Fuji Inverter FVR-B7S

200V Series 0.2 ~ 0.75kW

Instruction Manual

─────────── Contents ───────────

Fuji Electric Co., Ltd.

This Inverter is without Keypad Panel, it is option. Please order Keypad Panel "TPJ-GS" or "TPE-GS".

Power LED

Trip LED

Inverter Link Connector

Keypad Connector

FVR B7S

POWER

TRIP

H.LINK

PANEL

TERMINAL

E(G)

R ⎫
S ⎬ Commercial Power Input
T ⎭

30A (30B) ⎫
            ⎬ Protective Circuit Operation Signal
30C ⎭

P ⎫
  ⎬ Braking Resistor Terminals
DB ⎭

U ⎫
V ⎬ Motor Terminals
W ⎭

Main Circuit
Terminals Arrangement

SHT
BX
FWD
HLD
X2
RT1
RST
RUN
OL
FM
13
12
11

THR
REV
X1
X3
RT2
(NC)
FAR
LV
P12
CM1
CM2
CM

Control Connector
Pins Arrangement

1. Introduction

Thank you for purchasing the FUJI "FVR-B7S" inverter. This inverter uses 32 bit DSP for multi-function and high performance in every field.
This instruction manual is included with the inverter and equipment, and is provided for the use of the end user. Please be sure it accompanies the inverter.
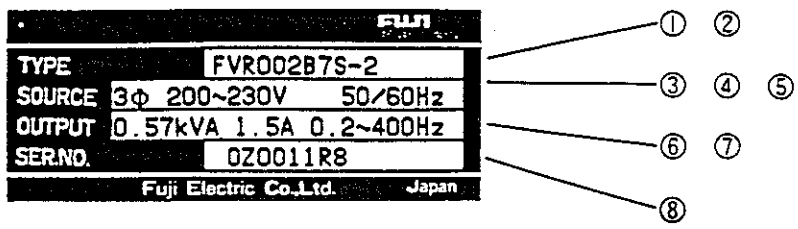
2. Inspection Items Upon Delivery

Please inspect the following items upon receipt of your inverter.
① Check the name plate to insure that the specifications correspond to those ordered.
② Inspect the unit for damage which may have occurred during shipping.
If you have any problems or questions regarding the inverter, please contact the distributor where the unit was purchased.

Name Plate

	FUJI
TYPE	FVR002B7S-2
SOURCE	3φ 200~230V 50/60Hz
OUTPUT	0.57kVA 1.5A 0.2~400Hz
SER.NO.	0Z0011R8
Fuji Electric Co.,Ltd.	Japan

① ②
③ ④ ⑤
⑥ ⑦
⑧

① Applicable Motor :

   0 0 2 → 0. 2 k W

   0 0 4 → 0. 4 k W

   0 0 8 → 0. 7 5 k W

② Power Series : 2 → 2 0 0 V series

③ Phase : 3 φ → 3 phases

④ Voltage range

   2 0 0 ~ 2 3 0 V → A C 2 0 0 V series

⑤ Frequency : 5 0 ／ 6 0 H z

⑥ Rated output current

   A C 2 0 0 V series :

   1. 5 A → 0 0 2 (0. 2 k W)

   3 A → 0 0 4 (0. 4 k W)

   5 A → 0 0 8 (0. 7 5 k W)

⑦ Output frequency range

   0. 2 t o 4 0 0 H z

⑧ Serial No.

3. Construction & Handling

(1) Removing Ventilation Cover

Ventilation Covers are upper and lower part of Unit Cover,
remove the covers using the following procedure.

    ① Insert minus driver to the edge of the cover, lifting
part of the cover, remove the cover.
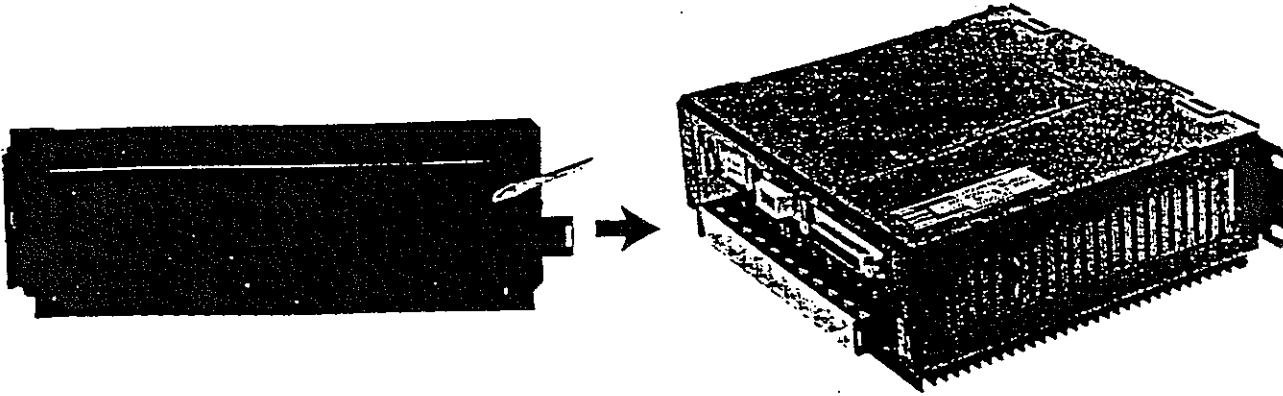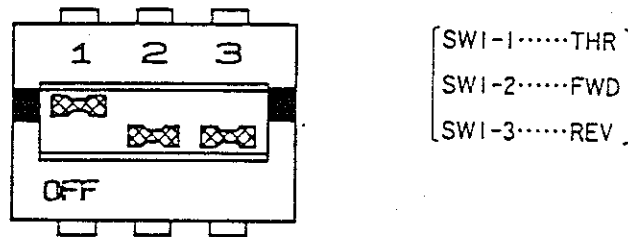

(2) Installation & Removing Option Cover

Remove the covers using the following procedure.
Reverse the procedure to install the cover.

    ① Insert your fingers between Unit Cover and Option Cover,
pulling up the cover, remove the cover.
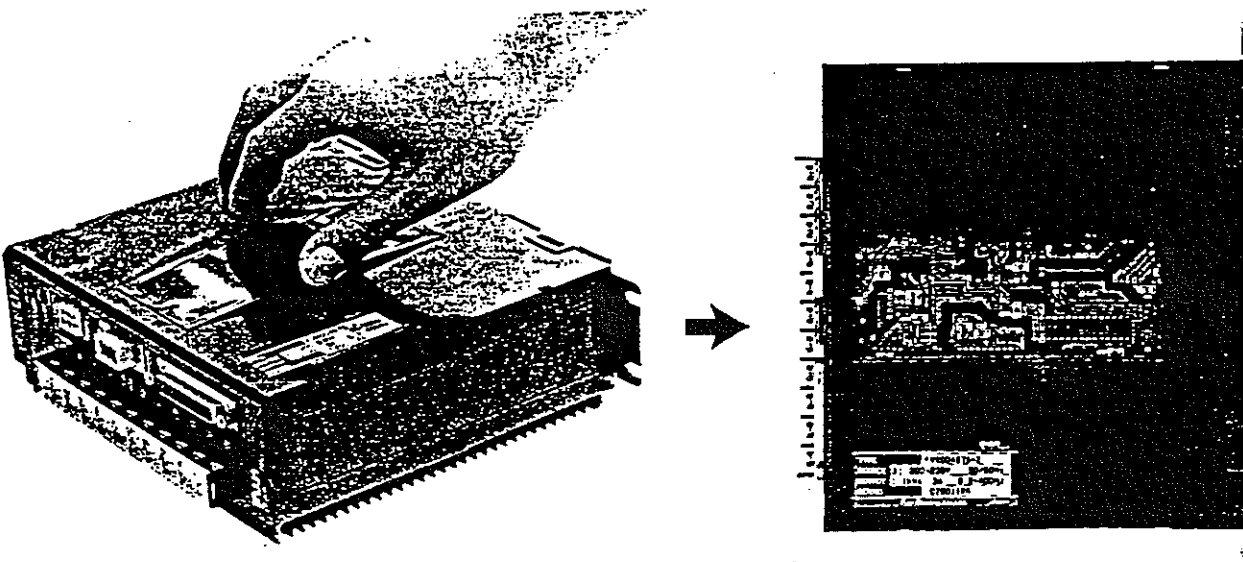
(3) Instruction Shorting Switch (SW1) for THR, FWD, REV
   After remove the cover, with SW1-1, SW1-2, SW1-3 on the board,
   short-circuit between each signal and CM.
   (Factory setting is THR-ON, FWD-OFF, REV-OFF.)

$$\begin{bmatrix} \text{SWI-I} \cdots \cdots \text{THR} \\ \text{SWI-2} \cdots \cdots \text{FWD} \\ \text{SWI-3} \cdots \cdots \text{REV} \end{bmatrix}$$

(4) Switching of Inverter Abnormal Signal Output
   As factory setting is contact A output, in case of using contact
   B, switch the connector of 30A & 30B using the following procedure.
   ① While pressing following figure part of Unit Cover, slide Unit
      Cover in the direction of Terminal Block, remove the cover.
   ② Change the connector(30A→30B) , it's lower part of Inverter.
      Reverse the procedure to install the cover.
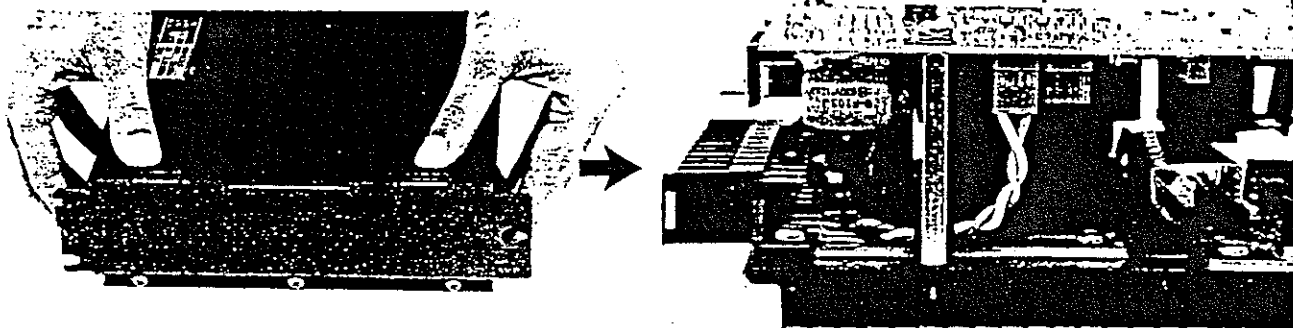
4. Operating Precautions

Misconnections in the wiring, etc. will result in damage to, and failure of the unit. Please
carefully note the items listed below, and use the unit as indicated.

① Do not impress power supply voltage that exceeds the standard specification voltage permissible fluctuation. If excessive voltage is applied to the inverter, damage to the internal elements will result.
② Do not connect power source to the output terminals (U, V, W). Connect power source only to the power terminals (R, S, T).
③ Do not connect power source to the breaking resistor connection terminals (P, DB). Never short-circuit between P-N or P-DB terminals, and do not connect any resistance with a resistance value (Ω) less than standard application breaking resistor.
④ Do not connect AC power source voltage to the control circuit terminals (except 30A, B, C).
⑤ For RUN and STOP, use the FWD-CM (forward) and REV-CM (reverse) terminals. Avoid using a contactor (ON/OFF) installed on the line side of the inverter for RUN and STOP.
⑥ Do not use a magnet switch on the output side of the inverter for ON/OFF operation.
⑦ Use only power capacity within the inverter capacity range of 1.5 times to 500kVA. If a power capacity greater than 500KVA is to be used, install a coordination reactor (ACR...option) on the line side of the inverter.
⑧ Do not connect a phase advance condenser to the output side of the inverter.
⑨ Do not operate without the ground wire connected.
⑩ If the inverter protective function is activated, consult Section 11 "Troubleshooting", and after correcting the problem, resume operation. Do not reset the alarm automatically by external sequence, etc.
⑪ Do not perform a megger test between the inverter terminals or on the control circuit terminals.

5. Installation Instructions

(1) Installation Conditions

Install the inverter in a location which meets the following requirements.

① The ambient temperature should be between −10°C and +50°C. (Remove the ventilation cover when the temperature exceeds +40°C)

② The humidity should be between 20 and 90% RH. Avoid any location subject to dew condensation, freezing or where the inverter would come in contact with water.

③ Do not install in any location subject to any of the following conditions: direct sunlight, dust, corrosive gas, inflammable gas or oil mist.

④ The inverter should be installed at an elevation below 1,000m, and vibration should be less than 0.6G.

(2) Installation Direction & Mounting Space

12cm or more

5cm or more

5cm or more

12cm or more
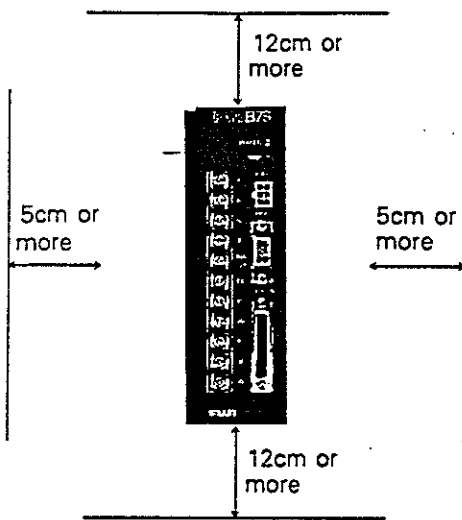
① Installation Method
Install the inverter perpendicular to the ground, and with the lettering "FVR-B7S" right side up. If the inverter is installed up side down, or horizontally, heat build-up will occur.

② Installation
To allow the escape of heat generated by the inverter, install at a sufficient distance from other equipment, walls or wiring ducts as shown in the figure on the left.

③ Installation Wall
During operation the temperature of the cooling fins of the inverter rises to approx. 90°C. For this reason, the mounting wall must be of heat resistant material.

④ Multiple Installations
When installing 2 or more inserters in close proximity, allow sufficient space as described in ② above, and install them in a horizontal row. If they must be installed in a vertical row, at least 50cm internal must be provided between each one, or a ventilation system should be provided to prevent the ambient temperature from rising.

(3) Mounting Screws & Holes

① Mounting screws or bolts should be   M 4

② For the location of mounting holes, see "External Dimensions" in Section 11.

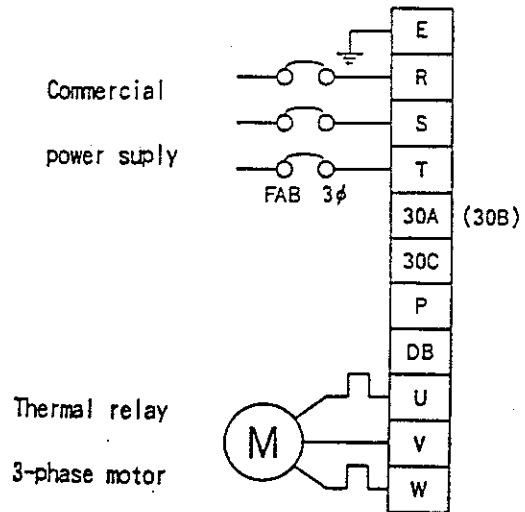
Ambient Temperature Cautions

Because the ambient temperature greatly affects inverter life and reliability, do not install in any location which exceeds the allowable temperature.
Leave the ventilation cover attached for temperatures of 40°C or lower, and remove the cover for temperatures between 40 and 50°C.

6. Wiring

(1) Main Circuit Wiring

① Power supply connection (R, S, T)
Connections can be made regardless of phase sequence.

② Motor wiring (U, V, W) .
When connected normally, the motor will rotate counterclockwise when viewed from the load side. If the motor rotates in reverse, interchange any 2 of the U, V or W terminal connections.

③ Ground terminal connection (E, (G))
For safety reasons, do not operate without the unit being grounded.
The ground wire must be as thick and short as possible as shown in the Applicable Wiring Equipment List (see Section 11 Appendix).

Commercial

power supply

FAB 3φ

Thermal relay

3-phase motor

M

| E |
| R |
| S |
| T |
| 30A | (30B) |
| 30C |
| P |
| DB |
| U |
| V |
| W |

Caution Note: Be sure that the power supply is never connected to the U, V, W terminals or the N, P, P, DB terminals.

(2) Control Circuit Wiring

① Factory Wiring at the time of shipment

Both RUN/STOP and the frequency setting is performed through the control circuit terminals.

(Please order the options, keypad panel and extension cable.)

* Function setting at the factory

| 1 | 5 | 0 | 1 |

| 1 | 6 | 0 | 1 |

② Handling of external thermal input terminal
THR-CM is short-circuited with SW1 inside option cover.
In case of using external thermal, remove option cover, switch SW1-1 off.

* 1. When both RUN/STOP and the frequency setting is performed through the control circuit terminals, the function setting should be $\boxed{1\,5\,0\,1}$, $\boxed{1\,6\,0\,1}$ or $\boxed{1\,6\,0\,2}$.
* 2. If RUN/STOP is performed through the keypad panel, and the only frequency setting is performed through the control circuit terminals, set the function at $\boxed{1\,5\,0\,0}$, $\boxed{1\,6\,0\,1}$. or $\boxed{1\,6\,0\,2}$.
* 3. If RUN/STOP is performed through control circuit terminals, and the frequency setting is performed through the operation panel, set the function at $\boxed{1\,5\,0\,1}$, $\boxed{1\,6\,0\,0}$.

(3) Wiring the external braking resistor unit (optional)

When frequent braking or high torque braking
is required, connect the optional braking
resistor as shown in the diagram on the right.

※1 Switch the factory set SW1-1 off. If it's not switched off,
during operation the OH2 alarm will not function.
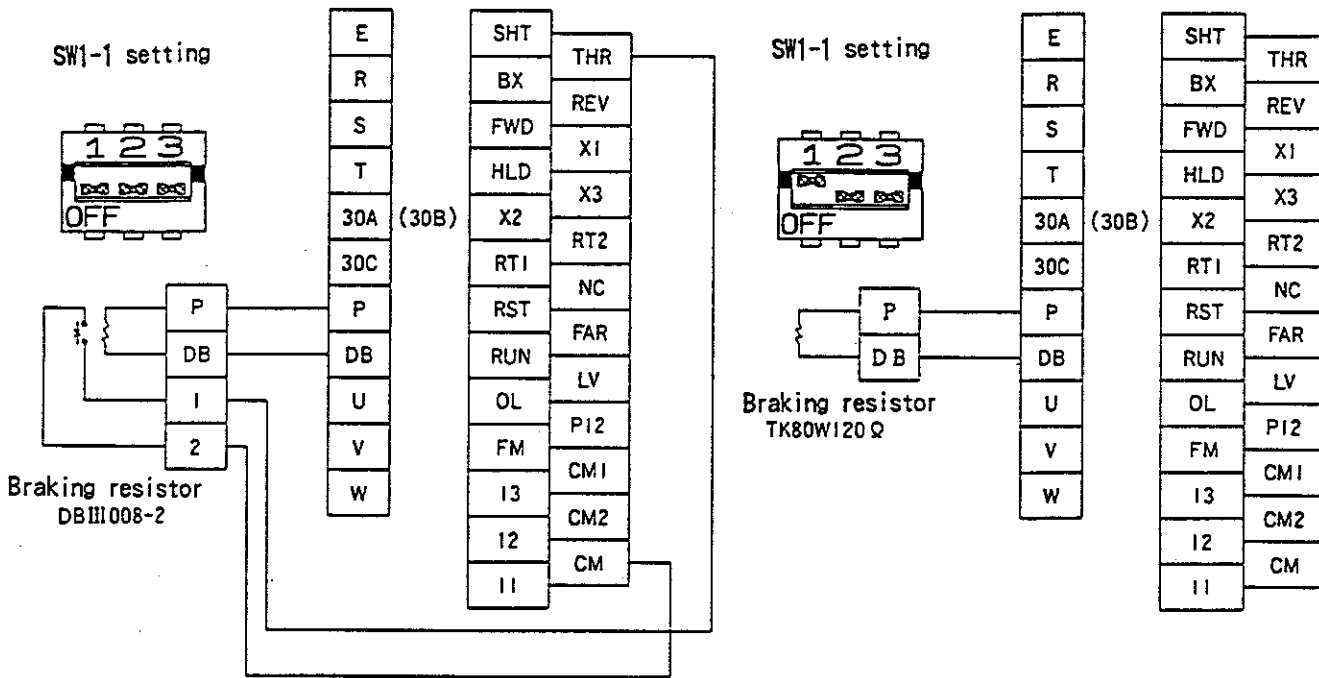
[Caution Notes]

1. If the P-DB terminals, or the P-N terminals are inadvertently short-circuited, damage to the inverter will result.

(4) Basic Connection Diagram

★ Keypad panel

★ Extension cable

★FAB

Power supply

FVRG7S-2: AC200~230V
50/60Hz

★ Frequency setting resistance
(1kΩ, 1/2W)

Connector of panel

★ Thermal relay

Motor

Ground

R
S
T
U
V
W

★ Braking resistor

P
DB
1
2

★ Frequency meter
− +

FM
SHT
PI2
FWD
REV
RST
X1
X2
X3
RT1
RT2
HLD
BX
THR
CM

I3
I2
I1

P
DB

Connector

30A
(30B)
30C

Protective circuit
Operation signal

OL
FAR
RUN
LV
CM
E
(G)

★ Option

Connector of link

Ground

Ground

[Caution Notes]

① The control circuit terminal wiring should be kept as far as possible from the main circuit wiring to prevent operational error due to noise interference. Never install them in the same duct or conduit. (A separation distance of 10cm or more is recommended.)
If the control circuit wiring must cross the main circuit wiring, make sure it crosses at a right angle.

