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.

13.2 Mitsubishi Electric Inverters

13.2.1 System Structure

The following table describes the system structure for connecting the Mitsubishi Electric inverters to the GP.

⚠ **Important** *If communication is halted due to signal cable breakage, GP/ GLC fault etc., the inverter does not detet such a fault. Use its Communication retry or Communication check to diagnose the problem and prevent an accident.*

■ FREQROL-A500 Series

Inverter	Cable Diagram	GP
FR-A520-□K FR-A540-□K	RS-422 (4-wire) (Cable Diagram 1)	GP or GLC Series
	RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	

"□" indicates the capacity of each inverter.

■ FREQROL-A500L Series

Inverter	Cable Diagram	GP
FR-A520L-□K FR-A540L-□K	RS-422 (4-wire) (Cable Diagram 1)	GP or GLC Series
	RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	

"□" indicates the capacity of each inverter.

■ **FREQROL-E500 Series**

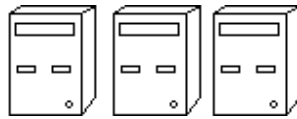| Inverter	Cable Diagram	GP
FR-E520-□K FR-E540-□K FR-E520S-□K FR-E510W-□K	RS-422 (4-wire) (Cable Diagram 1) RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	GP or GLC Series

"□" indicates the capacity of each inverter.

■ **FREQROL-F500 Series**

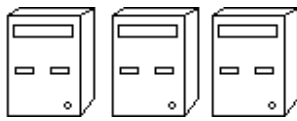| Inverter	Cable Diagram	GP
FR-F520-□K FR-F540-□K	RS-422 (4-wire) (Cable Diagram 1) RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	GP or GLC Series

"□" indicates the capacity of each inverter.

■ **FREQROL-F500L Series**

Inverter	Cable Diagram	GP
FR-F520L-□K FR-F540L-□K	RS-422 (4-wire) (Cable Diagram 1) RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	GP or GLC Series

"□" indicates the capacity of each inverter.

■ **FREQROL-S500 Series**

Inverter	Cable Diagram	GP
FR-S520-□K-R FR-S520S-□K-R FR-S510W-□K-R	RS-422 (4-wire) (Cable Diagram 1) RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	GP or GLC Series

"□" indicates the capacity of each inverter.

■ **FREQROL-B/B3 Series**

Inverter	Cable Diagram	GP
FR-B-□K FR-B3-□□□K	RS-422 (4-wire) (Cable Diagram 1) RS-422 (4-wire, 1:n communication) (Cable Diagram 2)	GP or GLC Series

"□" indicates the capacity of each inverter.

◆ **Connections**

• 1:1 connection
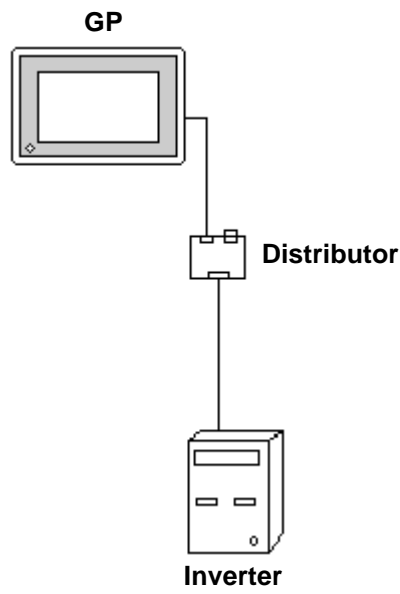
• 1:n connection
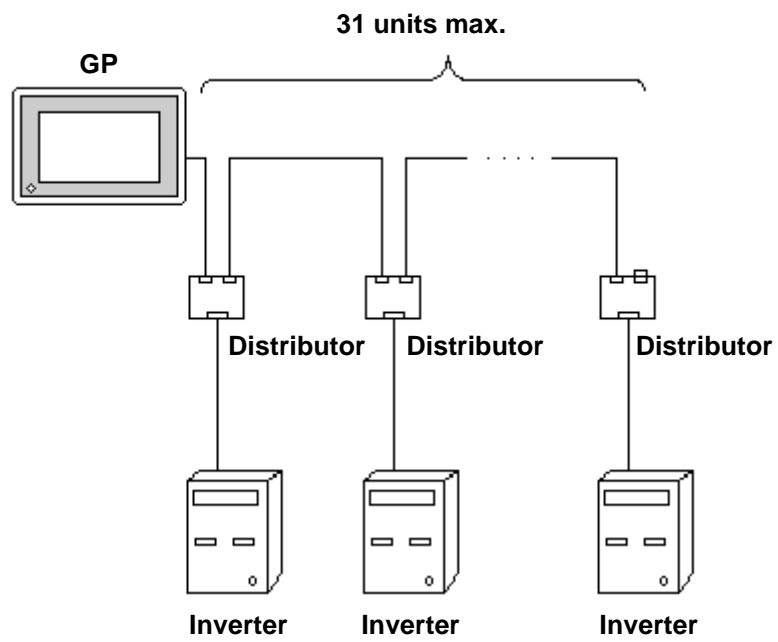
13.2.2 ► Cable Diagrams

