Fuji Inverter FVR-G7S-EX

200V, 400V Series

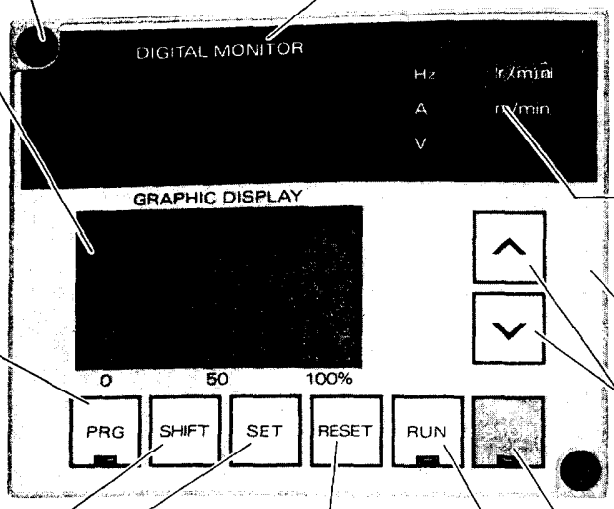
Instruction Manual

Contents

Fuji Electric Co., Ltd.

Keypad Panel

– Part Name & Function –



Attachment Screws

The keypad panel can be easily removed from the inverter unit by loosening the 2 attachment screws. With the optional extension cable, remote operation and display is possible.

Graphic Display

Frequency and output current are graphically displayed. The main input/output signal ON/OFF is also displayed.
When in program setting mode, the appropriate information is displayed graphically and by letters for easy function selection setting.

Program Key

Normal mode or program setting mode selection key. Key lights up when in program setting mode.

Shift Key

Selects unit display during either RUN or STOP when program key is in normal mode.
Also used for successive selection of code blocks for each function when program key is in program setting mode. (for code blocks, see Section 7)

Set Key

Data read-out and write for each function through this key. Also, when setting data on the graphic display, data accessed on the display can be written.

Reset Key

Resets abnormal STOP condition when program key is in normal mode.
Also changes from data update mode to function selection mode when program key is in program setting mode.

RUN Key

Key used for starting operation. The key lights up during operation.

This key does not function when data code selection is in terminal block operation 15:01 or link operation 15:02.

Digital Monitor

When setting the program, the function code is indicated by the 2 digits on the left, and the data code corresponding to the function code is indicated by the 2 digits on the right.
During operation it displays the set frequency, current, voltage, etc. If a protective STOP occurs, the cause of the problem will be displayed as a code.

Unit Indicators

The unit information is displayed by LED.

LCD Brightness Control Dial

This dial permits adjustment for easy to read brightness.

Up-Down Keys

These keys increase and decrease the frequency or speed.
When unit is in program setting mode, they change the function code or data values.

STOP Key

This key is used for stopping operation. The key will light when in STOP mode.
If pressed in External Signal Mode (1501), OH2 will be displayed, and inverter will coast stop.

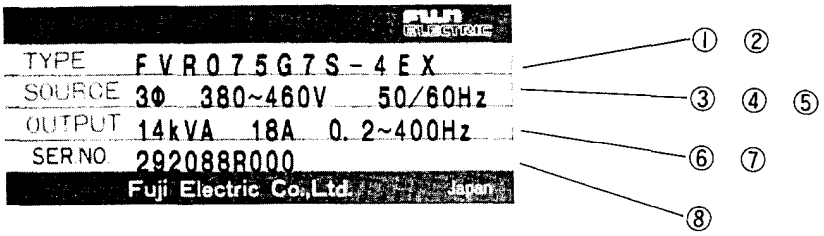
1. Introduction

Thank you for purchasing the FUJI "FVR-G7S" inverter. This inverter uses 32 bit DSP for multi-function and high performance in a variety of applications.
This instruction manual is included with the inverter, and is provided for the convenience 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 nearest Fuji sales office or the distributor where the unit was purchased.

Name Plate



① Applicable Motor:
004→0.4kw
008→0.75kw
015→1.5kw
022→2.2kw
040→4.0kw
055→5.5kw
075→7.5kw
110→11kw
150→15kw
185→18.5kw
220→22kw

② Power Series: 2EX→ 200V, 3ø series
: 4EX → 400V, 3ø series

③ Phase: 3ø → 3 phase

④ Voltage range
200 ~230V → AC200V, 3ø series
380 ~460V → AC400V, 3ø series

⑤ Frequency: 50/60 Hz

⑥ Rated output current

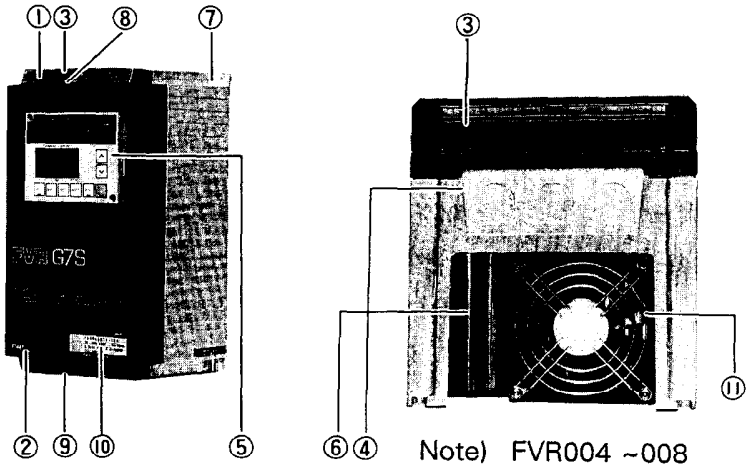
AC 200V series	AC 400V series:
3A →004(0.4kw)	2.5A→008(0.75kw)
5A→008(0.75kw)	3.7A→015(1.5kw)
8A→015(1.5kw)	5.5A→022(2.2kw)
11A→022(2.2kw)	9.0A→040(4.0kw)
17A→040(4.0kw)	13A→055(5.5kw)
25A→055(5.5kw)	18A→075(7.5kw)
33A→075(7.5kw)	24A→110(11kw)
46A→110(11kw)	30A→150(15kw)
59A→150(15kw)	39A→158(18.5kw)
74A→185(18.5kw)	45A→220(22kw)
87A→220(22kw)	

⑦ Output frequency range: 0.2 to 400 Hz

⑧ Serial No.

3. Construction & Handling

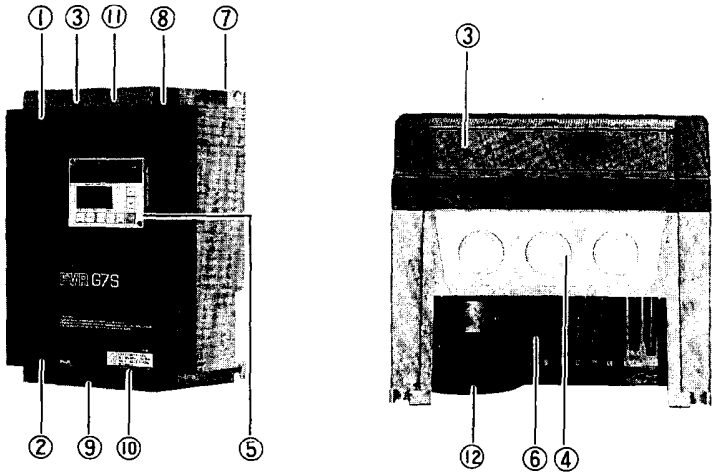
The FVR-G7S series feature completely enclosed construction (IP40), except for the cooling fan (IP 20), for improved adverse environment resistance. Also, with the detachable cable inlet, wiring can be easily performed.



FVR004 to 040G7S-2 EX
FVR008 to 040G7S-4 EX

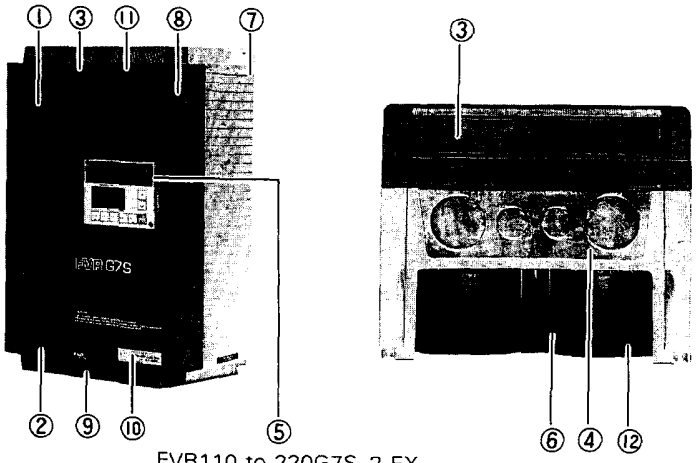
Note) FVR004 ~008 models are not equipped with cooling fans.

① Inverter Cover
② Terminal Cover
③ Ventilation Hole Blind Plate
④ Cable Inlet Plate
⑤ Operation Panel
⑥ Heat Sink
⑦ Mounting Screw Holes
⑧ Inverter Cover Screws
⑨ Terminal Cover Screws
⑩ Rating Nameplate
⑪ Cooling Fan
(except FVR004 - 008)
Rubber Bushings (provided loose)



FVR055 to 075G7S-2 EX
FVR055 to 075G7S-4 EX

① Inverter Cover
② Terminal Cover
③ Ventilation Hole Blind Plate
④ Cable Inlet Plate
⑤ Operation Panel
⑥ Heat Sink
⑦ Mounting Screw Holes
⑧ Inverter Cover Screws
⑨ Terminal Cover Screws
⑩ Rating Nameplate
⑪ Cooling Fan
⑫ Electrolytic Condenser
Rubber Bushings (provided loose)

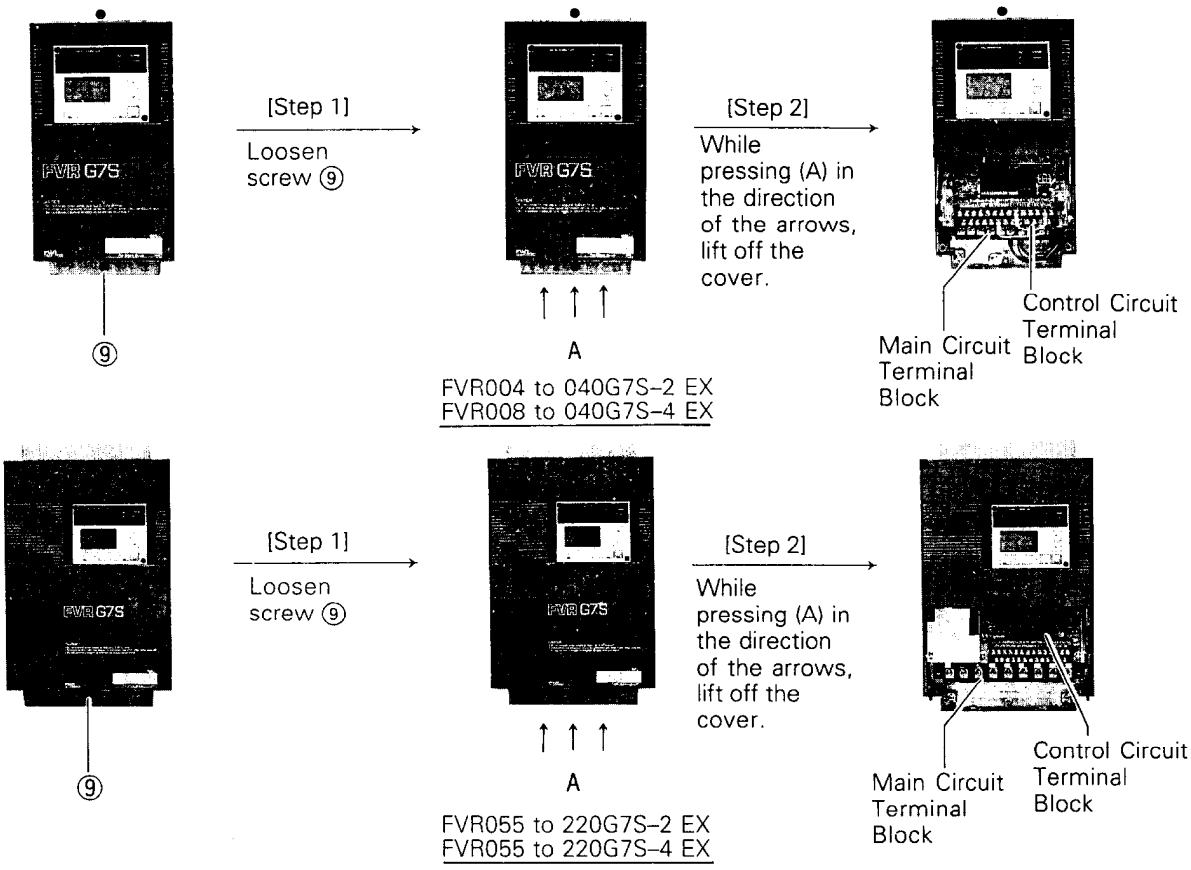


FVR110 to 220G7S-2 EX
FVR110 to 220G7S-4 EX

① Inverter Cover
② Terminal Cover
③ Ventilation Hole Blind Plate
④ Cable Inlet Plate
⑤ Operation Panel
⑥ Cooling Fins
⑦ Mounting Screw Holes
⑧ Inverter Cover Screws
⑨ Terminal Cover Screws
⑩ Rating Nameplate
⑪ Cooling Fan
⑫ Electrolytic Condenser
Rubber Bushings (provided loose)

(2) Installation & Removing the Terminal Cover

Remove the cover using the following procedure. 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 standerd specification voltage permissible flucution. If excessive voltage is applied to the inverter, damage to the internal elements will result.**
② **Do not connect power supply to the output terminals (U, V, W). Connect power supply only to the input terminals (L1, L2, L3).**
③ **Do not connect power supply to the breaking resistor connection terminals ((+), DB). Never shortcircuit between (+)-(−) or (+)-DB terminals, and do not connect any resistance with a resistance value (Ω) less than standerd applicable breaking resistor.**
④ **Do not connect power supply to the control circuit terminals. (except for 30 A,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 magnetic contactor on the output side of the inverter for ON/OFF operation.**
⑦ **Use only power supply capacity between 1.5 times of inverter output capacity and 500 kVA. If a power capacity greater than 500 kVA, use a Line side AC reactor (ACR...option) on the line side of the inverter.**
⑧ **Do not connect a power factor correcting capacitor to the output side of the inverter.**
⑨ **Do not operate without the ground wire conncted.**
If the inverter protective function is activated, consult Section 11 "Troubleshooting", and after remove the cause of the
⑩ **problem, resume operation. Do not reset the alarm automatically by external sequence.**
⑪ **Do not perform a megger test between the inverter terminals or on the control circuit terminals.**
⑫ **Erorr in current detection may become large when;**
- a) **The cable length between a motor and an inverter is longer than 100m.**
- b) **A specially designed motor is used.**
- c) **An inverter capacity is 2 ranks or more larger than a motor capacity.**

5. Installation Instructions

(1) Installation Conditions

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

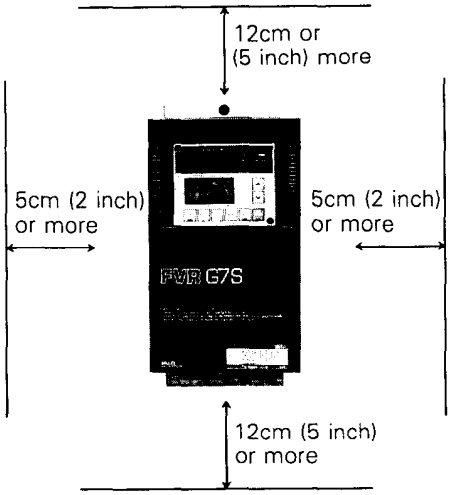
① The ambient temperature should be between −10°C and +50°C. (Remove the ventilation cover when the temperature exceeds +40°C)

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 any liquids.

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 5.8 m/s² {0.6G}.

(2) Installation Direction & Mounting Space



① **Direction**
Install the inverter vertically so that "FVR-G7S" can be seen in front. Horizontal or other positional installation will cause overheat of the inverter.

② **Space**
The inverter will generate heat during operation. Allow sufficient space around the unit as shown in the picture on the left.

③ **Mounting plate**
Heat sink temperature will reach around +90°C during operation. Please use thermostable material for inverter mounting plate.

④ **Multi-mounting**
When 2 or more inverters are installed within an inverter switchboard, arrange them side by side, also keeping the spacing (shown on the left) between each inverter. Please refer to the technical data for panel design. (MEH341)

(3) Mounting Screws & Holes

① Mounting screws or bolts should be M5 or M8.

② For the location of mounting holes, see "External Dimensions" in Section 12.

NOTICE

The durabity and reliability of the inverter will be affected by ambient temperature. Do not place the unit where ambient temperature is not proper. Observe the following temperature range.

With ventilation cover: −10 ~ +40°C

Without ventilation cover: −10 ~ +50°C

(4) Cable Opening (wiring lead-in plate)

Use the rubber bushings supplied loose with the inverter to prevent cable damage and for dustproofing.

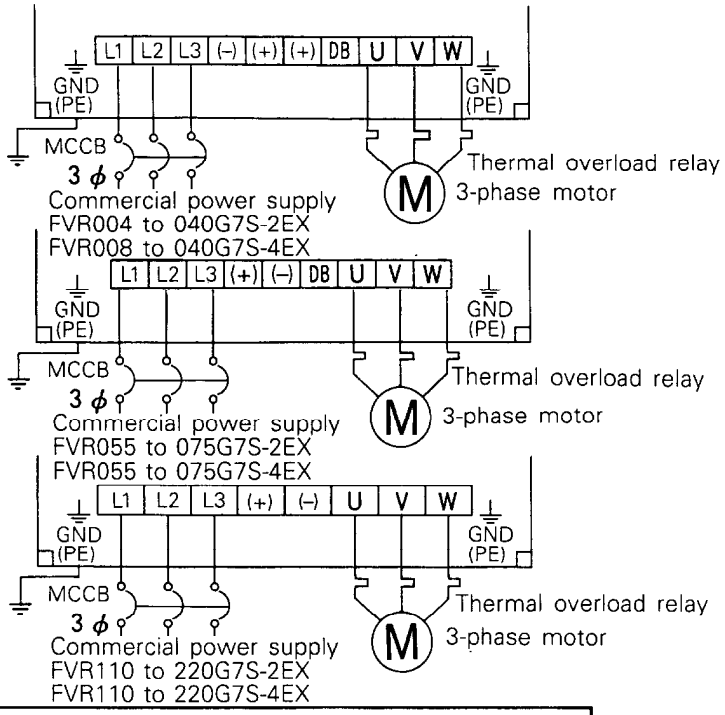
6. Wiring

(1) Main Circuit Wiring

① Power supply connection (L1, L2, L3)
Connections can be made regardless of phase rotation.

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 [GND (PE)]
For safety reasons, do not operate without the inverter being grounded.
The ground wire must be as thick and short as possible as shown in the Applicable Wiring Equipment List (see Section 12 Appendix).

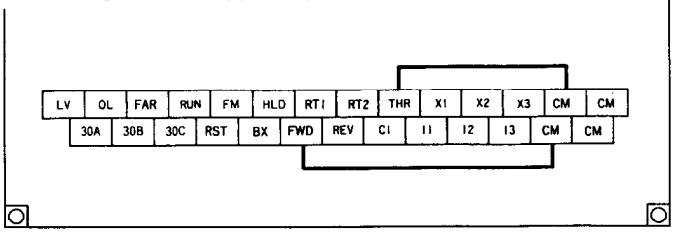


Caution Note: **Be sure that the power supply is never connected to the U, V, W terminals or the (–), (+), (+), DB terminals.**
Be sure to provide fuses, specified on page 65, on input line of inverter.

(2) Control Circuit Wiring

① Factory wiring at the time of shipment

The operation as well as the frequency is through the keypad panel.



RUN : Starts operation
STOP : Stops operation
∧ ∨ : Frequency setting

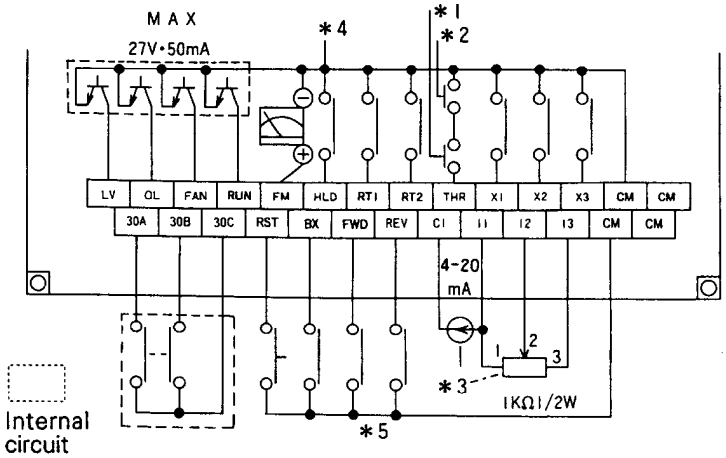
* Function setting 1500、1600
Operation as shown above is possible with the factory setting. The frequency is set at 50Hz at the time of shipment.

* For functions, see Section 9, (1) and (2).

When External Signal Mode is selected, and FWD-CM or REV-CM terminals are connected, inverter does not start at power-up, causing OH2 trip. To start the inverter disconnect all the FWD-CM and REV-CM connections, press RESET key, and make FWD-CM or REV-CM connection.

② Operation through control circuit terminals (external operation)

Please wire as shown below. See Section 12 for an explanation of each terminal.



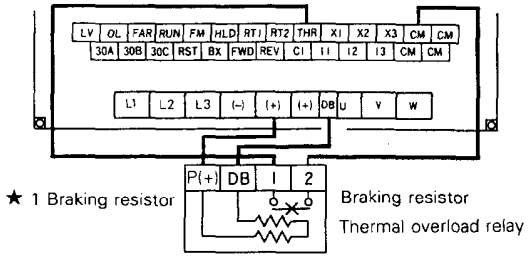
* 1) External braking resistor unit thermal switch (normally close contact)
* 2) Motor protective thermal switch (normally close contact).
* 3) When the current setting and the voltage setting are input at the same time, the setting will be their resultant total value. (when the function setting is 1602)
* 4) When 3-wire control function is selected and the HLD-CM contact is closed, the FWD and REV terminal signals are input as pulse signals and are self-held.
* 5) When the FWD and REV signals close at the same time, inverter will decelerate and stop.

1. When both RUN/STOP and the frequency setting is performed through the control circuit terminals, the function setting should be 1501, 1601 or 1602.
2. If RUN/STOP is performed through the keypad panel, and the frequency setting is performed through the control circuit terminals, set the function at 1500, 1601. or 1602
3. If RUN/STOP is performed through control circuit terminals, and the frequency setting is performed through the operation panel, set the function at 1501, 1600.

