0x0000000000000008	Multi-level Speed 2 (Binary Operation)
0x0000000000000010	Multi-level Speed 3 (Binary Operation)
…	…
…	…

E.g. 1) When wanting the inverter to operate in Normal Operation mode and also wanting to activate Multi-level Speed 1 and Multi-level Speed 2, be sure to write the following data to the inverter:

Normal operation   0x0000000000000001 + Multi-level Speed 1 0x0000000000000004 + Multi-level Speed 2   0x0000000000000008

= 0x000000000000000D

When wanting to write data only to address 02_00, "0" will be written to address 02_01.

E.g. 2) When wanting to clear normal operation command and remote operation data, write data "0x0000000200000001" to the inverter. This 64-bit data will be divided into two units of 32-bit data each, and will be written to the LS area. E.g., "0x00000001" will be written to LS100, and "0x00000002" will be written to LS101.

Use memcpy() (memory copy) function to copy the LS area data to address 02_00. This writes data "0x0000000200000001" to the inverter.

◆ **D-Script Example**

[w:01/LS0100] = 0x00000001

[w:01/LS0101] = 0x00000001

memcpy([w:01/02_00], [w:01/LS0100],2)

◆ **Command 03**

The following table describes Command 03's Read-only data. In a GP series unit, each data is treated as 32-bit data.

GP Address	Description
03_00	Output Frequency
03_01	Output Current
03_02	Rotation Direction
03_03	PID Feedback Monitor
03_04	Intelligent Input Monitor
03_05	Intelligent Output Monitor
03_06	Frequency Conversion Monitor
03_07	Output Torque
03_08	Output Voltage Monitor
03_09	Power Monitor
03_10	Reserved (default: 0)
03_11	RUN Time Monitor
03_12	ON Time Monitor

◆ **Command 04**

The following table describes Command 04's Read-only data. In a GP series unit, each data is treated as 16-bit data.

GP Address	Description
04_00	Inverter Status A
04_01	Inverter Status B
04_02	Inverter Status C
04_03	Reserved (default: 0)

◆ **Command 05**

The following table describes Command 05's Read-only data. In a GP series unit, each data is treated as 32-bit data.

GP Address	Description
05_00	Cumulative Count
05_01	Cause for Trip
05_02	Inverter Status A
05_03	Inverter Status B
05_04	Inverter Status C
05_05	Output Frequency
05_06	Cumulative RUN Time
05_07	Output Current
05_08	D.C. Voltage
05_09	Power ON Time

◆ **Command 08**

The following table describes Command 08 data. Since it is an instruction, it is Write-only. In GP Series units, writing arbitrary data issues instructions to the inverter.

GP Address	Description
08_00	Re-initialize Setting Values

◆ **Command 09**

The following table describes Command 09 data. In a GP Series unit, it is treated a 16-bit data.

GP Address	Description
09_00	Check if Setting Values can be saved to EEPROM or not.

◆ **Command 0A**

The following table describes Command 0A data. Since it is an instruction, it is Write-only. In GP Series units, writing arbitrary data issues instructions to the inverter.

GP Address	Description
0A_00	Save Setting Values to EEPROM

◆ **Command 0B**

The following table describes Command 0B data. Since it is an instruction, it is Write-only. In GP Series units, writing arbitrary data issues instructions to the inverter.

GP Address	Description
0B_00	Re-calculate Internal Constant

◆ **Command 0E**

The following table describes Command 0E data. It is Read-only.

GP Address	Description
0E_00	Read Output Frequency Setting Value

■ Function Code Numbers

◆ **Function Code A, b, C, F, H, P**

The following table defines function codes A, b, C, F, H and P. Each data is treated as 32-bit data. For inverter function code details,

▼*Reference*◣ *Your Inverter's Manual*

Inverter Function Code	GP Address	Description
A001	A_001	0, 0I, 02 Terminal Function
A002	A_002	Stop Key Function
A019	A_019	Multi-level Speed Function
b013	b_013	Electro-Thermal Characteristics
b021	b_021	Fault Load Restrictions
C001	C_001	Control No. 2
…	…	…

13.5.4 ▶ Environment Setup

The following tables show Digital's recommended Hitachi Industrial Equipment System Inverter communication settings and their corresponding settings on the GP.

GP/GLC/LT Settings		Inverter Settings	
Baud Rate	19200bps	Port Transmission Rate	19200bps
Data Length	7 bits	Data Length	7 bits
Stop Bit	1 bit	Stop Bit	1 bit
Parity Bit	None	Parity	None
Control Method	ER Control	————	————
Communication Format	2-wire	————	————
Station No.	1	Unit No.	1
————	————	Data Command	RS485

* *Be sure to perform inverter settings via the function mode parameters. For details regarding settings, refer to your inverter's instruction manual.*