MITSUBISHI
MITSUBISHI MELTRAC-A SERIES INVERTER

INSTRUCTION MANUAL FOR OPTION CARD T-OPT21

COMPUTER LINK CARD

(Serial Communication Link Card)

T-OPT21

- PLG FEEDBACK CONTROL
- COMPUTER LINK (Serial Communication Link)

Your purchase of this Mitsubishi MELTRAC-A INVERTER Option Card is greatly appreciated.
This instruction manual describes operating instructions and cautionary notes to use your MELTRAC-A Option Card correctly.
Incorrect operation or handling may cause unexpected problems. Be sure to read this operation manual thoroughly so that you will use your Option Card correctly.

COMPUTER LINK OPTION CARD (T-OPT21)
This is a multi-functional option card that is capable of communicating with personal computers and is designed to be used in constructing FA-compatible drive systems. The Option Card has the following functions.

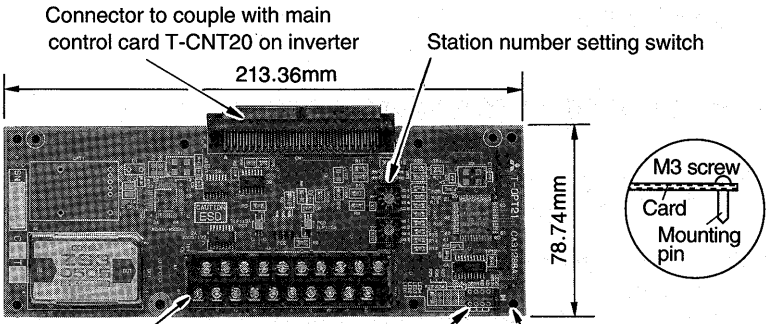
- PLG feedback control
- Computer link

TABLE OF CONTENTS

NOTE: This multi-functional Option Card is initialized as shown in the table below. In order for each feature to be functional, refer to the corresponding pages in this manual to set the necessary parameters.

Function	Initial condition	Note
PLG feedback control function	Not functional	Pr.105 is factory-set to [9999].
Computer link function	Not functional Monitor and parameter values can be read.	Pr.122 is factory-set to [0].

1. OUTLINE



- PLG feedback control
- Computer link

Terminal block TB1 Terminal layout

Terminal No.	Signal name	Description	Terminal No.	Signal name	Description
A1	SD1A	Transmission data output terminal A	B1	12V	External 12 V power source terminal
A2	SD2A	Transmission data input terminal A	B2	SG	External power grounding terminal
A3	SD1B	Transmission data inverse output terminal B	B3	Not used	
A4	SD2B	Transmission data inverse input terminal B	B4	FG	Frame grounding terminal
A5	SD2R	Terminal for connecting resistor at transmission end	B5	SG2	Transmission signal ground
A6	RD1A	Received data input terminal A	B6	Not used	
A7	RD2A	Received data output terminal A	B7	PA1	Encoder phase A signal input terminal
A8	RD1B	Received data inverse input terminal B	B8	PA2	Encoder phase A inverse signal input terminal
A9	RD2B	Received data inverse output terminal B	B9	PB1	Encoder phase B signal input terminal
A10	RD2R	Terminal for connecting resistor at transmission end	B10	PB2	Encoder phase B inverse signal input terminal

2. INSTALLATION

Remove the front cover from the inverter. Mount the Option Card according to the following instruction.

2-1 PREPARATION FOR INSTALLATION

(1) Check that the inverter type and model number are correct.
This Option Card is exclusively for MELTRAC-A series products.

(2) Check that the main circuit power and the control circuit power of the inverter have been turned off.
DO NOT MOUNT THE OPTION CARD WHILE POWER IS ON, AS DOING SO WOULD CAUSE THE INVERTER TO FAIL.

(3) If the PLG feedback control (optional) is to be used, prepare a PLG (or a motor with a PLG) and external power source.
See page 9 for details.

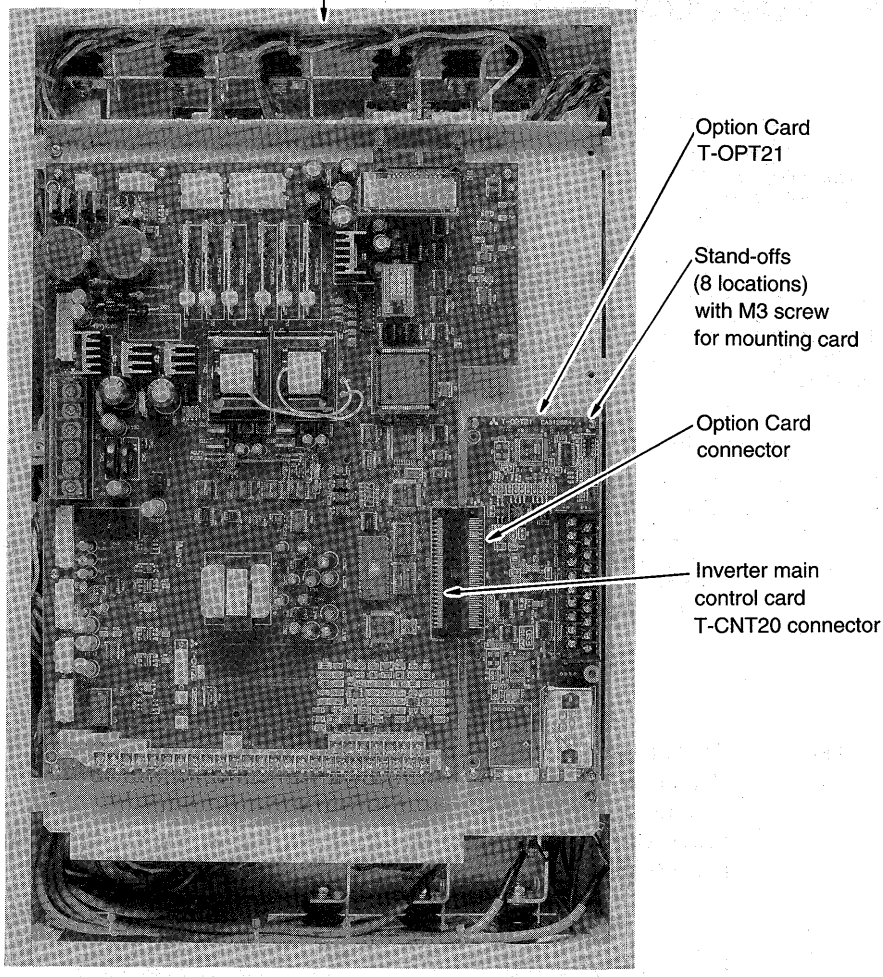
(4) Check that the following items are in the package.
- Operation manual x 1
- Option Card T-OPT21 x 1
- End piece (a piece secured on terminal block for mounting resistor at end) x 1
- M3 screws for mounting Option Card x 8
- Stand-offs for mounting Option Card x 8

2-2 INSTALLATION PROCEDURE

(1) Insert the Option Card connector into the connector on the main control card of the inverter.
Be sure to insert it firmly until fully seated.

(2) Securely mount the Option Card on the inverter with the attached M3 screws (8 locations). The connector may be incorrectly coupled if the stand-offs are not properly aligned with the inverter.

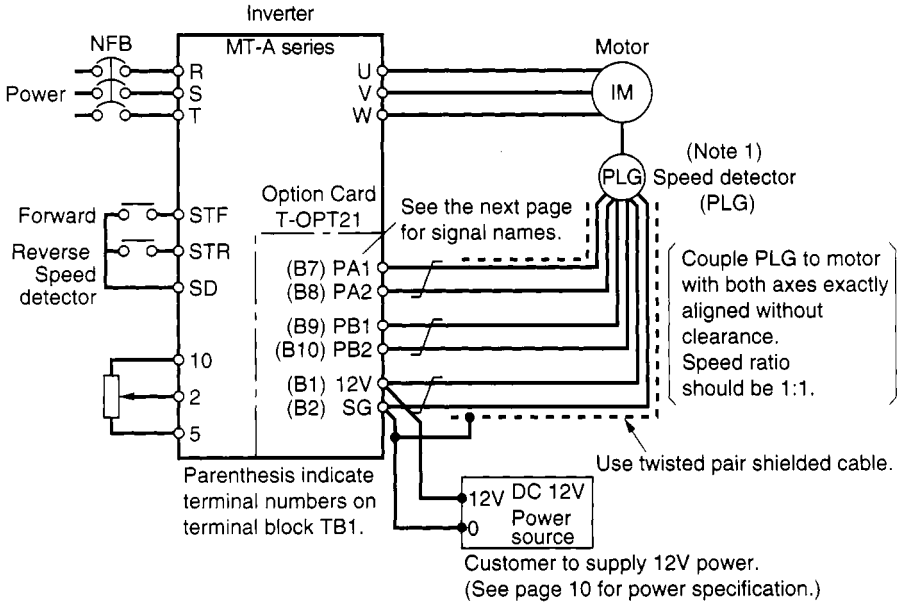
(3) See page 3 for mounting instruction.
★ Open terminals are used within the option card.
NEVER use these open terminals as relay terminals. Otherwise, the Option Card will be damaged.


Inverter (with the front cover removed)
Option Card
T-OPT21
Stand-offs
(8 locations)
with M3 screw
for mounting card
Option Card
connector
Inverter main
control card
T-CNT20 connector

3. OPERATING INSTRUCTIONS FOR PLG FEEDBACK CONTROL FUNCTION

A speed detector (pulse encoder PLG) detects motor rotational speed. The speed is fed back to the inverter which controls the output frequency in order to maintain a constant motor speed regardless of load variation.

