

MITSUBISHI

**GENERAL-PURPOSE INVERTER
COMPUTER LINK UNIT**

FR-CU03

INSTRUCTION MANUAL

Thank you for choosing the Mitsubishi FR-CU03.

Before using the equipment, please read this manual carefully to develop a complete familiarity with the functions and performance of the product. Please forward a copy of this manual to the end user.

Computer Link Unit FR-CU03

This communication option unit is designed to interface with FR-A024-S□□K-ER & FR-A044-□□K-ER inverter drives and a RS422A or RS485 compatible computer. Multi drive single computer configuration is possible. A FR-CU03 parameter unit is required to set parameter values before the FR-CU03 can be connected and used. A PU03E and FR-CU03 cannot be connected at the same time.

WARNING SYMBOLS

For your own safety please pay special attention to instructions containing these symbols:



This warning symbol indicates the presence of dangerous voltage. It informs you of high voltage conditions, situations and locations that may cause death or serious injury if you do not follow precautions.



This symbol indicates a general warning.



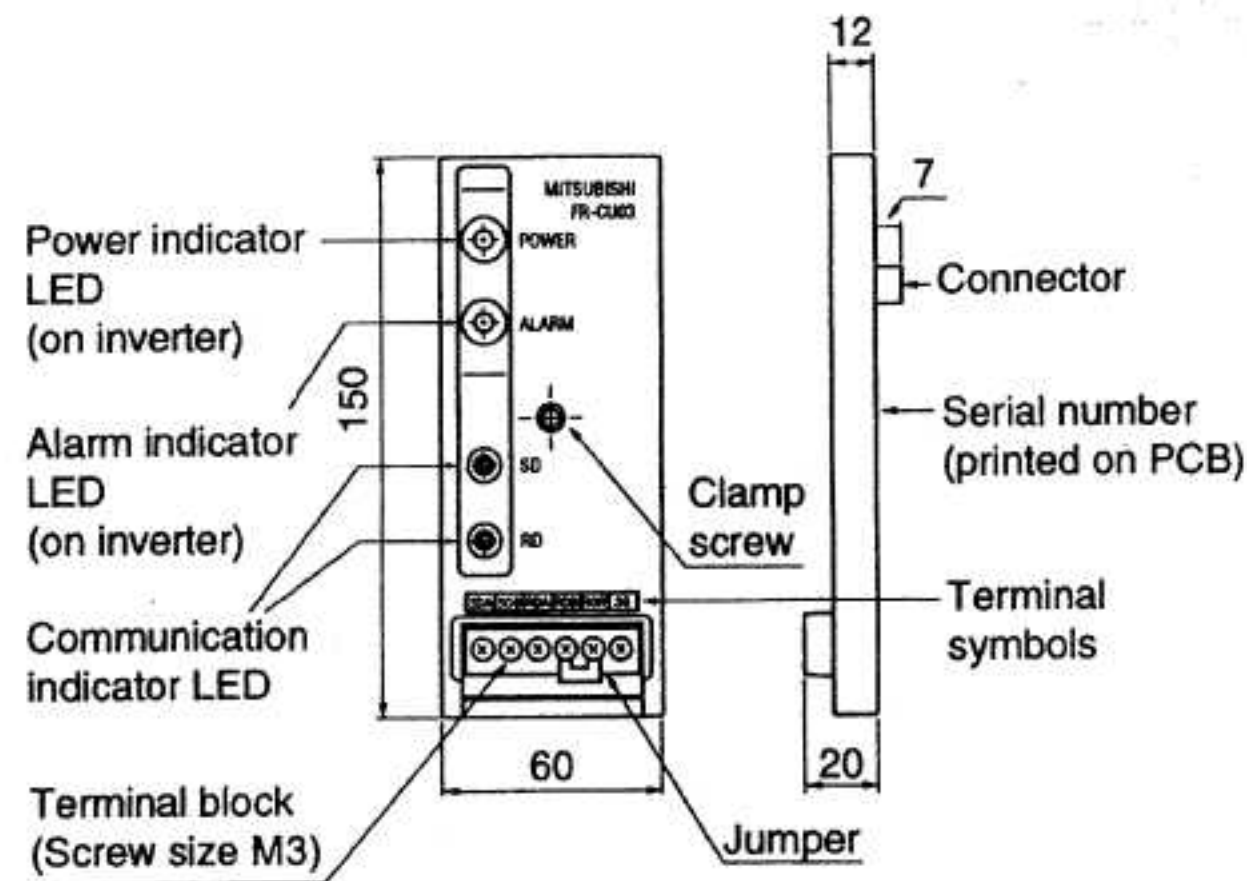
This warning symbol indicates an electrostatic discharge hazard.

NOTES inform you of situations or conditions which will damage machinery or cause additional motor-operation down-time if you do not take suggested steps.

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1. STRUCTURE



Voltage may be present at terminals.
Always isolate equipment and wait for charge
lamp to go out before servicing the unit.

2. INSTALLATION

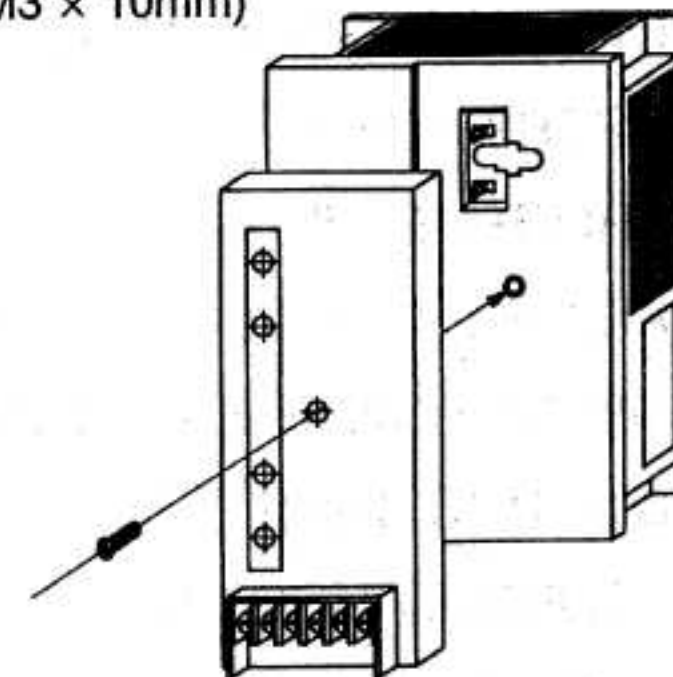
- The FR-CU03 must only be installed directly on the front cover of the inverter.

(1) Connection

Insert the FR-CU03 connector into the connector on the inverter as shown in the illustration below.
(Press on FR-CU03 to insert the connector securely.)

(2) Clamping FR-CU03

Clamp the FR-CU03 to the inverter with the clamp screw. (M3 × 10mm)



- Note:** 1. When installing the FR-CU03 to the inverter directly, it must be mounted on the front cover of the inverter. Never install it on the inverter with the front cover removed.
2. The FR-CU03 option must not be connected to the inverter using the cable option. (FR-CBL01 etc.)



Ensure mains power is isolated, and the charge
lamp is off before installing the CU03 option.