Recommended Cables

For connection of the GLC/GP and Mitsubishi Electric inverters, the following cables and cable manufcturers are recommended:

No.	Item	Model Code	Company	Remark
1	Cable (commercial type)	FR-CB201 (1m)	Mitsubishi Electric Corporation	Used between inverters
2		FR-CB203 (3m)	Mitsubishi Electric Corporation	Used between inverters
3		FR-CB205 (5m)	Mitsubishi Electric Corporation	Used between inverters
4	Wires	SGLPEV 0.5mm×4P	Mitsubishi Electric Corporation	
5	RJ45 connector	5-554720-3	Tyco Electronics AMP K.K.	
6	RS-485 distributor (commercial type)	MBJ-8	Hakko Electric Machine Works Co., Ltd.	Without termination resistance
		MBJ-8P		With termination resistance

Cable Diagram 1

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

<When making your own cable>

GP (25P male)

| 9 TRMX |
| 10 RDA |
| 16 RDB |
| 11 SDA |
| 15 SDB |
| 18 CSB |
| 19 ERB |
| 21 CSA |
| 22 ERA |
| 7 SG |

Resistance
100Ω

Resistance
100Ω

(RJ45 connector)

1	5	4	3	6
S G	S D A	S D B	R D A	R D B

1	5	4	3	6
S G	S D A	S D B	R D A	R D B

RJ45 connector for
termination resistance

Distributor
(MBJ-8P)

6	3	4	5	1
R D B	R D A	S D B	S D A	S G

FR-CB20* cable made by
Mitsubishi Electric Corp.

6	3	4	5	1
R D B	R D A	S D B	S D A	S G

Inverter
(RJ45 connector)