3-1 CONNECTION DIAGRAM

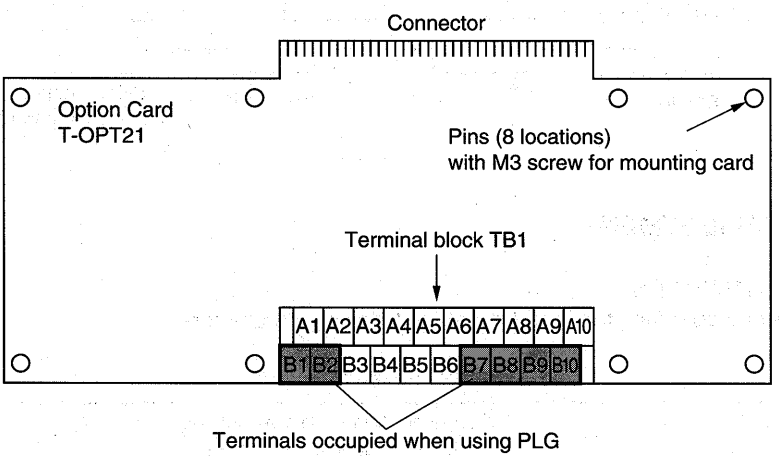


Note 1: The number of PLG pulses depends on the number of poles of the motor.
Number of PLG pulses = 150 pulses / number of poles
Example:
Install a 300 pulse-per-revolution PLG for a 2-pole motor or a 600 pulse-per-revolution PLG for a 4-pole motor.

Motor	Pulse number of PLG
2 Poles Motor	300 Pulses per revolution
4 Poles Motor	600 Pulses per revolution
6 Poles Motor	900 Pulses per revolution
8 Poles Motor	1200 Pulses per revolution

3.2 TERMINAL DESCRIPTION

Terminal No.	Signal name	Terminal name	Rating, etc.	Description
B7	PA1	PLG signal 1 (phase A +) input terminal	See page 9 for details of pulse signals.	Receives phase A and phase B signals from encoder.
B8	PA2	Common (PLG phase A –)		
B9	PB1	PLG signal 2 (phase B +) input terminal		
B10	PB2	Common (PLG phase B –)		
B1	12V	Positive power input terminal	DC 11.4 to 12.6 V (current consumption 200 mA)	Connect PLG power input. Connect 12 V + to terminal B1. Connect ground (SG) to terminal B2. Connect shielding line of shielded cable to terminal B2.
B2	SG	Power ground terminal		



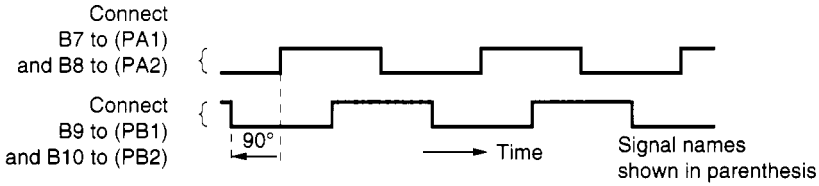
3-3 CAUTIONARY NOTES ON WIRING

(1) WIRING TO SPEED DETECTOR (PLG)

Use a twisted pair shielded cable (not smaller than 16AWG (1.25 mm^2)) for wiring to the Option Card (T-OPT21). The wiring to terminal B1 (12 V) and the wiring of the shield line of the twisted pair shielded cable to terminal B2 (SG) should be as follows depending on the length of the wiring.

Length of wiring	Increase in size
No longer than 100 m	No smaller than 16 AWG (1.25 mm^2)
No longer than 200 m	No smaller than 14 AWG (2.00 mm^2)

※ For the T-OPT terminals (B7, B8, B9 and B10), connect the feedback signal which has a phase angle that advances by 90° to terminals B7 and B8 when the motor rotates in the forward direction.



3-4 ADJUSTMENT

(1) PARAMETERS

Before operating the inverter, set the following parameters.

Table of parameters

Function No.	Function	Range of setting	Minimum setting	Ex-factory setting	Note
37	Number of motor poles	2 – 10※ 11 – 9998	1	4	See page 7.
105	Range of speed feedback	0.01 – 400 Hz 9999	0.01 Hz	9999	Speed feedback does not occur if set to 0 or 9999.
106	Feedback gain	0 – 100	0.1	1	See page 8.

(2) SETTING NUMBER OF MOTOR POLES (Pr.37)

Set the number of poles of the motor used.

※ Option Error (E.OPT) occurs if the inverter is operated with this parameter set to 11 – 9998.

Resetting: Set the number of motor poles to the correct value. Reset the inverter.

(3) SETTING SPEED FEEDBACK RANGE (Pr.105)

Set the range in which the feedback control takes place.

Set the upper and lower values based on the target value i.e. the frequency at which the user desires the motor to operate reliably).

Set this parameter by converting the slip (rpm) of the motor at its rated speed and load to a frequency.

(Example)

Assume that the rated speed of a 4-pole motor is 1,740 rpm at 60 Hz.

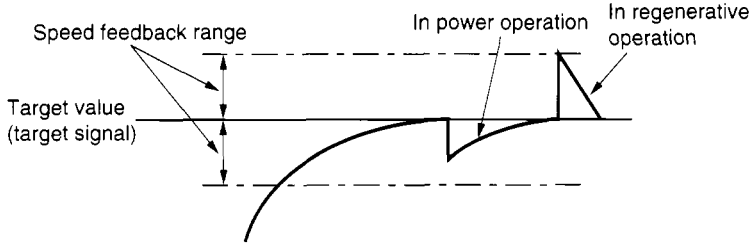
Slip Nsp = synchronous speed – rated speed

= 1,800 – 1,770 = 30 (rpm)

Frequency fsp corresponding to the slip fsp= (Nsp x number of poles)/120

= (30 x 4)/120 = 1 (Hz)

Poor response will result if the feedback range is too wide.



※ The speed feedback is set to 9999 (speed feedback not available) at the factory. Before starting operation, be sure to set this parameter to the proper value.

(4) SETTING FEEDBACK GAIN (Pr.106)
Set this parameter if the rotation is unstable or response is poor.
Setting greater than 1 ..... Response is improved. Unstable operation or over-current tends to occur.
Setting less than 1 ..... Response becomes slow. Stable operation results.

3-5 CAUTIONARY NOTES ON PLG FEEDBACK CONTROL

(1) Incorrect number of poles of the motor results in operation or control at incorrect speeds.

(2) The PLG should be coupled to the motor with its axis aligned exactly in line with the motor axis. The speed ratio should be 1:1.

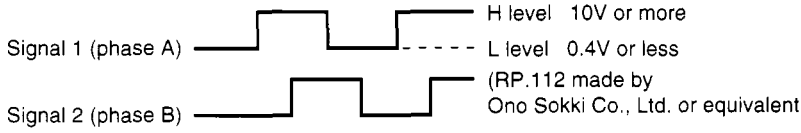
(3) To avoid instable phenomena such as hunting, feed-back control does not take place during acceleration or deceleration.
Feedback control takes place once the output frequency reaches within (set speed) ± (speed feedback range).

(4) If any of the following situations occur during a speed feedback operation, the inverter will not stop operation or produce an alarm. The inverter produces a frequency of (set speed) ± (speed feedback range) and does not follow the motor speed.
- The pulse encoder stops generating pulse signals due to failure such as electrical discontinuity.
- Pulse signals cannot be detected correctly due to interference such as induction noise.
- The motor is forced to accelerate (regenerative operation) or decelerate (such as motor locking) due to a large external force.

3-6 SPECIFICATIONS

(1) Drive motor
Standard motor 2-, 4-, 6-, or 8-pole
Constant torque motor 2-, 4-, 6-, or 8-pole

(2) Speed detector
(PLG)



PLG output signal terminal numbers (Ono Sokki RP.112)

Terminal No.	Description
1	Signal 1 (phase A)
2	Common
3	Signal 2 (phase B)
4	Common
6	Case (shield)
7	12V
8	0V

(3) Speed variation
Within ±0.1% of the maximum speed (3600 rpm)
(Load variation※ 0 – 100%) ..... 6 Hz or more)
※ 100% load means the maximum continuous operating torque with respect to the operating frequency that depends on the motor output characteristics. See the catalog or technical data.

(4) Speed control range
The speed control range depends on the inverter.

(5) Setting
- Setting speed feedback range
- Setting feedback gain

(6) Power source
The PLG and Option Card need a DC 12 V power source.
The customer should prepare this power source as it is not within the system supplied.
Power source: DC 12 V
No less than 200 mA current carrying capacity
For PLG-approximately 150 mA for normal operation
For Option Card-50 mA

3-7 CAUTIONARY NOTES ON USING PLG

The PLG consists of precision parts and components. Handle and operate the PLG with care. It may not function correctly if given a shock.

(1) INSTALLATION
- When installing the PLG do not subject it to shock by hammering it or exerting excessive force or the shaft.
- Use a coupling to connect the encoder shaft and the equipment shaft. Do not apply excessive forces when installing the coupling on the shaft. An improperly installed coupling may cause the shafts to receive a force larger than that allowed. Make sure that the shafts are correctly aligned and centered.
- Bearing life depends on conditions of use, especially on the shaft load. Note that longer bearing life can be expected under lower shaft loads.
- Do not disassemble the PLG, otherwise the oil sealing and drip proof capability may be impaired. Although the PLG is drip proof, make sure that it is not exposed to water or oil for a long period. Wipe off water or oil if splashed.

