Fuji Inverter FVR-G7S
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 Display

The unit information is displayed by LED.

LCD Brightness Control Dial

This dial permits adjustment for easy to read brightness.
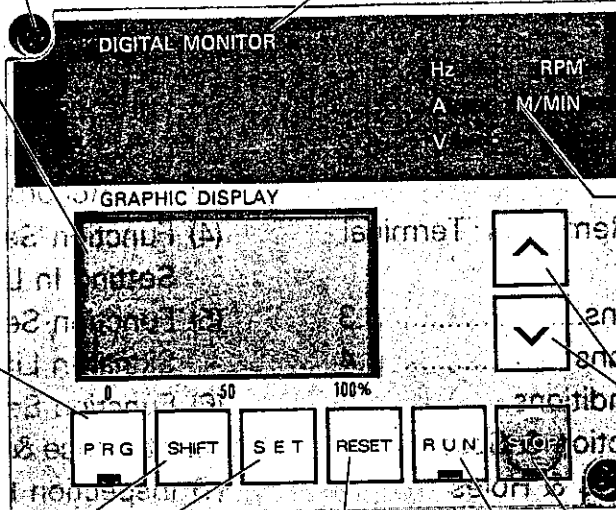
Up-Down Keys

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

1. Introduction

Thank you for purchasing the FUJI "FVR-G7S" inverter. This inverter uses 32 bit DSP for multi-function and high performance in every field.
This instruction manual is included with the inverter and equipment, and is provided for the use of the end user. Please be sure it accompanies the inverter.
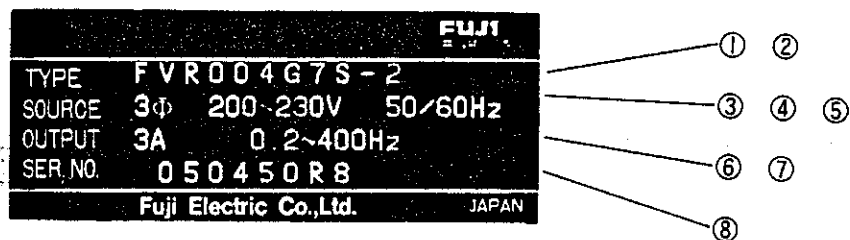
2. Inspection Items Upon Delivery

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

Name Plate

```
FUJI
TYPE    FVR004G7S-2                            ① ②
SOURCE  3Φ   200-230V    50/60Hz               ③ ④ ⑤
OUTPUT  3A        0.2~400Hz                     ⑥ ⑦
SER.NO.   05045OR8                              ⑧
        Fuji Electric Co.,Ltd.        JAPAN
```

① Applicable Motor:
004→0.4kw
008→0.75kw
015→1.5kw
022→2.2kw
037→3.7kw
055→5.5kw
075→7.5kw
110→11kw
150→15kw
185→18.5kw
220→22kw

② Power Series : 2 → 200V series
           : 4 → 400V series

③ Phase: 3ø → 3 phases

④ Voltage range
    200 ~ 230V → AC200V series
    380 ~ 460V → AC400V 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→037(3.7kw)
17A→037(3.7kw)	13A→055(5.5kw)
25A→055(5.5kw)	18A→075(7.5kw)
33A→075(11kw)	24A→110(11kw)
46A→110(11kw)	30A→150(15kw)
59A→150(15kw)	39A→185(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, for improved adverse environment resistance. Also, with the detachable wiring lead-in plate, wiring can be easily performed.
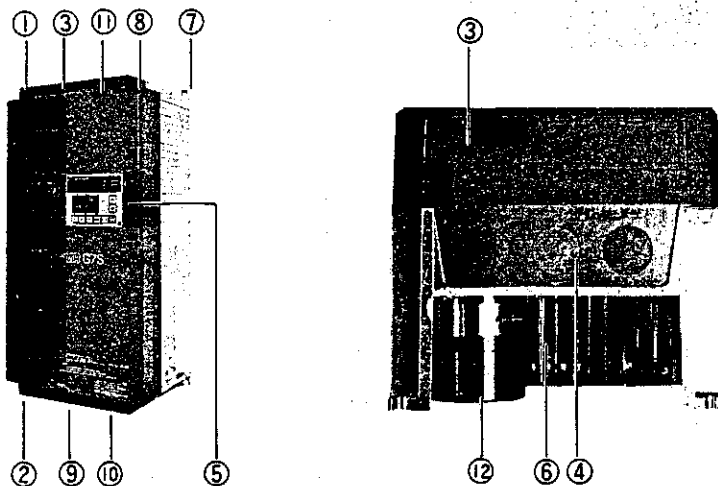
(1) Part Name
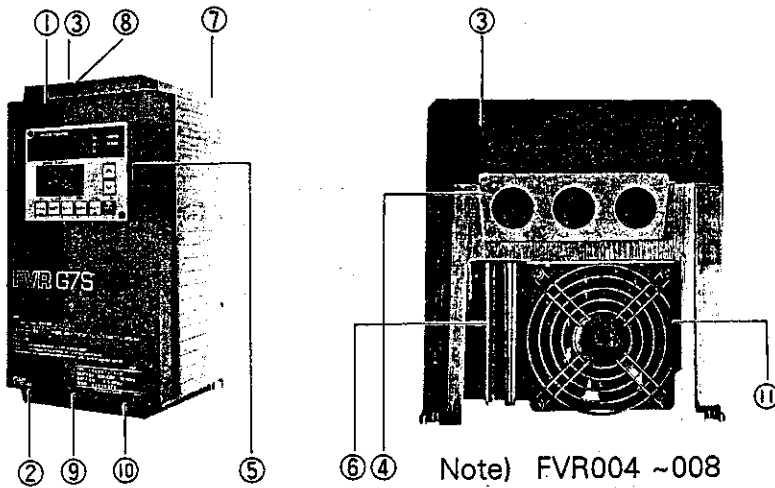
FVR004 ~ 037G7S-2
FVR008 ~ 037G7S-4

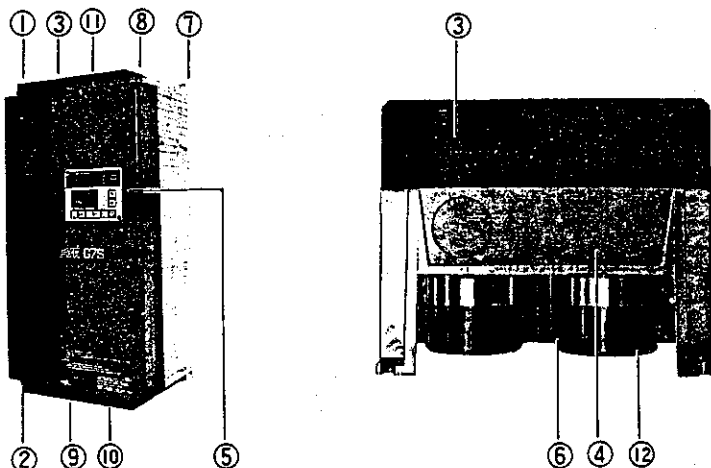Note) FVR004 ~008 models are not equipped with cooling fans.

① Unit Cover
② Terminal Cover
③ Ventilation Cover
④ Wiring Lead-in Plate
⑤ Operation Panel
⑥ Cooling Fins
⑦ Mounting Screw Holes
⑧ Unit Cover Screws
⑨ Terminal Cover Screws
⑩ Rating Name Plate
⑪ Cooling Fan
(except FVR004 - 008)
Rubber Bushings (included)

FVR055 ~ 075G7S-2
FVR055 ~ 075G7S-4

① Unit Cover
② Terminal Cover
③ Ventilation Cover
④ Wiring Lead-in Plate
⑤ Operation Panel
⑥ Cooling Fins
⑦ Mounting Screw Holes
⑧ Unit Cover Screws
⑨ Terminal Cover Screws
⑩ Rating Name Plate
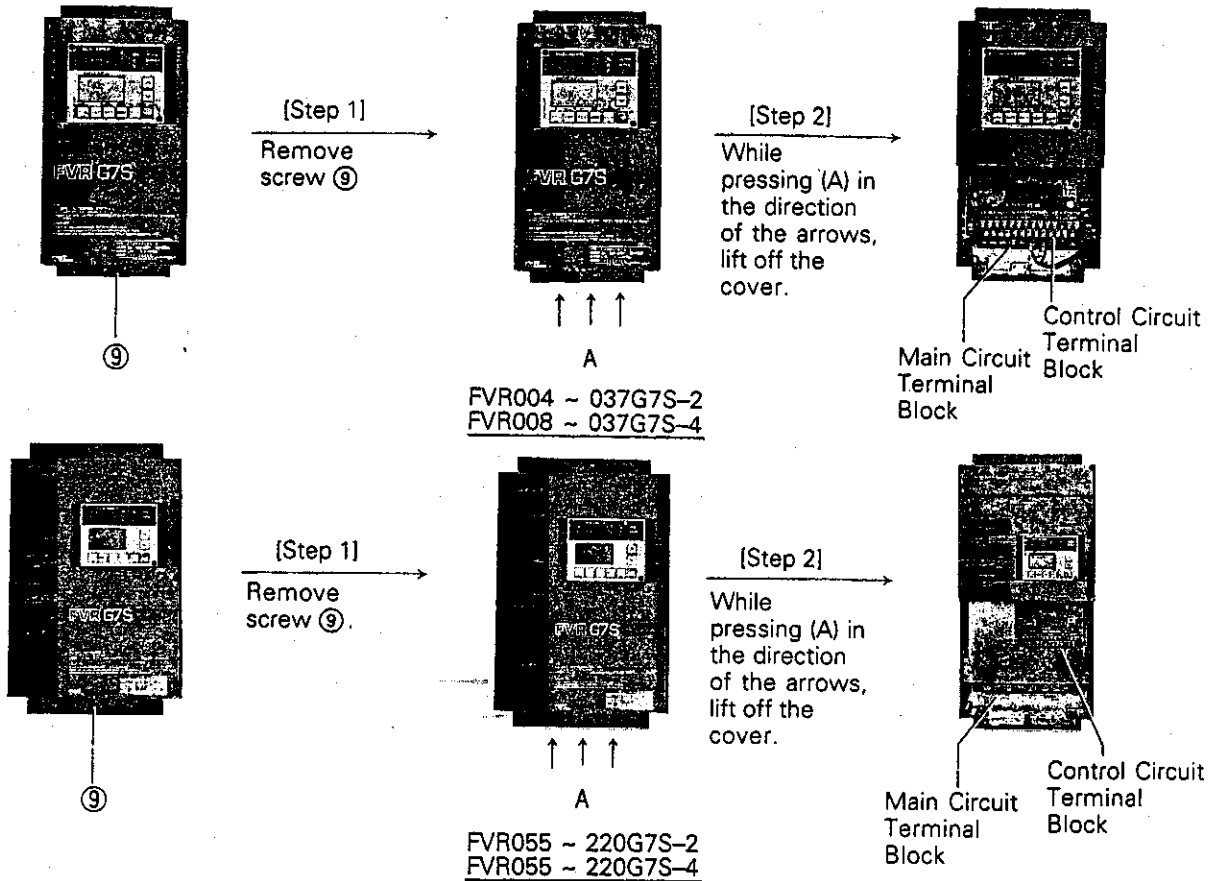⑪ Cooling Fan
⑫ Electrolytic Condenser
Rubber Bushings (included)

FVR110 ~ 220G7S-2
FVR110 ~ 220G7S-4

① Unit Cover
② Terminal Cover
③ Ventilation Cover
④ Wiring Lead-in Plate
⑤ Operation Panel
⑥ Cooling Fins
⑦ Mounting Screw Holes
⑧ Unit Cover Screws
⑨ Terminal Cover Screws
⑩ Rating Name Plate
⑪ Cooling Fan
⑫ Electrolytic Condenser
Rubber Bushings (included)

(2) Installation & Removal Terminal Cover

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

[Step 1]
Remove screw ⑨

⑨

[Step 2]
While pressing (A) in the direction of the arrows, lift off the cover.

A

FVR004 ~ 037G7S–2
FVR008 ~ 037G7S–4

Main Circuit Terminal Block

Control Circuit Terminal Block

[Step 1]
Remove screw ⑨.

⑨

[Step 2]
While pressing (A) in the direction of the arrows, lift off the cover.

A

FVR055 ~ 220G7S–2
FVR055 ~ 220G7S–4

Main Circuit Terminal Block

Control Circuit Terminal Block

4. Operating Precautions

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

① **Do not impress power supply voltage that exceeds the standard specification voltage permissible fluctuation. If excessive voltage is applied to the inverter, damage to the internal elements will result.**

② **Do not connect power source to the output terminals (U, V, W). Connect power source only to the power terminals (R, S, T).**

③ **Do not connect power source to the breaking resistor connection terminals (P, DB). Never short-circuit between P-N or P-DB terminals, and do not connect any resistance with a resistance value (Ω) less than standard application breaking resistor.**

④ **Do not connect AC power source voltage to the control circuit terminals (except 30A, B, C).**

⑤ **For RUN and STOP, use the FWD-CM (forward) and REV-CM (reverse) terminals. Avoid using a contactor (ON/OFF) installed on the line side of the inverter for RUN and STOP.**

⑥ **Do not use a magnet switch on the output side of the inverter for ON/OFF operation.**

⑦ **Use only power capacity within the inverter capacity range of 1.5 times to 500kVA. If a power capacity greater than 500KVA is to be used, install a coordination reactor (ACR...option) on the line side of the inverter.**

⑧ **Do not connect a phase advance condenser to the output side of the inverter.**

⑨ **Do not operate without the ground wire connected.**

⑩ **If the inverter protective function is activated, consult Section 11 "Troubleshooting", and after correcting the problem, resume operation. Do not reset the alarm automatically by external sequence, etc.**

⑪ **Do not perform a megger test between the inverter terminals or on the control circuit terminals.**

5. Installation Instructions

(1) Installation Conditions

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

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

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

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

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

(2) Installation Direction & Mounting Space
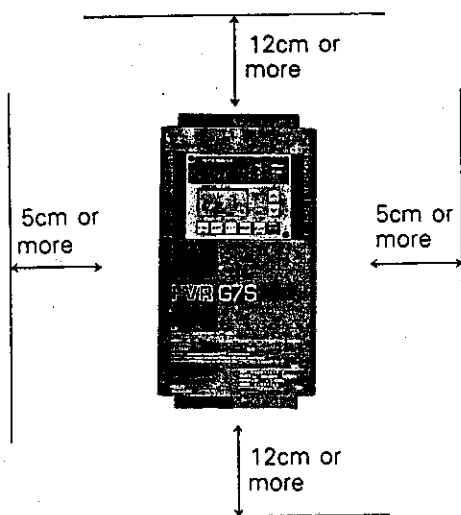
① Installation Method
Install the inverter perpendicular to the ground, and with the lettering "FVR-G7S" right side up. If the inverter is installed up side down, or horizontally, heat build-up will occur.

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

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

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

(3) Mounting Screws & Holes

① Mounting screws or bolts should be M5 or M8.

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

Ambient Temperature Cautions

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

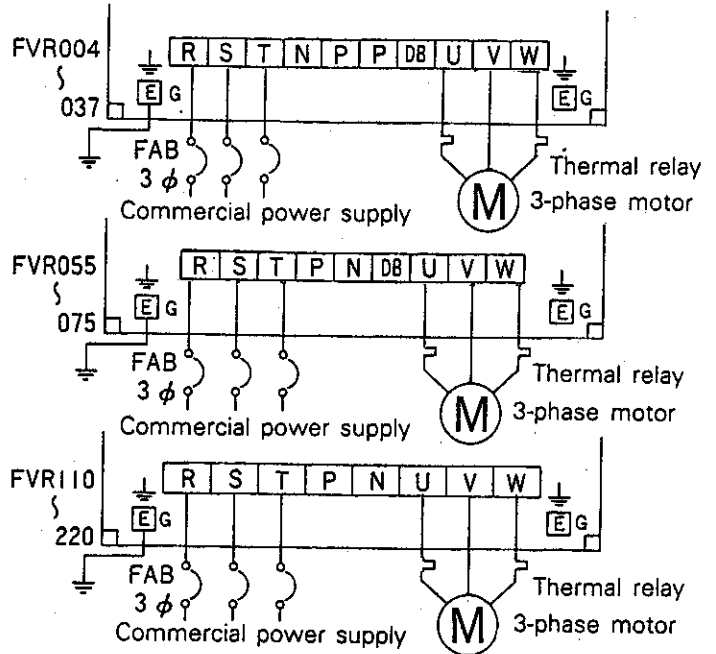---

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

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

6. Wiring

(1) Main Circuit Wiring

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

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

③ Ground terminal connection (E, (G))
For safety reasons, do not operate without the unit being grounded. The ground wire must be as thick and short as possible as shown in the Applicable Wiring Equipment List (see Section 12 Appendix).
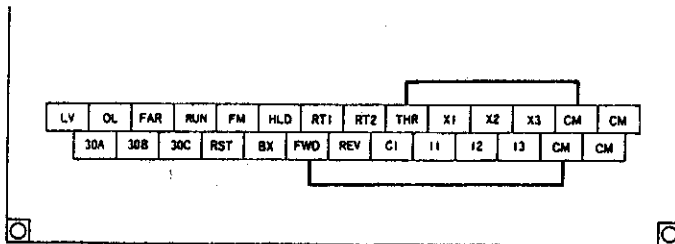

FVR004 ~ 037 — R S T N P P DB U V W / FAB 3φ / Commercial power supply / Thermal relay / 3-phase motor

FVR055 ~ 075 — R S T P N DB U V W / FAB 3φ / Commercial power supply / Thermal relay / 3-phase motor

FVR110 ~ 220 — R S T P N U V W / FAB 3φ / Commercial power supply / Thermal relay / 3-phase motor

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

(2) Control Circuit Wiring

① Factory wiring at the time of shipment

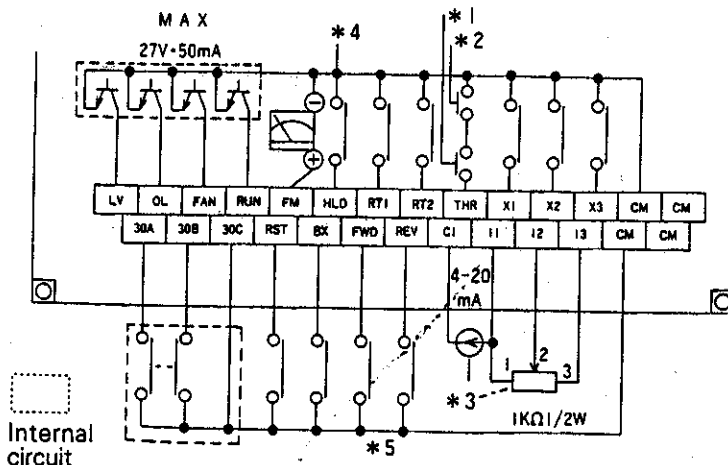The operation as well as the frequency is through the keypad panel.