② Use shielded or twisted wire for the control circuit wiring, which should be as short as possible (20m or less).
(Connect outer covering of the shielded wires to the inverter ground terminal and leave the other end open.)

③ Install a spark killer in parallel with any magnet switches or solenoid type coils, etc. which may be close to the inverter.

7. Operation

(1) Pre-Operation Inspection

After mounting and wiring is completed, check the following items before supplying power to the inverter.

① Check wiring for errors. (especially main circuit wiring)

② Make sure there are no wiring chips, screws, etc. remaining in the inverter.

③ Make sure all screw and terminal connections are tight.

④ Make sure no compressed wire ends are touching other terminals.

[Caution Notes]

Megger Test

Do not conduct megger tests between the inverter terminals or control circuit terminals. For megger testing method, see Section 10 Maintenance & Inspection.

(2) Test Run Check Points

Conduct the test run at a low frequency of around 5Hz. Conduct the test run in a safe manner, and check the following points.

① Smooth rotation

② Correct rotation direction

③ Abnormal vibration or noise in the motor

④ Smooth speed increase and speed reduction

(3) Selecting Operation Method

For the FVR-G7S series, the following methods select the RUN/STOP signal transmission method and the frequency setting signal transmission method.

	RUN/STOP	Operation Method Code Setting	Frequency Setting	Operation Method Code Setting
1	Operation Panel Method [RUN] [STOP] keys	`1500`	[∨] [∧] keys	`1600`
2			VR or analog signal (DC 0 to +10V)	`1601`
3			VR or analog signal (DC 0 to +10V)	`1602`
4	External Signal Method (FWD, REV)	`1501`	[∨] [∧] keys	`1600`
5			VR or analog signal (DC 0 to +10V)	`1601`
6			VR or analog signal (DC 0 to +10V)	`1602`

Multistage frequency operation (8 stages possible)
- For RUN/STOP and manual speed frequency setting, the function codes are `15`, `16` for setting as above.
- For the 1st to the 7th stage frequencies, the function codes are `29` `31` `33` `35` `37` `39` `41` and then select the external terminal (X1, X2, X3).

(4) Data Setting Method

In order that the inverter (including the motor) may operate under optimum conditions, in addition to the codes mentioned earlier, $|1|5|$, $|1|6|$, other setting changes are required. The following is a general explanation of the code setting method.

The details for code setting are given in Section 9. In addition to $|1|5|$ and $|1|6|$, also be sure to fully understand the other basic codes $|0|8|$, $|0|9|$, $|1|1|$, $|1|2|$, $|1|3|$ etc.

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① Data change setting in STOP mode

| STOP | Operation signal (RUN key, FWD & REV terminals) is completely in OFF mode |

* The frequencies that have been set will flash on the display $|6|0|0|0|$

| PRG | Changes to function setting mode $|0|0|\ |\ |$ |

Different block

| SHIFT | Function code block advances each time key is pressed. |

Same block

| ∧ | ∨ | Selects function code to changed within the block. |

| SET | Existing data access $|0|0|0|0|$ |

| ∧ | ∨ | Adjusts code or actual number to the desired data $|0|0|0|1|$ |

| SET | Stores data $|0|0|0|1|$ (Do not turn power OFF for 5 sec. after data write.) |

| RESET | Returns to function code block change mode |

YES ◇ Other function change? — For change of other data, repeat the above procedure

NO

| PRG | Ends function setting mode, returns to STOP mode |

② **Data change setting in RUN mode**

Function code $\boxed{0}\boxed{0}$ to $\boxed{1}\boxed{0}$, $\boxed{7}\boxed{3}$ to $\boxed{7}\boxed{5}$ and $\boxed{8}\boxed{0}$ to $\boxed{8}\boxed{2}$ data setting is possible in RUN mode Verification of all function codes and data is also possible.

After end of data setting, press $\boxed{\text{PRG}}$ key to return to frequency display.

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(5) Control Circuit Connection & Operation

① **Factory connections**

11	12	13	FM	OL	RUN	RST	RT1	X2	HLD	FWD	BX	SHT
CM	CM1	CM2	P12	LV	FAR	NC	RT2	X3	X1	REV	THR

* $\boxed{1}\boxed{5}\boxed{0}\boxed{0}$、$\boxed{1}\boxed{6}\boxed{0}\boxed{0}$ Basic connection required for

② **Common terminal connection example irrespective of operation method**

11	12	13	FM	OL	RUN	RST	RT1	X2	HLD	FWD	BX	SHT
CM	CM1	CM2	P12	LV	FAR	NC	RT2	X3	X1	REV	THR
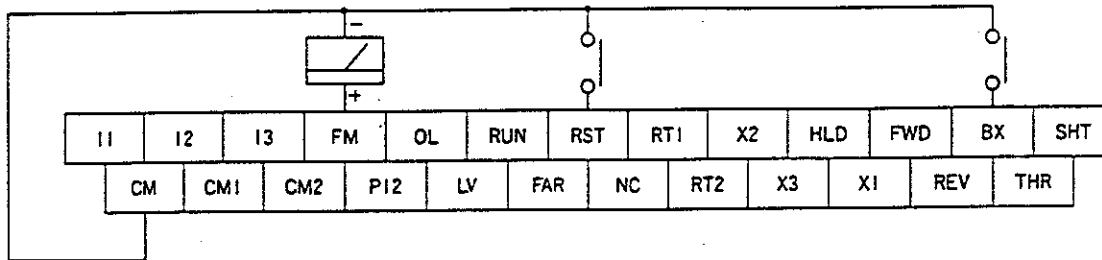
- FM .... Used for external analog meter when frequency indication is needed.
- THR .... Connected to CM with SW1-1 at the factory. Connects to "b" contact when inverter STOP is desired through external alarm.
- RST .... Connects to RESET key for alarm STOP reset
- BX .... Connects to "a" contact signal when inverter free-run is desired during normal operation.

③ **Operation Through Operation Panel (1 5 0 0)**
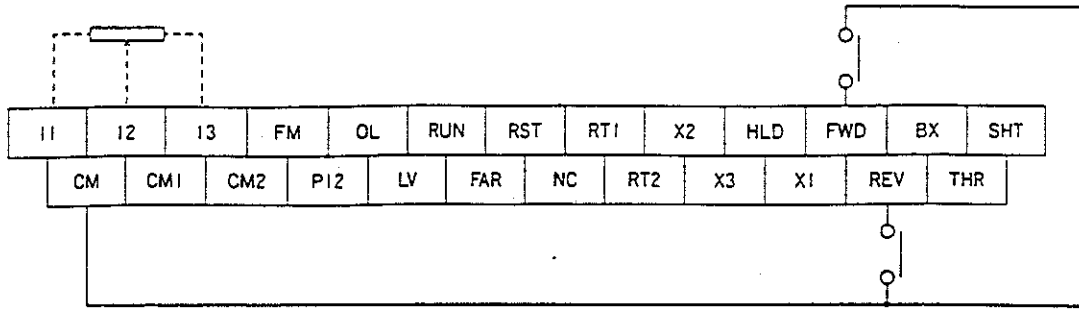
11	12	13	FM	OL	RUN	RST	RT1	X2	HLD	FWD	BX	SHT

CM	CM1	CM2	P12	LV	FAR	NC	RT2	X3	X1	REV	THR

a. Common terminal connections are as explained in (5)-②.

b. Rotation direction: short circuit between FWD-CM for forward rotation, short circuit between REV-CM for reverse rotation.

c. For frequency setting, select from the following 3 types of function code 1 6 .

    1 6 0 0 : 　∧　∨　keys for digital setting

    1 6 0 1 : 　Connection of 1kΩ(1/2W) rheostat to 13, 12, 11 terminals; or input of DC 0 to +10V DC voltage signals to terminals 12, 11(12 is +.)

d. RUN Operation Example (1 6 0 0)
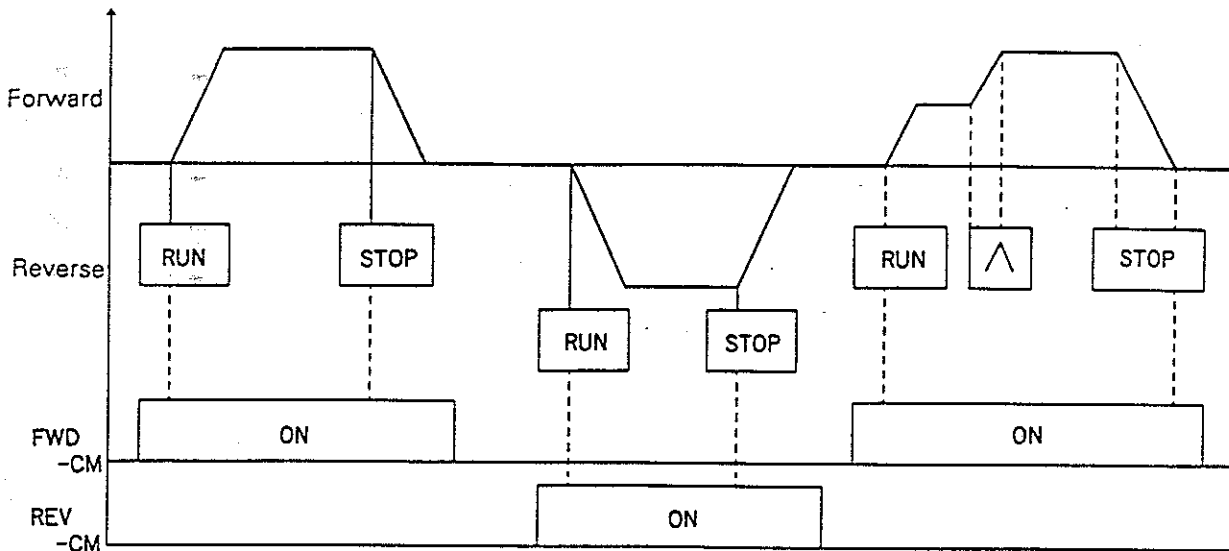
* When FWD-CM, REV-CM are both ON or OFF, deceleration STOP will result.

④ **External Signal Operation** ($\fbox{1}\fbox{5}\fbox{0}\fbox{1}$)
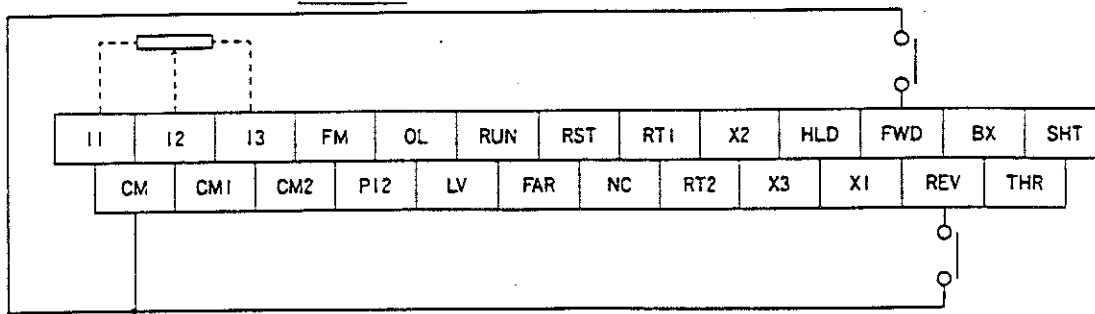
II	I2	I3	FM	OL	RUN	RST	RTI	X2	HLD	FWD	BX	SHT
CM	CMI	CM2	PI2	LV	FAR	NC	RT2	X3	XI	REV	THR	

a. Common terminal connections are as explained in (5)-②.

b. Rotation direction: short circuit between FWD-CM for forward rotation, short circuit between REV-CM for reverse rotation.

c. For frequency setting, the same 3 types can be selected as in (5)-③.

d. RUN Operation Example
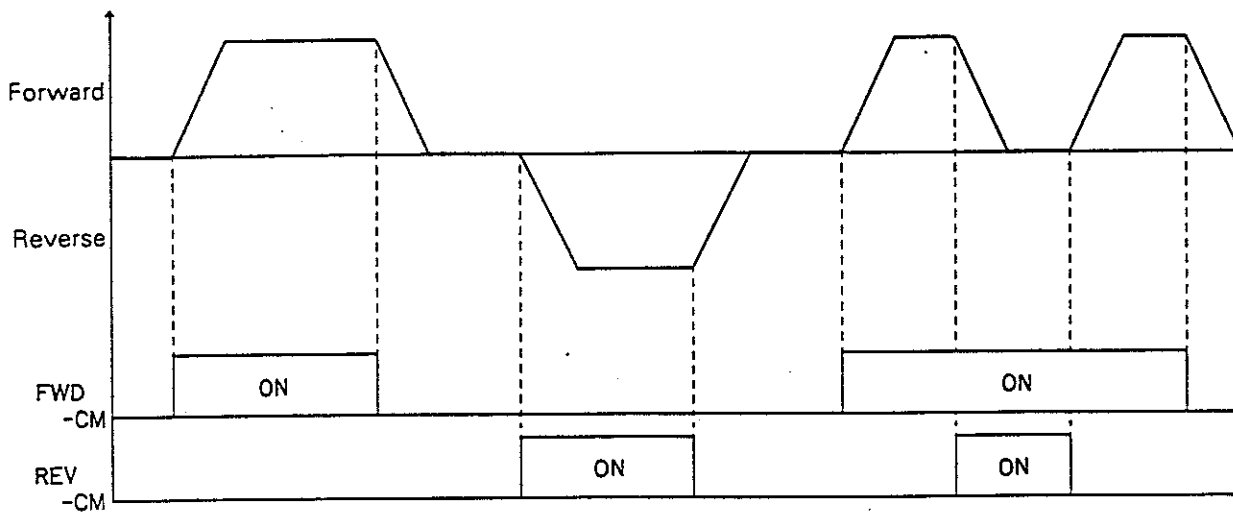
* When FWD-CM, REV-CM are both ON or OFF, deceleration STOP will result.

(6) Actual Operation

① Multi-step frequency operation (X1, X2, X3 terminals)

Multi-step frequency operation up to the 8th step is possible.
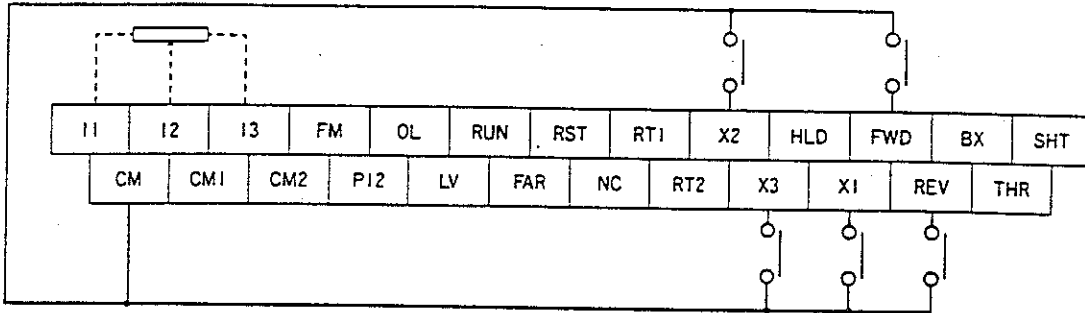
a. Setting is $\boxed{15}$ for operation method, and $\boxed{16}$ for manual frequency setting method.

b. The settings are: $\boxed{29}$ for multi-step frequency 1, $\boxed{31}$ for multi-step frequency 2, $\boxed{33}$ for multi-step frequency 3, $\boxed{35}$ for multi-step frequency 4, $\boxed{37}$ for multi-step frequency 5, $\boxed{39}$ for multi-step frequency 6, and $\boxed{41}$ for multi-step frequency 7.

c. RUN Operation Example

② Step Acceleration. Deceleration Operation (RT1, RT2 terminals)

4 different types of acceleration and deceleration times can be externally switched.

I1	I2	I3	· FM	OL	RUN	RST	RT1	X2	HLD	FWD	BX	SHT
	CM	CM1	CM2	P12	LV	FAR	NC	RT2	X3	X1	REV	THR

a. Setting is $\boxed{I}\boxed{5}$ for operation method, and $\boxed{I}\boxed{6}$ for manual frequency setting method.

b. The settings are: $\boxed{0}\boxed{8}$ for acceleration time 1, $\boxed{2}\boxed{3}$ for acceleration time 2, $\boxed{2}\boxed{4}$ for acceleration time 3, $\boxed{2}\boxed{5}$ for acceleration time 4, $\boxed{0}\boxed{9}$ for deceleration time 1, $\boxed{2}\boxed{6}$ for deceleration time 2, $\boxed{2}\boxed{7}$ for deceleration time 3, $\boxed{2}\boxed{8}$ for deceleration time 4.

c. RUN Operation Example
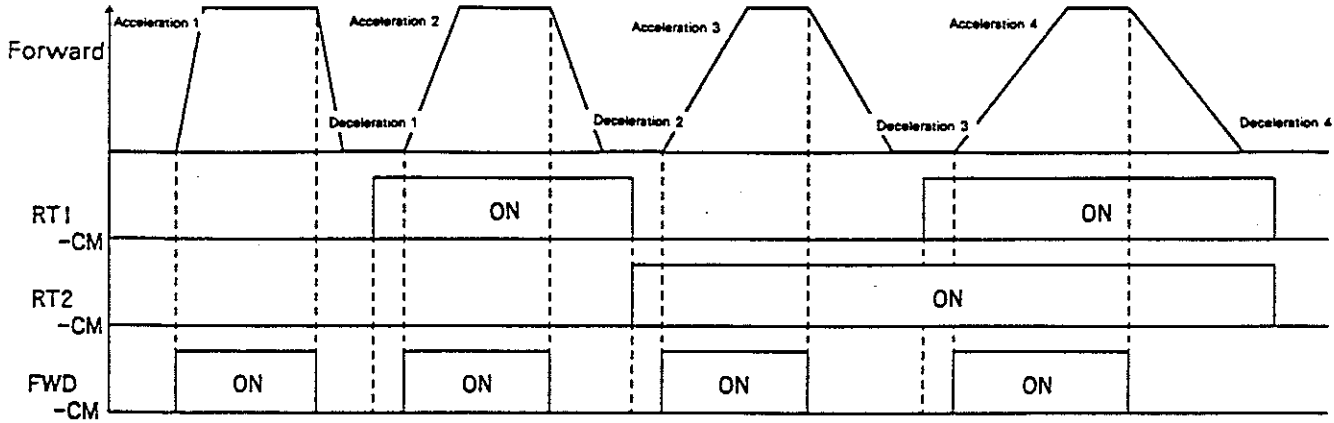
③ **Pattern Operation**

Pattern operation can be accomplished by aligning the step frequency setting and the timer setting.