(2) VIBRATION
- Vibration may cause the PLG to generate incorrect pulses. Make sure that the PLG is installed in a location free from the influence of vibration. The clearance between the slits of rotating slit disc is small for PLGs that generate many pulses per revolution. Such PLGs are sensitive to vibration. During low speed operation or when stopped vibration may cause the PLG to act as if the rotating slit disc had moved, making it generate incorrect pulses.

(3) ELECTRICAL WIRING AND CONNECTION
Make sure that the electrical wiring and connections are correct otherwise the internal circuits will be damaged.

(4) COUNTER-MEASURES AGAINST NOISE

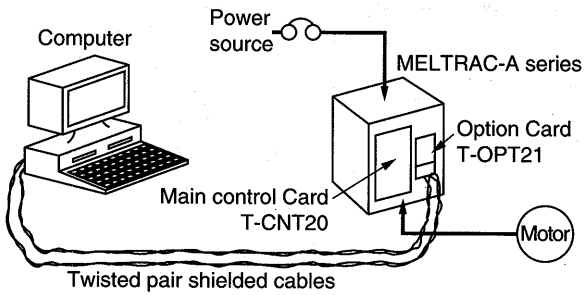
- Do not install the cables in parallel to power lines or in the same wiring duct.
- Do not use the PLG near discharge welding equipment or an electric furnace or similar equipment. In this case, provide the cables with a magnetic shield.
- Be sure to use shielded cables for extension wiring.
- Incorrect pulses may be generated when turning on or off the power. Wait a few seconds after turning on or off the power, before use.
- If malfunction due to noise caused by electrical potential between the PLG and control panel enclosures is possible, connect the two enclosures with wires no smaller than 2.0 mm^2 (14AWG).

4. COMPUTER LINK

Connected to a personal computer or FA computer with communication cables, this Option Card enables the user's program to control the inverters to read and write parameters, and monitor signals.

4-1 CONFIGURATION

(1) BASIC CONFIGURATION



(2) LAYOUT ON OPTION CARD T-OPT21 AND SIGNAL NAMES
Table 4-2-1 shows the terminal layout on the terminal block.

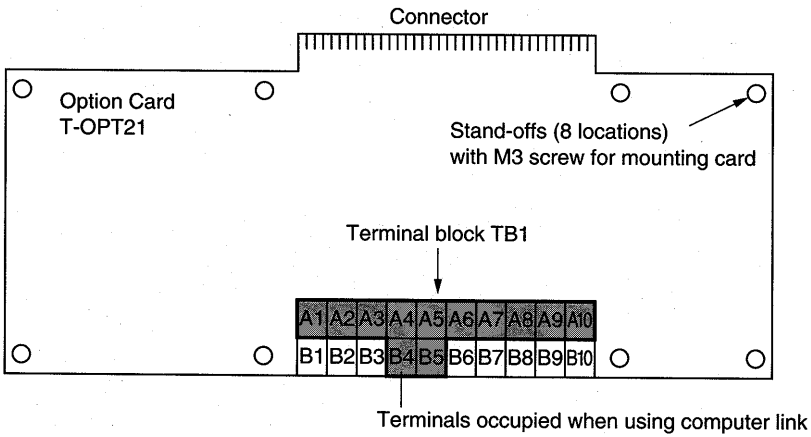


Table 4-2-1 Terminal block TB1 Terminal layout

Terminal No.	Signal name	Description
A1	SD1A	Transmission data output terminal A
A2	SD2A	Transmission data input terminal A
A3	SD1B	Transmission data output terminal B
A4	SD2B	Transmission data input terminal B
A5	SD2R	Terminal for connecting resistors at transmission end
A6	RD1A	Received data input terminal A
A7	RD2A	Received data output terminal A
A8	RD1B	Received data input terminal B
A9	RD2B	Received data output terminal B
A10	RD2R	Terminal for connecting resistors at receiving end
B4	FG	Frame grounding terminal
B5	SG2	Transmission signal ground

(3) EXAMPLES OF SYSTEM CONFIGURATION

1) The following Figures show system configurations in which the Option Card is connected to computers equipped with an RS-485 or RS-422-A interface.

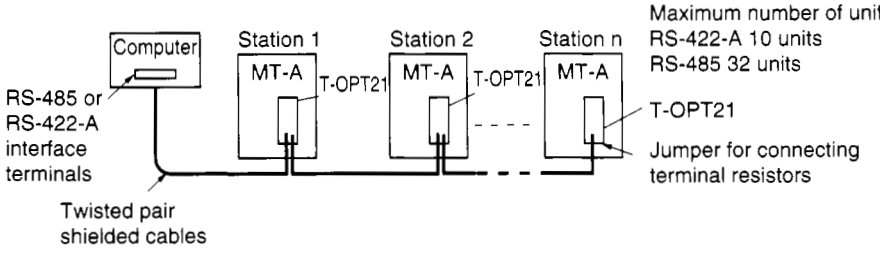
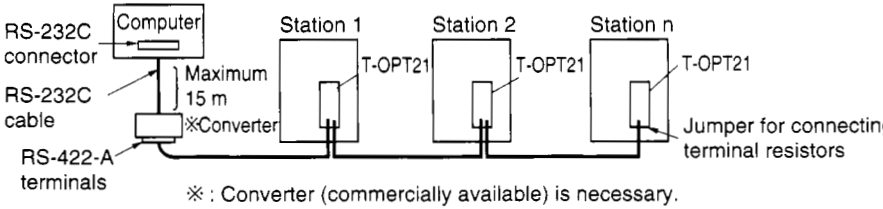


Figure 4-2-1



※ : Converter (commercially available) is necessary.

Figure 4-2-2

4-2 WIRING DIAGRAM

(1) COMPUTER AND ONE INVERTER

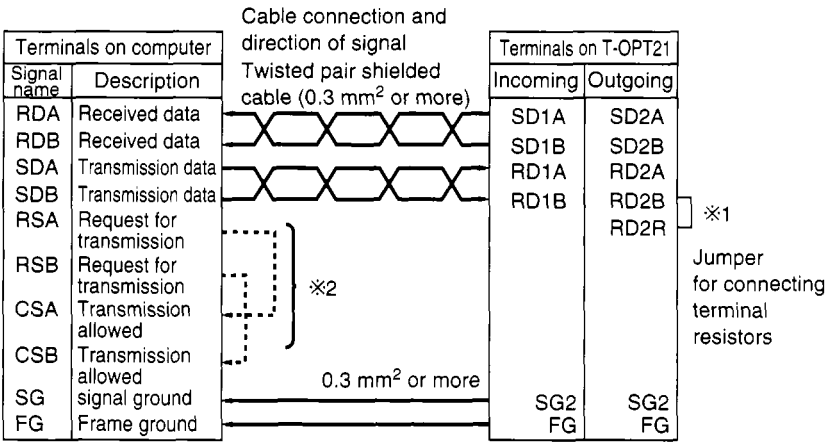


Figure 4-3

(2) COMPUTER AND MORE THAN ONE INVERTER (UP TO n)

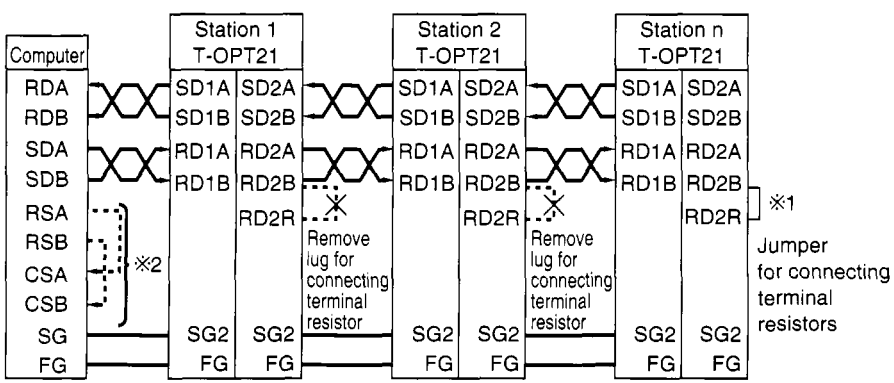


Figure 4-4

※1 Provide the jumper for connecting terminal resistors only for the T-OPT21 Card that is the remotest from the computer.

※2 Follow the instruction manual of the computer to be connected. The computer terminal numbers differ from one computer model to another. Be sure to use correct terminals.

4-3 OPERATING FUNCTIONS

(1) INVERTER OPERATION MODE

1) PU OPERATION ..... The inverter can be operated through the keys on the parameter unit (herein after referred to as "PU") mounted on the inverter.

2) EXTERNAL OPERATION ..... The inverter can be operated by turning on and off external signals connected to the control circuit terminals of the inverter.

3) COMPUTER LINK OPERATION .... The inverter can be operated by a computer program through the Computer Link Card T-OPT21.

(Operation signals and operating frequencies can be entered through the control circuit terminals depending on the settings of parameters 123 and 124. See section 4-6 (4).)

■ METHOD OF SWITCHING OPERATION MODES

Table 4-1

Symbol	Operation mode	Switching method
A	External operation ←→ PU operation	Operate keys on PU.
B	External operation ←→ Computer Link operation	By the user's program through computer. See section 4-5 (4)).