RUN : Starts operation
STOP : Stops operation,
[∧][∨]: frequency setting

| LV | OL | FAR | RUN | FM | HLD | RTI | RT2 | THR | XI | X2 | X3 | CM | CM |
| 30A | 30B | 30C | RST | BX | FWD | REV | CI | II | I2 | I3 | CM | CM |

* Function setting 1500,1600 Operation as shown above is possible with the factory setting. The frequency is set at 60Hz at the time of shipment.
* For functions, see Section 9, (1) and (2).

② Operation through control circuit terminals (external operation)

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

MAX 27V·50mA

| LV | OL | FAN | RUN | FM | HLD | RTI | RT2 | THR | XI | X2 | X3 | CM | CM |
| 30A | 30B | 30C | RST | BX | FWD | REV | CI | II | I2 | I3 | CM | CM |

4-20 mА
1KΩ1/2W

Internal circuit

* 1) External braking resistor unit thermostat (contact B)
* 2) Motor protective thermostat (contact B)
* 3) When the current setting and the voltage setting are input at the same time, the setting will be their resultant total valve. (when the function setting is 1602)
* 4) When 3-wire 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, operation will 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 only 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 7.5kW)
  ★ Option 2: Braking unit (MCA III-BU) and DB braking resistor (11 to 22kW)

FVR004 ~ 037G7S-2
FVR008 ~ 037G7S-4

★ 1 Braking resistor
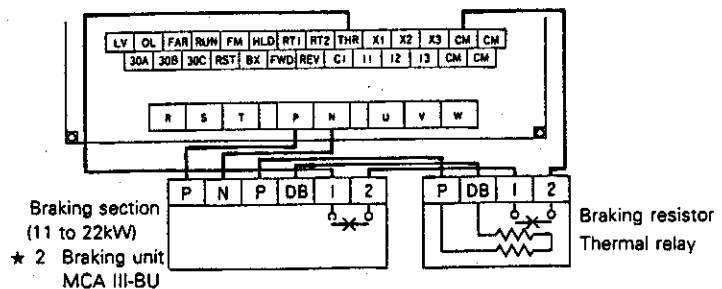
Braking resistor
Thermal relay
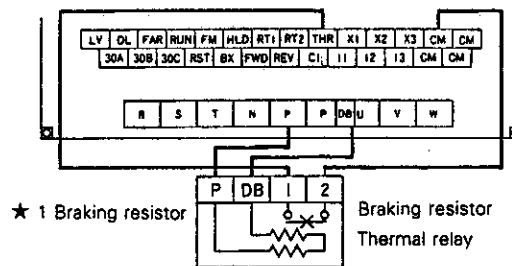
FVR055 ~ 075G7S-2
FVR055 ~ 075G7S-4
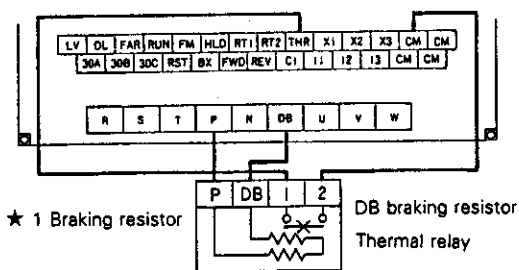
★ 1 Braking resistor

DB braking resistor
Thermal relay

FVR110 ~ 220G7S-2
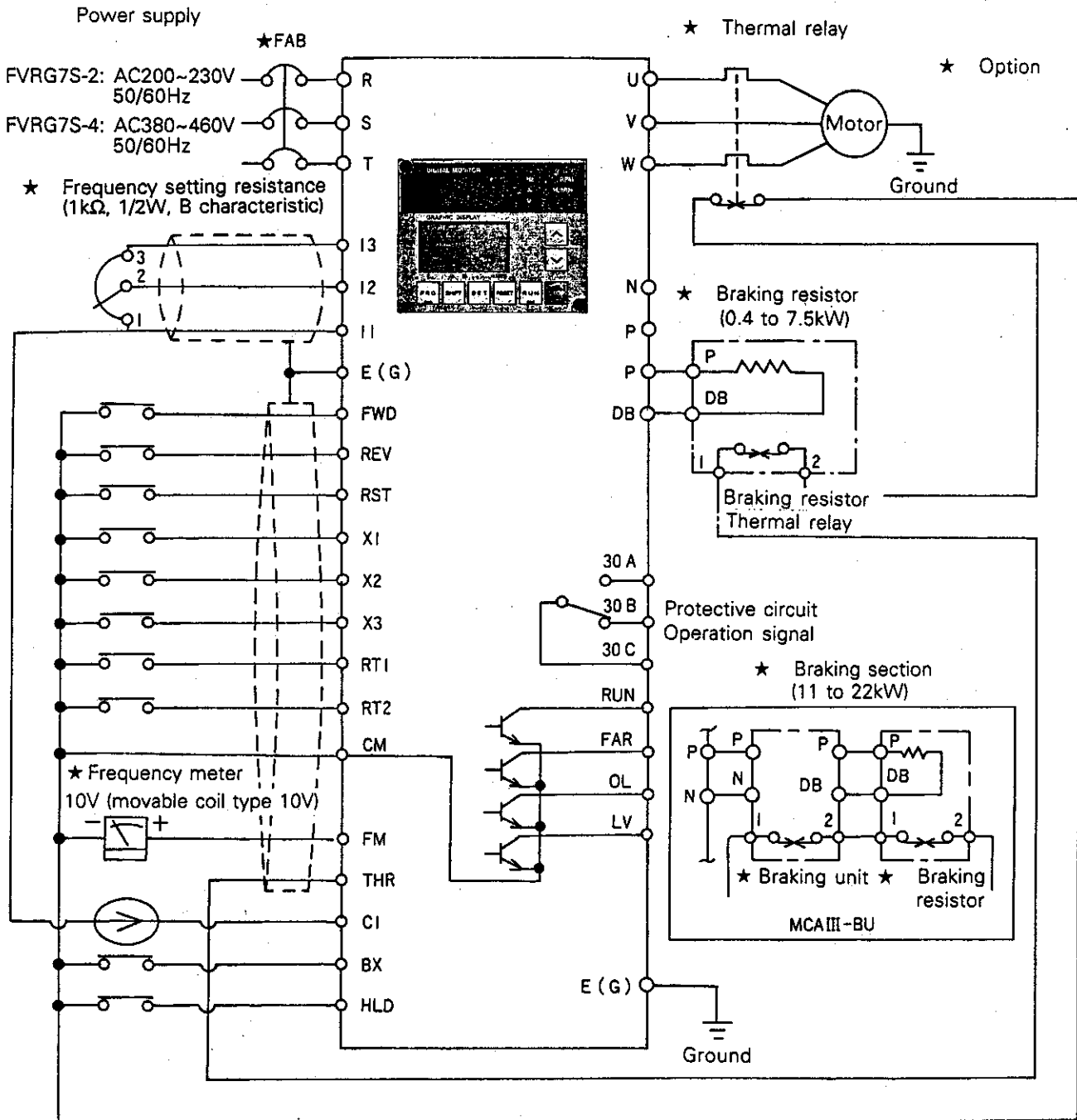FVR110 ~ 220G7S-4

Braking section
(11 to 22kW)
★ 2 Braking unit
MCA III-BU

Braking resistor
Thermal relay

[Caution Notes]

1. **If the P-DB terminals, or the P-N terminals are inadvertently short-circuited, damage to the inverter will result.**
2. **For those inverters without an internal DB transistor, the external braking resistor cannot be used. (With the exception of those below 7.5kW. If over 11kW, a braking unit and braking resistor are required.)**
3. **When using an external braking resistor with less than 7.5kW, first remove the inverter internal braking resistor terminals from P and DB, and then connect the external DB braking resistor to the P and DB terminals. (Caution: The internal braking resistor terminals which have been removed, must be protected with insulation.)**

(4) Basic Connection Diagram

Power supply

★FAB

FVRG7S-2: AC200~230V 50/60Hz
FVRG7S-4: AC380~460V 50/60Hz

★ Thermal relay

★ Option

Motor

Ground

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

R S T

13 12 11

E (G)

FWD
REV
RST
X1
X2
X3
RT1
RT2
CM

★ Frequency meter 10V (movable coil type 10V)

FM
THR
CI
BX
HLD

U V W

N
P
P
DB

★ Braking resistor (0.4 to 7.5kW)

P DB 1 2

Braking resistor Thermal relay

30 A
30 B
30 C

Protective circuit Operation signal

RUN
FAR
OL
LV

★ Braking section (11 to 22kW)

P N DB DB 1 2 1 2

★ Braking unit ★ Braking resistor

MCAIII-BU

E (G)

Ground

[Caution Notes]

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

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

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

7. Keypad Panel

(1) 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.
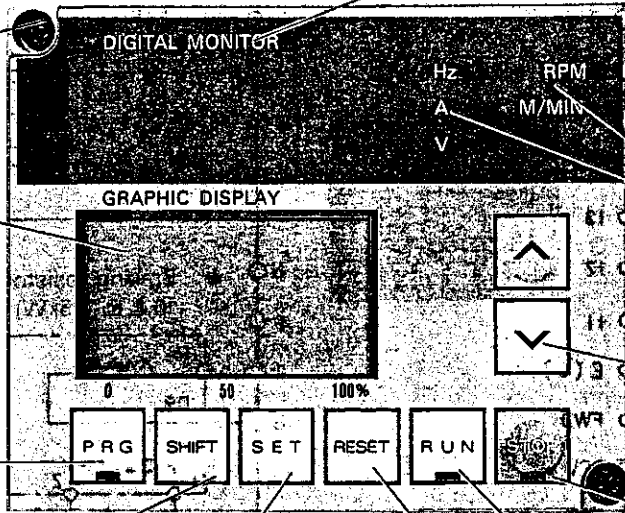
Graphic Display

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 (PGR) Key

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

ディ: 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 Display

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.

STOP Key

This key is used for stopping operation. The key will light up when in STOP mode.
This key does not function when data code selection is in terminal block operation $\boxed{15\ 01}$, or link operation $\boxed{15\ 02}$.

SHIFT Key

When program key is in normal 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 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 $\boxed{15\ 01}$, or link operation $\boxed{15\ 02}$.

(2) Controlling Method of Keypad Panel

When the supply power is activated, the operation panel display will be as shown in the figure on the right. If the $\boxed{RUN}$ key is pressed at this point, operation will be at 60Hz according to the function code set at the factory. Use the $\boxed{STOP}$ key to halt operation. For wiring connections, see the basic wiring diagram in Page 7.
To change the function code, use the following procedure.
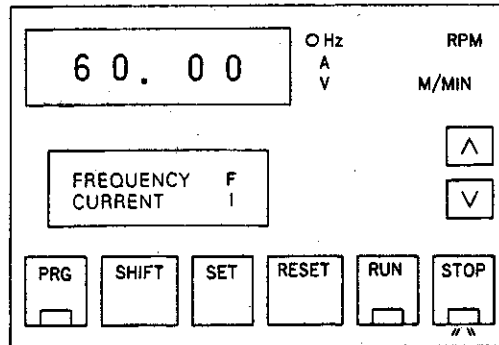
1) Selection of Function Code (LED lights)

Use the $\boxed{PRG}$ key to set program mode.
The Program mode is shown in the chart to the right.

One of the function codes; $\boxed{2}\boxed{2}\boxed{0}\boxed{0}$ (basic function),

$\boxed{2}\boxed{2}\boxed{0}\boxed{1}$ (standard function), or $\boxed{2}\boxed{2}\boxed{0}\boxed{2}$ (high level function) will be selected for the degree of complexity.

Each time the $\boxed{SHIFT}$ key is pressed, it changes the function code in the direction of the arrows as shown at right. (Example: $\boxed{0}\boxed{0}$ → $\boxed{0}\boxed{4}$ → $\boxed{0}\boxed{8}$)

The $\boxed{\Lambda}\boxed{V}$ keys change the function code in the vertical direction as shown at right.

(Example: $\boxed{0}\boxed{0}$ ↔ $\boxed{0}\boxed{1}$ ↔ $\boxed{0}\boxed{2}$)

2) Data Code Selection

After selecting the function codes, press the $\boxed{SET}$ key and the $\boxed{\Lambda}\boxed{V}$ keys change the data code.

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

High Level Function
Function code $\boxed{2}\boxed{2}\boxed{0}\boxed{2}$

Standard Function
Function code $\boxed{2}\boxed{2}\boxed{0}\boxed{1}$

Basic Function
Function code $\boxed{2}\boxed{2}\boxed{0}\boxed{0}$

(3)　Display & Key Operation

Normal operation	○ RUN frequency setting method (digital setting) ● Function setting 　RUN mode (15) 　00 or 01 　Frequency command (16) 　00	△ ▽ keys change operation frequency setting	

<table>
<tr><td rowspan="3" style="writing-mode:vertical-lr">Normal operation</td><td>○ RUN frequency setting method (digital setting)
● Function setting
　RUN mode (15)
　00 or 01
　Frequency command (16)
　00</td><td colspan="3">△ ▽ keys change operation frequency setting
<table>
<tr><td></td><td>One digit shift to the left resolution</td><td>Normal resolution</td></tr>
<tr><td>Maximum frequency: to 60Hz</td><td>0.002Hz</td><td>0 ~ 10.00Hz ~ 60.00Hz
0.01Hz　0.1Hz</td></tr>
<tr><td>Maximum frequency: 60Hz to 300Hz</td><td>0.01 Hz</td><td>0 ~ 10.00Hz ~ 100.0Hz ~
0.01Hz　0.1Hz　1Hz</td></tr>
<tr><td>Maximum frequency: 300Hz to 400Hz</td><td>0.02 Hz</td><td>0 ~ 10.00Hz ~ 100.0Hz ~
0.02Hz　0.1Hz　1Hz</td></tr>
</table>
SET key for writing operation frequency (STOP mode only)
(must be in frequency display mode)</td></tr>

<tr><td>○ DIGITAL MONITOR
● Function setting
　Digital monitor (00)
　00: Frequency
　01: Output current
　02: Output voltage
　03: Synchronous rpm
　04: Line speed</td><td colspan="3">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 rpm display
　↓
SHIFT key: Line speed display</td></tr>

<tr><td>○ GRAPHIC MONITOR
● Function setting
　Graphic monitor (01)</td><td>00</td><td colspan="2">Output frequency & output current level display (10 levels)
FREQUENCY　　F
■■■■■■■■■■
CURRENT　　　I
■■■■■■■■■■</td></tr>

<tr><td></td><td>01</td><td colspan="2">Control terminal block display 1
■FWD　　■RT1
■REV　　■RT2
■HLD</td></tr>

<tr><td></td><td>02</td><td colspan="2">Control terminal block display 2
■LV　　■X1
■OL　　■X2
■FAR　■X3
■RUN</td></tr>
</table>

<table>
<tr><td rowspan="4" style="writing-mode:vertical-lr">Program mode</td><td>○ DIGITAL MONITOR</td><td>●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</td></tr>
<tr><td></td><td>●Data Display
　SET key: Data read-out
　△ · ▽ keys: Data change (update)
　　　△ : data plus 1
　　　▽ : data minus 1
　SET key: Data write (After data write, do not turn power supply off for 5 sec.)
　RESET key: End data change</td></tr>
<tr><td>○ GRAPHIC MONITOR</td><td>●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.</td></tr>
<tr><td></td><td>●Data Display Mode
　SET key: Data read-out
　△ · ▽ keys: Data change (update)
　　　△ : data plus
　　　▽ : data minus
　SET key: Data write (After data write, do not turn power supply off for 5 sec.)
　RESET key: End data change (returns to function code display)</td></tr>
</table>

<table>
<tr><td rowspan="2" style="writing-mode:vertical-lr">Trip Mode</td><td>○ DIGITAL MONITOR</td><td>Current trip data display
　OC1, OC2, OC3, OV, LV, OH1, OH2
　OL1, Err1, Err2, Err3, Err4
RESET key: Trip reset</td></tr>
<tr><td>○ GRAPHIC MONITOR</td><td>Trip condition display
　F = XXX.XHz　　　　　　0 = LV
　I = X.XA　　　　　　　　-1 = OV
　V= XXXV　SHIFT　　　 -2 = OC1
Temperature = XX°C　　　 -3 = OH2

Trip record display
　(current)
　(time before)
　(2 times before)
　(3 times before)</td></tr>
</table>

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.

(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	`1 5 0 0`	[∨] [∧] keys	`1 6 0 0`
2			VR or analog signal (DC 0 to +10V)	`1 6 0 1`
3			Analog signal (DC4 to 20mA)+(DC0 to 10V)	`1 6 0 2`
4	External Signal Method (FWD, REV)	`1 5 0 1`	[∨] [∧] keys	`1 6 0 0`
5			VR or analog signal (DC 0 to +10V)	`1 6 0 1`
6			Analog signal (DC4 to 20mA)+(DC0 + 10V)	`1 6 0 2`

Multistage frequency operation (8 stages possible)
- For RUN/STOP and manual speed frequency setting, the function codes are `1 5`, `1 6` for setting as above.
- For the 1st to the 7th stage frequencies, the function codes are `2 9` `3 1` `3 3` `3 5` `3 7` `3 9` `4 1` and then select the external terminal (X1, X2, X3).