I1	I2	I3	FM	OL	RUN	RST	RT1	X2	HLD	FWD	BX	SHT

CM	CM1	CM2	P12	LV	FAR	NC	RT2	X3	X1	REV	THR
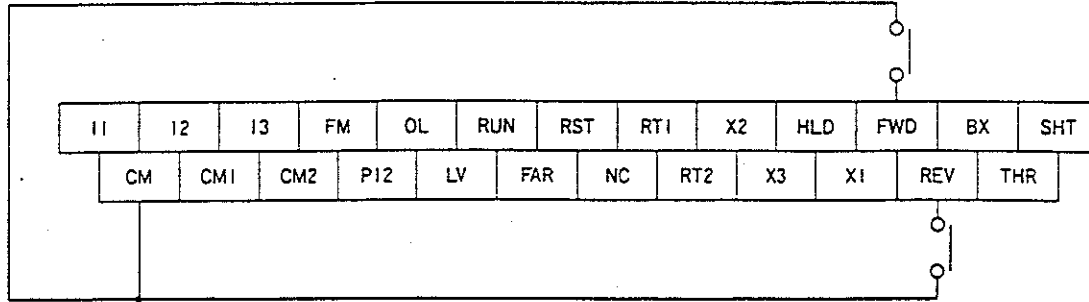
a. With function $\boxed{1}\boxed{9}\boxed{0}\boxed{1}$ pattern operation can be selected. (With $\boxed{1}\boxed{9}\boxed{0}\boxed{0}$ data $\boxed{3}\boxed{0}$, $\boxed{3}\boxed{2}$, $\boxed{3}\boxed{4}$, $\boxed{3}\boxed{6}$, $\boxed{3}\boxed{8}$, $\boxed{4}\boxed{0}$ and $\boxed{4}\boxed{2}$ cannot be accessed.)

b. $\boxed{2}\boxed{9}$ sets the frequency setting for Multistep Frequency 1 and sets the rotation direction, and acceleration/deceleration time. $\boxed{3}\boxed{0}$ sets the time for the Multistep Frequency 1 timer.
$\boxed{3}\boxed{1}$ sets the frequency setting for Multistep Frequency 2 and sets the rotation direction, and acceleration/deceleration time. $\boxed{3}\boxed{2}$ sets the timer for the Multistep Frequency 2 timer.
$\boxed{3}\boxed{3}$ sets the frequency setting for Multistep Frequency 3 and sets the rotation direction, and acceleration/deceleration time. $\boxed{3}\boxed{4}$ sets the time for the Multistep Frequency 3 timer.
$\boxed{3}\boxed{5}$ sets the frequency setting for Multistep Frequency 4 and sets the rotation direction, and acceleration/deceleration time. $\boxed{3}\boxed{6}$ sets the time for the Multistep Frequency 4 timer.
$\boxed{3}\boxed{7}$ sets the frequency setting for Multistep Frequency 5 and sets the rotation direction, and acceleration/deceleration time. $\boxed{3}\boxed{8}$ sets the time for the Multistep Frequency 5 timer.
$\boxed{3}\boxed{9}$ sets the frequency setting for Multistep Frequency 6 and sets the rotation direction, and acceleration/deceleration time. $\boxed{4}\boxed{0}$ sets the time for the Multistep Frequency 6 timer.
$\boxed{4}\boxed{1}$ sets the frequency setting for Multistep Frequency 7 and sets the rotation direction, and acceleration/deceleration time. $\boxed{4}\boxed{2}$ sets the time for the Multistep Frequency 7 timer.

(NOTE) When in timer display mode, use the $\boxed{\text{SET}}$ key for changing rotation direction or acceleration/deceleration time.

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c. When in operation panel operation mode ($\boxed{1}\boxed{5}\boxed{0}\boxed{0}$)
$\boxed{\text{RUN}}$ key : starts pattern operation

$\boxed{\text{RESET}}$ key : stops pattern operation (can be used after $\boxed{\text{STOP}}$ key)

$\boxed{\text{STOP}}$ key : temporarily stops pattern operation

d. When in control terminal operation mode ($\boxed{1}\boxed{5}\boxed{0}\boxed{1}$)
FWD-CM ON : starts pattern operation
FWD-CM OFF : force stops pattern operation
REV-CM ON : temporarily stops pattern operation

e. Operation Example
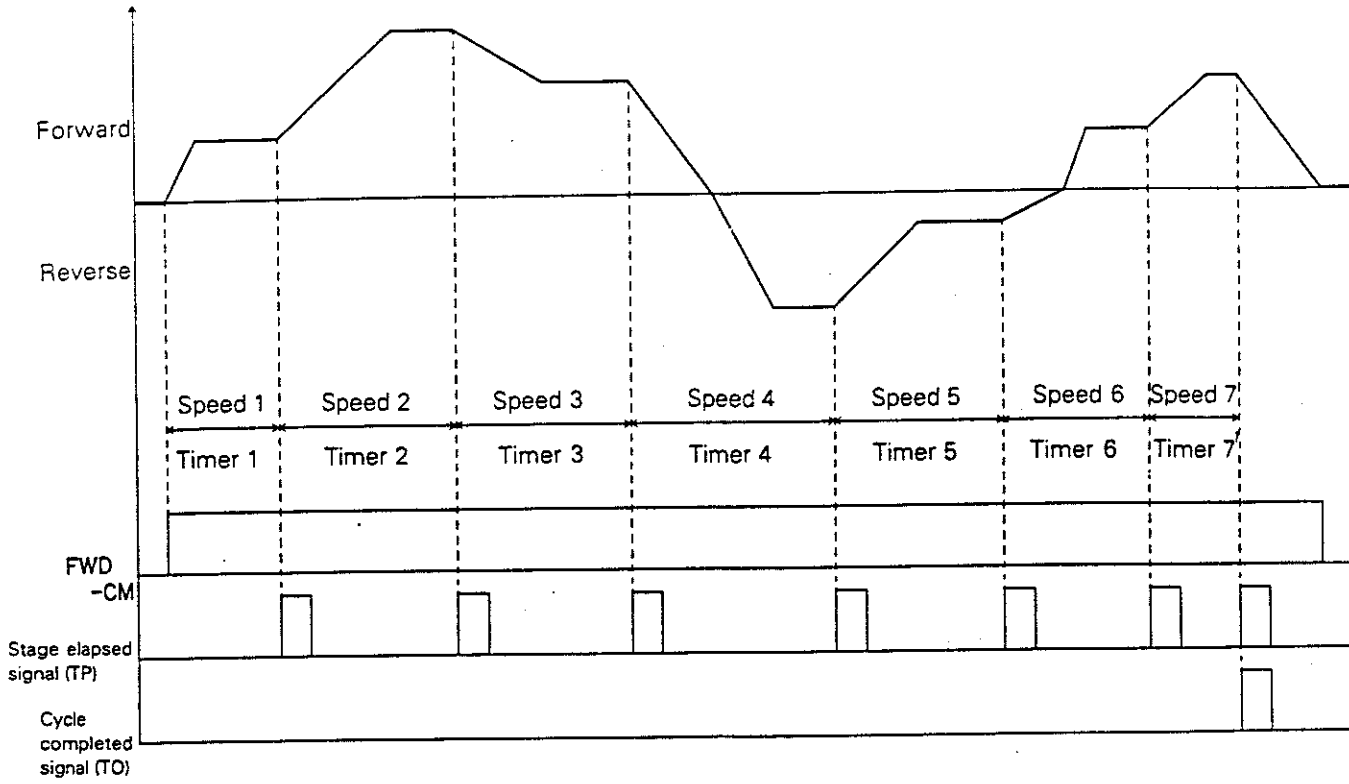
* In operation, the multistep frequency order is always in numerical order, 1 thru 7.

8. Function Explanation

(1) Function Code Tables

GRAPHIC DISPLAY	Function Code	Function	Display· Setting· Range	Minimum Unit	Factory Setting	Remarks

① Initial Setting

GRAPHIC DISPLAY	Function Code	Function	Display· Setting· Range	Minimum Unit	Factory Setting	Remarks
00 ■ DGTL MNTR GRHC MNTR MTR SOUND FM CALIBR	00	LED digital monitor selection	00: output frequency [Hz] 01: output current [A] 02: output voltage [V] 03: synchronous rpm [rpm] 04: line speed [m/min]	—	00	Can be set by SHIFT key during RUN/STOP 00: If the SHIFT key is press when the maximum frequency is 60Hz or less, [Hz] will flash and the output frequency = can be displayed down to the 3rd decimal place
	01	Graphics monitor selection	00: Hz AMP monitor 01: terminal signal ① 02: terminal signal ②	—	00	Output frequency· output current (1 to 10 levels) ON/OFF (■ : lights / out) ON/OFF (■ : lights / out)
	02	Motor noise reduction	00 to 05 (code)	—	03	6 levels OK
	03	FM terminal output level calibration	00 to 99 (code)	—	85	100 levels (approx. 6.5V - 10.3V)
04 ■ AUTO TRQ TRQ BOOST TRQ FINE AUTO ACC	04	Automatic torque boost control	00 : nonoperate 01 : operate	—	00	
	05	Torque boost	00 to 31 (code)	—	13	32 levels (00/01 is reduction torque curve)
	06	Fine adjustment of torque boost	00 to 09 (code)	—	00	10 division fine adjustment for each torque boost (05)
	07	Automatic accel/ decel control	00 : nonoperate 01 : operate	—	00	
08 ■ ACCEL 1 DECEL 1 DATA PRTC	08	Acceleration time 1	(LCD)0.01~3600S	0.01	6.00	(11kW or over 12.00)
	09	Deceleration time 1	(LCD)0.01~3600S	0.01	6.00	(11kW or over 12.00)
	10	Data protection	00 : change possible 01 : protect	—	00	STOP key and △/▽ keys (code change) SET key (code setting)

② Basic Functions

GRAPHIC DISPLAY	Function Code	Function	Display·Setting·Range	Minimum Unit	Factory Setting	Remarks
11 ■ MAX Hz BASE Hz RATED V MTR POLES	11	Maximum frequency	00 : 50Hz 01 : 60Hz 02 : 100Hz 03 : 120Hz 04 : free (Hz)	1Hz	01	04 (code) when setting (LCD) 0~400Hz
	12	Base frequency	00 : 50Hz 01 : 60Hz 02 : free (Hz)	1Hz	01	02 (code) when setting (LCD) 0~400Hz
	13	Rated output voltage	00 : 200V 01 : 220V 02 : 230V 03 : free (V)	1V	03 (0V)	03 (code) when setting (LCD) 0~230 0V setting : no AVR
	14	Normal of motor poles	02.04.06.08. 10.12	—	04	02 : 2 pole, 04 : 4 pole, 06 : 6 pole, 08 : 8 pole, 10 : 10 pole, 12 : 12 pole
15 ■ OPR COMND Hz COMND ACC PTN H TRQ BRK	15	Operation command	00 : Keypad panel operation 01 : terminal block operation 02 : link operation	—	01	
	16	Frequency command	00 : digital 01 : analog (voltage) 02 : analog (voltage)	—	01	Even when link operation mode is selected, monitoring of the set frequency is possible.
	17	Accel/Decel pattern	00 : linear 01 : weak "S" shape 02 : strong "S" shape	—	00	
	18	Normal/High torque dynamic brake	00 : normal brake 01 : hard brake	—	00	
19 ■ PTN OPR RESTART MNTR COEF FUNC BLK	19	Pattern operation	00 : nonoperate 01 : operate	—	00	
	20	Restart after instantaneous power failure	00 : nonoperate 01 : operate	—	00	
	21	Coefficient for line speed	(LCD)0.00~200	0.0	0.01	
	22	Function blocks used	00 : up to basic function 01 : up to standard function 02 : up to high level function		00	

GRAPHIC DISPLAY	Function Code	Function	Display· Setting· Range	Minimum Unit	Factory Setting	Remarks
③**Standard Function**						
23 ■ ACCEL 2 ACCEL 3 ACCEL 4	23	Acceleration time 2	(LCD)0.01~3600Sec	0.01	10.0	Terminals RT1 · RT2 ON · OFF
	24	Acceleration time 3	(LCD)0.01~3600Sec	0.01	15.0	Terminals RT1 · RT2 ON · OFF
	25	Acceleration time 4	(LCD)0.01~3600Sec	0.01	3.00	Terminals RT1 · RT2 ON · ON
26 ■ DECEL 2 DECEL 3 DECEL 4	26	Deceleration time 2	(LCD)0.01~3600Sec	0.01	10.0	Terminals RT1 · RT2 ON · OFF
	27	Deceleration time 3	(LCD)0.01~3600Sec	0.01	15.0	Terminals RT1 · RT2 OFF · ON
	28	Deceleration time 4	(LCD)0.01~3600Sec	0.01	3.00	Terminals RT1 · RT2 ON · ON
29 ■ MULT SPD1 TIMER 1 MULT SPD2 TIMER 2	29	Multistep speed setting 1	(LCD)0.00~400Hz	0.002	10.0	Only for pattern operation (19) mode select Timer 1 to 7 setting possible When setting Timer 1 to 7 Setting code (rotation direction · acceleration/deceleration time) 00 : FWD- acceleration/deceleration 1 01 : FWD- acceleration/deceleration 2 02 : FWD- acceleration/deceleration 3 03 : FWD- acceleration/deceleration 4 04 : REV- acceleration/deceleration 1 05 : REV- acceleration/deceleration 2 06 : REV- acceleration/deceleration 3 07 : REV- acceleration/deceleration 4
	30	Timer 1	(LCD)0.01~3600Sec	0.01	5.00	
	31	Multistep speed setting 2	(LCD)0.00~400Hz	0.002	20.0	
	32	Timer 2	(LCD)0.01~3600Sec	0.01	5.00	
33 ■ MULT SPD3 TIMER 3 MULT SPD 4 TIMER 4	33	Multistep speed setting 3	(LCD)0.00~400Hz	0.002	30.0	
	34	Timer 3	(LCD)0.01~3600Sec	0.01	5.00	Pattern operation summary When operation panel mode is selected (1500) RUN key : start operation STOP key : discontinue operation (pause) RESET key : pattern operation forced stop When terminal block operation is selected (1501) FWD terminal : start operation REV terminal : discontinue operation (pause)
	35	Multistep speed setting 4	(LCD)0.00~400Hz	0.002	40.0	
	36	Timer 4	(LCD)0.01~3600Sec	0.01	5.00	
37 ■ MULT SPD5 TIMER 5 MULT SPD6 TIMER 6	37	Multistep speed setting 5	(LCD)0.00~400Hz	0.002	50.0	
	38	Timer 5	(LCD)0.01~3600Sec	0.01	5.00	
	39	Multistep speed setting 6	(LCD)0.00~400Hz	0.002	60.0	
	40	Timer 6	(LCD)0.01~3600Sec	0.01	5.00	
41 ■ MULT SPD7 TIMER 7	41	Multistep speed setting 7	(LCD)0.00~400Hz	0.002	60.0	
	42	Timer 7	(LCD)0.01~3600Sec	0.01	5.00	
43 ■ ERCTRN OL H LIMITER L LIMITER FREQ BIAS	43	Electronic thermal overload relay	00 : nonoperate 01 : operate (%)	1%	00	When setting 01 (code) (LCD) 30 to 150%
	44	High limiter	(LCD)0~100%	1%	100	
	45	Low limiter	(LCD)0~100%	1%	0	
	46	Bias frequency	(LCD)0~100%	1%	0	
47 ■ FREQ GAIN JUMP Hz 1 JUMP Hz 2 JUMP Hz 3	47	Gain for frequency setting signal	(LCD)0~200%	1%	100	
	48	Jump frequency 1	(LCD)0~400Hz	1Hz	0	
	49	Jump frequency 2	(LCD)0~400Hz	1Hz	0	
	50	Jump frequency 3	(LCD)0~400Hz	1Hz	0	
51 ■ J HYSTR DC BRAKE DC BRK Hz DC BRK V	51	Jump frequency range	(LCD)0~5Hz	1Hz	0	
	52	DC brake	00 : nonoperate 01 : operate	–	00	
	53	DC brake starting frequency	(LCD)0~60Hz	1Hz	0	0.2 Hz at 00
	54	DC brake voltage	0 to 15% (code)	1%	00	
55 ■ DC BRK T START Hz I LIMITER SLIP COMP	55	DC braking time	(LCD)0.01~30Sec	0.01	0.10	
	56	Starting frequency	(LCD) 0.2~60 Hz	1Hz	1	0.2 Hz at 00
	57	Current limiter	00 : nonoperate 01 : operate (%)	1%	00	When setting 01 (code) (LCD) 30 to 150%
	58	Slip compensation control	00 : nonoperate 01 : operate		00	
59 ■ FDT Hz FDT HYSTR RUN FINSH OL WARN	59	Frequency level detection	(LCD)0~400Hz	1Hz	60	
	60	FDT and FAR signal hysterisis	(LCD)0~30Hz	1Hz	10	
	61	Run signal finishing frequency	(LCD)0~400Hz	1Hz	0	
	62	Overload early warning signal	(LCD)70~150%	1%	100	

GRAPHIC DISPLAY	Function Code	Function	Setting Data	Standard Function Terminals	Function Change Terminals	Data	Factory Setting	Other, LCD Display

④ High Function

4.1 Terminal Function Change

GRAPHIC DISPLAY	Function Code	Function	Setting Data	Standard Function Terminals	Function Change Terminals	Data	Factory Setting	Other, LCD Display
63 ■ X1-X2-X3 HOLD FUNC LV-OL-FAR	63	X1, X2 and X3 terminal function	00	X1~X3		Multistep Speed (7 steps)	00	
			01	X1 X2	△Hz ▽Hz	0.002 Hz step addition 0.002 Hz step subtraction		External input frequency addition · subtraction
			02	X1	BrI	DC Brake ON		Brake selection
	64	FWD/REV command hold (3-wire control)	00 01 02	HLD	DRV TM	2 wire 3 wire Cycle operation signal selection	00	
	65	LV, OL and FAR terminal output code	00	Independent terminal definition		LV OL FAR — Function is determined by function code (66 to 68)	00	
			01		3 bit code	LV OL FAR — Multistep timer selection (0 to 7)		
66 ■ LV FUNC OL FUNC FAR FUNC	66	LV terminal function	00	LV		Undervoltage signal	00	When selecting 3 bit code output, 0 to 7 step binary code is output at LV-OL-FAR. Accordingly, the data which has been set is ignored.
			01		OV	Overvoltage signal		
	67	OL terminal function	00 01 02	OL	CL IP	Overload early warning signal Current-limiting monitoring signal Undervoltage or restarting signal	00	
	68	FAR terminal function	00 01 02	FAR	FDT STOP	Frequency equivalence detection signal Frequency level detection signal Inverter stop signal (inverse of RUN signal)	00	
69 ■ RUN FUNC FM FUNC	69	RUN terminal function	00 01 02	RUN	TP TO	Inverter running signal Finish singal of each stage in patern operation Finish signal of each cycle in pattern operation	00	
	70	FM terminal function	00 01	FM	AMP	Frequency monitor signal (analog) Current monitor signal (analog)	00	

4.2 Link Function

GRAPHIC DISPLAY	Function Code	Function	Setting Data	Standard Function Terminals	Function Change Terminals	Data	Factory Setting	Other, LCD Display
71 ■ NO. ENTRY TL UNITS	71	Inverter unit No. entry for link operation (All inverters)	00	—	—	Master	15	Slave inverter numbers are recorded in order from small to large. When auxiliaries are not needed, they are recorded as slaves.
			01 02 03 04 ↓ 15	—	—	Aux. 1 (slave) Aux. 2 (slave) Aux. 3 (slave) Slave ↓ Slave		
	72	Number of units linked (Central inverter)	00 ↓ 15	—	—	Number of connect auxiliary/slave	00	Maximum number of connected inverters is 16. (Including maser)
73 ■ LINK MODE INPUT SEL NO. SELECT	73	Link mode (All inverters)	00 01 02 03	—	—	Inactive Individual frequency setting Individual monitoring signal Link operation	00	During operation / During stop 7301 SET : 80XX setting possible 7302 SET : 81XX setting possible 7303 SET : 82XX setting possible
	74	Run command input in link operation (Central inverter)	00 01	—	—	Keypad panel Terminal	00	During operation / During stop 1502 (link) SET : setting required
	75	Inverter unit No. (Central inverter only)	00 ↓ 15	—	—	Individual command — With link operation, this setting is necessary.	00	During operation / During stop When parameter command (8201) When 75XX SET Release Link (00 : transmission end) During Link (01 : start transmission) setting possible
			16	—	—	All command —		

4.3 Option Function
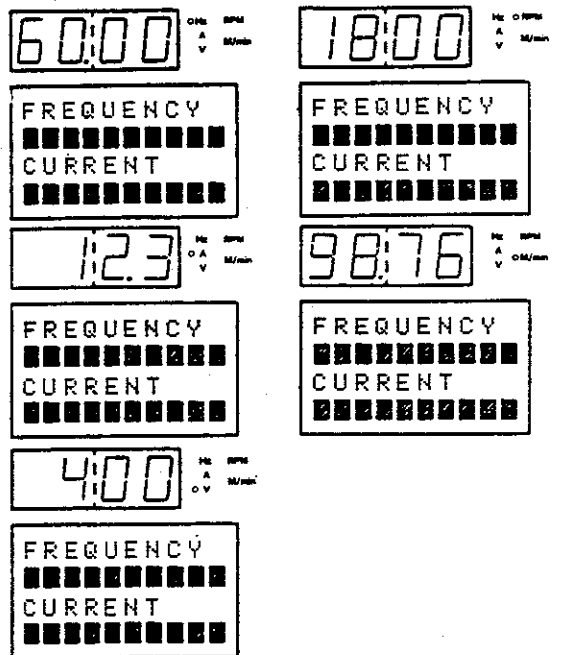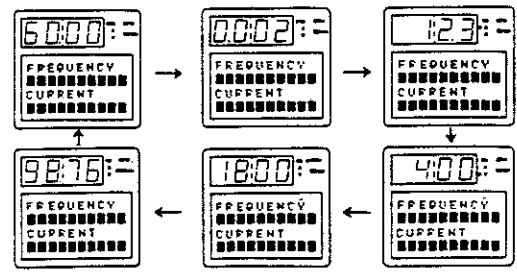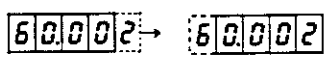
GRAPHIC DISPLAY	Function code	Function	Display · Setting · Range	Data	Factory Setting	Other, LCD Display
76 ■ OPTION 1 OPTION 2 OPTION 3 OPTION 4	76	Spares	00~99		00	
	77	Spares	00~99		00	
	78	Spares	00~99		00	
	79	Spares	00~99	·	00	