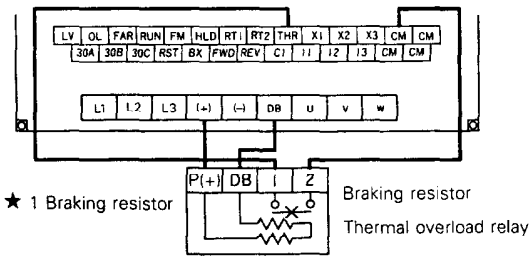
(3) Wiring the external braking resistor unit (optional)

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

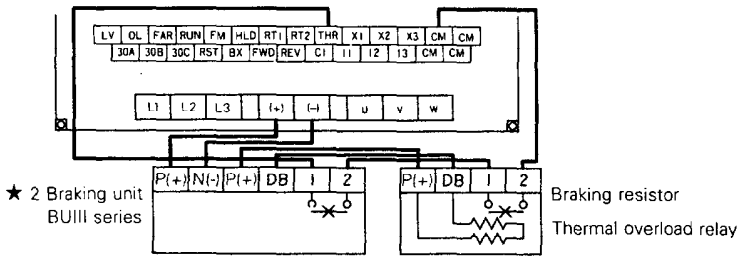
* 1 Remove the factory installed jumper from the CM THR terminals. If the jumper is not removed, during operation the OH2 alarm will not function.
* 2 ★ Option 1: Braking resistor (0.4 to 22kW)
  ★ Option 2: Braking unit (MUIII) and DB braking resistor (11 to 22kW)



FVR004 to 040G7S–2 EX
FVR008 to 040G7S–4 EX



FVR055 to 075G7S–2 EX
FVR055 to 075G7S–4 EX

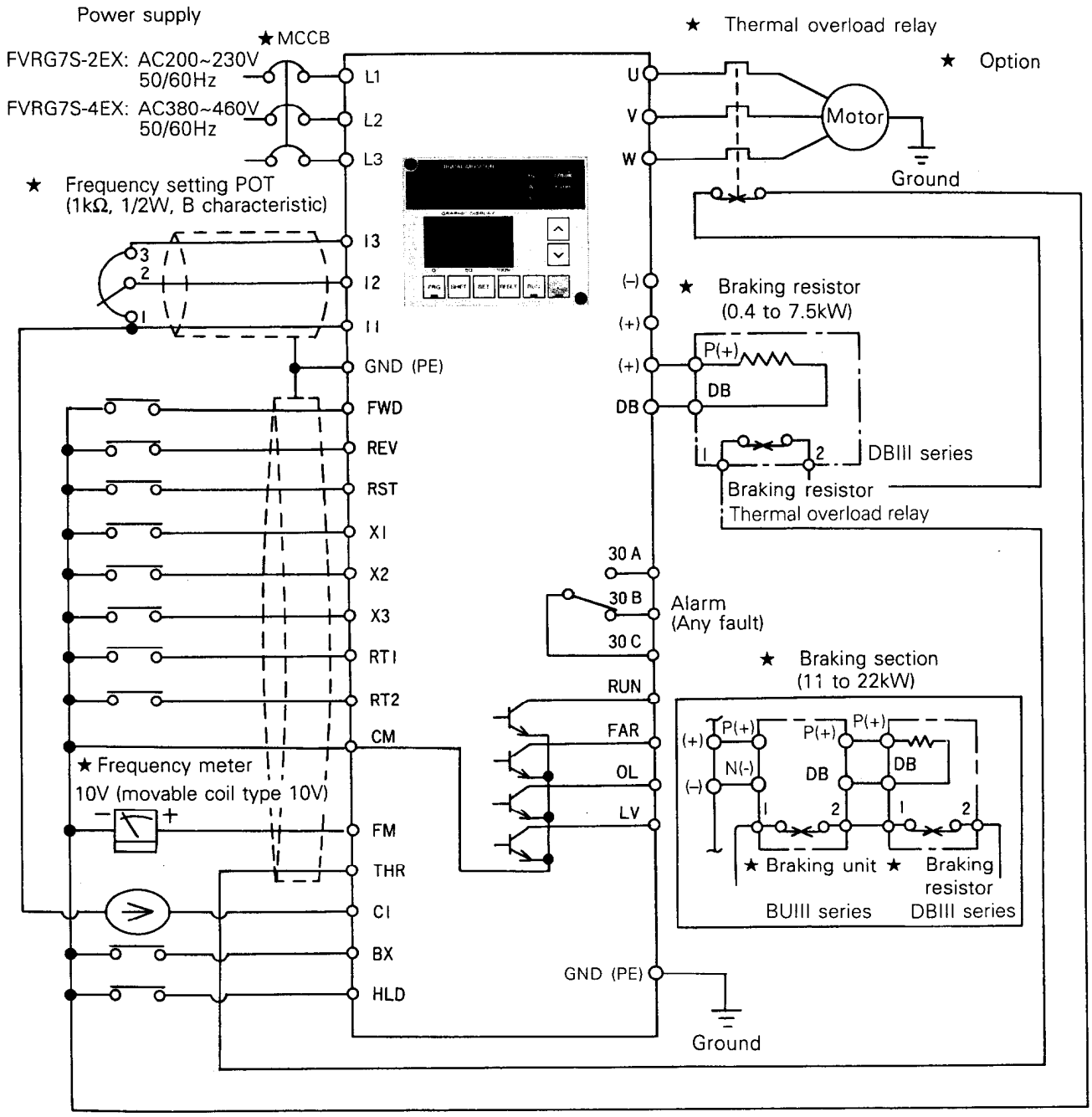


FVR110 to 220G7S–2 EX
FVR110 to 220G7S–4 EX

[Caution Notes]

1. **If the (+)-DB terminals, or the (+)-(–) terminals are inadvertently short-circuited, damage to the inverter will result.**
2. **Inverters having a capacity of 11 kW and above are not supplied with an internal DB transistor. Always use a braking unit (BUIII series) in conjunction with the dynamic braking resistor (DBIII series). Omission of the braking unit can result in a potentially hazardous condition due to severe resistor overheating.**
3. **Before wiring an external braking resistor (DBIII series) to inverter capacities of 7.5 kW and below make certain to first disconnect the internal resistor wiring at (+) and DB terminals. Removed internal wiring must be insulated with a suitable approved material prior to inverter operation.**

(4) Basic Schematic Diagram



[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 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.)

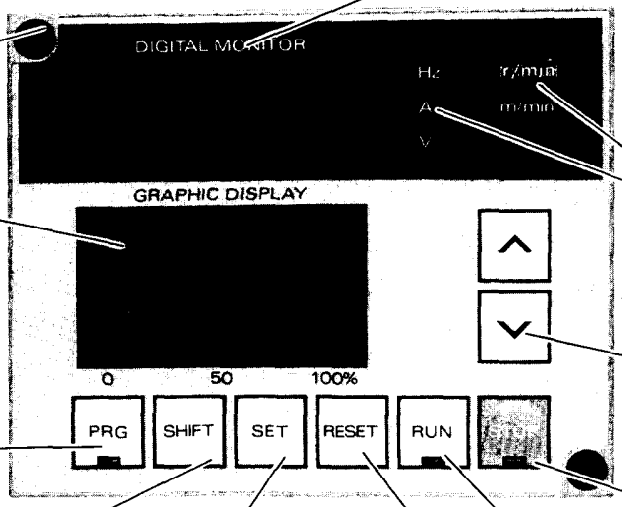
③ **Install a surge absorber in parallel with any magnet switches or solenoid type coils, etc. which may be close to the inverter.**

④ **Be sure to provide fuses, as specified on page 65, on line terminals of inverter provide MCCB as needed.**

⑤ **Don't connect CM and/or 11 terminal to the ground.**

7. Keypad Panel

(1) Part Name & Function



Mounting Screws

The keypad panel can be easily removed from the inverter unit by loosening the 2 mounting screws. With the optional extension cable, remote operation and display is possible.

Graphic Display

Frequency and output current are graphically displayed. The main input/output signal status is also displayed. When in program setting mode, the appropriate information is displayed graphically and by letters for easy function selection setting.

Digital Monitor

When setting the program, the function code is indicated by the 2 digits on the left, and the data code corresponding to the function code is indicated by the 2 digits on the right. During operation it displays the set frequency current, voltage, etc. If a protective STOP occurs, the causes of the problem will be displayed as a code.

Unit Indicators

The unit information is displayed by LED.

LCD brightness Control

This control permits adjustment for easy to read brightness.

Up-Down Keys

These keys increase or decrease the frequency or speed. When unit is in program setting mode, they change the function code or data values.

Program (PGR) Key

Normal mode or program setting mode selection key, Key lights up when in program setting mode.

SHIFT Key

When program key is in operation mode, unit display can be changed while in either RUN or STOP.
In program setting mode, this key allows function selection by displaying each function code block in sequence. (for code blocks, see the following page)

SET Key

Data read-out and write for each function through this key. Also, when setting data on the graphic display, data accessed on the display can be stored.

RESET Key

Resets abnormal STOP condition when program key is in normal mode.
Also changes from data update mode to function selection mode when program key is in program setting mode.

RUN Key

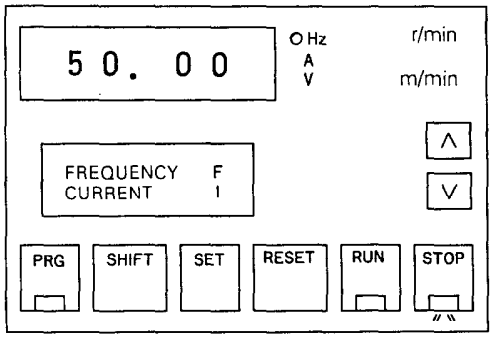
Key used for starting operation. The key lights up during operation.
This key does not function when data code selection is in terminal block operation [15:01], or link operation [15:02].

STOP Key

This key is used for stopping operation. The key will light up when in STOP mode.
If pressed in External Signal Mode (1501), OH2 will be displayed, and inverter will coast stop.

(2) Controlling Method of Keypad Panel

When the power supply is activated, the keypad panel display will be as shown in the figure on the right. If the [RUN] key is pressed at this point, operation will be at 50Hz according to the function code setting at the factory. Use the [STOP] key to stop operation. For wiring connections, see the basic wiring diagram in Page 7.
To change the function code, use the following procedure.



1) Selection of Function Code (LED lights)

Use the [PRG] key to set program mode.
The Program mode is shown in the chart to the right.

One of the function codes; [2000] (functions 00 to 22), [2001] (functions 00 to 62), or [2002] (functions 00 to 82)

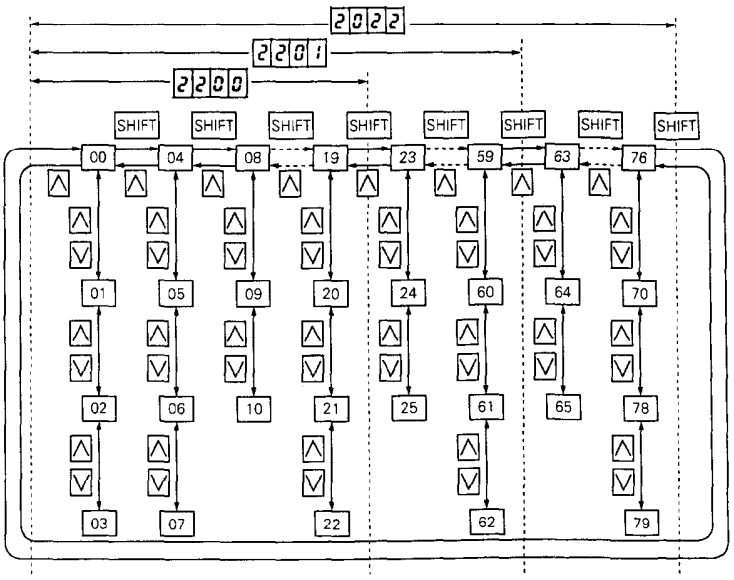
will be selected for the degree of complexity.

Each time the [SHIFT] key or [∧] key are pressed, it changes the function code in the direction of the arrows as shown at

right. (Example: [00] ↔ [04] ↔ [08])

The [∧] [∨] keys change the function code in the vertical direction as shown at right.

(Example: [00] ↔ [01] ↔ [02])



2) Data Code Selection

After selecting the function codes, press the [SET] key and the [∧] [∨] keys change the data code.

(some data are not displayed and are selected on the LCD GRAPHIC DISPLAY)
Selected data is stored by the SET key. The RESET key terminates data code selection, and returns to function code selection.

(3) Display & Key Operation

Normal operation

○ RUN frequency setting method (digital setting)
● Function setting
Operation command (15)
00 or 01
Frequency command (16)
00

Maximum frequency	Output frequency	freq. setting	freq. setting resolution (when one digit shift to the left)
0.2 to 60 Hz	0.2 to 10 Hz	0.01 Hz	0.002 Hz
	10 to 60 Hz	0.1 Hz	
60 to 300 Hz	0.2 to 10 Hz	0.01 Hz	0.01 Hz
	10 to 100 Hz	0.1 Hz	
	100 to 300 Hz	1 Hz	
300 to 400 Hz	0.2 to 10 Hz	0.02 Hz	0.02 Hz
	10 to 100 Hz	0.1 Hz	
	100 to 400 Hz	1 Hz	

○ DIGITAL MONITOR
● Function setting
LED Digital monitor selection (00)
00: Output frequency
01: Output current
02: Output voltage
03: Synchronous r/min
04: Line speed

SHIFT key: Frequency display (flashes during STANDARD/STOP mode) ←
↓
SHIFT key: Frequency display (flashes during one digit shift and STOP mode)
↓
SHIFT key: Output current display
↓
SHIFT key: Output voltage display
↓
SHIFT key: Synchronous r/min display
↓
SHIFT key: Line speed display ——

○ GRAPHIC DISPLAY
● Function setting
Graphic monitor selection (01)

00	Output frequency & output current (% indication) FREQUENCY F ■■■■■■■■■■ CURRENT I ■■■■■■■■■■
01	Input signal status display ■FWD ■RT1 ■REV ■RT2 ■HLD
02	Input/output signal status display ■LV ■X1 ■OL ■X2 ■FAR ■X3 ■RUN

Program mode

○ DIGITAL DISPLAY

●Function code display
[∧]·SHIFT key: Advances function code to the code block containing the desired function code
[∧]·[∨] keys: Selects desired function code
[∧]: function code minus 1
[∨]: function code plus 1

●Data display
SET key: data read-out
[∧]·[∨] keys: data change (update)
[∧]: data plus 1
[∨]: data minus 1
SET key: Data store (After data store, do not turn power supply off during 5 s.)
RESET key: End data change

○ GRAPHIC DISPLAY

●Function code display mode
[∧]·SHIFT key: Advances function code to the code block containing the desired function code.
[∧]·[∨] keys: Selects desired function code.
[∧]: moves cursor up.
[∨]: moves cursor down.

●Data display mode
SET key: Data read-out
[∧]·[∨] keys: Data change (update)
[∧]: data plus
[∨]: data minus
SET key: Data store (After data store, do not turn power supply off during 5 s.)
RESET key: End data change (returns to function code display)

Trip Mode

○ DIGITAL MONITOR

Alarm message data display
OC1, OC2, OC3, OV, LV, OH1, OH2
OL1, Err1, Err2, Err3, Err4
RESET key: Fault condition reset

○ GRAPHIC DISPLAY

Operation condition display
F = XXX.XHz
I = X.XA
V= XXXV [SHIFT] ON
Temp = XX°C

Trip record display
0 = LV (Present)
−1 =OV (Last)
−2 =OC1 (Before-last)
−3 = OH2 (Before-before-last)

8. 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 on page 58.

(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			POT or analog signal (DC 0 to +10V)	1601
3			Analog signal (DC4 to 20mA)+(DC0 to 10V)	1602
4	External Signal Method (FWD, REV)	1501	∨ ∧ keys	1600
5			POT or analog signal (DC 0 to +10V)	1601
6			Analog signal (DC4 to 20mA)+(DC0 + 10V)	1602

Multistep speed 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 step speeds, the function codes are 29 31 33 35 37 39 41 and then select the external terminal (X1, X2, X3).

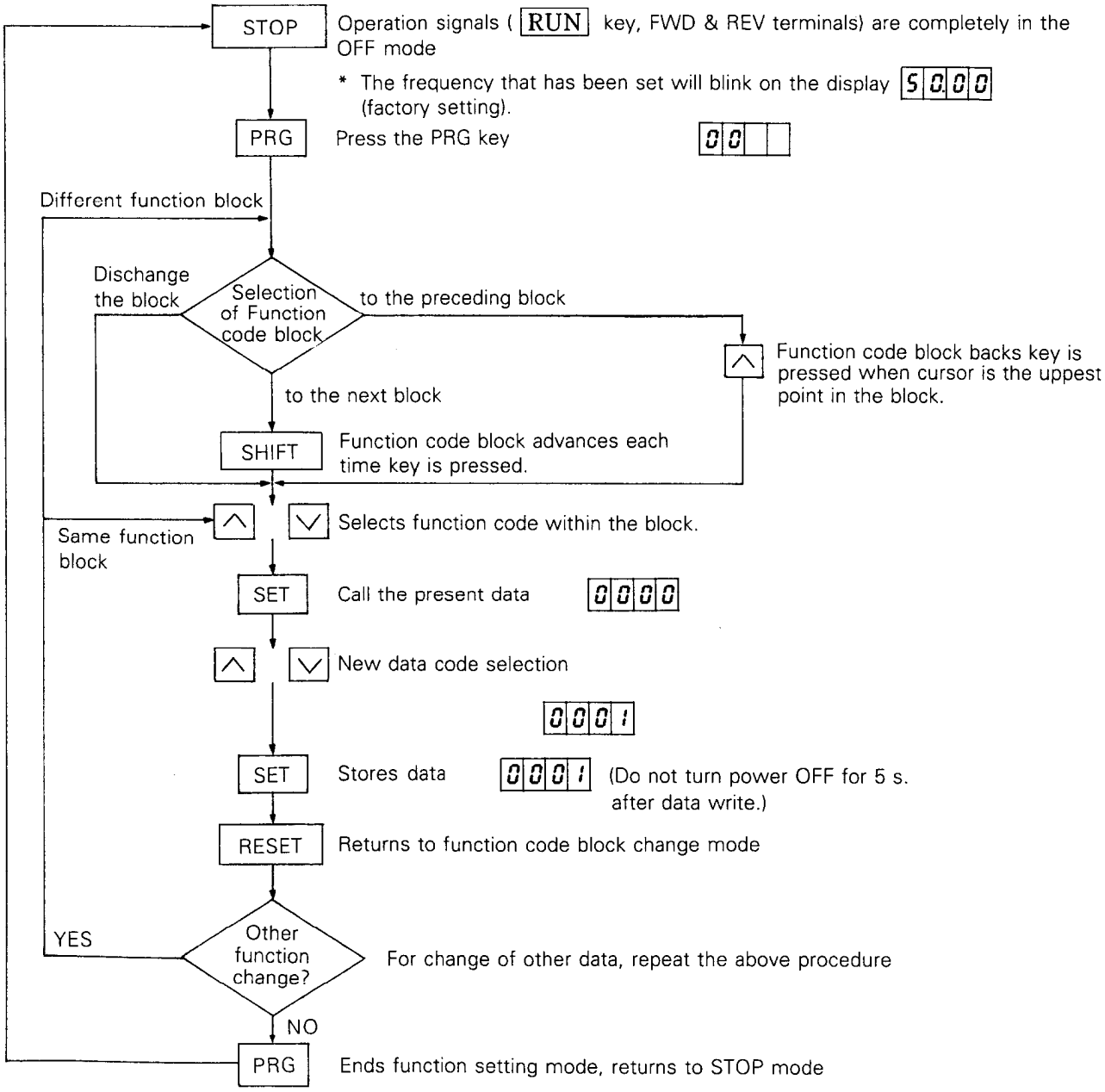
When External Signal Mode is selected, and FWD-CM or REV-CM terminals are connected, inverter does not start at power-up, causing OH2 trip. To start the inverter disconnect all the FWD-CM and REV-CM connections, press RESET key, and make FWD-CM or REV-CM connection.

(4) Setting Data Codes

In order that the inverter (including the motor) may operate under optimum conditions, other function code changes may be 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 [15] and [16], also be sure to fully understand the other basic codes [08], [09], [11], [12], [13] etc.

① Data code resetting in STOP mode



When External Signal Mode has been selected and FWD or REV is turned on during data setting in PROGRAM Mode, turn off the FWD or REV and PROGRAM Mode and turn on FWD or REV to start motor.

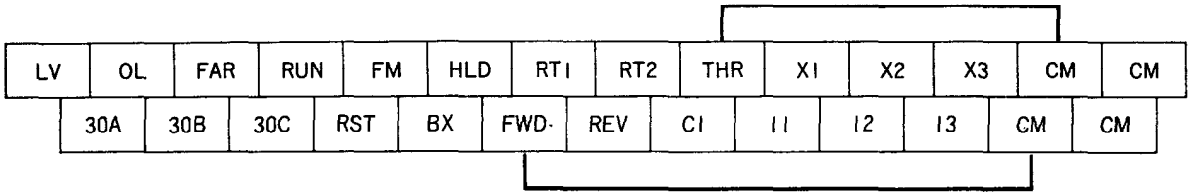
② **Data code resetting in RUN mode**

Function codes [00] to [09], [13] to [82] will allow data setting in the RUN mode Verification of all function codes and data is also possible.

After end of data setting, press [PRG] key to return to frequency display.

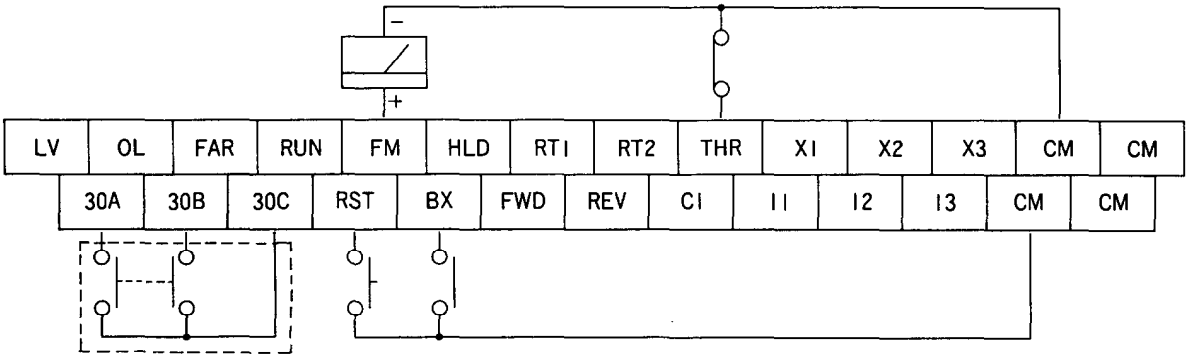
(5) Control Circuit Connection & Operation

① **Factory connections**



* [1500]、[1600] Basic connection required for keypad operation.

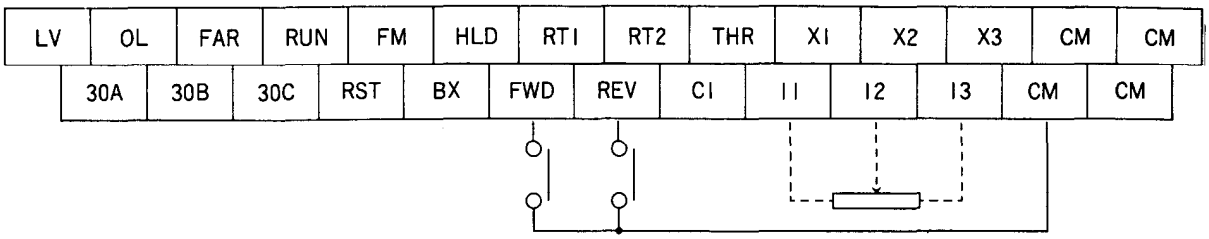
② **Common terminal connection example irrespective of operation method**



Internal circuit

- 30A, 30B, 30C .....When inverter is in alarm STOP, contact signal ("c" contact) is output.Used for alarm circuits, etc.
- FM ..... Used for external analog meter when frequency indication is needed.
- THR..... Connected to CM terminal at the factory. Connects to "B" contact (normally close contact) of external alarm signal when inverter STOP is desired through external alarm.
- RST..... Connects to RESET key for alarm STOP reset
- BX ..... Connects to "A" contact (normally open contact) signal when inverter free-run is desired during normal operation.