3. WIRING METHOD

(1) Connection of one computer and one inverter

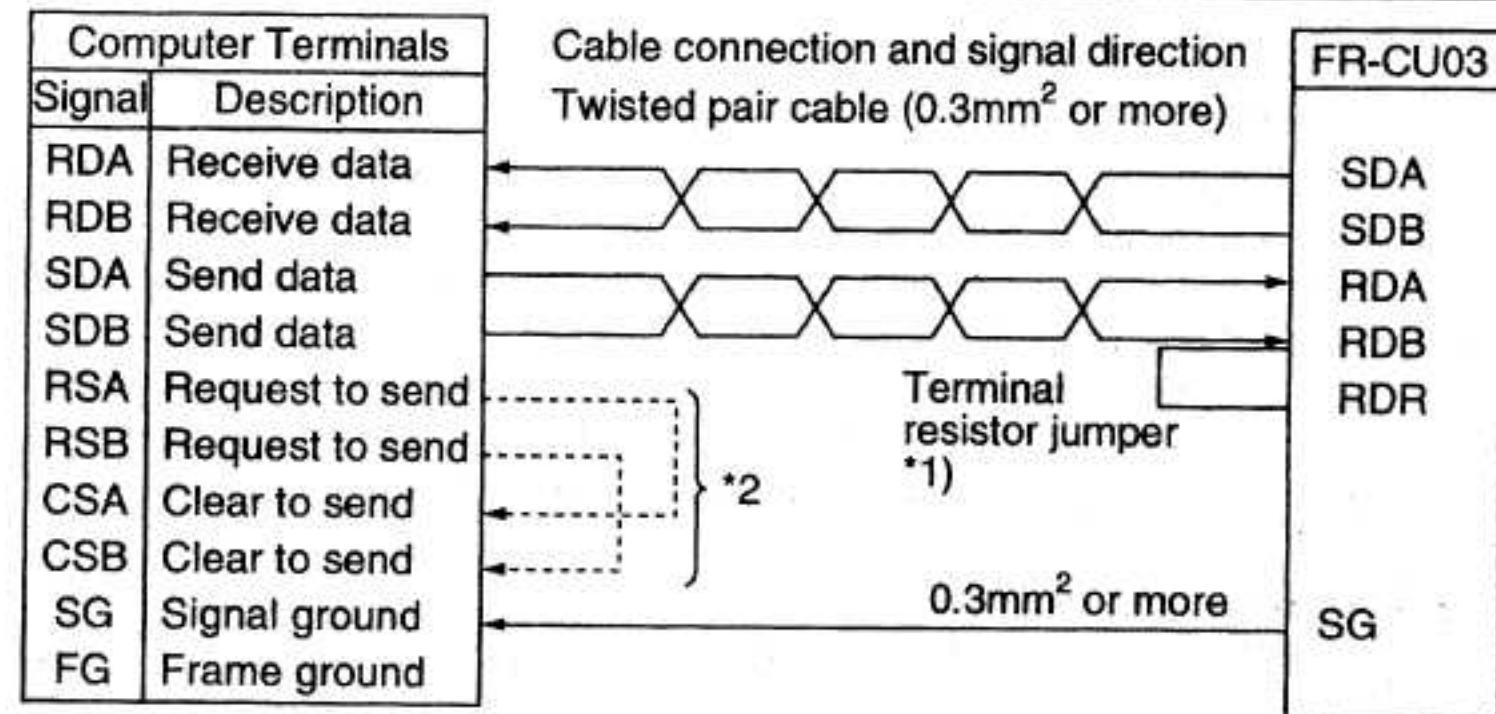


Fig. 3.1

(2) Connection of one computer and n inverters

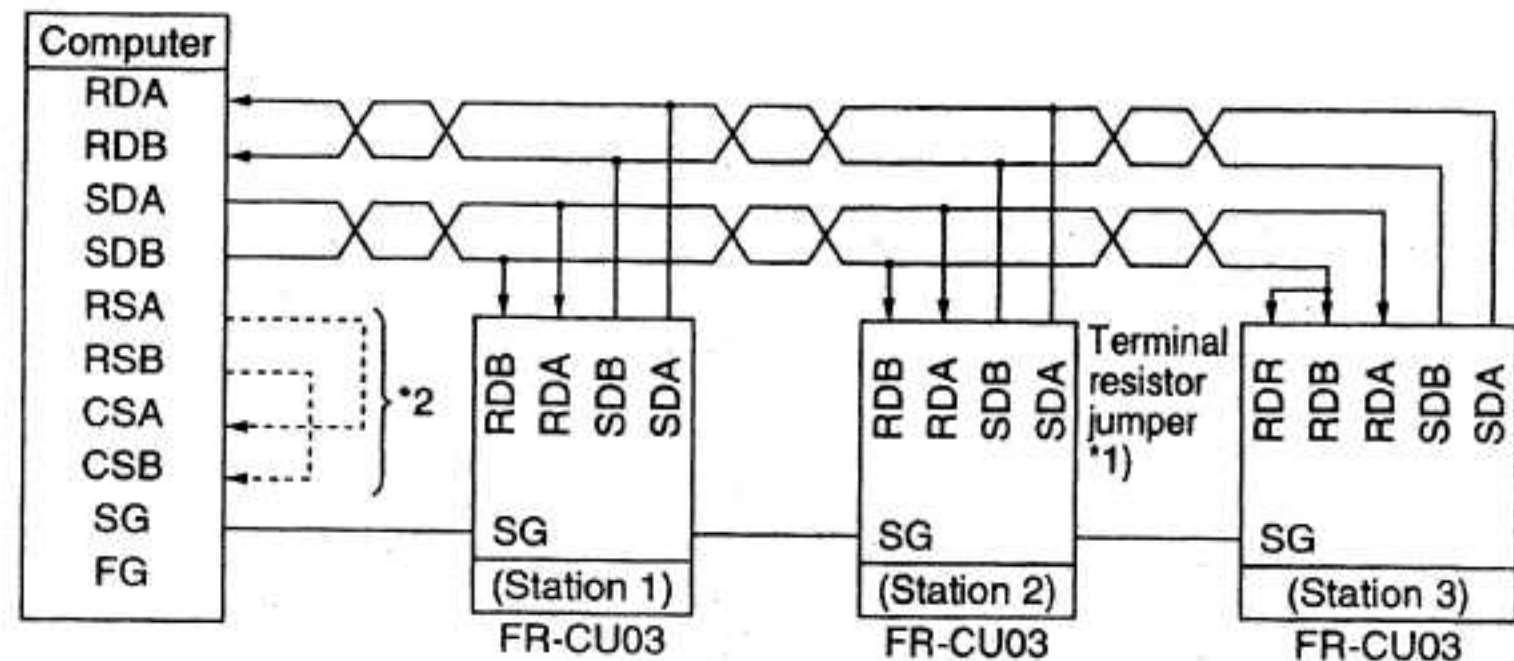


Fig. 3.2

*1) The terminal resistor jumper should only be connected to the remotest FR-CU03 unit.

*2) Connect in accordance with the manual of the computer used. Note that the computer terminal numbers depend on the model used.

4. OPERATIONAL FUNCTIONS

(1) Operation modes

- 1) PU operation
Controls the inverter from the keyboard of the parameter unit (referred to as the "PU") installed on the inverter.
- 2) External operation
Controls the inverter by switching on/off external signals to the control circuit terminals of the inverter.
- 3) Computer link operation
Controls the inverter in accordance with a computer program via the FR-CU03 computer link unit.
[Setting parameters 33 and 34 as appropriate allows the operation signal and output frequency to be entered from the control circuit terminals.]

■ Operation mode switching

Table 4.1

Symbol	Mode switching	Description
A	External operation ↔ PU operation	Press the corresponding key on the PU.
B	External operation ↔ Computer link operation	By computer user program. Refer to page 11.

- Switching conditions: The inverter must be at a stop (output frequency=0); and both the forward and reverse commands are off.

* Set "1" in parameter 35 to cause the inverter to enter computer link operation mode after it is powered up or reset.

(2) Functions available in operation modes

Table 4.2

Place of Control	Item	Operation Mode		
		Computer Link mode	External mode	PU mode.
User program from computer	Operation command	Yes ^{*1)}	No	No
	Output frequency setting	Yes ^{*1)}	No	No
	Monitor	Yes	Yes	Yes
	Parameter write	Yes (while at a stop)	No	No
	Parameter read	Yes	Yes	Yes
	Inverter reset	Yes ^{*2)}	No	No
Control circuit terminal	Operation command	Yes ^{*1)}	Yes	No
	Output frequency setting	Yes ^{*1)}	Yes	No
	Inverter reset	Yes	Yes	Yes

*1) Depends on the set values of Pr.33 and Pr.34 (See Section 7. (4).)