PU connector
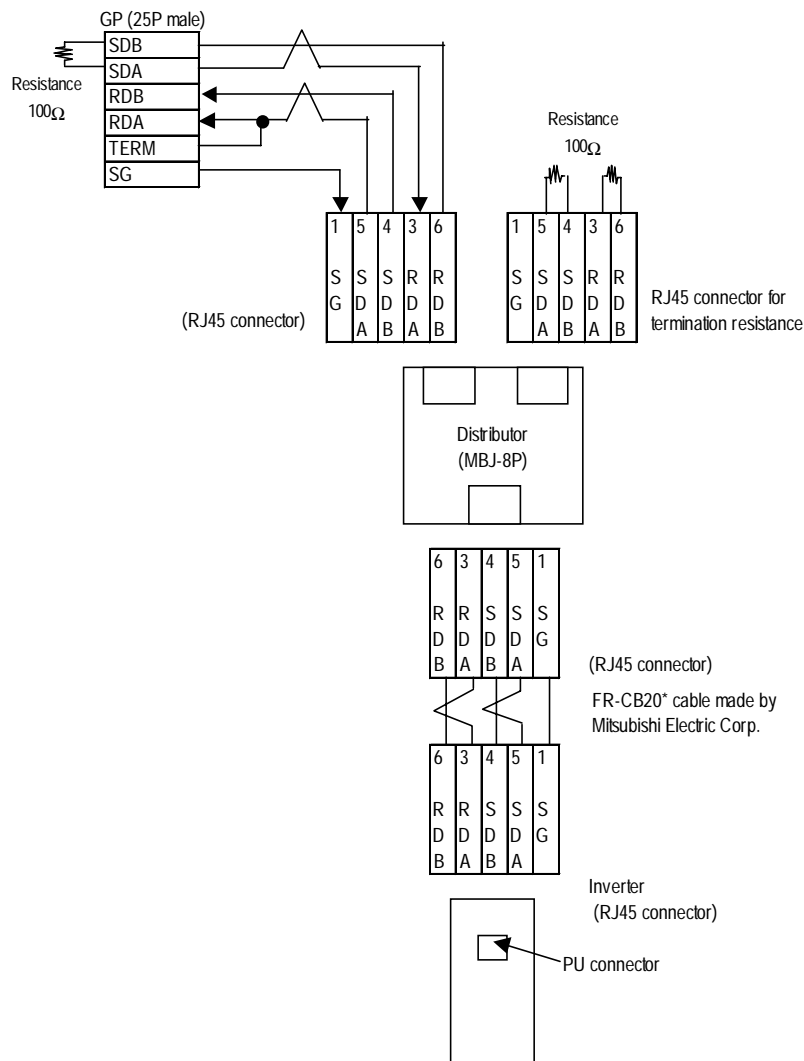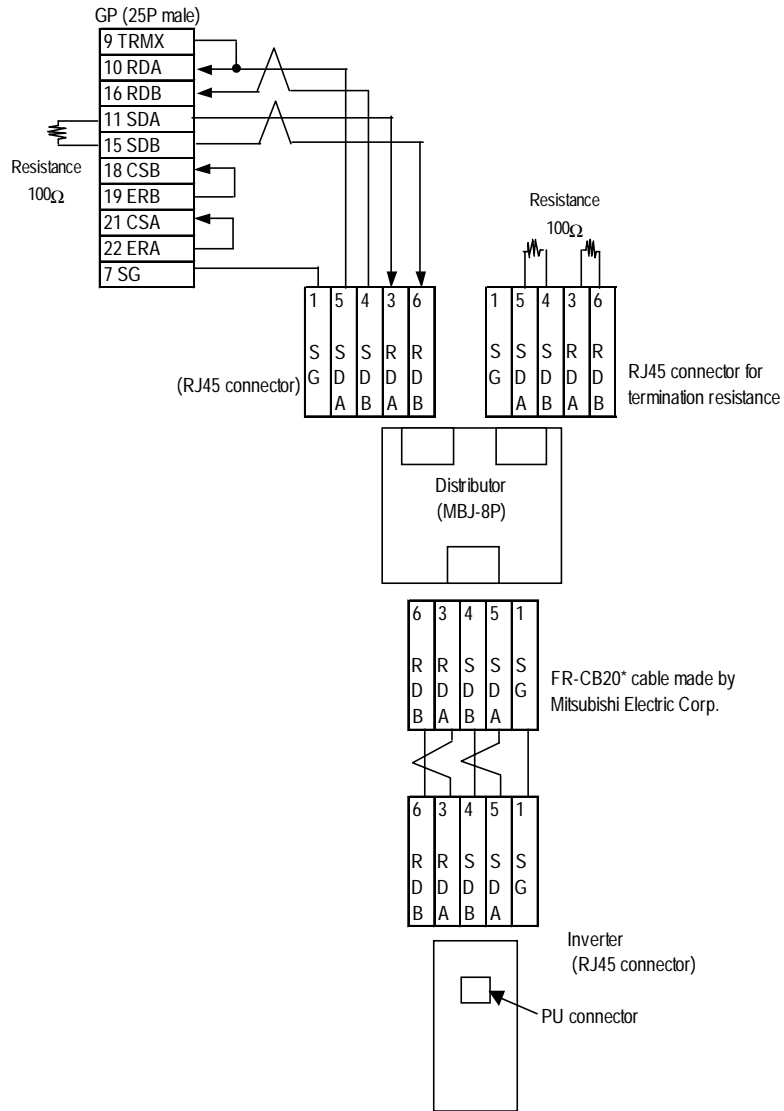
Cable Diagram 2