(4) Data Setting Method

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

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

---

① Data change setting in STOP mode

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

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

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

Different block

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

Same block

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

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

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

|0|0|0|1|

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

| RESET | Returns to function code block change mode

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

NO

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

② **Data change setting in RUN mode**

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

After end of data setting, press | PRG | **key to return to frequency display.**

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(5) Control Circuit Connection & Operation

① **Factory connections**

LV	OL	FAR	RUN	FM	HLD	RTl	RT2	THR	Xl	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	Cl	Il	l2	l3	CM	CM
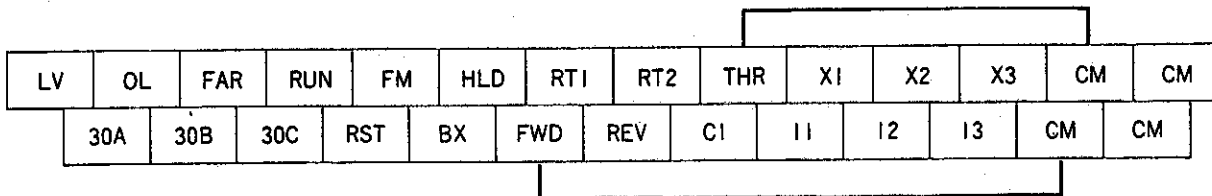
* $\boxed{1}\boxed{5}\boxed{0}\boxed{0}$, $\boxed{1}\boxed{6}\boxed{0}\boxed{0}$ Basic connection required for

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

LV	OL	FAR	RUN	FM	HLD	RTl	RT2	THR	Xl	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	Cl	Il	l2	l3	CM	CM
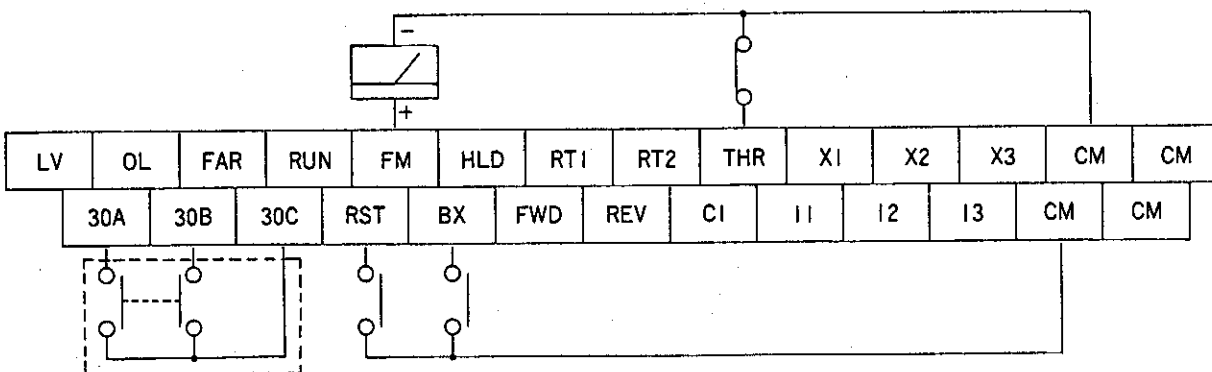
Internal circuit

- 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 when inverter STOP is desired through external alarm.
- RST.................................... Connects to RESET key for alarm STOP reset
- BX .... Connects to "a" contact signal when inverter free-run is desired during normal operation.

③ **Operation Through Operation Panel** (1500)
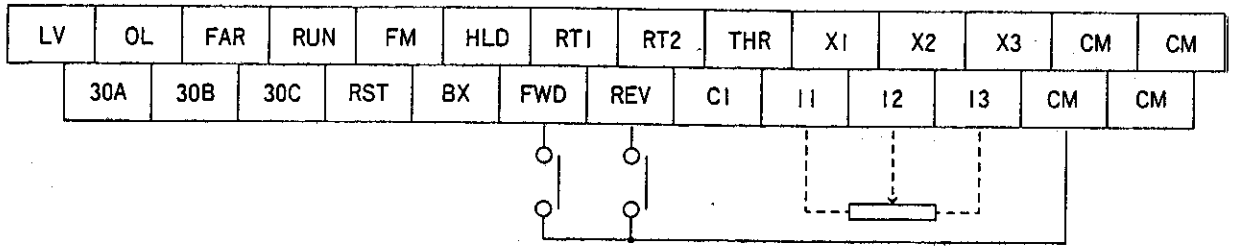
LV	OL	FAR	RUN	FM	HLD	RTI	RT2	THR	XI	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	CI	11	12	13	CM	CM

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 : $\wedge$ $\vee$ keys for digital setting
   1601 : Connection of 1kΩ(1/2W) rheostat to 13, 12, 11 terminals; or input of DC 0 to +10V DC voltage signals to terminals 12, 11(12 is +.)
   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)
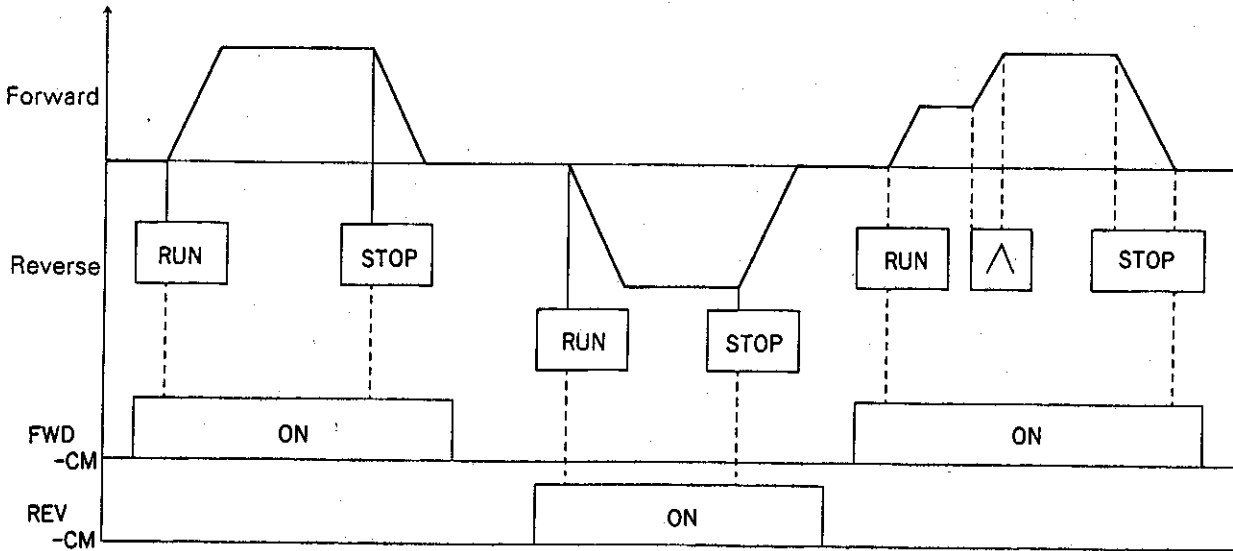
* When FWD-CM, REV-CM are both ON or OFF, deceleration STOP will result.

④ **External Signal Operation (** $\boxed{1\ 5\ 0\ 1}$ **)**
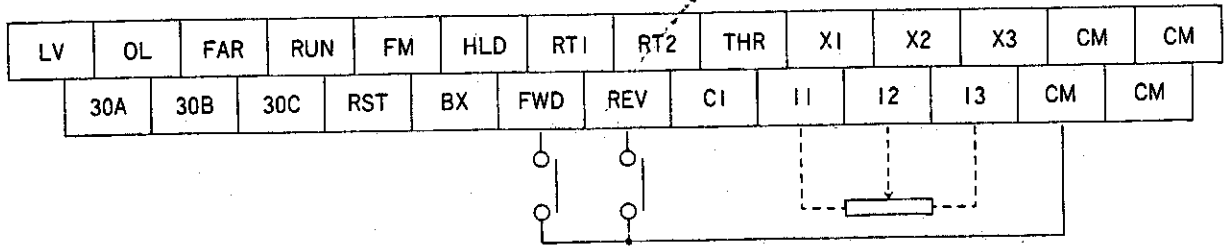
LV	OL	FAR	RUN	FM	HLD	RT I	RT2	THR	X I	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	CI	I I	I2	I3	CM	CM

a. Common terminal connections are as explained in (5)-②.
b. Rotation direction: short circuit between FWD-CM for forward rotation, short circuit between REV-CM for reverse rotation.
c. For frequency setting, the same 3 types can be selected as in (5)-③.
d. RUN Operation Example
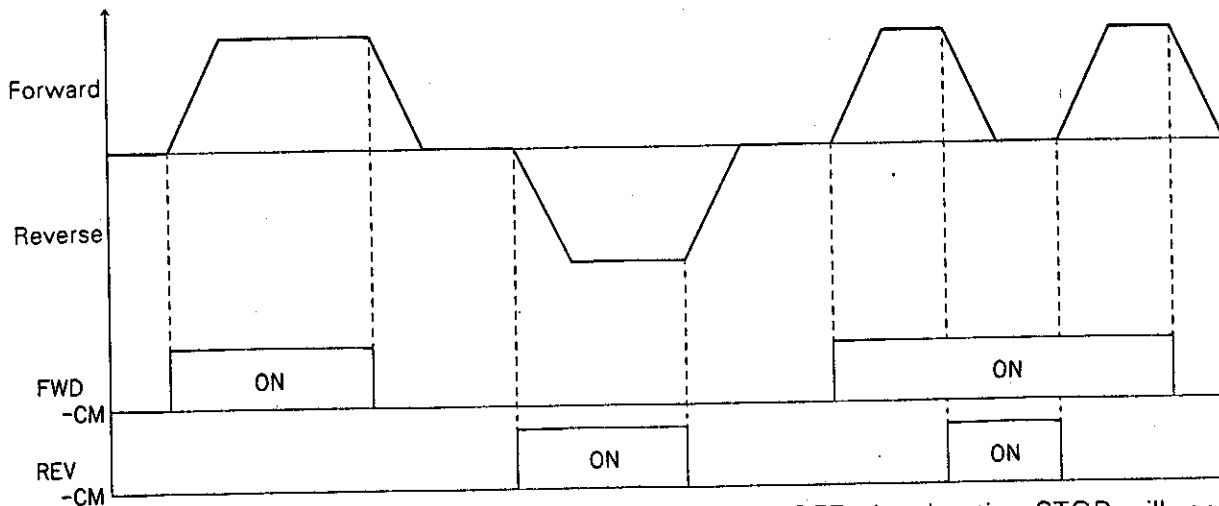
* When FWD-CM, REV-CM are both ON or OFF, deceleration STOP will result.

(6) Actual Operation

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

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

LV	OL	FAR	RUN	FM	HLD	RTI	RT2	THR	XI	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	CI	I1	I2	I3	CM	CM

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

b. The settings are: $\boxed{2\,9}$ for multi-step frequency 1, $\boxed{3\,I}$ for multi-step frequency 2, $\boxed{3\,3}$ for multi-step frequency 3, $\boxed{3\,5}$ for multi-step frequency 4, $\boxed{3\,7}$ for multi-step frequency 5, $\boxed{3\,9}$ for multi-step frequency 6, and $\boxed{4\,I}$ for multi-step frequency 7.

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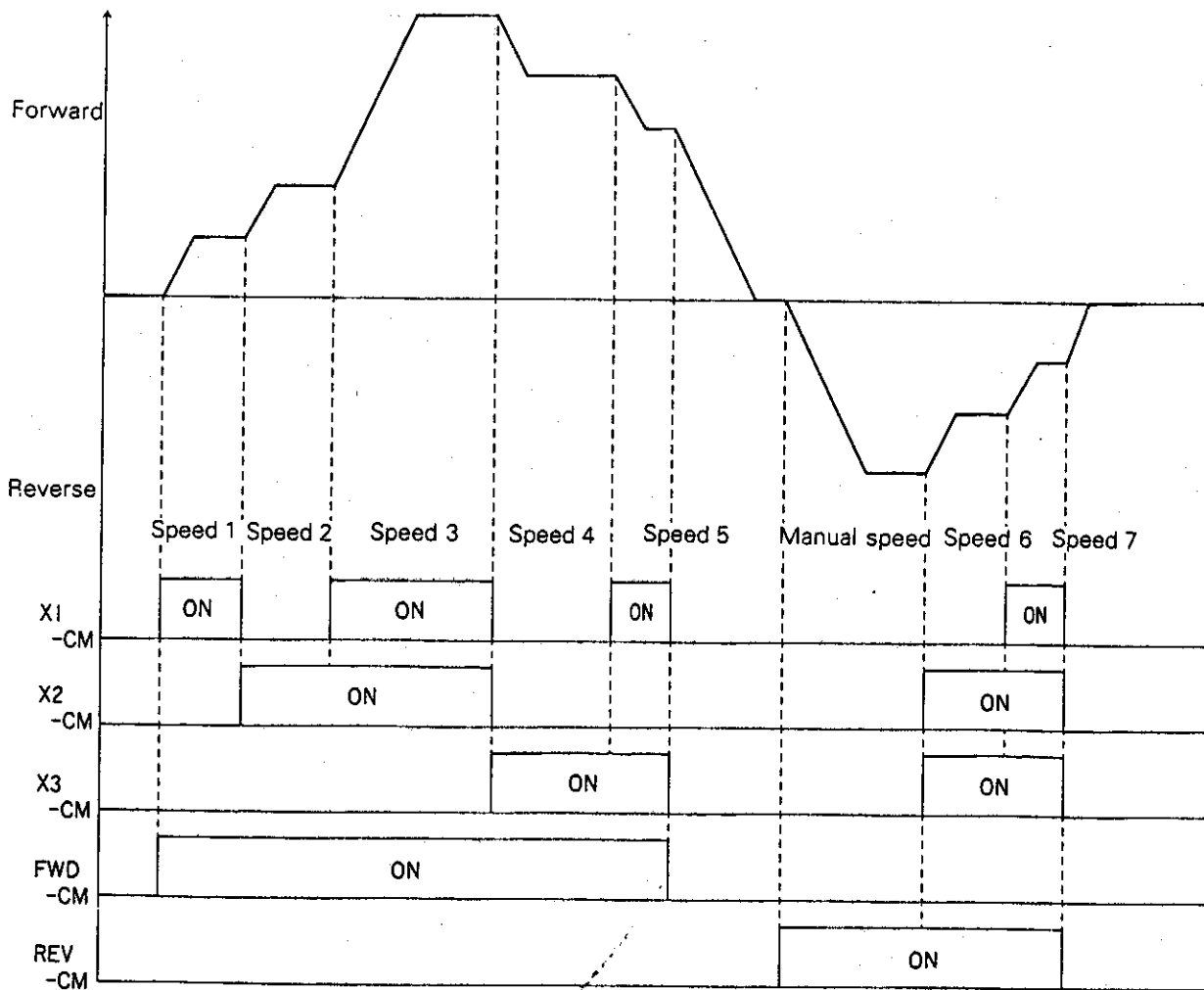
② Step Acceleration. Deceleration Operation (RT1, RT2 terminals)

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

LV	OL	FAR	RUN	FM	HLD	RTI	RT2	THR	XI	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	CI	I1	I2	I3	CM	CM
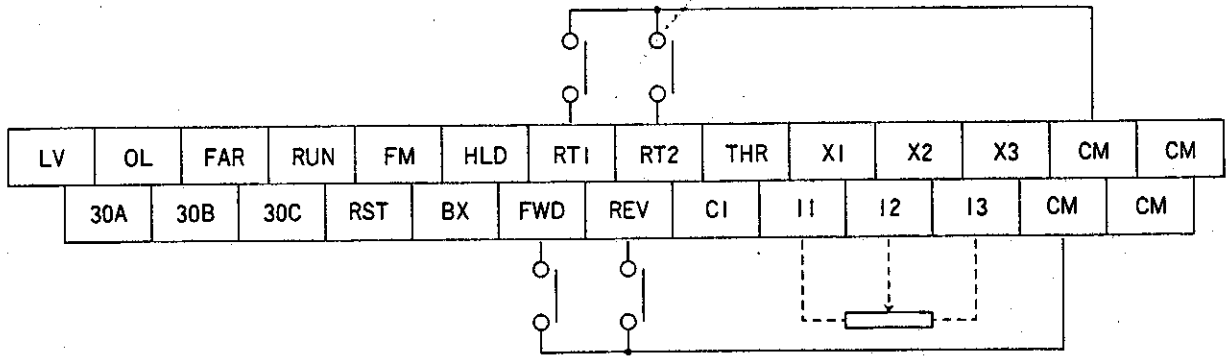
a. Setting is $\boxed{1}\boxed{5}$ for operation method, and $\boxed{1}\boxed{6}$ for manual frequency setting method.

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

c. RUN Operation Example
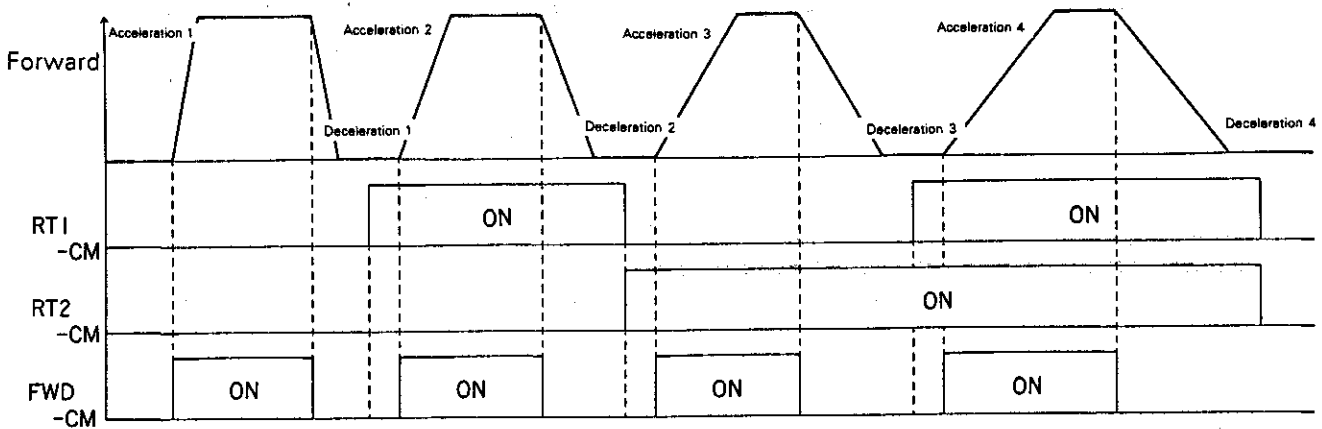
③ Pattern Operation

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

LV	OL	FAR	RUN	FM	HLD	RTI	RT2	THR	XI	X2	X3	CM	CM
	30A	30B	30C	RST	BX	FWD	REV	CI	I1	I2	I3	CM	CM
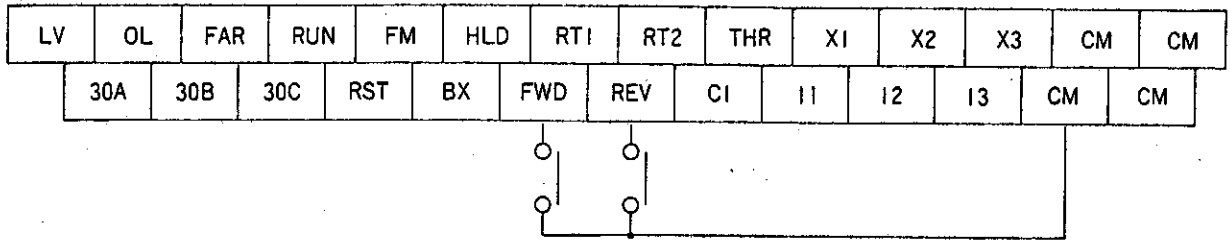
a. With function 1901 pattern operation can be selected. (With 1900 data 30, 32, 34, 36, 38, 40 and 42 cannot be accessed.)

b. 29 sets the frequency setting for Multistep Frequency 1 and sets the rotation direction, and acceleration/deceleration time. 30 sets the time for the Multistep Frequency 1 timer.
31 sets the frequency setting for Multistep Frequency 2 and sets the rotation direction, and acceleration/deceleration time. 32 sets the timer for the Multistep Frequency 2 timer.

