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VARIABLE FREQUENCY DRIVE

Hitachi VFD Quick Troubleshooting Guide

000819

WWW.mgitech.com

MGI **Technologies** Inc. 275 West 4th Ave, Vancouver, BC Canada

Important Application Notes

In general, proper installation and software programming can solve majority of the VFD problems. Before you assume that you have a faulty or bad VFD, please check the following mechanical and electrical conditions:

- Make sure that all electrical connections are tight. They may get loose during shipment or during operation, due to vibration. They can cause poor electrical connection and may cause "Hot Spot" result in failures after power up.

- Make sure that VFD and all the electrical connections are free of debris.

- Make sure that the VFD rated output current is greater than the motor FLA. VFDs are current rated device, not a horsepower rated. Some older motor may have higher than typical FLA that may exceed VFD rating.

- Make sure that supply voltage, VFD rated voltage and motor voltage match.

- Make sure that no power factor correction capacitors are installed between the VFD and the motor. It will damage the VFD if not removed.

- Make sure that no power factor correction capacitors are installed within 100m (300ft) of input to the VFD without a line reactor. They may cause nuisance overvoltage trips.

- Make sure that VFD is installed with ambient temperature no greater than 40°C (104°F). VFD must be de-rated. There must be at least 10cm (4in) of free space around the VFD for cooling. If the VFD is installed in a cabinet, there must be ample amount of space surrounding to ensure proper cooling.

- Make sure that VFD is installed with humidity level within 10~90% non-condensing.

- Make sure that the motor and the load rotate freely. Check for bad bearings, correct belt tension, belt alignment, and/or shaft alignment.

- For 460Vac or 575Vac installations, make sure that the motor specification for the cable length and carrier frequency limitations are okay. A load reactor or a output filter can be installed if necessary.

HITACHI VARIABLE FREQUENCY DRIVE
COMMON PROBLEMS

PROBLEM: The VFD keypad display does not light up

SOLUTION
. Check the input voltage at L1, L2, and L3 terminals. It should be within the VFD nameplate information.

. Check the DC bus voltage at P and N terminals. It should be approximately 1.4 times the input voltage.
    208Vac = 294Vdc
    46OVac = 65OVdc
    575Vdc = 800Vdc

If there is no voltage, input rectifier is damaged and the unit must be repaired.

. Check the connection between the keypad, the control board and the power supply beard.

PROBLEM: The VFD does not run the motor (no output)

Software parameters	J100	J300	L100 & SJ100	L300P & SJ300
Frequency set	F2	F2	F01	F001
Freq. Reference Source	F9	F9	A01	A001
Run Command Source	F9	F9	A02	A002

∴ The VFD must have a Frequency Reference set from the keypad, via terminal (0-10Vdc or 4-20mA), potentiometer (if equipped), or preset speeds.
The VFD must have a Run Command from its keypad (RUN key) or via terminal.

SOLUTIONS
. Make sure that the VFD is not tripped on an error. If it is, press "Stop/Reset" key once to clear the trip. It is recommended to investigate the cause of error prior to running the VFD.

● Check what the Frequency Reference Source is set to. Unless the VFD is a stand-alone unit, it should be set to 'Terminal".

● Check what the Run Command Source is set to. Unless the VFD is a stand-alone unit, it should be set to "Terminal".

● In some application, FRS (Free-Run-Stop, Coast-to-Stop) is set to one of the input terminal of the VFD. Clear the condition that enables FRS.

- . Some VFD systems have interlocks that have to be cleared. Check your system diagram for details.

- . Some VFD systems have time delay to commence running. Check your system diagram or system operation guide for details.

PROBLEM: The VFD does not reach the maximum speed (60Hz)

Software parameters	J100	J300	L100 & SJ100	L300P & SJ300
Maximum speed limit	A05	A05	A61	A061
0 end	na	na	AI2	A012
OI end	na	na	AI2	AI02

SOLUTION

- . Check the maximum speed limit is set to 60Hz or 0Hz (Hitachi factory default).

- . Check the 0 end and OI end are set to 60Hz or 0Hz (Hitachi factory default). <if applicable>

- . Check to sure that the motor is not overloaded. If it is, the VFD may be operating in current limit condition.

- . Check if the VFD is receiving full-speed reference of 10Vdc or 20mA. If not, see solutions for noise problems.

- . Check if the motor nameplate voltage is within the VFD nameplate. If the motor is a dual-voltage motor, make sure that it is wired to correct voltage.

- . Check if the wiring is okay. It may be operating in a single-phase condition. Make sure that wires are not knicked or cut during installation. Even the motor is checked and is running fine in bypass mode (across-the-line); the VFD may see a ground fault or over-current condition.

PROBLEM: The VFD trips during Acceleration

Sofhvare parameters	J100	J300	L100 & SJ100	L300P & SJ300
Acceleration time	F6	F6	F02	F002
Motor receiving voltage	F11	F11	A82	A082
Electronic overload level	A23	A23	b12	b012
Manual torque boost	F8	F8	A42	A042
DC brake enable	na	*	na	A051
DC brake power (start)	na	*	na	A057
DC brake time (start)	na	*	na	A058

* requires DOP, DRW, HOP or HRW high performance keypads or DOP Plus software

Error codes	J100	J300	L100 & SJ100	L300P & SJ300
CC during acceleration	E3	E03 & E33	E03	E03 & E30
Overload	E5	E05	E05	E05

If a large inertia load is accelerate in short period of time, the motor may require more current than what the VFD can supply. In this condition, the VFD trips on either overcurrent or overload depending on severity. In some cases, the VFD may have problems starting with spinning motor.

SOLUTION

- Increase the Acceleration time. Longer acceleration lowers the load on the VFD and the motor; which reduces heat generation. Also, it &ends the life of bells if equipped.

- Check if the motor and the load can be rotated freely. Bad bearings, tight and misaligned belts will cause excessive resistance. Foreign object may impede the operation. These can cause overcurrent condition and must be rectified immediately.

- Make sure that the motor nameplate voltage matches the VFD. Incorrect voltage can cause overcurrent condition and must be rectified immediately.

- Make sure that the Motor Receiving Voltage setting matches the motor nameplate voltage. Setting this parameter lower than the nameplate may cause the motor to stall. For 208V motor, choose 215V setting.

  Check if the thermal overload level is set correctly. If it is, increase the acceleration time,, and/or check the motor load.

- Check the Manual torque boost setting. You may have to increase or decrease depending on the situation. If the motor does not turn over 10Hz, increase the setting. If the motor turns, decrease the setting.

- If the motor and the load are spinning and the VFD is having a problem starting, wait until slow down or DC injection braking at start (not available on 3100, L100 and SJ100 series) may be introduced to slow it down.

PROBLEM: The VFD trips during Deceleration

Software parameters	J100	J300	L100 & SJ100	L300P & SJ300
Deceleration time	F7	F7	F03	FO03

Error codes	J100	J300	L100 & SJ100	L300P & SJ300
Overvoltage	E7	E07	E07	E07
Dynamic brake overload	E6	E06	E06*	E06
OC during deceleration	E2	E02 & E32	E02	E02 & E30

If a large inertia load is decelerated in short time, it will regenerate energy and acts as a generator. This will increase the DC bus voltage of the VFD and may cause DC bus overvoltage trip.

SOLUTION

. Increase the Deceleration time. Longer deceleration lowers the load on the VFD and can increase the life of its components.

. If rapid deceleration is required, a dynamic braking unit may be used. Contact your supplier for details.

NOTE: "Dynamic Brake Overload" error may appear if the DC bus voltage level is lower than "Overvoltage" trip level and the condition lasts for extended period of time. This voltage level is only slightly lower than the overvoltage trip level and must be rectified to eliminate nuisance trips.

PROBLEM: VFD current readout does not match the clamp on meter values

Software parameters	J100	J300	L100 & SJ100	L300P & SJ300
Output current	F1	d02	d02	d002
Output voltage	na	na	na	d013

Due to non-sinusoidal (PWM) output waveform and the harmonic content, many Fluke, Amprobe or other digital meter display erratic values. To obtain accurate readings, a True RMS or analog meter can be used. The VFD readings display an average of all three phases and are fairly accurate.

NOTE: Due to the current measurement and the calculation method used within the VFD processor, L100 and SJ100 series VFD may show higher current than normal under SO% full load of the VFD.

PROBLEM: Return Fan VFD trips on Overvoltaae under constant speed

Under certain control scenarios, the supply fan demands more airflow from the return fan can supply at, certain speed. This can cause the return fan to spin faster than what the VFD outputting to fun and causes regeneration of energy back to the VFD. Extended operation in this condition will cause the DC bus voltage to increase and will trip on overvoltage.

SOLUTION

. In general, the supply and the return fans should be operating within 20Hz of each other.

. Start both fans at same time and at same acceleration and deceleration time.

. Install Dynamic Brake Unit if fan operating speeds cannot be within 20Hz

PROBLEM: The frequency reference signal gets "pulled down"

A frequency reference signal (0-10Vdc or 4-20mA) can get noise induced. This may 'pull down" the signal to give erratic speed reference.

Solutions

. Install shielded cable for all analog signal lines. Shield of the wire must be ground at the common at one side only. Try both ends once at a time because depending on installation, grounding the shield at the source or receiving end may show different results.

. Keep analog signal lines away from 120Vac and power (208, 230, 460 or 575Vac) lines. They can induce noise to analog signal lines. Keep at least 10cm (4in) away if installed parallel to those lines. If lines must be crossed, keep a right angle as much as possible. In some installation, can induce more than 200Vac on the signal line if two lines are installed parallel to each other.

. Install a 0.1uF capacitor between the positive and negative of the signal terminals. Depending on installation, it may yield best result if installed at the source, at the receiving end or at both ends.

. Install small inductor in line with analog signal lines. Depending on installation, it may yield batter result if installed in positive line, in common line or in both lines.

NOTE: Installation of both a capacitor and an inductor may cause to resonate and may worsen the condition.

PROBLEM: Others

There many other problems you may experience. In ordered to assist you better, please record all the error codes, values, time of error occurred or any other information that may cause the problem.