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

<When making your own cable>

13.2.3 Supported Devices

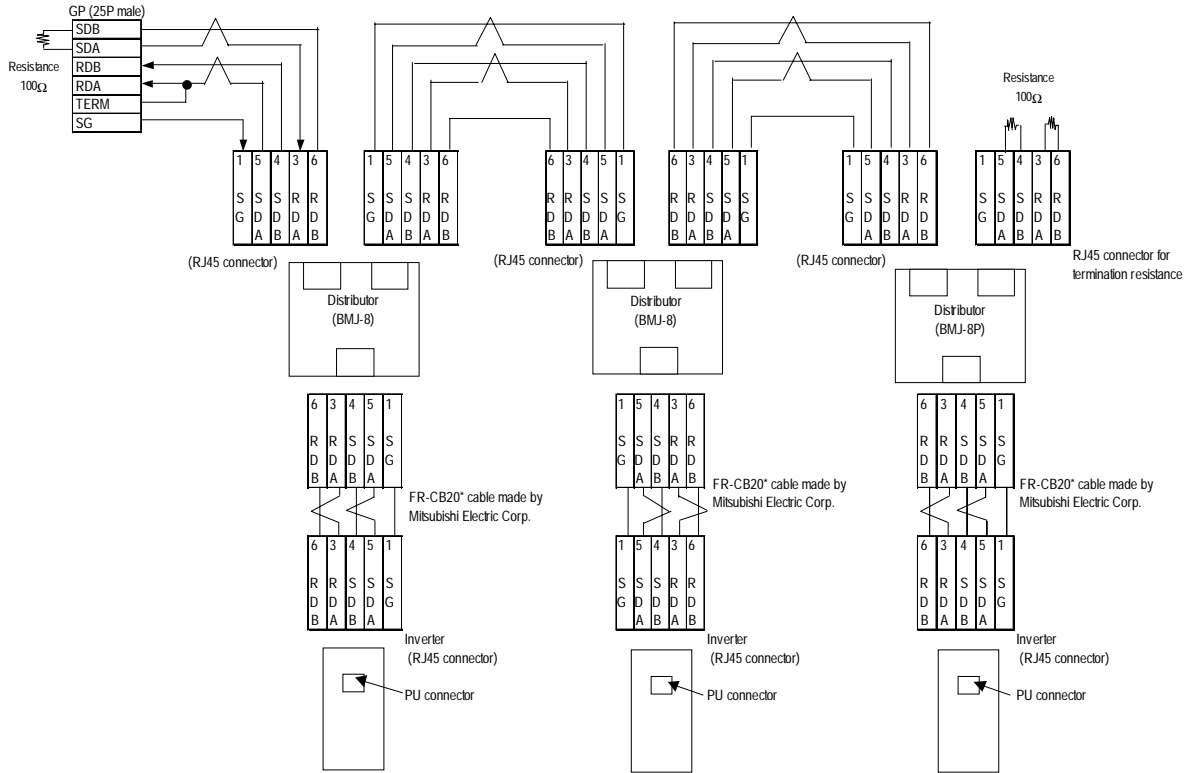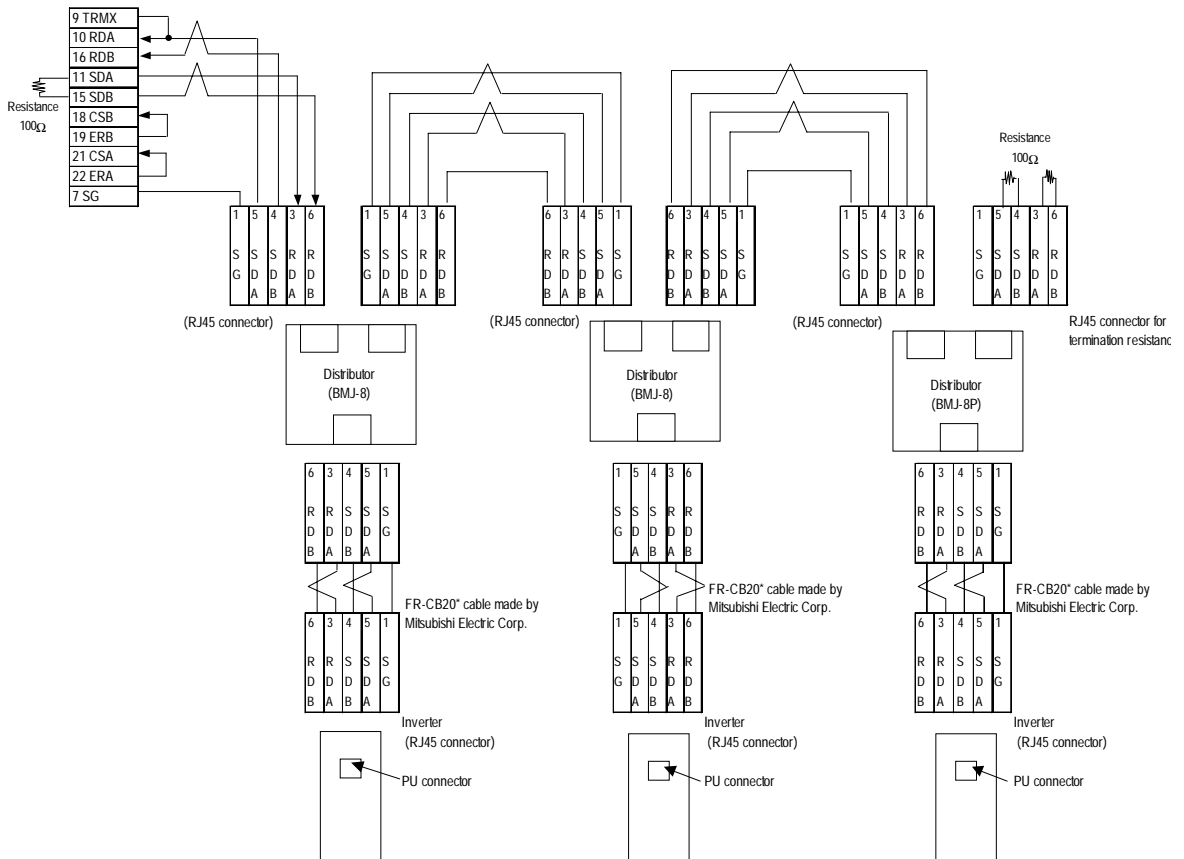| Device	Bit Addresses	Word Addresses	Remarks	
Parameter (except for Pr. 37 of FREQROL-S500 and FREQROL-E500)	000000 ~ 99315	0000 ~ 0993	*1	*3
Parameter (Pr.37 of FREQROL-S500 and FREQROL-E500)	P003700 ~ P003731	P0037	*2 *4	H/L
Operation mode	OPE000 ~ OPE015	OPE0	*3	
Output frequency (rpm)	OUTF000 ~ OUTF015	OUTF0	*5	H/L
Output current	OUTC000 ~ OUTC015	OUTC0	*5	
Output voltage	OUTV000 ~ OUTV015	OUTV0	*5	
Special monitor	SPM000 ~ SPM015	SPM0	*5	
Special monitor selection no.	SSEL000 ~ SSEL015	SSEL0		
Output frequency	SOF000 ~ SOF015	SOF0	*5	
Output current	SOC000 ~ SOC015	SOC0	*5	
Output voltage	SOV000 ~ SOV015	SOV0	*5	
Set frequency value	FSET000 ~ FSET015	FSET0	*5	
Run speed	RUNS000 ~ RUNS015	RUNS0	*5	
Motor torque	MOT000 ~ MOT015	MOT0	*5	
Regenerative brake	RBRK000 ~ RBRK015	RBRK0	*5	
Electronic thermal load factor	ELOF000 ~ ELOF015	ELOF0	*5	
Output current peak value	OCPV000 ~ OCPV015	OCPV0	*5	