4.4 Link Function
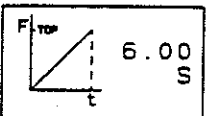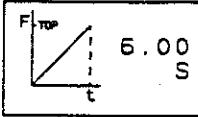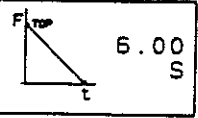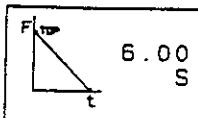
GRAPHIC DISPLAY	Function code	Setting Data	Function Name	Standard Function Terminals	Data	Factory Setting	Other, LCD Display
80 ■ FREQ BITS CODE OPR MODE	80	Frequency Setting	00 · Aux. 1	X1 X2 X3 RT1	Frequency Input · 4 bit binary input	00	resolution = max. frequency / 15
			01 · Aux. 1 Aux. 2	X1 X2 X3 RT1	8 bit binary input		resolution = max. frequency / 255
			02 · Aux. 1 Aux. 2 Aux. 3	X1 X2 X3 RT1	12 bit binary input		resolution = max. frequency / 4095
			00		4 bit frequency input		Master X1, X2, X3 and RT1 are 4 bit binary inputs for inverter numbers [00 to 15].
			01 · Master	— —	8 bit frequency input		Slave X1, X2, and X3 are for function setting by function code [6300].
			02		12 bit frequency input		Slave RT1 and RT2 are standard function
81 FREQ BITS ■ CODE OPR MODE (Advances on display by function code 7302 SET)	81	Monitoring Signal	00 · Master	LV OL FAR RUN 30A 30B 30C	Output terminal data monitor	00	Master X1, X2, X3, and RT1 are 4 bit binary input for inverter numbers [00 to 15]. Designated inverter output terminal data (LV, OL, FAR, RUN) monitored at master. 30 A, B, C are — batch monitored. Set data is fixed at 00.
82 FREQ BITS CODE ■ OPR MODE (Advances on display by function code 7303 SET)	82	Link Operation	00 · Master	—	Operation Command	·	Individual / All can be operated from master keypad panel or terminal block. Slave operates via mater frequency setting as well as keypad command.
			01		Load Command		The master parameter [except function code : 71 to 75, 80 to 82] is transmitted Individual / All. Parameter transmission to slave in operation is not possible. (Err4 will be displayed on master)

(2) Function Explanation
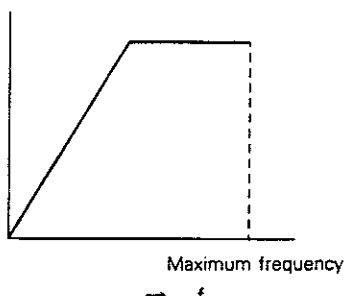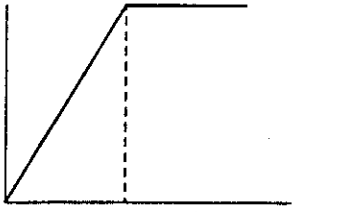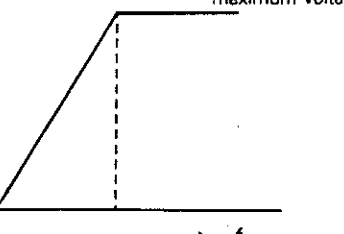
① Initial Setting
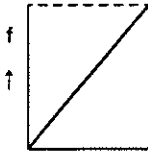
Function Code	Display	Function Explanation	Function Data
`[ 0 0 ]` Hz rpm A M/min ■ DGTL MNTR 　 GRHC MNTR 　 MTR SOUND 　 FM CALIBR LED Digital Monitor Selection		After the power supply is turned on. or after completion of program. the 7 segment LED (4 digit) initial display data can be changed.	
	`0 0 0 0`	Set frequency [Hz] (during STOP). output frequency [Hz] (during RUN) displayed	`0 0 : 0 0`
	`0 0 0 1`	Output current [A] display (virtual value)	
	`0 0 0 2`	Output voltage [V] display (virtual value)	
	`0 0 0 3`	Synchronous rotation speed [rpm] display	
	`0 0 0 4`	Line speed [m/min] display	

For each display mode, normally the display can be changed by using the SHIFT key.

For frequency display, one digit shift to the right for verification is possible by using the SHIFT key. (At this time the digit on the left will not be displayed)

`6 0 0 0 2` → `6 0.0 0 2`

Function Code	Display	Function Explanation	Function Data

| | | The LCD (liquid Crystal) display can be changed to the following 3 modes. | |

Function Code 01 — Graphics Monitor Selection

Display:
```
DGTL MNTR
▓ GRHC MNTR
  MTR SOUND
  FM CALIBR
```

Display	Mode
`0 1 0 0`	Output frequency [%]. output current [%] Graph display
`0 1 0 1`	Control terminal monitor 1
`0 1 0 2`	Control terminal monitor 2

Function Data: `0 100`

```
 60.00  ⌃Hz  RPM
               ˅   M/min

FREQUENCY
▓▓▓▓▓▓▓▓▓
CURRENT
▓▓▓▓▓▓▓▓▓
```

```
 60.00  ⌃Hz  RPM
               ˅   M/min

▓LV    ▓X1
▓OL    ▓X2
▓FAR   ▓X3
▓RUN
```

```
 60.00  ⌃Hz  RPM
               ˅   M/min

▓FWD   ▓RT1
▓REV   ▓RT2
▓HLD
```

① With function | 1 1 | the output frequency is a % of the set maximum frequency.(by 10 %)

② The output current is a % of the inverter rated current. (by 10%)

③ Control terminal monitor   ON is indicated by ▓.
No indication = OFF.

Function Code 02 — Motor Noise Reduction

Display:
```
DGTL MNTR
  GRHC MNTR
▓ MTR SOUND
  FM CALIBR
```

Display	
`0 2 0 0`	
～	
`0 2 0 5`	

The sound quality of the sound produced by the motor can be changed.

} Select from 6 types depending on the operating conditions

Function Data: `0203`

Function Code 03 — FM terminal Output Calibration

Display:
```
DGTL MNTR
  GRHC MNTR
  MTR SOUND
▓ FM CALIBR
```

Display	
`0 3 0 0`	
～	
`0 3 9 9`	

This function regulates the frequency indication meter voltage level output from the FM terminal.

Approx. 6.5 V
↓   Within this range regulation can be 1/100 resolution
Approx. 10.3 V

Function Data: `0385`

Function Code	Display	Function Explanation	Function Data
`04` Hz RPM A M/min V ■ AUTO TRQ / TRQ BOOST / TRQ FINE / AUTO ACC — Automatic torque boost control	`0400` `0401`	Automatically regulates the output voltage to correspond to the operating load conditions. Nonoperate : operates at set torque boost value (`05`) Operate : auto torque boost	`0400`
`05` Hz RPM A M/min V AUTO TRQ / ■ TRQ BOOST / TRQ FINE / AUTO ACC — Torque Boost	`0500` `0501` `0502` } `0531`	Setting can be made from 32 types, depending on type of load, motor characteristics, etc. } For reduction torque load use (fan, pump, etc.) Weak ↓ Strong ↑ output voltage V → frequency characteristics f	`0513`
`06` Hz RPM A M/min V AUTO TRQ / TRQ BOOST / ■ TRQ FINE / AUTO ACC — Fine Adjustment Of Torque Boost	`0600` } `0609`	For torque boost value set at `05` the torque boost value can be further fine adjusted. (10 Steps) [Example] For torque boost value set at `05` Strong V ↑ 10 steps { 0505 / 0504 → f	`0600`
`07` Hz RPM A M/min V AUTO TRQ / TRQ BOOST / TRQ FINE / ■ AUTO ACC — Automatic Accel/Decel Control	`0700` `0701`	Automatically determines the acceleration/deceleration time corresponding to the load characteristics, GD^2. The minimum times are 3 sec. for acceleration, and 8 sec. for deceleration. (0 ↔ 60Hz) Nonoperate (at `08` `09` operation is at set acceleration/deceleration time) Operate (auto acceleration/deceleration operation)	`0700`
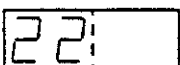
Function Code	Display	Function Explanation	Function Data

① For heavy inertia load.

② Does not function when momentary power failure restart $\boxed{2\,0\,0\,1}$ is active, or current limit $\boxed{5\,7\,0\,1}$ is selected.

③ Does not function for S time acceleration/deceleration $\boxed{1\,7\,0\,1}$ $\boxed{1\,7\,0\,2}$

---

08 — ACCEL 1 / DECEL 1 / DATA PRTC

Acceleration Time 1

Display: 08, F/TOP 6.00 S

Setting is possible within the 0.01S to 3,600S range to correspond to load characteristics. GD².

Setting time	Setting Resolution
0.01 ~ 9.99 s	By 0.01s
10.00 ~ 99.90 s	By 0.1s
100.0 ~ 999.0 s	By 1s
1000 ~ 3600 s	By 10s

Function Data: 08, 6.00 S

---

09 — ACCEL 1 / DECEL 1 / DATA PRTC

Deceleration Time 1

Display: 09, F/TOP 6.00 S

Is selected when both RT1-CM and RT2-CM are OFF.

Function Data: 09, 6.00 S

---

10 — ACCEL 1 / DECEL 1 / DATA PRTC

Data Protection

Display: $\boxed{1\,0\,0\,0}$, $\boxed{1\,0\,0\,1}$

For data that does not need to be changed, the set data can be locked.

No protect

Protect

① $\boxed{\wedge}$ $\boxed{\vee}$ keys + $\boxed{STOP}$ key changes data. Data is stored with the SET key.

② Change of data other than $\boxed{1\,0\ \ \ }$ is not possible.

Function Data: $\boxed{1\,0\,0\,0}$

② Basic Function

Function Coda	Display	Function Expalanation	Function Data
⌐		Sets maximum value for output frequency	
`1 1` Hz RPM ▲▼ M/min	`1 1 0 0`	50Hzmax	`1 1 0 1`
▓ MAX Hz BASE Hz RATED V MTR POLES	`1 1 0 1`	60Hzmax	
Maximum Frequency	`1 1 0 2`	100Hzmax	
	`1 1 0 3`	120Hzmax	
	`1 1 0 4`	Between 0 to 400Hz. the maximum frequency can be set with 1Hz step.	
		Damage may result if commonly used motors, etc. which are designed for low speed use, are operated at maximum frequency. Operate motors at a frequency setting conforming to the motor characteristics.	
`1 2` Hz RPM ▲▼ M/min		Sets the base frequency. (frequency for specified torque characteristics and specified output characteristic divergent point)	`1 2 0 1`
MAX Hz ▓ BASE Hz RATED V MTR POLES	`1 2 0 0`	50Hz	
Base Frequency	`1 2 0 1`	60Hz	
	`1 2 0 2`	Between 0 to 400Hz, the base frequency can be set with 1Hz step.	
		① Operate at a setting conforming to the motor characteristics. ② A setting exceeding the maximum frequency is not possible.	
`1 3 0 3` Hz RPM ▲▼ M/min	`1 3 0 0`	Sets the maximum value for the output voltage. 200V (maximum voltage)	`1 3 0 3` (0V)
MAX Hz BASE Hz ▓ RATED V MTR POLES	`1 3 0 1`	220V	
Rated Output Voltage	`1 3 0 2`	230V	
	`1 3 0 3`	When set at 0V. voltage proportioned to the power supply voltage is output. Between 1 to 230V , output voltage can be set with 1 V step.	
		Output of voltage exceeding the power supply voltage is not possible.	
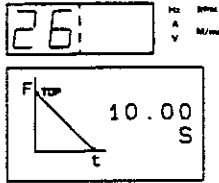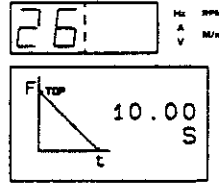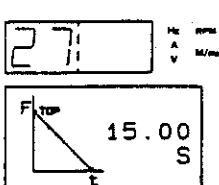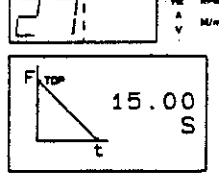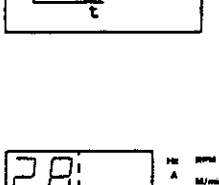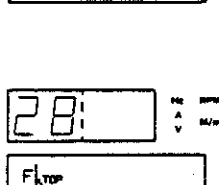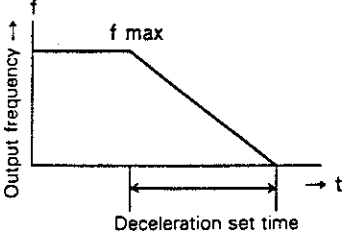
Function Code	Display	Function Explanation	Function Data
![14 display] MAX Hz BASE Hz RATED V ■ MTR POLES / Number of Motor Poles	`1 4 0 2` `1 4 0 4` `1 4 0 6` `1 4 0 8` `1 4 1 0` `1 4 1 2`	The number of motor poles is set using the display for synchronous rpm. 2 pole conversion 4 pole conversion 6 pole conversion [Example] Display when 4 pole motor is operated at 60Hz. 8 pole conversion `1 8 0 0` ■RPM 10 pole conversion 12 pole conversion	`1 4 0 4`
![15 display] ■ OPR COMND Hz COMND ACC PTN H TRQ BRK / Operation Command	`1 5 0 0` `1 5 0 1` `1 5 0 2`	Selection can be made from the following 3 types. Panel operation mode (RUN STOP keys) Terminal block mode (FWD, REV, HLD terminals) Link mode (group operation : see p.54 to 57)	`1 5 0 1`
![16 display] OPR COMND ■ Hz COMND ACC PTN H TRQ BRK / Frequency Command	`1 6 0 0` `1 6 0 1` `1 6 0 2`	Selection can be made from the following 3 types. Digital setting (∧ ∨ keys) Analog setting (DC 0 to 10V) Analog setting (DC 0 to 10V) Even when `1 5 0 2` link operation is selected, monitor of setting frequency is possible.	`1 6 0 1`
![17 display] OPR COMND Hz COMND ■ ACC PTN H TRQ BRK / Accel/Decel Pattern	`1 7 0 0` `1 7 0 1` `1 7 0 2`	Selection can be made from the following 3 types. Linear acceleration/deceleration (Fig. a) Weak S curve acceleration/deceleration (Fig. b) Strong S curve acceleration/deceleration (Fig. c) Fig. a Fig. b Fig. c Does not function when `0 7 0 1` auto acceleration/ deceleration is selected.	`1 7 0 0`

Function Code	Display	Function Explanation	Function Data

`18` Hz RPM A M/min
 	
 OPR COMND
 Hz COMND
 ACC PTN
 ▨ H TRQ BRK
 	
 Normal/High Torque Dynamic Brake
	`1800`
	
	 `1801`
		Selection can be made from the following 2 types of regenerative braking methods.
		
		 Standard brake via internal DB impedance
		
		 High brake via external DB impedance (option)
		
		 • For standard braking via internal DB impedance, braking operates at below 66Hz output frequency.
		 • For high braking via external DB impedance, braking operates at full output frequency range.
		
		 For loads requiring an instantaneous stop, set the high brake mode and connect the optional external DB impedance.
			`1800`

`19` Hz RPM A M/min
 	
 ▨ PTN OPR
 RESTART
 MNTR COEF
 FUNC BLK
 	
 Pattern Operation
	`1900`
	
	 `1901`
		Selects between operate/nonoperate for timer multistep frequency operation set by function codes `29` to `42`
		
		 Nonoperate (standard multistep frequency operation)
		
		 Operate (timer multistep frequency operation)
		
		 See function codes ___ to `42` for pattern operation details.
			`1900`

`20` Hz RPM A M/min
 	
 PTN OPR
 ▨ RESTART
 MNTR COEF
 FUNC BLK
 	
 Restart After Instantaneous Power Failure
	`2000`
	
	 `2001`
		Selects restart mode for instantaneous power failure and restoration.
		
		 Nonoperate
		     (No operation command: inverter stop
		     With operation command: undervoltage trip)
		 Operate
		     (Picks up the free running motor rpm for a smooth restart)
		
		 ① For `2001` , operates only when LU lights up.
		
		   The LU light times for each unit is listed in the table below.
		
		                                      (sec.)
		 200V series
		
		         <table><tr><td>002</td><td>004</td><td>008</td></tr><tr><td>0.5</td><td>1.2</td><td>1.4</td></tr></table>
		
		 ② Combined use with current limit function is possible.
			`2000`

Function Coda	Display	Function Expalanation	Function Data
21 Hz RPM A M/min PTN OPR RESTART ▨ MNTR COEF FUNC BLK Coefficient for Line Speed	F coefficient $Hz \times 0.000$ ↓ F coefficient $Hz \times 200$	Coefficient K is for display of m/min Display value = output frequency × K Display output frequency × 0.00 ↓ } By 0.01 setting is possible when K = 0.00 to 200. Displays output frequency × 200 If the value for output frequency × K exceeds 9999. 9999 is displayed. [Example] K = 200 at output 100HZ 100Hz × K = 20,000 → display $\boxed{9\,9\,9\,9}$	
22 Hz RPM A M/min PTN OPR RESTART MNTR COEF ▨ FUNC BLK Function Blocks Used	$2\,2\,0\,0$ $2\,2\,0\,1$ $2\,2\,0\,2$	The function code block display range for function code setting as well as verification can be defined. (SHIFT key changes display range definition) Up to basic function display ($0\,0$ → $2\,2$ setting and verification possible) Up to standard function display ($0\,0$ → $6\,2$ setting and verification possible) Function display ($0\,0$ → $8\,2$ setting and verification possible)	$\boxed{2\,2\,0\,0}$

③ Standard Function

Function Code	Display	Function Explanation	Function Data
`23` ⬛ ACCEL 2 ☐ ACCEL 3 ☐ ACCEL 4 — Acceleration Time 2	`23` F TOP 10.00 S	Setting between the 0.01S to 3600S range is possible to correspond to the load characteristics, GD². 0.01 to 9.99S : By 0.01S 10.00 to 99.90S: By 0.1S 100.0 to 999.0S: By 1S 1000 to 3600S: By 10S Selection of acceleration times 1 through 4 is made via RT1 and RT2 terminal combinations.	`23` F TOP 10.00 S
`24` ☐ ACCEL 2 ⬛ ACCEL 3 ☐ ACCEL 4 — Acceleration Time 3	`24` F TOP 15.00 S		`24` F TOP 15.00 S
`25` ☐ ACCEL 2 ☐ ACCEL 3 ⬛ ACCEL 4 — Acceleration Time 4	`25` F TOP 3.00 S		`25` F TOP 3.00 S

Selection of acceleration times 1 through 4 is made via RT1 and RT2 terminal combinations.

Terminal ON/OFF	RT2–CM ON	RT2–CM OFF
RT1–CM ON	Acceleration Time 4	Acceleration Time 2
RT1–CM OFF	Acceleration Time 3	Acceleration Time 1

※ The setting time equals the time required to reach the set maximum frequency from zero.

(0 → max. set freq.)

Indicates time change (sec.) up to (`| ¦ ¦ | |` setting)

f

fmax

output frequency

→ t

acceleration set time

Function Coda	Display	Function Explanation	Function Data

Function Coda column:

26

■ DECEL 2
DECEL 3
DECEL 4

Deceleration Time 2

27

DECEL 2
■ DECEL 3
DECEL 4

Deceleration Time 3

28

DECEL 2
DECEL 3
■ DECEL 4

Deceleration Time 4

Display column:

26

10.00 S

27

15.00 S

28

3.00 S

Function Explanation column:

Setting between the 0.01S to 3600S range is possible to correspond to the load characteristics, GD^2.

0.01 to 9.99S : By 0.01S
10.00 to 99.90S : By 0.1S
100.0 to 999.0S : By 1S
1000 to 3600S : By 10S

Selection of deceleration times 1 thru 4 is made via RT1 and RT2 terminal combinations.