MGI Technologies Inc. Integrated VFD System Commissioning Manual < Hitachi >

1)   Integrated VFD system diagrams

2)   Commissioning manual

3)   MGI standard system operation and troubleshooting manual

4)   MGI system with bypass option operation and troubleshooting manual

5)   MGI system routine maintenance guide

6)   MGI system product manuals

7)   Hitachi 5300 series manual

8)   Hitachi L100 series manual

9)   Hitachi L300 Plus series manual
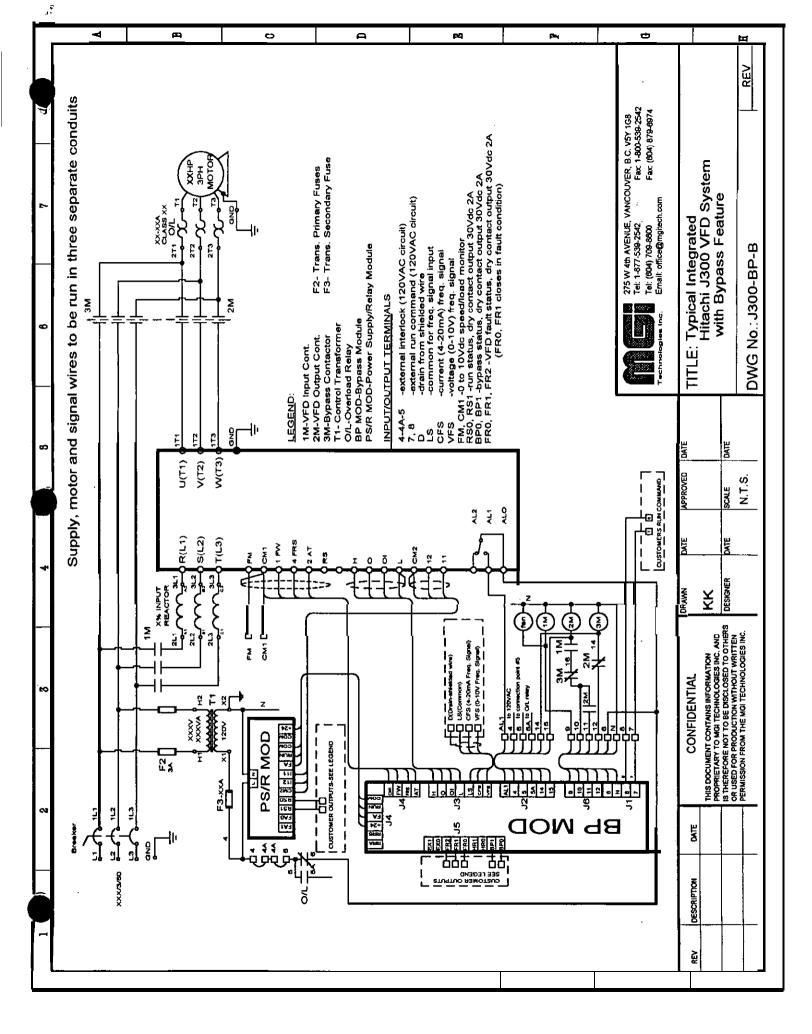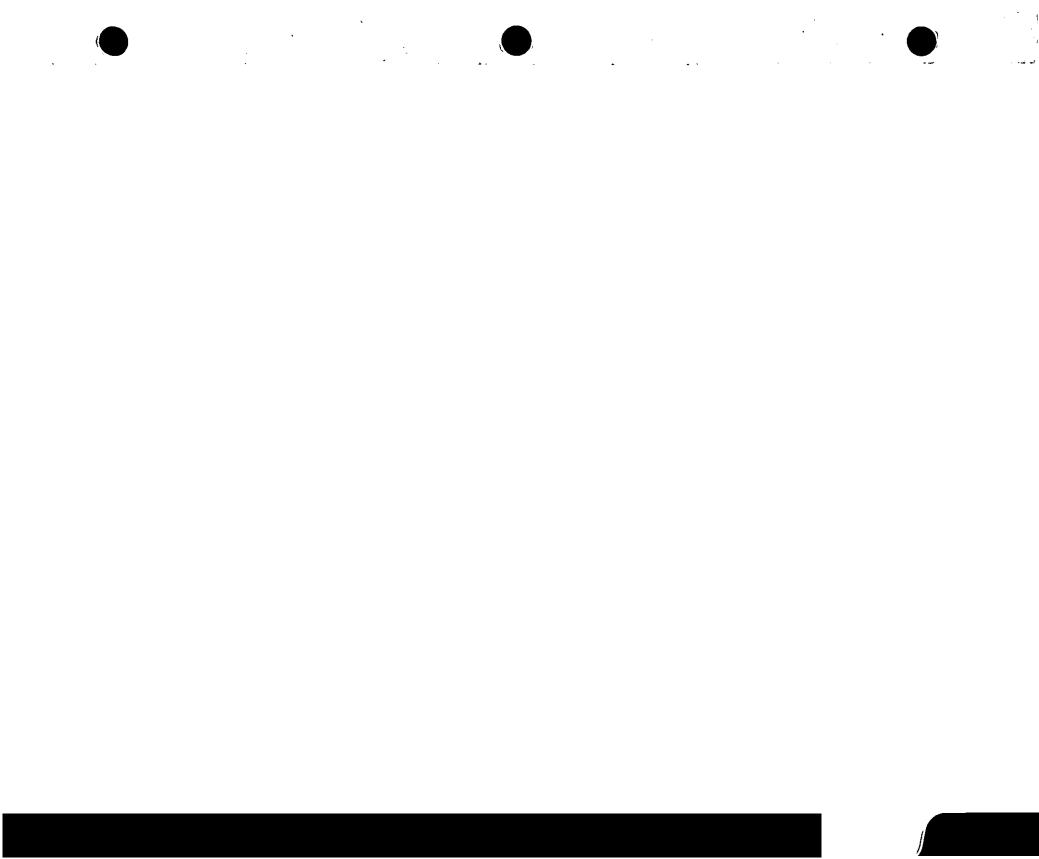
10)   Hitachi VFD software parameter list

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INTEGRATED VFD SYSTEM

MGI Integrated VFD System Diagrams

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Supply, motor and signal wires to be run in three separate conduits

LEGEND:

1M- VFD Input Cont.
2M- VFD Output Cont.
3M- Bypass Contactor
T1- Control Transformer
O/L- Overload Relay
BP MOD- Bypass Module
PS/R MOD- Power Supply/Relay Module

F2- Trans. Primary Fuses
F3- Trans. Secondary Fuse

INPUT/OUTPUT TERMINALS

4-4A-5   -external interlock (120VAC circuit)
7, 8   -external run command (120VAC circuit)
D   -drain from shielded wire
LS   -common for freq. signal input
CFS   -current (4-20mA) freq. signal
VFS   -voltage (0-10V) freq. signal
FM, CM1 -0 to 10Vdc speed/load monitor
RS0, RS1 -run status, dry contact output 30Vdc 2A
BP0, BP1 -bypass status, dry contact output 30Vdc 2A
FR0, FR1, FR2 -VFD fault status, dry contact output 30Vdc 2A
          (FR0, FR1 closes in fault condition)

TITLE: Typical Integrated
Hitachi J300 VFD System
with Bypass Feature

DWG No.: J300-BP-B

REV

DRAWN KK
DESIGNER
SCALE N.T.S.

REV | DESCRIPTION | DATE

MGI

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INTEGRATED VFD SYSTEM

Commissioning
Manual

000525

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MGI Technologies Inc. 275 West 4th Ave, Vancouver, BC **Canada**

MGI – Hitachi VFD System Commissioning Manual

To properly commission the MGI – Hitachi VFD System, you will require following items:

- Quality tools
- Digital multimeter capable to measure up to 1000Vac and dc
- Clamp-on ammeter
- Megger
- 0- 1 0Vdc and 4-20mA signal generator

Following items are optional:

- DOP or DRW keypad with adapter for L100 and L300Plus
- DOP Plus PC software

Please use the MGI – Hitachi VFD System Commissioning Report sheet. To provide better service and fof warranty purpose, please complete and return the sheet for each VFD unit commissioned to the MGI Service Department.

PRE-POWER-UP CHECKS

Record the nameplate information. Be sure that the VFD full load current capacity is greater than the motor rating.

Contact information

- Your company name and the service technician who commissioned the VFD.
- Customer's name
- Project site information

Nameplate information

- VFD system nameplate data, tag name, location, application, etc
- VFD nameplate data
- Motor nameplate data

Following installation conditions must be met unless the system is designed for such conditions:

Environment

- Ambient temperature is within -10°C ~ 40°C (14°F ~ 104°F).
- Humidity is within 20% ~ 90%, non-condensing.
- Adequate ventilation, no corrosive or dusty environment.
- Protection against water source. (i.e. sprinkler, pipes, vent holes)
- Tidiness of the unit, no loose wire, metal or any foreign objects inside.

Power supply, Wiring & Motor

- A line reactor is required if:
    - 9 The kVA rating of the supply transformer is greater than 10 times the kVA rating of the VFD.
    - 9 Supply transformer is greater than 500kVA.
    - 9 The supply voltage is 575Vac.
- Completion of field wiring. Check for their size, termination and installation method.
- Check electrical connections, mounting bolts, nuts and screws. They may become loose during shipping.
- Check for the proper grounding.
- The motor should be meggered.
- Determine the application of the motor, constant torque or variable torque.
- A load reactor and/or filter is required if:
    - 9 575Vac application.
    - 9 460Vac application with cable longer than 50ft.
    - 9 Load reactor may not be necessary if inverter duty motor is used. Check with motor specification.

POWERED CHECKS

Power Supply

Without applying the power to the VFD, measure the line voltages:
- L1-L2
- L1-L3
- L2-L3

They should be within 3% of each other and 10% of the VFD nameplate rating.

If the line voltage is within the VFD rating, apply the power to the VFD. Measure the line voltages again and record the readings. Measure the DC bus voltage across P(+) and N(-) terminals.

Software Programming

Check and program all necessary software parameters such as acceleration & deceleration time, application (constant & variable torque), carrier frequency, motor voltage, and thermal overload level. Incorrect software programming may result in equipment malfunction or damage. Record any changes to the software for future reference.

Motor Rotation

Check if the system can be operated at full speed. In some systems, full speed operations require special procedures, otherwise damages to other equipment may occur.

Check the direction of motor rotation in both the VFD and the BYPASS mode. Record the Free Run Stop (Coast-to-stop) time. If the rotation is incorrect follow the procedure below:

	Rotation is fine in the VFD mode	Rotation is reverse in the VFD mode
Rotation is fine in the Bypass mode	No wiring changes required	Swap two phases at both input and output of the unit.
Rotation is reverse in the Bypass mode	Swap two phases at the input of the unit.	Swap two phases at the output of the unit.

Motor Current

Check the motor current in both the VFD and the BYPASS operation. Depending on the digital clamp on ammeter, readings may not be accurate in the VFD operation due to frequency content of the output waveform. Use the VFD current monitor display. Other than the inrush current, the motor should not draw more than its FLA rating.

Input and Output Signals

Check both the input and the output signals for correct and accurate operation,
- Check the accuracy of 0-10Vdc or 4-20mA speed reference input.
- Run command.
- Customer interlock.
- Preset speed, if required.
- Check the accuracy of 0-10Vdc or 4-20mA feedback.
- RUN status feedback.
- AT SPEED status feedback.
- FAULT status feedback.
- VFD mode status feedback.
- BYPASS mode status feedback.

Operator switches and Indicator lights

Check all operator switches and indicator lights for correct operation,

Commissioning Wrap-up

To complete the commissioning of the VFD system, check the following:
. Software parameter setting is recorded.
- VFD manual in the enclosure pocket.
- VFD system wiring diagram in the system.
- Instruction manuals for other devices are in the enclosure pocket.
- Record any other changes made to the system.
- Complete the MGI VFD System Commissioning Report.

You must send the MGI VFD System Commissioning Report and the VFD parameter sheet to MGI to register the warranty extension.

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INTEGRATED VFD SYSTEM

MGI Standard VFD System Operation and Troubleshooting Manual

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MGI Technologies Inc. 275 West 4th Ave, Vancouver, BC Canada

Integrated VFD System with Hand-Off-Auto Option Operation Manual

Thank you for purchasing MGI Integrated VFD System with Hand-Off-Auto Option. This operation manual guides you through basic operation of this package.

- Note -   MGI Integrated VFD Systems are custom built for your specific needs. Your unit may have additional features not mentioned in this manual.

Modes of operation

This unit is equipped with Hand-Off-Auto selector switch. This switch enables you to select the source of operation commands such as RUN and FREQUENCY commands.

Operation of the VFD in "HAND" mode
The "HAND" mode is sometime referred to as "LOCAL" mode. In this mode, both the "Run Command" and the "Frequency Reference" are provided the controls on the VFD package. It is commonly used if your building management system is not functioning but you would like to operate the equipment manually. The "Run Command" is initiated as soon as you select the "HAND-OFF-AUTO" operator to "HAND" position and the Speed Pot can be used to set the desired speed.

Operation of the VFD in "OFF" mode
In this mode, the VFD will be powered but no operation will be performed. This mode is used when software programming of the VFD is required.

Operation of the VFD in "AUTO" mode
The "'AUTO" mode is sometime referred to as "REMOTE" mode. In this mode, both the "Run Command" and the "Frequency Reference" is provided by the building management system. Normally, this is the setting you would select and the building management system will take care the rest for you.

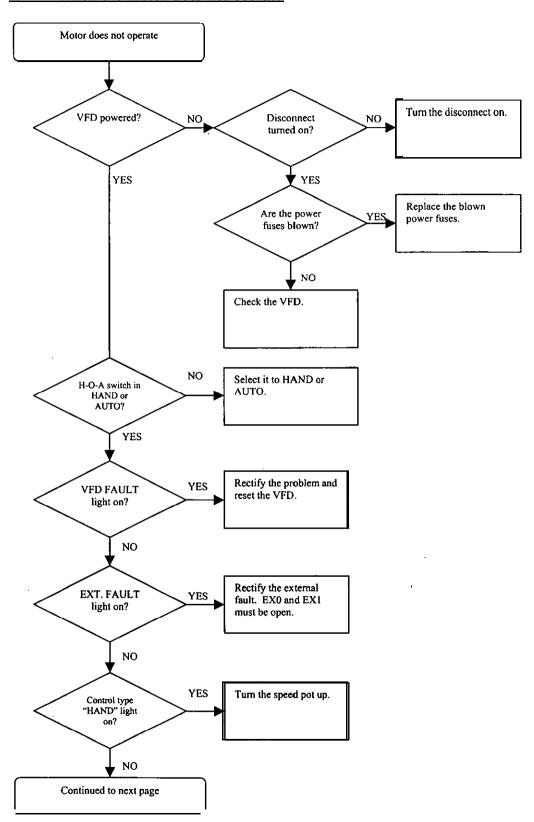# Integrated VFD System with HOA Option Troubleshooting Guide

This section guides you to troubleshoot the MGI Integrated VFD System with HOA Option.