*2) The inverter cannot be reset if a computer link communication error has occurred.

(3) Input from computer to inverter

- 1) Operation commands
 - Bit0: Current input selection (AU)
 - 1: Forward rotation (STF)
 - 2: Reverse rotation (STR)
 - 3: Low speed (RL)
 - 4: Middle speed (RM)
 - 5: High speed (RH)
 - 6: Second acce/dcce time selection (RT)
 - 7: Inverter output halt (MRS)
- 2) Output frequency: 16-bit binary in increments of 0.01 Hz
The output frequency of the inverter can be set.
- 3) Inverter reset
The inverter can be reset from the computer.
- 4) Parameter set value write
For the parameters indicated in the data code list set values can be written.

(4) Input from inverter to computer

- 1) Inverter status ... The following operating states can be monitored.
 - Bit0: Running (RUN)
 - 1: Forward running
 - 2: Reverse running
 - 3: Up to frequency (SU)
 - 4: Overload (OL)
 - 5:
 - 6: Frequency detection (FU)
 - 7: Alarm
- 2) Inverter monitoring
 - Output frequency Binary in 0.01Hz increments
 - Output current Binary in 0.01A increments
 - Alarm definition Binary (up to eight most recent alarms)
- 3) Parameter set value read
For the parameters indicated in the data code list in Section 12, their set values can be read.

(5) Operation at alarm occurrence

Table 4.3

Place of Alarm Occurrence	Description	Operation Mode		
		Computer link operation	External operation	PU operation
Inverter fault	Inverter operation	Stop	Stop	Stop
	Data communication	Continued	Continued	Continued
Data communication fault	Inverter operation	Stop	Continued	Continued
	Data communication	Stop	Stop	Stop

(6) Inverter reset

Table 4.4

Resetting Method	Operation Mode		
	Computer link operation	External operation	PU operation
Computer program	Yes*1)	No	No
Connect terminals RES-SD	Yes	Yes	Yes
Switch off inverter power	Yes	Yes	Yes

*1) The inverter cannot be reset from the computer if the communication line is faulty.

*2) Resetting the inverter from the computer switches to the external operation mode. To resume the computer link operation, the operation mode should be switched to the computer link operation mode by the computer program.

5. OPERATION

(1) General operation

- 1) The computer CPU decodes and executes the user program.
- 2) Communication data in accordance with the user program is converted into serial signals in the computer and is then converted into the level conforming to the RS-422A or RS-485 standard and transmitted to the inverter by the driver.
- 3) The communication data is received by the receiver in the FR-CU03 unit.
- 4) The inverter CPU checks the data for any errors, processes the data in accordance with the check result, creates reply data.
- 5) The replay data is converted into the level conforming to the RS-422A or RS-485 standard and returned to the computer by the driver in the FR-CU03 unit.
- 6) The reply data is received by the receiver in the computer and read and checked in accordance with user program.

(2) Function block diagram

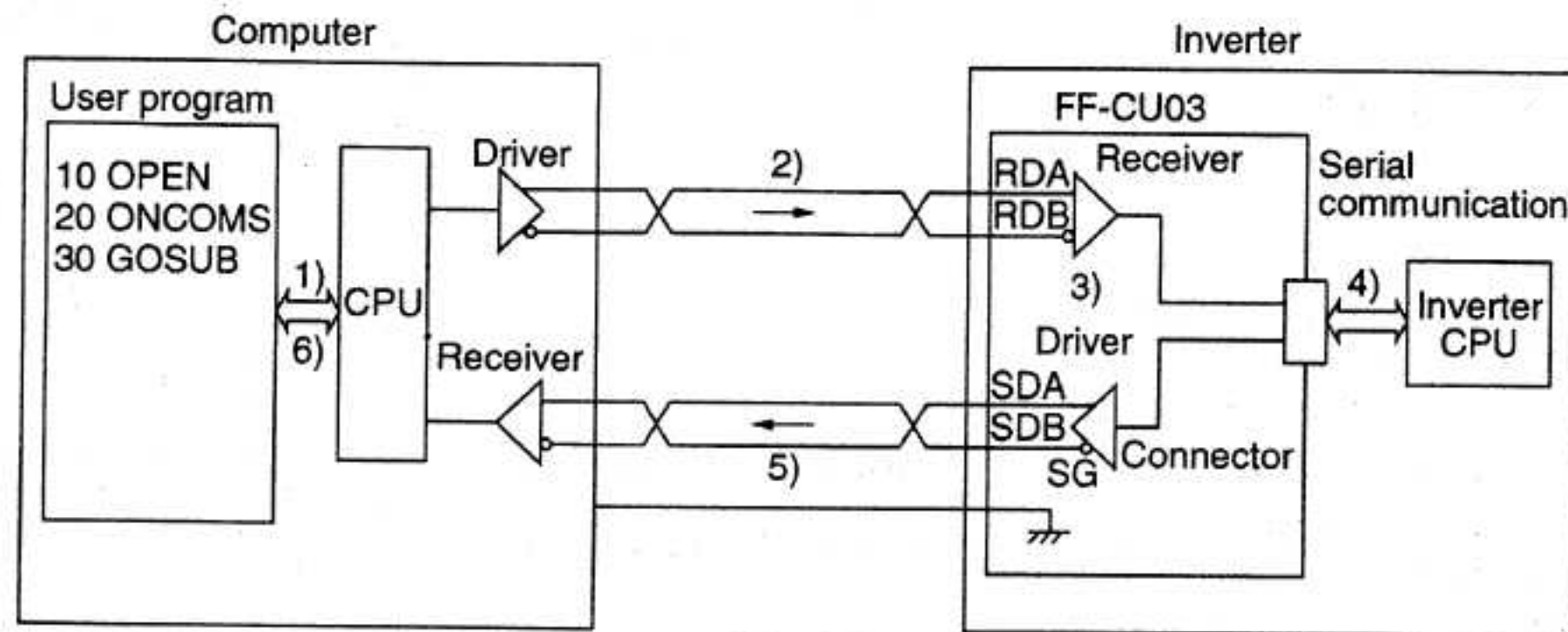


Fig. 5.1

6. PROGRAMMING

(1) Communication protocol

Data communication between the computer and inverter is performed in the following procedure:

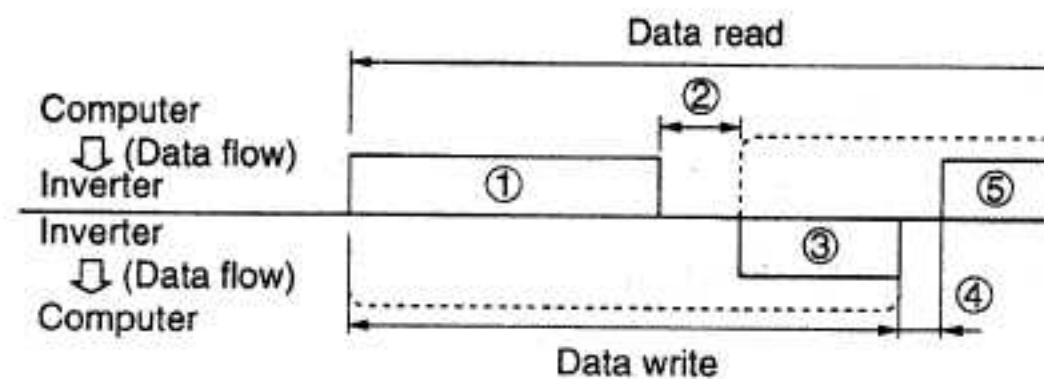


Fig. 6.1

Table 6.1

	Operation Control		Operation Command	Frequency Setting	Parameter Write	Inverter Reset	Monitor	Parameter Read
①	Communication request is sent to the inverter in accordance with the computer program.		A'	A (A'') ^{*3)}	A (A'') ^{*3)}	A	B	B
②	Inverter data processing time		Present	Present	Present	Absent	Present	Present
③	Reply data from the inverter Data 1 is checked for error.	Without error	C	C	C	Absent	E, E' (E'') ^{*3)}	E (E'') ^{*3)}
		Request accepted						
		With error Request rejected	D	D	D	Absent	F	F
④	Computer processing delay time		Absent	Absent	Absent	Absent	Present	Present
⑤	Answer from computer in response to reply data 3. Data 3 is checked for error.	Without error	Absent	Absent	Absent	Absent	G	G
		No processing						
		With error 3 re-output	Absent	Absent	Absent	Absent	H	H