③ Keypad panel operation (1500)



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.

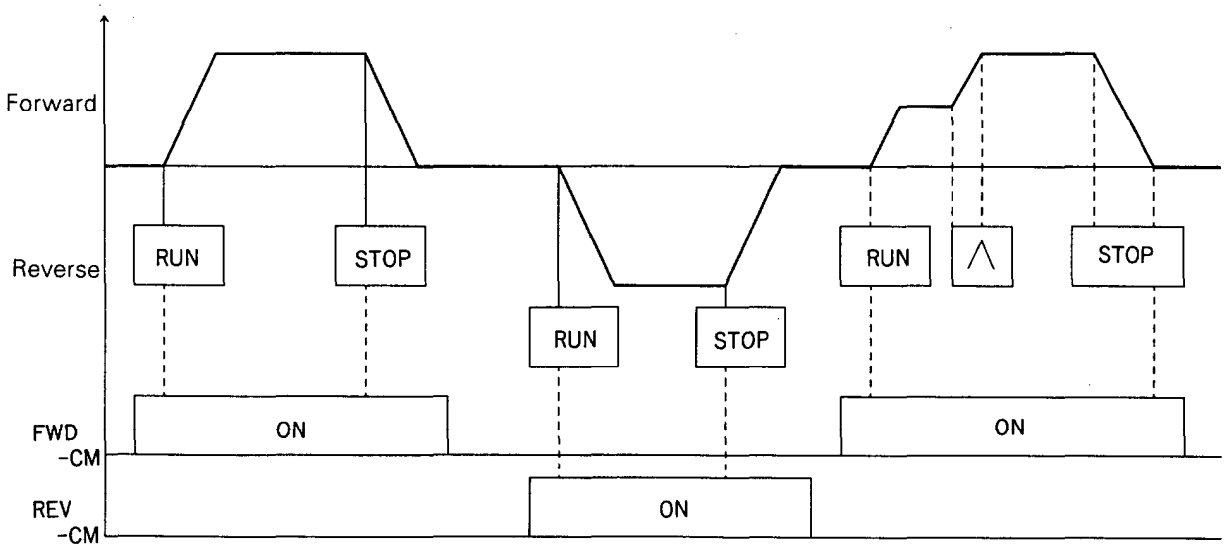
c. For frequency setting, select from the following 3 types of function code 16.

1600 : ∧ ∨ keys for digital setting

1601 : Connection of 1kΩ(1/2W) POT to 13, 12, 11 terminals; or input of DC 0 to +10V DC voltage signals to terminals 12, 11(12 is +.)

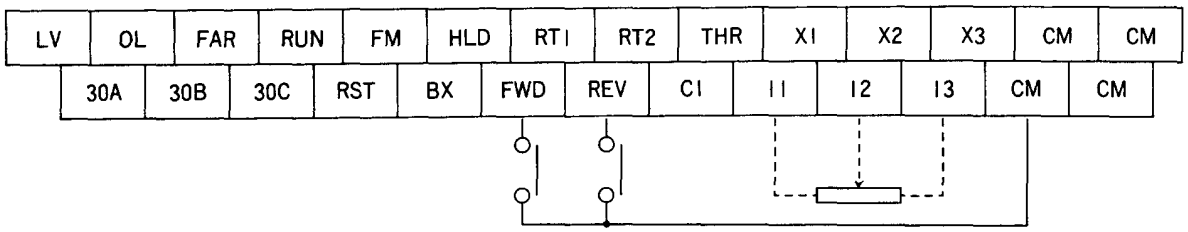
1602 : Added setting of DC 4 to 20mA DC current signals to terminals C1, 11 and DC 0 to +10V DC voltage signals to terminals 12, 11 (12 is +.)

d. RUN Operation Example (1600)

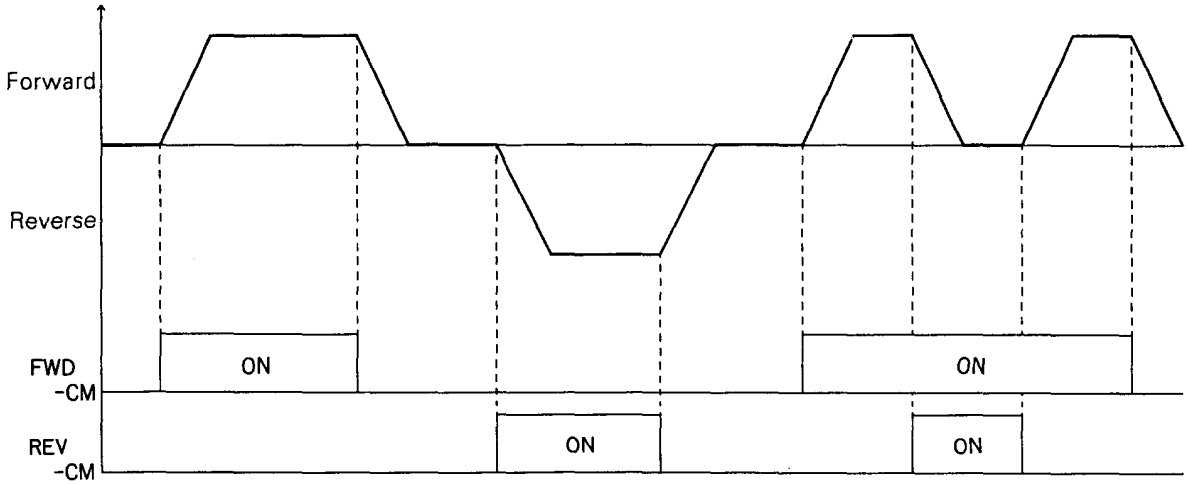


* When FWD-CM, REV-CM are both ON or OFF, deceleration STOP will result.

④ **Terminal operation (1501)**



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

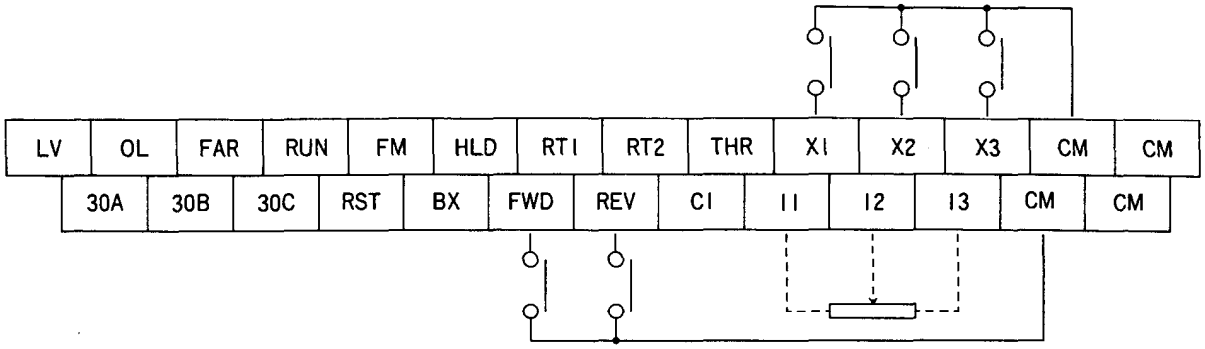


* When FWD-CM, REV-CM are both ON or OFF, deceleration STOP will result.

(6) Advanced Operation

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

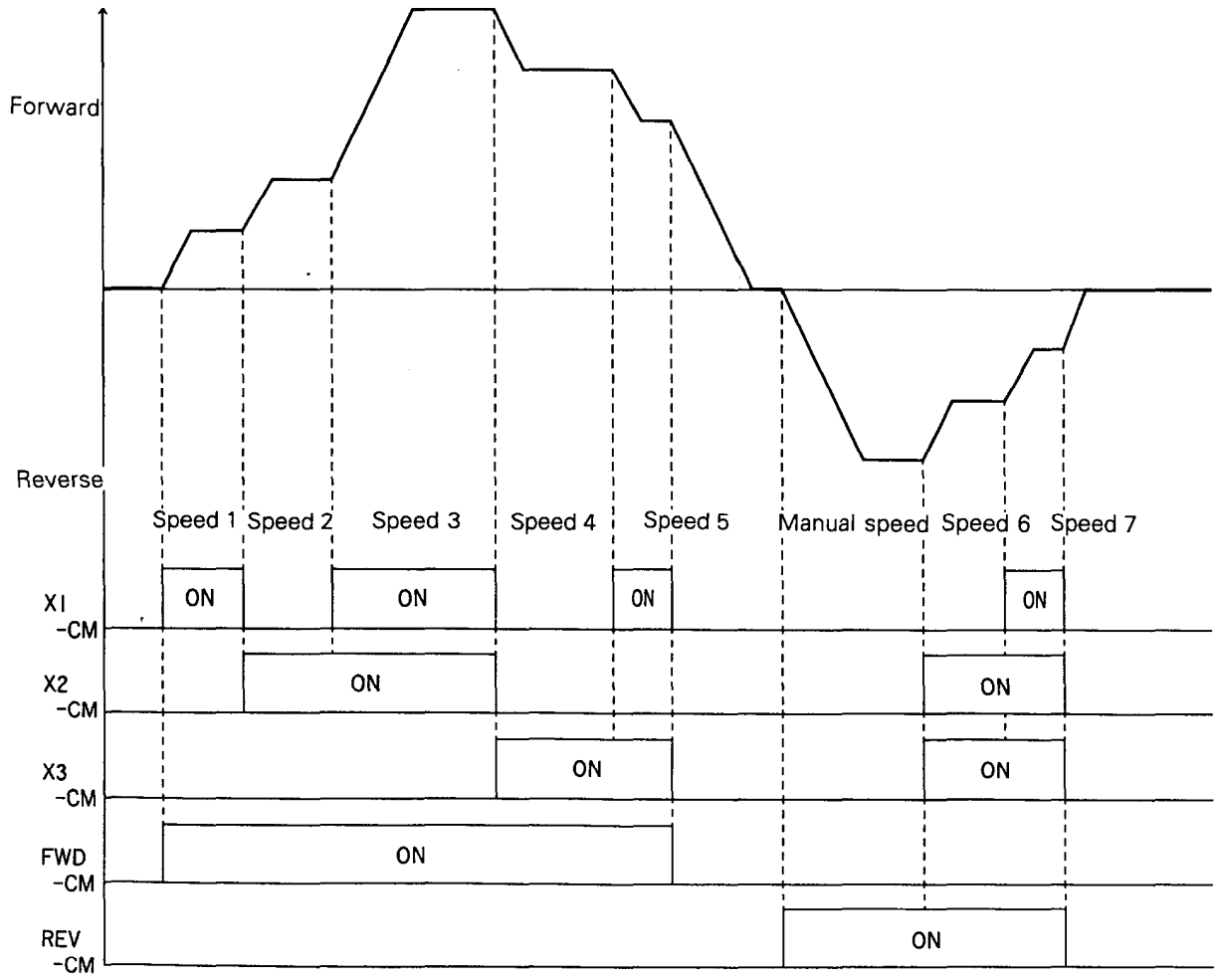
Multi-step speed operation up to the 8th step is possible.



a. Setting is [15] for operation method, and [16] for manual frequency setting method.

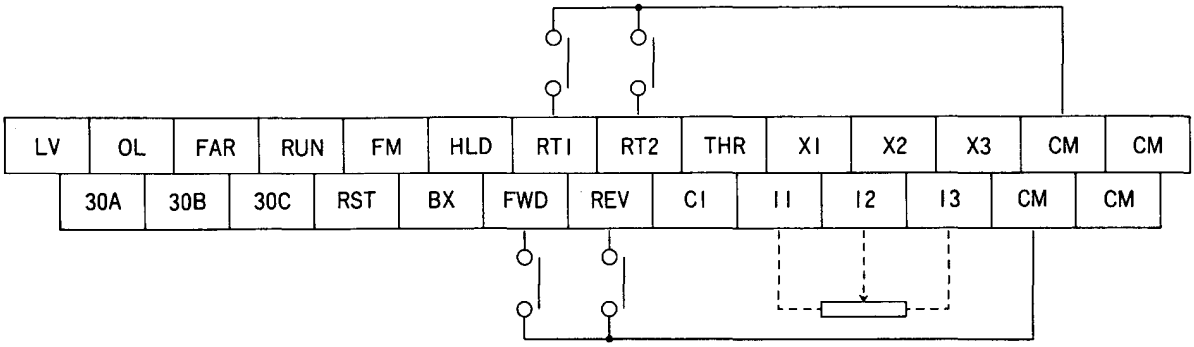
b. The settings are: [29] for multi-step speed 1, [31] for multi-step speed 2, [33] for multi-step speed 3, [35] for multi-step speed 4, [37] for multi-step speed 5, [39] for multi-step speed 6, and [41] for multi-step speed 7.

c. RUN Operation Example



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

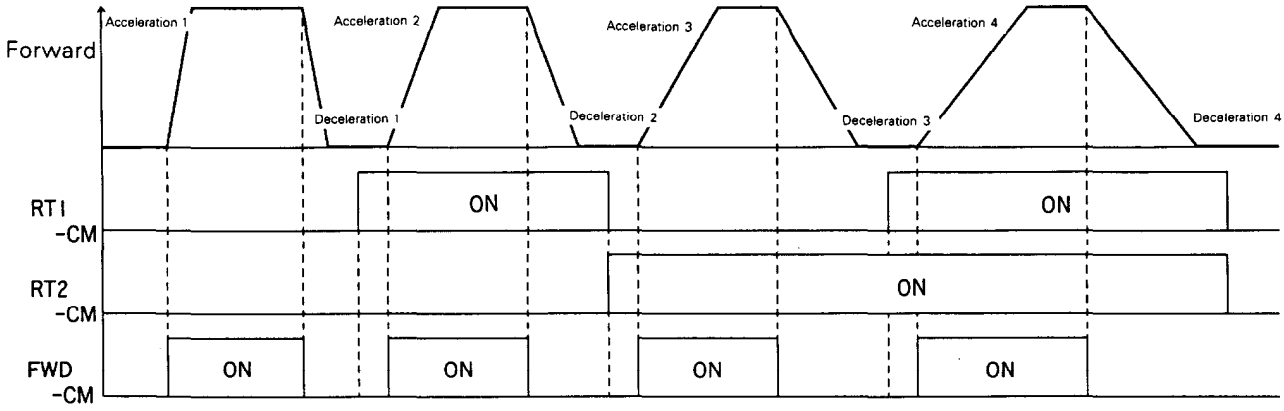
4 different types of acceleration and deceleration times can be externally switched.



a. Setting is [15] for operation method, and [16] for manual frequency setting method.

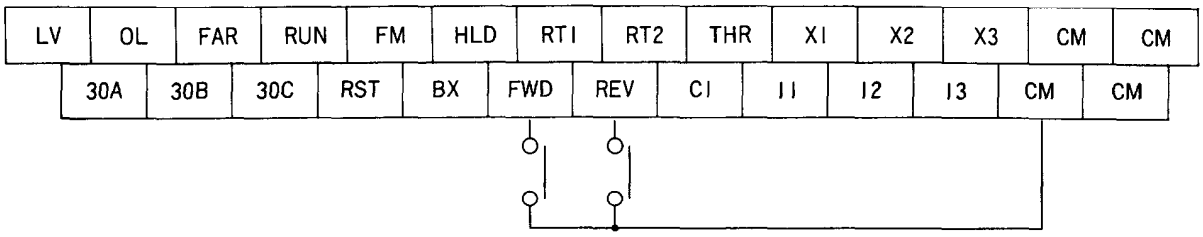
b. The settings are: [08] for acceleration time 1, [23] for acceleration time 2, [24] for acceleration time 3, [25] for acceleration time 4, [09] for deceleration time 1, [26] for deceleration time 2, [27] for deceleration time 3, [28] for deceleration time 4.

c. RUN Operation Example



③ Pattern Operation

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



a. With function [1901] pattern operation can be selected. (With [1900] data [30], [32], [34], [36], [38], [40] and [42] cannot be accessed.)

b. [29] sets the frequency setting for Multistep Speed 1. [30] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 1 timer.
[31] sets the frequency setting for Multistep Speed 2. [32] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 2 timer.
[33] sets the frequency setting for Multistep Speed 3. [34] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 3 timer.
[35] sets the frequency setting for Multistep Speed 4. [36] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 4 timer.
[37] sets the frequency setting for Multistep Speed 5. [38] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 5 timer.
[39] sets the frequency setting for Multistep Speed 6. [40] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 6 timer.
[41] sets the frequency setting for Multistep Speed 7. [42] sets the rotation direction, acceleration/deceleration time, and the time for the Multistep Speed 7 timer.

(NOTE) When in timer display mode, use the [SET] key for changing rotation direction or acceleration/deceleration time.

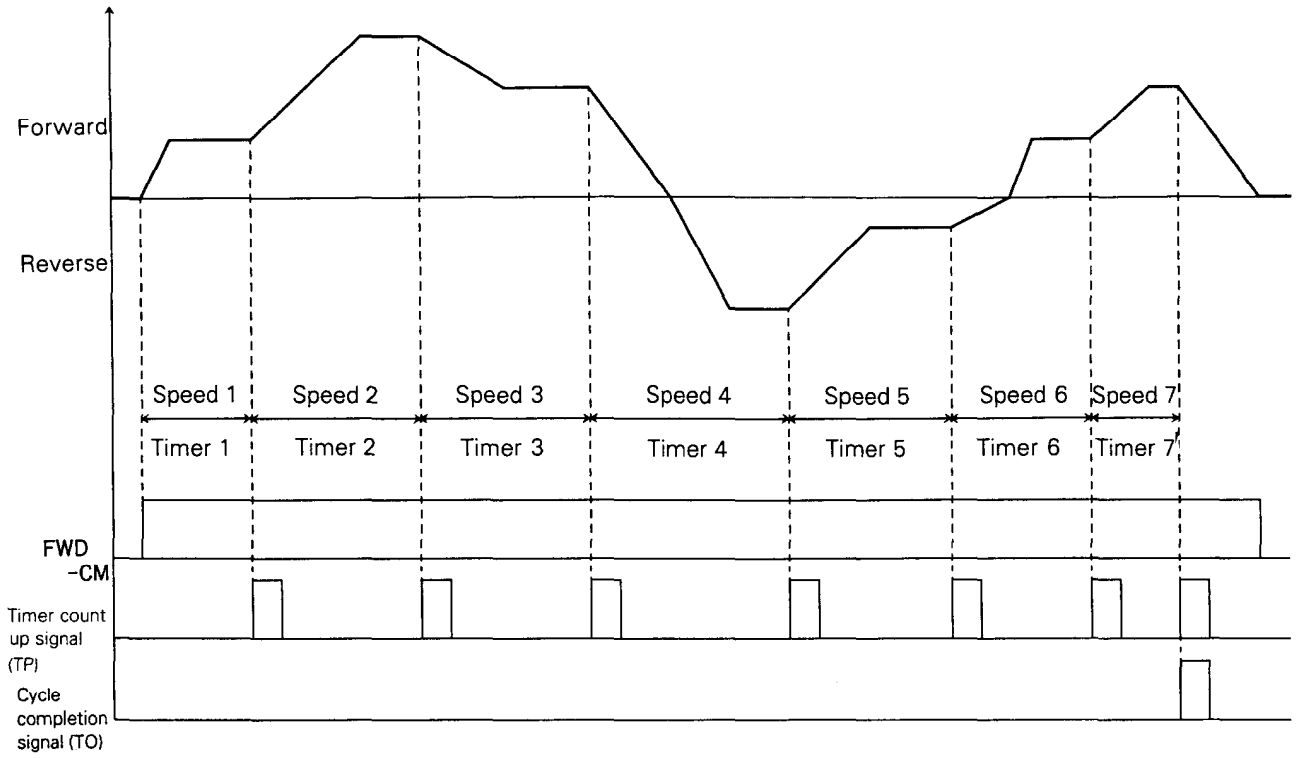
c. When in keypad panel operation mode ([1500])
[RUN] key : starts pattern operation

[RESET] key : stops pattern operation (can be used after [STOP] key)

[STOP] key : temporarily stops pattern operation

d. When in terminal operation mode ([1501])
FWD-CM ON : starts pattern operation
FWD-CM OFF : temporarily stops pattern operation
RST-CM ON : stops pattern operation

e. Operation Example



* In operation, the multistep speed order is always in numerical order, 1 thru 7.

Caution) The decelation time after the time for the multistep speed 7 is over, is the setting value in Decel (function code 09) at panel operation mode (function code 15-00), and in function 42 at terminal operation mode (function code 15-01).

9. Function Explanation

(1) Function Code Tables

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 r/min 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 blink and the output frequency = can be displayed down to the 3rd decimal place
	01	Graphics monitor selection	00: Frequency. Current 01: Input-singal status 02: I/O singal status	–	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-pattern
	03	FM terminal output level calibration	00 to 99 (code)	–	85	100-step (approx. 6.5V - 10.3V)
04 ■ AUTO TRQ TRQ BOOST TRQ FINE AUTO ACC	04	Automatic torque boost control	00 : Inactive 01 : Active	–	00	
	05	Torque boost	00 to 31 (code)	–	13	32-pattern (00/01 is reduction torque curve) (5.5 kW and over 8)
	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 : Inactive 01 : Active	–	00	
08 ■ ACCEL 1 DECEL 1 DATA PRTC	08	Acceleration time 1	(LCD) 0.01~3600s	0.01	6.00	(11kW and over 12.00)
	09	Deceleration time 1	(LCD) 0.01~3600s	0.01	6.00	(11kW and over 12.00)
	10	Manufacture use function		–	00	About data changing, please inquire at our office.