To troubleshoot the VFD unit itself, please refer to the VFD troubleshooting manuals for each VFD model types.
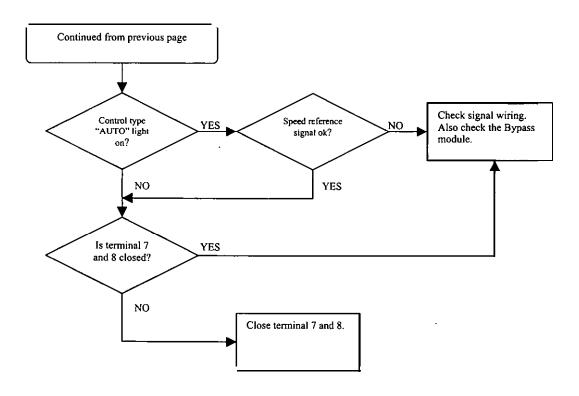
!! WARNING !!

Some troubleshooting procedures require the system to be powered and its door to be opened to perform the test. There are multiple circuits that may be powered at any given time. Follow standard safety procedures to prevent any damage to the equipment or personal injuries.
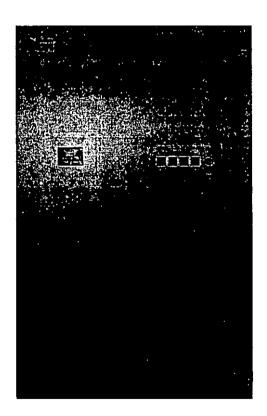
1.   When the motor does not ooerate

```
┌─────────────────────────┐
│  Motor does not operate │
└─────────────────────────┘
            │
            ▼
      ╱ VFD powered? ╲ ──NO──▶ ╱ Disconnect ╲ ──NO──▶ ┌──────────────────────┐
      ╲             ╱          ╲ turned on? ╱          │ Turn the disconnect on. │
            │                        │                 └──────────────────────┘
           YES                      YES
            │                        ▼
            │                 ╱ Are the power ╲ ──YES──▶ ┌──────────────────────┐
            │                 ╲ fuses blown?  ╱          │ Replace the blown     │
            │                        │                   │ power fuses.          │
            │                       NO                   └──────────────────────┘
            │                        ▼
            │                 ┌──────────────┐
            │                 │ Check the VFD. │
            │                 └──────────────┘
            ▼
      ╱ H-O-A switch in ╲ ──NO──▶ ┌──────────────────────┐
      ╲ HAND or AUTO?   ╱         │ Select it to HAND or  │
            │                     │ AUTO.                 │
           YES                    └──────────────────────┘
            ▼
      ╱ VFD FAULT ╲ ──YES──▶ ┌──────────────────────┐
      ╲ light on? ╱          │ Rectify the problem and │
            │                │ reset the VFD.          │
           NO                └──────────────────────┘
            ▼
      ╱ EXT. FAULT ╲ ──YES──▶ ┌──────────────────────┐
      ╲ light on?  ╱          │ Rectify the external   │
            │                 │ fault.  EX0 and EX1    │
           NO                 │ must be open.          │
            ▼                 └──────────────────────┘
      ╱ Control type   ╲ ──YES──▶ ┌──────────────────────┐
      ╲ "HAND" light on? ╱        │ Turn the speed pot up. │
            │                     └──────────────────────┘
           NO
            ▼
┌─────────────────────────┐
│ Continued to next page  │
└─────────────────────────┘
```

Continued from previous page

Control type "AUTO" light on? — YES → Speed reference signal ok? — NO → Check signal wiring. Also check the Bypass module.

NO

YES

Is terminal 7 and 8 closed? — YES

NO

Close terminal 7 and 8.

4

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INTEGRATED VFD SYSTEM

MGI VFD System with
Bypass Option
Operation and
Troubleshooting Manual

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Integrated VFD System with Bypass Option Operation Manual

Thank you for purchasing MGI Integrated VFD System with Bypass Option. This operation manual guides you through basic operations of this package.

- Note -   MGI Integrated VFD Systems are custom built for your specific needs. Your unit may have additional features not mentioned in this manual.

SELECTOR SWITCHES

VFD – OFF – BYPASS selector switch

This switch enables you to select one of following operations:

1. VFD position: Enables variable speed operation of the motor using the VFD. Normally, this is the mode you would select to operate this unit.
2. OFF position: No motor operation in this position. This mode used when you want to power down the motor.
3. BYPASS position: Across-the-line (full speed) operation for the motor and no variable speed regulation. This mode is used when the VFD is not functioning but you would like to operate the motor.

HAND – OFF- AUTO selector switch

This switch enables you to select the source of operation commands such as RUN and FREQUENCY commands. This switch enables you to select one following operations:

1. HAND position: Sometime referred as LOCAL mode. The motor operations are performed manually.
2. OFF position: No operation in this position,
3. AUTO position: Sometime referred as REMOTE mode. The motor operations are performed using remote controller such as PLC or building management system.

OPERATION IN VARIOUS MODES

Operation of the VFD in "HAND" mode
In this mode, both the "Run Command" and the "Frequency Reference" are provided by the controls on the VFD package. This mode is commonly used if your building management system is not functioning but you would like to operate the equipment manually. The "Run Command" is initiated as soon as you select the "HAND-OFF-AUTO" operator to "HAND" position. In the VFD mode, the Speed Pot can be used to set the desired speed.

Operation of the VFD in "OFF" mode
In this mode, the VFD will be powered but no operation will be performed. This mode is used when software programming of the VFD is required.

Operation of the VFD in "AUTO" mode
In this mode, both the "Run Command" and the "Frequency Reference" is provided by the building management system. Normally, this is the setting you would select and the building management system will take care the rest for you.

Operation of the BYPASS in "HAND" mode
In this mode, switching "H-O-A" switch from "OFF" to "HAND" enables the BYPASS operation.

Operation of the BYPASS in "OFF" mode
No operation of the motor will be performed.

Operation of the BYPASS in "AUTO" mode
In this mode, the BYPASS operation is controlled by the building management system.

In case of VFD errors

VFD will trip to protect itself or the load (motor) if abnormal condition occurs. When it trips, the VFD will lock itself out and require a manual reset by pressing the "STOP/RESET" button. Before you reset the VFD, please log the error message and other error data. Error information is important to correct the problem from happening again. Please use supplied log sheet.

VFD Error Log Sheet (EXAMPLE)

Equipment	J300-075HFU Bypass Package	Serial Number	ME-12345-2
Tag	AHU-2		

Date	Time of acknowledgement	Trip cause	Frequency	Current	Voltage	Run time	Notes
An example for the standard operator keypad.							
January 1, 2000	8:00 AM	E05	54.3Hz	18A	78U	na	Happened between 6:00am to 7:30am
An example for the DOP, HOP and SC-OPE operator keypad.							
January 1, 2000	8:00 AM	Over V	34.5Hz	12.3A	852.4V	1Y 234D	Happened during Generator test

Repeated fault condition will stress the unit and may lead to the VFD failure. If same type of faults appear frequently, contact your local service representative and have the cause of the problem corrected immediately.

In case of VFD failure

If the fault condition is severe enough, the VFD may be permanently damaged. Also, water, dust, or metal objects entering the package may damage the unit. If these conditions occur, contact your local service representative for an inspection and a repair.

Integrated WD System with Bypass Option Troubleshooting Manual

This manual guides you to troubleshoot the MGI Integrated VFD System with Bypass Option. This section is divided into two:

1. When the motor does not operate in the "VFD mode".
2. When the motor does not operate in the "BYPASS mode".

To troubleshoot the VFD unit itself, please refer to the VFD troubleshooting manuals for each VFD model types.
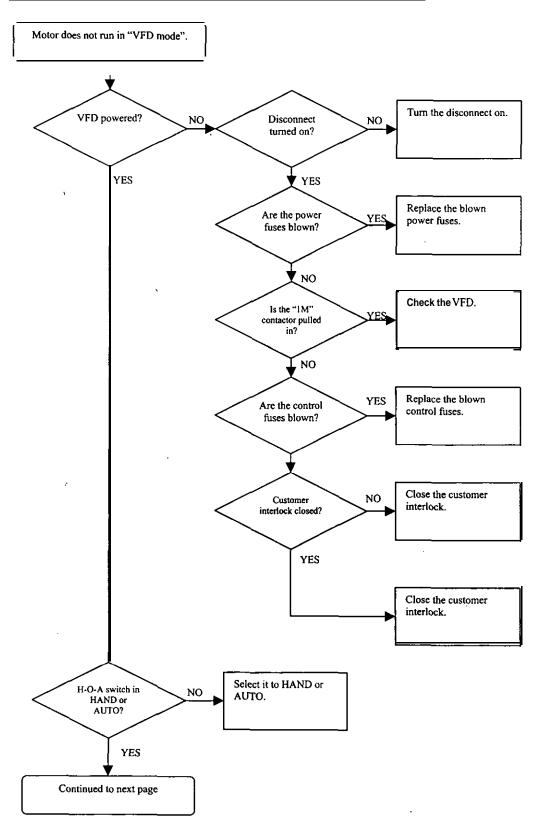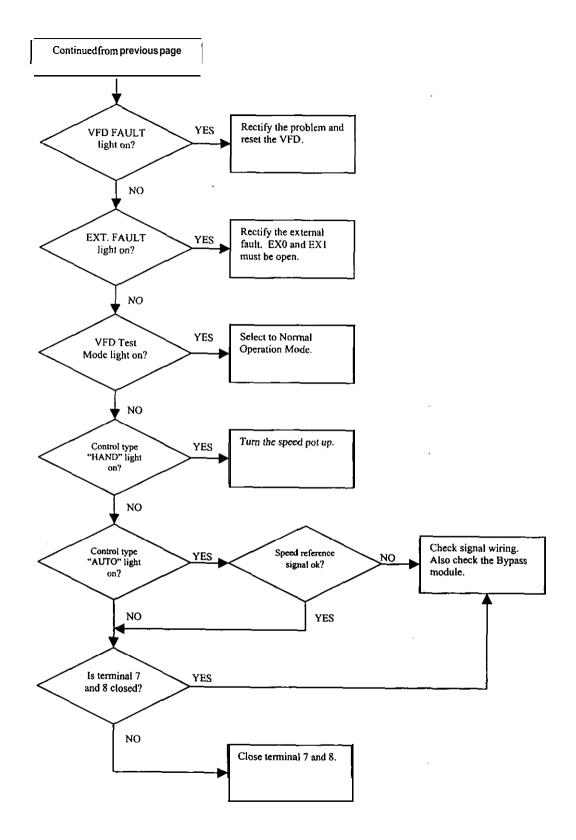
!! WARNING !!

Some troubleshooting procedures require the package to be powered and its door to be opened to perform the test. There are multiple circuits that may be powered at any given time. Follow standard safety procedures to prevent any damage to the equipment or personal injuries.

1. When the motor does not ooerate in the "VFD mode".

Motor does not run in "VFD mode".

VFD powered? — NO → Disconnect turned on? — NO → Turn the disconnect on.

YES (VFD powered)

YES (Disconnect turned on)

Are the power fuses blown? — YES → Replace the blown power fuses.

NO

Is the "1M" contactor pulled in? — YES → Check the VFD.

NO

Are the control fuses blown? — YES → Replace the blown control fuses.

Customer interlock closed? — NO → Close the customer interlock.

YES → Close the customer interlock.

H-O-A switch in HAND or AUTO? — NO → Select it to HAND or AUTO.

YES

Continued to next page

2

VFD FAULT light on? — YES → Rectify the problem and reset the VFD.

NO ↓

EXT. FAULT light on? — YES → Rectify the external fault. EX0 and EX1 must be open.

NO ↓

VFD Test Mode light on? — YES → Select to Normal Operation Mode.

NO ↓

Control type "HAND" light on? — YES → Turn the speed pot up.

NO ↓

Control type "AUTO" light on? — YES → **Speed reference signal ok?** — NO → Check signal wiring. Also check the Bypass module.

Speed reference signal ok? — YES →

Control type "AUTO" light on? — NO ↓

Is terminal 7 and 8 closed? — YES → Check signal wiring. Also check the Bypass module.

NO ↓

Close terminal 7 and 8.