- *1) If a data error has occurred and a retry must be made,, execute retry according to the user program. The inverter comes to an alarm stop (E. OPT) if the number of consecutive retries exceeds the permissible value.
- *2) On receiving the occurrence of any data error, the inverter returns reply data 3 to the computer again. The inverter comes to an alarm stop (E. OPT) if the number of consecutive data error times exceeds the permissible value.
- *3) If Pr. 37 is set 0.01 to 9998 and data code (Link parameter expansion setting) "FF" is set 1, then data format A" or E" is used. (Pr 37, Output frequency write)

(2) Data format

Data is used in hexadecimal. Data is automatically transferred in ASCII between the computer and inverter.

1) Data format types

- ① Communication request data from computer to inverter

[Data write]

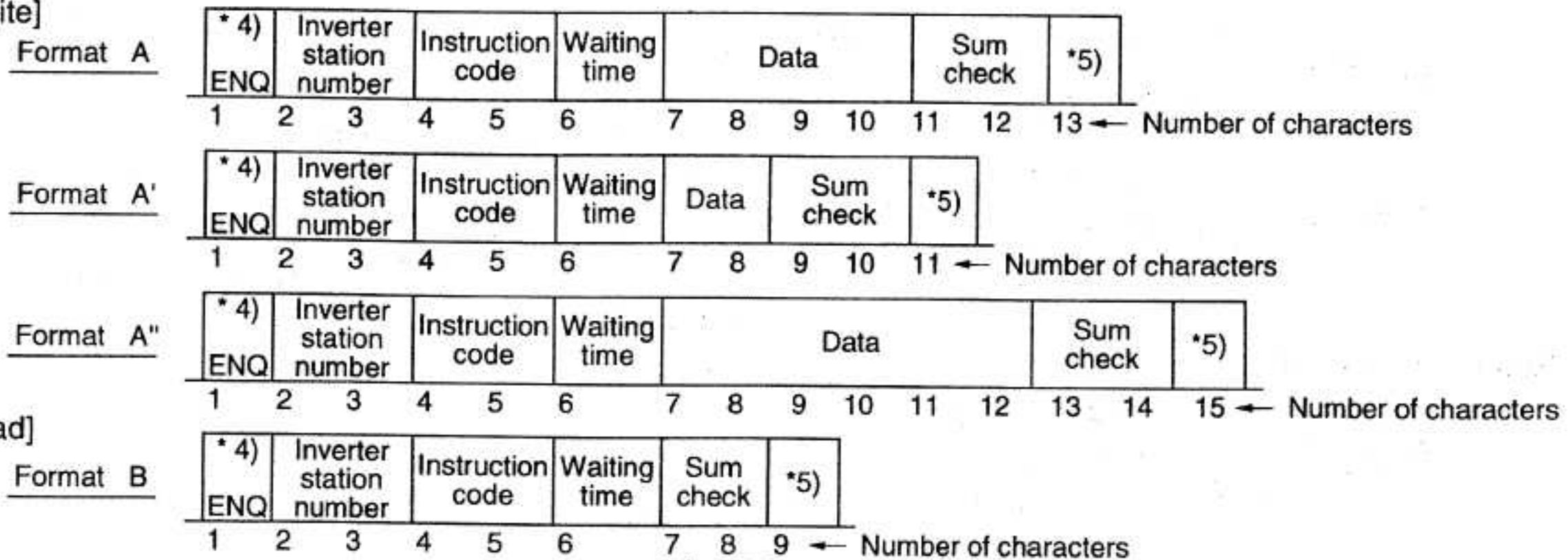


Fig. 6.2

*4) Control code (See Table 6.2)

*5) CR, LF codes

When data is transmitted from the computer to the inverter, the CR (carriage return) and LF (line feed) codes are automatically set at the end of a data group depending on the computer used. In such a case, these codes must also be set when data is transmitted from the inverter to the computer.

② Reply data from inverter to computer during data write

[No data error detected]

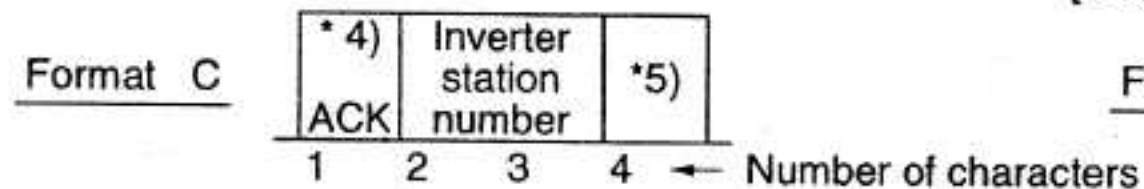


Fig. 6.3

[Data error detected]

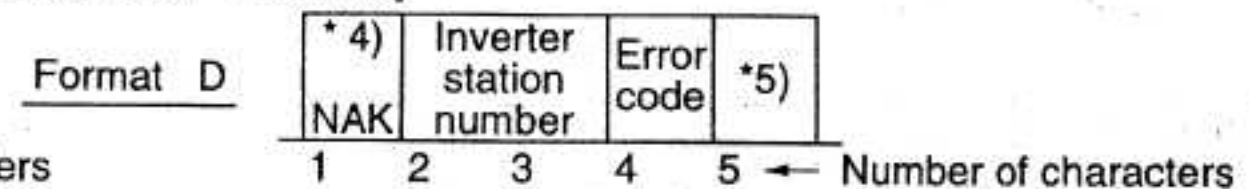
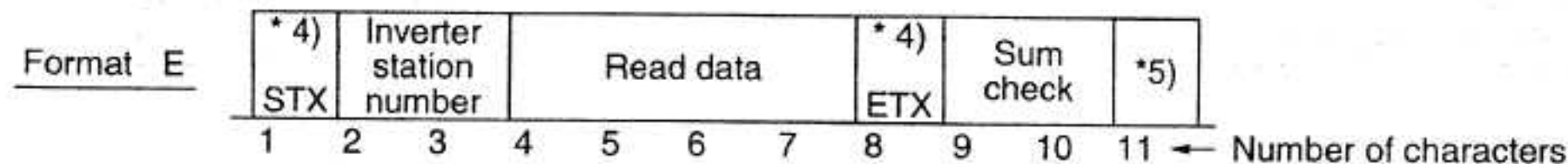


Fig. 6.4

③ Reply data from inverter to computer during data read

[No data error detected]



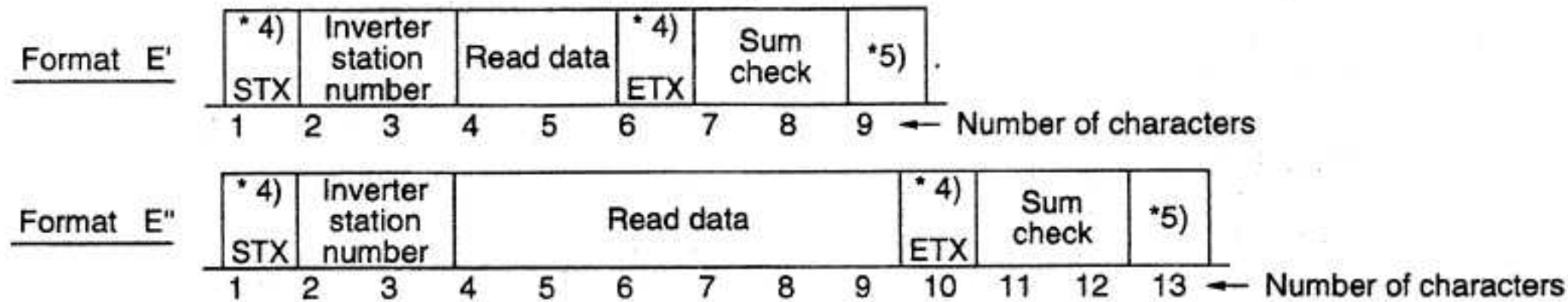


Fig. 6.5

[Data error detected]