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	00	04 (code) when setting (LCD) 0 ~400Hz
	12	Base frequency	00 : 50Hz 01 : 60Hz 02 : free (Hz)	1Hz	00	02 (code) when setting (LCD) 0 ~400Hz
	13	Rated output voltage	00 : 200V (400)* 01 : 220V (440) 02 : 230V (460) 03 : free (V)	1V (2V)	03 (220V) (380V)	03 (code) when setting (LCD) 0~230 (0~460)* 0V setting : no AVR
	14	Number 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 operation 02 : link operation	–	00	
	16	Frequency command	00 : digital 01 : analog (voltage) 02 : analog (voltage & current)	–	00	Even when link operation mode is selected, monitoring of the set frequency is possible.
	17	Accel/Decel pattern	00 : linear 01 : non-linear (S-curve) 1 02 : non-linear (S-curve) 2	–	00	
	18	Normal/High torque dynamic brake	00 : normal brake 01 : high brake	–	00	
19 ■ PTN OPR RESTART MNTR COEF FUNC BLK	19	Pattern operation	00 : Inactive 01 : Active	–	00	
	20	Restart after instantaneous power failure	00 : Inactive 01 : Active	–	00	
	21	Coefficient for line speed	(LCD) 0.01~200	0.01	0.01	
	22	Function blocks used	00 : basic functions 01 : standard functions 02 : all functions		00	00 : up to 22 01 : up to 62 02 : up to 82

* ( ) : 400V series

GRAPHIC DISPLAY	Function Code	Function	Display· Setting· Range	Minimum Unit	Factory Setting	Remarks
③Standard Function						
23 ■ ACCEL 2 ACCEL 3 ACCEL 4	23	Acceleration time 2	(LCD) 0.01~3600s	0.01	10.0	Terminals RT1 · RT2 ON · OFF
	24	Acceleration time 3	(LCD) 0.01~3600s	0.01	15.0	Terminals RT1 · RT2 OFF · ON
	25	Acceleration time 4	(LCD) 0.01~3600s	0.01	3.00	Terminals RT1 · RT2 ON · ON
26 ■ DECEL 2 DECEL 3 DECEL 4	26	Deceleration time 2	(LCD) 0.01~3600s	0.01	10.0	Terminals RT1 · RT2 ON · OFF
	27	Deceleration time 3	(LCD) 0.01~3600s	0.01	15.0	Terminals RT1 · RT2 OFF · ON
	28	Deceleration time 4	(LCD) 0.01~3600s	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	0.00	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 Pattern operation summary When keypad 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 RST terminal : Pattern operation forced stop
	30	Timer 1	(LCD) 0.01~3600s	0.01	0.00	
	31	Multistep speed setting 2	(LCD) 0.00~400Hz	0.002	0.00	
	32	Timer 2	(LCD) 0.01~3600s	0.01	0.00	
33 ■ MULT SPD3 TIMER 3 MULT SPD 4 TIMER 4	33	Multistep speed setting 3	(LCD) 0.00~400Hz	0.002	0.00	
	34	Timer 3	(LCD) 0.01~3600s	0.01	0.00	
	35	Multistep speed setting 4	(LCD) 0.00~400Hz	0.002	0.00	
	36	Timer 4	(LCD) 0.01~3600s	0.01	0.00	
37 ■ MULT SPD5 TIMER 5 MULT SPD6 TIMER 6	37	Multistep speed setting 5	(LCD) 0.00~400Hz	0.002	0.00	
	38	Timer 5	(LCD) 0.01~3600s	0.01	0.00	
	39	Multistep speed setting 6	(LCD) 0.00~400Hz	0.002	0.00	
	40	Timer 6	(LCD) 0.01~3600s	0.01	0.00	
41 ■ MULT SPD7 TIMER 7	41	Multistep speed setting 7	(LCD) 0.00~400Hz	0.002	0.00	
	42	Timer 7	(LCD) 0.01~3600s	0.01	0.00	
43 ■ ERCTRN OL H LIMITER L LIMITER FREQ BIAS	43	Electronic thermal overload relay	00 : Inactive 01 : Active	1%	00	When setting 01 (code) (LCD) 30 to 105%
	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 : Inactive 01 : Active	–	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) 0.001~30s	0.01	0.10	
	56	Starting frequency	**(LCD) 0.2~60 Hz**	1Hz	1	0.2 Hz at 00
	57	Current limiter	00 : Inactive 01 : Active	1%	00	When setting 01 (code) (LCD) 30 to 150%
	58	Slip compensation control	00 : Inactive 01 : Active		00	
59 ■ FDT Hz FDT HYSTR RUN FINSH OL WARN	59	Frequency level detection	(LCD) 0~400Hz	1Hz	50	
	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

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 Control		Brake selection
	64	FWD/REV command hold (3-wire control)	00 01 02	HLD	DRV TM	2 wire 3 wire Pattern operation cammand hold	00	
	65 (Independent / Code)	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: Speed-step monitor in pattern operation		
66 ■ LV FUNC OL FUNC FAR FUNC	66 (Terminal Function Changeover)	LV terminal function	00 01	LV / OV		Undervoltage signal Overvoltage 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.
	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 pattern 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

71 ■ NO. ENTRY TL UNITS	71	Inverter unit No. entry for link operation (All inverters)	00	–	–	Central inverter	15	Local inverter numbers are recorded in order from small to large.
			01 to 15	–	–	Local inverter		
	72	Number of units linked (Central inverter)	00 to 15	–	–	Total local inverters linked to central inverter	00	Maximum number of connected inverters is 16. (Including central)
73 ■ LINK MODE INPUT SEL NO. SELECT	73	Link mode (All inverters)	00 01	–	–	Inactive Inavtive	00	
			02	–	–	Individual monitoring		
			03	–	–	Joint operation		
	74	Run/Stop command input in link operation (central inverter)	00 01	–	–	Keypad Terminal	00	Central inverter only Refer to 1502
	75	Inverter unit No. (Destination address)	00 to 15	–	–	Specified units No. to connect	00	Central inverter only
			16			All units		

4.3 Option Function

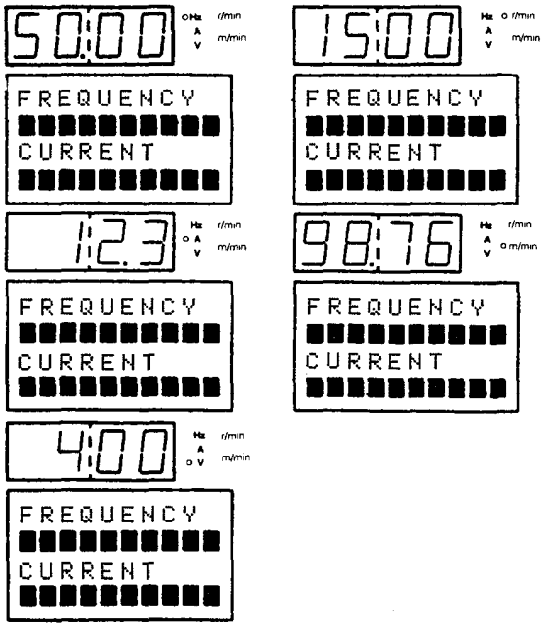
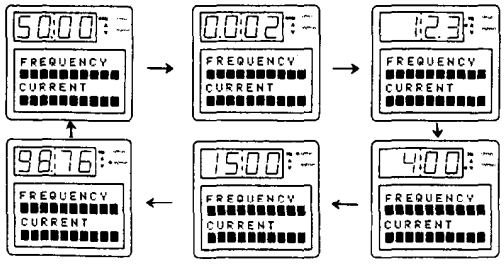
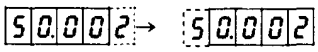
GRAPHIC DISPLAY	Function code	Function	Display · Setting · Range	Data	Factory Setting	Other, LCD Display
76 ■ ACR GAIN OPTION 2 OPTION 3 OPTION 4 (The data setting is allowed in the run mode.	76	Adjustment for current limiter 2	00 01~99	Current limiter 1 Adjustment current limiter 2	00	Refer to function code 57
	77	Option 2	00~99		00	Refer to specification of option
	78	Option 3	00~99		00	
	79	Option 4	00~99		00	

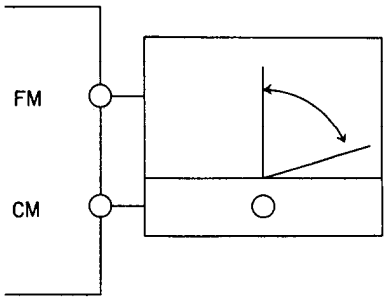
4.4 Link Function

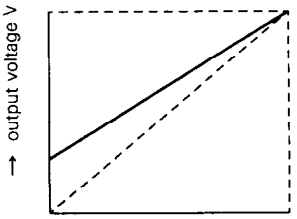
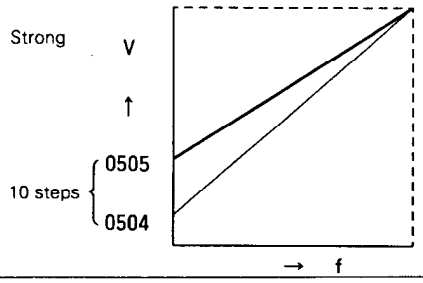
GRAPHIC DISPLAY	Function code	Setting Data		Function			Factory Setting	Other, LCD Display
				Function Name	Standard Function Terminals	Data		
82 FREQ BITS CODE ■ OPR MODE (Advances on display by function code 7303 SET)	82	Link Operation	00	Operation mode in Joint operation	—	Normal operation	01	Individual/All can be operated from central keypad panel or terminal block. Local operates via central frequency setting as well as keypad command.
			01			Parameter copy		The central parameter (except function code : 71 to 75, 80 to 82) is transmitted Individual / All. Parameter transmission to local in operation is not possible. (Err4 will be displayed on central)

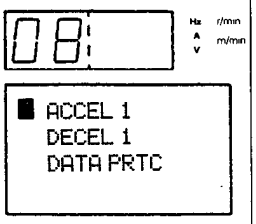
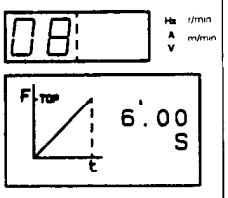
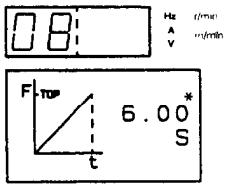
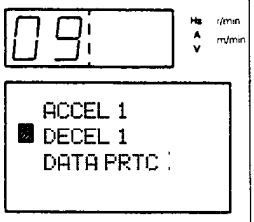
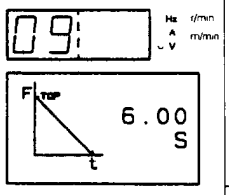
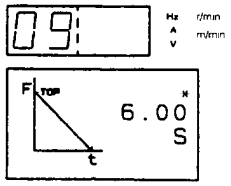
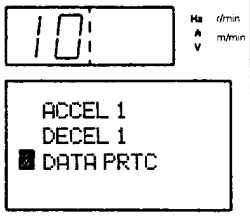
(2) Function Explanation

① Initial Setting

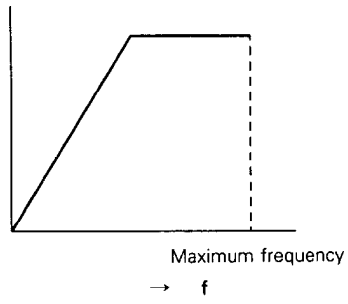
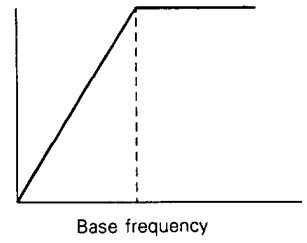
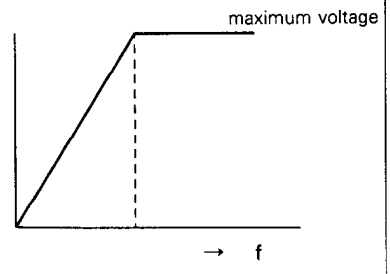
Function Coda	Display	Function Expalanation	Factory Setting Function Data
00		After the power supply is turned on. or after completion of program, the 7 segment LED (4 digit) initial display data can be changed.	0000
■ DGTL MNTR GRHC MNTR MTR SOUND FM CALIBR LED Digital Monitor Selection	0000	Set frequency [Hz] (during STOP). output frequency [Hz] (during RUN) displayed	
	0001	Output current [A] display (virtual value) (note) Erorr in current detection may become large when; a) The cable lenght between a motor and an inverter is longer than 100m. b) A specially designed motor is used. c) An inverter capacity is 2 ranks or more larger than a motor capacity.	
	0002	Output voltage [V] display (virtual value)	
	0003	Synchronous rotation speed [r/min] display	
	0004	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) 	

Function Coda	Display	Function Expalanation	Factory Setting Function Data
01 DGTL MNTR ■ GRHC MNTR MTR SOUND FM CALIBR Graphics Monitor Selection	0100 0101 0102	The LCD (liquid Crystal) display can be changed to the following 3 modes. Output frequency [%]. output current [%] Graph display Control terminal monitor 1 Control terminal monitor 2 50.00 FREQUENCY CURRENT 50.00 ■LV ■X1 ■OL ■X2 ■FAR ■X3 ■RUN 50.00 ■FWD ■RT1 ■REV ■RT2 ■HLD ① With function 11 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 Signal condition ON is indicated by ■. No indication = OFF.	0100
02 DGTL MNTR GRHC MNTR ■ MTR SOUND FM CALIBR Motor Audible Noise Reduction	0200 ⟆ 0205	The motor audible noise tone can be changed. Select from 6 types depending on the operating conditions	0203
03 DGTL MNTR GRHC MNTR MTR SOUND ■ FM CALIBR FM terminal Output Calibration	0300 ⟆ 0399	This function regulates the frequency indication meter voltage level output from the FM terminal. Approx. 6.5 V ↓ Approx. 10.3 V Within this range regulation can be 1/100 resolution 	0385

Function Coda	Display	Function Expalanation	Factory Setting Function Data
04 Hz A V r/min m/min ■ 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. Inactive : operates at set torque boost value (05) Active : automatically reduce torque boost value under light load condition.	04:00
05 Hz A V r/min m/min 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 variable torque load use (fan, pump, etc.) Weak ↓ Strong  	05:13 4.0 kW or less 05:08 5.5 kW or over
06 Hz A V r/min m/min 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  	06:00
07 Hz A V r/min m/min 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, GD². The minimum times are 3 s for acceleration and 8 s for deceleration. (0 ↔ 60Hz) Nonoperate (at 08 09 operation is at set acceleration/deceleration time) Operate (auto acceleration/deceleration operation)	07:00

Function Coda	Display	Function Expalanation	Factory Setting Function Data
		① For heavy inertia load. ② Does not function when momentary power failure restart 2001 is active, or current limit 5701 is selected. ③ Does not function for S time acceleration/deceleration 1701 1702	
 Acceleration Time 1	 	Setting is possible within the 0.01s to 3,600s range to correspond to load characteristics. GD^2. 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	 *12.00s for 11 kW and over.
 Deceleration Time 1	 	Is selected when both RT1-CM and RT2-CM are OFF.	 *12.00s for 11 kW and over.
 Manufacture use function		About data changing, please contact to our office.	

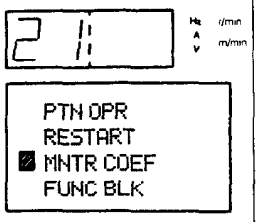
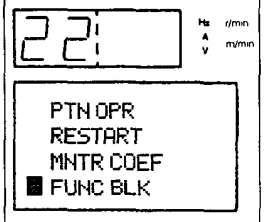
② Basic Function

Function Coda	Display	Function Expalanation	Factory Setting Function Data
11 Hz r/min m/min ■ MAX Hz BASE Hz RATED V MTR POLES Maximum Frequency	1100 1101 1102 1103 1104	Sets maximum value for output frequency 50Hzmax 60Hzmax 100Hzmax 120Hzmax  Between 0 to 400Hz. the maximum frequency can be set with 1Hz step. Damage may result if motors which are designed for commercial power supply are operated at frequencies (speeds) which exceed the nameplate rating. If higher speed operation is desire, please consult the individual motor manufacture to confirm the limitation.	1100
12 Hz r/min m/min MAX Hz ■ BASE Hz RATED V MTR POLES Base Frequency	1200 1201 1202	Sets the base frequency. (frequency for specified torque characteristics and specified output characteristic divergent point) 50Hz 60Hz  Between 0 to 400Hz, the base frequency can be set with 1Hz step. ① Operate at a setting conforming to the motor nameplate. ② A setting exceeding the maximum frequency is impossible.	1200
13 03 Hz r/min m/min MAX Hz BASE Hz ■ RATED V MTR POLES Rated Output Voltage	1300 1301 1302 1303	Sets the maximum value for the output voltage. 200V (400V)* 220V (440V)* 230V (460V)*  When set at 0V. voltage proportioned to the power supply voltage is output. Between 1 to 230V (2 to 460V)*, output voltage can be set with 1V (2V)* step. Output voltage can't exceed input voltage.	1303 220V (380V)*

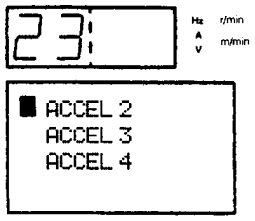
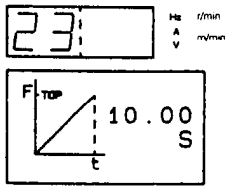
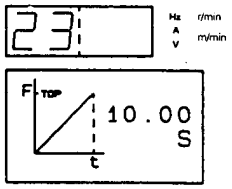
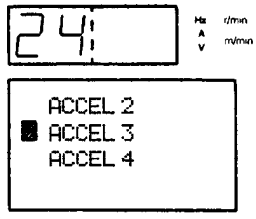
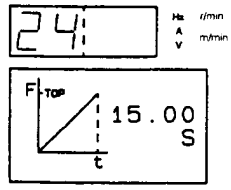
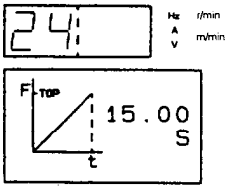
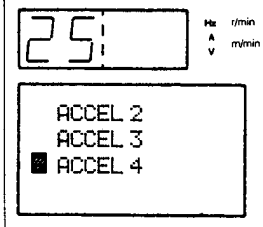
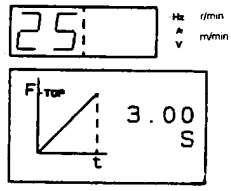
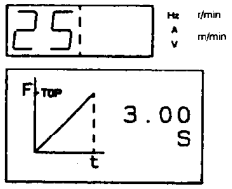
* ( ) : 400V series

Function Coda	Display	Function Expalanation	Factory Setting Function Data
14 Hz r/min ∧ ∨ m/min MAX Hz BASE Hz RATED V ■ MTR POLES Number of Motor Poles	1402 1404 1406 1408 1410 1412	The number of motor poles is set for synchronous speed (r/min) display. 2 pole conversion 4 pole conversion 6 pole conversion 8 pole conversion 10 pole conversion 12 pole conversion [Example] Display when 4 pole motor is operated at 50Hz. 1500 ■ r/min	1404
15 Hz r/min ∧ ∨ m/min ■ OPR COMND Hz COMND ACC PTN H TRQ BRK Operation Command	1500 1501 1502	Selection can be made from the following 3 types. Keypad panel operation (RUN STOP keys) Terminal operation (FWD, REV, HLD terminals) Joint operation (see p.53 to 57)	1500
16 Hz r/min ∧ ∨ m/min OPR COMND ■ Hz COMND ACC PTN H TRQ BRK Frequency Command	1600 1601 1602	Selection can be made from the following 3 types. Digital setting (∧ ∨ keys) Analog setting (DC 0 to 10V) Analog setting (DC 0 to 10V) + (DC 4 to 20mA) Even when 1502 link operation is selected, monitor of setting frequency is possible.	1600
17 Hz r/min ∧ ∨ m/min OPR COMND Hz COMND ■ ACC PTN H TRQ BRK Accel/Decel Pattern	1700 1701 1702	Selection can be made from the following 3 types. Linear acceleration/deceleration (Fig. a) Non linear acceleration/deceleration (Fig. b) S-curve 1 Non linear acceleration/deceleration (Fig. c) S-curve 2 f ↑ → t Fig. a f ↑ → t Fig. b f ↑ → t Fig. c Does not function when 0701 auto acceleration/ deceleration or 5701 current limiter are selected.	1700

Function Coda	Display	Function Expalanation	Factory Setting Function Data
18 Hz/r/min ∧∨ 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 dynamic braking methods. Standard brake via internal DB resistor High torque brake via external DB resistor (option) For loads requiring a faster stop than standard brake, set the high brake mode and connect the optional DB resistor.	1800
19 Hz/r/min ∧∨ m/min ■ PTN OPR RESTART MNTR COEF FUNC BLK Pattern Operation	1900 1901	Selects between active/inactive for timer multistep frequency operation set by function codes 29 to 42. Inactive (standard multistep frequency operation) Active (timer multistep frequency operation) See function codes 29 to 42 for pattern operation details.	1900
20 Hz/r/min ∧∨ m/min PTN OPR ■ RESTART MNTR COEF FUNC BLK Restart After Instantaneous Power Failure	2000 2001	Selects restart mode after instantuneous power failure. Inactive (No operation command: inverter stop With operation command: undervoltage trip) **CAUTION** **When "restart after instantaneous power failure" is disabled — function code 2000 is selected, with the terminals CM-FWD or REV closed — reseting the inverter, after power supply has been recovered, will start the inverter-driven motor.** Active (Picks up the free running motor rpm for a smooth restart) ① For 2001, operates only during LU lights up. The LU light times for each unit is listed in the table below. (s.) 200V series 004 / 008 / 015 / 022 / 040 / 055 / 075 / 110 / 150 / 185 / 220 1.4 / 1.4 / 2 / 3.5 / 3.5 / 6 / 10 / 14 / 20 / 20 / 24 400V series 008 / 015 / 022 / 040 / 055 / 075 / 110 / 150 / 185 / 220 0.9 / 1.0 / 1.2 / 2.0 / 2.2 / 3.0 / 3.4 / 4.3 / 5.1 / 5.8 ② Combined use with current limit function is possible.	2000

Function Coda	Display	Function Expalanation	Factory Setting Function Data
 Coefficient for Line Speed	*F coefficient* Hz × 0.01 ↓ F coefficient Hz × 200	Coefficient K is for display of m/min Display value = output frequency x K Display output frequency x 0.01 ↓ Displays output frequency x 200 } By 0.01 setting is *possible when* K = 0.01 to 200. If the value for output frequency x K exceeds 9999. *9999 is displayed.* [Example] K = 200 at output 100HZ 100Hz x K = 20,000 → display 9999	0.01
 Function Blocks Used	2200 2201 2202	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 00 → 22 (setting and verification possible) Up to standard function display 00 → 62 (setting and verification possible) All function display 00 → 82 (setting and verification possible)	2200

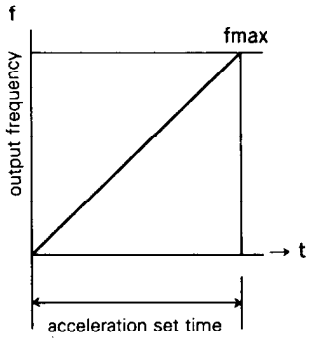
③ Standard Function

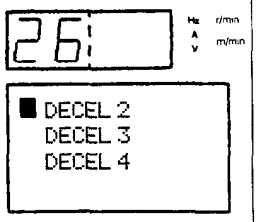
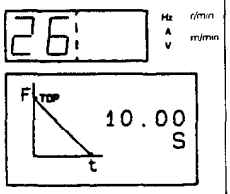
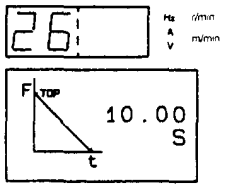
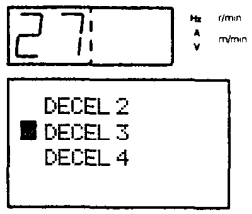
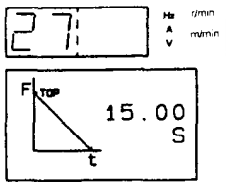
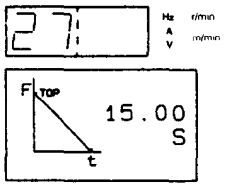
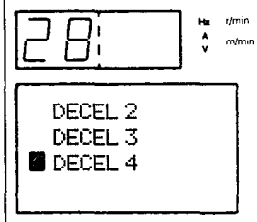
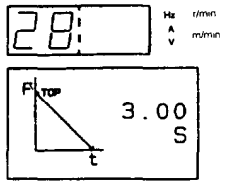
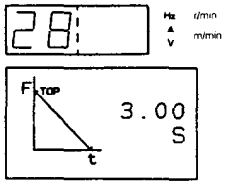
Function Coda	Display	Function Expalanation	Factory Setting Function Data
 Acceleration Time 2		Setting between the 0.01s to 3600s range is possible to correspond to the load characteristics, GD^2. 0.01 to 9.99s : By 0.01s 10.00 to 99.90s: By 0.1s 100.0 to 999.0s: By 1s 1000 to 3600s: By 10s Selection of acceleration times 1 through 4 is made via RT1 and RT2 terminal combinations.	
 Acceleration Time 3			
 Acceleration Time 4			

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 maximum setting frequency from zero.
(0 → max. set freq.)