3

2.   When the motor does not operate in the "BYPASS mode",

```
┌─────────────────────────┐
│ Motor does not run in    │
│ "BYPASS mode".           │
└─────────────────────────┘
              │
              ▼
        ╱ Package ╲        NO        ╱ Disconnect ╲      NO      ┌──────────────────────┐
       ╱  powered? ╲ ──────────────▶╲  turned on? ╱ ──────────▶│ Turn the disconnect on.│
       ╲           ╱                 ╲           ╱               └──────────────────────┘
        ╲         ╱                   ╲         ╱
            │ YES                         │ YES
            │                             ▼
            │                       ╱ Are the power ╲   YES    ┌──────────────────────┐
            │                      ╱  fuses blown?   ╲ ──────▶│ Replace the blown     │
            │                      ╲                 ╱         │ power fuses.          │
            │                       ╲               ╱          └──────────────────────┘
            │                            │ NO
            │                            ▼
            │                       ╱ Is the "3M" ╲    YES     ┌──────────────────────┐
            │                      ╱ contactor pulled╲ ──────▶│ Check the motor and   │
            │                      ╲    in?          ╱         │ the power cables.     │
            │                       ╲               ╱          └──────────────────────┘
            │                            │ NO
            │                            ▼
            │                       ╱ Are the control ╲  YES   ┌──────────────────────┐
            │                      ╱  fuses blown?    ╲ ─────▶│ Replace the blown     │
            │                      ╲                  ╱        │ control fuses.        │
            │                       ╲                ╱         └──────────────────────┘
            │                            │
            │                            ▼
            │                       ╱ Customer      ╲   NO     ┌──────────────────────┐
            │                      ╱ interlock closed?╲ ─────▶│ Close the customer    │
            │                      ╲                  ╱        │ interlock.            │
            │                       ╲                ╱         └──────────────────────┘
            │                            │ YES
            │                            │              ┌──────────────────────┐
            │                            └────────────▶│ Close the customer    │
            │                                           │ interlock.            │
            │                                           └──────────────────────┘
            ▼
     ╱ H-O-A switch in ╲    NO    ┌──────────────────────┐
    ╱    HAND or        ╲ ──────▶│ Select it to HAND or  │
    ╲    AUTO?          ╱        │ AUTO.                 │
     ╲                 ╱         └──────────────────────┘
            │ YES
            ▼
  ┌─────────────────────────┐
  │ Continued to next page   │
  └─────────────────────────┘
```

4

Continued from previous page

```
                    │
                    ▼
              ╱─────────╲                    ┌──────────────────┐
             ╱ EXT. FAULT ╲      YES          │ Rectify the external │
            ╱  light on?   ╲──────────────▶   │ fault. EX0 and EX1   │
             ╲            ╱                    │ must be open.        │
              ╲─────────╱                      └──────────────────┘
                    │
                    │ NO
                    ▼
              ╱─────────╲                    ┌──────────────────┐
             ╱ O/L FAULT  ╲      YES          │ Correct the motor    │
            ╱  light on?   ╲──────────────▶   │ overload condition and│
             ╲            ╱                    │ reset the overload relay.│
              ╲─────────╱                      └──────────────────┘
                    │
             NO     │
                    ▼
              ╱─────────╲                    ┌──────────────────┐
             ╱ Control type╲     YES          │ Check signal wiring. │
            ╱  "HAND" light ╲─────────────▶   │ Also check the Bypass│
             ╲    on?      ╱                   │ module.              │
              ╲─────────╱                      └──────────────────┘
                    │
                    │ NO
                    ▼
              ╱─────────╲                    ┌──────────────────┐
             ╱ Control type╲     NO           │ Select "HAND" or     │
            ╱  "AUTO" light ╲─────────────▶   │ "AUTO".              │
             ╲    on?      ╱                   │                      │
              ╲─────────╱                      └──────────────────┘
                    │
                    │ YES
                    ▼
              ╱─────────╲                    ┌──────────────────┐
             ╱ Is terminal 7╲    YES          │ Check the Bypass     │
            ╱  and 8 closed? ╲─────────────▶  │ module. Also, check  │
             ╲             ╱                   │ motor.               │
              ╲─────────╱                      └──────────────────┘
                    │
                    ▼
         ┌──────────────────────┐
         │ Close terminal 7 and 8. │
         │                        │
         └──────────────────────┘
```

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HITACHI

INTEGRATED VFD SYSTEM

MGI VFD System
Routine Maintenance
Manual

000525

WWW.mgitech.com
MGI Technologies Inc. 275 West 4th Ave, Vancouver, BC Canada

Integrated VFD System Routine Maintenance Guide

To maintain reliable operation, the equipment must be routinely checked. Following is the maintenance procedure under normal condition. If the installation environment is severe, such as dusty condition or vibrating mounting fixture, more frequent maintenance is required.

Every six (6) months if continuous operation, every three (3) months if operated less than 24 hours a day

- Check power wire connections at following locations. Tighten if necessary.
    - 9   VFD terminal
    - 9   Line and **load** reactors, if equipped
    - 9   **Contactors,** if equipped
    - 9   Output filter, if equipped
    - 9   Disconnect, if equipped
    - **9**   Thermal overload, if equipped
    - **9**   Input and output terminal, if equipped
- Check ventilation filter if equipped. Clean and replace it if necessary.
- Check for the cleanness of the VFD heatsink. In dusty environment, the heatsink may be clogged and may cause overheating problem.
- Check the indicator lights if they are the incandescent-type bulbs. Replace if necessary.

If the equipment is operated less than 24 hours a day, heating and cooling of equipment cause expansion and contraction of components. This increases the possibility of connections getting loose.

Every twelve (12) months

- Check the VFD cooling and package cooling fans if equipped. If it is making too much noise (i.e. squeaking, grinding, etc), replace it.
- Check electrolytic capacitors (i.e. DC bus capacitors, power supply capacitors) for leakage or bulging. Replace if necessary.
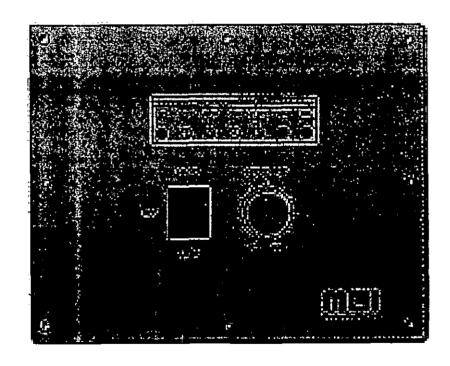
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HOA MODULE
SA-HOA-MOD-A

HOA MODULE

Operator's Manual

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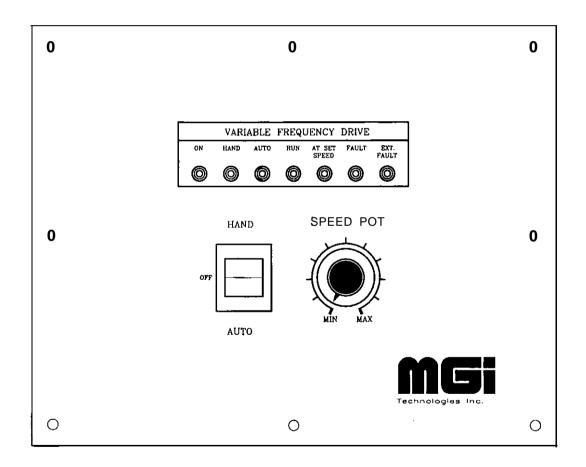
Hand-Off-Auto Module: Model SA-HOA-MOD-A

Introduction

MGI's Hand-Off-Auto module, SA-HOA-MOD-A, is designed to operate with Hitachi VFDs. It is designed to mount on to the front door of the enclosure with all operators and indicator lights clearly marked. The rocker style selector switch and the potentiometer provide solid and easy operation; seven high brightness LED indicator lights monitor the system status. All connections to the Hand-Off-Auto Module are made with quick connectors for fast and reliable installation.

Figure 1   Front view of the Hand-Off-Auto Module.

Features
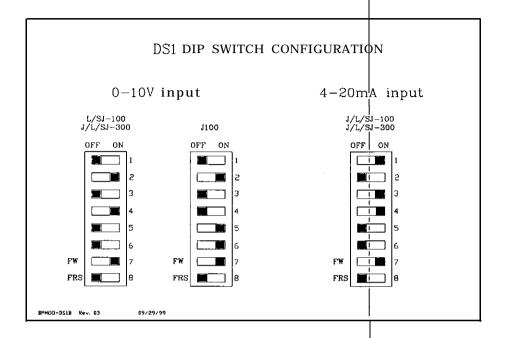
Operator Controls	
Control	**Function**
HAND-OFF-AUTO selector	Sets system to HAND, OFF or AUTO mode
SPEED POT potentiometer	Sets VFD frequency when HAND mode is selected

Diagnostic Indicator Lights		
Light		**ON Status**
VFD ON		When VFD is powered
CONTROL TYPE	HAND	When in "HAND" mode
	AUTO	When in "AUTO" mode
VFD	RUN	When VFD is running
	AT SET SPEED	When VFD reaches Set Speed
	FAULT	When VFD experiences a Fault Condition
	EXT. FAULT	When external fault condition is received (e.g. Freeze status, Smoke status). VFD will not operate motor until fault clears
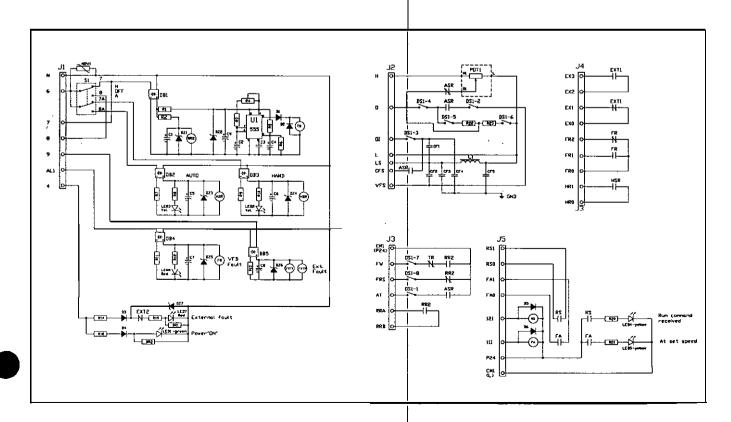
Dry Contact Outputs			
Contact Designation	**Contact Function**	**Type**	**Rating**
RSO- RS1	Closes when VFD is running	N/O	30Vdc 2A
FAO –FA1	Closes when VFD reaches Set Speed	N/O	3OVdc 2A
RRA – RRS	Closes when VFD receives 'RUN" command	N/O	30Vdc 2A
EXO –EX1	Closes when system receives 'External Fault" input	N/C	3OVdc 2A
EX2 – EX3	Opens when system receives 'External Fault' input (used for internal wiring of the package, not available for external connection)	N/0	30Vdc 2A
FRO –FR1– FR2	Contacts change state when VFD Fault Condition occurs FRO, FR1– closes in fault condition FRO, FR2 -opens in fault condition	N/O & N/C	30Vdc 2A
HRO – HR1	Closes when system is in "HAND" mode	N/O	30Vdc 2A

Dip Switch setting

The DIP switch, DP1, must be set correctly depending on the VFD model and the type of frequency reference signal Follow the chart below for settings.

Circuit diaaram for SA-HOA-MOD-A Hand-Off-Alto Module

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BYPASS MODULE
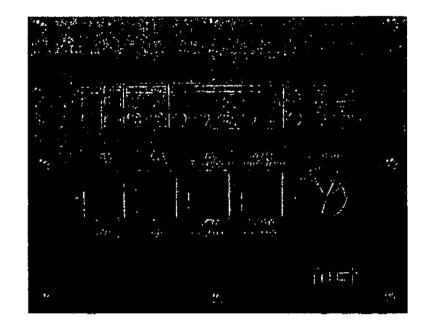
Operator's Manual

000604

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MGI Technologies Inc. 275 West 4th Ave, Vancouver, BC Canada

BYPASS MODULE: Model SA-BPMO-B

1. INTRODUCTION

MGI's Bypass Module, the SA-BPMO-B, is designed to operate with 2 or 3 contactor bypass system using Hitachi VFD. It is designed to mount on to the front door of the bypass enclosure with all operators and indicators clearly marked. Four rocker switches and one potentiometer provide solid and easy operation; twelve high brightness LED indicator lights monitor the system status, All connections to the Bypass Module are made with plug-in quick connectors, for fast and reliable installation. Other features such as "VFD TEST MODE", "BYPASS AUTO START" and adjustable time delay for the VFD run command are built into the Bypass Module.
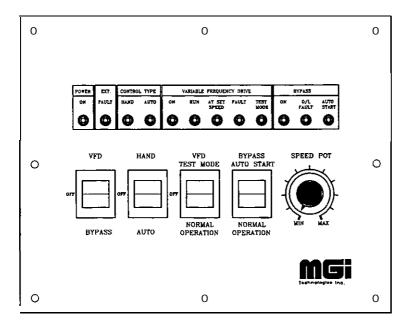
Figure 1

Front view of the Bypass Module

2. FEATURES

2.1 OPERATOR SWITCHES AND SPEED-POT

Control	Function
VFD-OFF-BYPASS selector	Sets system to VFD, OFF or BYPASS mode
HAND-OFF-AUTO selector	Sets system to HAND, OFF or AUTO mode
VFD TEST MODE-OFF-NORMAL OPERATION selector	Sets system to VFD TEST MODE, OFF or NORMAL OPERATION mode. While in VFD TEST MODE, the motor can be run in BYPASS mode.
BYPASS AUTO START – NORMAL OPERATION selector	Sets system to BYPASS AUTO START or NORMAL mode. If AUTO START is selected, the system will switch to Bypass mode in an event of VFD faults automatically.
SPEED POT potentiometer	Sets VFD frequency when VFD and HAND modes are selected

2.2   INDICATOR LIGHTS

indicator Light		ON Status
POWER ON		When control power is applied to the Bypass Module
EXT. FAULT		When external fault signal is received (e.g. Freeze status, Smoke status). Motor cannot run until fault clears.
CONTROL TYPE	- HAND	When in "HAND" mode
	- AUTO	When in 'AUTO" mode
VFD	-ON	When VFD is powered
	- RUN	When VFD receives a Run command
	-AT SET SPEED	When VFD reaches Set Speed
	FAULT	When VFD experiences a Fault Condition
	-TEST MODE	When VFD TEST MODE is selected
BYPASS	-ON	When System is in BYPASS mode
	- O/L FAULT	When thermal Overload Relay is in Fault Condition
	- AUTO START	When BYPASS AUTO START mode is selected

Note: The "RUN" and "At SET SPEED" indicators are available if the MG-PSRM-A is used with the Bypass Module.