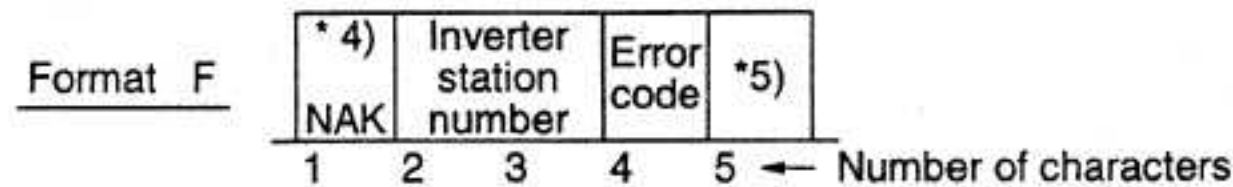


Fig. 6.6

④ Reply data from computer to inverter during data read

[No data error detected]

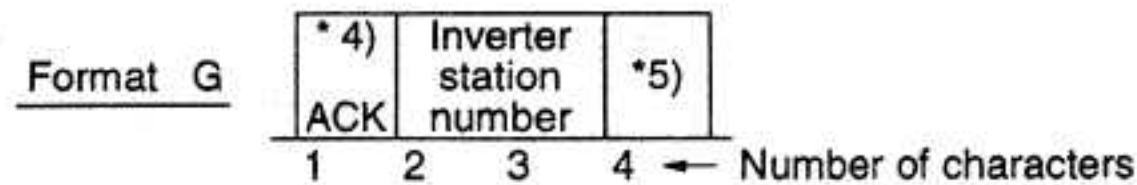


Fig. 6.7

[Data error detected]

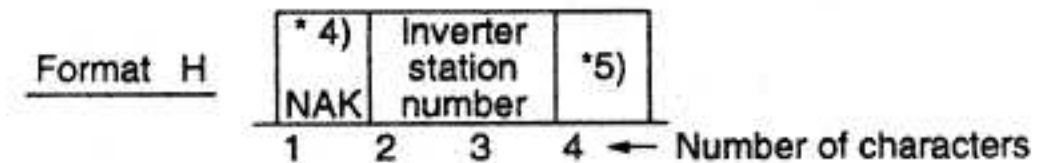


Fig. 6.8

2) Control codes

Table 6.2

Signal	ASCII Code	Description
NUL	H00	Null (No processing)
STX	H02	Start of Text (Start of data)
ETX	H03	End of Text (End of data)
ENQ	H05	Enquiry (Communication request)

Signal	ASCII Code	Description
ACK	H06	Acknowledge (No data error detected)
LF	H0A	Line Feed
CR	H0D	Carriage Return
NAK	H15	Negative Acknowledge (Data error detected)

(3) Program Example

The following example switches the operation mode to computer link operation.

Program

Line number

```

10 OPEN "COM1: 9600, E,8,2,HD" AS#1
20 COMST1,1,1: COMST1,2,1
30 ON COM (1) GOSUB*REC
40 COM (1) ON
50 D$ = "01FB10000"
60 S = 0
70 FOR I = 1 TO LEN (D$)
80 A$ = MID $ (D$, I, 1)
90 A = ASC (A$)
100 S = S + A
110 NEXT I
120 D$ = CHR$ (& H5) + D$ + RIGHT $ (HEX $ (S),2)
130 PRINT # 1,D$
140 GOTO 50
1000 *REC
1010 IF LOC (1) = 0 THEN RETURN
1020 PRINT "RECEIVE DATA"
1030 PRINT INPUT $ (LOC (1), #1)
1040 RETURN

```

General flow chart

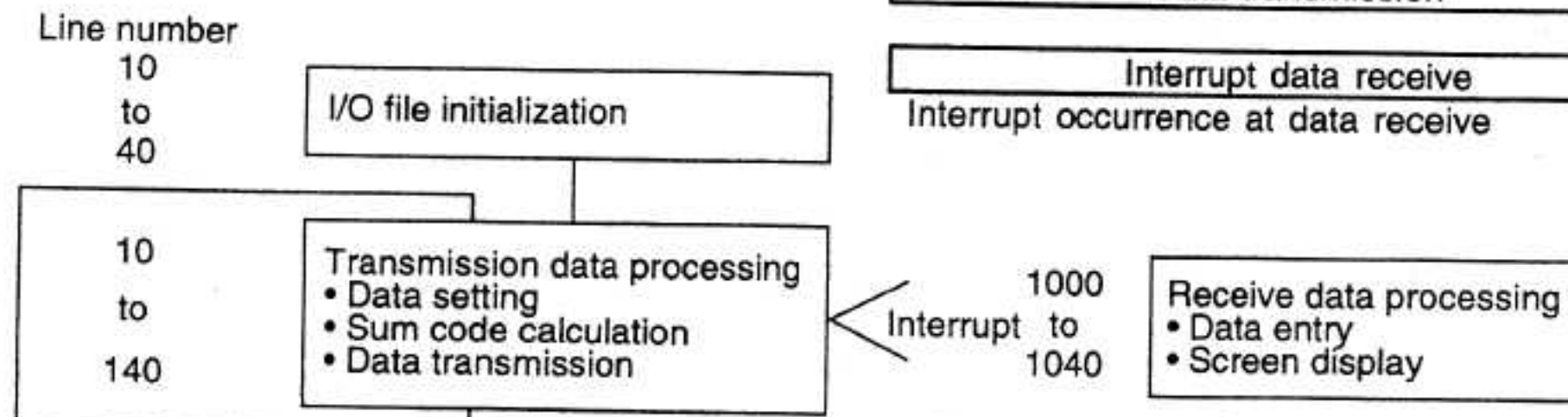


Fig. 6.9

7. ADJUSTMENT AND SETTINGS

(1) Function of parts

Table 7.1

No.	Description	Explanation
1	Connector	To interface the inverter printed circuit board. Correctly fit this connector to the inverter connector pins.
2	Terminal block	For serial signal input/output. See page 3 for the wiring method. (Terminal screw size: M3)
3	Terminal resistor jumper	To connect the terminal resistor contained in the FR-CU03 unit. ● Inverter having final station number: Connect terminals RDB and RDR ● Other inverters: Remove the jumper.
4	Communication indicator LEDs	SD LED indicates transmitting RD LED indicates receiving.
5	Installation holes (1 places)	To fasten the FR-CU03 unit to the inverter cover with the accessory mounting screws.

(2) Parameter initialization

To perform communication between the computer and inverter, the parameters must be initialized as indicated in Table 7.2. Proper data communication cannot be done if the parameters have not been initialized or if any parameter has been set to a wrong value.