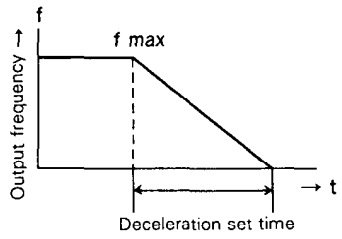
Indicates time change (s.) up to (1 1 setting)



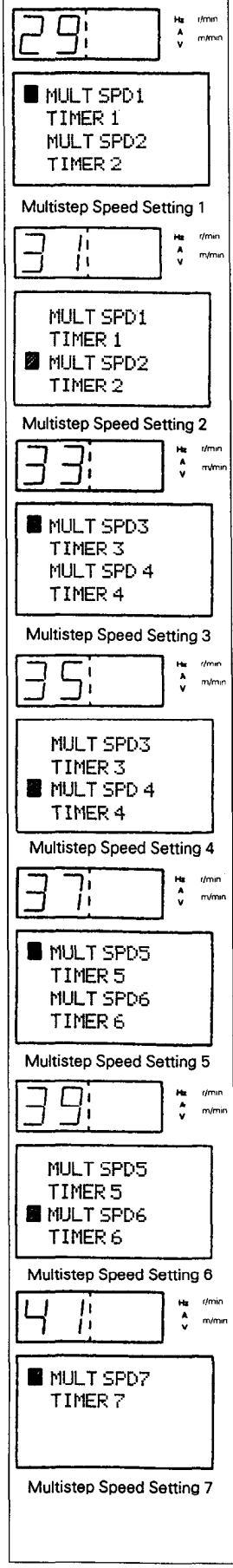
Function Coda	Display	Function Expalanation	Factory Setting Function Data
 Deceleration Time 2		*Setting between the 0.01s to 3600s range is possible to correspond to the load characteristics, GD².* 0.01 to 9.99s : By 0.01s 10.00 to 99.90s : By 0.1s 100.0 to 999.0s : By 1s 1000 to 3600s : By 10s Selection of deceleration times 1 thru 4 is made via RT1 and RT2 terminal combinations.	
 Deceleration Time 3			
 Deceleration Time 4			

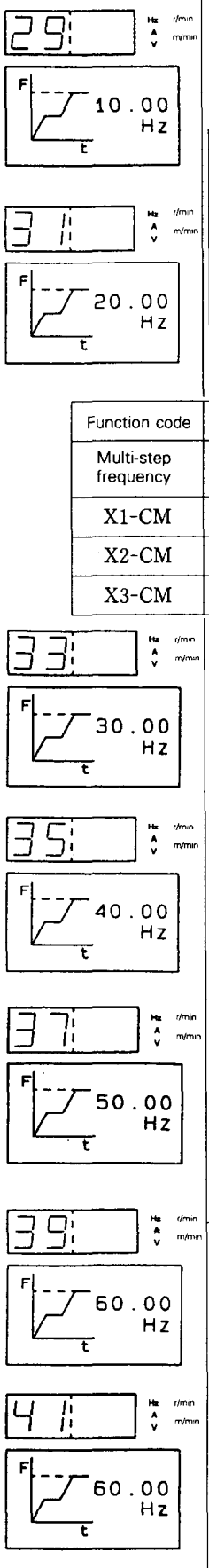
Terminal ON/OFF	RT2–CM ON	RT2–CM OFF
RT1–CM ON	Deceleration time 4	Deceleration time 2
RT1–CM OFF	Deceleration time 3	Deceleration time 1

* The setting time equals the time required to reach 0 from the maximum setting frequency. (max. frequency → 0)
Indicates time change (sec.) up to (1 1) setting)



Function Coda	Display	Function Expalanation	Factory Setting Function Data





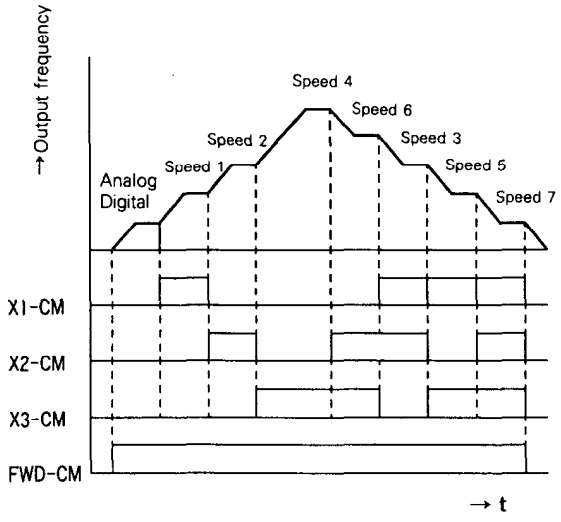
8 multi-steps frequency operation is possible through selecting of the control terminals X1, X2, X3 combination as shown below (for 1900 setting)

[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

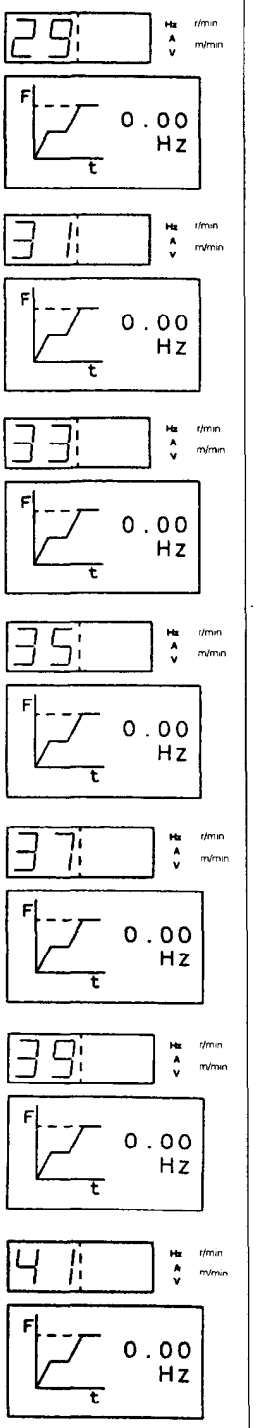


① When X1-CM, X2-CM, X3-CM are all OFF, setting is made by digital (^ v keys), or analog (DC 0 to +10V, 4 to 20mA) which is selected by function 16

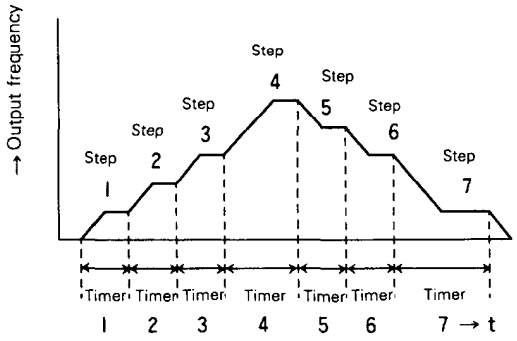
② A setting exceeding the maximum frequency set by 11 is impossible.

③ When 1901 is set, pattern operation is possible.

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



Function Coda	Display	Function Expalanation	Factory Setting Function Data
30	3000	When 1901 is set, pattern operation is possible by multi-step frequency 1 thru 7 combination.	3000
MULT SPD1 ■ TIMER 1 MULT SPD2 TIMER 2	F 0.01 S t	When in pattern operation, no frequency changeover via the combination of X1, X2, X3 terminals is necessary.	
Timer 1			
32	3200	Operation is in the multi-step frequency 1 → multi-step frequency 2 → ..... multi-step frequency 7 order.	3203
MULT SPD1 TIMER 1 MULT SPD2 ■ TIMER 2	F 0.01 S t		
Timer 2			
34	4200		3402
MULT SPD3 ■ TIMER 3 MULT SPD 4 TIMER 4	F 0.01 S t		
Timer 3			
36			3601
MULT SPD3 TIMER 3 MULT SPD 4 ■ TIMER 4			
Timer 4			
38			3802
MULT SPD5 ■ TIMER 5 MULT SPD6 TIMER 6			
Timer 5			
40			4000
MULT SPD5 TIMER 5 MULT SPD6 ■ TIMER 6			
Timer 6			
42			4201
MULT SPD7 ■ TIMER 7			
Timer 7			

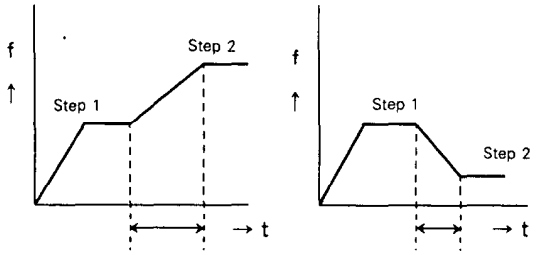
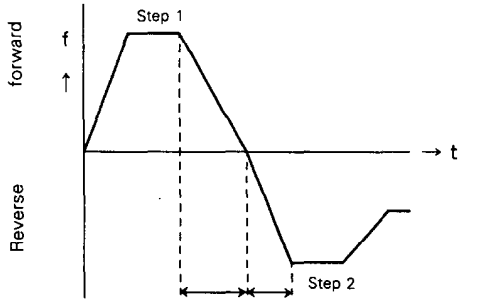


[Rotation direction and acceleration/deceleration time]
Function codes

30 32 34 36 38 40 42

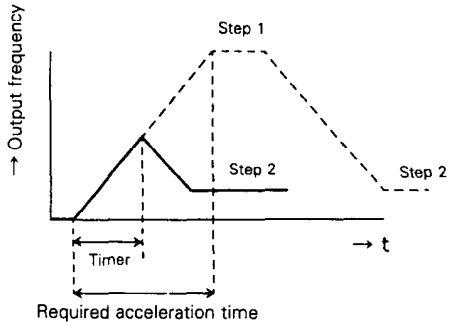
By using the chart below to see the code, rotation direction and acceleration/deceleration time can be determined.

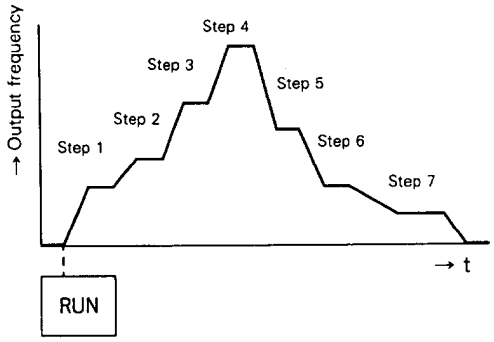
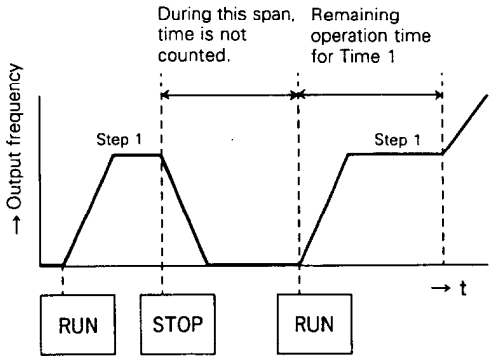
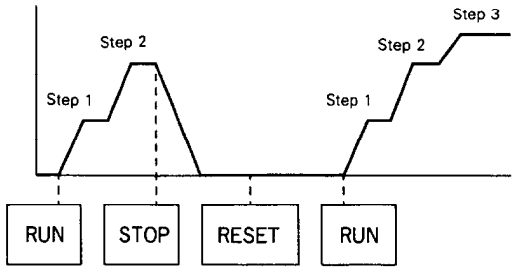
Data Code	Rotation Direction	Acceleration Time · Deceleration Time	
00	Forward (FWD)	08	09
01		23	26
02		24	27
03		25	28
04	Reverse (REV)	08	09
05		23	26
06		24	27
07		25	28

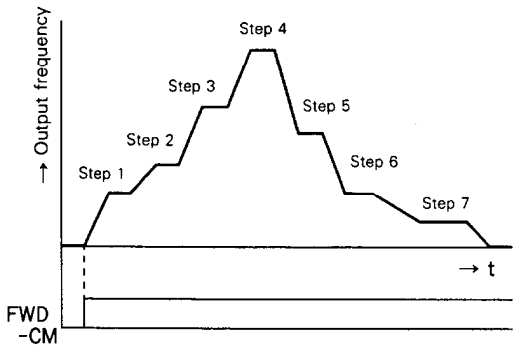
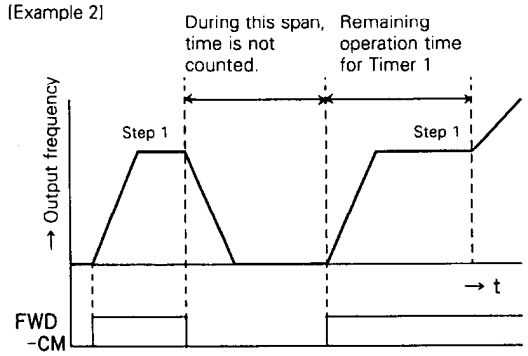
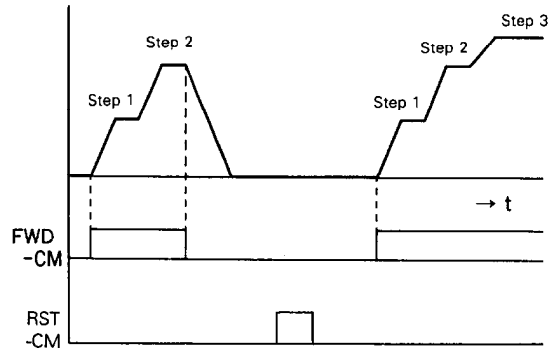
Function Coda	Display	Function Expalanation	Factory Setting Function Data
		When the next frequency in the process is higher than the present frequency, the acceleration time will be automatically selected. If the next frequency is lower than the present frequency, the deceleration time will be automatically selected. [Example 1] when data code is 3200  Function code 08 setting Acceleration Time Function code 09 setting Deceleration Time [Example 2] when data code is 3204  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.	

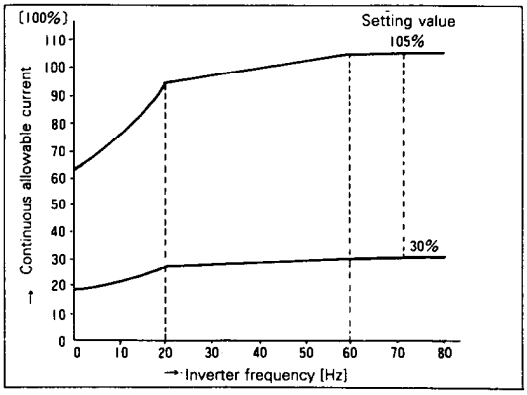
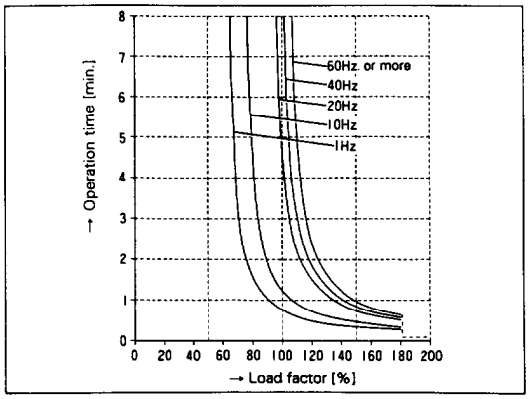
Timer Setting	Setting Resolution
0.01~9.99s	0.01s
10.00~99.90s	0.1s
100.0~999.0s	1s
1000~3600s	10s

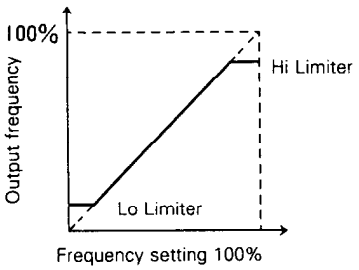
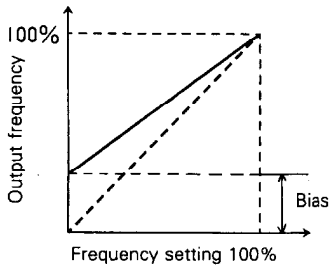
The time set on the timer includes the time required for acceleration/deceleration. Therefore, if the time set on the timer is less than the time required for the acceleration.deceleration conditions, it will proceed to the next process before the set step frequency is reached.

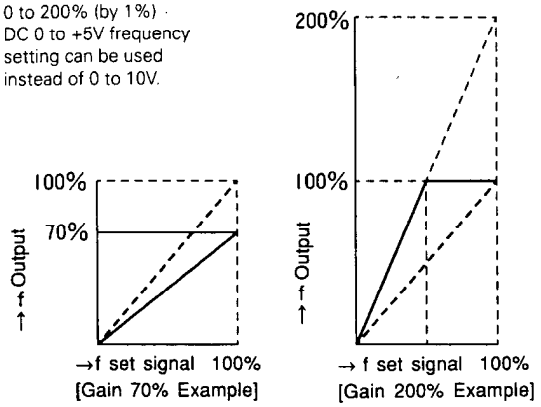
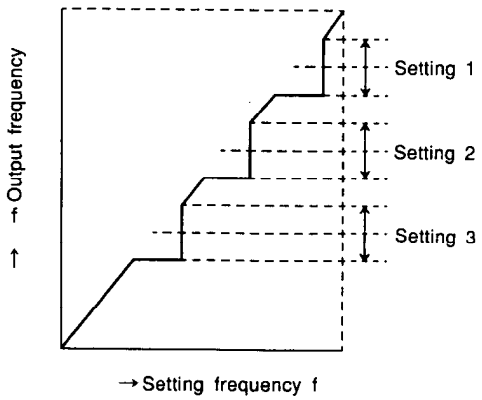
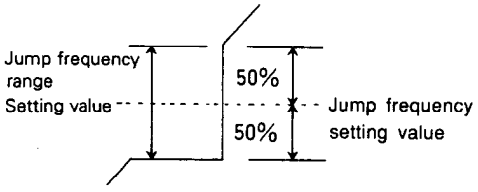


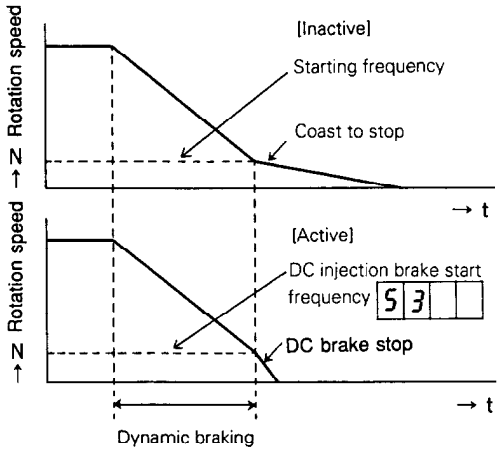
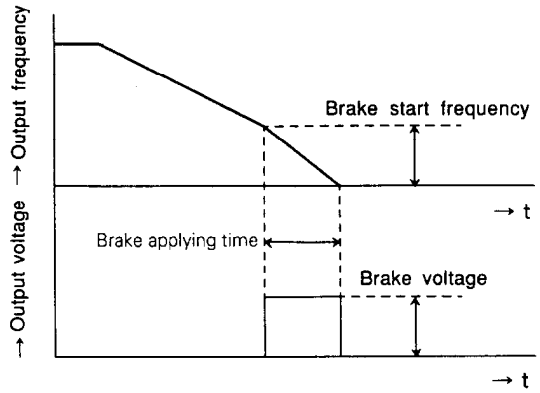
Function Coda	Display	Function Expalanation	Factory Setting Function Data
		[Timer multi-step frequency operation method] ① Keypad Operation The key functions are changed as follows: RUN key : Start operation STOP key : Temporary stop of pattern operation (pause) RESET key : Pattern operation reset (The next RUN input will start operation from Step 1) * RESET function only during STOP. [Example 1]  [Example 2]  [Example 3]  	

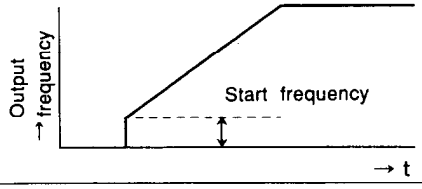
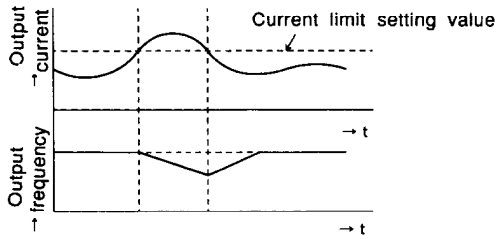
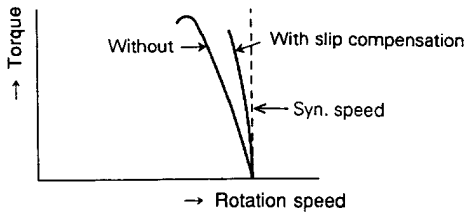
Function Coda	Display	Function Expalanation	Factory Setting Function Data
		② Control Terminal Operation The terminal functions are changed as follows: FWD-CM = ON : Start operation FWD-CM = OFF : Temporary stop of pattern operation RST-CM = ON : Pattern operation reset [Example 1]  [Example 2]  [Example 3]  	
		① During timer operation, if RT1-CM, RT2-CM terminals are selected, operation will switch to allernative acceleration/ deceleration times set by 23 to 28 ② During timer operation, if X1-CM, X2-CM, X3-CM terminals are selected, operation will switch to multi-step speed 1 to 7 set by 29 31 33 35 37 39 41 Note: For condition ① and ② above, timer remains activated.	