2.3   BYPASS SYSTEM STATUS -DRY CONTACT OUTPUTS

Contacts	Contact Function	Type	Rating
RRA - RRB	Closes when VFD receives "RUN" command	N/O	3OVdc 2A
EXO - EX1	Closes when system receives "External Fault" input	NIC	3OVdc 2A
FRO - FR1- FR2	Contacts change state when VFD fault condition occurs	NIO & NIC	3OVdc 2A
HRO - HR1	Closes when system is in "HAND" mode	N/O	30Vdc 2A
BP0 - BP1	Closes when system is in "BYPASS" mode	N/O	30Vdc 2A

NOTE: Do **not use these dry contact outputs for voltages higher then 30Vdc.** For a 120Vac system, install a relay rated for 120Vac.

3.   OPERATION OF THE BYPASS SYSTEM

3.1   VFD OPERATION

.   "VFD TEST MODE-NORMAL OPERATION" switch in the "NORMAL OPERATION" position.

.   "VFD-OFF-BYPASS" switch in the "OFF" position
-    Contactors 1M, 2M and 3M will open. The motor will not operate in both the VFD and the Bypass mode.

.   "VFD-OFF-BYPASS" switch in 'VFD" position
-    Contactors 1M and 2M will close and contactor 3M will open. Connects the power to the VFD input and connects the VFD output to the motor.
-    The VFD "ON" indicator light and the digital operator will light up.

.   "HAND-OFF-AUTO" switch in the "OFF" position
-    The Run command cannot be initiated. VFD is in the stand-by-mode.
-    The Frequency can be set via the speed potentiometer.
-    Motor will not run or will decelerate to stop.

- "HAND-OFF-AUTO" switch in the "HAND" position
    - "HAND" indicator light will light up.
    - The Run command is closed and the VFD accelerates to the frequency set by the speed pot.
    - "RUN' and "AT SET SPEED" indicator lights will light up when the Bypass Module is used with the MG-PSRM-A Power Supply/Relay Module. (Exception: When used with Hitachi J100 series VFD, only one of the signals can be displayed)

- "HAND-OFF-AUTO" switch in "AUTO" position.
    - "AUTO" indicator light will light up.
    - The Frequency setting command is received from an external 0-IOVDC or 4-20mA analog signal connected to terminals, Land VFS or L and CFS respectively.
    - The Run command is applied by externally controlled, N/O dry contact connected to terminals 7 and 8.

NOTE: The "VFD FAULT" indicator light will light up when the VFD is in the fault mode.
           The "VFD TEST MODE-OFF-NORMAL OPERATION" switch must be in the "NORMAL OPERATION" position for the motor to run in the VFD mode.

3.2   BYPASS OPERATION

- "VFD-OFF-BYPASS" switch in the "BYPASS" position
    - "BYPASS ON" indicator light will light up.

- "HAND-OFF-AUTO" switch in the 'OFF" position
    - Contactors 1M, 2M and 3M will open. No operation of the motor

- "HAND-OFF-BYPASS" switch in "HAND " position
    - "HAND" indicator light will light up.
    - Contactor 3M will close and will operate the motor under full speed
    - Contactors 1M and 3M will remain open.

- "HAND-OFF-AUTO" switch in the "AUTO" position
    - "AUTO" indicator light will light up.
    - Contactor 3M will close when an external run command is initiated and will operate the motor under full speed.
    - Contactors 2M and 3M will remain open.

3.3   VFD TEST MODE

- "VFD TEST MODE-OFF-Normal Operation" switch in the "VFD TEST MODE" position
    - Contactor 1M will close and apply power to the VFD.
- "VFD-OFF-BYPASS" switch in the VFD or OFF position
    - No motor operation.
- "VFD-OFF-BYPASS" switch in the "BYPASS" position.
    - Contactor 3 M will close and operate the motor under full speed.

NOTE: In order to run the motor in the 'VFD" mode after the "VFD Test Mode", the run command must to be removed by switching the "HAND-OFF-AUTO" switch to the "OFF" position. Once the VFD output frequency has decelerated to 0Hz, the system is ready to operate in the "VFD" mode.

3.3 AUTO BYPASS START OPERATION

● "BYPASS AUTO START-NORMAL OPERATION" switch in the "BYPASS AUTO START" position
  – "BYPASS AUTO START" indicator light will light up.
  – In an event of VFD faults, contactors 1M and 2M will open and contactor 3M will close automatically, switching the system operation from VFD mode to BYPASS mode.

3.5 FRS (Free Run Stop) OPERATION
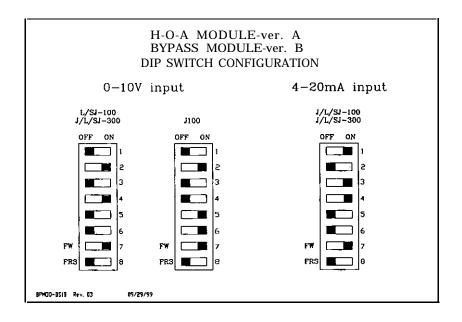
  – FRS (coast-to-stop) operation can be enabled by selecting the Switch 8 of DS1 DIP switch to the "ON" position.
  – When the Run command is opened, the motor will free-run to stop.

3.6 TIME DELAY FOR RUN COMMAND
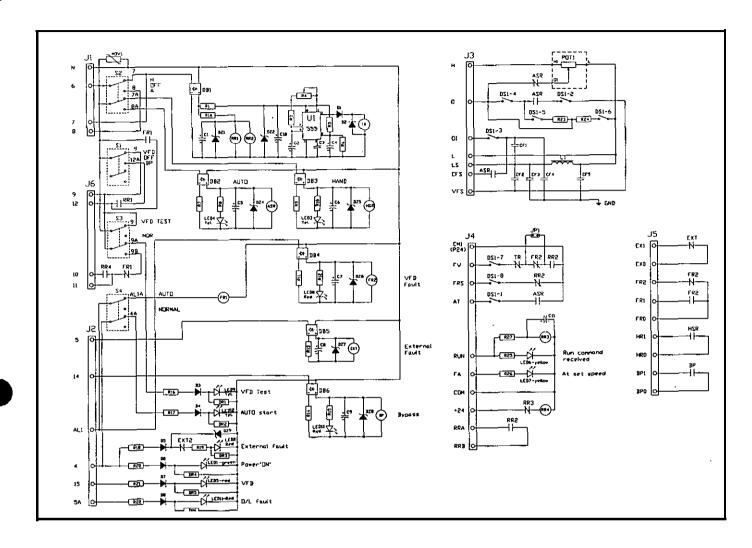
  – Power interruption may cause occasional VFD trips. Trips are caused by the run command being applied to the VFD before the DC Bus and internal power supply output is stabilized. There is a time delay function for the run command built into the Bypass Module to reduce trips. The time range (approximately O-12 seconds) can be set via the R4 trim potentiometer. The delay time is factory set and should not require any field adjustment.

4. DIP SWITCH SETTING

The DIP switch, DP1, must be set correctly depending on the VFD model and the type of frequency reference signal. Follow the chart below for settings.

```
┌─────────────────────────────────────────────────────────┐
│                  H-O-A MODULE-ver. A                      │
│                  BYPASS MODULE-ver. B                     │
│                  DIP SWITCH CONFIGURATION                 │
│                                                           │
│        0-10V input                      4-20mA input      │
│                                                           │
│     L/SJ-100                         J/L/SJ-100           │
│    J/L/SJ-300          J100          J/L/SJ-300           │
│                                                           │
│     OFF   ON         OFF   ON         OFF   ON            │
│    ┌──────┐ 1       ┌──────┐ 1       ┌──────┐ 1          │
│    ┌──────┐ 2       ┌──────┐ 2       ┌──────┐ 2          │
│    ┌──────┐ 3       ┌──────┐ 3       ┌──────┐ 3          │
│    ┌──────┐ 4       ┌──────┐ 4       ┌──────┐ 4          │
│    ┌──────┐ 5       ┌──────┐ 5       ┌──────┐ 5          │
│    ┌──────┐ 6       ┌──────┐ 6       ┌──────┐ 6          │
│ FW ┌──────┐ 7    FW ┌──────┐ 7    FW ┌──────┐ 7          │
│ FRS┌──────┐ 8    FRS┌──────┐ 8    FRS┌──────┐ 8          │
│                                                           │
│ BPMOD-DS13  Rev. 03       09/29/99                        │
└─────────────────────────────────────────────────────────┘
```

3. ELECTRICAL DIAGRAM of the SA-BPMO-B, BYPASS MODULE

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Power Supply – Relay Module
PSRM - A

POWER SUPPLY – RELAY MODULE

Operator's Manual

000004

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MGI Technologies Inc. 275 West 4th Ave, Vancouver, **BC** Canada

Power Supply Relay Module: ME-PSRM-A

INTRODUCTION

This module is design to operate with any collector (solid state) type output rated at 24VDC of the inverter. It can provide sets of normally open dry contacts and output for 24VDC pilot lights for two separate inputs.

Also, there is 24VDC power (up to 100mA) available for additional relays, SC-OPE unit or transducers as required.
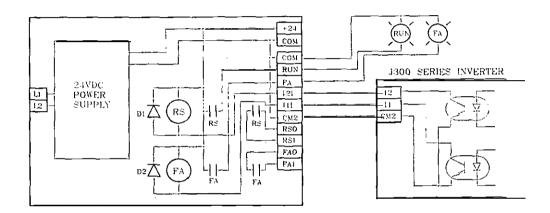
Figure 1. Typical interconnection of the Power Supply Relay Module with Hitachi 5300 series inverter.

I/O TERMINALS DESCRIPTION

L1 & L2	120VAC power input.
+24 & COM	24VDC output.
RUN, FA, & COM	24VDC outputs for "RUN" and "FA" (Frequency Arrival) pilot lights.
	* Power to the "RUN" is available when VFD is operating the motor.*
	* Power to the "FA" (Frequency Arrival) is available when VFD is operating at the set speed.*
11, 12, & CM2	Inputs, "11", "12", and "CM2", from the inverter.
RSO, RSI	"RUN" status dry contact output. Closes when the VFD is operating the motor.
FAO, FAI	"FA" (Frequency Arrival) status dry contact output. Closes when the VFD is operating at the set frequency.

SPECIFICATIONS:

Input voltage:	120VAC (also available with 240VAC)
Relay contact ratings:	0.5A at 125VAC
	2A at 30VDC
	Minimum load 10uA, 10mVDC
DC Power Supply:	24VDC, maximum load 100mA including indicator lights "RUN" and "FA".

NOTE   LED type indicator lamp is recommended to minimize the load on the power supply

MGi
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SINE WAVE FILTER
MG-SWFI-A Series

SINE WAVE FILTER

Instruction Manual
and Operation Guide

000604

WWW.mgitech.com

MGI Technologies Inc. 275 West 4th Ave, **Vancouver, BC** Canada

MG-SWFI-A Series LRC Sine Wave Filter

Introduction

In IGBT VFD applications with long motor cables, a phenomenon called voltage amplification occurs. This phenomenon causes the motor terminal voltage to increase as high as three times the DC bus voltage of the VFD. This high voltage can lead to motor winding insulation breakdowns. The severity of this condition varies with the system voltage, cable length, motor surge impedance, cable surge impedance, and voltage rise time.