33 sets the frequency setting for Multistep Frequency 3 and sets the rotation direction, and acceleration/deceleration time. 34 sets the time for the Multistep Frequency 3 timer.

35 sets the frequency setting for Multistep Frequency 4 and sets the rotation direction, and acceleration/deceleration time. 36 sets the time for the Multistep Frequency 4 timer.
37 sets the frequency setting for Multistep Frequency 5 and sets the rotation direction, and acceleration/deceleration time. 38 sets the time for the Multistep Frequency 5 timer.

39 sets the frequency setting for Multistep Frequency 6 and sets the rotation direction, and acceleration/deceleration time. 40 sets the time for the Multistep Frequency 6 timer.
41 sets the frequency setting for Multistep Frequency 7 and sets the rotation direction, and acceleration/deceleration time. 42 sets the time for the Multistep Frequency 7 timer.

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

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c. When in operation 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 control terminal operation mode (1501)
FWD-CM ON : starts pattern operation
FWD-CM OFF : force stops pattern operation
REV-CM ON : temporarily stops pattern operation

9. Function Explanation

(1) Function Code Tables

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

① Initial Setting

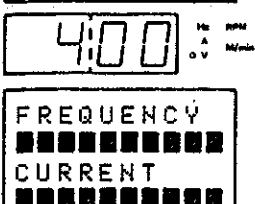| GRAPHIC DISPLAY	Function Code	Function	Display· Setting· Range	Minimum Unit	Factory Setting	Remarks
00 ■ DGTL MNTR GRHC MNTR MTR SOUND FM CALIBR	00	LED digital monitor selection	00: output frequency [Hz] 01: output current [A] 02: output voltage [V] 03: synchronous rpm [rpm] 04: line speed [m/min]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

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

② Basic Functions

GRAPHIC DISPLAY	Function Code	Function	Display-Setting-Range	Minimum Unit	Factory Setting	Remarks
11 ■ MAX Hz BASE Hz RATED U MTR POLES	11	Maximum frequency	00 : 50Hz 01 : 60Hz 02 : 100Hz 03 : 120Hz 04 : free (Hz)	1Hz	01	04 (code) when setting (LCD) 0 ~400Hz
	12	Base frequency	00 : 50Hz 01 : 60Hz 02 : free (Hz)	1Hz	01	02 (code) when setting (LCD) 0 ~400Hz
	13	Rated output voltage	00 : 200V (400)* 01 : 220V (440) 02 : 230V (460) 03 : free (V)	1V	03 (0V)	03 (code) when setting (LCD) 0~230 (0~460)* 0V setting : no AVR
	14	Normal of motor poles	02.04.06.08. 10.12	—	04	02 : 2 pole, 04 : 4 pole, 06 : 6 pole, 08 : 8 pole, 10 : 10 pole, 12 : 12 pole
15 ■ OPR COMND Hz COMND ACC PTN H TRQ BRK	15	Operation command	00 : Keypad panel operation 01 : terminal block operation 02 : link operation	—	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 : weak 'S' shape 02 : strong 'S' shape	—	00	
	18	Normal/High torque dynamic brake	00 : normal brake 01 : hard brake	—	00	
19 ■ PTN OPR RESTART MNTR COEF FUNC BLK	19	Pattern operation	00 : nonoperate 01 : operate	—	00	
	20	Restart after instantaneous power failure	00 : nonoperate 01 : operate	—	00	
	21	Coefficient for line speed	(LCD) 0.00~200	0.0	0.01	
	22	Function blocks used	00 : up to basic function 01 : up to standard function 02 : up to high level function		00	

* ( ) : 400V series

③Standard Function

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

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

④ High Function
4.1 Terminal Function Change

GRAPHIC DISPLAY	Function Code	Function	Setting Data	Standard Function Terminals	Function Change Terminals	Data	Factory Setting	Other, LCD Display
63 ■ X1-X2-X3 HOLD FUNC LV-OL-FAR	63	X1, X2 and X3 terminal function	00	X1~X3		Multistep Speed (7 steps)	00	
			01	X1 X2	△Hz ▽Hz	0.002 Hz step addition 0.002 Hz step subtraction		External input frequency addition · subtraction
			02	X1	BrI	DC Brake ON		Brake selection
	64	FWD/REV command hold (3-wire control)	00 01 02	HLD	DRV TM	2 wire 3 wire Cycle operation signal selection	00	
	65	LV, OL and FAR terminal output code	00	Independent terminal definition		LV OL FAR — Function is determined by function code [66 to 68]	00	
			01		3 bit code	LV OL FAR — Multistep timer selection [0 to 7]		
66 ■ LV FUNC OL FUNC FAR FUNC	66	LV terminal function	00 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.
	67	OL terminal function	00 01 02	OL CL IP		Overload early warning signal Current-limiting monitoring signal Undervoltage or restarting signal	00	Accordingly, the data which has been set is ignored.
	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 signal 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

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

-21-
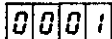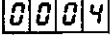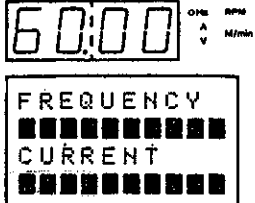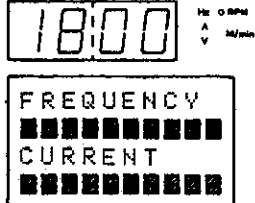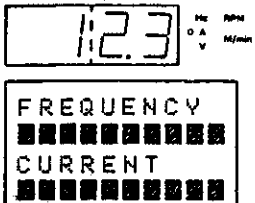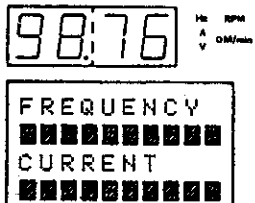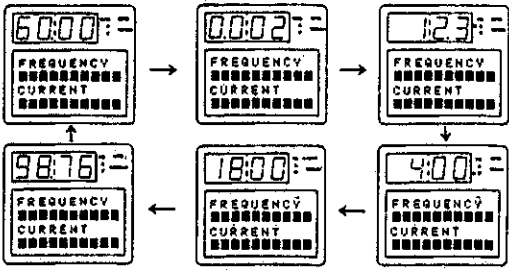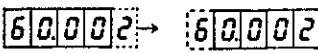
4.3 Option Function

GRAPHIC DISPLAY	Function code	Function	Display · Setting · Range	Data	Factory Setting	Other, LCD Display
76 ■ OPTION 1 　OPTION 2 　OPTION 3 　OPTION 4	76	Spares	00~99		00	
	77	Spares	00~99		00	
	78	Spares	00~99		00	
	79	Spares	00~99		00	
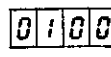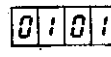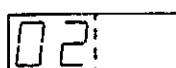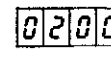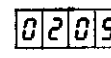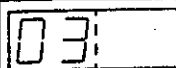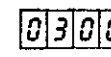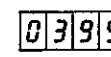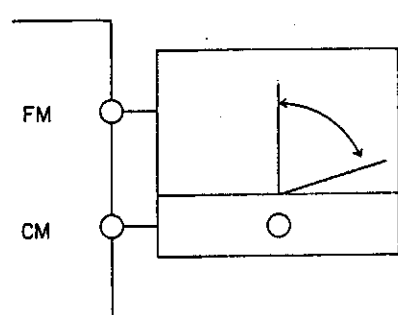
4.4 Link Function
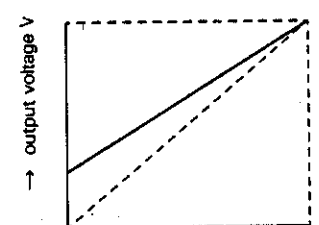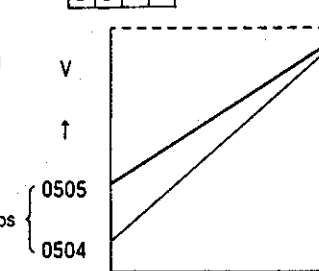
GRAPHIC DISPLAY	Function code	Setting Data	Function Name	Standard Function Terminals	Data	Factory Setting	Other, LCD Display
80 ■ FREQ BITS 　CODE 　OPR MODE	80	*Frequency Setting* 00	Aux. 1	X1 X2 X3 RT1	*Frequency Input* 4 bit binary input	00	resolution = max. frequency / 15
		01	Aux. 1 Aux. 2	X1 X2 X3 RT1	8 bit binary input		resolution = max. frequency / 255
		02	Aux. 1 Aux. 2 Aux. 3	X1 X2 X3 RT1	12 bit binary input		resolution = max. frequency / 4095
		00	Master	—	— 4 bit frequency input		Master X1, X2, X3 and RT1 are 4 bit binary inputs for inverter numbers [00 to 15].
		01			8 bit frequency input		Slave X1, X2, and X3 are for function setting by function code (63XX).
		02			12 bit frequency input		Slave RT1 and RT2 are standard function
81 　FREQ BITS ■ CODE 　OPR MODE (Advances on display by function code 7302 SET)	81	*Monitoring Signal* 00	Master	LV OL FAR RUN 30A 30B 30C	Output terminal data monitor	00	Master X1, X2, X3, and RT1 are 4 bit binary input for inverter numbers [00 to 15]. Designated inverter output terminal data (LV, OL, FAR, RUN) monitored at master. 30 A, B, C are — batch monitored. Set data is fixed at 00.
82 　FREQ BITS 　CODE ■ OPR MODE (Advances on display by function code 7303 SET)	82	*Link Operation* 00	Master	—	Operation Command		Individual / All can be operated from master keypad panel or terminal block. Slave operates via mater frequency setting as well as keypad command.
		01			Load Command		The master parameter (except function code : 71 to 75, 80 to 82) is transmitted Individual / All. Parameter transmission to slave in operation is not possible. (Err4 will be displayed on master)
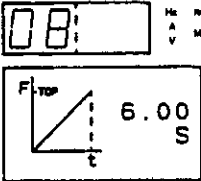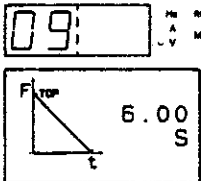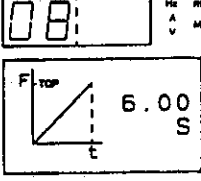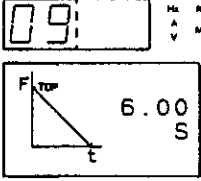
(2) Function Explanation

① Initial Setting

Function Code	Display	Function Explanation	Function Data
`00` Hz rpm / A V / M/min ■ DGTL MNTR GRHC MNTR MTR SOUND FM CALIBR LED Digital Monitor Selection	`0000`	After the power supply is turned on. or after completion of program, the 7 segment LED (4 digit) initial display data can be changed. Set frequency [Hz] (during STOP). output frequency [Hz] (during RUN) displayed	`00:00`
	`0001`	Output current [A] display (virtual value)	
	`0002`	Output voltage [V] display (virtual value)	
	`0003`	Synchronous rotation speed [rpm] display	
	`0004`	Line speed [m/min] display	

`60:00` Hz○RPM / A▽ M/min
```
FREQUENCY
■■■■■■■■■■
CURRENT
■■■■■■■■■
```

`18:00` Hz○RPM / A▽ M/min
```
FREQUENCY
■■■■■■■■■■
CURRENT
■■■■■■■■■■
```

`12.3` Hz○▽RPM / A▽ M/min
```
FREQUENCY
■■■■■■■■■■
CURRENT
■■■■■■■■■
```

`98:76` Hz RPM / A▽ O M/min
```
FREQUENCY
■■■■■■■■■■
CURRENT
■■■■■■■■■
```

`4:00` Hz RPM / A○▽ M/min
```
FREQUENCY
■■■■■■■■■■
CURRENT
■■■■■■■■■■
```

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

`60:00` → `0.0.02` → `12.3`
↑ `98:76` ← `18:00` ← `4:00` ↓

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)

`60.002` → `60.002`

Function Coda	Display	Function Explanation	Function Data

`01` Hz RPM M/min
 	
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
		
		`60:00` GHz RPM M/min
		FREQUENCY ■■■■■■■■■■
		CURRENT ■■■■■■■■■■
		
		`60:00` GHz RPM M/min
		■LV ■X1
		■OL ■X2
		■FAR ■X3
		■RUN
		
		`60:00` GHz RPM M/min
		■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 Control terminal monitor ON is indicated by ■.
		   No indication = OFF.
			`0100`

`02` Hz RPM M/min
 	
DGTL MNTR
GRHC MNTR
■ MTR SOUND
FM CALIBR
 	
Motor Noise Reduction
	`0200`
	~
	`0205`
		The sound quality of the sound produced by the motor can be changed.
		
		Select from 6 types depending on the operating conditions
			`0203`

`03` Hz RPM M/min
 	
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
		↓ Within this range regulation can be 1/100 resolution
		Approx. 10.3 V
		
		FM
		
		CM
			`0385`
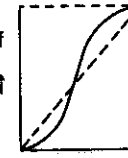
Function Coda	Display	Function Explanation	Function Data
`04` Hz RPM ↕ M/min ■ AUTO TRQ / TRQ BOOST / TRQ FINE / AUTO ACC — Automatic torque boost control	`0400` `0401`	Automatically regulates the output voltage to correspond to the operating load conditions. Nonoperate : operates at set torque boost value (`05`) Operate : auto torque boost	`0400`
`05` Hz RPM ↕ 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 reduction torque load use (fan, pump, etc.) Weak ↓ Strong → frequency characteristics f	`0513`
`06` Hz RPM ↕ 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` Strong V ↑ ⎰ 0505 10 steps ⎱ 0504 → f	`0600`
`07` Hz RPM ↕ 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, GD^2. The minimum times are 3 sec. for acceleration. and 8 sec. for deceleration. (0 ↔ 60Hz) Nonoperate (at `08` `09` operation is at set acceleration/deceleration time) Operate (auto acceleration/deceleration operation)	`0700`

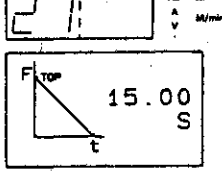| Function Code	Display	Function Explanation	Function Data
—		① For heavy inertia load. ② Does not function when momentary power failure restart [2][0][0][1] is active, or current limit [5][7][0][1] is selected. ③ Does not function for S time acceleration/deceleration [1][7][0][1] [1][7][0][2]	
[0][8] ▨ ACCEL 1 DECEL 1 DATA PRTC — Acceleration Time 1	[0][8] 6.00 S	Setting is possible within the 0.01S to 3,600S range to correspond to load characteristics. GD². <table><tr><td>Setting time</td><td>Setting Resolution</td></tr><tr><td>0.01 ~ 9.99 s</td><td>By 0.01s</td></tr><tr><td>10.00 ~ 99.90 s</td><td>By 0.1s</td></tr><tr><td>100.0 ~ 999.0 s</td><td>By 1s</td></tr><tr><td>1000 ~ 3600 s</td><td>By 10s</td></tr></table>	[0][8] 6.00 S
[0][9] ACCEL 1 ▨ DECEL 1 DATA PRTC — Deceleration Time 1	[0][9] 6.00 S	Is selected when both RT1-CM and RT2-CM are OFF.	[0][9] 6.00 S
[1][0] ACCEL 1 DECEL 1 ▨ DATA PRTC — Data Protection	[1][0][0][0] [1][0][0][1]	For data that does not need to be changed, the set data can be locked. No protect Protect ① [∧][∨] keys + [STOP] key changes data. Data is stored with the SET key. ② Change of data other than [1][0][ ][ ] is not possible.	[1][0][0][0]
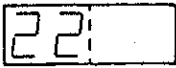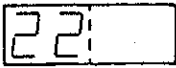
② Basic Function

Function Coda	Display	Function Explanation	Function Data
`I I` ☐ MAX Hz · BASE Hz RATED U MTR POLES Maximum Frequency	`I I 0 0` 50Hzmax `I I 0 I` 60Hzmax `I I 0 2` 100Hzmax `I I 0 3` 120Hzmax `I I 0 4`	Sets maximum value for output frequency V ↑ ... Maximum frequency → f Between 0 to 400Hz, the maximum frequency can be set with 1Hz step. Damage may result if commonly used motors, etc. which are designed for low speed use, are operated at maximum frequency. Operate motors at a frequency setting conforming to the motor characteristics.	`I I 0 I`
`I 2` MAX Hz ☐ BASE Hz RATED U MTR POLES Base Frequency	`I 2 0 0` 50Hz `I 2 0 I` 60Hz `I 2 0 2`	Sets the base frequency. (frequency for specified torque characteristics and specified output characteristic divergent point) V ↑ ... Base frequency Between 0 to 400Hz, the base frequency can be set with 1Hz step. ① Operate at a setting conforming to the motor characteristics. ② A setting exceeding the maximum frequency is not possible.	`I 2 0 I`
`I 3 0 3` MAX Hz BASE Hz ☐ RATED U MTR POLES Rated Output Voltage	`I 3 0 0` 200V (400V)* `I 3 0 I` 220V (440V)* `I 3 0 2` 230V (460V)* `I 3 0 3`	Sets the maximum value for the output voltage. maximum voltage V ↑ ... → f When set at 0V, voltage proportioned to the power supply voltage is output. Between 1 to 230V (460V)*, output voltage can be set with 1 V step. Output of voltage exceeding the power supply voltage is not possible.	`I 3 0 3` (0V)

* ( ) : 400V series
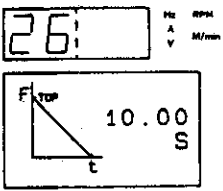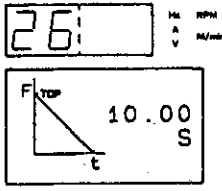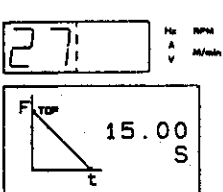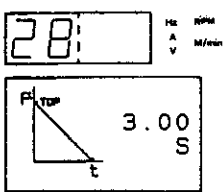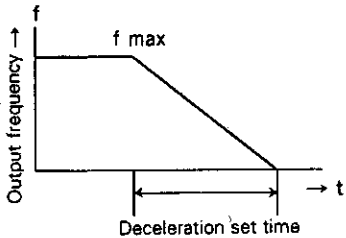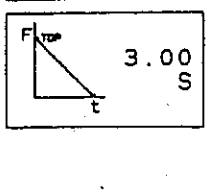
Function Code	Display	Function Explanation	Function Data

`14` Hz RPM / V 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 using the display for synchronous rpm.
		