Table 7.2

No.	Function	Parameter No.	Data set value	Description	Initial Setting
1	Communication speed	32	12, 24, 48, 96 (note) 9999	Indicates communication speed (baud) (Example 96 → 9600 baud)	96
2	Operation command selection	33	0, 1 (note) 9999	0: COM 1: EX	0
3	Speed command selection	34	0, 1 (note) 9999	0: COM 1: EX	0
4	Computer link start-up mode selection	35	0, 1 (note) 9999	0: EXT, PU 1: Serial link	0
5	Station number	36	0 to 31 (note) 9999		0
6	Serial data length	48	0, 1 (note) 9999	0: 8 bit 1: 7 bit	0

No.	Function	Parameter No.	Data set value	Description	Initial Setting
7	Stop bit length	49	0, 1 (note) 9999	0: 1 bit 1: 2 bit	1
8	Parity check	50	0, 1, 2 (note) 9999	0: No Parity check 1: Odd Parity check 2: Even Parity check	2
9	CR, LF code selection	51	0, 1, 2 (note) 9999	0: Both CR & LF absence 1: CR only presence 2: Both CR & LF presence	1
10	Allowable retries at communication error	52	0 to 10	Indicates the allowed number of error occurrences. Factory set to 1.	1
11	Allowable communication time interval	53	0, 0.1 to 999.8 (note) 9999	0: Computer link operation disallowed 0.1 to 999.8: Allowable value 9999 (OFFFH); Communication check halt	0

Note) If any parameter 32 to 36 or 48 to 51 is set 9999, communication between computer and inverter cannot made.

(3) Setting the inverter station number

- 1) The station number may be set between 0 and 31 in Pr. When the RS-422A interface is used, the station number may be set between 0 and 31 but the number of inverters connected must be less than 10.
- 2) Note that the same station number cannot be set for different inverters. (If such setting has been made, proper communication will not be performed.)
- 3) Station numbers do not have to be sequential and may be skipped, e.g. as shown in Fig. 7.1

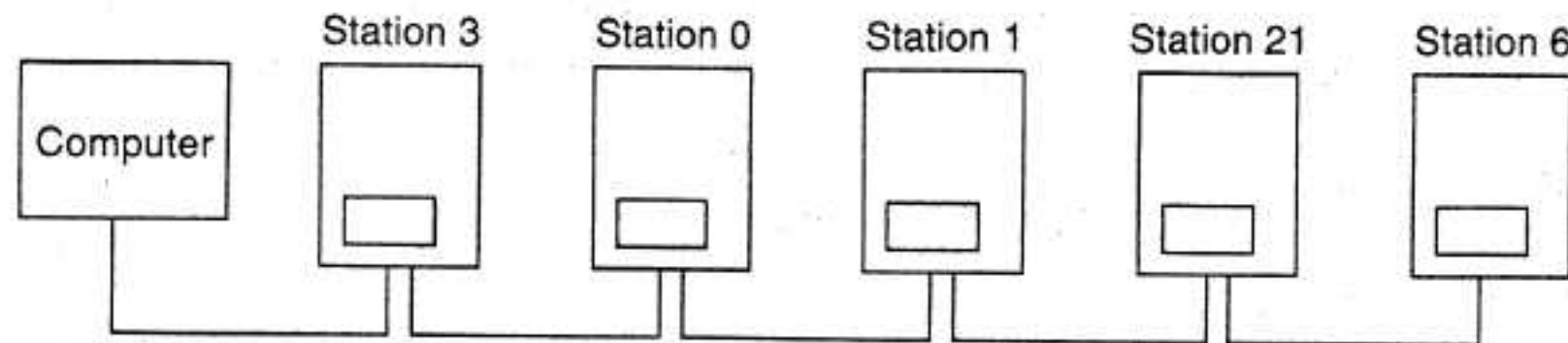


Fig. 7.1 Station Number Setting Example

(4) Control place selection

In the computer link operation mode, operation can be performed by signals from external terminals in accordance with the conditions set in parameter 33 (operation command control place selection) and parameter 34 (speed command control place selection).

Table 7.3 Control Place Selection

Control Place Selection		Functions Equivalent to external terminals									
Pr.33 Operation command	Pr.34 Speed command	STF	STR	2	4	RH, RM, RL	AU	RES	MRS	OH	RT
0: Computer	0: Computer	COM	COM	COM	—	COM	BO	BO	BO	EX	COM
0: Computer	1: External terminals	COM	COM	EX	EX	EX	BO	BO	BO	EX	COM
1: External terminals	0: Computer	EX	EX	COM	—	COM	BO	BO	EX	EX	EX
1: External terminals	1: External terminals	EX	EX	EX	EX	EX	BO	BO	EX	EX	EX

Note) EX : Control by signal from external terminal is only valid.
 COM : Control from computer user program is only valid.
 BO : Control from both external terminal and computer is valid.
 — : Control from both external terminal and computer is invalid.

8. OPERATION MODE AT POWER ON

Set parameter 35 (start-up operation mode) as appropriate to select the operation mode at power on and restoration from instantaneous power failure.

Table 8.1

Parameter Set Value	Pr.79	Operation Mode	Mode at Power On and Restoration from Instantaneous Power Failure
0	0	PU or external operation	External operation mode
	1	PU operation	PU operation mode
	2	External operation	External operation mode
1	Computer link operation		Computer link operation mode. (Need not be switched by program.)

9. INSTRUCTIONS

(1) Programming instruction

- 1) The inverter does not accept data from the computer if it has an error. For this reason, a retry program for data error must be included in the user program.
- 2) When a request of any data communication (e.g. operation command, monitor) is given by the computer, the inverter does not voluntarily return data to the computer. Hence, the program should be written to give a data read request as required from the computer at the time of monitoring, etc.

(2) Operating instructions

- 1) To prevent hazard, the inverter is designed to be inoperative when an allowable communication time interval has not been set in Pr.53 (set value = 0). Before starting operation, therefore, an appropriate value must be set in Pr.53.
- 2) Data communication is not made automatically but is executed only once a communication request is given by the computer. The inverter therefore cannot be stopped if communications are disabled during operation due to a broken cable, etc. After the allowable communication time interval (Pr.53) has elapsed, the inverter is brought to an alarm stop (E.OPT).

The inverter can be coasted to a stop by connecting inverter terminals RES-P24 or shutting the power off.

10. TROUBLESHOOTING

(1) Data from computer unread by inverter

- 1) Computer conforming the RS422A, RS485 standard?
- 2) FR-CU03 unit and communication cables fitted properly? (Check for contact fault, broken cable, wrong polarity, etc.)
- 3) Inverter initialization correct?
- 4) Inverter station number setting correct?
(Check that setting and program match and that the same station number is not used for different inverters.)
- 5) Correct communication request program executed in computer?

(2) Operation mode not switched to computer link operation

- 1) Is the inverter in external operation mode? Are signals to STF or STR off?
- 2) Correct operation mode switching program executed?

(3) Inverter not started in computer link mode

- 1) Inverter starting program executed properly?
- 2) Control place select conditions in Section 7 (4) set properly?
- 3) Inverter output provided?
- 4) Allowable communication time interval set properly?

(4) Inverter brought to alarm stop during operation due to communication fault

- 1) FR-CU03 unit and communication cables fitted properly?
(Check for contact fault, broken cable, etc.)
- 2) Computer operating without fault?
- 3) Program written to give communication request from computer periodically?
- 4) Allowable communication time interval set properly?
- 5) Format of data transferred proper?

11. SET ITEMS AND SET DATA

After initialization is complete, set the instruction codes and data as required and start communication from computer to allow operation control and monitoring as appropriate.