Converter output voltage peak value	COPK000 ~ COPK015	COPK0	*5	
Input power	IPOW000 ~ IPOW015	IPOW0	*5	
Output power	OPOW000 ~ OPOW015	OPOW0	*5	
Alarm (latest Nos. 1 & 2)	A12D000 ~ A12D015	A12D0	*5	H/L
Alarm (latest Nos. 3 & 4)	A34D000 ~ A34D015	A34D0	*5	
Alarm (latest Nos. 5 & 6)	A56D000 ~ A56D015	A56D0	*5	
Alarm (latest Nos. 7 & 8)	A78D000 ~ A78D015	A78D0	*5	
Run command	RUNC000 ~ RUNC015	RUNC0	*6	
Inverter status monitor	INVS000 ~ INVS015	INVS0	*5	
Run frequency write (E^{2}PROM)	RWRT000 ~ RWRT015	RWRT0	*6	
Set frequency write (RAM and E^{2}PROM)	SFWE000 ~ SFWE015	SFWE0	*6	
Set frequency write (only RAM)	SFWR000 ~ SFWR015	SFWR0	*6	
Set frequency read (E^{2}PROM)	SFRE000 ~ SFRE015	SFRE0	*5	
Set frequency read (RAM)	SFRR000 ~ SFRR015	SFRR0	*5	
Error all clear	ERCL000 ~ ERCL015	ERCL0	*6*7	
Inverter reset	RSET000 ~ RSET015	RSET0	*6*7	
Parameter all clear	ALLC000 ~ ALLC015	ALLC0	*6*7	
User clear	ALLC000 ~ ALLC015	ALLC0	*6*7	
Extended Setup of Link Parameters	LNKP000 ~ LNKP015	LNKP0		
Second Parameter Selection	SECP000 ~ SECP015	SECP0		