		2 pole conversion
		
		4 pole conversion
		
		6 pole conversion [Example]
		 Display when 4 pole motor is
		 operated at 60Hz.
		
		8 pole conversion `1800` ■RPM
		
		10 pole conversion
		
		12 pole conversion
			`1404`

`15` Hz RPM / V 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.
		
		Panel operation mode (RUN STOP keys)
		
		Terminal block mode (FWD, REV, HLD terminals)
		
		Link mode (group operation : see p.54 to 57)
			`1500`

`16` Hz RPM / V 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 RPM / V 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)
		Weak S curve acceleration/deceleration (Fig. b)
		Strong S curve acceleration/deceleration (Fig. c)
		
		f↑ → t f↑ → t f↑ → t
		Fig. a Fig. b Fig. c
		
		Does not function when `0701` auto acceleration/ deceleration is selected.
			`1700`

Function Coda	Display	Function Expalanation	Function Data
`18` Hz RPM ▲ M/min ▼ OPR COMND Hz COMND ACC PTN ▨ H TRQ BRK Normal/High Torque Dynamic Brake	`1800` `1801`	Selection can be made from the following 2 types of regenerative braking methods. Standard brake via internal DB impedance High brake via external DB impedance (option) • For standard braking via internal DB impedance, braking operates at below 66Hz output frequency. • For high braking via external DB impedance, braking operates at full output frequency range. For loads requiring an instantaneous stop, set the high brake mode and connect the optional external DB impedance.	`1800`
`19` Hz RPM ▲ M/min ▼ ▨ PTN OPR RESTART MNTR COEF FUNC BLK Pattern Operation	`1900` `1901`	Selects between operate/nonoperate for timer multistep frequency operation set by function codes `29` to `42` Nonoperate (standard multistep frequency operation) Operate (timer multistep frequency operation) See function codes ▢ to `42` for pattern operation details.	`1900`

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

200V series

004	008	015	022	037	055	075	110	150	185	220
1.4	1.4	2	3.5	3.5	6	10	14	20	20	24

400V series

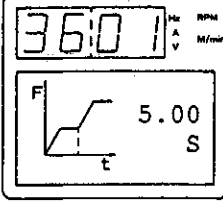| 008	015	022	037	055	075	110	150	185	220
0.9	1.0	1.2	2.0	2.2	3.0	3.4	4.3	5.1	5.8
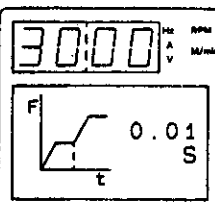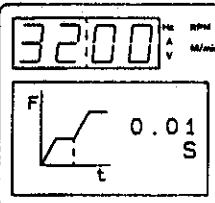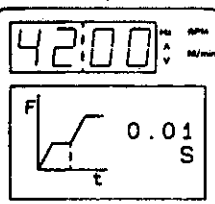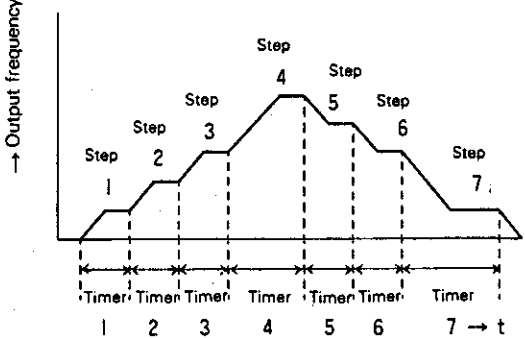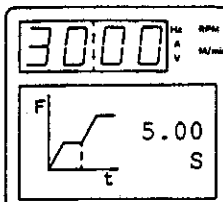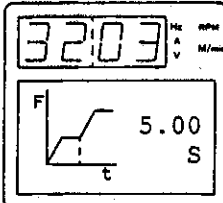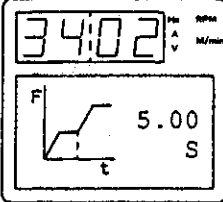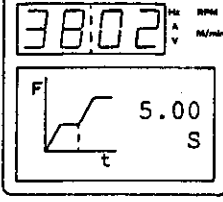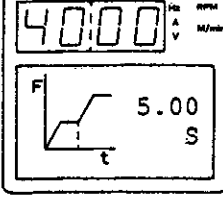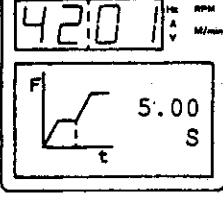
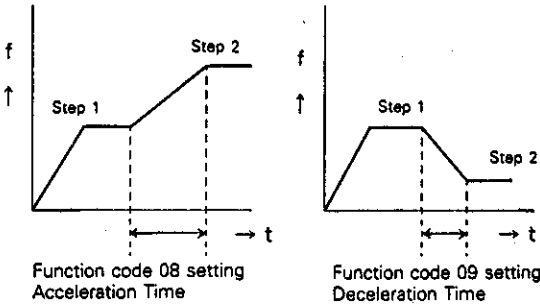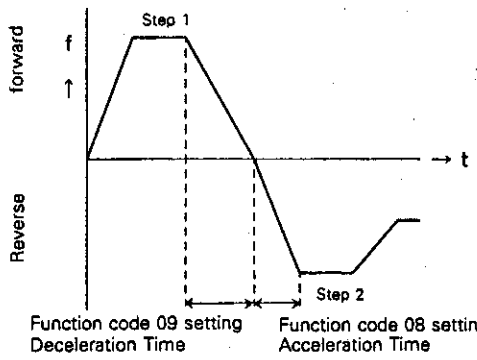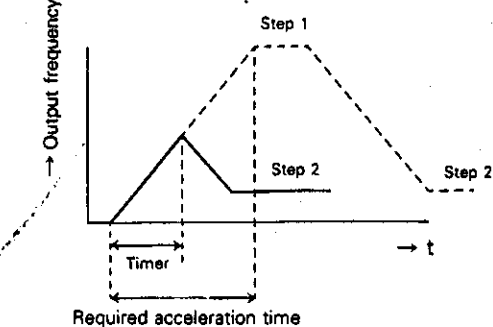| Function Coda	Display	Function Expalanation	Function Data
![2 1] Hz mm/min A M/min PTN OPR RESTART ▨ MNTR COEF FUNC BLK Coefficient for Line Speed	F coefficient $Hz \times 0.000$ ↓ F coefficient $Hz \times 200$	Coefficient K is for display of rp/min Display value = output frequency x K Display output frequency x 0.00 ↓ } By 0.01 setting is possible when K = 0.00 to 200. Displays output frequency x 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 [9][9][9][9]	
![2 2] Hz mm/min A M/min PTN OPR RESTART MNTR COEF ▨ FUNC BLK Function Blocks Used	[2][2][0][0] [2][2][0][1] [2][2][0][2]	The function code block display range for function code setting as well as verification can be defined. (SHIFT key changes display range definition) Up to basic function display ([0][0] → [2][2] setting and verification possible) Up to standard function display ([0][0] → [6][2] setting and verification possible) Function display ([0][0] → [8][2] setting and verification possible)	![2200]

③ Standard Function
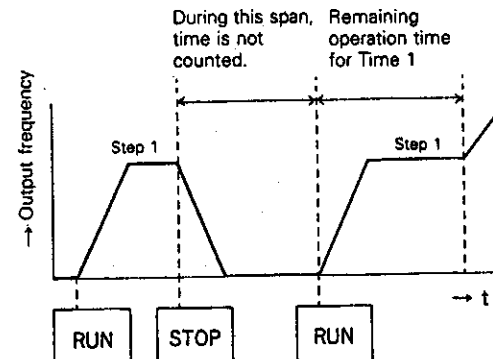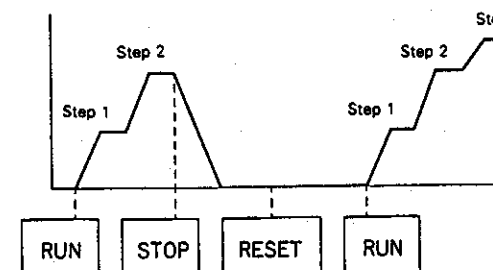
Function Code	Display	Function Explanation	Function Data

![23] Hz RPM M/min
 	
■ ACCEL 2
   ACCEL 3
   ACCEL 4
 	
Acceleration Time 2
	![23] Hz RPM M/min
	
	F↑TOP ╱ 10.00 S
	→t
		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.
		
		(see table below)
		
		※ The setting time equals the time required to reach the set maximum frequency from zero.
		(0 → max. set freq.)
			![23] Hz RPM M/min
			
			F↑TOP ╱ 10.00 S
			→t

![24] Hz RPM M/min
 	
   ACCEL 2
■ ACCEL 3
   ACCEL 4
 	
Acceleration Time 3
	![24] Hz RPM M/min
	
	F↑TOP ╱ 15.00 S
	→t
			![24] Hz RPM M/min
			
			F↑TOP ╱ 15.00 S
			→t

![25] Hz RPM M/min
 	
   ACCEL 2
   ACCEL 3
■ ACCEL 4
 	
Acceleration Time 4
	![25] Hz RPM M/min
	
	F↑TOP ╱ 3.00 S
	→t
			![25] Hz RPM M/min
			
			F↑TOP ╱ 3.00 S
			→t

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

Indicates time change (sec.) up to (▮ ▮ ▯ setting)

f

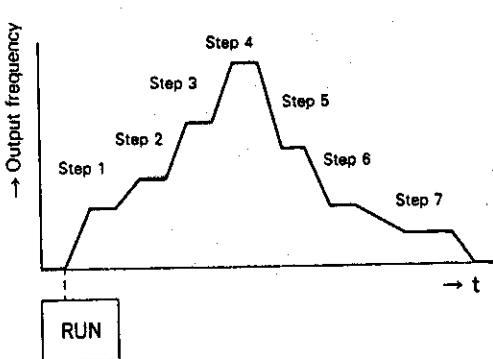fmax

output frequency

→ t

acceleration set time

Function Coda	Display	Function Expalanation	Function Data
$\boxed{26}$ ⬛ DECEL 2 / DECEL 3 / DECEL 4 Deceleration Time 2	$\boxed{26}$ F↘ 10.00 S	Setting between the 0.01S to 3600S range is possible to correspond to the load characteristics, GD².	$\boxed{26}$ F↘ 10.00 S
$\boxed{27}$ DECEL 2 / ⬛ DECEL 3 / DECEL 4 Deceleration Time 3	$\boxed{27}$ F↘ 15.00 S		$\boxed{27}$ F↘ 15.00 S
$\boxed{28}$ DECEL 2 / DECEL 3 / ⬛ DECEL 4 Deceleration Time 4	$\boxed{28}$ F↘ 3.00 S		$\boxed{28}$ F↘ 3.00 S

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

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

Terminal ON/OFF	RT2–CM ON	RT2–CM OFF
RT1–CM ON	Deceleration time 4	Deceleration time 2
RT1–CM OFF	Deceleration time 3	Deceleration time 1
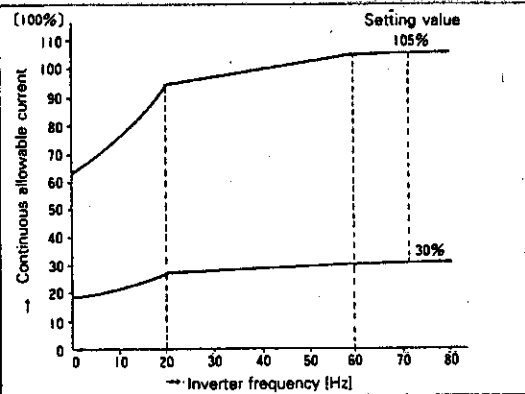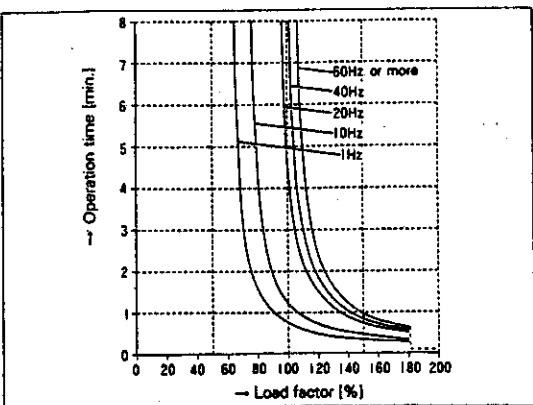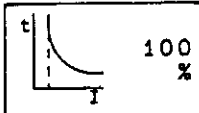
※ The setting time equals the time required to reach 0 from the maximum frequency. (max. frequency → 0)
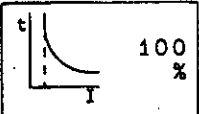Indicates time change (sec.) up to ($\boxed{1\,1}$ setting)

Deceleration set time

Function Code	Display	Function Explanation	Function Data

8 step multi-step frequency operation is possible through switching of the control terminals X1, X2, X3 (for setting) [1 9 0 0]

[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

Function Code column (left):

- 29 — MULT SPD1 / TIMER 1 / MULT SPD2 / TIMER 2 — Multistep Speed Setting 1 (MULT SPD1 checked)
- 31 — MULT SPD1 / TIMER 1 / MULT SPD2 / TIMER 2 — Multistep Speed Setting 2 (MULT SPD2 checked)
- 33 — MULT SPD3 / TIMER 3 / MULT SPD 4 / TIMER 4 — Multistep Speed Setting 3 (MULT SPD3 checked)
- 35 — MULT SPD3 / TIMER 3 / MULT SPD 4 / TIMER 4 — Multistep Speed Setting 4 (MULT SPD 4 checked)
- 37 — MULT SPD5 / TIMER 5 / MULT SPD6 / TIMER 6 — Multistep Speed Setting 5 (MULT SPD5 checked)
- 39 — MULT SPD5 / TIMER 5 / MULT SPD6 / TIMER 6 — Multistep Speed Setting 6 (MULT SPD6 checked)
- 41 — MULT SPD7 / TIMER 7 — Multistep Speed Setting 7 (MULT SPD7 checked)

Display column:
- 29 — F 10.00 Hz
- 31 — F 20.00 Hz
- 33 — F 30.00 Hz
- 35 — F 40.00 Hz
- 37 — F 50.00 Hz
- 39 — F 60.00 Hz
- 41 — F 60.00 Hz

Function Data column:
- 29 — F 10.00 Hz
- 31 — F 20.00 Hz
- 33 — F 30.00 Hz
- 35 — F 40.00 Hz
- 37 — F 50.00 Hz
- 39 — F 60.00 Hz
- 41 — F 60.00 Hz

Output frequency diagram with Speed 1 through Speed 7, Analog/Digital, and terminal signals X1-CM, X2-CM, X3-CM, FWD-CM vs t.

① When X1-CM, X2-CM, X3-CM are all OFF, setting is made by digital ([∧] [∨] keys), or analog (DC 0 to +10V, 4 to 20mA) which is selected by function [1 6].

② A setting exceeding the maximum frequency set by [1 1] is not possible.

③ When [1 9 0 1] is set, operation is by timer multi-step frequency.

④ When [6 3 0 0] is set, multi-step frequency 1 thru 7 switching is possible via X1, X2, X3 terminals.
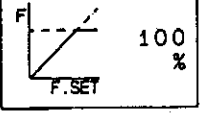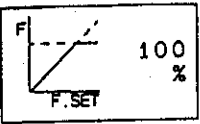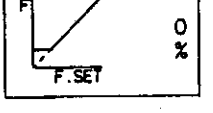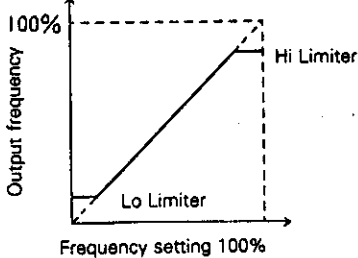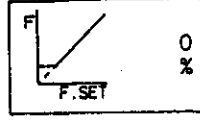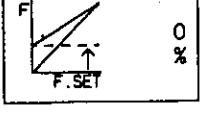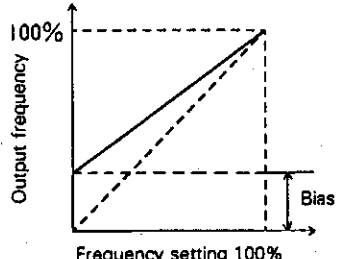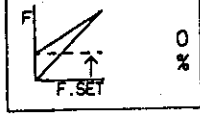
Function Coda	Display	Function Explanation	Function Data

30 Hz/RPM/M/min

MULT SPD1
▨ TIMER 1
MULT SPD2
TIMER 2

Timer 1

32 Hz/RPM/M/min

MULT SPD1
TIMER 1
MULT SPD2
▨ TIMER 2

Timer 2

34 Hz/RPM/M/min

MULT SPD3
▨ TIMER 3
MULT SPD 4
TIMER 4

Timer 3

36 Hz/RPM/M/min

MULT SPD3
TIMER 3
MULT SPD 4
▨ TIMER 4

Timer 4

38 Hz/RPM/M/min

MULT SPD5
■ TIMER 5
MULT SPD6
TIMER 6

Timer 5

40 Hz/RPM/M/min

MULT SPD5
TIMER 5
MULT SPD6
▨ TIMER 6

Timer 6

42 Hz/RPM/M/min

MULT SPD7
■ TIMER 7

Timer 7

Display column:

3000 Hz/RPM/M/min — F graph, 0.01 S

3200 Hz/RPM/M/min — F graph, 0.01 S

4200 Hz/RPM/M/min — F graph, 0.01 S

Function Explanation

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

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

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

[Rotation direction and acceleration/deceleration time]
Function codes

30 **32** **34** **36** **38** **40** **42**

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

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

Function Data column:

3000 Hz/RPM/M/min — F graph, 5.00 S

3203 Hz/RPM/M/min — F graph, 5.00 S

3402 Hz/RPM/M/min — F graph, 5.00 S

3601 Hz/RPM/M/min — F graph, 5.00 S

3802 Hz/RPM/M/min — F graph, 5.00 S

4000 Hz/RPM/M/min — F graph, 5.00 S

4201 Hz/RPM/M/min — F graph, 5.00 S

Function Coda	Display	Function Expalanation	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 `3 2 0 0` [Example 2] when data code is `3 2 0 4` [Timer Setting] After setting the rotation direction and acceleration/deceleration time, set the timer. | Timer Setting	Setting Resolution
---	---
0.01~9.99sec	0.01sec
10.00~99.90sec	0.1sec
100.0~999.0sec	1sec
1000~3600sec	10sec	 The time set on the timer includes the time required for acceleration/deceleration. Therefore, if the time set on the timer is less than the time required for the acceleration.deceleration conditions, it will proceed to the next process before the set step frequency is reached. 	
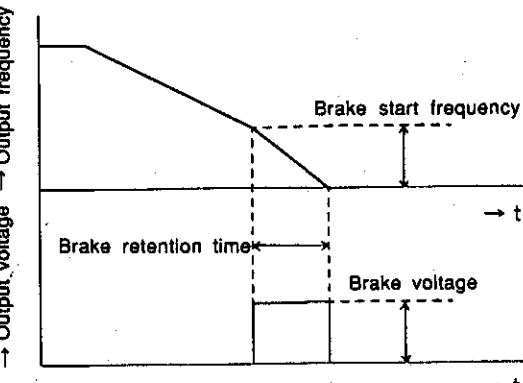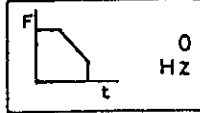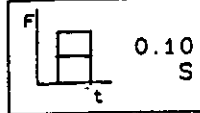
Function Coda	Display	Function Expalanation	Function Data
—		**[Timer multi-step frequency operation method]** ① Panel Operation The key functions are changed as follows:	

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

RUN key : Start operation

STOP key : Temporary stop of inverter operation (pause)

RESET key : Timer operation reset

(The next RUN input will start operation from Step 1)

✳ RESET function only during STOP.