- Switching preconditions
  The inverter is stopped. Neither the forward nor the reverse signal is ON.

★ If computer link start-up mode selection parameter 125 is set to "1," the system goes into the Computer Link mode when the power is turned on or the inverter is reset. See section 4-7.

(Note) Make sure that the inverter initial settings are correct before setting parameter 125 to either "1" or "2."

(2) FUNCTIONS OF EACH OPERATION MODE

Table 4-2

Operating from	Item	Operation mode		
		Computer Link operation	External operation	PU operation
Computer using user's program	Operation command	Available※1	Not available	Not available
	Setting operating frequency	Available※1	Not available	Not available
	Monitor	Available	Available	Available
	Writing parameter	Available (when stopped)	Not available	Not Available
	Reading parameter	Available	Available	Available
	Resetting inverter	Available※2	Not available	Not available
Control circuit terminals	Operation command	Available※1	Available	Not available
	Setting operating frequency	Available※1	Available	Not available
	Resetting inverter	Available	Available	Available

※1 Depends on values of Pr.123 and Pr.124. See section 4-6 (4).
※2 Cannot be reset if the computer link communication fails.

(3) INPUT INTO INVERTER FROM COMPUTER

1) OPERATION COMMANDS

The following commands are used:

bit 0: Not applicable
1: Forward operation (STF)
2: Reverse operation (STR)
3: Low speed operation (RL)
4: Medium speed operation (RM)
5: High speed operation (RH)
6: Secondary acceleration/deceleration (RT)
7: Inverter output halt (MRS)

2) SETTING OPERATING FREQUENCY

Binary code 16 bit, every 0.01 Hz
Inverter output frequency can be set.

3) RESETTING IN CASE OF INVERTER FAILURE
The computer can reset the inverter in the event of failure.

4) WRITING PARAMETERS
Parameter values of the items listed in the list of data codes in section 4-11 can be written.

(4) INPUT TO COMPUTER FROM INVERTER

1) INVERTER STATUS
The following events can be monitored.

bit 0: In operation (RUN)
1: In forward operation
2: In reverse operation
3: Frequency arrive (SU)
4: Overload (OL)
5: Instantaneous power failure (IPF)
6: Frequency detection (FU)
7: Failure has occurred.

2) MONITORING INVERTER
- Output frequency ..... Binary code every 0.01 Hz
- Output current ..... Binary code every 0.1 A
- Output voltage ..... Binary code every 0.1 V
- Failure description ..... Binary code for eight failure events

3) READING PARAMETER SETTINGS
Parameter values of the items listed in the list of data codes in section 4-11 can be read.

(5) SYSTEM OPERATION IN CASE OF FAILURE

Table 4-3

Fault location	Description	Operation mode		
		Computer Link operation	External operation	PU operation
Inverter failure	Inverter operation	Stop	Stop	Stop
	Data communication	Continued	Continued	Continued
Data communication failure	Inverter operation	Stop	Continued	Continued
	Data communication	Stop	Stop	Stop

(6) RESETTING INVERTER

Table 4-4

Resetting method	Operation mode		
	Computer link operation	External operation	PU operation
Computer program	Available※1	Not available	Not available
Closing across terminals RES and SD	Available	Available	Available
Turning off inverter power	Available	Available	Available

※1 In the event of circuit failure, the computer cannot reset the system.

NOTE: If reset through the computer, the external mode results. To resume the Computer Link operation, switch the operation mode to the Computer Link mode through the program.

4-4 DESCRIPTION OF OPERATION

(1) OUTLINE OF OPERATION (See Figure 4-5.)

① The computer CPU interprets the user's program and execute the commands.

② According to the user's program, the computer converts the communication data to serial signals. The driver further converts these signals to the levels according to the RS-422 or RS-485 standard and sends them out to the inverter.

③ The receiver on the T-OPT21 Card receives the communication data. The CPU then converts the communication data to the serial signals and sends them out to the inverter CPU.

④ The CPU on the inverter checks the data for errors. Depending on the check result, the inverter carries out the processes necessary. It then produces return signals and sends them out to the CPU on the T-OPT21 Card through the serial communication.

⑤ The communication CPU on the T-OPT21 Card converts the return signals to the serial signals. The driver further converts these signals to the levels according to the RS-422-A or RS-485 standard and sends them out to the computer.

⑥ The receiver on the computer checks the return data. The computer reads the data and checks them according to the user's program.

(2) FUNCTIONAL BLOCK DIAGRAM

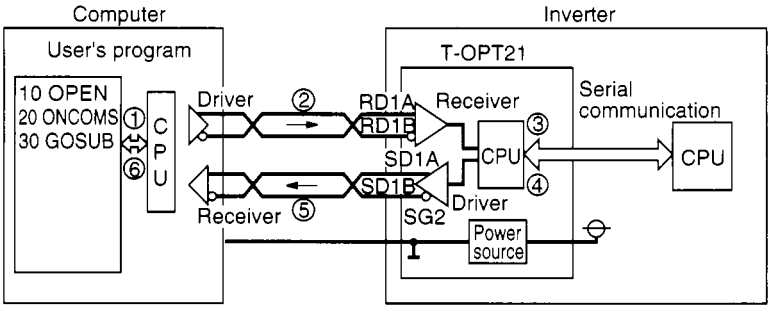
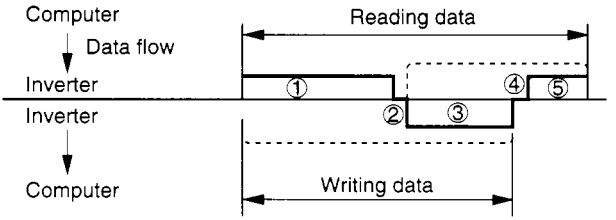


Figure 4-5

4-5 PROGRAMMING

(1) COMMUNICATION PROCEDURE

Communication between the computer and the inverter follows the procedure below.



(2) OPERATIONS RELATED TO COMMUNICATION AND TYPES OF DATA FORMAT

Table 4-5 Types of data format

No.	Operation		Operation command	Operating frequency	Writing parameter	Resetting inverter	Monitor	Reading parameter
①	Transmits request for data to inverter according to computer program.		A'	A	A	A	B	B
②	Inverter processing time		Yes	Yes	Yes	No	Yes	Yes
③	Data returned from inverter Checks data ① for errors.	No errors	C	C	C	No	E	E
		Accepts request.					E'	
		Error exists. Rejects request.	D	D	D	No	F	F
④	Time delay for computer processing		No	No	No	No	Yes	Yes
⑤	Response from computer regarding return data ③ Checks data ③ for errors.	No errors	No	No	No	No	G	G
		No processing						
		Error exists. Outputs ③ again.	No	No	No	No	H	H

※1 If retrial is necessary when data error occurs, the user's program should be so prepared. When the number of times of retrial exceeds the allowable number, the inverter stops and generates an alarm (E.OPT).

※2 When receiving a signal telling that a data error has occurred, the inverter sends back return data ③ again to the computer. When the number of occurrences of consecutive data errors exceeds the allowable number, the inverter stops and generates an alarm (E.OPT).

(3) DATA FORMAT

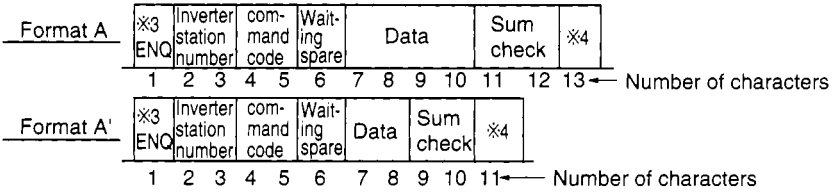
The data is expressed in the hexadecimal codes.

Data communicated between the computer and the inverter is automatically converted to ASCII codes.

1) TYPES OF DATA FORMAT

(1) COMMUNICATION REQUEST FROM COMPUTER TO INVERTER

[Writing data]



[Reading data]

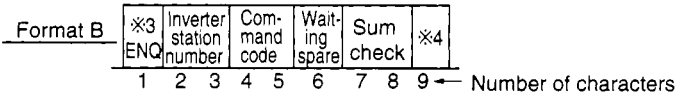


Figure 4-7-1

※3 Control codes. See table 4-6.

※4 CR and LF codes

When transmitting data from the computer to the inverter, code CR (carriage return) or LF (line feed) is automatically placed at the end of the data block depending on com-puters. If this is the case, the inverter should do the same to be consistent with the computer operation.

(2) DATA RETURNED FROM INVERTER TO COMPUTER WHEN WRITING DATA

[No data error exists.]

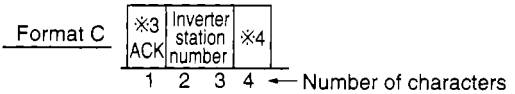


Figure 4-7-2

[Data error exists.]

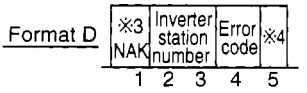


Figure 4-7-3

(3) DATA RETURNED FROM INVERTER TO COMPUTER WHEN READING DATA

[No data error exists.]

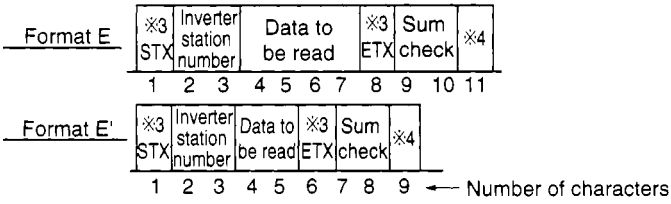


Figure 4-7-4

[Data error exists.]