*1 For the detailed information about the parameters, refer to Mitsubishi Electric's multi-purpose inverter manuals.

*2 For the parameter 37 of FREQROL-S500 and E500, specify "P0037" has the device.

*3 This device cannot be used as 32-bit data.

*4 This is a 32-bit device.

*5 No data can be written. When performing data write, a Host Communication Error (02:F0) will occur.

*6 No data can be read out. When performing data read, a Host Communication Error (02:F0) will occur.

*7 For the data to be written, refer to the instruction manuals for various models of Mitsubishi general-purpose inverters (e.g., User Clear H9669).

> **• The following tables show the relations between data codes and settings as given in the instruction manuals for the above applicable devices and inverters.**

[Parameter read/write]

Address

Function	Parameter Number	Name	Data Code		
			Read	Write	Extended Set Value for Link Parameter (Data Code: 7F/FF)
Basic Functions	0	Torque boost	00	80	0
	1	Upper Frequency Limit	01	81	0
	2	Lower Frequency Limit	02	82	0
	3	Base Frequency	03	83	0

:

[Devices Other Than Parameters]

Select an applicable device from the supported device list.

No.	Item		Command Code	Details of Data	Number of Data Digits
1	Run Mode	Read	H7B	H0000: Communication Option Operation H0001: External Operation H0002: Communication Operation (PU Connector)	4 digits
		Write	HFB	H0000: Communication Option Operation H0001: External Operation H0002: Communication Operation (PU Connector)	
2	Monitor	Output Frequency [rpm]	H6F	H0000 to HFFFF: Output Frequency (Hexadecimal) Unit: 0.01 Hz	4 digits

:

Device Input Method

The device address input method on the GP screen creation software is described below:

Device
To read/write parameters,
select "...." or "SP".
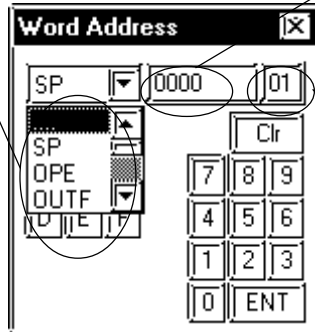
Address
For a parameter, enter the
parameter number. For a P-
device, the address is fixed
to 0037. In other cases, the
address is fixed to 0.