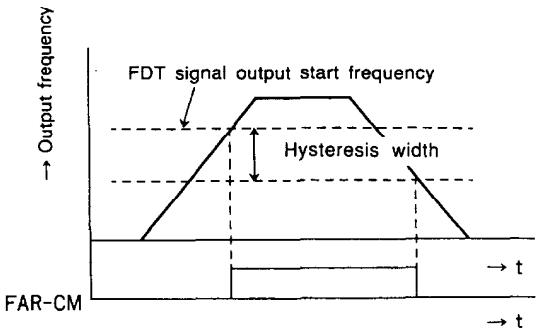
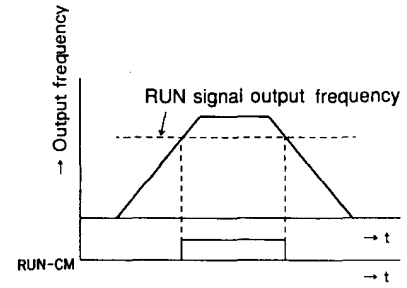
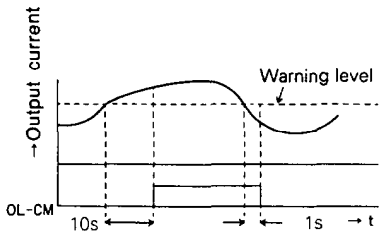
Function Coda	Display	Function Expalanation	Factory Setting Function Data
43 Hz r/min m/min ■ ERCTRN OL H LIMITER L LIMITER FREQ BIAS Electronic Thermal Overload Relay	4300 4301 Hz r/min m/min t 100 % I	Commonly used motor (TEFC, 4 pole) over-heating protection is possible over the entire operating frequency range. Inactive Active (electronic thermal protection operation) Setting range 30 to 105% (by 1%) Setting value % = K x Motor rated current / Inverter rated current K = 1.0 (when 50Hz is base frequency) K = 1.1 (when 60Hz is base frequency) Derating characteristics for continuous allowable current  Electronic thermal overload protection operating characteristics  (note) Erorr in current detection may become large when; a) The cable length between a motor and an inverter is longer than 100m. b) A specially designed motor is used. c) An inverter capacity is 2 ranks or more larger than a motor capacity.	4300 4301 Hz r/min m/min t 105 % I

Function Coda	Display	Function Expalanation	Factory Setting Function Data
44 ERCTRN OL ■ H LIMITER L LIMITER FREQ BIAS High Limiter	44 F 100 % F.SET	The output frequency for the upper limit as well as the lower limit are set as a % of the maximum frequency 0 to 100% (by 1%)	44 F 100 % F.SET
45 ERCTRN OL H LIMITER ■ L LIMITER FREQ BIAS Low limiter	45 F 0 % F.SET	0 to 100% (by 1%) 	45 F 0 % F.SET
46 ERCTRN OL H LIMITER L LIMITER ■ FREQ BIAS Bias Frequency	46 F 0 % F.SET	Outputs a biased frequency corresponding to the frequency setting Set as a % of the maximum frequency 0 to 100% (by 1%) 	46 F 0 % F.SET

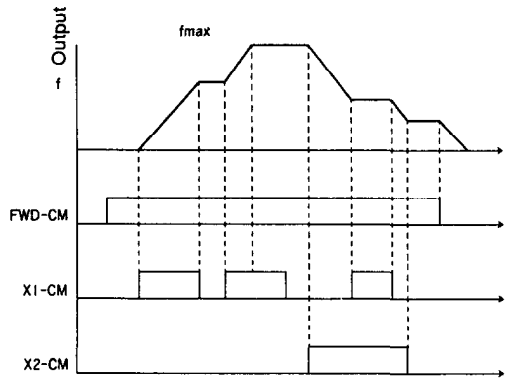
Function Coda	Display	Function Expalanation	Factory Setting Function Data
47 ■ FREQ GAIN JUMP Hz 1 JUMP Hz 2 JUMP Hz 3 Gain For Frequency Setting Signal	47 F 100 % F.SET	A rationed frequency corresponding to the frequency setting is output. It is set as a % of the maximum frequency. (Output frequency is limited by the maximum frequency setting [11].) 0 to 200% (by 1%) DC 0 to +5V frequency setting can be used instead of 0 to 10V.  Frequency gain is operative only when frequency setting method is analog [1601] 、 [1602]	47 F 100 % F.SET
48 FREQ GAIN ■ JUMP Hz 1 JUMP Hz 2 JUMP Hz 3 Jump Frequency 1	48 F 0 Hz F.SET	The frequency jumps can avoid the load mechanical resonance points. (3 settings are available) 0 to 400Hz (1Hz step)  0 to 5Hz jump width setting is possible. (1Hz step) 	48 F 0 Hz F.SET
49 FREQ GAIN JUMP Hz 1 ■ JUMP Hz 2 JUMP Hz 3 Jump Frequency 2	49 F 0 Hz F.SET		49 F 0 .Hz F.SET
50 FREQ GAIN JUMP Hz 1 JUMP Hz 2 ■ JUMP Hz 3 Jump Frequency 3	50 F 0 Hz F.SET		50 F 0 Hz F.SET
51 ■ J HYSTR DC BRAKE DC BRK Hz DC BRK V Jump Frequency Range	51 F 0 Hz F.SET		51 F 0 Hz F.SET

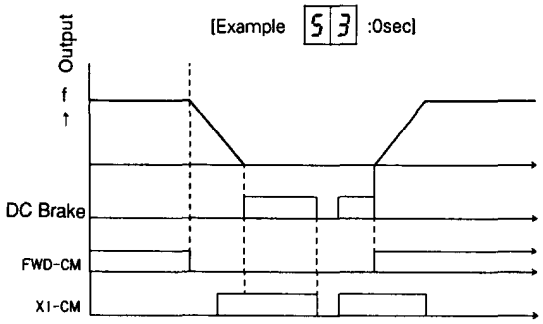
Function Coda	Display	Function Expalanation	Factory Setting Function Data
S2 J HYSTR ■ DC BRAKE DC BRK Hz DC BRK V DC Brake	S200 S201	Selection for DC injection brake. Inactive (dynamic braking only) Active (DC injection braking is applied after dynamic braking) 	S200
S3 J HYSTR DC BRAKE ■ DC BRK Hz DC BRK V DC Brake Starting Frequency	S400 S415	Setting for the DC injection 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 injection brake strength.	S3 F 0 Hz S400
S4 J HYSTR DC BRAKE DC BRK Hz ■ DC BRK V DC Brake Voltage		Brake strength changes according to the motor characteristics	
S5 ■ DC BRK T START Hz I LIMITER SLIP COMP DC Braking Time		Within a 0.01 to 30 s time span, setting is possible or match the load GD^2. Setting Range / Setting Resolution: 0.01~9.99s / 0.01s; 10.00~30.00s / 0.1s 	S5 F 0.10 S

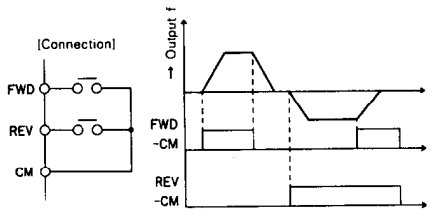
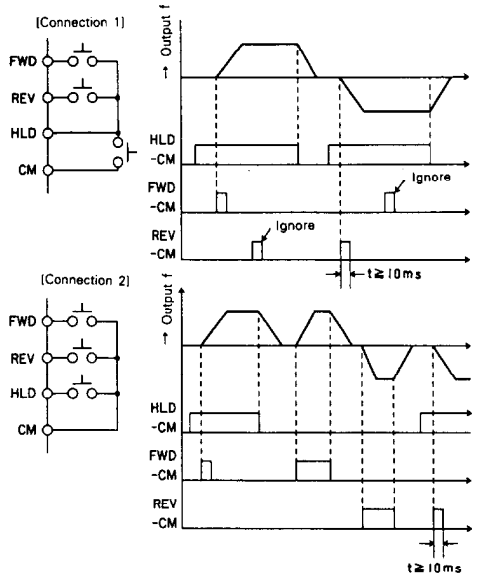
Function Coda	Display	Function Expalanation	Factory Setting Function Data
56 DC BRK T ■ START Hz I LIMITER SLIP COMP Starting Frequency	56 V 1 Hz F	The start frequency setting can be by 1Hz within a 0.2Hz to 60Hz range 0Hz (0.2Hz start) ↓ 60Hz 	56 V 1 Hz F
57 DC BRK T START Hz ■ I LIMITER SLIP COMP Current Limiter	57 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. Inactive Active (operates at 30 to 150% of the inverter rating. By 1% setting possible)  ① Does not operate for deceleration. ② When using this function, the automatic acceleration/deceleration function does not operated. ③ Slip compensation 5801 is disabled. ④ S curve acceleration/deceleration 1701 and 1702 are disabled.	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)** Inactive (no slip compensation) Active (with slip compensation)  ① Being disabled during I limiter 5701 operates. ② Operates only during steady speed operation.	5800

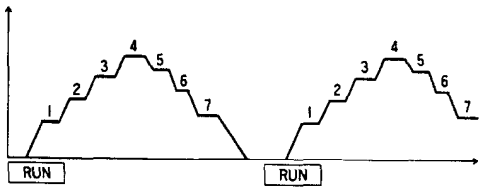
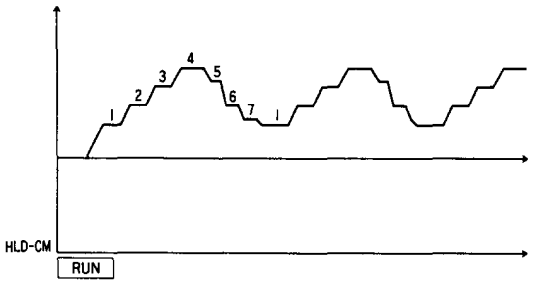
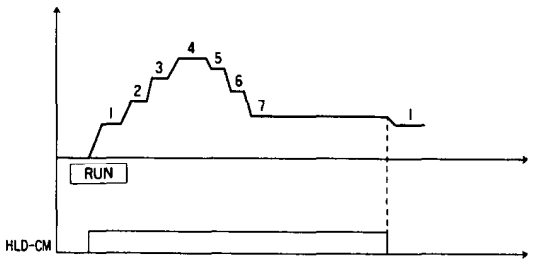
Function Coda	Display	Function Expalanation	Factory Setting Function Data
59 ■ FDT Hz FDT HYSTR RUN FINSH OL WARN Frequency Level Detection	59 F 50 Hz FDT	The FAR-CM terminal ON signal is output when the output frequency goes above the frequency level detection. The OFF level is set by 60 0 to 400Hz (1Hz step)	59 F 50 Hz FDT
60 FDT Hz ■ FDT HYSTR RUN FINSH OL WARN FDT And FAR Signal Hysteresis	60 F 10 Hz FDT	0 to 30Hz (1Hz step) 	60 F 10 Hz FDT
		When 6801 is set, the FDT signal is active.	
61 FDT Hz FDT HYSTR ■ RUN FINSH OL WARN RUN Signal Finishing Frequency	61 F 0 Hz RUN	The RUN-CM terminal ON signal is output when the output frequency goes above the RUN signal finishing frequency. 0 to 400Hz (by 1Hz) 	61 F 0 Hz RUN
		When 6900 is set, the RUN signal is active.	
62 FDT Hz FDT HYSTR RUN FINSH ■ OL WARN Overload Early Warning Signal	62 I 100 % OL	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) 	62 I 100 % OL
		When 6700 is set, the OL signal is active.	

④ High Level Function (See p.57 for Frequency Setting In Link Operation, Monitering signal In Link Operation and Link Operation function settings)

Function Coda	Display	Function Expalanation	Factory Setting Function Data
63 Hz A V r/min m/min ■X1-X2-X3 HOLD FUNC LV-OL-FAR X1, X2, and X3 Terminal Function	6300	The terminal X1, X2, X3 functions can be changed to the following 3 types via the data setting. 8 multisteps speed setting operation is possible through switching X1, X2, X3. See function codes 29 31 33 35 37 39 41 for details on multistep speed setting operation.	6300
	6301	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 frequency change rate is determined by the acceleration/deceleration time setting values. 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 override this function (44 , 45) ④ Always at 0Hz for operation start ⑤ Operative only when frequency setting is by digital method 1600 ⑥ When there is no operation command (RUN , FWD, REV), X1, X2 input is ignored. ⑦ ∧ ∨ key input is ignored. 	

Function Coda	Display	Function Expalanation	Factory Setting Function Data
	6302	When DC injection brake is selected by 5201 : with X1-CM = ON: DC brake during stop with X1-CM = OFF: brake reset  ① The strength of the DC injection brake is set by 54 ② Operation command override this function. (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 windings during the X1-CM - ON period, be careful of temperature rise. (When long periods of DC braking are required, measure the temperature to insure it is within the allowable limit for the motor.)	

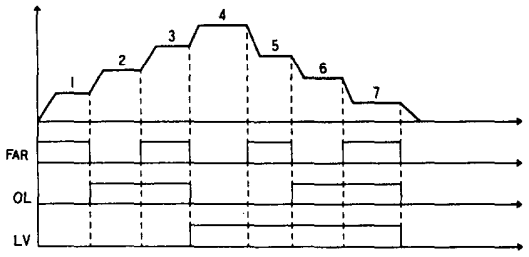
Function Coda	Display	Function Expalanation	Factory Setting Function Data
64 Hz A V r/min m/min X1-X2-X3 ■ HOLD FUNC LV-OL-FAR FWD/REV Command Hold (3-Wire Control)	6400	Depending on the data selection, the HLD terminal function can be changed to the following 3 types. 2 wire operation When terminal operation (1501) is selected, the following operation results.  When both FWD-CM and REV-CM are ON at the same time, deceleration to stop results. HLD terminal input is ignored. 3 wire operation When Terminal block operation (1501) is selected, the following operation results.  ① When HLD-CM is ON : and FWD-CM is ON for over 10 ms. : Forward HLD-CM is OFF : Stop and REV-CM is ON for over 10 ms : 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 ms.	6400
	6401		

Function Coda	Display	Function Expalanation	Factory Setting Function Data
	6402	Mode selection for pattern operation. When 6400 6401  When 6402 : 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 1901 pattern operation is selected. With 1900 , normal 2 wire operation results (same as 6400).	

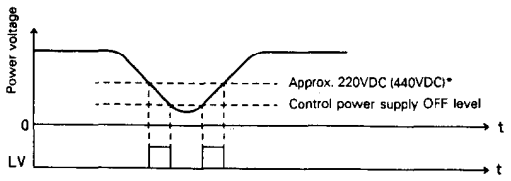
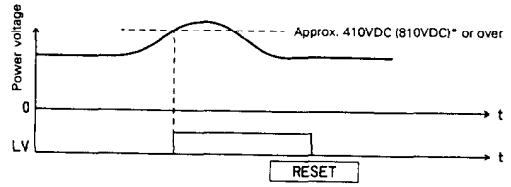
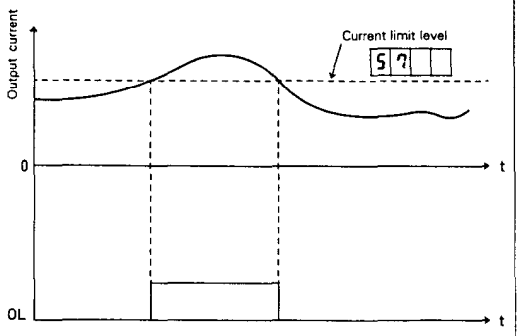
Function Coda	Display	Function Expalanation	Factory Setting Function Data
65 Hz r/min ▲ ▼ m/min X1-X2-X3 HOLD FUNC ■ LV-OL-FAR LV, OL and FAR Terminal Output Code	6500 6501	The signal data output from LV, OL, FAR terminals can be changed. LV terminal outputs the signal selected by 66 OL terminal outputs 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

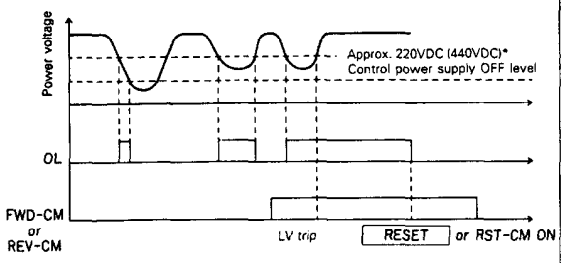
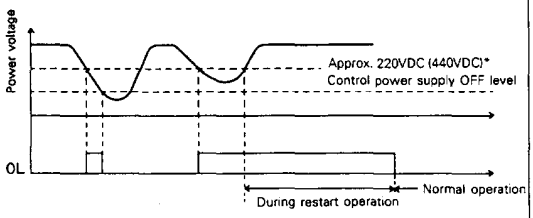
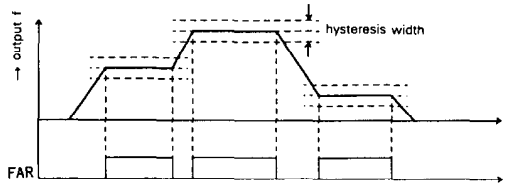
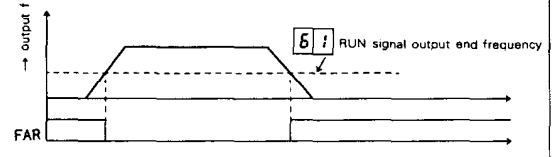
1 : ON 0 : OFF



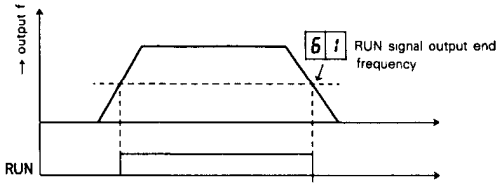
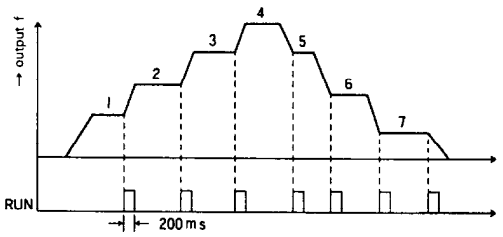
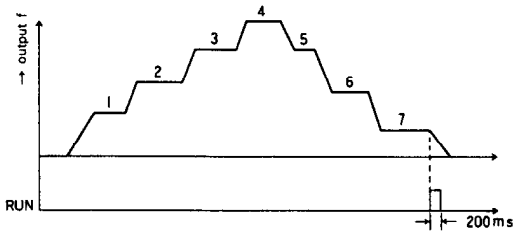
With 1900, there is no output.

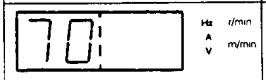
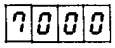
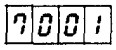
Function Coda	Display	Function Explanation	Factory Setting Function Data
66 Hz r/min A m/min V ■ LV FUNC OL FUNC FAR FUNC LV Terminal Function	6600	The function for terminal LV can be selected from the following 2 types. Only operative for 6500 Undervoltage signal (LV signal) is output from LV terminal.  The LV signal is output from the time the power voltage drops below approx. 150V (300V)* to the point where the control power no longer exists.	6600
	6601	The over-voltage signal (OV signal) is output from the LV terminal.  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) Voltage is measured at DC bus.	
67 Hz r/min A m/min V LV FUNC ■ OL FUNC FAR FUNC OL Terminal Function	6700	The function for terminal OL can be selected from following 3 types. Only operative for 6500 The inverter overload early warning signal (OL signal) is output from the OL terminal. See 62 for signal details.	6700
	6701	The current-limiting monitoring signal (CL signal) is output from the OL terminal. 	

* ( ) : 400V series

Function Coda	Display	Function Expalanation	Factory Setting Function Data
	6702	The under voltage signal (IP signal) is output from the OL terminal. Signal output when in 2000 (restart inactive)  Signal output when in 2001 (restart active) 	
68 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

* ( ) : 400V series

Function Coda	Display	Function Expalanation	Factory Setting Function Data
69 Hz r/min ∧ ∨ m/min ■ RUN FUNC FM FUNC Run Terminal Function	6900	The following 3 types of signal output at the RUN terminal can be selected. The inverter running signal (RUN signal) is output at the RUN terminal. The signal ON/OFF level is set by 61 . 	6900
	6901	For 1901 pattern operation, the time-up signal (TP signal) is output by the RUN terminal. (outputs at each stage in pattern operation)  No signal output when 1900	
	6902	For pattern operation 1901 , 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 the TO signal is output at 7 step end point. 6402	

Function Coda	Display	Function Expalanation	Factory Setting Function Data
  FM Terminal Function	 	The following 2 types of monitor signals output by the FM terminal can be selected. Frequency monitor signal (analog) is output by the FM terminal. Voltage adjustment is performed by 03 . Output current monitor signal (analog) 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 10.3V.)	

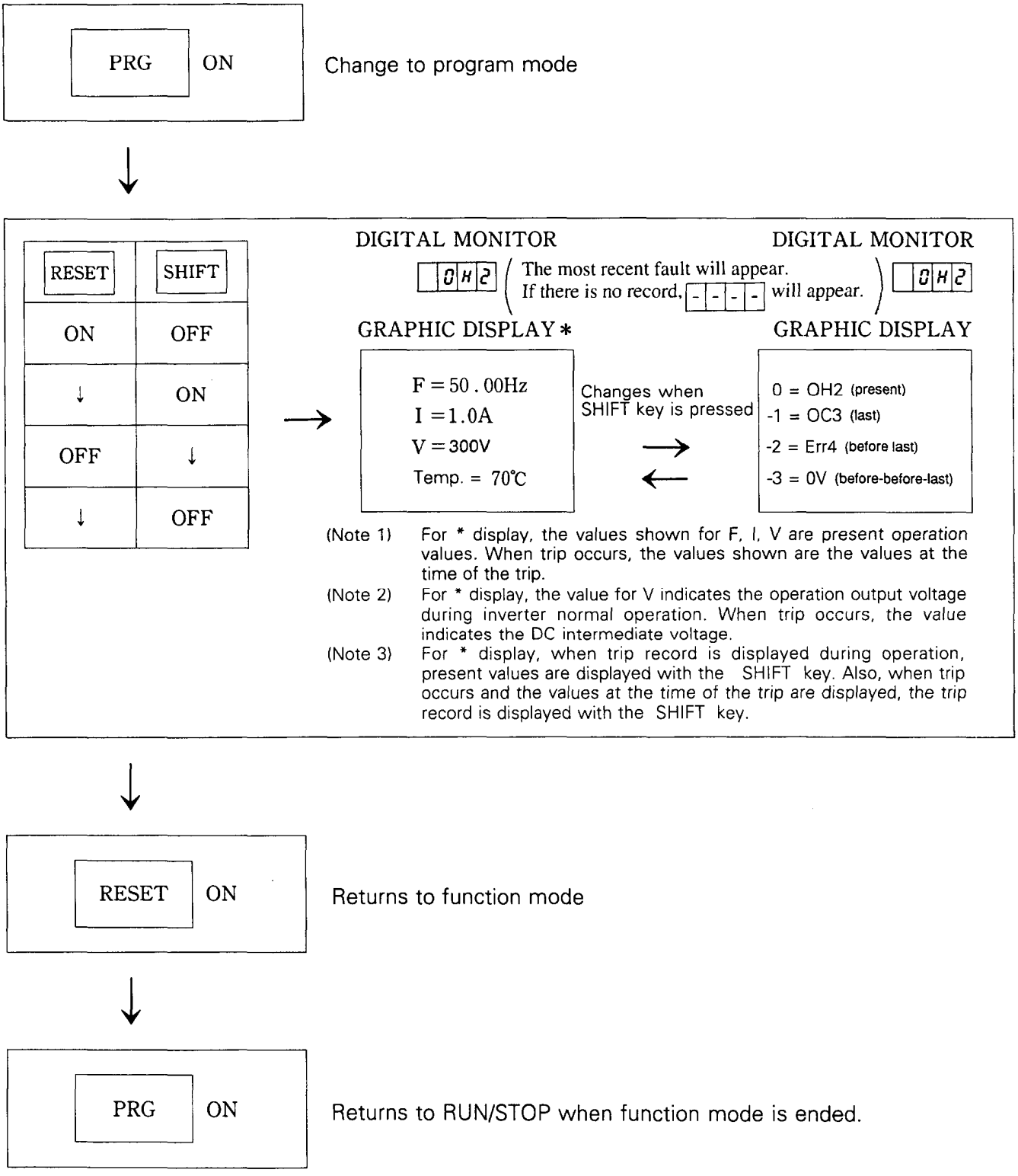
Function Coda	Display	Function Expalanation	Factory Setting Function Data
7 1 Hz r/min ▲ m/min ▼ ■ NO. ENTRY TL UNITS Inverter Unit No. Entry For Link Operation (All Inverters)	7100 7101 ⌇ 7115	Determines the function of the various inverters when performing link operation. Err4 will result when 2 identical numbers are recorded within the same group. Central inverter Local inverter 1 ⌇ Local inverter 15 Always input the inverter numbers consecutively from lowest to highest.	7115
72 Hz r/min ▲ m/min ▼ NO. ENTRY ■ TL UNITS Number of Units Linked (Central Inverter)	7200 ⌇ 7215	Needed only for central inverter setting Input the total inverter linked to central inverter When the total number connected is greater than the stored number of inverters. → Not linked inverter will appear. When the total number connected is less than the stored number of inverters. → Err 4	7200
73 Hz r/min ▲ m/min ▼ ■ LINK MODE INPUT SEL NO. SELECT Link Mode (All Inverters)	7300 7301 7302 7303	Link Mode Selection Inactive (After Err4 reset. automatically returns to 7300) → (for central inverter) Inactive Individual monitoring The local terminal data is monitored via the central terminal block. Set the output terminal data via the function code for each inverter. Terminal output: LV, OL, FAR, RUN The inverter No. determination is set via the central terminal block. RT1 X3 X2 X1 MSB LSB Joint operation → SET → 82XX	7300

Function Coda	Display	Function Expalanation	Factory Setting Function Data
74 Hz r/min ∧ ∨ m/min LINK MODE ■ INPUT SEL NO. SELECT RUN/STOP command Input in Link Operation	7400 7401	Setting for central (required for joint operation) Selects insterface for central in case of 1502 (link) operation Control. RUN/STOP via keypad panel RUN/STOP via terminal	7400
75 Hz r/min ∧ ∨ m/min LINK MODE INPUT SEL ■ NO. SELECT Inverter Unit No.	7500 ⟆ 7515 7516	Setting for central (required for joint operation) Record command inverter No. Specified units No. to connect (individual command) All units (total number command)	7500
76 Hz r/min ∧ ∨ m/min ■ ACR GAIN OPTION 2 OPTION 3 OPTION 4 Changeover of Current Limiter 1 and Current Limiter 2. Gain adjustment in Current Limiter 2.	7600 7601 ⟆ 7699	Current Limiter 1 Current limiter operates during acceleration and constant speed running. Current Limiter 2 Current limiter operates during constant speed running. Gain is adjustable. 7601 – 7699 High response speed — Low response speed Current limiter enabled/disabled and Limit level adjustment can be done through 57	7600

Function Coda	Display	Function Expalanation	Factory Setting Function Data
82 Hz A V r/min m/min OPR MODE Operation mode in Joint operation	8200	Selects link operation mode Normal operation The central terminal data (input) and key input through keypad is transmitted to the local(s). The local performs RUN/STOP operation according to the central frequency setting and operation. The inverter No. is set by function 75.	8201
	8201	Parameter copy Function code data setting for the local is performed at the central keypad panel. The inverter No. determination is set by function 75.	