The MG-SWFI-A series LRC sine wave filter includes a RC component combined with a 5% impedance reactor. It is designed to operate with VFDs at high carrier frequencies for whisper-quiet operation of the motor. See Table 1 for recommended carrier frequency setting.
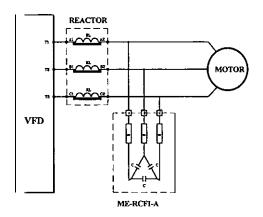
Fig. 1: Typical LRC Sine Wave Filter connection
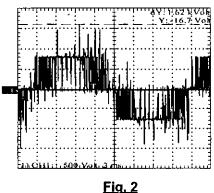
Advantages of using the MG-SWFI-A LRC Sine Wave Filter

- produces sinusoidal current and voltage waveforms
- protects motor insulation breakdown due to voltage stress
- motor runs cooler and quieter
- extends the life of the motor
- reduces losses **in** the motor
- reduces shaft current
- reduces harmonic leakage current in the cable
- eliminates cable length restrictions caused by voltage amplification

The MG-SWFI-A LRC Sine Wave Filter eliminates all the headaches with dv/dt and peak voltage by converting the PWM output waveform into a near sinusoidal voltage waveform. The peak motor terminal voltage with the MG-SWFI-A LRC Sine Wave Filter is equal to the DC bus voltage of the VFD, which equals to the line voltage. See Fig. 2, 3 and 4 for the differences in performance.

Vp da 600 VAC class motor terminal voltage

- Fig. 2   with no reactor and no LRC filter, 150 ft of motor cable
- Fig. 3   with load reactor only and 250 ft of motor cable
- Fig. 4   with the MG-SWFI-A LRC Sine Wave Filter and 250 ft of motor cable

Fig. 2   **Fig. 3**   **Fig. 4**
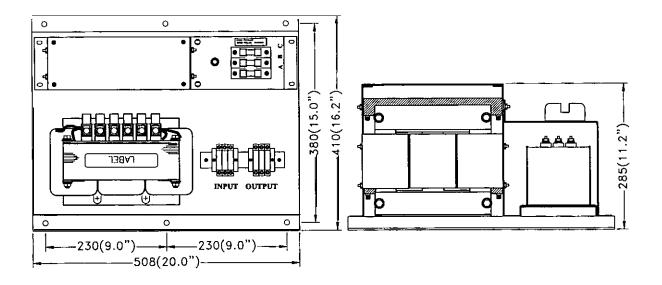
Table 1: MG-SWFI-A Series LRC Sine Wave Filter Selection and Carrier Frequency Setting Chart

Motor Hp		LRC Sine Wave Filter	Reactor P/N	RC Component P/N	Minimum carrier frequency	Recommended Carrier frequency
575V	460V	P/N				
1	1	MG-SWFI-002-3-A	RL-00203	MG-RCFI-055-A	8 kHz	14-16 kHz
2	2	MG-SWFI-004-4-A	RL-00404	MG-RCFI-055-A	6 kHz	14-16 kHz
3	NA	MG-SWFI-004-3-A	RL-00403	MG-RCFI-055-A	6 kHz	14-16 kHz
5	3	MG-SWFI-008-4-A	RL-00804	MG-RCFI-055-A	6 kHz	14-16 kHz
7.5	5	MG-SWFI-008-3-A	RL-00803	MG-RCFI-055-A	6 kHz	14-16 kHz
10	7.5	MG-SWFI-012-3-A	RL-01203	MG-RCFI-110-A	12 kHz	14-16 kHz
15	10	MG-SWFI-018-3-A	RL-01803	MG-RCFI-110-A	12 kHz	14-16 kHz
20/25	15	MG-SWFI-025-3-A	RL-02503	MG-RCFI-220-A	14 kHz	14-16 kHz
30	20/25	MG-SWFI-035-3-A	RL-03503	MG-RCFI-220-A	14 kHz	14-16 kHz
40	30	MG-SWFI-045-3-A	RL-04503	MG-RCFI-300-A	12 kHz	12-16 kHz
50	40	MG-SWFI-055-3-A	RL-05503	MG-RCFI-300-A	12 kHz	12-16 kHz
60/75	50/60	MG-SWFI-080-3-A	RL-08003	MG-RCFI-450-A	10 kHz	12-16 kHz
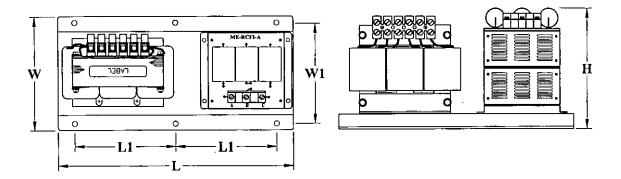
Notes:
1) MG-SWFI-A LRC Sine Wave Filters are supplied with a reactor and a RC component.
2) MG-SWFI-A LRC Sine Wave Filters operate more efficiently at higher carrier frequency. It is recommended to set the carrier frequency higher than the specified minimum setting.

Dimensions for Open-Type MG-SWFI-080-3-A LRC Sine Wave Filter
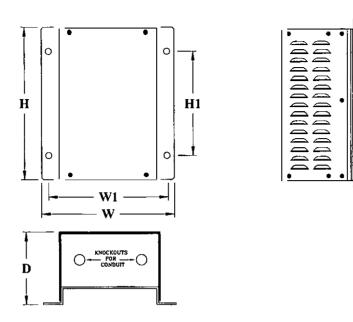
Dimensions for Open-Type LRC Sine Wave Filter up to MG-SWFI-055-3-A

LRC Sine Wave Filter P/N	Dimensions (mm/in)				
	L	L1 or 2L1	W	W1	H
MG-SWFI-002-3-A	270/10.7	230/9.0	165/6.5	145/5.7	122/5.7
MG-SWFI-004-4-A	270/10.7	230/9.0	165/6.5	145/5.7	122/5.7
MG-SWFI-004-3-A	270/10.7	230/9.0	165/6.5	145/5.7	122/5.7
MG-SWFI-008-4-A	270/10.7	230/9.0	165/6.5	145/5.7	145/5.7
MG-SWFI-008-3-A	270/10.7	230/9.0	165/6.5	145/5.7	145/5.7
MG-SWFI-012-3-A	310/12.2	270/9.0	165/6.5	145/5.7	145/5.7
MG-SWFI-018-3-A	310/12.2	270/9.0	165/6.5	145/5.7	165/6.5
MG-SWFI-025-3-A	380/15.0	165/6.5	180/7.0	165/6.5	165/6.5
MG-SWFI-035-3-A	380/15.0	165/6.5	180/7.0	165/6.5	204/8.0
ME-SWFI-045-3-A	380/15.0	165/6.5	180/7.0	165/6.5	234/9.0
MG-SWFI-055-3-A	380/15.0	165/6.5	180/7.0	165/6.5	230/9.0
MG-SWFI-080-3-A	508/20.0	230/9.0	410/16.2	380/15.0	285/11.2

Dimensions for Enclosed-Type LRC Sine Wave Filter

LRC Sine Wave Filter P/N	Dimensions (mm/in)				
	W	W1	H	H1	D
ME-SWFI-002-3-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-004-4-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-004-3-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-008-4-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-008-3-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-012-3-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-018-3-A	260/10.2	1240/9.5	310/12.2	280/11.0	180/7.0
ME-SWFI-025-3-A	310/12.2	340/14.2	360/13.4	310/12.2	230/9.0
ME-SWFI-035-3-A	310/12.2	340/14.2	360/13.4	310/12.2	230/9.0
ME-SWFI-045-3-A	310/12.2	340/14.2	360/13.4	310/12.2	230/9.0
ME-SWFI-055-3-A	310/12.2	340/14.2	360/13.4	310/12.2	230/9.0
ME-SWFI-080-3-A	590/23.2	560/22.0	510/20.0	460/18.0	305/12.0

HITACHI INVERTER

J300 SERIES

INSTRUCTION MANUAL

Three phase input 200/400V class

J300 U : USA version

Hitachi, Ltd.
Tokyo Japan

SAFETY

For the Best Results with J300 Series inverter, read this manual and all of the warning sign attached to the inverter carefully before installing and operating it, and follow the instructions exactly. Keep this manual handy for your quick reference.

Definitions and Symbols

A safety instruction (message) is given with a hazard alert symbol and a signal word; WARNING or CAUTION. Each signal word has the following meaning throughout this manual.

This symbol means hazardous high voltage. It used to call your attention to items or operations that could be dangerous to your and other persons operating this equipment.
Read these message and follow these instructions carefully.

This is the "Safety Alert Symbol." This symbol is used to call your attention to items or operations that could be dangerous to your or other persons operating this equipment. Read these messages and follow these instructions carefully.

WARNING   WARNING
Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION   CAUTION
Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage of product.
The matters described under ⚠ CAUTION may, if not avoided, lead to serious results depending on the situation. Important matters are described in CAUTION (as well as WARNING), so be sure to observe them.

NOTE   NOTE: Notes indicate an area or subject of special merit, emphasizing either the product's capabilities or common errors in operation or maintenance.

HAZARDOUS HIGH VOLTAGE

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there might be exposed components with cases or protrusions at or above line potential. Extreme care should be taken to protect against shock.
Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on an electronic controllers or rotating electrical equipment.

PRECAUTIONS

⚠ **WARNING:** This equipment should be installed, adjusted and serviced by qualified electrical maintenance personal familiar with the construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.

⚠ WARNING : The user is responsible for ensuring that all driven machinery, drive train mechanism **not** supplied by Hitachi, Ltd., and process line material are capable of safe operation at an applied frequency of 150% of the maximum selected frequency range to the AC motor. Failure to do so can result in destruction of equipment and injury to personnel should a single point failure occur.

⚠ WARNING : For protection, install a leak breaker type with a high frequency circuit capable -of large currents to avoid an unnecessary operation. The ground fault protection circuit is not designed to protect personal injury.

⚠ WARNING: HAZARD OF ELECTRICAL SHOCK. DISCONNECT INCOMING POWER BEFORE WORKING ON THIS CONTROL.

⚠ **AVERTISSEMENT** : RISQUE DE CHOC ELECTRIQUECOUPER L'ALIMENTATION AVANT LE DEPANNAGE DE CETTE COMMANDE.

⚠ **CAUTION:** These instructions should be read and clearly understood before working on J300 series equipment.

⚠ **CAUTION:** Proper grounds, disconnecting devices and other safety devices and their location are the responsibility of the user and are not provided by Hitachi, Ltd.

⚠ **CAUTION:** Be sure to connect a motor thermal switch or overload device to the J300 series controller to assure that the inverter will shut down in the event of an overload or an overheated motor.

⚠ **CAUTION:** DANGEROUS VOLTAGE EXISTS UNTIL CHARGE LIGHT IS OFF.

⚠ **ATTENTION:** PRESENCE DE TENSIONS DANGEREUSES TANT QUE LE VOYANT N'EST PAS ETEINT.

⚠ **CAUTION:** Rotating shafts and above ground electrical potentials can be hazardous. Therefore, it is strongly recommended that all electrical work conform to the National Electrical Codes and local regulations. Installation, alignment and maintenance should be performed only by qualified personnel. Factory recommended test procedures, included in the instruction manual. should he followed. Always disconnect electrical power before working on the unit.

NOTE : POLLUTION DEGREE 2

The inverter must be used in environment of the degree 2.
Typical constructions that reduce the possibility of conductive pollution are;

1) The use of an on-ventilated enclosure
2) The use of a filtered ventilated enclosure when the ventilation is fan forced that is, ventilation is accomplished by one or more blowers within the enclosure that provide a positive intake and exhaust.

NOTE : ENCLOSURE SIZE FOR 75 kW TO 110 kW

The inverter, 75kW to 110kW must be installed into an enclosure with dimmensions no less than 183cm (72 in) by 183cm (72 in) by 60cm (24 in).

NOTE : ENCLOSURE SIZE FOR 132 kW AND BIGGER

The inverters, 132kW and bigger, are complied as recognizedcomponents.
Therse devices are intended for use in an overall ecclosure with an internal ambient of 40 degree C for variable torque rating or 50 degree C for constant torque rating maximum.
End product temperature testing should be conducted to verify sufficient forced air ventilation is provided to maintain this ambient in room ambient of 10-40 degree C.
Based upon component level testing, end product temperature testing may be conducted at any convenient room ambient in the rangeof 20-40 dwgree C, unless the room ambient in the intended application exceeds 40degree C, in which case testing should be conducted at the elevated ambient.
Enclosure internal ambient temperature should be measured above the drive on to the upper left or right side. Temperature measurments on the drive itself should not be necessary.