[Example 1]

[Example 2]

During this span, time is not counted.   Remaining operation time for Time 1

[Example 3]

Function Coda	Display	Function Expalanation	Function Data

		② Control Terminal Operation
		  The terminal functions are changed as follows:
		  FWD-CM = ON : Start operation
		  FWD-CM = OFF : Stop timer operation
		  REV-CM = ON : Temporary stop timer operation
		(pause)
		
		[Example 1]
		
		[Example 2]
		
		[Example 3]	

		① During timer operation, if RT1-CM, RT2-CM terminals are ON/OFF, operation will switch to acceleration.deceleration times set by $\boxed{2}\boxed{3}$ to $\boxed{2}\boxed{8}$ ② During timer operation, if X1-CM, X2-CM, X3-CM terminals are ON/OFF, operation will switch to multi-step frequencies 1 to 7 set by $\boxed{2}\boxed{9}$ $\boxed{3}\boxed{1}$ $\boxed{3}\boxed{3}$ $\boxed{3}\boxed{5}$ $\boxed{3}\boxed{7}$ $\boxed{3}\boxed{9}$ $\boxed{4}\boxed{1}$ The time for both ① and ② is counted on the timer.	

Function Coda	Display	Function Expalanation	Function Data

Function Coda:

```
43
```
Hz RPM / M/min

```
■ ERCTRN OL
  H LIMITER
  L LIMITER
  FREQ BIAS
```

Electronic Thermal
Overload Relay

Display:

`4300`

`4301` Hz RPM / M/min

t [curve] 100 % I

Function Expalanation:

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

Nonoperate

Operate (electronic thermal protection operation)

Setting range 30 to 105% (by 1%)

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

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

Continuous allowable current characteristics

Electronic Thermal Operation Characteristics

Function Data:

`4300`

`4301` Hz RPM / M/min

t [curve] 100 % I

Function Coda	Display	Function Explanation	Function Data
`44` Hz RPM / M/min ERCTRN OL ■ H LIMITER L LIMITER FREQ BIAS High Limiter	`44` Hz RPM / M/min 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` Hz RPM / M/min F ___ 100 % F.SET
`45` Hz RPM / M/min ERCTRN OL H LIMITER ■ L LIMITER FREQ BIAS Low limiter	`45` Hz RPM / M/min F 0 % F.SET	0 to 100% (by 1%) 100% ――― Hi Limiter Output frequency Lo Limiter Frequency setting 100%	`45` Hz RPM / M/min F 0 % F.SET
`46` Hz RPM / M/min ERCTRN OL H LIMITER L LIMITER ■ FREQ BIAS Bias Frequency	`46` Hz RPM / M/min 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%) 100% ――― Output frequency Bias Frequency setting 100%	`46` Hz RPM / M/min F 0 % F.SET

Function Coda	Display	Function Explanation	Function Data
47 ■ FREQ GAIN JUMP Hz 1 JUMP Hz 2 JUMP Hz 3 Gain For Frequency Setting Signal	**47** [F/F.SET graph] 100 %	A rationed frequency corresponding to the frequency setting is output. It is set as a % of the maximum frequency. (Higher than the maximum frequency is not output) 0 to 200% (by 1%) DC 0 to +5V correspondence is possible. [Graphs: Gain 70% Example — →f set signal 100%, Output 70%; Gain 200% Example — →f set signal 100%, 200%, Output] Frequency gain is operative only when frequency setting method is analog $\boxed{1601}$ 、 $\boxed{1602}$	**47** [F/F.SET graph] 100 %
48 FREQ GAIN ■ JUMP Hz 1 JUMP Hz 2 JUMP Hz 3 Jump Frequency 1	**48** [F/F.SET graph] 0 Hz	The frequency jumps to prevent the load mechanical resonance point and the inverter output frequency from overlapping. (3 location setting possible) 0 to 400Hz (by 1Hz) [Graph: Output frequency f vs Setting frequency f — Setting 1, Setting 2, Setting 3] From 0 to 5Hz, a 1Hz jump width setting is possible. [Graph: Jump frequency range, Setting value, 50%, 50%, Jump frequency setting value]	**48** [F/F.SET graph] 0 Hz
49 FREQ GAIN JUMP Hz 1 ■ JUMP Hz 2 JUMP Hz 3 Jump Frequency 2	**49** [F/F.SET graph] 0 Hz		**49** [F/F.SET graph] 0 Hz
50 FREQ GAIN JUMP Hz 1 JUMP Hz 2 ■ JUMP Hz 3 Jump Frequency 3	**50** [F/F.SET graph] 0 Hz		**50** [F/F.SET graph] 0 Hz
51 ■ J HYSTR DC BRAKE DC BRK Hz DC BRK V Jump Frequency Range	**51** [F/F.SET graph] 0 Hz		**51** [F/F.SET graph] 0 Hz
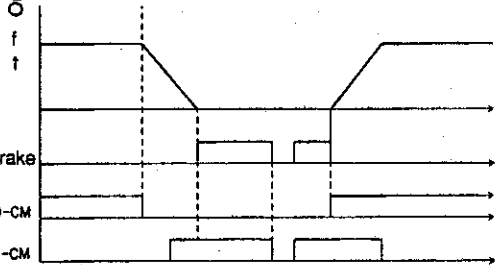
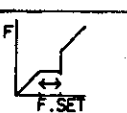| Function Coda	Display	Function Explanation	Function Data
`52` Hz RPM M/min	`5200`	Switches current brake between Operate / Nonoperate. Nonoperate (only regenerative brake)	`5200`
J HYSTR ■ DC BRAKE DC BRK Hz DC BRK U DC Brake	`5201`	Operate (DC brake after regenerative brake) Regenerative brake	

`53` Hz RPM M/min
 	
 J HYSTR
 DC BRAKE
 ■ DC BRK Hz
 DC BRK U
 	
 DC Brake Starting Frequency
	`5400`
	 ~
	 `5415`
		Setting for the DC brake starting frequency
		 0 to 60Hz (by 1Hz) (except at 0Hz braking is from 0.2Hz)
		
		 Week
		 ↓ } Setting can be made from 16 types of DC brake strength.
		 Strong
			`53` Hz RPM M/min
			  0 Hz
			
			 `5400`

`54` Hz RPM M/min J HYSTR DC BRAKE DC BRK Hz ■ DC BRK U DC Brake Voltage		Brake strength changes according to the motor characteristics Within a 0.01 to 30 sec. time span, setting is possible or match the load GD². 	Setting Range	Setting Resolution	 |---|---| 	0.01~9.99sec	0.01sec	 	10.00~30.00sec	0.1sec		
`55` Hz RPM M/min ■ DC BRK T START Hz I LIMITER SLIP COMP DC Braking Time			`55` Hz RPM M/min 0.10 S

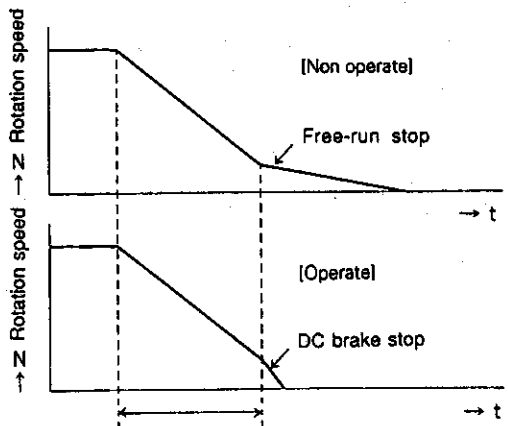| Function Coda	Display	Function Expalanation	Function Data
56 Hz RPM DC BRK T ☒ START Hz I LIMITER SLIP COMP Starting Frequency	**56** Hz RPM V / F 1 Hz	The start frequency setting can be by 1Hz within a 0.2Hz to 60Hz range 0Hz (0.2Hz start) ↓ 60Hz Output frequency ↑ Start frequency → t	**56** Hz RPM V / F 1 Hz
57 Hz RPM DC BRK T START Hz ☒ I LIMITER SLIP COMP Current Limiter	**57** Hz RPM I / LOAD 150 % **5700** **5701**	When the output current reaches the current limit level, the output frequency is automatically lowered to avoid over-current trip. Nonoperate Operate (operates at 30 to 150% of the inverter rating. By 1% setting possible) Output current ↑ Current limit setting value → t Output frequency ↑ → t ① Does not operate for deceleration. ② When using this function, the automatic acceleration/deceleration function does not operated.	**5700**
58 Hz RPM DC BRK T START Hz I LIMITER ☒ SLIP COMP Slip Compensation Control	**5800** **5801**	Automatically judges the relative size of the load by the output current fluctuations, and regulates the inverter frequency for consistent rpm operation. (controls speed fluctuations to 1/3 of normal slip) Nonoperate (no slip compensation) Operate (with slip compensation) Torque ↑ No slip compensation With slip compensation → Rotation speed Operates only during constant speed operation.	**5800**
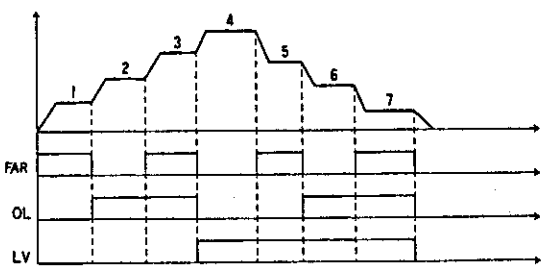
Function Code	Display	Function Explanation	Function Data

`59` Hz RPM M/min
 	
 ■ FDT Hz
   FDT HYSTR
   RUN FINSH
   OL WARN
 	
 Frequency Level Detection
	`59` Hz RPM M/min
	
	 F 60 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 (by 1Hz)
		
		 0 to 30Hz (by 1Hz)
		
		 FDT signal output start frequency
		 Hysteresis width
		 → Output frequency
		 FAR-CM → t
		 → t
			`59` Hz RPM M/min
			
			 F 60 Hz
			 FDT

`60` Hz RPM M/min
 	
   FDT Hz
 ▨ FDT HYSTR
   RUN FINSH
   OL WARN
 	
 FDT And FAR Signal Hysteresis
	`60` Hz RPM M/min
	
	 F 10 Hz
	 FDT
		When `6801` is set, the FDT signal is operative.	`60` Hz RPM M/min
			
			 F 10 Hz
			 FDT

`61` Hz RPM M/min
 	
   FDT Hz
   FDT HYSTR
 ▨ RUN FINSH
   OL WARN
 	
 RUN Signal Finishing Frequency
	`61` Hz RPM M/min
	
	 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)
		
		 RUN signal output frequency
		 → Output frequency
		 RUN-CM → t
		 → t
		
		 When `6900` is set, the RUN signal is operative.
			`61` Hz RPM M/min
			
			 F 0 Hz
			 RUN

`62` Hz RPM M/min
 	
   FDT Hz
   FDT HYSTR
 ▨ RUN FINSH
 ▨ OL WARN
 	
 Overload Early Warning Signal
	`62` Hz RPM M/min
	
	 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)
		
		 Warning level
		 → Output current
		 OL-CM
		 10 Second 1 Second → t
		
		 When `6700` is set, the OL signal is operative.
			`62` Hz RPM M/min
			
			 I 100 %
			 OL
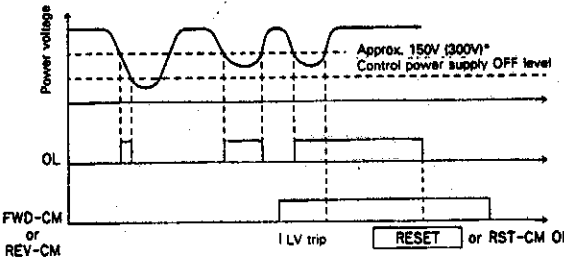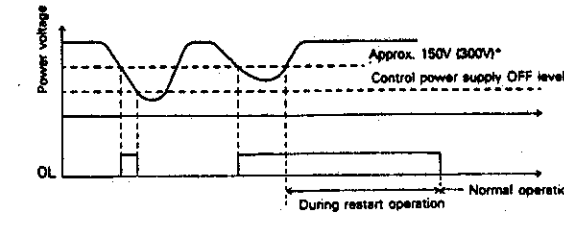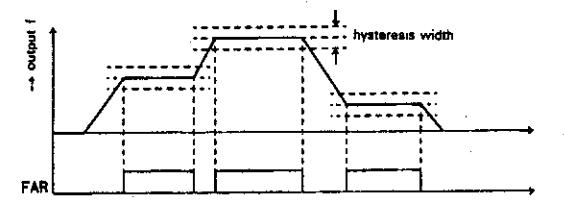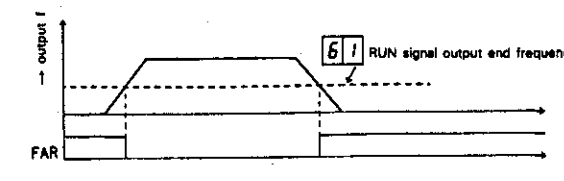
④ **High Function (See p.57 for Frequency Setting In Link Operation, Moniltering Signal In Link Operation and Link Operation function settings)**

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

−44−

Function Coda	Display	Function Explanation	Function Data
	$\boxed{6}\boxed{3}\boxed{0}\boxed{2}$	When DC brake is selected by $\boxed{5}\boxed{2}\boxed{0}\boxed{1}$: with X1-CM = ON: DC brake during stop with X1-CM = OFF: brake reset [Example $\boxed{5}\boxed{3}$:0sec] ① The strength of the DC brake is set by $\boxed{5}\boxed{4}$ ② Operation command take precedence. ($\boxed{\text{RUN}}$, FWD, REV) (While X1-CM is ON, if FWD-CM is ON: DC brake reset) ③ X2-CM, X3-CM terminal ON/OFF is ignored. ④ As DC current continues to flow to the motor during the X1-CM - ON period, be careful of temperature rise. (When long periods of DC braking are required, measure the temperature previously.)	

Function Coda	Display	Function Explanation	Function Data
⌐6 4¦ X1-X2-X3 ▨ HOLD FUNC LU-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 block operation (1501) is selected, the following operation results. [Connection] figure When both FWD-CM and REV-CM are ON at the same time, deceleration stop results. HLD terminal input is ignored.	6400
	6401	3 wire operation When Terminal block operation (1501) is selected, the following operation results. [Connection 1] figure [Connection 2] figure ① When HLD-CM is ON : and FWD-CM is ON for over 10 msec. : Forward HLD-CM is OFF : Stop and REV-CM is ON for over 10 msec : Reverse HLD-CM is OFF : Stop During the period when HLD-CM is ON, either the FWD or REV signal whichever input first takes precedence. ② When HLD-CM is OFF, if FWD and REV signal are input, 2 wire operation will result. ③ Operation will not start if FWD, REV signal t (time) is less than 10 msec.	

Function Coda	Display	Function Expalanation	Function Data
	|6|4|0|2|	Switches timer operation mode. When |6|4|0|0| |6|4|0|1| When |6|4|0|2| : with HLD-CM in OFF, returns to the 1st step after 1 cycle of operation. With HLD-CM in ON, maintains the 7th step level after 1 cycle of operation. ① Only operative when |1|9|0|1| pattern operation is selected. With |1|9|0|0| , normal 2 wire operation results (same as |6|4|0|0|).	

Function Code	Display	Function Explanation	Function Data
`65` Hz RPM 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	Function Data

`66` Hz RPM A V M/min
 	
 ■ LV FUNC
 OL FUNC
 FAR FUNC
 	
 LV Terminal Function
	`6600`
	
	 `6601`
		The function for terminal LV can be switched between the following 2 types.
		
		 Only operative for `6500`
		
		 Under-voltage signal (LV signal) is output from LV.
		
		 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.
		
		 The over-voltage signal (0V signal) is output from the LV terminal.
		
		 The 0V signal, when activated for over-voltage protection, is output from the LV terminal. The 0V signal is maintained until alarm reset is performed. (RESET key or RST-CM = ON)
			`6600`

`67` Hz RPM A V M/min
 	
 LV FUNC
 ■ OL FUNC
 FAR FUNC
 	
 OL Terminal Function
	`6700`
	
	 `6701`
		The function for terminal OL can be switched between the following 3 types.
		
		 Only operative for `6500`
		
		 The inverter over-load early warning signal (OL signal) is output from the OL terminal. See `62` for signal details.
		
		 The current-limiting monitoring signal (CL signal) is output from the OL terminal.
		
			`6700`

* ( ) : 400V series

Function Coda	Display	Function Expalanation	Function Data
---	6702	The under voltage signal (IP signal) is output from the OL terminal. Signal output when in 2000 instantaneous restart nonoperate. Power voltage ─ Approx. 150V (300V)* Control power supply OFF level OL FWD-CM or REV-CM ─ I LV trip [RESET] or RST-CM ON Signal output when in 2001 restarting. operate. Power voltage ─ Approx. 150V (300V)* Control power supply OFF level OL ─ During restart operation ─ Normal operation	
68 LV FUNC OL FUNC ▨ FAR FUNC FAR Terminal Function	6800	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 output f ─ hysteresis width FAR	6800
	6801	The setting frequency detection signal (FDT signal) is output at the FAR terminal. See 59 for signal details.	
	6802	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. output f ─ 61 RUN signal output end frequency FAR	

* ( ) : 400V series

Function Coda	Display	Function Expalanation	Function Data
`6 9` Hz RPM ▲ V M/min ■ RUN FUNC FM FUNC Run Terminal Function	`6 9 0 0`	The following 3 types of signal output at the RUN terminal can be selected. The inverter operation signal (RUN signal) is output at the RUN terminal. The signal ON/OFF level is set by `6 1`	`6 9 0 0`
	`6 9 0 1`	For `1 9 0 1` pattern operation, the time-up signal (TP signal) is output by the RUN terminal. (outputs at time-up point of each timer) No signal output when `1 9 0 0`	
	`6 9 0 2`	For pattern operation `1 9 0 1`, the cycle completed signal (TO signal) is output at the RUN terminal. (outputs at 7 step end point) Also for the continuation of timer operation by `6 4 0 2` the TO signal is output at 7 step end point.	