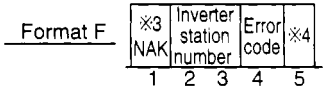


Figure 4-7-5

(4) DATA RETURNED FROM COMPUTER TO INVERTER WHEN READING DATA

[No error exists.]

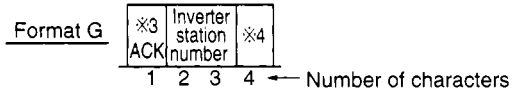


Figure 4-7-6

[Data error exists.]

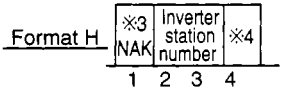


Figure 4-7-7

2) Explanation of DATA

(1) CONTROL CODES

Table 4-6

Signal name	ASCII code	Description
NUL	H00	Null
STX	H02	Start of Text
ETX	H03	End of Text
ENQ	H05	Enquire (request for communication)
ACK	H06	Acknowledge (no data error)
LF	H0A	Line Feed
CR	H0D	Carriage Return
NAK	H15	Negative Acknowledge (data error exists.)

(2) Inverter station No.

The station No. of the inverter which will communicate with the computer is assigned.

A hexadecimal code in the range of H00 to H1F (stations 0 to 31) is assigned as the station No..

(3) Command code

The request content of operation, monitor or other process commanded to the inverter by the computer is assigned. Accordingly, a variety of operation and monitor processes can be freely assigned by the command code. (For details, refer to Section 4–10.)

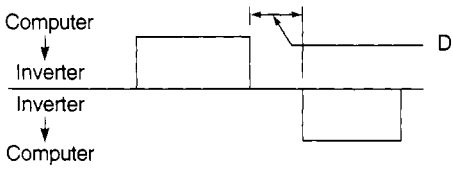
(4) Data

The write/read data of the frequency, parameter and others for the inverter are represented. The content and settable range of the set data are determined corresponding to each command code in Item (3). (For details, refer to Section 4–10.)

(5) Wait time

This time assigns the time for which it waits until the answer-back data is sent after the inverter received data from the computer. The wait time is set in the 10-msec units in the range of 0 to 150msec according to the response-possible time of the computer.

(Example: Setting 1:10msec, 2: 20msec)



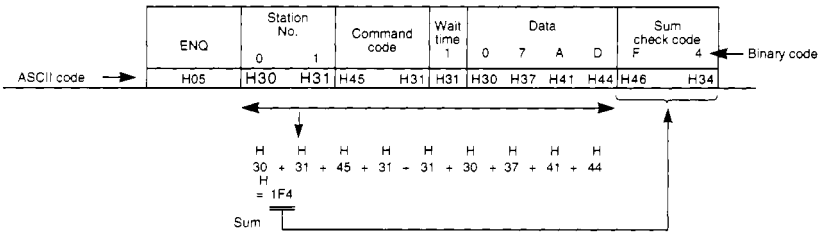
Data process time of inverter
= Wait time + Data check time
(Setting time X 10msec) (50msec)

(6) Sum check code

The objective data is converted into the ASCII code.

The lower one byte (8 bits) of the result (sum) gained by adding the code with the binary code is converted into two ASCII digits (hexadecimal). These digits are called the sum check code.

Example:



(4) SAMPLE PROGRAMS

A sample program that switches the operation mode to the Computer Link operation.

Program data number

```
   10  OPEN "COM1 :9600,E,8,2,HD" AS #1
   20  COMST 1,1, 1:COMST 1,2,1
   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
```

Initial setting of input/output file

☆ Opens communication file.
☆ Sets ON/OFF for circuit control signals (RS and ER)
☆ Interruptible

Sets transmission data

Calculates sum code

☆ Adds control code and sum code

Transmits data

Receives interruption data

☆ Interruption occurs when receiving data

OUTLINE FLOW DIAGRAM

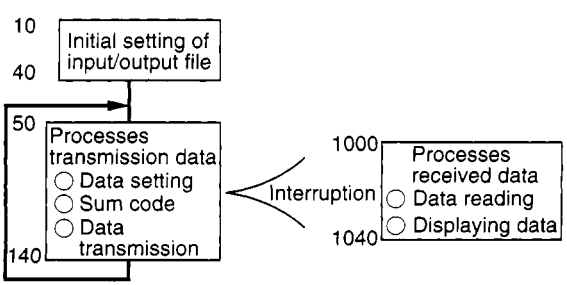
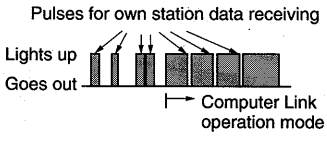


Figure 4-8

4-6 ADJUSTMENT AND SETTING

(1) FUNCTIONS OF EACH COMPONENT

Table 4-7

No.	Name	Description
1	Connector	For interface with printed circuit board on body. Mount connector in such a manner that connector pins on body are not displaced or bent. See section 2.2.
2	Terminal block (input)	Terminal for input/output serial signals. See section 4-2 for wiring. (Spacing between terminals: 7.62 mm terminal screw: M3)
3	Terminal block (output)	
4	Jumper piece for connecting terminal resistors	Jumper piece for connecting terminal resistors that are integrated in T-OPT21 Card. See section 4-2. • Last-numbered inverter: Connect between terminals RD2B and RD2R. • Inverters other than last-numbered one: Remove jumper piece.
5	Switch for setting station numbers	For setting inverter station numbers from 0 through 31. See section 4-6 (2).
6	LED for indicating communication	In modes other than Computer Link operation mode, LED lights up only when receiving data of its own station. In Computer Link operation mode, LED goes out only when receiving data of its own station. 
7	Mounting holes (8 locations)	Mount on the cover with attached stand-offs. See section 2.2.

(2) SETTING INVERTER STATION NUMBERS

Use switches SW1 and SW2 on the T-OPT21 Card to set the inverter station numbers. Be sure to set the inverter station numbers before turning on the power. Do not change station numbers during operation. Otherwise, the data communication becomes inoperative and the inverters cannot be stopped.

1) SETTING METHOD ..... See Figure 4-9.
Align the arrow (↑) of the corresponding switch to the desired station number.

Example:
- Station No.1: Align the arrow (26) of the station 1 switch to "1." Align switch X10 to "0."
- Station No.26: Align switch X1 to "6" and switch X10 to "2."
- Station No.0 Align both switches X1 and X10 to "0."

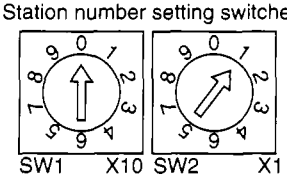


Figure 4-9

2) Inverter station numbers can be from 0 through 31. If set to any number from 32 through 99, the setting is ignored. Station numbers from 0 through 31 can be used for the RS-422 interface. However, make sure that the number of inverters is no greater than 10.

3) Do not allocate the same station number to more than one inverter, otherwise, incorrect data communication will result.

4) Make sure that the arrow of the station number setting switch is correctly aligned with a number. If it is aligned between two numbers, incorrect data communication will result.

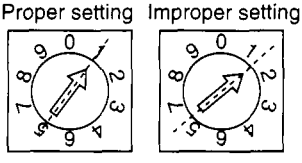


Figure 4-10

5) Station numbers may be allocated independently of the order of cable connection.
Vacant stations may exist.
See Figure 4-11 for example.

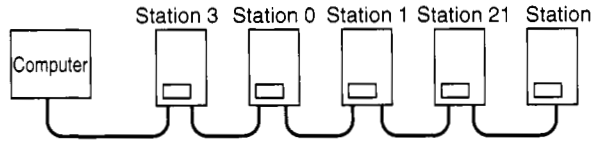


Figure 4-11 Example of station number setting

(3) INITIAL SETTING OF PARAMETERS

The parameters listed in Table 4-8 should be established initially for the computer to communicate with the inverters. Incomplete or incorrect initial setting makes data communication inoperative.

Table 4-8 Initial parameter setting

	Parameter	Parameter No.	Setting	Description
1	Allowable communication time interval	122	0*	Computer Link operation inoperative
			0.1 – 999.8	Allowable range (0.1 second interval)
			(9999) 65535	Communication check aborted
2	Allowable number of times of communication error retrial	121	0 – 10	Represents allowable number of error events. Factory set 1
3	Baud rate	118	3, 6, 12, 24, 48, 96*	Represents Baud rate. Example 96 represents 9600 baud
4	Stop bit length	119	0	Stop bit length 1 bit
			1*	Stop bit length 2 bit
5	Parity check	120	0	No parity check
			1	With odd number parity
			2*	With even number parity
6	CR, LF commands	126	0	Neither CR nor LF
			1*	CR only
			2	Both CR and LF

The settings with symbol "★" show the factory settings.

(4) SELECTING LOCATION OF OPERATION

Even in the Computer Link operation mode, signals from the external terminals can operate inverters depending on the settings of parameters 123 (selection of location for operation control) and 124 (selection of location for speed control).