(3) Fault Memory Verification Method

Possible during operation or stop



(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 during inverter normal operation. When trip occurs, 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.

(4) Function Setting For Individual Monitoring

Function Code	Setting Data		Remarks
	Central	Local	
15	00 or 01	←	Keypad 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	←	Individual Monitoring

(5) Function Setting For Normal Operation. (Joint operation)

Function Code	Setting Data		Remarks
	Central	Local	
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 Units Number
72	00 ~ 15	–	Setting for Number of Units Linked
73*2	03	←	Joint operation
74	00 or 01	–	Keypad Operation/Terminal Operation Selection
75	16	–	All Units Selection
82	00	–	Normal Operation Selection

(Note 1) After setting the local inverters, set the central.

*1 Set the local inverter numbers in squence from 01 without skipping.

*2 Set function code 73 after setting other codes.

10. Maintenance & Inspection

In order that the inverter may provide 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.

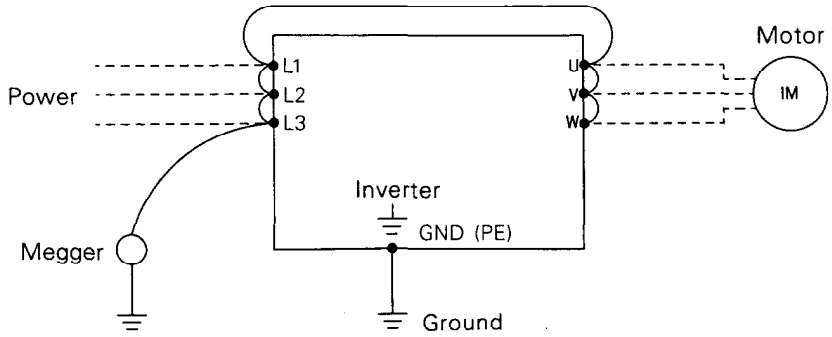
Megger Test

① When conducting an external circuit megger test, disconnect all inverter terminals making sure to 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) or (323V to 506V)*	Adjust the power supply voltage.
	Ambient Temperature	Within permissible range (-10°C to 50°C)	After investigating the cause, correct to within specification limits
	Ambient Humidity	Permissible range (20 to 90% RH)	
		Dew condensation / Freezing	
	Vibration	Within permissible limit (5.8m/s^2 {0.6 G} 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 Dust accumulation on control board	Cleaning Blow out with compressed air
	Connectors	Loose connectors	Tighten connectors
	Screws	Loose screws	Tighten screws

* 400V series

(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 capacitor 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.

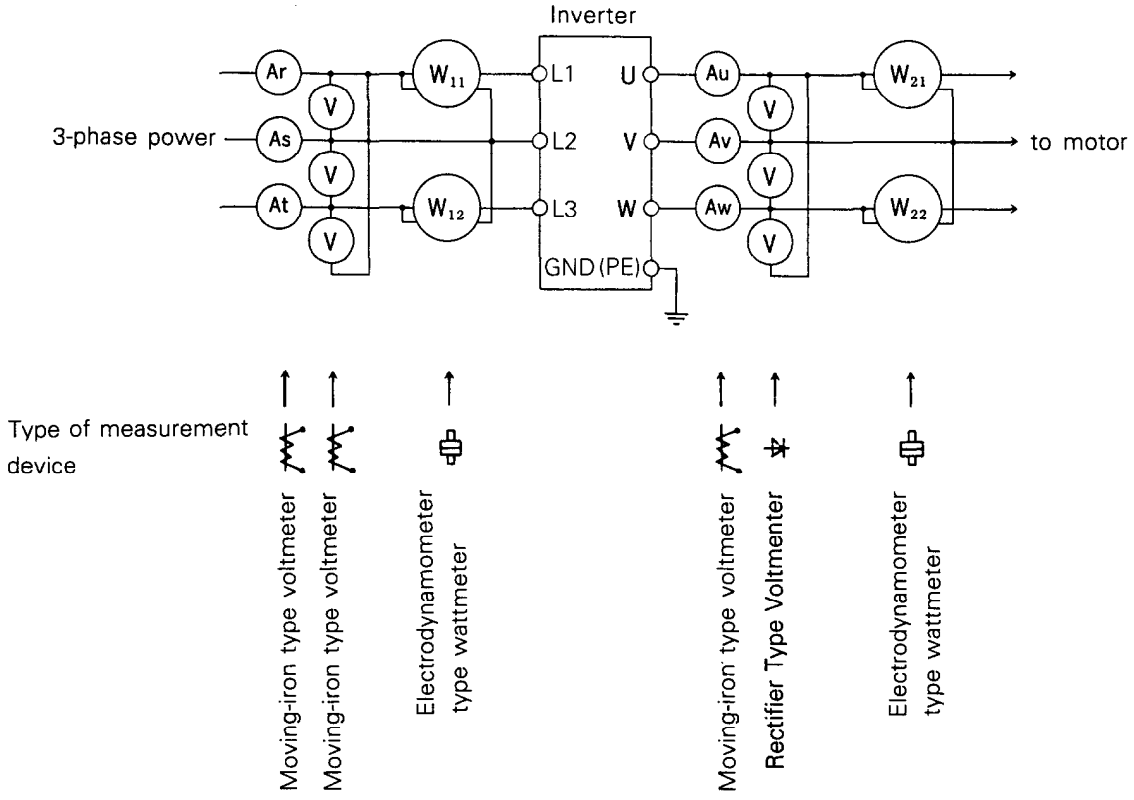
(3) Measurement Points & Meters

Since the inverter input/output voltage and current contains high harmonic 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 large capacity as much 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)



11. Troubleshooting

(1) Protective Function

Protective Function	Function Explanation	Display	Protective Operation
Overcurrent protection	Protects the inverter when the current flow momentarily reaches the specified protection level. OC1: During acceleration OC2: During deceleration OC3: During steady state	OC1 OC2 OC3	• Stops inverter output • Motor coast-to-stop • Alarm signal (1c) output • Alarm signal is internally held until reset. (*)
Protection against instantaneous Power Failure Undervoltage protection	For instantaneous power failure or undervoltage less than 15ms., operation is intermittent. For a period exceeding 15ms., the inverter may be stopped. If the restart after instantaneous power failure mode is activated, operation will resume automatically after the power is restored.	LU	Stops inverter output
Overvoltage protection	This function protects the inverter when the DC bus voltage reaches the momentary overvoltage protection level.	OU	• Stops inverter output • Motor coast-to-stop • Alarm singnal (1c) output • Alarm signal is internally held until reset. (*)
Inverter Overheating	Detects inverter overheating caused by overload operation, cooling fan failure, abnormally high ambient temperature, etc.	OH1	
External Alarm	As an external alarm, it stops output when the DB braking resistor thermal overload relay, etc. connected to the THR-CM terminals goes from ON to OFF. (Use normally closed contact)	OH2	
Electronic Thermal Overload Relay Trip	Performs motor overload protection when connected to a 4 pole T.E.F.C 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 communication trouble between Keypad and main control PCB.	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	

- ADDITION -

OH2

- **When power is ON with FWD or REV terminal connected in External signal mode.**
- **When STOP key on keypad is pressed in External signal mode.**
- **When Program Mode is released after FWD or REV terminal has been turned on in External signal mode.**

(Note 1) (*) Alarm signal hold

After the protective function has been activated and the alarm signal has been output, if the circuit-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 alarm condition.

(Note 3) The past 3 faults are stored in the memory. This faults information is displayed on the GRAPHIC DISPLAY.

Failure information as well as operation condition (frequency, voltage, current, inverter internal temperature) is displayed on the GRAPHIC MONITOR.
Please refer to page 56 for detail information.

To reset inverter turn off all start signals (FWD, REV, RUN, etc.), and press RESET key.

(2) Troubleshooting

① Protective Operation Display

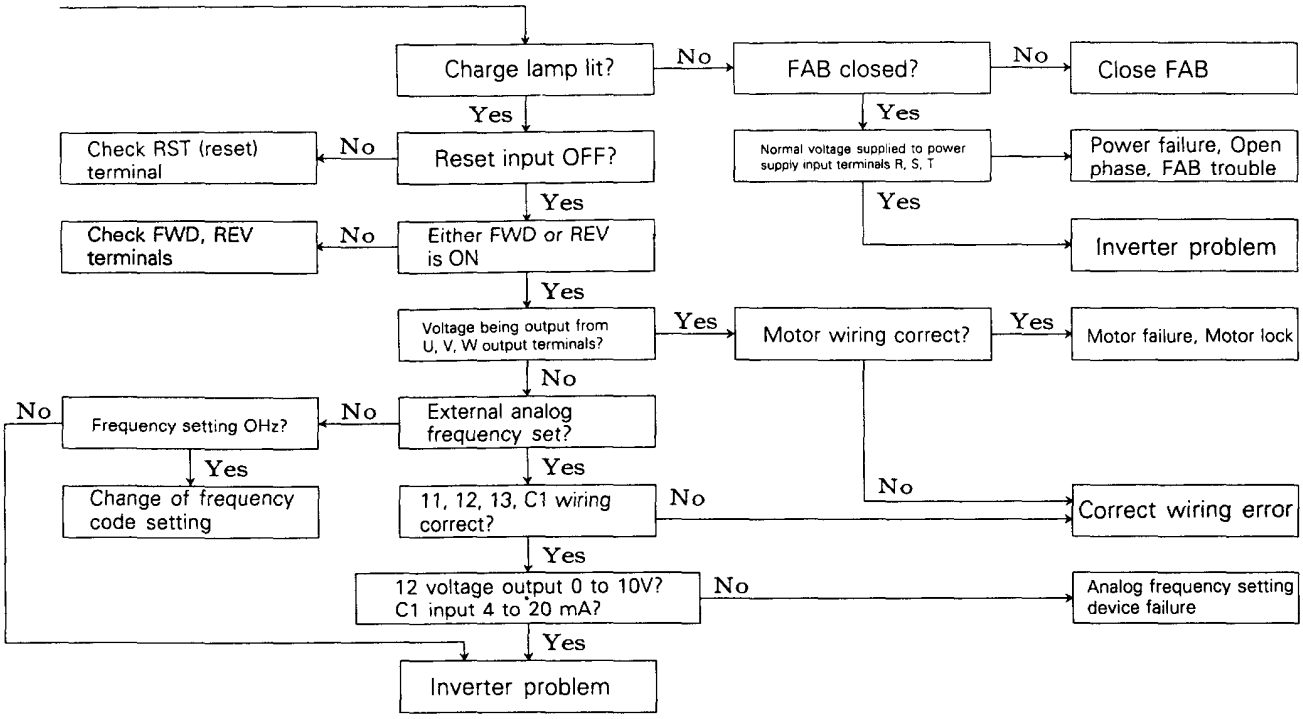
Display	Check Point	Corrective Measure
OC1	① Power supply voltage within permissible limits	Adjust power supply voltage
	② Output line short-circuited	Output line insulation Motor megger measurement
	③ Proper torque boost	Adjust to proper value
	④ Proper acceleration time	Extend acceleration time
	⑤ Other than ① thru ④	Increase inverter capacity
OC2	① Power supply voltage within permissible limits	Adjust power supply voltage
	② Output line short-circuited	Output line insulation Motor megger measurement
	③ Proper deceleration time	Extend deceleretion time.
	④ Other than ① thru ③	Connect DB resistor (option) Increase inverter capacity
OC3	① Power supply voltage within permissible limits	Adjust power supply voltage
	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 voltage within permissible limits	Adjust power supply voltage
	② Proper deceleration time	Extend 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 load Increase inverter capacity
OH2	① Proper wiring between THR-CM	Check wiring and contact configuration
	② Thermal overload relay activated	Reduce load
	③ Continuity check between external DB braking unit terminal 1-2	Correct ambient temp./Reduce braking duty
	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 incorrectly	Check electric thermal overload setting
	② Load is over permissible limits	Reduce load
Err1	① Correct function code selection	Verify function code setting
Err2 Err3	① Noise source close to inverter ② Abnormal ambient temperature	Noise prevention measures should be considered Correct temperature to specified limits
Err4	① Wiring correct	Confirm 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 keypad panel. (Press the [RESET] key after the motor has stopped.) To reset the alarm externally, turn ON between the RST-CM control circuit terminals.

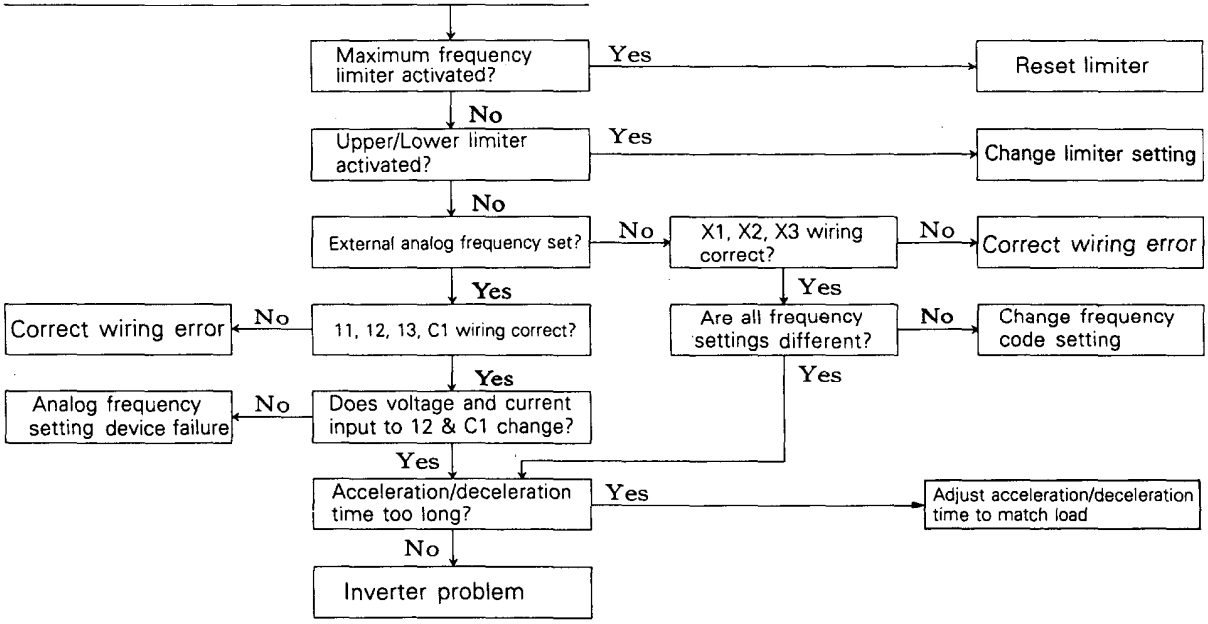
(Note 2) "LV" is displayed when the power supply is switched off, but this does not indicate any abnormality.

② Troubleshooting Charts

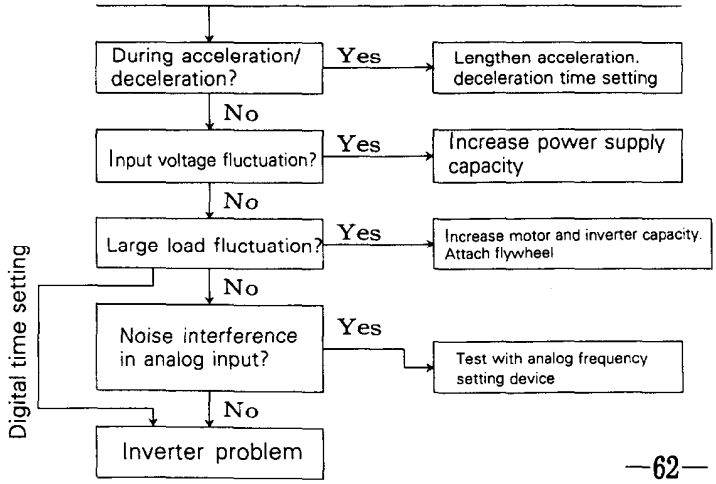
i) Motor does not run



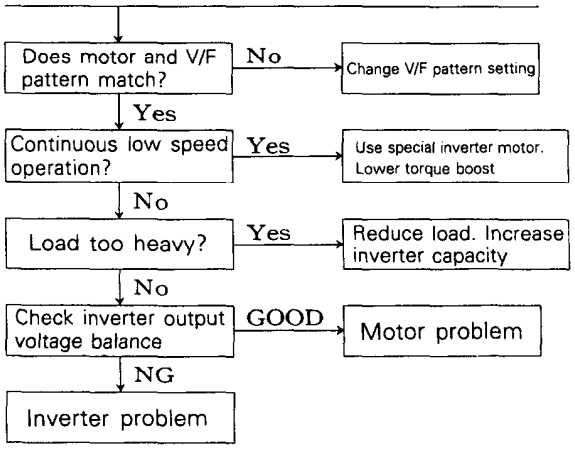
ii) Motor runs but speed does not change



iii) Motor rotation is not smooth



iv) Motor overheats



12. Appendix

(1) Standard Specifications

Item		Specification										
Inverter Model Number		FVR 004G7S-2 EX	FVR 008G7S-2 (-4) EX	FVR 015G7S-2 (-4) EX	FVR 022G7S-2 (-4) EX	FVR 040G7S-2 (-4) EX	FVR 055G7S-2 (-4) EX	FVR 075G7S-2 (-4) EX	FVR 110G7S-2 (-4) EX	FVR 150G7S-2 (-4) EX	FVR 185G7S-2 (-4) EX	FVR 220G7S-2 (-4) EX
Standard Applicable Motors [kW]		0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22
Output Ratings	Rated Capacity [kVA] (Note 1)	1.1	1.9	3.0 (2.8)	4.2	6.5 (6.9)	9.5 (10)	13 (14)	18	22 (23)	28 (30)	33 (34)
	Rated Output Voltage [V](Note 2)	3-phase 3-wire type 200 to 230 (380 to 460)										
	Rated Output Frequency [Hz]	50 ~400										
	Rated Output Current [A]	3	5(2.5)	8 (3.7)	11 (5.5)	17 (9.0)	25 (13)	33 (18)	46 (24)	59 (30)	74 (39)	87 (45)
	Overload Current Rating	150% for 1 min. (inverse time characteristic)										
Input ratings	Rated Input AC Voltage	3-phase 3-wire type 200 to 230V (380 to 460V), 50/60Hz										
	Allowable fluctuation	Voltage: + 10% Voltage: – 15% Voltage unbalance %: within 3% Frequency: ± 5%										
Control	Control System	Sinusoidal PWM control										
	Frequency control Range	0.2 to 400Hz (start frequency 0.2 to 60Hz, maximum frequency 0.2 to 400Hz setting possible)										
	Output frequency stability	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 (380 to 460V) Frequency: 50. to 400Hz (When in fee selection, voltage or frequency 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 s. (independent acceleration/deceleration), linear, S characteristic (Strong & weak), automatic and multi-step acceleration/deceleration (independent 4-step) selection possible. (Both terminal & program selection possible.)										
	Standard 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 10.3)									
		Brake selection	Normal or High brake selection possible									
		Pattern operation	7 independent step settings possible (frequency up to 400Hz, timer up to 3,600 s.)									
		Program operation	Based on the pattern operation; 1 cycle, repeat cycle, continuous operation at least step speed, etc. selection possible									
		Restart after instantaneous power failure	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 frequency	The magnitude of the bias which contains the frequency setting signal, can be set from 0 to 100% (1% step)									
		Gain for frequency setting signal	The output frequency gain corresponding to the frequency setting signal can be set from 0 to 200% (1% step)									
		Jump frequency	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 limiting	Output current can be controlled within a range of between 30% and 150% (1% step)									
		Multistep speed	8 step speed operation possible									
		2-wire, 3-wire control selection	Selection between the hold constant of operation stop command (2-wire operation) or the momentary contact (3-wire operation) is possible.									
		Selection of terminal function	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 (460V)
(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			FVR 004G7S-2 EX	FVR 008G7S-2 (-4) EX	FVR 015G7S-2 (-4) EX	FVR 022G7S-2 (-4) EX	FVR 040G7S-2 (-4) EX	FVR 055G7S-2 (-4) EX	FVR 075G7S-2 (-4) EX	FVR 110G7S-2 (-4) EX	FVR 150G7S-2 (-4) EX	FVR 185G7S-2 (-4) EX	FVR 220G7S-2 (-4) EX
Braking Toque	Standard Equipment	Regenerative braking (Note 4)	150% or more		150% or more (65% or more)	100% or more (45% or more)	100% or more (40% or more)	40% or more (35% or more)		Condenser regenerative braking: 20% or more			
		DC braking	Braking frequency 0.2 to 60Hz, braking time 0.01 to 30 s., braking voltage 0 to 15%										
	With optional equipment	Type	Braking resistor							Braking resistor and braking unit			
		Torque	150% or more			100% or more				100% or more			
Operation	Frequency setting signal		Frequency setting device or voltage input: DC 0 to 10V (DC 0 to 5V), current input DC 4 to 20mA										
	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.										
	External output signal	Contact output	Batch alarm output (1c contact, contact point capacity is AC 250V, 0.3A, COSø = 0.3)										
		Open corrector output	Inverter running, Frequency equivalence detection, Overload early warning, Undervoltage ✻ 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, overvoltage.										
Protection			Stall prevention, overcurrent, instantaneous power failure, undervoltage, overvoltage, inverter overheating, external fault (external thermal overload relay, etc.), motor overload (electronic thermal overload relay), setting error, communication error, DSP error, link error, short circuit for output terminal, ground fault (for 4.0kW or less optional function)										
Indication	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 data code (see operation panel explanation)										
		Protection display	OC1: overcurrent during acceleration , OC2: overcurrent during deceleration, OC3: overcurrent during steady state running, LU: under-voltage, OU: overvoltage, OH1: inverter overheating, OH2: external alarm, 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										
Conditions	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		20 to 90%RH (non-condensing)										
	Vibration		Less than 5.8 m/s² {0.6 G} (conforms to JIS C0011)										
	Shipping temperature		-25 ~ + 65°C										
Installation			Inside switchboard, install as an external cooling system										
Protection/Cooling Types			Fully enclosed self-cooling type (IP40)		Fully enclose forced air cooling type (IP40, fan not enclosed)								
Approx. weight [kg]			3.0	3.0 (3.6)	4.3 (4.4)	4.4 (4.5)	4.5 (4.6)	10.7 (9.3)	10.9 (9.5)	14.7 (12.9)	15.0 (13.0)	19.0 (16.6)	19.5 (16.9)
Options			Relay output unit, copy unit, remote operation extension cable, inverter terminal link cable, link adaptor, remote operation keypad panel, remote display panel, T link card, radio interference surppressing reactor, noise surppressing AC reactor, Line side coordinating AC reactor, power filter, spark killer, surge killer, arrester, frequency meter, frequency setting POT, braking unit braking resistor, MCA series, ground fault detection unit Digital interface card, PG feedback card, Synchronized operation card.										