Table 11.1

Table 1-11																																																																			
No.	Items		Instruction Code	Description	Number of Data Digits																																																														
1	Operation mode	Read	H7B	H0000: Computer link operation H0001: External operation	4 digits																																																														
		Write	HFB	H0000: Computer link operation H0001: External operation																																																															
2	Monitor	Output frequency (speed)	H6F	H0000 to HFFFF: Output frequency (hexadecimal) in 0.01Hz increments Speed (hexadecimal) in 0.001 rpm increments if parameter 37 setting is between 0.01 and 9998.	4 digits or 6 digits																																																														
		Output current	H70	H0000 to HFFFF: Output current (hexadecimal) in 0.01A increments																																																															
					H0000 to HFFFF: Two most recent alarm definitions Alarm definition display example (instruction code H74) Read data = H41AO [Previous error FAN Most recent error OPT]																																																														
					<div style="text-align: center;"><div style="display: flex; justify-content: space-between;">b15b8 b7b0</div><table border="1" style="margin: auto;"><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table><div style="display: flex; justify-content: space-around; margin-top: 5px;">Previous error (H41)Most recent error (HA0)</div></div> <p>Alarm data For more information, see the inverter manual.</p> <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>Data</th><th>Description</th><th>Data</th><th>Description</th></tr></thead><tbody><tr><td>H00</td><td>No alarm</td><td></td><td></td></tr><tr><td>H10</td><td>OC1</td><td></td><td></td></tr><tr><td>H11</td><td>OC2</td><td>H60</td><td>OLT</td></tr><tr><td>H12</td><td>OC3</td><td>H70</td><td>BE</td></tr><tr><td>H20</td><td>OV1</td><td>H80</td><td>GF</td></tr><tr><td>H21</td><td>OV2</td><td>H90</td><td>OHT</td></tr><tr><td>H22</td><td>OV3</td><td>HA0</td><td>OPT</td></tr><tr><td>H30</td><td>THT</td><td>HB0</td><td>PE</td></tr><tr><td>H31</td><td>THM</td><td>HB1</td><td>PUE</td></tr><tr><td></td><td></td><td>HB2</td><td>RET</td></tr><tr><td>H41</td><td>FAN</td><td>HC0</td><td>CPU</td></tr></tbody></table>		0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	Data	Description	Data	Description	H00	No alarm			H10	OC1			H11	OC2	H60	OLT	H12	OC3	H70	BE	H20	OV1	H80	GF	H21	OV2	H90	OHT	H22	OV3	HA0	OPT	H30	THT	HB0	PE	H31	THM	HB1	PUE			HB2	RET	H41
0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0																																																				
Data	Description	Data	Description																																																																
H00	No alarm																																																																		
H10	OC1																																																																		
H11	OC2	H60	OLT																																																																
H12	OC3	H70	BE																																																																
H20	OV1	H80	GF																																																																
H21	OV2	H90	OHT																																																																
H22	OV3	HA0	OPT																																																																
H30	THT	HB0	PE																																																																
H31	THM	HB1	PUE																																																																
		HB2	RET																																																																
H41	FAN	HC0	CPU																																																																

No.	Item	Instruction Code	Description	Number of Data Digits
3	Operation command	HFA	<p>H00 to HFF: Operation command</p> <p>b0: Current input selection (AU) b1: Forward rotation (STF) b2: Reverse rotation (STR) b3: Low speed (RL) b4: Middle speed (RM) b5: High speed (RH) b6: Second acce/dcce time selection (RT) b7: Inverter output half (MRS)</p> <p>b7 b0 0 0 1 0 0 0 1 0 (Data of example 1)</p> <p>Example 1: H62 ... Second acceleration/deceleration selected for high-speed forward rotation. Example 2: H00 ... Stop</p>	2 digits
4	Inverter status monitor	H7A	<p>H00 to HFF: Inverter operating status</p> <p>b0: Inverter running (RUN) b1: Forward running b2: Reverse running b3: Up to frequency (SU) b4: Overload (OL) b5: b6: Frequency detection (FU) b7: Alarm</p> <p>b7 b0 0 0 0 0 1 0 1 1 (Data of example 1)</p> <p>Example 1 H0B: Frequency reached during forward running. Example 2 H80: Stop due to error occurrence.</p>	2 digits
5	Output frequency write (E ² PROM)	HEE	<p>H0000 to H9C40: In 0.01Hz increments (hexadecimal) (0 to 400.00Hz) To change the output frequency consecutively, write data to the inverter RAM. (Instruction code: HED)</p>	4 digits or 6 digits
6	Inverter reset	HFD	<p>H9696: Inverter is reset. Since the inverter is reset at the start of communication by the computer, the inverter cannot send reply data back to the computer.</p>	4 digits
7	Parameter all clear	HFC	<p>H9696: All parameters return to the factory-set values. When parameter all clear is executed, the initialized items set in Section 7 (3) return to the factory-set values. Therefore initialization should be made again to resume operation.</p>	4 digits

No.	Item	Instruction Code	Description	Number of Data Digits
8	Parameter write	H80 to HEC	Write and/or read parameters as required in accordance with the instruction code and data list in section 12. Note that some parameters cannot be written or read.	4 digits
9	Parameter read	H00 to H4F		

12. DATA CODE LIST

(1) Standard parameters (Data code FF = 0)

Parameter No.	Function	Data Code		Setting range	Minimum Increment	Initial Setting
		Read	Write			
0	Torque boost	00	80	0 to 30%	0.1%	6%
1	Max. frequency limit	01	81	0 to 120Hz	0.01Hz	120Hz
2	Min. frequency limit	02	82	0 to 120Hz	0.01Hz	0Hz
3	Base frequency	03	83	0 to 400Hz	0.01Hz	50Hz
4	Multi-speed setting (high speed)	04	84	0 to 400Hz	0.01Hz	50Hz
5	Multi-speed setting (middle speed)	05	85	0 to 400Hz	0.01Hz	30Hz
6	Multi-speed setting (low speed)	06	86	0 to 400Hz	0.01Hz	10Hz
7	Acceleration time	07	87	0 to 3600 seconds	0.1 seconds	5 seconds
8	Deceleration time	08	88	0 to 3600 seconds	0.1 seconds	5 seconds
9	Electronic thermal relay	09	89	0 to 500A	0.01A	Rated value
10	DC dynamic brake frequency	0A	8A	0 to 120Hz	0.01Hz	3Hz
11	DC dynamic brake time	0B	8B	0 to 10 seconds	0.1 seconds	0.5 seconds
12	DC dynamic brake voltage	0C	8C	0 to 30%	0.1%	6%
13	Starting frequency	0D	8D	0 to 60Hz	0.01Hz	0.5Hz
14	Selection of applied load	0E	8E	0, 1, 2, 3	1	0
15	Jog frequency	0F	8F	0 to 400Hz	0.01Hz	5Hz
16	Jog accel./decel.	10	90	0 to 3600 seconds	0.1 seconds	0.5 seconds
17	External thermal relay signal input	11	91	0, 1	1	0

Parameter No.	Function	Data Code		Setting range	Minimum Increment	Initial Setting
		Read	Write			
18	High-speed maximum frequency limit	12	92	120 to 400Hz	0.01Hz	120Hz
19	Base frequency voltage	13	93	0 to 1000V, 8888, 9999	0.1V	8888
20	Acceleration/deceleration reference frequency	14	94	1 to 400Hz	0.01Hz	50Hz
22	Stall prevention level	16	96	0 to 200%	0.1%	150%
24	Multispeed setting (speed 4)	18	98	0 to 400Hz, 9999	0.01Hz	9999
25	Multispeed setting (speed 5)	19	99	0 to 400Hz, 9999	0.01Hz	9999
26	Multispeed setting (speed 6)	1A	9A	0 to 400Hz, 9999	0.01Hz	9999
27	Multispeed setting (speed 7)	1B	9B	0 to 400Hz, 9999	0.01Hz	9999
29	Acceleration/deceleration pattern	1D	9D	0, 1, 2	1	0
30	Regenerative brake duty selection	1E	9E	0, 1	1	0
31	Setting of E ² PROM write by computer link	1F	9F	0, 1	1	0
32	Communication speed	20	A0	12, 24, 48, 96, 9999	1	96
33	Operation command selection	21	A1	0, 1, 9999	1	0
34	Speed command selection	22	A2	0, 1, 9999	1	0
35	Computer link start-up mode selection	23	A3	0, 1, 2, 9999	1	0
36	Station number selection	24	A4	0 to 31, 9999	1	0
37	Speed display	25	A5	0, 1 to 9998	1	0
38	Frequency at 5V (10V) input	26	A6	1 to 400Hz	0.01Hz	50Hz
39	Frequency at 20mA input	27	A7	1 to 400Hz	0.01Hz	50Hz
40	Output terminal assignment	28	A8	0 to 33	1	02
41	Up to frequency sensitivity	29	A9	0 to 100%	0.1%	10%
42	Output frequency detection	2A	AA	0 to 400Hz	0.01Hz	6Hz
43	Output frequency detection during reverse operation	2B	AB	0 to 400Hz, 9999	0.01Hz	9999