Terminal ON/OFF	RT2–CM ON	RT2–CM OFF
RT1–CM ON	Deceleration time 4	Deceleration time 2
RT1–CM OFF	Deceleration time 3	Deceleration time 1

✳ The setting time equals the time required to reach 0 from the maximum frequency. (max. frequency → 0)
Indicates time change (sec.) up to ([i] [i] [ ] [ ] setting)

f max

Output frequency

→ t

Deceleration set time

Function Data column:

26

10.00 S

27

15.00 S

28

3.00 S

Function Code	Display	Function Explanation	Function Data

Function Code column:

`29`

☑ MULT SPD1
TIMER 1
MULT SPD2
TIMER 2

Multistep Speed Setting 1

`31`

MULT SPD1
TIMER 1
☑ MULT SPD2
TIMER 2

Multistep Speed Setting 2

`33`

☑ MULT SPD3
TIMER 3
MULT SPD 4
TIMER 4

Multistep Speed Setting 3

`35`

MULT SPD3
TIMER 3
☑ MULT SPD 4
TIMER 4

Multistep Speed Setting 4

`37`

☑ MULT SPD5
TIMER 5
MULT SPD6
TIMER 6

Multistep Speed Setting 5

`39`

MULT SPD5
TIMER 5
☑ MULT SPD6
TIMER 6

Multistep Speed Setting 6

`41`

☑ MULT SPD7
TIMER 7

Multistep Speed Setting 7

Display column:

`29` 10.00 Hz

`31` 20.00 Hz

`33` 30.00 Hz

`35` 40.00 Hz

`37` 50.00 Hz

`39` 60.00 Hz

`41` 60.00 Hz

Function Explanation column:

8 step multi-step frequency operation is possible through switching of the control terminals X1, X2, X3 (for setting) `1900`

[Set resolution]

Multi-step set value / Maximum frequency	0~1.000Hz	1.000~10.00Hz	10.00~100.0Hz	100.0~Hz
60Hz	0.002Hz	0.01Hz	0.1Hz	—
300Hz	0.01Hz	0.01Hz	0.1Hz	1Hz
400Hz	0.02Hz	0.01Hz	0.1Hz	1Hz

[Relationship between the terminals and multi-step frequency 1 to 7]

Function code	16	29	31	33	35	37	39	41
Multi-step frequency	Analog Digital	Speed 1	Speed 2	Speed 3	Speed 4	Speed 5	Speed 6	Speed 7
X1-CM	OFF	ON	OFF	ON	OFF	ON	OFF	ON
X2-CM	OFF	OFF	ON	ON	OFF	OFF	ON	ON
X3-CM	OFF	OFF	OFF	OFF	ON	ON	ON	ON

① When X1-CM, X2-CM, X3-CM are all OFF, setting is made by digital (∧ ∨ keys), or analog (DC 0 to +10V, 4 to 20mA) which is selected by function `16`.

② A setting exceeding the maximum frequency set by `11` is not possible.

③ When `1901` is set, operation is by timer multi-step frequency.

④ When `6300` is set, multi-step frequency 1 thru 7 switching is possible via X1, X2, X3 terminals.

Function Data column:

`29` 10.00 Hz

`31` 20.00 Hz

`33` 30.00 Hz

`35` 40.00 Hz

`37` 50.00 Hz

`39` 60.00 Hz

`41` 60.00 Hz

Function Code	Display	Function Explanation	Function Data

Function Code column (left):

`30`

MULT SPD1
■ TIMER 1
MULT SPD2
TIMER 2

Timer 1

`32`

MULT SPD1
TIMER 1
MULT SPD2
■ TIMER 2

Timer 2

`34`

MULT SPD3
■ TIMER 3
MULT SPD 4
TIMER 4

Timer 3

`36`

MULT SPD3
TIMER 3
MULT SPD 4
■ TIMER 4

Timer 4

`38`

MULT SPD5
■ TIMER 5
MULT SPD6
TIMER 6

Timer 5

`40`

MULT SPD5
TIMER 5
MULT SPD6
■ TIMER 6

Timer 6

`42`

MULT SPD7
■ TIMER 7

Timer 7

Display column:

`30.00` F 0.01 S

`32.00` F 0.01 S

`42.00` F 0.01 S

Function Explanation:

When `1901` is set, timer multi-step frequency operation is possible by multi-step frequency 1 thru 7 combination.

When in timer multi-step frequency operation, no frequency changeover via the X1, X2, X3 terminals is necessary.

Operation is in the multi-step frequency 1 → multi-step frequency 2 → ..... multi-step frequency 7 order.

[Rotation direction and acceleration/deceleration time] Function codes

`30` `32` `34` `36` `38` `40` `42`

By using the chart below to see the code, rotation direction and acceleration/deceleration time can be determined.

Data Code	Rotation Direction	Acceleration Time · Deceleration Time	
`00`	Forward (FWD)	`08`	`09`
`01`		`23`	`26`
`02`		`24`	`27`
`03`		`25`	`28`
`04`	Reverse (REV)	`08`	`09`
`05`		`23`	`26`
`06`		`24`	`27`
`07`		`25`	`28`

Function Data column (right):

`30.00` F 5.00 S

`32.03` F 5.00 S

`34.02` F 5.00 S

`36.01` F 5.00 S

`38.02` F 5.00 S

`40.00` F 5.00 S

`42.01` F 5.00 S

Function Code	Display	Function Explanation	Function Data

When the next frequency in the process is higher than the present frequency, the acceleration time will be automatically selected. If the next frequency is lower than the present frequency, the deceleration time will be automatically selected.

[Example 1] when data code is $\boxed{3\,2\,0\,0}$
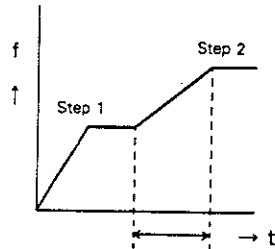
Function code 08 setting
Acceleration Time
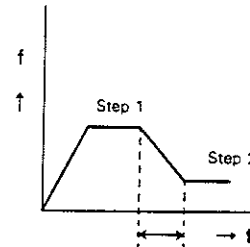
Function code 09 setting
Deceleration Time

[Example 2] when data code is $\boxed{3\,2\,0\,4}$
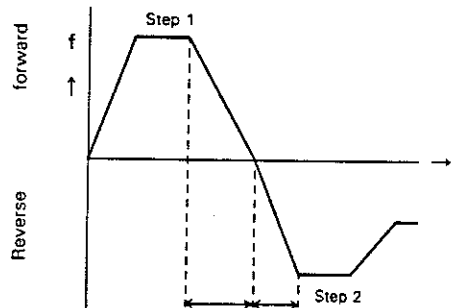
Function code 09 setting
Deceleration Time

Function code 08 setting
Acceleration Time

[Timer Setting]
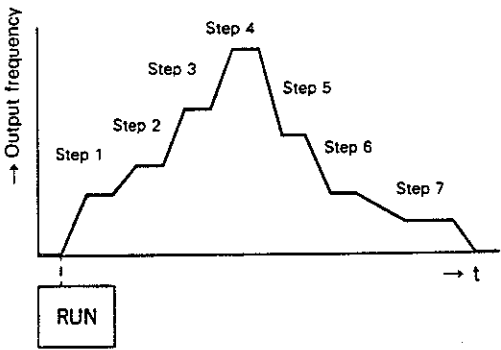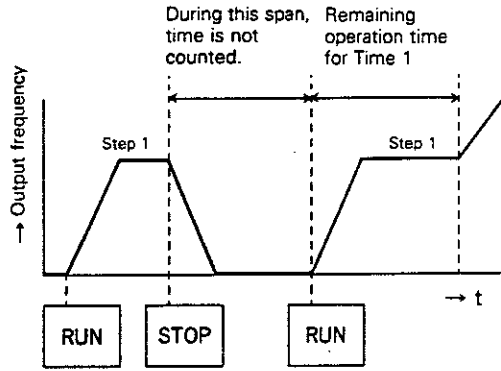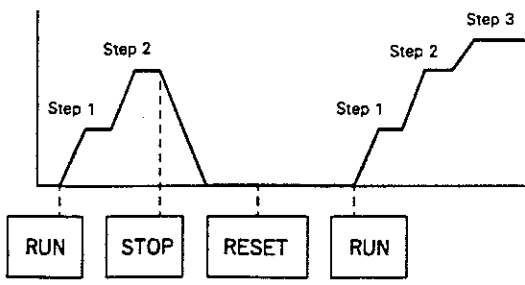
After setting the rotation direction and acceleration/deceleration time, set the timer.
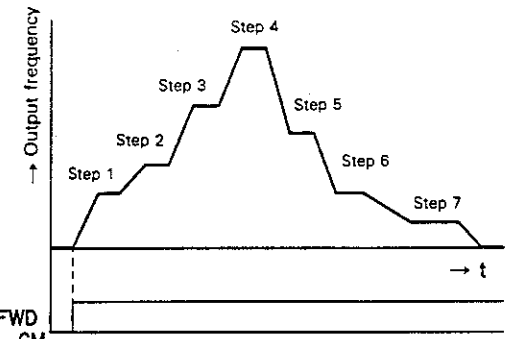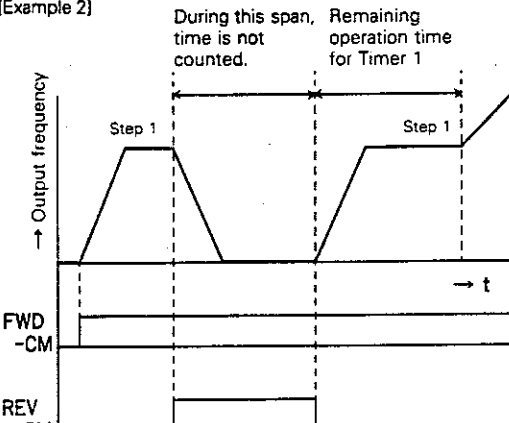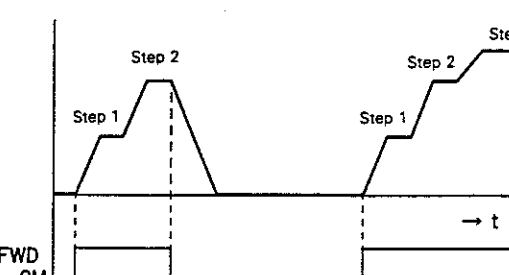
Timer Setting	Setting Resolution
0.01~9.99sec	0.01sec
10.00~99.90sec	0.1sec
100.0~999.0sec	1sec
1000~3600sec	10sec
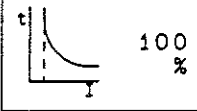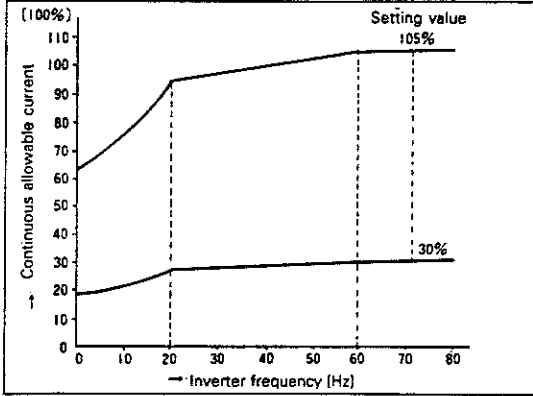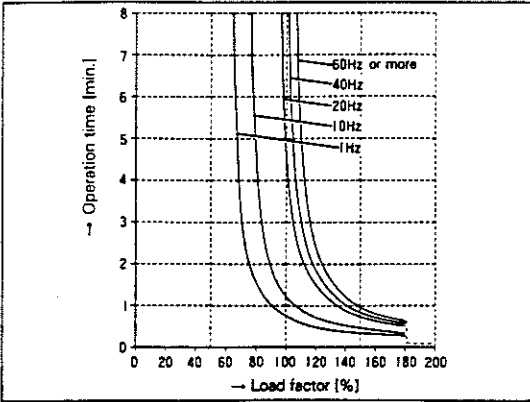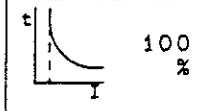
The time set on the timer includes the time required for acceleration/deceleration. Therefore, if the time set on the timer is less than the time required for the acceleration.deceleration conditions, it will proceed to the next process before the set step frequency is reached.
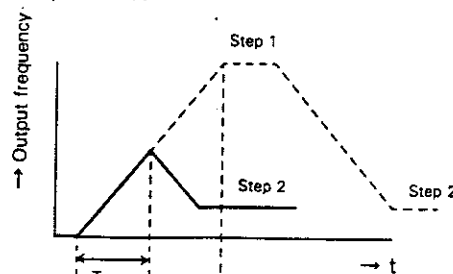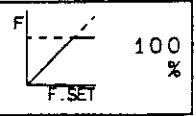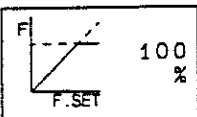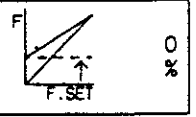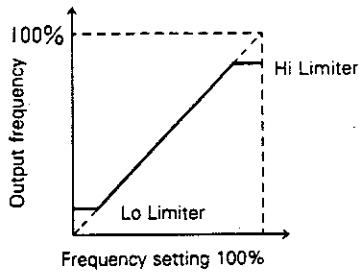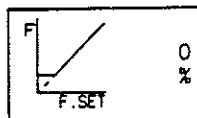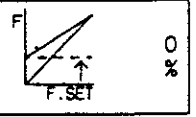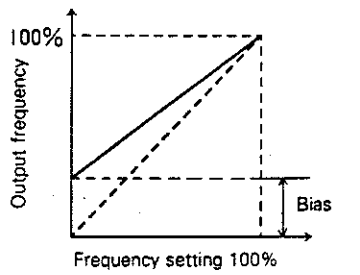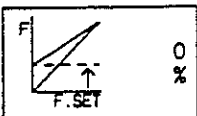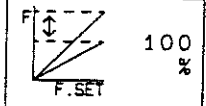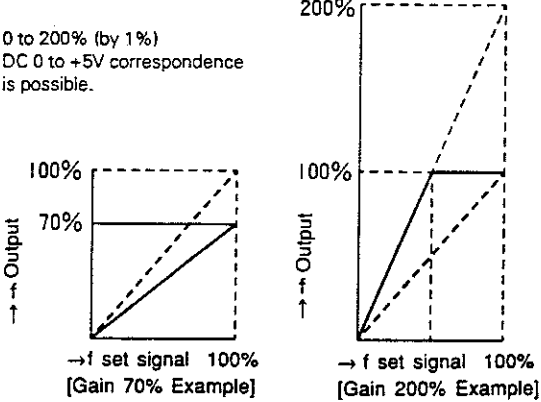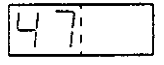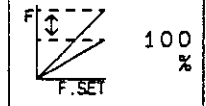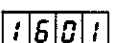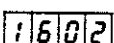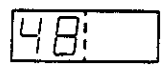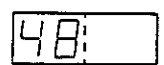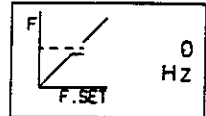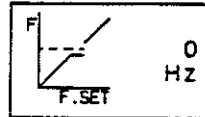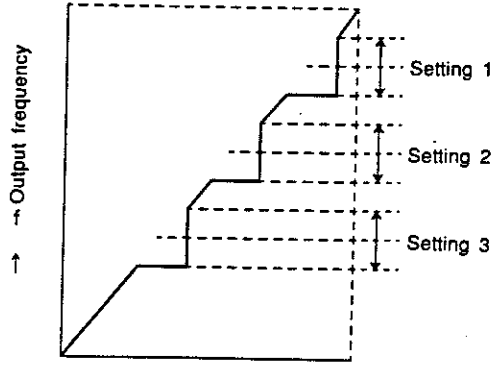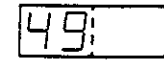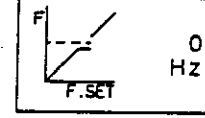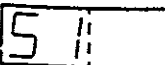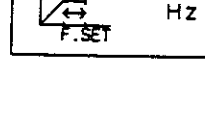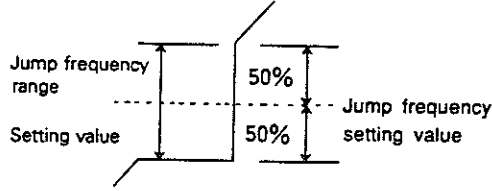
Required acceleration time

— 33 —
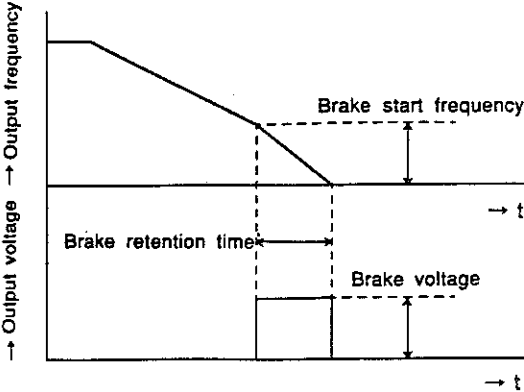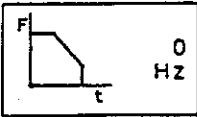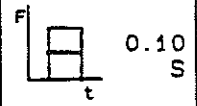
Function Coda	Display	Function Expalanation	Function Data

[Timer multi-step frequency operation method]
① Panel Operation
   The key functions are changed as follows:

$\boxed{\text{RUN}}$ key : Start operation

$\boxed{\text{STOP}}$ key : Temporary stop of inverter operation (pause)

$\boxed{\text{RESET}}$ key : Timer operation reset

(The next $\boxed{\text{RUN}}$ input will start operation from Step 1)

※ RESET function only during STOP.