(Note 4) Short time rating

(2) External Dimensions

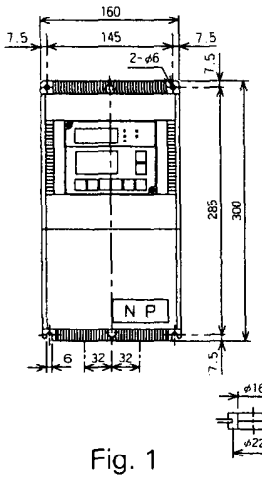


Fig. 1

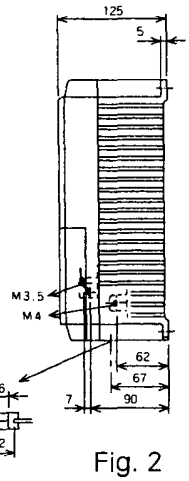


Fig. 2

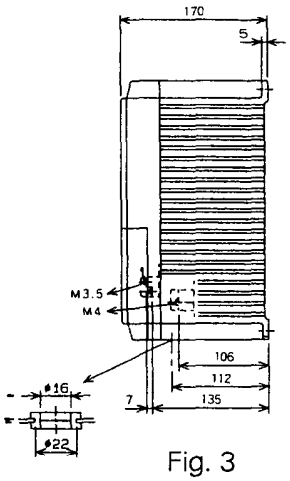


Fig. 3

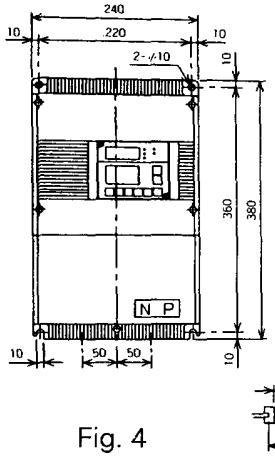


Fig. 4

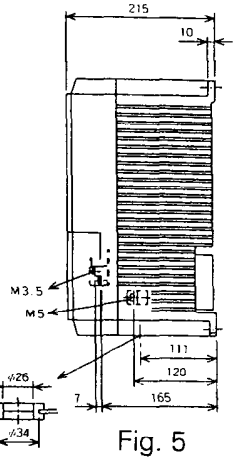


Fig. 5

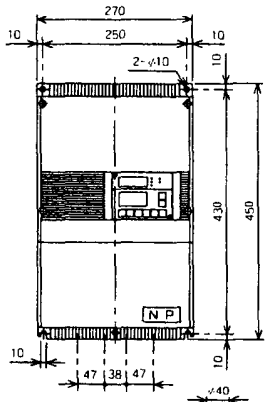
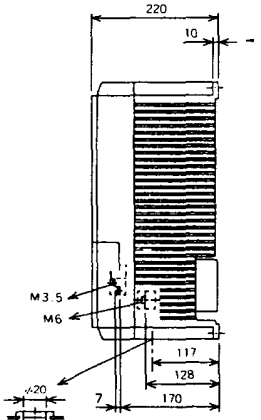


Fig. 6

Both sides



Central 2 locations

Fig. 7

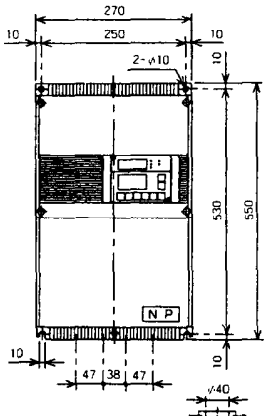
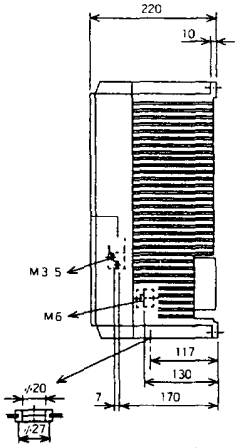


Fig. 8

Both sides



Central 2 locations

Fig. 9

Type / View	FVR004 G7S-2EX	FVR008 G7S-2EX(-4)	FVR015 G7S-2EX(-4)	FVR022 G7S-2EX(-4)	FVR040 G7S-2EX(-4)	FVR055 G7S-2EX(-4)	FVR075 G7S-2EX(-4)	FVR110 G7S-2EX(-4)	FVR150 G7S-2EX(-4)	FVR185 G7S-2EX(-4)	FVR220 G7S-2EX(-4)
Front View	Fig. 1	Fig. 1	Fig. 1	Fig. 1	Fig. 1	Fig. 4	Fig. 4	Fig. 6	Fig. 6	Fig. 8	Fig. 8
Side View	Fig. 2	Fig. 2 (Fig. 3)	Fig. 3	Fig. 3	Fig. 3	Fig. 5	Fig. 5	Fig. 7	Fig. 7	Fig. 9	Fig. 9

(3) Application Of Wiring And Equipment

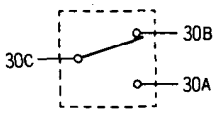
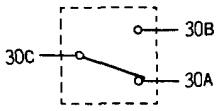
Motor Output [kW]		0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22
Inverter Model		FVR004 G7S-2EX	FVR008 G7S-2EX(-4)	FVR015 G7S-2EX(-4)	FVR022 G7S-2EX(-4)	FVR040 G7S-2EX(-4)	FVR055 G7S-2EX(-4)	FVR075 G7S-2EX(-4)	FVR110 G7S-2EX(-4)	FVR150 G7S-2EX(-4)	FVR185 G7S-2EX(-4)	FVR220 G7S-2EX(-4)
Inverter Capacity [KVA]		1.1	1.9	3.0 (2.8)	4.2	6.5 (6.9)	9.5 (10)	13 (14)	18	22 (23)	28 (30)	33 (34)
Applicable wire sizes [mm²] (*)	Main circuit	3.5		5.5 (3.5)			8 (5.5)	14 (5.5)	14 (8)	22 (14)	38 (14)	38 (22)
	Control circuit	0.5~1.25										
FUJI Auto Braker		SA33B/15	SA33B/15 (SA33B/5)	SA33B/15 (SA33B/10)	SA33B/20 (SA33B/15)	SA53B/30 (SA33B15)	SA53B/50 (SA33B/30)	SA63B/60 (SA33B/30)	SA103B/75 (SA53B/40)	SA103B/100 (SA53B/50)	SA203B/100 (SA63B/50)	SA203B/150 (SA53B/75)
FUJI Fault Braker		SG33B/15	SG33B/15 (SG33B/5)	SG33B/15 (SG33B/10)	SG33B/20 (SG33B/15)	SG53B/30 (SG33B/15)	SG53B/50 (SG33B/30)	SG63B/60 (SG33B/30)	SG103B/75 (SG53B/40)	SGa103B/100 (SG53B/50)	SG203B/100 (SG63B/50)	SG203B/150 (SG103B/75)
Fuse [A]		5	10 (5)	20 (10)		30 (20)	30 (30)	40 (30)	60 (30)	75 (40)	100 (60)	
FUJI Magnetic Contractor		SC-05				SC-5-1 (SC-05)	SC-1N (SC-5-1)	SC-2N (SC-5-1)	SC-2SN (SC-1N)	SC-3N (SC-2N)	SC-4N (SC-3N)	SC-5N (SC-3N)
FUJI Thermal Relay		TR-ISN 1.7~2.6	TR-ISN 2.8~4.2 (1.4~2.2)	TR-ISN 5~8 (2.8~4.2)	TR-ISN 7~11 (4~6)	TR-ISN 12~18 (6~9)	TR-ISN 18~26 (9~13)	TR-3N 24~36 (12~18)	TR-3N 34~50 (18~26)	TR-3N 45~67 (24~36)	TR-6N 54~80 (TR-3N 28~40)	TR-6N 65~95 (TR-3N 34~50)
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.
( ) : 400 V series

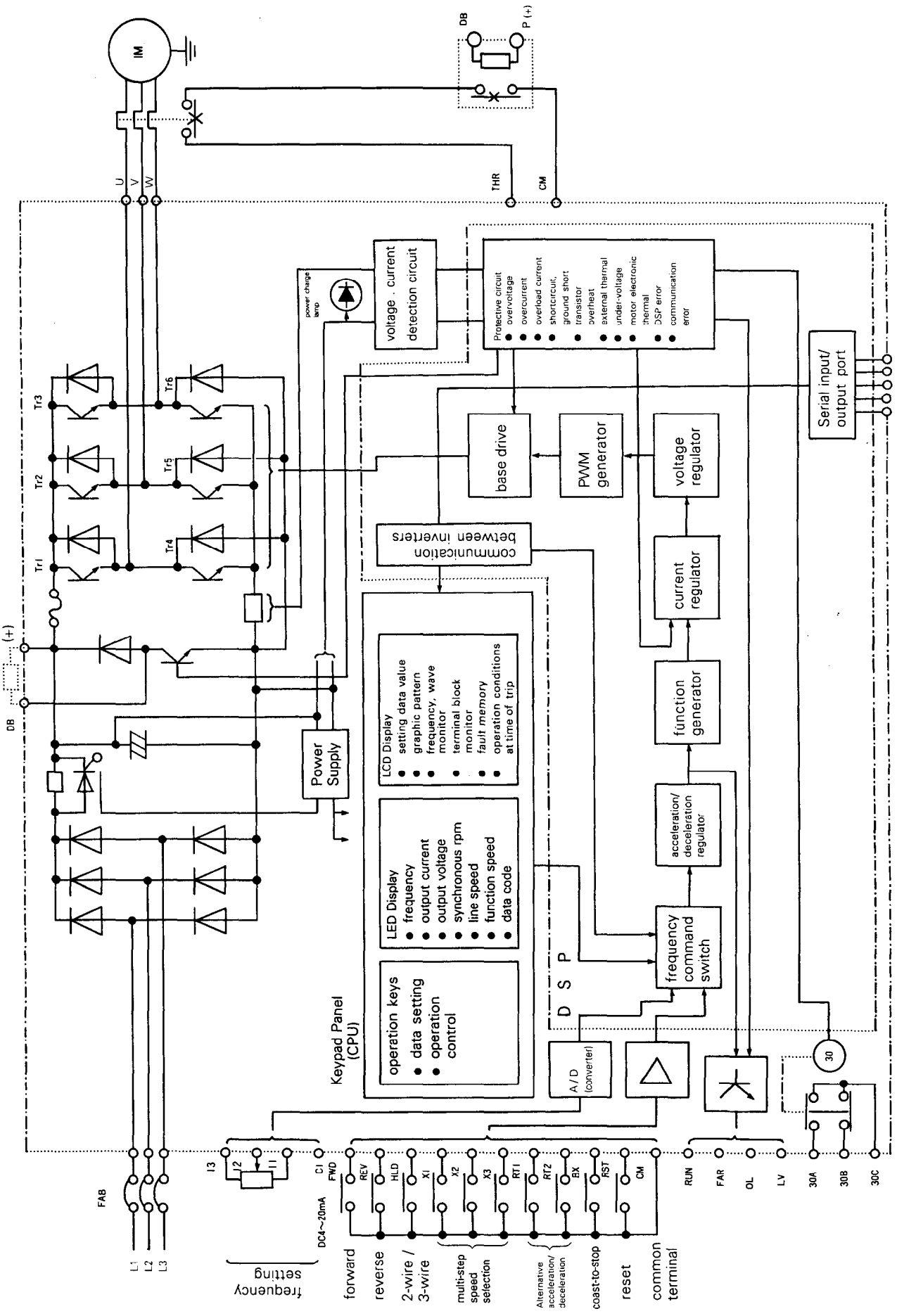
(4) Terminal Function

	Terminal Code	Terminal Name	Explanation
Main circuit	L1, L2, L3	Commercial power supply input terminals	Connection for commercial power supply AC 200 to 230V (380 to 460V)*
	U,V,W	Inverter output terminals	Connection for 3-phase induction motor
	(+),DB	External braking resistor terminals	Connection for external braking resistor (7.5kW or less)
	(−), (+)	External braking unit terminals	Connection for external braking resistor via external braking unit (11 to 22 kW)
	GND (PE)	Ground terminal	Connection for ground
Control input terminal	11	Frequency setting common terminal	Voltage setting and current setting common terminal (Do not connect to CM terminal as they are not isolated)
	12	Frequency setting voltage input	When DC 0 to +10V (0 to 5V) is input, the maximum frequency is reached at +10V (5V) and it is proportional until 0V. Input impedance is 22KΩ. (When setting frequency gain)
	13	Power supply for frequency setting	Stabilized DC +10V power supply, 10mA or less (for terminal 11)
	C1	Frequency setting current input	When DC 4 to 20mA is input, the maximum frequency is reached at 20mA and it is proportional until 4mA.
	CM	Control circuit common terminal	Common terminal for control input/output signal (Do not connect to terminal 11 as they are not isolated.)
	FWD REV	Forward command input terminal Reverse command input terminal	Forward command via FWD-CM (closed). reverse comm and via REV-CM (closed) [with FWD-CM (closed) and REV-CM (closed). inverter decelerates and stops]
	BX	Motor coast-to-stop input terminal	Motor coast-to-stop with BX-CM (closed) (For use when applying machine brake with inverter in operation).
	HLD	3-wire control	When 3-wire operation function is selected and HLD-CM is closed, the pulse signal input from FWD, REV terminals is self-held.
	X1 X2 X3	Multi-step speed operation command input terminal 1 Multi-step speed operation command input terminal 2 Multi-step speed operation command input terminal 3	(Example) Multi-step speed 1 with X1-CM (closed) (Example) Multi-step speed 2 with X2-CM (closed) (Example) Multi-step speed 7 with X1-X2-X3-CM (closed) (When there is no input to X1, X2, X3, operation is by set frequency)
	RT1 RT2	Multi-step acceleration/deceleration time command input terminal	RT1-CM (closed) RT2-CM (closed) 3 types of acceleration/deceleration times RT1-RT2-CM (closed) Note (When there is no input to RT1, RT2, operation is by normal 1st acceleration/deceleration time)
	THR	External thermal overload relay, external braking resistor thermostat terminal	With THR-CM (open), motor will coast-to-stop. With no external thermal OL relay or external braking resistor thermostat, the THR-CM terminals must be closed otherwise inverter operation is not possible.

* ( ) : 400Vseries

	Terminal Code	Terminal Name	Explanation
Control Input Terminals	RST	Alarm reset signal input	The protective function is reset when the RST-CM (closed) terminals are short-circuited for more than 0.1 s. (If there is input to FWD, REV terminals; the unit restarts the instant reset is made.)
	FM	Frequency meter connection terminal	Outputs maximum frequency at +10V, and it is proportional to output frequency until 0V. (DC voltage meter (7 to 10V output) ··· Internal impedance should be more than 10kΩ DC current meter (1mA) ··· 10 kΩ1/2W supplied in series)
Control Output Terminal	RUN	Inverter running signal output terminal (0 speed)	During deceleration, and if function 61 is the set frequency, RUN-CM will be "ON". (Open collector output, 27V 50mA MAX)
	FAR	Frequency equivalence detection signal output terminal (speed attainment)	When the set frequency is reached, FAR-CM will be "ON". (Open collector output, 27V 50mA MAX)
	OL	Inverter overload early warning signal output terminal	With function code 62, when the set output current is exceeded for over 10 s., OL-CM will be "ON". (Open collector output, 27V 50mA MAX)
	LV	Undervoltage signal output terminal	With the set under detection, LV-CM will be "ON". (Open collector output, 27V 50mA MAX)
	30A 30B 30C	Alarm output	The inverter protective function is activated, output is from 1c contact. (any fault) (contact capacity for resistance load AC 250V 0.3A cos ø = 0.3)  [Normal]  [Abnormal]

(5) FVR-G7 Control Block Diagram



Function Code Table

Function Code	Function	Display. Setting. Range	Factory Setting	For customer use
00	LED digital monitor selection	00 : output frequency [Hz] 01 : output current [A] 02 : output voltage [V] 03 : Motor syn. speed [r/min] 04 : line speed [m/min]	00	
01	Graphics monitor selection	00 : Frequency, Current 01 : Input-signal status 02 : I/O signal status	00	
02	Motor noise reduction	00 to 05 (code)	03	
03	FM terminal output level calibration	00 to 99 (code)	85	
04	Automatic torque boost control	00 : Inactive 01 : Active	00	
05	Torque boost	00 to 31 (code) ※ 1	13 08	
06	Fine adjustment of torque boost	00 to 09 (code)	00	
07	Automatic accel/ decel control	00 : Inactive 01 : Active	00	
08	Acceleration time 1	(LCD) 0.01 to 3,600 s. ※ 2	6.00 12.00	
09	Deceleration time 1	(LCD) 0.01 to 3,600 s. ※ 2	6.00 12.00	
10	Manufacture used function		00	
11	Maximum frequency	00 : 50Hz 01 : 60Hz 02 : 100Hz 03 : 120Hz 04 : free (Hz)	00	
12	Base frequency	00 : 50 Hz 01 : 60 Hz 02 : free (Hz)	00	
13	Maximum output voltage	00 : 200V (400V)* 01 : 220V (440V) 02 : 230V (460V) 03 : free (V)	03 [220V (380 V)]	
14	Number of motor poles	02. 04. 06. 08. 10. 12.	04	
15	Operation command	00 : keypad panel operation 01 : terminal operation 02 : link operation	00	
16	Frequency command	00 : digital 01 : analog (voltage) 02 : analog (voltage + current)	00	
17	Accel/Decel pattern	00 : linear 01 : weak "S" shape curve 02 : strong "S" shape curve	00	
18	Normal/High torque dynamic brake	00 : normal brake 01 : high brake	00	
19	Pattern operation	00 : Inactive 01 : Active	00	
20	Restart after instantaneous power failure	00 : Inactive 01 : Active	00	
21	Coefficient for line speed	(LCD) 0.01 ~ 200	0.01	
22	Function blocks used	00 : up to 22 01 : up to 62 02 : up to 82	00	
23	Acceleration time 2	(LCD) 0.01~ 3600s	10.0	
24	Acceleration time 3	(LCD) 0.01~ 3600s	15.0	
25	Acceleration time 4	(LCD) 0.01~ 3600s	3.00	

Function Code	Function	Display. Setting. Range	Factory Setting	For customer use
26	Deceleration time 2	(LCD) 0.01 ~ 3600s	10.0	
27	Deceleration time 3	(LCD) 0.01 ~ 3600s	15.0	
28	Deceleration time 4	(LCD) 0.01 ~ 3600s	3.00	
29	Multistep speed setting 1	(LCD) 0.00 ~ 400Hz	0.00	
30	Timer 1	(LCD) 0.01 ~ 3600s	0.00	
31	Multistep speed setting 2	(LCD) 0.01 ~ 400Hz	0.00	
32	Timer 2	(LCD) 0.01 ~ 3600s	0.00	
33	Multistep speed setting 3	(LCD) 0.01 ~ 400Hz	0.00	
34	Timer 3	(LCD) 0.01 ~ 3600s	0.00	
35	Multistep speed setting 4	(LCD) 0.01 ~ 400Hz	0.00	
36	Timer 4	(LCD) 0.01 ~ 3600s	0.00	
37	Multistep speed setting 5	(LCD) 0.01 ~ 400Hz	0.00	
38	Timer 5	(LCD) 0.01 ~ 3600s	0.00	
39	Multistep speed setting 6	(LCD) 0.01 ~ 400Hz	0.00	
40	Timer 6	(LCD) 0.01 ~ 3600s	0.00	
41	Multistep speed setting 7	(LCD) 0.01 ~ 400Hz	0.00	
42	Timer 7	(LCD) 0.01 ~ 3600s	0.00	
43	Electronic thermal overload relay	00 : Inactive 01 : Active	00	
44	High limiter	(LCD) 0~ 100%	100	
45	Low limiter	(LCD) 0~ 100%	0	
46	Bias frequency	(LCD) 0~ 100%	0	
47	Gain for frequency setting signal	(LCD) 0~ 200%	100	
48	Jump frequency 1	(LCD) 0~ 400Hz	0	
49	Jump frequency 2	(LCD) 0~ 400Hz	0	
50	Jump frequency 3	(LCD) 0~ 400Hz	0	
51	Jump frequency range	(LCD) 0~ 5Hz	0	
52	DC brake	00 : Inactive 01 : Active	00	
53	DC brake starting frequency	(LCD) 0~ 60Hz	0	
54	DC brake voltage	0 to 15 (code)	00	
55	DC braking time	(LCD) 0.01 ~ 30s	0.10	
56	Starting frequency	(LCD) 0.2 ~ 60Hz	1	
57	Current limiter	00 : Inactive 01 : Active	00	
58	Slip compensation control	00 : Inactive 01 : Active	00	
59	Frequency level detection	(LCD) 0~ 400Hz	50	
60	FDT and FAR signal hysterisis	(LCD) 0~ 30Hz	10	
61	Run signal finishing frequency	(LCD) 0~ 400Hz	0	
62	Overload early warning signal	(LCD) 70~ 150%	100	

(NOTE) During operation, function code data 00 to 09, 73 to 82 setting is possible. Also all function codes and data verification is possible.

※ 1 The factory setting for Torque Boost is: (4.0kW or less : 13 / 5.5kW or over : 08)

※ 2 The factory setting for Acceleration Time 1 and Deceleration Time 1 is: (7.5kW or less 6.00 / 11kW or over 12.00). *** ( ) : 400V series**