Table 4-9 Selection of location for operation

Selection of location for operation		Functions corresponding to external terminals													
Pr.123 (operation command)	Pr.124 (speed command)	STF	STR	STOP	JOG	RT	2	4	1	RH,RM, RL	AU	RES	MRS	OH	CS
0: computer	0: computer	Cmp	Cmp	–	–	Cmp	Cmp	–	Ofs	Cmp	—	E/B	E/B	Ext	Ext
0: computer	1: External terminals	Cmp	Cmp	–	–	Cmp	Ext	Ext	Ext	Ext	E/B	E/B	E/B	Ext	Ext
1: External terminals	0: computer	Ext	Ext	Ext	Ext	Ext	Cmp	–	Ofs	Cmp	—	E/B	Ext	Ext	Ext
1: External terminals	1: External terminals	Ext	Ext	Ext	Ext	Ext	Ext	Ext	Ext	Ext	E/B	E/B	Ext	Ext	Ext

[Legend]

Ext: Signals only from the external terminals are valid for operation.
Cmp: Signals only from the computer user's program are valid for operation.
E/B: Signals either computer or external terminals or both are valid for operation.
– : Signals neither from computer nor external terminals are valid for operation.
Ofs: When parameter 28 (multi-step speed input compensation) is "1," signals only from the external terminals are valid for operation.

4-7 OPERATION MODE AFTER TURNING ON POWER OR INSTANTANEOUS POWER FAILURE

Parameter 125 (operation start-up mode) is used to select the operation mode after turning on the power or after instantaneous power failure.

Table 4-10

Parameter setting	Operation mode Pr.79		Mode after turning on power or instantaneous power failure
0	0	PU or external operation	External operation mode
	1	PU operation only	PU operation mode
	2	External operation only	External operation mode
※1	Computer Link operation		Computer Link operation (No switching through the program is necessary.)
※※2	Computer Link instantaneous power failure, re-start		As long as the T-OPT21 Card is mounted, the system automatically re-stores the operating condition immediately before the instantaneous power failure and resumes the Computer Link operation without communication signals from the computer.

※If an instantaneous power failure occurs during the Computer Link operation, the system stops executing the computer program. It does not resume program execution even when the power is restored.

※※First, carry out initial setting for each inverter. Then, set Pr.125 to either "1" or "2."

Note If the initial settings of the inverter and the computer do not agree and Pr.125 is set to either "1" or "2," the system goes into the Computer Link operation mode when the power is turned on. However, data communication from the computer or PU operation will be inoperative. Correct such incorrect settings according to the following procedure.

1) Turn off the inverter power. Remove Option Card T-OPT21.
2) Turn on the inverter power. Put it into the PU operation. Set Pr.77 to "2."
3) Turn off the inverter power. Mount Option Card T-OPT21.
4) Turn on the inverter power. Change the inverter setting value Pr.125 from either "1" or "2" to "0."
5) Turn off the inverter power. Turn it on again.
6) Put it into the PU operation mode. Make the inverter settings agree with the computer settings.

4-8 CAUTIONARY NOTES

(1) CAUTIONARY NOTES ON PROGRAMMING

1) If there is an error in the data sent from the computer, the inverter will not receive the data. Make sure that the re-write program is incorporated in the user's program in preparation for such errors.

2) In the data communication, the computer issues all requests for communication, such as operation commands, monitor, etc. The inverter will not voluntarily return any data. The user's program should be such that the computer requests for reading data when necessary.

(2) CAUTIONARY NOTES ON OPERATION

1) Make sure that the allowable communication time interval is established. In order to enhance safety, the system is interlocked so that inverter will not operate if the allowable communication time interval of the inverter has not been established.

2) Data communication does not take place automatically. It takes place only once for every request for communication issued by the computer. If the data communication fails in the middle of operation due to discontinuity of the signal lines, for example, the inverter cannot be stopped. If the allowable communication time interval is exceeded, the inverter stops operation while generating the E.OPT alarm. If a contact is closed between RES and SD or the power supply is cut off, "free- run" can be stopped.

4-9 TROUBLESHOOTING

(1) The inverter cannot read the data sent from the computer.
Check if:
1) The computer is compatible with RS-422-A and RS-485 standards.
2) The T-OPT21 Option Card and communication cables are correctly installed. Check for poor contact, discontinuity, incorrect polarity, etc.
3) The initial settings of the inverter are correct.
4) The station switches are correctly set. Check if settings agree with the program. Check if more than one station has the same station number.
5) The computer correctly executes the data request program.

(2) The operation mode cannot be switched to the Computer Link operation mode.
Check if:
1) The inverter is in the external operation mode. Check if there is a contact closure between STF or STR and SD.
2) The computer correctly executes the data request program.

(3) The inverter cannot start up even in the Computer Link mode.
Check if:
1) The program that starts the inverter has been executed.
2) The location of operation described in section 4-6 (4) is correctly executed,
3) The inverter sends out signals.
4) The allowable communication time interval is correctly established.

(4) In the middle of operation, due to communication failure, the inverter stops operation while generating an alarm.
Check if:
1) The Option Card T-OPT21 and communication cables are mounted correctly. Check for poor contact, discontinuity, etc.
2) The computer is operating normally.
3) The program is such that the computer requests for communication routinely.
4) The allowable communication time interval is correctly established.
5) The communication data format is correct.

4-10 PARAMETERS AND SETTINGS

After completing the initial setting, establish the command codes and data as listed in the table below. Have the computer initiate data communication, and various operation control and monitoring will be operative.

<table>
<tr><th>No.</th><th colspan="3">Parameter</th><th>Command code</th><th>Data</th><th>Number of data digits</th></tr>
<tr><td rowspan="2">1</td><td colspan="2" rowspan="2">Mode selection</td><td>Reading</td><td>H7B</td><td>H0000: Computer Link operation
H0001: External operation
H0002: PU operation</td><td rowspan="2">4 digits</td></tr>
<tr><td>Writing</td><td>HFB</td><td>H0000: Computer Link operation
H0001: External operation</td></tr>
<tr><td rowspan="5">2</td><td rowspan="5">Monitor</td><td colspan="2">Output frequency (rotational speed)</td><td>H6F</td><td>H0000 to HFFFF: Output frequency (hexadecimal) every 0.01Hz
Rotational speed (hexadecimal) unit 1rpm in rpm with parameter 37 set to 11 through 9998</td><td rowspan="5">4 digits</td></tr>
<tr><td colspan="2">Output current</td><td>H70</td><td>H0000 to HFFFF: Output current (hexadecimal) every 0.1 A (f) Output voltage</td></tr>
<tr><td colspan="2">Output voltage</td><td>H71</td><td>H0000 to HFFFF: Output voltage (hexadecimal) every 0.1 V</td></tr>
<tr><td colspan="2">Failure</td><td>H74
I
H77</td><td>H0000 to HFFFF: Description of last two failure events
Example of failure description
(for command code 74)
Assuming that readout data is H40A0,
b15 b8 b7 b0
0 1 0 0 0 0 0 0 1 0 1 0 0 0 0 0
Last failure event (H40) Present failure event (HA0)
Third failure event before latest····· OC1
Second failure event before latest····· THT
Previous failure event····· FIN
Latest failure event····· OPT
Failure data ..... See the inverter operation manual for details of failure description.</td><td rowspan="2">4 digits</td></tr>
<tr><td colspan="4"><table>
<tr><th>Data</th><th>Description</th><th>Data</th><th>Description</th></tr>
<tr><td>H00</td><td>Normal</td><td>H50</td><td>IPF</td></tr>
<tr><td>H10</td><td>OC1</td><td>H51</td><td>UVT</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>H40</td><td>FIN</td><td>HB2</td><td>RET</td></tr>
<tr><td>H41</td><td>FAN</td><td>HC0</td><td>CPU</td></tr>
</table></td></tr>
</table>

No.	Parameter	Command code	Data	Number of data digits
3	Operation command	HFA	H00 ~ HFF: Operation corresponding to operation commands b7 b0 0 1 1 0 0 0 1 0 (Data for Example 1) [Example 1] H62 ... Secondary acceleration/ deceleration selected at high speed operation in normal direction [Example 2] H00 ... Stop bit 0: Not applicable 1: Forward operation (STF) 2: Reverse operation (STR) 3: Low speed operation (RL) 4: Medium speed operation (RM) 5: High speed operation (RH) 6: Secondary acceleration/ deceleration (RT) 7: Inverter output halt (MRS)	2 digits
4	Inverter status monitor	H7A	H00 to HFF: Inverter operation status b7 b0 0 0 0 0 1 0 1 1 (Data for Example 1) [Example 1] H0B .... Frequency is reached during operation in normal direction. [Example 2] H80 .... Stops due to failure. bit 0: In operation (RUN) 1: In forward operation 2: In reverse operation 3: Frequency reached (SU) 4: Overload (OL) 5: Instantaneous power failure (IPF) 6: Frequency detection (FU) 7: Failure has occurred.	2 digits
5	Writing operating frequency (E^2ROM)	HEE	H00000 to H9C40: every 0.01 Hz (hexadecimal) (0 to 400.00 Hz) When changing operating frequency often, write the corresponding code in the RAM. (command code: HED)	4 digits
6	Inverter reset	HFD	H9696: Resets inverter. When the computer carries out data communication, the inverter is reset. The inverter cannot send out return data to the computer.	4 digits
7	Clear all parameters	HFC	H9696: Re-writes all parameters to the factory-set values. (See section 4-11.) When "all parameters clear" is executed, all the parameters including those set up in section 4-6 (3) are re-written to the factory-set values. Before resuming operation, re-initialize the se parameters.	4 digits
8	Writing parameters	H80 – HFF	See the list of command codes and data described in section 4-11 to carry out necessary reading and writing. Note that some parameters cannot be read or written.	4 digits
9	Reading parameters	H00 – H7F		