[Example 1]

[Example 2]

[Example 3]
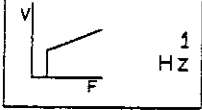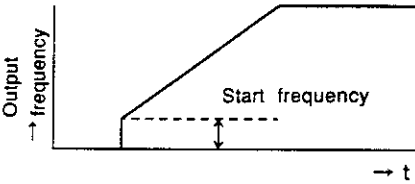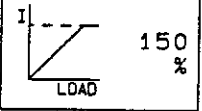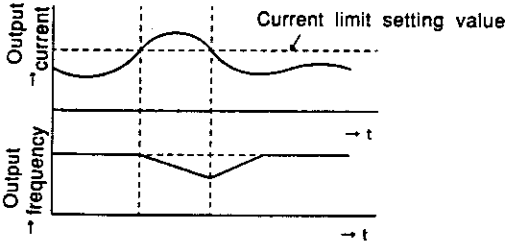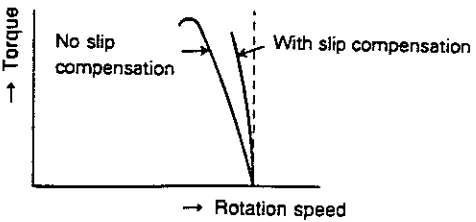
Function Coda	Display	Function Expalanation	Function Data
		② Control Terminal Operation The terminal functions are changed as follows: FWD-CM = ON : Start operation FWD-CM = OFF : Stop timer operation REV-CM = ON : Temporary stop timer operation (pause) [Example 1] [Example 2] During this span, Remaining time is not operation time counted. for Timer 1 [Example 3]	
		① During timer operation, if RT1-CM, RT2-CM terminals are ON/OFF, operation will switch to acceleration.deceleration times set by $\boxed{2}\,\boxed{3}$ to $\boxed{2}\,\boxed{8}$ ② During timer operation, if X1-CM, X2-CM, X3-CM terminals are ON/OFF, operation will switch to multi-step frequencies 1 to 7 set by $\boxed{2}\,\boxed{9}$ $\boxed{3}\,\boxed{1}$ $\boxed{3}\,\boxed{3}$ $\boxed{3}\,\boxed{5}$ $\boxed{3}\,\boxed{7}$ $\boxed{3}\,\boxed{9}$ $\boxed{4}\,\boxed{1}$ The time for both ① and ② is counted on the timer.	
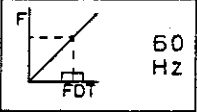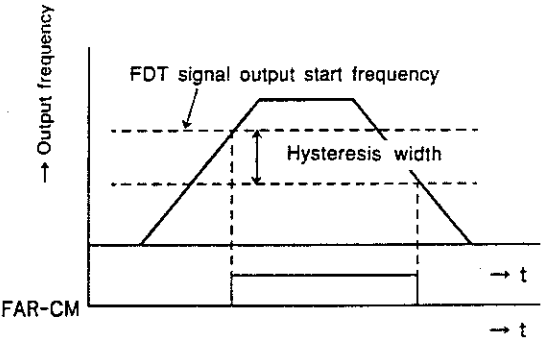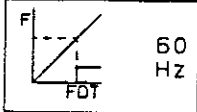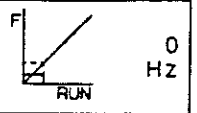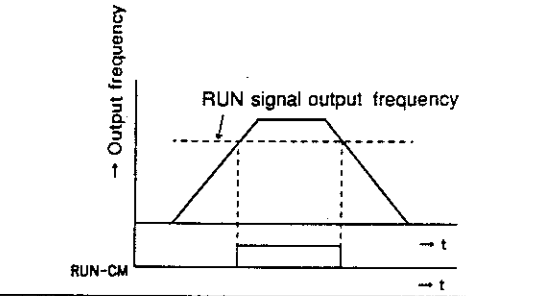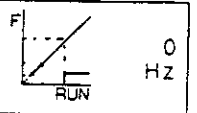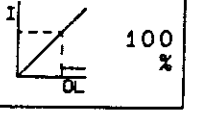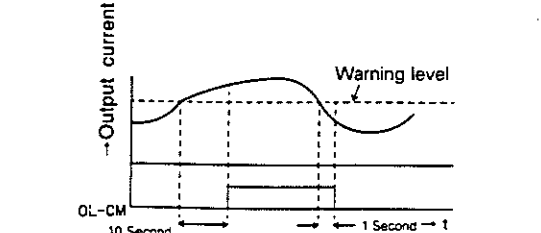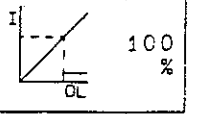
Function Coda	Display	Function Expalanation	Function Data

Function Code:

4 3 (Hz RPM M/min)

■ ERCTRN OL
H LIMITER
L LIMITER
FREQ BIAS

Electronic Thermal
Overload Relay

Display:

4 3 0 0

4 3 0 1 (Hz RPM M/min)

t | 100 %

Function Explanation:

Commonly used motor (4 pole) over-heating protection is possible.
(all frequency range protection possible)

Nonoperate

Operate (electronic thermal protection operation)

Setting range 30 to 105% (by 1%)

$$\text{Setting value \%} = K \times \frac{\text{Motor rated current}}{\text{Inverter rated current}}$$

$K = 1.0$ (when 50Hz is base frequency)
$K = 1.1$ (when 60Hz is base frequency)

Continuous allowable current characteristics

Electronic Thermal Operation Characteristics

Function Data:

4 3 0 0

4 3 0 1 (Hz RPM M/min)

t | 100 %

Function Coda	Display	Function Expalanation	Function Data

| | | The output frequency for the upper limit as well as the lower limit are set as a % of the maximum frequency | |

44

ERCTRN OL
■ H LIMITER
L LIMITER
FREQ BIAS

High Limiter

Display: **44** — F / F.SET graph, 100 %

0 to 100% (by 1%)

Function Data: **44** — F / F.SET graph, 100 %

45

ERCTRN OL
H LIMITER
■ L LIMITER
FREQ BIAS

Low limiter

Display: **45** — F / F.SET graph, 0 %

0 to 100% (by 1%)

Function Data: **45** — F / F.SET graph, 0 %

100%

Output frequency

Hi Limiter

Lo Limiter

Frequency setting 100%

| | | Outputs a biased frequency corresponding to the frequency setting
Set as a % of the maximum frequency | |

46

ERCTRN OL
H LIMITER
L LIMITER
■ FREQ BIAS

Bias Frequency

Display: **46** — F / F.SET graph, 0 %

0 to 100% (by 1%)

Function Data: **46** — F / F.SET graph, 0 %

100%

Output frequency

Bias

Frequency setting 100%

Function Code	Display	Function Explanation	Function Data
47 FREQ GAIN ■ JUMP Hz 1 / JUMP Hz 2 / JUMP Hz 3 — Gain For Frequency Setting Signal	100 %	A rationed frequency corresponding to the frequency setting is output. It is set as a % of the maximum frequency. (Higher than the maximum frequency is not output) 0 to 200% (by 1%) DC 0 to +5V correspondence is possible. →f set signal 100% [Gain 70% Example] →f set signal 100% [Gain 200% Example] Frequency gain is operative only when frequency setting method is analog $\boxed{1601}$, $\boxed{1602}$	100 %
48 FREQ GAIN ■ JUMP Hz 1 / JUMP Hz 2 / JUMP Hz 3 — Jump Frequency 1	0 Hz	The frequency jumps to prevent the load mechanical resonance point and the inverter output frequency from overlapping. (3 location setting possible) 0 to 400Hz (by 1Hz)	0 Hz
49 FREQ GAIN JUMP Hz 1 / ■ JUMP Hz 2 / JUMP Hz 3 — Jump Frequency 2	0 Hz	Setting 1 / Setting 2 / Setting 3 → Setting frequency f	0 Hz
50 FREQ GAIN JUMP Hz 1 / JUMP Hz 2 / ■ JUMP Hz 3 — Jump Frequency 3	0 Hz	From 0 to 5Hz, a 1Hz jump width setting is possible.	0 Hz
51 ■ J HYSTR / DC BRAKE / DC BRK Hz / DC BRK V — Jump Frequency Range	0 Hz	Jump frequency range — 50% — Jump frequency setting value Setting value — 50%	0 Hz

−38−

Function Code	Display	Function Explanation	Function Data

Row 1:

Function Code: `52` (Hz/RPM A v M/min)

```
  J HYSTR
☒ DC BRAKE
  DC BRK Hz
  DC BRK V
```
DC Brake
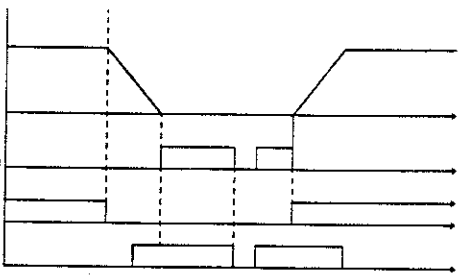
Display: `5200`, `5201`

Function Explanation:
Switches current brake between Operate / Nonoperate.

Nonoperate (only regenerative brake)

Operate (DC brake after regenerative brake)

[Non operate] — Free-run stop

[Operate] — DC brake stop

Regenerative brake

Function Data: `5200`

Row 2:

Function Code: `53` (Hz/RPM A v M/min)

```
  J HYSTR
  DC BRAKE
☒ DC BRK Hz
  DC BRK V
```
DC Brake Starting Frequency

Function Code: `54` (Hz/RPM A v M/min)

```
  J HYSTR
  DC BRAKE
  DC BRK Hz
☒ DC BRK V
```
DC Brake Voltage

Function Code: `55` (Hz/RPM A v M/min)

```
■ DC BRK T
  START Hz
  I LIMITER
  SLIP COMP
```
DC Braking Time

Display: `5400` ∫ `5415`

Function Explanation:
Setting for the DC brake starting frequency
0 to 60Hz (by 1Hz) (except at 0Hz braking is from 0.2Hz)

Week ↓ Strong — Setting can be made from 16 types of DC brake strength.

Brake strength changes according to the motor characteristics

Within a 0.01 to 30 sec. time span, setting is possible or match the load GD^2.

Setting Range	Setting Resolution
0.01~9.99sec	0.01sec
10.00~30.00sec	0.1sec

Brake start frequency

Brake retention time

Brake voltage

Function Data:

`53` (Hz/RPM) — 0 Hz `5400`

`55` (Hz/RPM) — 0.10 S

Function Code	Display	Function Explanation	Function Data
`56` DC BRK T **▓** START Hz I LIMITER SLIP COMP Starting Frequency	`56` Hz RPM M/min V┌ /1 Hz └F┘	The start frequency setting can be by 1Hz within a 1Hz to 60Hz range 1 Hz ↓ 60Hz Output frequency ↑ ⟋‾‾ Start frequency → t	`56` Hz RPM M/min V┌ /1 Hz └F┘

`57`
 	
 DC BRK T
 START Hz
 ▓ I LIMITER
 SLIP COMP
 	
 Current Limiter
	`57` Hz RPM M/min
	
	 I┌ / 150 % └LOAD┘
	
	 `5700`
	 `5701`
		When the output current reaches the current limit level, the output frequency is automatically lowered to avoid over-current trip.
		
		 Nonoperate
		
		 Operate (operates at 30 to 150% of the inverter rating. By 1% setting possible)
		
		 Output current ↑ ‿⌒‿ Current limit setting value → t
		
		 Output frequency ↑ → t
		
		 ① Does not operate for deceleration.
		 ② When using this function, the automatic acceleration/deceleration function does not operated.
			`5700`

`58`
 	
 DC BRK T
 START Hz
 I LIMITER
 ▓ SLIP COMP
 	
 Slip Compensation Control
	`5800`
	
	 `5801`
		Automatically judges the relative size of the load by the output current fluctuations, and regulates the inverter frequency for consistent rpm operation. (controls speed fluctuations to 1/3 of normal slip)
		
		 Nonoperate (no slip compensation)
		
		 Operate (with slip compensation)
		
		 Torque ↑ No slip compensation → With slip compensation → Rotation speed
		
		 Operates only during constant speed operation.
			`5800`

Function Coda	Display	Function Explanation	Function Data
59 □ FDT Hz FDT HYSTR RUN FINSH OL WARN Frequency Level Detection	**59** 60 Hz (F/FDT graph)	The FAR-CM terminal ON signal is output when the output frequency goes above the frequency level detection. The OFF level is set by │6│0│ │ 0 to 400Hz (by 1Hz)	**59** 60 Hz (F/FDT graph)
60 FDT Hz ☒ FDT HYSTR RUN FINSH OL WARN FDT And FAR Signal Hysteresis	**60** 10 Hz (F/FDT graph)	0 to 30Hz (by 1Hz) FDT signal output start frequency Hysteresis width FAR-CM → t → t	**60** 10 Hz (F/FDT graph)
		When │6│8│0│1│ is set, the FDT signal is operative.	
61 FDT Hz FDT HYSTR ☒ RUN FINSH OL WARN RUN Signal Finishing Frequency	**61** 0 Hz (F/RUN graph)	The RUN-CM terminal ON signal is output when the output frequency goes above the RUN signal finishing frequency. 0 to 400Hz (by 1Hz) RUN signal output frequency RUN-CM → t → t	**61** 0 Hz (F/RUN graph)
		When │6│9│0│0│ is set, the RUN signal is operative.	
62 FDT Hz FDT HYSTR RUN FINSH ☒ OL WARN Overload Early Warning Signal	**62** 100 % (I/OL graph)	The OL-CM terminal ON signal is output when the output current exceeds the overload early warning signal value for over 10 sec. 70% to 150% by 1% (for inverter rating) Warning level OL-CM 10 Second ← 1 Second → t	**62** 100 % (I/OL graph)
		When │6│7│0│0│ is set, the OL signal is operative.	
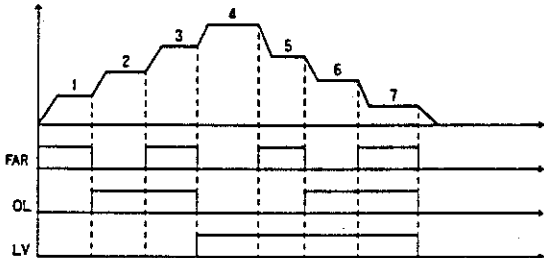
④ **High Function (See p.57 for Frequency Setting In Link Operation, Monitering Signal In Link Operation and Link Operation function settings)**

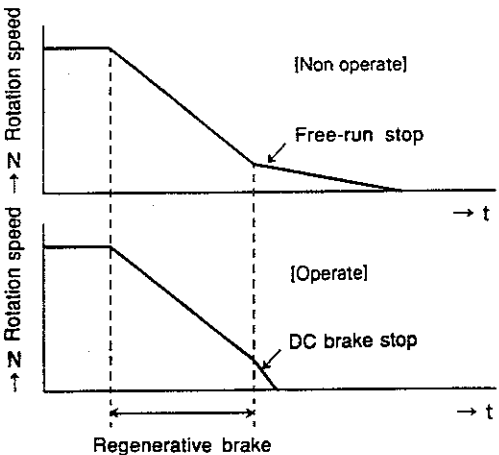| Function Code	Display	Function Explanation	Function Data
`6 3` Hz RPM A M/min v ■ X1-X2-X3 HOLD FUNC LV-OL-FAR X1, X2, and X3 Terminal Function	`6 3 0 0`	The terminal X1, X2, X3 functions can be changed to the following 3 types via the data setting. 8 step multi-step frequency operation is possible through switching X1, X2, X3. See function codes `2 9` `3 1` `3 3` `3 5` `3 7` `3 9` `4 1` for details on multistep frequency operation.	`6 3 0 0`
	`6 3 0 1`	During operation, with `RUN` key or FWD, REV terminals: When X1-CM is ON: output frequency increase When X1-CM is OFF: output frequency fixed When X2-CM is ON: output frequency decrease When X2-CM is OFF: output frequency fixed The up/down variable speed is determined by the acceleration/deceleration time setting value. ① X3-CM terminal ON/OFF is ignored. ② When both X1-CM and X2-CM are ON at the same time, the frequency at that time is fixed. ③ Hi Limiter And LO Limiter take precedence (`4 4` `4 5`) ④ Always at 0Hz for operation start ⑤ Operative only when frequency setting is by digital method `1 6 0 0` ⑥ When there is no operation command (`RUN` , FWD, REV), X1, X2 input is ignored. ⑦ `∧` `∨` key input is ignored.	
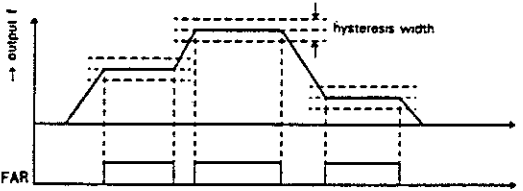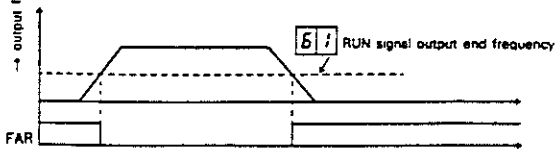
Function Code	Display	Function Explanation	Function Data

| | `6302` | When DC brake is selected by `5201`: | |

with X1-CM = ON: DC brake during stop
with X1-CM = OFF: brake reset

[Example `53` :0sec]

① The strength of the DC brake is set by `54`

② Operation command take precedence. (`RUN` , FWD, REV)
(While X1-CM is ON, if FWD-CM is ON: DC brake reset)
③ X2-CM, X3-CM terminal ON/OFF is ignored.
④ As DC current continues to flow to the motor during the X1-CM - ON period, be careful of temperature rise. (When long periods of DC braking are required, measure the temperature previously.)
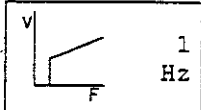
Function Code	Display	Function Explanation	Function Data

Function Code: `6 4 1` (Hz RPM, A, V, M/min)
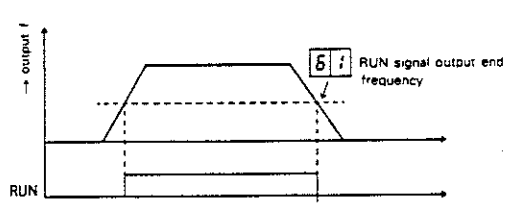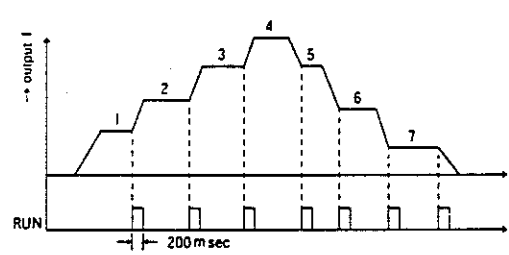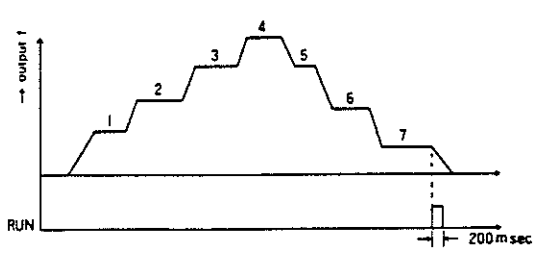
X1-X2-X3
☒ HOLD FUNC
LU-OL-FAR

FWD/REV Command Hold
(3-Wire Control)

Display: `6 4 0 0` and `6 4 0 1`

Function Data: `6 4 0 0`

Depending on the data selection, the HLD terminal function can be changed to the following 3 types.

2 wire operation

When terminal block operation (`1 5 0 1`) is selected, the following operation results.

[Connection]

FWD
REV
CM

FWD-CM
REV-CM

When both FWD-CM and REV-CM are ON at the same time, deceleration stop results. HLD terminal input is ignored.

3 wire operation

When Terminal block operation (`1 5 0 1`) is selected, the following operation results.

[Connection 1]

FWD
REV
HLD
CM

HLD-CM
FWD-CM   ignore
REV-CM   ignore
t ≥ 10 msec

[Connection 2]

FWD
REV
HLD
CM

HLD-CM
FWD-CM
REV-CM
t ≥ 10 msec

① When HLD-CM is ON : and FWD-CM is ON for over 10 msec. :
Forward
HLD-CM is OFF : Stop
and REV-CM is ON for over 10 msec : Reverse
HLD-CM is OFF : Stop
During the period when HLD-CM is ON, either the FWD or REV signal whichever input first takes precedence.

② When HLD-CM is OFF, if FWD and REV signal are input, 2 wire operation will result.

③ Operation will not start if FWD, REV signal t (time) is less than 10 msec.
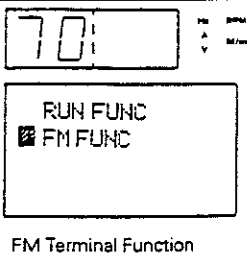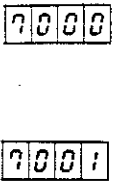
Function Coda	Display	Function Explanation	Function Data

Switches timer operation mode.

When `6 4 0 0` `6 4 0 1`

When `6 4 0 2` : with HLD-CM in OFF, returns to the 1st step after 1 cycle of operation.

With HLD-CM in ON, maintains the 7th step level after 1 cycle of operation.

① Only operative when `1 9 0 1` pattern operation is selected.

With `1 9 0 0` , normal 2 wire operation results (same as `6 4 0 0`).

Function Code	Display	Function Explanation	Function Data

`65`
 	
 X1-X2-X3
HOLD FUNC
▨ LV-OL-FAR
 	
 LV, OL and FAR Terminal Output Code
	`6500`
	
	`6501`
		The signal data output from LV, OL, FAR terminals can be changed.
		
		LV terminal outputs the signal selected by `66`
		
		OL terminal outputs the signal selected by `67`
		
		FAR terminal outputs the signal selected by `68`
		
		When `1901` pattern operation is selected, a binary signal equivalent to 1st speed → 7th speed is output from LV, OL, FAR terminals.
			`6500`

	1st Speed	2	3	4	5	6	7
FAR	1	0	1	0	1	0	1
OL	0	1	1	0	0	1	1
LV	0	0	0	1	1	1	1

1 : ON   0 : OFF

With `1900` , there is no output.

Function Coda	Display	Function Explanation	Function Data

66 ⬛ LU FUNC / OL FUNC / FAR FUNC — LV Terminal Function

Display: `6600`

The function for terminal LV can be switched between the following 2 types.

Only operative for `6500`

Under-voltage signal (LV signal) is output from LV.

Approx. 150V
Control power supply OFF level

The LV signal is output from the time the power voltage drops below approx. 150V to the point where the control power no longer exists.

Display: `6601`

The over-voltage signal (OV signal) is output from the LV terminal.

Approx. 260V   or over

RESET

The OV signal, when activated for over-voltage protection, is output from the LV terminal. The OV signal is maintained until alarm reset is performed. (RESET key or RST-CM = ON)

Function Data: `6600`

---

67 LU FUNC / ⬛ OL FUNC / FAR FUNC — OL Terminal Function

Display: `6700`

The function for terminal OL can be switched between the following 3 types.

Only operative for `6500`

The inverter over-load early warning signal (OL signal) is output from the OL terminal. See `62` for signal details.

Display: `6701`

The current-limiting monitoring signal (CL signal) is output from the OL terminal.