Parameter No.	Function	Data Code		Setting range	Minimum Increment	Initial Setting
		Read	Write			
44	2nd acceleration/deceleration time	2C	AC	0 to 3600 seconds, 9999	0.1 seconds	9999
45	2nd deceleration time	2D	AD	0 to 3600 seconds, 9999	0.1 seconds	9999
46	2nd torque boost	2E	AE	0 to 30%, 9999	0.1%	9999
47	2nd V/F (base frequency)	2F	AF	0 to 400Hz, 9999	0.01Hz	9999
48	Communication data length	30	B0	0, 1, 9999	1	0
49	Stop bit length	31	B1	0, 1, 9999	1	1
50	Parity check	32	B2	0, 1, 2, 9999	1	2
51	CR, LF, Code selection	33	B3	0, 1, 9999	1	1
52	Number of communication retries	34	B4	0 to 10, 9999	1	1
53	Communication check time interval	35	B5	0, 0.1 to 999.8, 9999	0.1 seconds	0
54	Selection of FM terminal function	36	B6	0, 1	1	0
55	Frequency reference setting	37	B7	0 to 400Hz	0.01Hz	50Hz
56	Current monitoring reference	38	B8	0 to 500A	0.01A	Rated value
57						
58						
59						
60						
61						
62						
63						
64						
65	Retry selection	41	C1	0, 1, 2, 3	1	0
66						
67	Retry count after an occurrence of inverter alarm	43	C3	0 to 10, 101 to 110	1	0

Parameter No.	Function		Data Code		Setting range	Minimum Increment	Initial Setting
			Read	Write			
68	Retry waiting time		44	C4	0 to 360 seconds	0.1 seconds	1 seconds
69	Clearing retry count		45	C5	0	—	0
70	Regenerative brake duty		46	C6	0 to 30%	0.1%	0%
71							
72	PWM carrier frequency selection		48	C8	0.7 to 14.5KHz	0.1KHz	1KHz
73	0 – 5V, 0 – 10V selection		49	C9	0 to 5, 10 to 15	1	1
74	Selection for current input reference		4A	CA	0 to 1	1	0
75	Reset selection		4B	CB	0, 1	1	0
76							
77	Parameter write prohibition		4D	CD	0, 1, 2	1	0 Must not be set.
78	Reverse prevention		4E	CE	0, 1, 2	1	0
79	Operation mode selection		4F	CF	0 to 4, 7, 8	1	0
80	Motor capacity		50	D0	0.2 to 3.7kW, 9999 (note)	0.01kW	9999
—	Second parameter switching		6C	EC	0, 1, 2		00
—	Frequency setting	Output frequency setting (RAM)	6D	ED	0 to 400Hz	0.01Hz	0Hz
—		Output frequency setting (E ² ROM)	6E	EE	0 to 400Hz	0.01Hz	0Hz
—	Monitor	Frequency monitor	6F	—	0 to 400Hz	0.01Hz	
—		Output current monitor	70	—	0 to 500A	0.01A	
—/996	Alarm display	Most recent No.1, No.2 alarm display read/clear	74	F4	9696		
		Most recent No.3, No.4 alarm display read/clear	75				
—	Inverter status monitor/operation command		7A	FA	00 to FF		00
—	Operation mode acquisition		7B	FB	0, 1, 2		

Parameter No.	Function	Data Code		Setting range	Minimum Increment	Initial Setting
		Read	Write			
998	Parameter all clear	—	FC	9966		—
999	Parameter clear	—	FC	9696		—
—	Parameter all clear (Except for Computer link parameters)	—	FC	5A5A		—
—	Parameter clear (Except for Computer link parameters)	—	FC	55AA		
997	Inverter reset	—	FD	9696		—
—	Link parameter expansion setting	7F	FF	0: Pr.0 to 99 & Pr.996 to 999 1: Pr.100 to 995		

Note) (200V class: 2.2kW 400V class: 3.7kW)

(2) Special parameters (Data code FF = 1)

Parameter No.	Function	Data Code		Setting range	Minimum Increment	Initial Setting
		Read	Write			
900	FM terminal calibration	5C	DC	0 to 4096	1	Not defined
902	Frequency setting voltage bias	5E	DE	0 to 60.00Hz (0 to 4096)	0.01Hz	0
903	Frequency setting voltage gain	5F	DF	1 to 400.00Hz (0 to 4096)	0.01Hz	50Hz
904	Frequency setting current bias	60	E0	0 to 60.00Hz (0 to 4096)	0.01Hz	0
905	Frequency setting current gain	61	E1	0 to 400.00Hz (0 to 4096)	0.01Hz	50Hz
990	Selection of key click sound	66	E6	0, 1	1	0
991	Selection of the parameter unit display data	67	E7	0, 1, 2	1	0
—	Link parameter expansion setting	7F	FF	0: Pr.0 to 99 1: Pr.100 to 915	1	0

13. ERROR CODE LIST

The corresponding error code in the following list is displayed if an error is detected in any communication request data from the computer.

Error Code	Item	Definition	Inverter Operation
H0	Computer NAK error	The number of errors consecutively detected in communication request data from the computer is greater than the allowed number of retry times.	Brought to an alarm stop (E. OPT) if error occurs continuously more than the allowable number of retry times.
H1	Parity error	The parity check result does not match the specified parity.	
H2	Sum check error	The sum check code in the computer does not match that of the data received by the inverter.	
H3	Protocol error	Data received by the inverter is in wrong protocol.	
H4	Framing error	The stop bit length is not as specified by initialization.	
H5	Overrun error	New data has been sent by the computer before the inverter completes receiving the preceding data.	Does not accept receive data but is not brought to alarm stop.
H6	—	—	
H7	Character error	The character received is invalid (other than 0 to 9, A to F, control code).	
H8	—	—	
H9	—	—	
HA	Mode error	Parameter write was attempted in other than the computer link operation mode or during inverter operation.	Does not accept receive data but is not brought to alarm stop.
HB	Instruction code error	The specified command does not exist.	
HC	Data range error	Invalid data has been specified for parameter write, frequency setting, etc.	
HD	—	—	Does not accept receive data but is not brought to alarm stop.
HE	Inverter communication error	Communication is faulty between the option and inverter.	
HF	—	—	

14. SPECIFICATIONS (FR-CU03)

(1) Power supply

- Control power: Supplied by the inverter
- Communication power: 5VDC

(2) Conforming standard

- Shared between RS422A and RS485 (EIA standard)

(3) Transmission form

- Multidrop link system

(4) Communication cable

- Twisted pair cable

(5) Transmission distance

- Max. 500m overall

(6) Number of inverters connected

- Up to 10 inverters for RS422A computer interface
- Up to 32 inverters for RS485 computer interface

(7) Applicable computer

- Computer with RS422A or RS485 interface

(8) Applicable inverter

- All models of the FR-A024 series inverters

(9) Communication specifications

Item		Specifications				
Communication speed		9600 ^{*1)} /4800/2400/1200 baud rates selected				
Inverter response time		Time between the start of computer communication and the start of control (e.g. start, stop) by the inverter.				
		Communication speed (baud)	9600	4800	2400	1200
		Response time (msec)	Approx. 25	Approx. 40	Approx. 65	Approx. 115
		Depends on communication speed.				
Control procedure		Synchronous system				
Communication system		Half duplex system				
Character system		ASCII (7/8 ^{*1)} bits)				
Stop bit length		1/2 ^{*1)} bits selected.				
Check system	Parity check	Available (even ^{*1)} /odd)/unavailable				
	Sum check	Available				

*1) Factory-set value



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