Inverter unit No.

• *As shown in the following table, you may need to enter "9999"*
  (meaning an invalid parameter setting or the like) depending
  upon the parameter types. In this case, the data written and read
  from the GP/GLC is as follows:

No.	Inverter Model	Inverter Setting	Written Data	Read Data
1	Other than FR-S500	9999	-1 (0xFFFF)	-1 (0xFFFF)
2		8888	-16 (0xFFF0)	-16 (0xFFF0)
3	FR-S500	— — —	-1 (0xFFFF)	-1 (0xFFFF)
4		888	-16 (0xFFF0)	-16 (0xFFF0)

• *The system area (20 words) on the GP/GLC unit cannot be used.*
  When the GP/GLC unit is offline, or when using the screen editor
  software, it seems that the data is being entered and used nor-
  mally. However, even if the system area is selected, it will remain
  disabled.

13.2.4 ▶ Environment Setup

The following tables show Digital's recommended Mitsubishi Electric inverter communication settings and their corresponding settings on the GP.

GP/GLC Settings		Inverter Settings	
Baud Rate	19200bps	Baud Rate	19200bps
Data Length	8bit	Data Length	8bit
Stop Bit	2bit	Stop Bit	2bit
Parity Bit	Even	Parity Bit	Even
Data Flow Control	ER	———	———
Communication Format When using RS-422	RS-422 (4-wire)	———	———
Unit No.*1	0 ~ 31	Unit No.	0 ~ 31

■ Setting Method

Use the inverter's front keys to enter communication settings.

Use parameters 117 to 124 for the inverter communication settings, as follows:

No.	Parameter No.	Name	Inverter Setting Range
1	117	Station number	0 ~ 31
2	118	Communication Speed	48...4800bps 96...9600bps 192...1920bps
3	119	Stop bit length/Data length	0...8/1 1...8/2 10...7/1 11...7/2
4	120	Parity check Presence/Absence	0: OFF 1: Even 2: Odd
5	121	Number of communication retries	0 ~ 10,9999 or --- [*1]
6	122	Communication check time internal	except 0 [*2]
7	123	Waiting time settings	9999 or ---
8	124	CR, LF Presence/Absence selection	0: CR/LF OFF 1: CR ON 2: CR/LF ON

*1 Depending on the environment, change the setting range.

*2 Depending on the environment, set any number except 0.

13.2.5 **Error Codes**

<Error Codes Specific to Inverters>

The following error numbers are supported by the inverters. Each error number (format = 02:OO: $\triangle\triangle$) will be displayed on the left bottom of the GLC/GP screens. (The "OO" characters reflect an error number displayed on the GLC/GP (shown in the table below) and the "$\triangle\triangle$" characters reflect an inverter unit number where the error occurs.)

▼*Reference*▲ *Mitsubishi Electric Corporation; Each inverter series' Operation Manual*

Error No.	Error Name	Causes
00	Computer NAK error	———
01	Parity error	The GLC/GP parity settings are incorrect.
02	Sum check error	An error occurred on communication data due to noise, etc.
03	Protocol error	———
04	Flaming error	An error occurred on communication data due to noise, etc., or the stop bit settings are incorrect.
05	Overrun error	———
06	———	———
07	Character error	———
08	———	———
09	———	———
0A	Mode error	Parameter write was attempted when the mode is not the computer link operation mode or while the inverter is operating.
0B	Instruction code error	A non-existent address has been designated during screen creation.
0C	Data range error	When parameter or operation frequency data was written, the designated data was exceeded the correct setting range.
0D	———	———
0E	———	———
0F	———	———

Depending on the inverter specifications, when multiple errors occurred simultaneously, the larger error number will be displayed.