Current limit level `57`

Function Data: `6700`

Function Code	Display	Function Explanation	Function Data
	6702	The under voltage signal (IP signal) is output from the OL terminal. Signal output when in 2000 instantaneous restart nonoperate. Signal output when in 2001 restarting. operate. 	
58 LV FUNC OL FUNC ☒ FAR FUNC FAR Terminal Function	6800 6801 6802	The signal output from the FAR terminal can be selected from the following 3 types. The frequency equivalence detection signal (FAR signal) is output from the FAR terminal. The hysteresis width is set by 60 The setting frequency detection signal (FDT signal) is output at the FAR terminal. See 59 for signal details. During inverter operation, reverse signal (STOP signal) is output as the FAR terminal. The signal ON/OFF level is set by 61 The RUN signal's reverse signal is output. 	6800
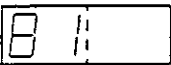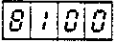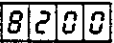
Function Code	Display	Function Explanation	Function Data

69 〔☑ RUN FUNC / FM FUNC〕

Run Terminal Function

6900

The following 3 types of signal output at the RUN terminal can be selected.

The inverter operation signal (RUN signal) is output at the RUN terminal. The signal ON/OFF level is set by 〔6 1〕

6901

For 〔1 9 0 1〕 pattern operation, the time-up signal (TP signal) is output by the RUN terminal. (outputs at time-up point of each timer)

No signal output when 〔1 9 0 0〕

6902

For pattern operation 〔1 9 0 1〕, the cycle completed signal (TO signal) is output at the RUN terminal. (outputs at 7 step end point)

Also for the continuation of timer operation by 〔6 4 0 2〕 the TO signal is output at 7 step end point.

〔6900〕

Function Code	Display	Function Explanation	Function Data
70 RUN FUNC FM FUNC FM Terminal Function	7000 7001	The following 2 types of monitor signals output by the FM terminal can be selected. Hz meter use voltage is output by the FM terminal. Voltage adjustment is performed by 03 Output current monitor use voltage is output by the FM terminal. Voltage adjustment is performed by 03 (A current which is 1.5 times of the inverter rated current can be adjusted between 6.5 and 10.5V.)	70:00

Function Coda	Display	Function Expalanation	Function Data

`7 1` ⬛ NO. ENTRY TL UNITS
 	
Inverter Unit No. Entry For Link Operation (All Inverters)
	`7 1 0 0`
	`7 1 0 1`
	`7 1 0 2`
	`7 1 0 3`
	`7 1 0 4`
	〜
	`7 1 1 5`
		Determines the function of the various inverters when performing link operation.
		
		Err4 will result when 2 identical numbers are recorded within the same group.
		
		for Master record
		
		Slave No.1
		(Auxiliary No.1 for input terminal link)
		
		Slave No.2
		(Auxiliary No.2 for input terminal link)
		
		Slave No.3
		(Auxiliary No.3 for input terminal link)
		
		Slave No.4
		
		〜
		
		Slave No.15
		Always record the inverter numbers consecutively from lowest to highest.
			`7 1 1 5`

`7 2` NO. ENTRY ⬛ TL UNITS
 	
Number of Units Linked (Central Inverter)
	`7 2 0 0`
	〜
	`7 2 1 5`
		Needed only for Master setting
		  Record the total number of units connected (Master and Slave).
		
		When the total number connected is greater than the recorderd number of inverters. → The number of not inked inverter will appear.
		
		When the total number connected is less than the recorded number of inverters. → Err 4
			`7 2 0 0`

`7 3` ⬛ LINK MODE INPUT SEL NO. SELECT
 	
Link Mode (All Inverters)
	`7 3 0 0`
	`7 3 0 1`
	`7 3 0 2`
	`7 3 0 3`
		Link Mode Selection
		
		Link Nonoperate
		(After Err4 reset. automatically returns to `7 3 0 0`)
		→ (for Mater)
		
		Frequency Setting → SET → `8 0 X X`
		
		Monitoring Signal → SET → `8 1 X X`
		
		Link Operation → SET → `8 2 X X`
			`7 3 0 0`

Function Code	Display	Function Explanation	Function Data
`74` LINK MODE ■ INPUT SEL NO. SELECT — Run Command Input In Link Operation (Central Inverter)	`7400` `7401`	Setting for Master (required for link operation) Selects interface for Master 1502 (link) operation Control. RUN/STOP via operation panel RUN/STOP via terminal block	`7400`
`75` LINK MODE INPUT SEL ■ NO. SELECT — Inverter Unit No. (Central Inverter Only)	`7500` ﹨ `7515` `7516`	Setting for Master (required for link operation) Record command inverter No. (Individual command) (Total number command)	`7500`
`80` ■ FREQ BITS CODE OPR MODE — Number Of Bits For Frequency Setting In Link Operation (Central Inverter)	`8000` `8001` `8002`	Selects number of bits for frequency input 4 Bit binary input Aux. 1	RT1	X3	X2	X1	MSB LSB Setting resolution = Max. frequency/15 8 Bit binary input	AUX.2	AUX.1	MSB LSB Setting resolution = Max. frequency/255 12 Bit binary input	AUX.3	AUX.2	AUX.1	MSB LSB Setting resolution = Max. frequency/4095 Inverter No. designation is set via the master terminal block.	RT1	X3	X2	X1	MSB LSB	`0008`

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Function Coda	Display	Function Expalanation	Function Data

8 1
⬚ FREQ BITS
▨ CODE
⬚ OPR MODE
 	
Monitoring Signal Output Code In Link Operation
	8 1 0 0	The slave terminal data is monitored via the master terminal block.
		
		Set the output terminal data via the function code for each inverter.
		
		Terminal LV
		output OL
		           FAR
		           RUN
		
		The inverter No. determination is set via the Master terminal block.
		
		| RT1 | X3 | X2 | X1 |
		MSB LSB
			8 1 0 0

8 2 ⬚ FREQ BITS ⬚ CODE ▨ OPR MODE Monitoring Mode In Link Operaton	8 2 0 0 8 2 0 1	Selects link operation mode Operation command The master terminal data (input) and key input is transmitted to the slave (s). The slave performs RUN/STOP operation according to the master frequency setting.operate command. The inverter No. determination is performed by function 75. Parameter initial command Function setting for the Slave is performed at the Master operation panel. The inverter No. determination is performed by function 75.	8 2 0 0

(3) Trip Record Verification Method

Possible during operation or stop

PRG	ON

Change to program mode

↓

RESET	SHIFT
ON	OFF
↓	ON
OFF	↓
↓	OFF

→

DIGITAL MONITOR

| | 0 | H | 2 |

GRAPHIC DISPLAY *

| F = 60.00Hz |
| I = 1.0A |
| V = 600V |
| Temp. = 70°C |

Changes when
SHIFT key is pressed

→

←

DIGITAL MONITOR

| | 0 | H | 2 |

GRAPHIC DISPLAY

| 0 = OH2 (current) |
| -1 = OC3 (time before) |
| -2 = Err4 (2 times before) |
| -3 = OV (3 times before) |

(Note 1)   For * display, the values shown for F, I, V are present operation values. When trip occurs, the values shown are the values at the time of the trip.

(Note 2)   For * display, the value for V indicates the operation output voltage. For trip, the value indicates the DC intermediate voltage.

(Note 3)   For * display, when trip record is displayed during operation, present values are displayed with the SHIFT key. Also, when trip occurs and the values at the time of the trip are displayed, the trip record is displayed with the SHIFT key.

↓

RESET	ON
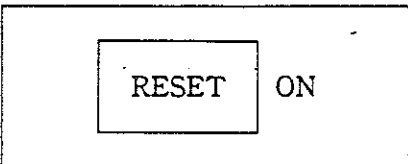
Returns to function mode

↓

PRG	ON
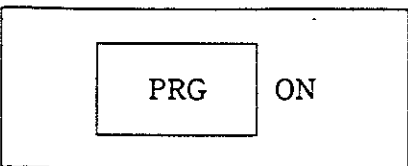
Returns to RUN/STOP when function mode is ended.

(4) Function Setting For Frequency Setting In Link Operation

Function Code	Setting Data					Remarks
	Master	Auxiliary 1	Auxiliary 2	Auxiliary 3	Slave	
15	00 or 01	←	←	←	←	Panel Operation / Terminal Operation Selection
16	01or 02	←	←	←	←	Link Set Frequency Monitor
71	00	01 *1	02 *1	03 *1	04 ~ 15 *1	Setting for Inverter Number
73*2	01	←	←	←	←	Frequency Setting Selection
80	00 ~ 02	←	←	←	←	Bit Length Setting

(5) Function Setting For Monitoring Signal In Link Operation

Function Code	Setting Data		Remarks
	Master	Slave	
15	00 or 01	←	Panel Operation / Terminal Operation Selection
71	00	01 ~ 15 *1	Setting for Inverter Number
72	00 ~ 15	–	Setting for Number of Connected Inverters
73*2	02	←	Monitoring Signal Selection

(6) Function Setting For Link Operation

Function Code	Setting Data		Remarks
	Master	Slave	
15	02	←	Link Operation Selection
16	00 or 01 or 02	–	Link Set Frequency Monitor
47	0 ~ 200%	0 ~ 200%	Percentage Setting
71	00	01 ~ 15 *1	Setting for Inverter Number
72	00 ~ 15	–	Setting for Number of Connected Inverters
73*2	03	←	Link Opeartion Select
74	00 or 01	–	Panel Operation / Terminal Operation Select
75	16	–	All inverter Selection
82	00	–	Operation Command Selection In Link Operation

(Note 1) After setting the slave and the auxiliary inverters, set the master.
※ 1   Set the slave inverter numbers in sequence from 01 without skipping.
※ 2   Set function code 73 after setting other codes.

9. Maintenance & Inspection

In order that the inverter may give long periods of trouble free operation, and to prevent future problems from occurring, the following items should be inspected.

<Caution Notes>

> **Conduct inspection after disconnecting the power supply and after the "CRG" lamp has gone out.**

Megger Test

① When conducting an external circuit megger test, disconnect all inverter terminals and never apply test voltage to the inverter.

② When Conducting a megger test on the inverter itself, perform the test only on the main circuit as shown in the diagram below. Do not conduct a megger test on the control circuits.

③ When conducting a continuity test on the control circuits, use a tester (high resistance range type) and not a megger or a buzzer.

Megger Test Outline
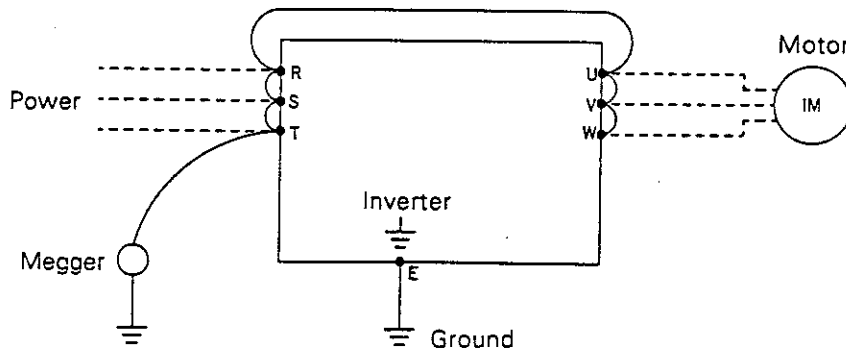
(1) Inspection Items

Inspection Point	Inspection Item	Object of Inspection	Correction
Condition	Power Source Voltage	Within permissible range (170V to 253V)	Ajust the power supply voltage.
	Ambient Temperature	Within permissible range (-10°C to 50°C)	After investigating the cause, bring into line with specification limits
	Ambient Humidity	Permissible range (20 to 90% RH)	
		Dew condensation / Freezing	
	Vibration	Within permissible limit (0.6G or less)	
Other	Noise	Noise from cooling fan, etc.	Contact the distributor where the unit was purchased.
	Smell	Smell of burning	
	Dust	Dust accumulation on cooling fins, cooling fan	Cleaning
		Dust accumulation on control board	Blow out with compressed air
	Connectors	Loose connectors	Tighten connectors
	Screws	Loose screws	Tighten screws

(2) Periodic Part Replacement

The life of the inverter will vary according to the installation environment and the amount of running time. However, if continuous operation is within the allowable limits, the life of the ordinary electrolytic condenser is approx. 5 years with the life of the cooling fan being approx. 3 years. It is recommended, however, that these parts be replaced before failure occurs.

(3) Measurement Points & Meters

Since the inverter input/output voltage and current contains high frequencies, selection of the wrong measuring device can lead to gross miscalculations. When using a CT (current-detection transformer) to measure the current, if the frequency is low the amount of error will be great. For this reason always use a CT with as large a capacity as possible.

Measurement Items and Types of Devices

Item		Simple Measurement	Precision Measurement
Input	Voltage	Tester.	Moving-iron type voltmeter
	Current	Clamp meter	Moving-iron type ammeter
	Power	—	Electrodynamometer type wattmeter
Output	Voltage	Tester.	Rectifier type voltmeter
	Current	Clamp meter	Moving-iron type voltmeter
	Power	—	Electrodynamometer type wattmeter

Example of Measurement (Locations & Devices)
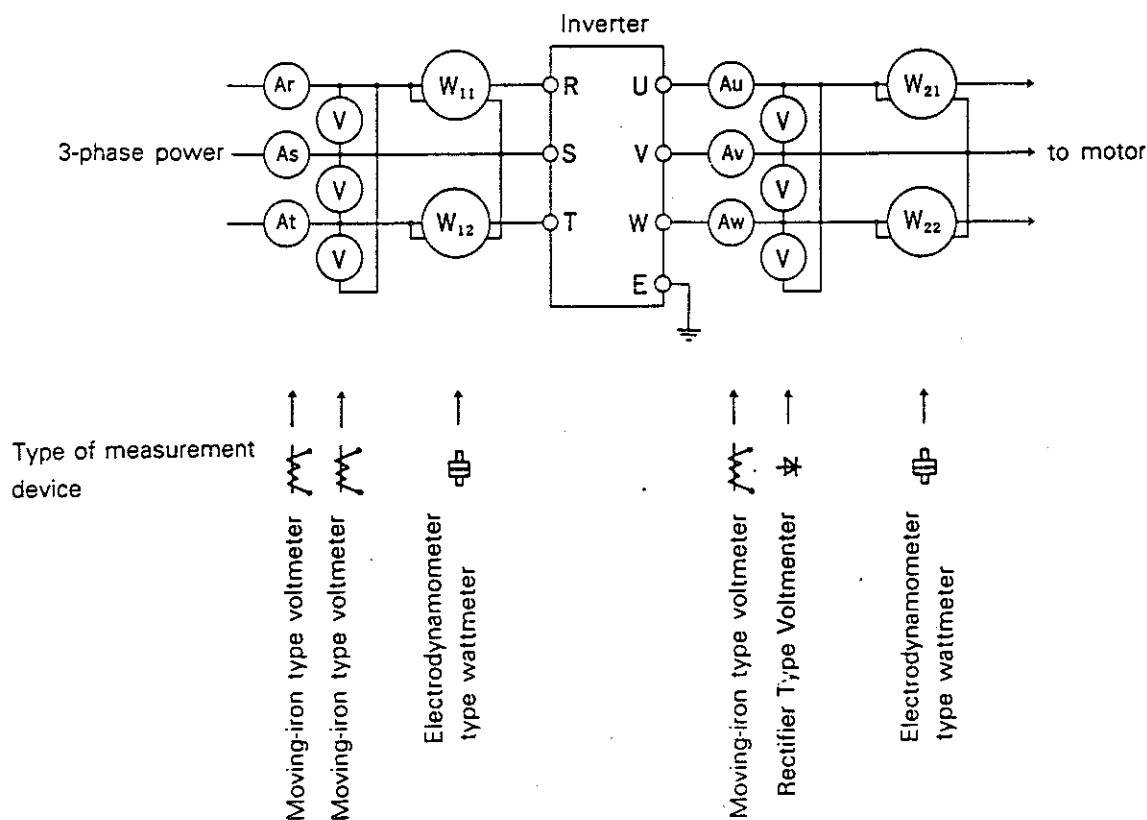
10 . Troubleshooting

(1) Protective Function

Protective Function	Function Explanation	Display	Protective Operation
Over-current protection	Protects the inverter when the over-current flow momentarily reaches the specified protection level. OC1: During acceleration OC2: During deceleration OC3: During constant speed operation	OC1 OC2 OC3	• Stops inverter output • Motor coast-to-stop • Batch alarm (1c) output • Alarm signal is internally held until the alarm command is reset. (※)
Protection against momentary Power Failure Under-voltage Protection	For momentary power failure or under-voltage less than 15msec., operation is intermittent. For a period exceeding 15msec., the inverter is stopped. If the restart after instuntaneous power failure mode is selected, operation will resume automatically after the power is restored.	LU	Stops inverter output
Over-voltage Protection	This function protects the inverter when the over-voltage (regenerative over-voltage) reaches the momentary over-voltage protection level.	OU	• Stops inverter output • Motor coast-to-stop • Batch alarm (1c) output • Alarm signal is internally held until the alarm command is reset. (※)
Inverter Overheating	Detects inverter overheating caused by overload operation, cooling fan failure, abnormally high ambient temperature, etc.	OH1	
External Thermal	As an external alarm, it stops output when the DB braking resistor thermal relay, etc. connected to the THR-CM terminals goes from ON to OFF.	OH2	
Electronic Thermal Overload	Performs motor overload protection when connected to the 4 poles of this company's commonly used motor, even if there is no external thermal overload.	OL1	
Setting Error	Displayes when incompatible function codes are selected.	Err1	
Communication Error	Displays when there is continuous keypad panel abnormal communication.	Err2	
DSP Error	Displays when there is any malfunction of the internal DSP by external noises or abnormally high ambient temperatures.	Err3	
Link Error	Displays when there is a mismatch between the set function and the actual wiring during link operation.	Err4	

(Note 1) (※) Alarm signal hold

After the protective function has ben activated and the alarm signal has been output, if the auto-breaker installed on the power supply side is switched OFF, there will be no inverter control power and the signal cannot be internally held.

(Note 2) Reset command

Use the keypad panel RESET key or turn on the control terminals RST-CM to reset from the abnormal stop condition.

(Note 3) The past 3 protective operations are stored in the memory. This protective operation information is displayed on the GRAPHIC DISPLAY and is changed each time the SHIFT key is pressed (time before → 2 times before → 3 times before).

Failure information as well as failure condition (frequency, voltage, current, inverter internal temperature) is displayed on the GRAPHIC MONITOR.

(2) Troubleshooting

① Protective Operation Display

Display	Check Point	Corrective Measure
OC1	① Power supply voltage within permissible limits...............	Adjust power voltage
	② Output line short-circuited	Output line insulation
		Motor megger measurement
	③ Proper torque boost	Adjust to proper value
	④ Proper acceleration time..	Lengthen acceleration time
	⑤ Other than ① thru ④	Increase inverter capacity
OC2	① Power supply voltage within permissible limits...............	Adjust power voltage
	② Output line short-circuited	Output line insulation
		Motor megger measurement
	③ Proper deceleration time	Lengthen deceleration time
	④ Other than ① thru ③	Connect DB braking resistor (option)
		Increase inverter capacity
OC3	① Power supply current within permissible limits...............	Adjust power current
	② Output line short-circuited..	Output line insulation
		Motor megger measurement
	③ Sudden change in load...	Eliminate sudden load change
		Increase inverter capacity
	④ Other than ① thru ③	Investigate for noise intrusion
OV	① Power supply current within permissible limits...............	Adjust power current
	② Proper deceleration time	Lengthen deceleration time
	③ Other than ① or ②	Connect DB resistor (option)
OH1	① Inverter ambient temp. within permissible limits	Correct to proper temperature
	② Cooling fan operating (Over 1.5 kw)	Replace cooling fan
	③ Load is over permissible limits ....:.	Reduce road
		Increase inverter capacity
OH2	① Proper wiring between THR-CM	Rewire
	② Thermal overload relay activated	Reduce load
	③ Continuity check between external DB braking unit	
	terminal 1-2...	Correct ambient temp./Lower braking frequency
	④ Inverter ambient temp. within permissible limits	Correct to proper temperature
LV	① Power supply voltage within permissible limits................	Adjust power voltage
	② MC, FAB is closed	Close MC, FAB
	③ Open phase	Correct wiring
	④ Other than ① thru ③	Investigate power supply capacity
OL1	① Electronic thermal overload set correctly	Change thermal relay
	② Load is over permissible limits	Reduce load
Err1	① Correct function code selection..	Verify function code
Err2	① Noise source close to inverter...	Noise prevention measures
Err3	② Abnormal ambient temperature..	Correct temperature
Err4	① Wiring correct	Conform wiring and function code setting for link operation mode

(Note 1) Motor coast-to-stop when protective operation is displayed. According to the chart above, after correcting the cause of the problem, reset with the [RESET] key on the operation panel. (Press the [RESET] key after the motor has stopped.) To reset the alarm, turn ON between the RST-CM control circuit terminals.