Function Coda	Display	Function Expalanation	Function Data
$\boxed{70}$ Hz RPM A M/min RUN FUNC ▨ FM FUNC FM Terminal Function	$\boxed{7000}$ $\boxed{7001}$	The following 2 types of monitor signals output by the FM terminal can be selected. Hz meter use voltage is output by the FM terminal. Voltage adjustment is performed by $\boxed{03}$ Output current monitor use voltage is output by the FM terminal. Voltage adjustment is performed by $\boxed{03}$ (A current which is 1.5 times of the inverter rated current can be adjusted between 6.5 and 10.5V.)	$\boxed{7000}$

Function Code	Display	Function Explanation	Function Data

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

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

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

Function Code	Display	Function Explanation	Function Data
`7 4` Hz RPM A/v M/min **LINK MODE** ▨ **INPUT SEL** **NO. SELECT** Run Command Input In Link Operation (Central Inverter)	`7 4 0 0` `7 4 0 1`	Setting for Master (required for link operation) Selects interface for Master 1502 (link) operation Control. RUN/STOP via operation panel RUN/STOP via terminal block	`7 4 0 0`
`7 5` Hz RPM A/v M/min **LINK MODE** **INPUT SEL** ▨ **NO. SELECT** Inverter Unit No. (Central Inverter Only)	`7 5 0 0` \ `7 5 1 5` `7 5 1 6`	Setting for Master (required for link operation) Record command inverter No. (Individual command) (Total number command)	`7 5 0 0`
`8 0` Hz RPM A/v M/min ▨ **FREQ BITS** **CODE** **OPR MODE** Number Of Bits For Frequency Setting In Link Operation (Central Inverter)	`8 0 0 0` `8 0 0 1` `8 0 0 2`	Selects number of bits for frequency input 4 Bit binary input Aux. 1 `RT1  X3  X2  X1` MSB LSB Setting resolution = Max. frequency/15 8 Bit binary input `AUX.2  AUX.1` MSB LSB Setting resolution = Max. frequency/255 12 Bit binary input `AUX.3  AUX.2  AUX.1` MSB LSB Setting resolution = Max. frequency/4095 Inverter No. designation is set via the master terminal block. `RT1  X3  X2  X1` MSB LSB	`0 0 0 8`

Function Code	Display	Function Explanation	Function Data

$\boxed{8\ 1}$ Hz RPM A v M/min
 	
FREQ BITS
▨ CODE
OPR MODE
 	
Monitoring Signal Output Code In Link Operation
	$\boxed{8\ 1\ 0\ 0}$	The slave terminal data is monitored via the master terminal block.
		
		Set the output terminal data via the function code for each inverter.
		
		Terminal output LV
		           OL
		           FAR
		           RUN
		
		The inverter No. determination is set via the Master terminal block.
		
		| RT1 | X3 | X2 | X1 |
		
		MSB LSB
			$\boxed{8\ 1\ 0\ 0}$

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

(3) Trip Record Verification Method

Possible during operation or stop

PRG	ON

Change to program mode

↓

RESET	SHIFT
ON	OFF
↓	ON
OFF	↓
↓	OFF

→

DIGITAL MONITOR

| | 0 | H | 2 |

GRAPHIC DISPLAY *

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

Changes when
SHIFT key is pressed

→
←

DIGITAL MONITOR

| | 0 | H | 2 |

GRAPHIC DISPLAY

```
0  = OH2 (current)
-1 = OC3 (time before)
-2 = Err4 (2 times before)
-3 = 0V (3 times before)
```

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

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

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

↓

RESET	ON
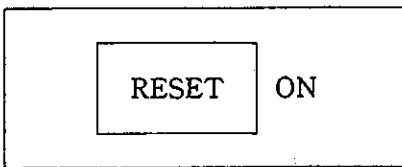
Returns to function mode

↓

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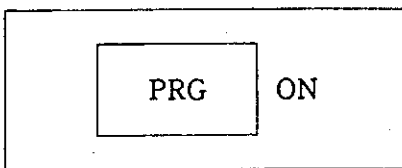
Returns to RUN/STOP when function mode is ended.

(4) Function Setting For Frequency Setting In Link Operation

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

(5) Function Setting For Monitoring Signal In Link Operation

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

(6) Function Setting For Link Operation

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

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

10. Maintenance & Inspection

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

<Caution Notes>

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

Megger Test

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

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

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

Megger Test Outline
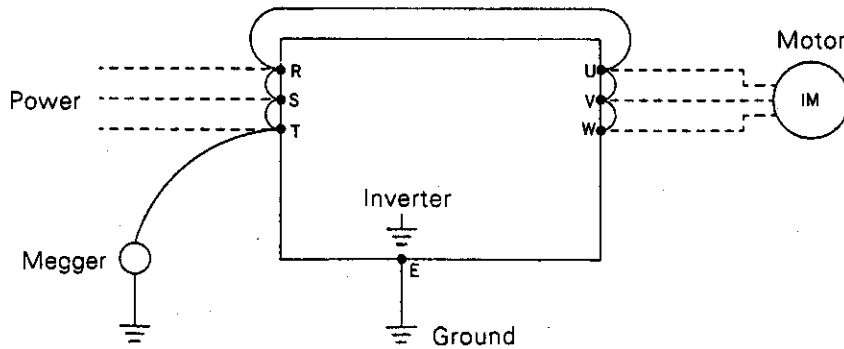
(1) Inspection Items

Inspection Point	Inspection Item	Object of Inspection	Correction
Condition	Power Source Voltage	Within permissible range (170V to 253V) or (323V to 506V)*	Ajust the power supply voltage.
	Ambient Temperature	Within permissible range (-10°C to 50°C)	After investigating the cause, bring into line with specification limits
	Ambient Humidity	Permissible range (20 to 90% RH)	
		Dew condensation / Freezing	
	Vibration	Within permissible limit (0.6G or less)	
Other	Noise	Noise from cooling fan, etc.	Contact the distributor where the unit was purchased.
	Smell	Smell of burning	
	Dust	Dust accumulation on cooling fins, cooling fan / 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 condenser is approx. 5 years with the life of the cooling fan being approx. 3 years. It is recommended, however, that these parts be replaced before failure occurs.

(3) Measurement Points & Meters

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

Measurement Items and Types of Devices

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

Example of Measurement (Locations & Devices)
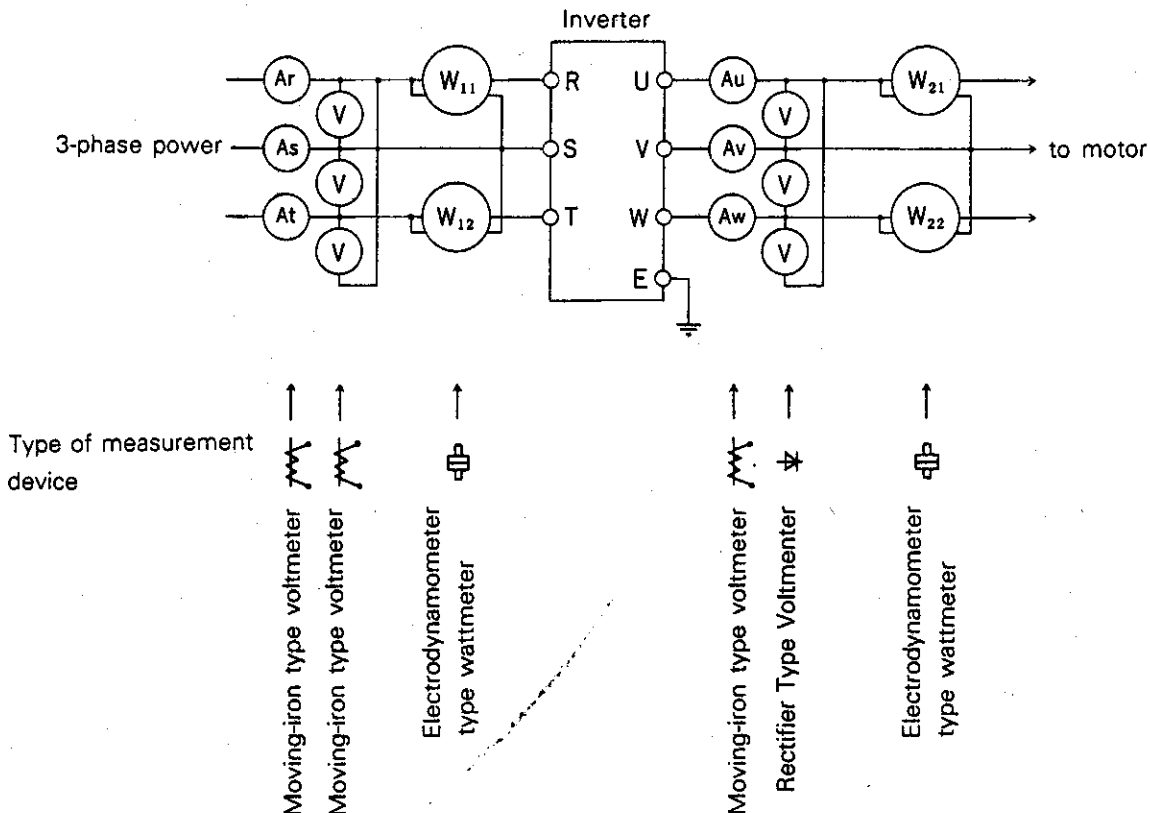
11. Troubleshooting

(1) Protective Function

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

(Note 1) (※) Alarm signal hold

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

(Note 2)   Reset command

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

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

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

(2) Troubleshooting

① Protective Operation Display

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

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

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

② Troubleshooting Charts

i) Motor does not run

```
                    Charge lamp lit?  ──No──▶  FAB closed?  ──No──▶  Close FAB
                          │Yes                      │Yes
Check RST (reset)  ◀─No── Reset input OFF?      Normal voltage supplied to power  ──▶  Power failure, Open
terminal                  │Yes                   supply input terminals R, S, T        phase, FAB trouble
                                                      │Yes
Check FWD, REV     ◀─No── Either FWD or REV      ──────────────────────────────▶  Inverter problem
terminals                 is ON
                          │Yes
                     Voltage being output from  ──Yes──▶  Motor wiring correct?  ──Yes──▶  Motor failure, Motor lock
                     U, V, W output terminals?
                          │No                              │No
Frequency setting 0Hz? ◀─No── External analog   ──────────────────────────────▶  Correct wiring error
     │Yes                      frequency set?
Change of frequency           │Yes
code setting             11, 12, 13, C1 wiring  ──No──────────────────────────▶  Correct wiring error
                         correct?
                              │Yes
                     12 voltage output 0 to 10V?  ──No──▶  Analog frequency setting
                     C1 input 4 to 20 mA?                   device failure
                              │Yes
                         Inverter problem
```

ii) Motor runs but speed does not change

```
                    Maximum frequency  ──Yes──▶  Reset limiter
                    limiter activated?
                          │No
                    Upper/Lower limiter  ──Yes──▶  Change limiter setting
                    activated?
                          │No
                    External analog frequency set?  ──No──▶  X1, X2, X3 wiring  ──No──▶  Correct wiring error
                          │Yes                                correct?
Correct wiring error ◀─No── 11, 12, 13, C1 wiring correct?    │Yes
                          │Yes                          Are all frequency  ──No──▶  Change frequency
Analog frequency    ◀─No── Does voltage and current    settings different?          code setting
setting device failure     input to 12 & C1 change?         │Yes
                          │Yes
                    Acceleration/deceleration  ──Yes──▶  Adjust acceleration/deceleration
                    time too long?                        time to match load
                          │No
                    Inverter problem
```

iii) Motor rotation is not smooth

```
During acceleration/  ──Yes──▶  Lengthen acceleration,
deceleration?                    deceleration time setting
     │No
Input voltage fluctuation?  ──Yes──▶  Increase power supply
     │No                               capacity
Large load fluctuation?  ──Yes──▶  Increase motor and inverter capacity.
     │No                            Attach flywheel
Noise interference   ──Yes──▶  Test with analog frequency
in analog input?                setting device
     │No
Inverter problem
```

Digital time setting

iv) Motor overheats

```
Does motor and V/F  ──No──▶  Change V/F pattern setting
pattern match?
     │Yes
Continuous low speed  ──Yes──▶  Use special inverter motor.
operation?                       Lower torque boost
     │No
Load too heavy?  ──Yes──▶  Reduce load. Increase
     │No                    inverter capacity
Check inverter output  ──GOOD──▶  Motor problem
voltage balance
     │NG
Inverter problem
```

12. Appendix

(1) Standard Specifications

Item		Specification										
Inverter Type		FVR 004G7SS-2	FVR 008G7S-2 (-4)	FVR 015G7S-2 (-4)	FVR 022G7S-2 (-4)	FVR 037G7S-2 (-4)	FVR 055G7S-2 (-4)	FVR 075G7S-2 (-4)	FVR 110G7S-2 (-4)	FVR 150G7S-2 (-4)	FVR 185G7S-2 (-4)	FVR 220G7S-2 (-4)
Standard Applicable Motors [kW]		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Control	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]	0.2 ~ 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)										
Power Supply	Rated Input AC Voltage	3-phase 3-wire type 200 to 230V (380 to 460V), 50/60Hz										
	Allowable fluctuation	Voltage: + 10% Voltage unbalance %: within 3% Voltage: – 15% Frequency: ± 5%										
Output	Control System	Vector Dispersion PWM control										
	Output Frequency Range	0.2 to 400Hz (start frequency 0.2 to 60Hz, maximum frequency 0.2 to 400Hz setting possible)										
	Frequency Temperature Fluctuation	Analog Setting: max. frequency ± 0.2% (at 25 ± 10°C)										
		Digital Setting max. frequency ± 0.01% (at –10°C to +50°C)										
	Frequency Setting Resolution	Analog Setting: 0.02Hz (at max. frequency 60Hz)										
		Digital Setting: 0.002Hz (at max. frequency 60Hz)										
	Frequency Setting Resolution	0.002Hz (both analog & digital setting)(Note 3)										
	Voltage / Frequency Characteristics (V/F)	Voltage: 200 to 230V (380 to 460V) (When in fee selection, voltage or frequency Frequency: 0.2 to 400Hz can be arbitrarily adjusted)										
	Torque Boost	320 patterns (squared decrease, including 10 step minute adjustment), automatic torque boost selection possible										
	Acceleration/Deceleration Characteristics	0.01 to 3600 sec. (independent acceleration/deceleration), linear, S characteristic (Strong & weak), automatic and multi-step acceleration/deceleration (independent 4-step) selection possible. (Both terminal & program selection possible.)										
	Internal Functions — Operating sound selection	The sound quality of the sound produced by the motor can be changed to prevent resonance.										
	Frequency meter adjustment	Scale calibration of externally connected analog frequency meter (DC 6.5 to 10.5)										
	Parameter protection	Data lock is possible to ensure that the data codes are not changed.										
	Terminal link	Operation frequency setting for multiple inverters, multi-step operation, interlocking operation, and ratio operation are all possible at the same time.										
	Brake switch	Normal or strong brake selection possible										
	Pattern operation	7 independent step settings possible (frequency up to 400Hz, timer up to 3,600 sec.)										
	Program operation	Based on the pattern operation; 1 cycle, repeat cycle, continuous operation at least step speed, etc. selection possible										
	Momentary power failure restart	After momentary power failure, automatic restart possible										
	High/Low limiter	Output frequency upper and lower range limit 0 to 100% (1% step) setting possible										
	Bias	The magnitude of the bias which contains the frequency setting signal, can be set from 0 to 100% (1% step)										
	Gain	The output frequency gain corresponding to the frequency setting signal can be set from 0 to 200% (1% step)										
	Frequency jump	A 3 point jump in width of sympathetic vibrations, and resonance is possible during 0 to 5Hz (1Hz step)										
	Slip compensation control	Even with load fluctuations, maintains motor at constant speed										
	Current limit control	Output current can be controlled within a range of between 30% and 150% (1% step)										
	8 step speed switch (operation panel included)	8 step speed operation possible										
	2-wire, 3-wire changeover	Selection between the hold constant of operation stop command (2-wire operation) or the momentary contact (3-wire operation) is possible.										
	Terminal function change	The function of the same terminal can be changed via the setting (for 10 terminals)										

(Note 1) Indicates rated capacity when rated output voltage is 230V (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)