4-11 TABLE OF DATA CODES

(1) STANDARD PARAMETERS
(With data code FF = 0)

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
0	Torque boost	00	80	0 – 30%	0.1%	1%
1	Upper limit frequency	01	81	0 – 60Hz	0.01Hz	60Hz
2	Lower limit frequency	02	82	0 – 120Hz	0.01Hz	0Hz
3	Basic frequency	03	83	0 – 400Hz	0.01Hz	60Hz
4	Multi-speed setting (high speed)	04	84	0 – 400Hz	0.01Hz	60Hz
5	Multi-speed setting (medium speed)	05	85	0 – 400Hz	0.01Hz	30Hz
6	Multi-speed setting (low speed)	06	86	0 – 400Hz	0.01Hz	10Hz
7	Acceleration time	07	87	0 - 3600 seconds 0 - 360 seconds	0.1/0.01 seconds	15 seconds
8	Deceleration time	08	88	0 - 3600 seconds 0 - 360 seconds	0.1/0.01 seconds	15 seconds
9	Electronic thermal current relay	09	89	0 – 3600A	0.1A	Rating
10	DC Braking operation frequency	0A	8A	0 – 120Hz	0.01Hz	0Hz
11	DC Braking operation time	0B	8B	0 – 10 seconds	0.1 seconds	0.5 seconds
12	DC Braking operation voltage	0C	8C	0 – 30%	0.1%	1%
13	Start-up frequency	0D	8D	0 – 60Hz	0.01Hz	0.5Hz
14	Applicable load selection	0E	8E	0, 1, 2, 3	1	0
15	JOG frequency	0F	8F	0 – 400Hz	0.01Hz	5Hz
16	JOG acceleration/deceleration time	10	90	0 - 3600 seconds 0 - 360 seconds	0.1/0.01 seconds	15 seconds
17	External thermal relay input	11	91	0, 1, 2, 3	1	0

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
18	Upper limit frequency in high speed	12	92	0 – 400Hz	0.01Hz	60Hz
19	Voltage at base frequency	13	93	0 – 1000V 9999	0.1V	9999
20	Reference frequency for acceleration/deceleration	14	94	0 – 400Hz	0.01Hz	60Hz
21	Acceleration/deceleration time unit	15	95	0, 1	1	0
22	Operation level for stall prevention	16	96	0 – 120%	0.1%	120%
23	Operation level 2 for stall prevention	17	97	0 – 120% 9999	0.1%	9999
24	Multi-speed setting (4th speed)	18	98	0 – 400Hz 9999	0.01Hz	9999
25	Multi-speed setting (5th speed)	19	99	0 – 400Hz 9999	0.01Hz	9999
26	Multi-speed setting (6th speed)	1A	9A	0 – 400Hz 9999	0.01Hz	9999
27	Multi-speed setting (7th speed)	1B	9B	0 – 400Hz 9999	0.01Hz	9999
28	Multi-speed input compensation	1C	9C	0, 1	1	0
29	Acceleration/deceleration pattern	1D	9D	0, 1, 2, 3	1	0
30	Regenerative brake selected	1E	9E	0, 1	1	0
31	Frequency jump 1A	1F	9F	0 – 400Hz 9999	0.01Hz	9999
32	Frequency jump 1B	20	A0	0 – 400Hz 9999	0.01Hz	9999
33	Frequency jump 2A	21	A1	0 – 400Hz 9999	0.01Hz	9999
34	Frequency jump 2B	22	A2	0 – 400Hz 9999	0.01Hz	9999
35	Frequency jump 3A	23	A3	0 – 400Hz 9999	0.01Hz	9999

NOTE: "9999" in factory setting should be set to be "65535 (HFFFF)."

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
36	Frequency jump 3B	24	A4	0 – 400Hz 9999	0.01Hz	9999
37	Speed display	25	A5	2 – 10 11 – 9998	1	4
38	Automatic torque boost	26	A6	0 – 200%	0.1%	0
39	Automatic torque boost start-up current	27	A7	0 – 3600A	0.01A	0
40	Output terminal allocation	28	A8	0 – 9999	1	1234
41	Band width for frequency reached	29	A9	0 – 100%	0.1%	10%
42	Output frequency detection	2A	AA	0 – 400Hz	0.01Hz	6Hz
43	Output frequency detection when reversed	2B	AB	0 – 400Hz 9999	0.01Hz	9999
44	Secondary acceleration/ deceleration time	2C	AC	0 - 3600 seconds 0 - 360 seconds	0.1/0.01 seconds	15 seconds
45	Secondary deceleration time	2D	AD	0 - 3600 seconds 0 - 360 seconds	0.1/0.01 seconds	9999
46	Secondary torque boost	2E	AE	0 – 30% 9999	0.1%	9999
47	Secondary V/F (basic frequency)	2F	AF	0 – 400Hz 9999	0.01Hz	9999
48	Operation level (current) for preventing secondary stall	30	B0	0 – 120%	0.1%	120%
49	Operation level (frequency) for preventing secondary stall	31	B1	0 – 400Hz	0.01Hz	0
50	Secondary frequency detection	32	B2	0 – 400Hz	0.01Hz	30Hz
51	LED indication data selection	33	B3	1 – 14, 17, 18	1	1
52	PU main indication data selection	34	B4	0, 17 – 20	1	0
53	PU level indication data selection	35	B5	0 – 3, 5 – 14, 17, 18	1	1

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
54	FM terminal function selection	36	B6	1 - 3, 5 - 14, 17, 18, 21, 101 – 103, 105 – 114, 117, 118, 121	1	1
55	Reference frequency setting	37	B7	0 – 400Hz	0.01Hz	60Hz
56	Current monitor reference	38	B8	0 – 3600A	0.01A	Rating
57	Re-start free line time	39	B9	0 - 30 seconds 9999	0.1 seconds	9999
58	Re-start transient time	3A	BA	0 – 5 seconds	0.1 seconds	0.5 seconds
59	Remote setting function	3B	BB	0, 1, 2	1	0
60	Intelligent mode selection	3C	BC	0 – 5	1	0
61	Reference current	3D	BD	0 – 3600A 9999	0.01A	9999
62	Acceleration reference time	3E	BE	0 – 120% 9999	0.1%	9999
63	Deceleration reference time	3F	BF	0 – 120% 9999	0.1%	9999
64	Lift mode starting frequency	40	C0	0 – 10Hz	0.01Hz	9999
65	Hold time during start-up	41	C1	0 – 10 seconds	0.1 seconds	0
66	Stall restriction, frequency for starting reduction	42	C2	0 – 400Hz	0.01Hz	60Hz
67	Number of times of retry in case of alarm	43	C3	0 – 10 (101 – 110)	1	0
68	Time for waiting for retry	44	C4	0 - 10 seconds 9999	0.1 seconds	9999
69	Indication of number of times of retry	45	C5	0	1	0

Parameter No.	Name		Data code		Setting range	Minimum setting unit	Factory setting
			Reading	Writing			
70	Duty for regenerative brake		46	C6	0 – 100%	0.1%	0%
71	Applicable motor		47	C7	0, 1, 2	1	0
72	PWM mode selection		48	C8	0, 1, 2		0
73	0 - 5 V, 0 - 10 V selection		49	C9	0 – 5, 10 – 15	1	1
74	Input filter constant		4A	CA	0 – 8	1	1
75	Reset selection		4B	CB	0, 1, 2, 3	1	0
76	Alarm code output selection		4C	CC	00 – 54	1	00
77	Parameter write inhibit selection		–	–	0, 1, 2	1	0 Setting impossible
78	Anti-reversal selection		4E	CE	0, 1, 2	1	0
79	Operation mode selection		–	–	0 – 5	1	0 Setting impossible
80	Motor capacity		50	D0	0 – 3600kW 9999	0.01kW	9999
81	Number of poles		51	D1	2 – 6, 12 – 16, 9999	1	9999
	Second parameter switching		6C	EC	00, 01, 02	1	00
	Frequency setting	Operation frequency (RAM)	6D	ED	0 – 400Hz	0.01Hz	0Hz
		Operation frequency (E^2ROM)	6E	EE	0 – 400Hz	0.01Hz	0Hz
	Monitor	Frequency monitor	6F	–	0 – 400Hz	0.01Hz	
		Output current monitor	70	–	0 – 500A	0.01A	
		Output voltage monitor	71	–	0 – 1000V	0.1V	
		Special monitor	72	–			

Parameter No.	Name		Data code		Setting range	Minimum setting unit	Factory setting
			Reading	Writing			
	Monitor	Special monitor selection No.	73	F3	0 – 14	1	1
	Failure indication	Last No.1, No.2 failure indication clear	74	F4	9696H		
		Last No.3, No.4	75	–			
		Last No.5, No.6	76	–			
		Last No.7, No.8	77	–			
	Inverter status monitor / operation command		7A	FA	00 ~ FF		
	Operation mode achieved		7B	FB	0, 1, 2		00
	Parameter all clear		–	FC	9696H		
	Inverter reset		–	FD	9696H		
	–		–	–			
	Link parameter extension setting		7F	FF	0: Pr0 – 99 1: Pr100 – 905		

(2) SPECIAL PARAMETERS (Data code FF = 1)