(Note 2) "LV" is displayed when the power supply is switched on or off, and does not indicate any abnormality.

i) Motor does not run

Charge lamp lit? —No→ FAB closed? —No→ Close FAB

Charge lamp lit? —Yes↓

FAB closed? —Yes↓ Normal voltage supplied to power supply input terminals R, S, T —No→ Power failure, Open phase, FAB trouble

Normal voltage supplied to power supply input terminals R, S, T —Yes→ Inverter problem

Reset input OFF? —No→ Check RST (reset) terminal

Reset input OFF? —Yes↓

Either FWD or REV is ON —No→ Check FWD, REV terminals

Either FWD or REV is ON —Yes↓

Voltage being output from U, V, W output terminals? —Yes→ Motor wiring correct? —Yes→ Motor failure, Motor lock

Motor wiring correct? —No→ Correct wiring error

Voltage being output from U, V, W output terminals? —No↓

External analog frequency set? —No→ Frequency setting 0Hz? —No→ (Digital time setting)

Frequency setting 0Hz? —Yes→ Change of frequency code setting

External analog frequency set? —Yes↓

11, 12, 13, C1 wiring correct? —No→ Correct wiring error

11, 12, 13, C1 wiring correct? —Yes↓

12 voltage output 0 to 10V? C1 input 4 to 20 mA? —No→ Analog frequency setting device failure

12 voltage output 0 to 10V? C1 input 4 to 20 mA? —Yes↓

Inverter problem

ii) Motor runs but speed does not change

Maximum frequency limiter activated? —Yes→ Reset limiter

Maximum frequency limiter activated? —No↓

Upper/Lower limiter activated? —Yes→ Change limiter setting

Upper/Lower limiter activated? —No↓

External analog frequency set? —No→ X1, X2, X3 wiring correct? —No→ Correct wiring error

X1, X2, X3 wiring correct? —Yes→ Are all frequency settings different? —No→ Change frequency code setting

Are all frequency settings different? —Yes↓

External analog frequency set? —Yes↓

11, 12, 13, C1 wiring correct? —No→ Correct wiring error

11, 12, 13, C1 wiring correct? —Yes↓

Does voltage and current input to 12 & C1 change? —No→ Analog frequency setting device failure

Does voltage and current input to 12 & C1 change? —Yes↓

Acceleration/deceleration time too long? —Yes→ Adjust acceleration/deceleration time to match load

Acceleration/deceleration time too long? —No↓

Inverter problem

iii) Motor rotation is not smooth

During acceleration/deceleration? —Yes→ Lengthen acceleration, deceleration time setting

During acceleration/deceleration? —No↓

Input voltage fluctuation? —Yes→ Increase power supply capacity

Input voltage fluctuation? —No↓

Large load fluctuation? —Yes→ Increase motor and inverter capacity. Attach flywheel

Large load fluctuation? —No↓

Noise interference in analog input? —Yes→ Test with analog frequency setting device

Noise interference in analog input? —No↓

Inverter problem

iv) Motor overheats

Does motor and V/F pattern match? —No→ Change V/F pattern setting

Does motor and V/F pattern match? —Yes↓

Continuous low speed operation? —Yes→ Use special inverter motor. Lower torque boost

Continuous low speed operation? —No↓

Load too heavy? —Yes→ Reduce load. Increase inverter capacity

Load too heavy? —No↓

Check inverter output voltage balance —GOOD→ Motor problem

Check inverter output voltage balance —NG↓

Inverter problem

Digital time setting

11. Appendix

(1) Standard Specifications

Item		Specification		
Inverter Type		FVR002B7S-2	FVR004B7S-2	FVR008B7S-2
Standard Applicable Motors [kW]		0.2	0.4	0.75
Control — Rated Capacity [kVA] (Note 1)		0.57	1.1	1.9
Rated Output Voltage [V](Note 2)		3-phase 3-wire type 200 to 230		
Rated Output Frequency [Hz]		0.2 – 400		
Rated Output Current [A]		1.5	3	5
Overload Current Rating		150% for 1 min. (inverse time characteristic)		
Power Supply — Rated Input AC Voltage		3-phase 3-wire type 200 to 230V , 50/60Hz		
Allowable fluctuation		Voltage: + 10% Voltage unbalance %: within 3% Voltage: – 15% Frequency: ± 5%		
Output — Control System		Vector Dispersion PWM control		
Output Frequency Range		0.2 to 400Hz (start frequency 0.2 to 60Hz, maximum frequency 0.2 to 400Hz setting possible)		
Frequency Temperature Fluctuation		Analog Setting: max. frequency ± 0.2% (at 25 ± 10°C)		
		Digital Setting max. frequency ± 0.01% (at –10°C to +50°C)		
Frequency Setting Resolution		Analog Setting: 0.02Hz (at max. frequency 60Hz)		
		Digital Setting: 0.002Hz (at max. frequency 60Hz)		
Frequency Setting Resolution		0.002Hz (both analog & digital setting)(Note 3)		
Voltage / Frequency Characteristics (V/F)		Voltage: 200 to 230V (When in fee selection, voltage or frequency Frequency: 0.2 to 400Hz can be arbitrarily adjusted)		
Torque Boost		320 patterns (squared decrease, including 10 step minute adjustment), automatic torque boost selection possible		
Acceleration/Deceleration Characteristics		0.01 to 3600 sec. (independent acceleration/deceleration), linear, S characteristic (Strong & weak), automatic and multi-step acceleration/deceleration (independent 4-step) selection possible. (Both terminal & program selection possible.)		
Internal Functions	Operating sound selection	The sound quality of the sound produced by the motor can be changed to prevent resonance.		
	Frequency meter adjustment	Scale calibration of externally connected analog frequency meter (DC 6.5 to 10.5)		
	Parameter protection	Data lock is possible to ensure that the data codes are not changed.		
	Terminal link	Operation frequency setting for multiple inverters, multi-step operation, interlocking operation, and ratio operation are all possible at the same time.		
	Brake switch	Normal or strong brake selection possible		
	Pattern operation	7 independent step settings possible (frequency up to 400Hz, timer up to 3,600 sec.)		
	Program operation	Based on the pattern operation; 1 cycle, repeat cycle, continuous operation at least step speed, etc. selection possible		
	Momentary power failure restart	After momentary power failure, automatic restart possible		
	High/Low limiter	Output frequency upper and lower range limit 0 to 100% (1% step) setting possible		
	Bias	The magnitude of the bias which contains the frequency setting signal, can be set from 0 to 100% (1% step)		
	Gain	The output frequency gain corresponding to the frequency setting signal can be set from 0 to 200% (1% step)		
	Frequency jump	A 3 point jump in width of sympathetic vibrations, and resonance is possible during 0 to 5Hz (1Hz step)		
	Slip compensation control	Even with load fluctuations, maintains motor at constant speed		
	Current limit control	Output current can be controlled within a range of between 30% and 150% (1% step)		
	8 step speed switch (operation panel included)	8 step speed operation possible		
	2-wire, 3-wire changeover	Selection between the hold constant of operation stop command (2-wire operation) or the momentary contact (3-wire operation) is possible.		
	Terminal function change	The function of the same terminal can be changed via the setting (for 10 terminals)		

(Note 1) Indicates rated capacity when rated output voltage is 230V
(Note 2) Output of voltage exceeding the power supply voltage is not possible.
(Note 3) The output frequency is changed at 0.002Hz intervals during acceleration/deceleration. (when at max. frequency 60Hz)

Item		Specification		
Inverter Type		FVR002B7S-2	FVR004B7S-2	FVR008B7S-2
Control Torque	Standard Equipment	Regenerative braking	Condenser regenerative		
		DC braking	Braking frequency 0.2 to 60Hz, braking time 0.01 to 30 sec., braking voltage 0 to 15%		
	With optional equipment	Type	Braking resistor		
		Torque	150% or more		

Item			Specification	
Operation	Frequency setting signal		Frequency setting device or voltage input: DC 0 to 10V (DC 0 to 5V)	
	Input signal (contact input)		✳ By changing the terminal function, the input command or modes can be changed as follows: cycle operation command, frequency adder-subtractor setting, DC brake command, link input. Forward command, reverse command, self-holding selection (when operating 3-wire), multi-step speed (8-step) setting, multi-step accel/decel time setting (4-step), coast-to-stop command, external alarm, reset.	(Sampling time span 1 msec or less)
	External output signal	Contact output	Batch alarm output (1c contact, contact point capacity is AC 250V, 0.3A, COSθ = 0.3)	
		Open corrector output	During inverter operation, rated frequency attainment, over-load prediction, under-voltage. ✳ These can be changed to the following outputs through the terminal change function. Finish signal of each stage/cycle in pattern operation, frequency level detection, inverter stop, current-limiting monitoring, undervoltage or restarting detection, over-voltage detection.	

Item			Specification	
Protection Function			Stall prevention, over-current, momentary power failure, under-voltage, over-voltage, inverter over-heating, external problems (external thermal activation, etc.), motor overload (electronic thermal), setting error, communication error, DSP error, link error, output terminal short-circuit.	
Display	Frequency meter output signal		Analog: DC 0 to +10V (adjustment range DC 6.5V to 10.3V) ≋ With the terminal change function, this terminal can be changed to load meter equivalent output signal.	
	Keypad panel	Frequency meter output signal	Digital display	4 digit LED, unit is LED
			Graphic display	LCD, with brightness control
		Operation display	Output frequency, set frequency, output current, output voltage, synchronous rpm, line speed	
		Setting display	Function code and setting data displayed (see operation panel explanation)	
		Protection display	OC1: acceleration over-current, OC2: deceleration over-current, OC3: constant speed over-current, LU: under-voltage, OU: over-voltage, OH1: inverter over-heat, OH2: external alarm (external thermal), OL1: electronic thermal (motor overload), Err1: setting error, Err2: communication error, Err3: DSP error, Err4: link error, operating conditions at time of protective operation (4 times including output frequency, etc.), record of protective operations (display of past 3 protective operations)	
		Input signal display	Display of signal existence at FWD, REV, HLD, X1, X2, X3, RT1, RT2 terminals	
	Charge lamp (LED)		Lights when DC capacitor voltage is charged	

Item		Specification		
Condition	Installation location	Indoor, less than 1,000m elevation, not in contact with corrosive gas, oil mist or dust, out of direct sunlight		
	Ambient temperature	−10 to +50 °C (remove ventilation cover if temperature is over +40°C)		
	Temperature	Below 90%RH (without dew condensation)		
	Vibration	0.6G or less (conforms to JIS C0011)		
	Shipping temperature	−25 – +65°C		
Installation		Install on a panel, install as an external cooling system		
Protection/Cooling Types		Selfcooling type (IP00)		
Approx. weight [kg]		1.5	1.6	1.9
Options		Relay output unit, copy unit, remote operation extension cable, inverter terminal link cable, link adaptor, remote operation panel, remote display panel, T link card, radio noise reduction zero phase reactor, noise reduction AC reactor, power supply coordinating AC reactor, power factor improvement Ac reactor, power filter, spark killer, surge killer, arrester, frequency meter, frequency setting device, braking unit, braking resistor, MCA series, ground short detection unit		

(2) External Dimensions

FVR002B7S-2/FVR004B7S-2

FVR008B7S-2

(3) Application Of Wiring And Equipment

Motor Output [kW]		0.2	0.4	0.75
Inverter Model		FVR002B7S-2	FVR004B7S-2	FVR008B7S-2
Inverter Capacity [KVA]		0.57	1.1	1.9
Applicable wire sizes [mm²] (*)	Main circuit	1.25(3.5)		
	Control circuit	0.5(1.25)		
FUJI Auto Braker		SA33/15		
Fuse [A]		5		10
FUJI Magnetic Contractor		SC-05		
FUJI Thermal Relay		TR-1SN(1.7-2.6)		TR-1SN(2.8-4.2)
Spark killer		S2-A-0 (for magnetic contacter), S1-B-0 (for mini control relay and timer)		

(Note 1)   The above data is based on the commonly used FUJI motor.
(Note 2) (*) The standard wire is 600V vinyl wire.

(4) Terminal Function

	Code	Terminal Name	Terminal Function
Main circuit part	E(G)	Ground terminal	Connection for ground
	R,S,T	Commercial power input terminals	Connection for commercial power Ac 200 to 230V
	30A(30B),30C	Alarm output	1a(1b) contact AC 250V, 0.3A (cos θ = 0.3)
	P,DB	External braking resistor terminals	Connection for external braking resistor
	U,V,W	Inverter output terminals	Connection for 3-phase induction motor
Control circuit part — Frequency setting	13	Frequency setting voltage output terminal	Internal power supply (DC +10V)
	12	Frequency setting voltage input	Frequency setting signal input (DC 0 to +10V)
	11	Frequency setting common terminal	Internal power supply (0 V)
Option connection	P12	Ground short detection voltage output	Internal power supply (DC +12 to 15V)
	SHT	Ground short detection signal input	Connection for ground short detection unit(MCA III -GFD)
	CM	Common	Internal power supply (0 V)
	FM	Frequency meter connection	FM-CM : Regulation (DC +6.5 to 10.5V)
Input signal	FWD	Forward input	FWD-CM : Forward via short-circuit
	REV	Reverse input	REV-CM : Reverse via short-circuit
	BX	Motor coast-to-stop command	BX-CM : Motor coast-to-stop via short-circuit
	THR	External alarm input	THR-CM : Alarm function via open
	RST	Alarm reset	RST-CM : Reset function via short-circuit
	X1,X2,X3	Multi-step speed selection input	X1,X2,X3-CM : Operation speed switching (8 types)
	RT1,RT2	Acceleration/deceleration time selection input	RT1,RT2-CM : Acceleration/deceleration time switching (4 types)
	HLD	3-wire operation · Stop command	HLD-CM :3-wire operation function via short-circuit, the pulse signal input from FWD,REV terminals is self-held
	CM	Common	Internal power supply (0 V)
Output signal	RUN	Inverter running signal	RUN-CM : Open corrector output (27V MAX)
	FAR	Frequency equivalence detection signal	FAR-CM : Open corrector output (27V MAX)
	LV	Under-voltage signal	LV-CM : Open corrector output (27V MAX)
	OL	Overload early warning signal	OL-CM : Open corrector output (27V MAX)
	CM	Common	Internal power supply (0 V)

‡ CM and CM1, CM2 are short-circuited inside.

(5) FVR-B7S Control Block Diagram

IM

THR
CM

DB
P

power charge lamp

voltage · current detection circuit

Protective circuit
- over-voltage
- over-current
- over-load current
- short-circuit, ground short
- transistor
- overheat
- external thermal
- under-voltage
- motor electronic thermal
- DSP error
- communication error

base drive

PWM generator

voltage regulator

Serial input/ output port

Tr3 Tr6
Tr2 Tr5
Tr1 Tr4

communication between inverters

current regulator

function generator

acceleration/ deceleration regulator

P
DB

Power Supply

LCD Display
- setting data value
- graphic pattern
- frequency, wave monitor
- terminal block monitor
- trip record
- operation conditions at time of trip

LED Display
- frequency
- output current
- output voltage
- synchronous rpm
- line speed
- function speed
- data code

Keypad Panel (CPU)

operation keys
- data setting
- operation control

frequency command switch

D S P

A / D (inverter)

30

FAB

R
S
T

I3
I2
I1
C1
FWD
REV
HLD
X1
X2
X3
RT1
RT2
BX
RST
CM

RUN
FAR
OL
LV
30A
30B
30C

DC4~20mA

frequency setting

forward
reverse
2-wire / 3-wire
multi-step frequency setting
acceleration/ deceleration time switch
free-run stop
reset
common terminal

Function Code Table

Function Code	Function	Display. Setting. Range	Factor Setting	For customer use	Function Code	Function	Display. Setting. Range	Factor Setting	For customer use
00	LED digital monitor selection	00 : output frequency [Hz] 01 : output current [A] 02 : output voltage [V] 03 : synchronous rpm [rpm] 04 : line speed [m/min]	00		26	Deceleration time 2	(LCD) 0.01 – 3600Sec	10.0	
					27	Deceleration time 3	(LCD) 0.01 – 3600Sec	15.0	
01	Graphics monitor selection	00 : Hz AMP monitor 01 : terminal signal 1 02 : terminal signal 2	00		28	Deceleration time 4	(LCD) 0.01 – 3600Sec	3.00	
					29	Multistep speed setting 1	(LCD) 0.00 – 400Hz	10.0	
02	Motor noise reduction	00 to 05 (code)	03		30	Timer 1	(LCD) 0.01 – 3600Sec	5.00	
03	FM terminal output level calibration	00 to 99 (code)	85		31	Multistep speed setting 2	(LCD) 0.01 – 400Hz	20.0	
					32	Timer 2	(LCD) 0.01 – 3600Sec	5.00	
04	Automatic torque boost control	00 : nonoperate 01 : operate	00		33	Multistep speed setting 3	(LCD) 0.01 – 400Hz	30.0	
05	Torque boost	00 to 31 (code)	13		34	Timer 3	(LCD) 0.01 – 3600Sec	5.00	
06	Fine adjustment of torque boost	00 to 09 (code)	00		35	Multistep speed setting 4	(LCD) 0.01 – 400Hz	40.0	
07	Automatic accel/ decel control	00 : nonoperate 01 : operate	00		36	Timer 4	(LCD) 0.01 – 3600Sec	5.00	
					37	Multistep speed setting 5	(LCD) 0.01 – 400Hz	50.0	
08	Acceleration time 1	(LCD) 0.01 to 3,600 sec.	6.00 / 12.00		38	Timer 5	(LCD) 0.01 – 3600Sec	5.00	
09	Deceleration time 1	(LCD) 0.01 to 3,600 sec.	6.00 / 12.00		39	Multistep speed setting 6	(LCD) 0.01 – 400Hz	60.0	
10	Data protection	00 : change possible 01 : protect	00		40	Timer 6	(LCD) 0.01 – 3600Sec	5.00	
11	Maximum frequency	00 : 50Hz 00 : 60Hz 00 : 100Hz 00 : 1200Hz 04 : free (Hz)	01		41	Multistep speed setting 7	(LCD) 0.01 – 400Hz	60.0	
					42	Timer 7	(LCD) 0.01 – 3600Sec	5.00	
12	Base frequency	00 : 50 Hz 01 : 60 Hz 02 : free (Hz)	01		43	Electronic thermal overload relay	00 : nonoperate 01 : operate (%)	00	
13	Rated output voltage	00 : 200V 00 : 220V 00 : 230V 03 : free (V)	03 (0V)		44	High limiter	(LCD) 0– 100%	100	
					45	Low limiter	(LCD) 0– 100%	0	
14	Number of motor poles	02. 04. 06. 08. 10. 12.	04		46	Bias frequency	(LCD) 0– 100%	0	
					47	Gain for frequency setting signal	(LCD) 0– 200%	100	
15	Operation command	00 : keypad panel operation 01 : terminal block operation 02 : link operation	01		48	Jump frequency 1	(LCD) 0– 400Hz	0	
					49	Jump frequency 2	(LCD) 0– 400Hz	0	
16	Frequency command	00 : digital 01 : analog (voltage) 02 : analog (voltage)	01		50	Jump frequency 3	(LCD) 0– 400Hz	0	
					51	Jump frequency range	(LCD) 0– 5Hz	0	
17	Accel/Decel pattern	00 : linear 01 : weak "S" shape curve 02 : strong "S" shape curve	00		52	DC brake	00 : nonoperate 01 : DC brake	00	
					53	DC brake starting frequency	(LCD) 0– 60Hz	0	
18	Normal/High torque dynamic brake	00 : normal brake 01 : hard brake	00		54	DC brake voltage	0 to 15 (code)	00	
19	Pattern operation	00 : nonoperate 01 : operate	00		55	DC braking time	(LCD) 0.01 – 30Sec	0.10	
20	Restart after instantaneous power failure	00 : nonoperate 01 : operate	00		56	Starting frequency	(LCD) 0.2 – 60Hz	1	
21	Coefficient for line speed	(LCD) 0.00 – 200	0.01		57	Current limiter	00 : nonoperate 01 : operate (%)	00	
22	Function blocks used	00 : up to basic function 01 : up to standard function 02 : up to high level function	00		58	Slip compensation control	00 : nonoperate 01 : operate	00	
					59	Frequency level detection	(LCD) 0– 400Hz	60	
23	Acceleration time 2	(LCD) 0.01– 3000Sec	10.0		60	FDT and FAR signal hysterisis	(LCD) 0– 30Hz	10	
24	Acceleration time 3	(LCD) 0.01– 3600Sec	15.0		61	Run signal finishing frequency	(LCD) 0– 400Hz	0	
25	Acceleration time 4	(LCD) 0.01– 3600Sec	3.00		62	Overload early warning signal	(LCD) 70– 150%	100	

(NOTE) During operation, function code data 00 to 10, 73 to 75, 80 to 82 setting is possible. Also all function codes and data verification is possible.