NOTE : SET OF MOTOR CAPACITY AND POLES (Al, A2)

When data does not match a capacity of connected motor, it may cause unstaible motor operation. Set proper motor capacity (kW) and motor poles even under V/F control mode.

Revision History Table

No.	Revision Contents	The Date of Issue	Operation Manual No
I	Page iii : Pollution degree Page 2-l : Description of inverter model Page4-2 : Change of note Page 5-8, 5-9 : Addition of 750 to 1100H Page 5- 10 : Terminal description Page 11-1,11-2,11-3 : addition of 750 to 1100H	Aug. 1997	NB506XA
2	Page iii : Enclosure size Page 4-1 : Enclosure size, page 7-5; note 3, Page 7-11: F8 boost value in VP1 to 3 Page 7- 15: A0 note for boost value Page 12- 13: additio of note I Page A25-A3 1: addition of line for set value Page A-33: deletion of A-93 on clause	Feb. 1998	NB506XB
3	Page iii: note for 132 kW to 220 kW is added Page 2-1: added 132 to 220kW Page 4-1; note for 132 kW to 220 kW is added page 4-2: note,note l corrected 110kW->260kW page 5-8: added 1320 to 2200H in table Page 5-10: terminal layout corrected Page7-5: corrected monitor d3 39 to 99 Page7-18: A10, addition of 1320 to 2200H Page 11 -1,2,3: added 1320 to 2200H	Feb. 1999	NB506XC

TABLE OF CONTENTS

1. Installation

⚠ CAUTION

- Be sure to install the unit on flame resistant material such as metal. . . . . p. 4-1
  Otherwise, there is a danger of tire.
- Be sure not to place anything inflammable in the vicinity. p. 4-1
  Otherwise, there is a danger of fire.
- Be sure not to let the foreign matter enter such as cut wire refuse, spatter .... p. 4-1
  from welding, iron refuse, wire, dust, etc.
  Otherwise, there is a danger of fire.
- Be sure to install it in a place which can bear the weight according to p. 4-1
  the specifications in the text (4. Installation).
  Otherwise, it may fall and there is a danger of injury.
- Be sure to install the unit on a perpendicular wall which is not subject . . p. 4-1
  to vibration.
  Otherwise, it may fall and there is a danger of injury.
- Be sure not to install and operate an inverter which is damaged or parts .... p. 4-1
  of which are missing.
  Otherwise. there is a danger of injury.
- Be sure to install it in a room which is not exposed to direct sunlight p. 4-1
  and is well ventilated. Avoid environments which tend to be high in
  temperature. high in humidity or to have dew condensation, as well as
  places with dust, corrosive gas, explosive gas, inflammable gas,
  grinding-fluid mist, salt damage, etc.
  Otherwise, there is a danger of fire.
- Be sure that the wall surface is a nonflammable 'material, such as steel .... p. 4-2
  plate.

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2. Wiring

⚠ WARNING

- Be sure to ground the unit. .... p. 5-1
  Otherwise, there is a danger of electric shock and/or fire.
- Wiring work shall be carried out by electrical experts. p. 5-1
  Otherwise, there is a danger of electric shock and/or fire.
- Implement wiring after checking that the power supply is off. . p. 5-1
  It might incur electric shock and/or fire.
- After installing the main body, carry out wiring: p. 5-1
  Otherwise. there is a danger of electric shock and/or injury.
- Wait until DC bus voltage is discharged after power supply is turned .... p. 5-10
  off.
  Otherwise. there is a danger of electric shock.

⚠ CAUTION

- Make sure that the input voltage is:
  Three phase 200 to 220 V/50 Hz, 200 to 230 V/60 Hz
  Three phase 380 to 415 V/50 Hz, 400 to 460 V/60 Hz

- Be sure not to input a single phase to a 3 phase type.
  Otherwise, there is a danger of fire.

- Be sure not to connect AC power supply to the output terminals
  [U (T1), V (T2), W (T3)].
  Otherwise, there is a danger of injury and/or fire.

Power supply

- Fasten the screws with the specified fastening torque. Check so that
  there is no loosening of screws.
  Otherwise, there is a danger of fire.

- Be sure to install an earth leakage breaker.

  The ground fault protection is designed to detect current flowing to the
  ground upon power on. This function is to protect the inverter. not
  people. Install the earth leakage breaker to protect against the ground
  fault on wires between the inverter and the motor. (Use a breaker that is
  very sensitive to high frequency current so as not to cause malfunction.)

- Be sure to set the fuse(s) (the same phase as the main power supply)
  in the operation circuit.
  Otherwise, there is a danger of fire.

- As for motor leads, earth leakage breakers and electromagnetic
  contactors, be sure to use the equivalent ones with the specified
  capacity (rated).
  Otherwise, there is a danger of fire.

- Connection to wiring terminal must be reliabily fixed with two means
  of support.

⚠ CAUTION

External or remote over load protection required, if multiple motors to .... 'p. 5-4
be connected.

For models J300-450LFU and -550LFU only , connect to branch
circuit protected at maximum 300% of output current rating.

Suitable for use on a circuit capable of delivering not more than 10,000
rms symmetrical amperes,*** volts maximum,
(where *** = input voltage)
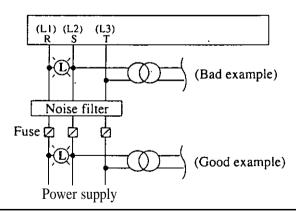
Alarm connection may contain harzordous live voltage even when   . . p. 5-11
inverter is disconnected. In case of removing front cover for
maintenance or inspection, confirm that incoming power for alarm
connection is surely disconnected.

⚠ CAUTION

Input phase failure protection

(1) J300-U version inverter are provided with the phase failure protection on the power
supply.

(2) When a buzzer, lamp, noise filter or transformer is connected between the input power
'terminals (L1, L2, L3) and input power fuses, input phase failure cannot be protected.

3. Control and operation

A⚠ WARNING

- Be sure to turn on the input power supply after mounting the surface   p. 6-1
  cover. While being energized, be sure not to remove the cover.
  Otherwise, there is a danger of electric shock.

- Be sure not to operate the switches with wet hands.   p. 6-1
  Otherwise, there is a danger of electric shock.

- While the inverter is energized, be sure not to touch the inverter   p. 6-1
  terminals even during stoppage.
  Otherwise, there is a danger of electric shock.

- If the re-try mode is selected, it may suddenly restart during the trip   p. 6-1
  stop. Be sure not to approach the machine. (Be sure to design the
  machine so that personnel safety will be secured even if it restarts.)
  Otherwise, there is a danger of injury.

- Even if the power supply is cut for a short period of time, it may restart .... p. 6-1
  operation after the power supply is recovered if the operation command
  is given. If it may incur danger to personnel, be sure to make a circuit
  so that it will not restart after power recovery.
  Otherwise,, there is a danger of injury.

- The Stop Key is effective only when the function is set. Be sure to .... p. 6-1
  prepare the Key separately from the emergency stop.
  Otherwise, there is a danger of injury.

- After the operation command is given, if the alarm reset is conducted, it .... p. 6-1
  will restart suddenly. Be sure to set the alarm reset after checking the
  operation command is off.
  Otherwise, there is a danger of injury.

- Be sure not to touch the inside of the energized inverter or to put a bar .... p. 6-1
  into it.
  Otherwise, there is a danger of electric shock an&or fire.

- The STOP/RESET key works only when a function is set. Prepare an .... p. 7-1
  emergency switch separately. The use of the STOP/RESET key as an
  emergency switch may cause an injury.

$\underset{!}{\triangle}$ **CAUTION**	

* Radiating fin and discharging resistor will have high temperature. · · · · · · p. 6-2
  Be sure not to touch them.
  Otherwise, there is a danger of getting burned.

* Low to high speed operation of the inverter can be easily set. Be sure   p. 6-2
  to operate it after checking the tolerance of the motor and machine.
  Otherwise, there is a danger of injury.

* If a motor is operated at a frequency higher than 60Hz, be sure to check . . p. 6-2
  the speeds of the motor and the machine with each manufacturer, and
  after getting their consent, operate them.
  Otherwise, there is a danger of machine breakage.

* Check the following before and during the test run.   .   . p. 6-3
  Otherwise, there is a danger of machine breakage.

  • Was the short-cut bar between +1 and + connected?
  • Was the direction of the motor correct?
  • Was the inverter tripped during acceleration or deceleration?
  • Were the rpm and frequency meter correct?
  • Were there any abnormal motor vibrations or noise?

  • When overcurrent tripping or overvoltage tripping occurs during the
    test run, increase the acceleration time or deceleration time.

4.　Maintenance, inspection and part replacement

$\underset{!}{\triangle}$ **WARNING**	

* Be sure to turn off the power supply during maintenance and   p. 10-1
  inspection.

* After the power supply has been turned off, you must always wait IO   p. 10-1
  minutes so that DC bus capacitors can discharge then start maintenance
  and inspection after the CHARGE lamp on the printed-circuit board has
  gone out. (Immediately after the lamp has gone out, there will be a
  residual voltage of about 50 V DC in the DC bus intermediate circuit.)
  Perform the work after the CHARGE lamp has stopped flickering.

* Make sure that only qualified persons will perform maintenance,
  inspection and part replacement. (Before starting the work, remove   p. 10-1
  metallic objects from your person (wristwatch, bracelet, etc.)
  (Be sure to use tools protected with insulation.)
  Otherwise. there is a danger of electric shock and/or injury.

⚠ CAUTION

* When removing connectors, never pull the wires. (Wires for cooling . . p. 10-1
   fan and thermal relay)
   Otherwise, there is a danger of fire due to wire breakage and/or injury.

5. Appendix

⚠ WARNING

* When the inverter stops due to a trip with retry mode selected, the   · · · · · · · p. A-15
   motor restarts suddenly. Stand clear of the machine. Otherwise, you
   may be injured. (Design the machine in such a way that persons are
   protected against a restart of the machine.)
 * If the retry mode is selected, do not approach the inverter unnecessarily. . ··········p. A-16
   It will be restarted suddenly after it trips/stops. (Design the inverter so
   that the safety can be assured even in such a restart.) Otherwise, bodily
   injury will result.

6. Others

⚠ WARNING

* Never modify the unit.
  Otherwise, there is a danger of electric shock and/or injury.

⚠ CAUTION
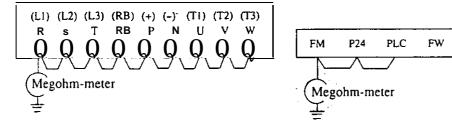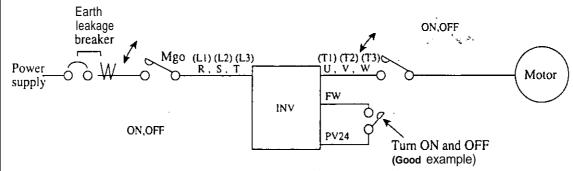
* **Withstand voltage tests and insulation resistance tests (megger test-s) are executed before the units are shipped, so that there is no need to conduct these tests before operation.**

  When conducting megger tests as a part of daily inspection, be sure that these tests are only executed between the main circuit and the ground. Do not execute megger tests on the control circuit.
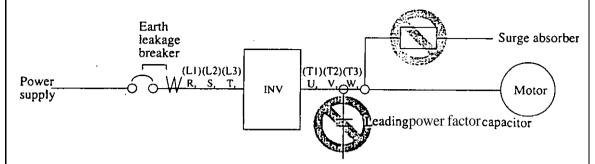
* Do not **attach or remove wiring or connectors (including Digital operator and** Remote **operator) when power is applied. Also, do not check signals during operation. Otherwise, a trip may occur or a failure may be caused. To stop the operation, be sure to use an operation instruction (FW,REV.) Do not turn power off within three minutes after it is turned on, or vice versa.**

* **Do not stop operation by switching off the electromagnetic(Mgo) contactors on the primary or secondary sides of the inverter. To stop the operation, be sure to use an operation instruction (FW,REV.) Do not turn power off within three** minutes after it is turned on, or vice versa. **(Bad** example)

  When there has been an instantaneous power failure, and if an operation instruction has been given; then the unit may restart operation after the power failure has ended. If there is a possibility that such an occurrence may harm humans, then install an electromagnetic contactor (Mgo) on the power supply side, so that the circuit does not allow automatic restarting after the power supply recovers. If the optional remote operator is used and the retry function has been selected, this will also cause automatic restarting when an operation instruction has been input, so please be careful.