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
100	BCD input (offset)	–	–	0 – 400Hz	0.01Hz	0
101	BCD input (gain)	–	–	0 – 400Hz 9999	0.01Hz	60Hz
102	Binary input (offset)	–	–	0 – 400Hz	0.01Hz	0
103	Binary input (gain)	–	–	0 – 400Hz 9999	0.01Hz	60Hz
104	BCD/binary selection	–	–	0, 1, 2, 3 9999	1	0
105	Speed feedback range	05	85	0 – 400Hz 9999	0.01Hz	9999
106	Feedback gain	06	86	0 – 100	0.1	1.0
107	V/F1 (1st frequency)	–	–	0 – 400Hz, 9999	0.01Hz	9999
108	V/F1 (1st frequency voltage)	–	–	0 – 1000V	0.1V	0
109	V/F2 (2nd frequency)	–	–	0 – 400Hz, 9999	0.01Hz	9999
110	V/F2 (2nd frequency voltage)	–	–	0 – 1000V	0.1V	0
111	V/F3 (3rd frequency)	–	–	0 – 400Hz, 9999	0.01Hz	9999
112	V/F3 (3rd frequency voltage)	–	–	0 – 1000V	0.1V	0
113	V/F4 (4th frequency)	–	–	0 – 400Hz, 9999	0.01Hz	9999
114	V/F4 (4th frequency voltage)	–	–	0 – 1000V	0.1V	0
115	V/F5 (5th frequency)	–	–	0 – 400Hz, 9999	0.01Hz	9999
116	V/F5 (5th frequency voltage)	–	–	0 – 1000V	0.1V	0
117	Number of times of averaging for speed detection	11	91	1 – 20	1	4
118	Baud rate	–	–	3 – 96	1	96
119	Stop bit length	–	–	0, 1	1	1

NOTE: "9999" in factory setting should be set to be "65535 (HFFFF)."

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
120	Parity check provision	–	–	0, 1, 2	1	2
121	Number of times of communication retry	15	95	0 – 10	1	1
122	Time interval for checking communication	16	96	0 – 999.8 seconds 9999	0.1%	0
123	Operation command location	17	97	0, 1	1	0
124	Speed command location	18	98	0, 1	1	0
125	Computer link start-up mode selection	–	–	0, 1, 2	1	0
126	Selection for provision of CR, LF	–	–	0, 1, 2	1	1
127	Provision of PLC Link · computer link E^2ROM writing	1B	9B	0, 1	1	0
128	PI operation selection	–	–	0, 1, 9999	1	9999
129	Proportional range of PI	–	–	0.1 – 3600%, 9999	0.1%	4%
130	PI integrating time	–	–	0.1 – 3600 seconds 9999	0.1 seconds	150 seconds
131	Upper limit	–	–	0 – 200% 9999	0.1%	9999
132	Lower limit	–	–	0 – 200% 9999	0.1%	9999
133	PLC Link · PU PI target value	–	–	0 – 100%	0.1%	0%
134	Relay output selection	–	–	0 – 9999	1	12
135	Analog meter output selection	–	–	1 – 21	1	17
136	Analog meter offset	–	–	0 – 100%	0.1%	0
137	Analog meter gain	–	–	0 – 100%	0.1%	100%
138	Re-start lead-in upper limit frequency	–	–	0 – 400Hz	0.01Hz	60Hz
139	Upper limit for deceleration rate during re-start	–	–	0 – 60.0 seconds	0.1 seconds	30 seconds

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
140	Torque load square reduction rate	–	–	0 – 5	0.01	1.75
141	Current limit time lag	–	–	0 – 60 seconds	0.1 seconds	30 seconds
142	Instantaneous power failure time	–	–	0 – 5 seconds	0.1 seconds	0 seconds
143	Rated voltage	–	–	0 – 1000V	0.1V	Depending on inverter capacity
144	Rated current	–	–	0 – 3600A	0.1A	Depending on inverter capacity
145	Type selection	–	–			
146	Analog input voltage/current switching	–	–	0, 1	1	0
147	(Not used)	–	–			
148	(Not used)	–	–			
149	(Not used)	–	–			
150	(Not used)	–	–			
151	(Not used)	–	–			
152	(Not used)	–	–			
153	(Not used)	–	–			
154	(Not used)	–	–			
155	(Not used)	–	–			
156	(Not used)	–	–			
157	(Not used)	–	–			
158	————	–	–			
159	————	–	–			
200	Program minute/second selection	–	–	0, 1	1	0
201	Program set 1	–	–			
202	Program set 2	–	–			

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
203	Program set 3	–	–			
204	Program set 4	–	–	For direction of rotation		
205	Program set 5	–	–	0 – 2	1	0
206	Program set 6	–	–			
207	Program set 7	–	–			
208	Program set 8	–	–	For frequency		
209	Program set 9	–	–	0 – 400.0Hz 9999	0.1Hz	9999
210	Program set 10	–	–			
211	Program set 11	–	–			
212	Program set 12	–	–	For time		
213	Program set 13	–	–	0 – 99.59	0.01	0
214	Program set 14	–	–			
215	Program set 15	–	–			
216	Program set 16	–	–			
217	Program set 17	–	–			
218	Program set 18	–	–			
219	Program set 19	–	–			
220	Program set 20	–	–			
221	Program set 21	–	–			
222	Program set 22	–	–			
223	Program set 23	–	–			
224	Program set 24	–	–			
225	Program set 25	–	–			
226	Program set 26	–	–			
227	Program set 27	–	–			
228	Program set 28	–	–			

Parameter No.	Name	Data code		Setting range	Minimum setting unit	Factory setting
		Reading	Writing			
229	Program set 29	–	–			
230	Program set 30	–	–			
231	Time set	–	–	0 – 99.59	0.01	0
900	FM terminal calibration	–	–		1	1444
901	AM terminal calibration	–	–		1	3521
902	Frequency setting voltage bias	5E	DE	0 – 60Hz (0 – 4095)	0.1Hz	0
903	Frequency setting voltage gain	5F	DF	0 - 400.00Hz (0 – 4095)	0.1Hz	60Hz
904	Frequency setting current bias	60	E0	0 – 60.0Hz (0 – 4095)	0.1Hz	0
905	Frequency setting current gain	61	E1	1 - 400.00Hz (0 – 4095)	0.1Hz	60Hz
	Link parameter extension setting	7F	FF	0 : Pro–99 1 : Prloo–905		

4-12 LIST OF ERROR CODES

The following table lists the error descriptions if an error is found in the data from the computer requesting communication.

Error code	Error	Error description	Inverter operation
H0	Computer NAK error	Data requesting for communication from computer contains consecutive errors the number of which exceeds allowable number of times of retry.	If consecutive errors are detected the number of which exceeds allowable number of times of retry, inverter stops operation while generating E.OPT alarm.
H1	Parity error	Description disagrees with parity designation.	
H2	Sum check error	Value of sum check code sent by computer does not agree with value of sum check code received by inverter.	
H3	Protocol error	Data received by inverter contains syntax error.	
H4	Framing error	Stop bit length differs from initial setting.	
H5	Over-run error	Computer has sent out next data before inverter completes receiving preceding data.	
H6	–	–	–
H7	Character error	Irregular characters (0 through 9, A through F, characters other than control codes) are received.	Data is not accepted. Alarm stop does not occur.
H8	–	–	–
H9	–	–	–
HA	Mode error	Parameter writing is attempted when system is not in Computer Link operation mode or when inverter is in operation.	Data is not accepted. Alarm stop does not occur.
HB	Command code error	Non-existent command code is issued.	
HC	Data range error	Data exceeding allowable setting range is designated when writing operating frequency, etc.	
HD	–	–	–
HE	Inverter communication error	Data communication is inoperative between Option Card and inverter.	Data is not accepted. Alarm stop does not occur.
HF	–	–	–

4-13 SPECIFICATIONS

1) Power source
   - Control power: supplied from inverter
   - Communication power: DC 5 V, up to 60 mA

2) Standards complied
   - [EIA standard] both RS422–A and RS485

3) Transmission method
   - Multi-drop link system

4) Communication cable
   - Twisted pair shielded cable

5) Transmission distance
   - Maximum 500 m

6) Number of inverters connected
   - Computer interface is RS422-A: 10 inverters
   - Computer interface is RS485: 32 inverters

7) Compatible computers
   - Computers that have RS422–A or RS485 interface.

8) Compatible inverters
   - All models of MELTRAC-A series

9) Communication specifications

<table>
<tr><th colspan="2">Item</th><th>Specifications</th></tr>
<tr><td colspan="2">Communication speed</td><td>9600*1/4800/2400/1200/600/300 baud selectable</td></tr>
<tr><td colspan="2">Inverter response time</td><td>Time from communication start of computer to start of stop, run or other control of inverter
<table><tr><td>Communication speed (baud)</td><td>9600</td><td>4800</td><td>2400</td><td>1200</td><td>600</td><td>300</td></tr><tr><td>Response time (msec)</td><td>Approx. 140</td><td>Approx. 160</td><td>Approx. 200</td><td>Approx. 300</td><td>Approx. 400</td><td>Approx. 500</td></tr></table>Variable depending on the communication speed.</td></tr>
<tr><td colspan="2">Control procedure</td><td>Start-stop synchronous type</td></tr>
<tr><td colspan="2">Communication method</td><td>Half-duplex type</td></tr>
<tr><td colspan="2">Character system</td><td>ASCII (8 bits)</td></tr>
<tr><td colspan="2">Stop bit length</td><td>1/2*1 bit selectable</td></tr>
<tr><td rowspan="2">Check system</td><td>Parity check</td><td>Do (even*1/odd)/Not do</td></tr>
<tr><td>Sum check</td><td>Do</td></tr>
</table>

※1 Factory-set at shipment.