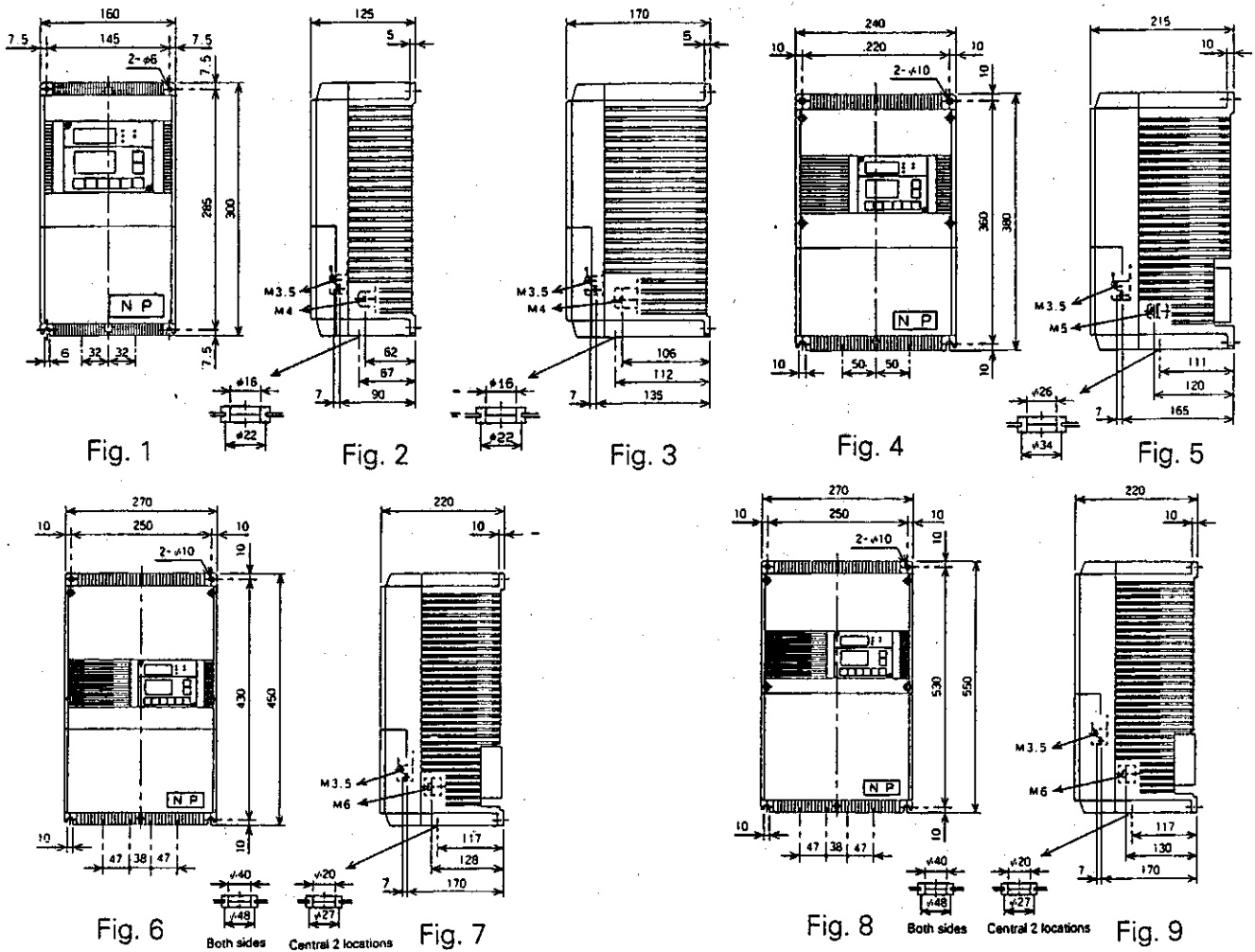| Item			Specification										
Inverter Type			FVR 004G7S-2	FVR 008G7S-2 (-4)	FVR 015G7S-2 (-4)	FVR 022G7S-2 (-4)	FVR 037G7S-2 (-4)	FVR 055G7S-2 (-4)	FVR 075G7S-2 (-4)	FVR 110G7S-2 (-4)	FVR 150G7S-2 (-4)	FVR 185G7S-2 (-4)	FVR 220G7S-2 (-4)
Control Torque	Standard Equipment	Regenerative braking (Note 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 sec., 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. (Sampling time span 1 msec or less)										
	External output signal	Contact output	Batch alarm output (1c contact, contact point capacity is AC 250V, 0.3A, COSØ = 0.3)										
		Open corrector output	During inverter operation, rated frequency attainment, over-load prediction, under-voltage. ※ These can be changed to the following outputs through the terminal change function. Finish signal of each stage/cycle in pattern operation, frequency level detection, inverter stop, current-limiting monitoring, undervoltage or restarting detection, over-voltage detection.										
Protection Function			Stall prevention, over-current, momentary power failure, under-voltage, over-voltage, inverter over-heating, external problems (external thermal activation, etc.), motor overload (electronic thermal), setting error, communication error, DSP error, link error, output terminal short-circuit, short to ground protection (for 3.7kW or less optional function)										
Display	Frequency meter output signal		Analog: DC 0 to +10V (adjustment range DC 6.5V to 10.3V) ※ With the terminal change function, this terminal can be changed to load meter equivalent output signal.										
	Keypad panel	Frequency meter output signal — Digital display	4 digit LED, unit is LED										
		Frequency meter output signal — Graphic display	LCD, with brightness control										
		Operation display	Output frequency, set frequency, output current, output voltage, synchronous rpm, line speed										
		Setting display	Function code and setting data displayed (see operation panel explanation)										
		Protection display	OC1: acceleration over-current, OC2: deceleration over-current, OC3: constant speed over-current, LU: under-voltage, OU: over-voltage, OH1: inverter over-heat, OH2: external alarm (external thermal), OL1: electronic thermal (motor overload), Err1: setting error, Err2: communication error, Err3: DSP error, Err4: link error, operating conditions at time of protective operation (4 times including output frequency, etc.), record of protective operations (display of past 3 protective operations)										
		Input signal display	Display of signal existence at FWD, REV, HLD, X1, X2, X3, RT1, RT2 terminals										
	Charge lamp (LED)		Lights when DC capacitor voltage is charged										
Condition	Installation location		Indoor, less than 1,000m elevation, not in contact with corrosive gas, oil mist or dust, out of direct sunlight										
	Ambient temperature		−10 to +50 °C (remove ventilation cover if temperature is over +40°C)										
	Temperature		Below 90%RH (without dew condensation)										
	Vibration		0.6G or less (conforms to JIS C0011)										
	Shipping temperature		−25 ~ + 65°C										
Installation			Install on a panel, install as an external cooling system										
Protection/Cooling Types			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 panel, remote display panel, T link card, radio noise reduction zero phase reactor, noise reduction AC reactor, power supply coordinating AC reactor, power factor improvement Ac reactor, power filter, spark killer, surge killer, arrester, frequency meter, frequency setting device, braking unit, braking resistor, MCA series, ground short detection unit										

(Note 4)   Short time rating

(2) External Dimensions

Fig. 1   Fig. 2   Fig. 3   Fig. 4   Fig. 5

Fig. 6   Fig. 7   Fig. 8   Fig. 9

Type / View	FVR004 G7S-2	FVR008 G7S-2 (-4)	FVR015 G7S-2 (-4)	FVR022 G7S-2 (-4)	FVR037 G7S-2 (-4)	FVR055 G7S-2 (-4)	FVR075 G7S-2 (-4)	FVR110 G7S-2 (-4)	FVR150 G7S-2 (-4)	FVR185 G7S-2 (-4)	FVR220 G7S-2 (-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

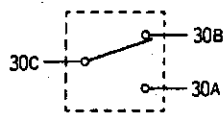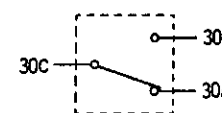| Motor Output [kW]	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22
Inverter Model	FVR004 G7S-2	FVR008 G7S-2 (-4)	FVR015 G7S-2 (-4)	FVR022 G7S-2 (-4)	FVR037 G7S-2 (-4)	FVR055 G7S-2 (-4)	FVR075 G7S-2 (-4)	FVR110 G7S-2 (-4)	FVR150 G7S-2 (-4)	FVR185 G7S-2 (-4)	FVR220 G7S-2 (-4)
Inverter Capacity [KVA]	1.1	1.9	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	1.25		2 (1.25)	2 (1.25)	3.5 (1.25)	5.5 (2)	5.5 (3.5)	5.5 (5.5)	8 (5.5)	14 (5.5)	22 (14)
Control circuit	0.5(1.25)										
FUJI Auto Braker	SA33B/15	SA33B/15 (SA33B/5)	SA33B/30 (SA33B/10)	SA33B/30 (SA33B/15)	SA53B/40 (SA33B15)	SA53B/40 (SA33B/30)	SA53B/50 (SA33B/30)	SA63B/60 (SA33B/30)	SA103B/75 (SA53B/40)	SA103B/100 (SA53B/50)	SA203B/125 (SA53B/50)
FUJI Fault Braker	SG33B/15	SG33B/15 (SG33B/5)	SG33B/30 (SG33B/10)	SG33B/30 (SG33B/15)	SG53B/40 (SG33B/15)	SG53B/40 (SG33B/30)	SG53B/50 (SG33B/30)	SG63B/60 (SG53B/40)	SGa103B/75 (SG53B/50)	SGa103B/100 (SG53B/50)	SGA203B/125 (SG53B/50)
Fuse [A]	5	10 (5)	20 (10)	20 (10)	30 (20)	30 (30)	40 (30)	60 (30)	75 (40)	100 (60)	100 (60)
FUJI Magnetic Contactor	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-4N)
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 13~20 (6~9)	TR-ISN 20~26 (9~13)	TR-3N 24~36 (13~20)	TR-3N 34~50 (20~26)	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.

(4) Terminal Function

	Terminal Code	Terminal Name	Explanation
Main circuit	R,S,T	Commercial power input terminals	Connection for commercial power Ac 200 to 230V (380 to 460V)*
	U,V,W	Inverter output terminals	Connection for 3-phase induction motor
	P,DB	External braking resistor terminals	Connection for external braking resistor (7.5kW or less)
	N,P	External braking unit terminals	Connection for external braking resistor via external braking unit
	E (G)	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 mpedance is 22KΩ. (When setting frequency gain)
	13	Frequency setting voltage output terminal	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	Forward 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]
	REV	Reverse command input terminal	
	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 operation · Stop command	When 3-wire operation function is selected and HLD-CM is closed, the pulse signal input from FWD, REV terminals is self-held.
	X1	Multi-step speed operation command input terminal 1	(Example) Multi-step speed 1 with X1-CM (closed)
	X2	Multi-step speed operation command input terminal 2	(Example) Multi-step speed 2 with X2-CM (closed)
	X3	Multi-step speed operation command input terminal 3	(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 relay, external braking resister thermostat terminal	With THR-CM (open), motor will coast-to-stop. With no external thermal relay or external braking resistor thermostat, the THR-CM terminals must be closed or inverter operation is not possible.

* ( ) : 400Vseries

	Terminal Code	Terminal Name	Explanation
Control Input Terminals	RST	Reset signal input terminal	The protective function is reset when the RST-CM (closed) terminals are short-circuited for more than 0.1 sec. (If there is input to FWD, REV terminals; the unit restarts the instant reset is made.)
Control Input Terminals	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 over 10kΩ DC current meter (1mA) ··· 10 kΩ 1/2W 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 corrector output, 27V 50mA MAX)
Control Output Terminal	FAR	Frequency equivalence detection signal output terminal (speed attainment)	When the set frequency is reached, FAR-CM will be "ON". (Open corrector output, 27V 50mA MAX)
Control Output Terminal	OL	Inverter overload early warning signal output terminal	With function code 62, when the set output current is exceeded for over 10 sec., OL-CM will be "ON". (Open corrector output, 27V 50mA MAX)
Control Output Terminal	LV	Under-voltage signal output terminal	With the set under detection, LV-CM will be "ON". (Open corrector output, 27V 50mA MAX)
Control Output Terminal	30A 30B 30C	Inverter abnormal signal output terminal	The inverter protective function is activated, output is from 1c contact. (contact capacity for resistance load AC 250V 0.3A cos ø = 0.3) 30C —○ ┤├ ○— 30B / ○— 30A [Normal] 30C —○ ┤├ ○— 30B / ○— 30A [Abnormal]

(5) FVR-G7 Control Block Diagram
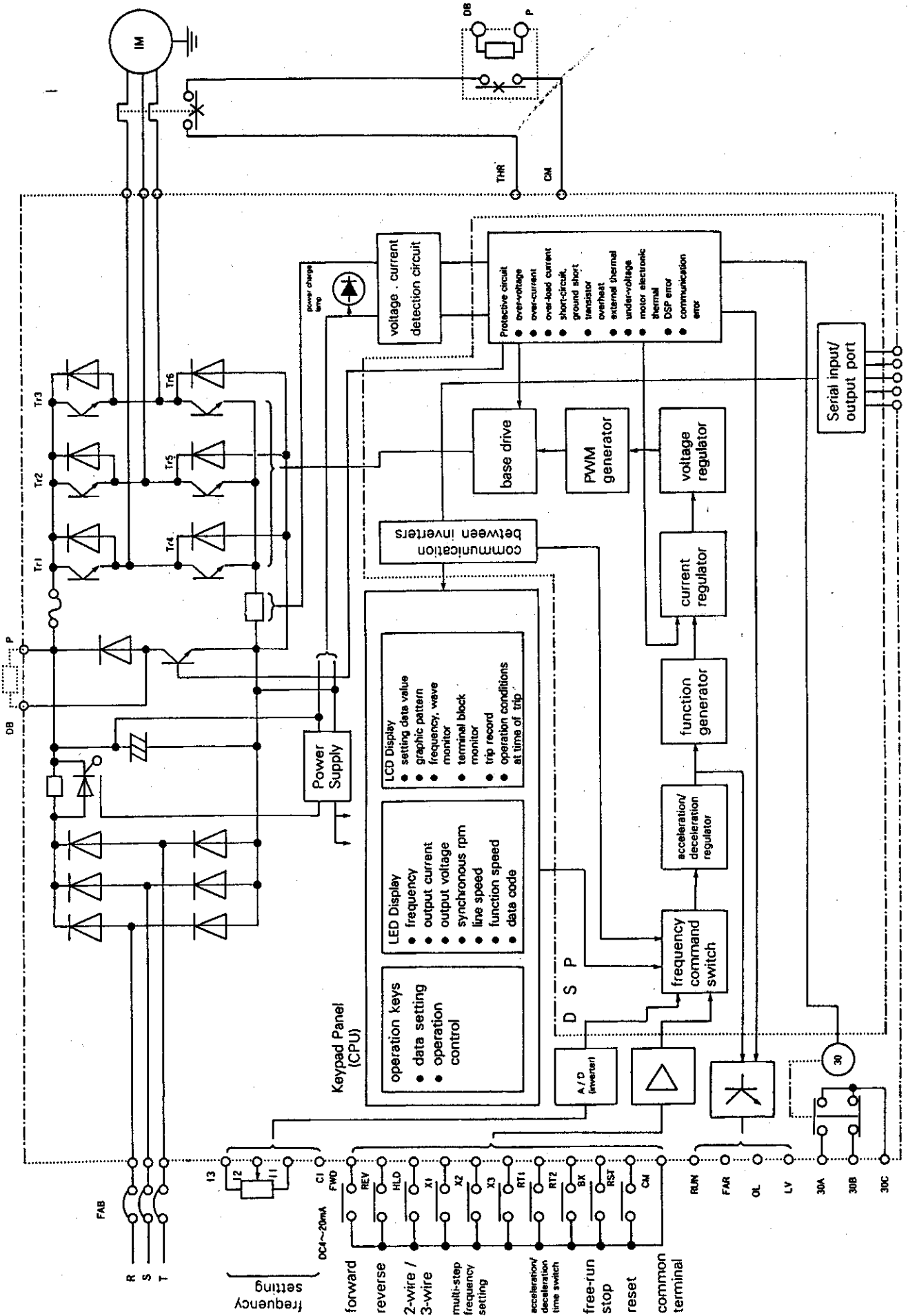
Function Code Table

Function Code	Function	Display. Setting. Range	Factor Setting	For customer use
00	LED digital monitor selection	00 : output frequency [Hz] 01 : output current [A] 02 : output voltage [V] 03 : synchronous rpm [rpm] 04 : line speed [m/min]	00	
01	Graphics monitor selection	00 : Hz AMP monitor 01 : terminal signal 1 02 : terminal signal 2	00	
02	Motor noise reduction	00 to 05 (coda)	03	
03	FM terminal output level calibration	00 to 99 (code)	85	
04	Automatic torque boost control	00 : nonoperate 01 : operate	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 : nonoperate 01 : operate	00	
08	Acceleration time 1	(LCD) 0.01 to 3,600 sec. ※ 2	6.00 12.00	
09	Deceleration time 1	(LCD) 0.01 to 3,600 sec. ※ 2	6.00 12.00	
10	Data protection	00 : change possible 01 : protect	00	
11	Maximum frequency	00 : 50Hz 00 : 60Hz 00 : 100Hz 00 : 1200Hz 04 : free (Hz)	01	
12	Base frequency	00 : 50 Hz 01 : 60 Hz 02 : free (Hz)	01	
13	Rated output voltage	00 : 200V (400V)* 00 : 220V (440V) 00 : 230V (460V) 03 : free (V)	03 (0V)	
14	Number of motor poles	02. 04. 06. 08. 10. 12.	04	
15	Operation command	00 : keypad panel operation 01 : terminal block 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 : hard brake	00	
19	Pattern operation	00 : nonoperate 01 : operate	00	
20	Restart after instantaneous power failure	00 : nonoperate 01 : operate	00	
21	Coefficient for line speed	(LCD) 0.00 ~ 200	0.01	
22	Function blocks used	00 : up to basic function 01 : up to standard function 02 : up to high level function	00	
23	Acceleration time 2	(LCD) 0.01~ 3000Sec	10.0	
24	Acceleration time 3	(LCD) 0.01~ 3600Sec	15.0	
25	Acceleration time 4	(LCD) 0.01~ 3600Sec	3.00	
26	Deceleration time 2	(LCD) 0.01 ~ 3600Sec	10.0	
27	Deceleration time 3	(LCD) 0.01 ~ 3600Sec	15.0	
28	Deceleration time 4	(LCD) 0.01 ~ 3600Sec	3.00	
29	Multistep speed setting 1	(LCD) 0.00 ~ 400Hz	10.0	
30	Timer 1	(LCD) 0.01 ~ 3600Sec	5.00	
31	Multistep speed setting 2	(LCD) 0.01 ~ 400Hz	20.0	
32	Timer 2	(LCD) 0.01 ~ 3600Sec	5.00	
33	Multistep speed setting 3	(LCD) 0.01 ~ 400Hz	30.0	
34	Timer 3	(LCD) 0.01 ~ 3600Sec	5.00	
35	Multistep speed setting 4	(LCD) 0.01 ~ 400Hz	40.0	
36	Timer 4	(LCD) 0.01 ~ 3600Sec	5.00	
37	Multistep speed setting 5	(LCD) 0.01 ~ 400Hz	50.0	
38	Timer 5	(LCD) 0.01 ~ 3600Sec	5.00	
39	Multistep speed setting 6	(LCD) 0.01 ~ 400Hz	60.0	
40	Timer 6	(LCD) 0.01 ~ 3600Sec	5.00	
41	Multistep speed setting 7	(LCD) 0.01 ~ 400Hz	60.0	
42	Timer 7	(LCD) 0.01 ~ 3600Sec	5.00	
43	Electronic thermal overload relay	00 : nonoperate 01 : operate (%)	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 : nonoperate 01 : DC brake	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 ~ 30Sec	0.10	
56	Starting frequency	(LCD) 0.2 ~ 60Hz	1	
57	Current limiter	00 : nonoperate 01 : operate (%)	00	
58	Slip compensation control	00 : nonoperate 01 : operate	00	
59	Frequency level detection	(LCD) 0~ 400Hz	60	
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 10, 73 to 75, 80 to 82 setting is possible. Also all function codes and data verification is possible.

　※ 1　The factory setting for Torque Boost is: (7.5kW or less : 13 / 11kW 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