⚠ CAUTION

- **Do not insert leading power factor capacitors or surge absorbers between the output terminals of the inverter and the motor.**

- **Be sure to ground the grounding terminal, ⏚.**
- **When inspecting the unit, after turning the power supply off be sure to wait unitl the CHARGE lamp beside the control terminal is off before opening the cover.**

  (If the lamp is lit or still flickering, then the internal capacitor's residual voltage is still dangerous.)

● MOTOR TERMINAL SURGE VOLTAGE SUPPRESSION FILTER (FOR THE 400 V CLASS)

In a system using an inverter of the voltage control PWM system, a surge voltage caused by the cable constants such as the cable length (especially when the distance between the motor and inverter is 10 m or more) and cabling method may occur at the motor terminal.

A dedicated filter of the 400 V class for suppressing this surge voltage is available, Please order one.

● PROTECTION AGAINST NOISE INTERFERENCE FROM INVERTER

The inverter uses many semiconductor switching elements such as transistors and IGBTs. Thus, a radio set or measuring instrument located near the inverter is susceptible to noise interference.

To protect the instruments from erroneous operation due to noise interference, they should be installed well apart from the inverter. It is also effective to shield the whole inverter structure.

Addition of an EMI filter on the input side of the inverter also reduces the effect of noise from commercial power line on external devices.

Note that external dispersion of noise from the power line can be minimized by connecting an EMI filter on the primary side of inverter.

. EFFECTS OF DISTRIBUTOR LINES ON INVERTERS

In the cases below involving a general-purpose inverter, a large peak current flows on the power supply side, sometimes destroying the converter module. Where such situations are foreseen, or the paired equipment must be highly reliable, install an AC reactor between the power supply and the inverter.

(A) The unbalance factor of the power supply is 3% or higher.

(B) The power supply capacity is at least IO times greater than the inverter capacity (and the power supply capacity, 500 kVA or more).

(C) Abrupt power supply changes are expected.

　　Examples:

　　(1) Several inverters are interconnected with a short bus.

　　(2) A thyristor converter and an inverter are interconnected with a short bus.

　　(3)' An installed phase advance capacitor opens and closes.

In cases (A), (B) or (C), we recommend installing an AC reactor of 3% (in a voltage drop at rated current) with respect to the supply voltage on the power supply side.

* When occurring an EEPROM **error** ($E \quad 8$), **be sure to confirm the setting** value again.

• **When setting b contact to the reverse command ([REV] terminal), the inverter state automatically. Do not set to b contact.**

GENERAL CAUTION
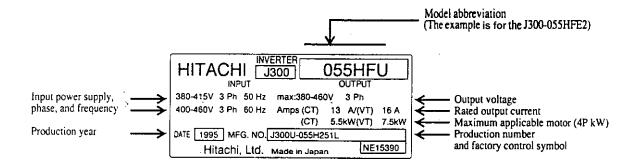
In all the illustrations in this manual, covers and safety devices are occasionally removed to describe the details. When the product is operated, make sure that the covers and safety devices are placed as they were specified originally and operate it according to the instruction manual.

Before installation and wiring, be sure to check the following:

- Make sure that there was no damage during transportation the unit.

- After unpacking the unit, make sure that the package contains one inverter and one opera-
tion manual
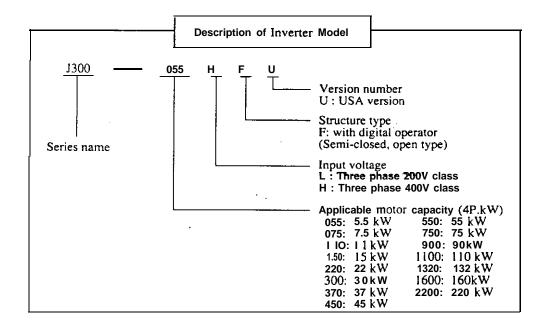
- Make sure that the product is the one you ordered by checking the specifications label on
the front of the cover.

Model abbreviation
(The example is for the J300-055HFE2)

HITACHI	INVERTER J300	055HFU

INPUT   OUTPUT

Input power supply, → 380-415V 3 Ph 50 Hz   max:380-460V   3 Ph ← Output voltage
phase, and frequency → 400-460V 3 Ph 60 Hz   Amps (CT)   13   A/(VT)   16 A ← Rated output current
                             (CT)   5.5kW(VT)   7.5kW ← Maximum applicable motor (4P kW)
Production year → DATE 1995 MFG. NO. J300U-055H251L ← Production number
       Hitachi, Ltd. Made in Japan   NE15390   and factory control symbol

Contents of Specifications Label

If you discover any problems, contact your sales agent immediately.

Description of Inverter Model

J300 —— 055   H   F   U

Version number
U : USA version

Structure type
F: with digital operator
(Semi-closed, open type)

Series name

Input voltage
L : Three phase 200V class
H : Three phase 400V class

Applicable motor capacity (4P.kW)
055: 5.5 kW	550: 55 kW
075: 7.5 kW	750: 75 kW
I IO: I I kW	900: 90kW
1.50: 15 kW	1100: 110 kW
220: 22 kW	1320: 132 kW
300: 30kW	1600: 160kW
370: 37 kW	2200: 220 kW
450: 45 kW	

3.1   Names of Parts

Blind cover

Front cover

A set screw

Charge lamp
(LED)

Control circuit
terminals

Digital
operator

Main circuit
terminals

Cover

Wiring
holes

Case

4. INSTALLATION

⚠ CAUTION

* Be sure to install the unit on flame resistant material such as metal.
  Otherwise, there is a danger of fire.
* Be sure not to place anything inflammable in the vicinity.
  Otherwise, there is a danger of fire.
* Be sure not to let the foreign matter enter such as cut wire refuse, spatter from welding, iron refuse, wire, dust, etc.
  Otherwise, there is a danger of tire.
* Be sure to install it in a place which can bear the weight according to the specifications in the text (4. Installation).
  Otherwise, it may fall and there is a danger of injury.
* Be sure to install the unit on a perpendicular wall which is not subject to vibration.
  Otherwise, it may fall and there is a danger of injury.
* Be sure not to install and operate an inverter which is damaged or parts of which are missing.
  Otherwise, there is a danger of injury.
* Be sure to install it in a room which is not exposed to direct sunlight and is well ventilated. Avoid environments which tend to be high in temperature, high in humidity or to have dew condensation, as well as places with dust, corrosive gas, explosive gas, inflammable gas, grinding-fluid mist, salt damage, etc.
  Otherwise, there is a danger of fire.

NOTE : ENCLOSURE SIZE FOR 75 kW to 110kW
The inverters, 75kW to 110kW must be installed into an enclosure with dimmensions no less than 183cm (72 in) by 183cm (72 in) by 60cm (24 in).

NOTE : ENCLOSURE SIZE FOR 132 kW AND BIGGER
The inverters, 132kW and bigger, are complied as recognizedcomponents.
Therse devices are intended for use in an overall ecclosure with an internal ambient of 40 degree C for variable torque rating or 50 degree C for constant torque rating maximum.
End product temperature testing should be conducted to verify sufficient forced air ventilation is provided to maintain this ambient in room, ambient of 10-40 degree C.
Based upon component level testing, end product temperature testing may be conducted at any convenient room ambient in the rangeof 20-40 dwgree C, unless the room ambient in the intended application exceeds 40degree C, in which case testing should be conducted at the elevated ambient.
Enclosure internal ambient temperature should be measured above the drive on to the upper left or right side. Temperature measurments on the drive itself should not be necessary.

For cooling purposes, be sure that the inverter is installed vertically. In addition, be sure that it is separated from other components and walls. If foreign matter is introduced into the interior of the inverter, this may cause malfunctions, so make sure that no foreign matter can enter it.

(a)   (b)

NOTE:. Install the invener vertically.
        Do not install it on the floor or horizontally.
        (   ) is for 75 to 260kW

⚠ CAUTION
Be sure that the wall surface is a nonflammable material. such as steel plate.

⚠ Be sure to check the ambient temperature.
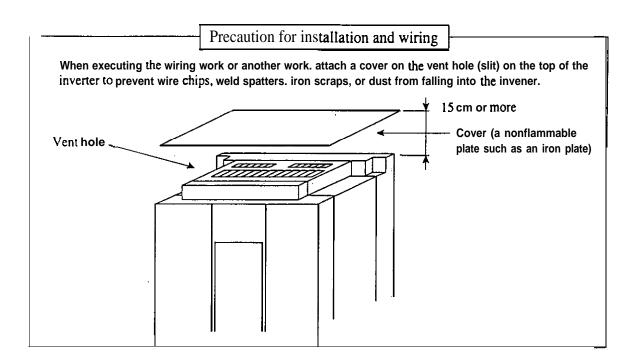
Place of installation	Load characteristics	Ambient temperature	Applicable model
Within the enclosure (NOTE I)	Constant torque	-10 to 50°C	All models (NOTE 2)
	Variable torque	-10 to 40°C	

NOTE 1: The inverter should be installed in a locked enclosure that meets the requirements in **IP4X.**

The higher the ambient temperature inside the inverter. the shorter its life will be. If a heat generating unit is used near the inverter, try to keep it as far away as possible. Also, when installing the invener in a box, be sure to carefully consider ventilation and the dimensions.

NOTE 2: Each of inverters 22 kW to 260 kW must be installed in a locked enclosure.

When executing the wiring work or another work. attach a cover on the vent hole (slit) on the top of the inverter to prevent wire chips, weld spatters. iron scraps, or dust from falling into the invener.

15 cm or more

Vent hole

Cover (a nonflammable plate such as an iron plate)

5. WIRING

⚠ **WARNING**

* Be sure to ground the unit.
  Otherwise, there is a danger of electric shock and/or fire.
 	
* Wiring work shall be carried out by electrical experts.
  Otherwise, there is a danger of electric shock and/or fire.
 	
* Implement wiring after checking that the power supply is off.
  It might incur electric shock and/or fire.
 	
* After installing the main body, carry out wiring.
  Otherwise, there is a danger of electric shock and/or injury.

⚠ C A U T I O N

* Make sure that the input voltage is:
  Three phase 200 to 220 V/50 Hz, 200 to 230 V/60 Hz
  Three phase 380 to 41.5 V/50 Hz, 400 to 460 V/60 Hz

* Be sure not to input a single phase to a 3 phase type.
  Otherwise, there is a danger of fire.

* Be sure not to connect AC power supply to the output terminals
  [U (T1), V (T2), W (T3)].
  Otherwise, there is a danger of injury and/or fire.

Power supply

* Fasten the screws with the specified fastening torque. Check so that there is no
  loosening of screws.
  Otherwise, there is a danger of fire.

  Be sure to install an earth leakage breaker.

* The ground fault protection is designed to detect current flowing to the ground upon
  power on. This function is to protect the inverter, not people. Install the earth leakage
  breaker to protect against the ground fault on wires between the inverter and the motor.
  (Use a breaker that is very sensitive to high frequency current so as not to cause
  malfunction.)

* Be sure to set the fuse(s) (the same phase as the main power supply)
  in the operation circuit.
  Otherwise, there is a danger of fire.

  As for motor leads, earth leakage breakers and electromagnetic contactors, be sure to
  use the equivalent ones with the specified capacity (rated).
  Otherwise, there is a danger of fire.

5-2

The terminal board will be exposed when the front cover or terminal cover (450L/HF, 550L/HF) is removed. Wire the inverter in this state.

5.1   Wiring the Power Supply and Motor

Power supply

- The inverter will be damaged if the power supply is connected to the motor terminals U(T1), V(T2) and W(T3), so be sure not to make any mistakes.

- If multiple motors are to be connected, be sure to attach a thermal relay to each motor.

NOTE 1:   When changing the power supply of the motor between the inverter and commercial power, be sure to install mechanically interlocked switches Mg1 and Mg2.
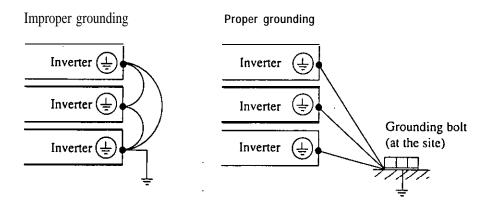
NOTE 2:   Install an earth leakage breaker at the input of the inverter. (Select an earth leakage breaker whose sensitive current level is raised in high frequency range.)
When the cable length between the inverter and motor is long (more than IO m), the thermal relay may malfunction due to higher harmonics. Therefore, install an AC reactor on the output side of the inverter or use a cm-rent sensor in place of the thermal relay.

NOTE 3: Be sure that the specified grounding is carried out. Be sure to separate the unit's grounding pole from those of other heavy electric machinery, and avoid using common grounding poles.

If multiple inverters are used, make sure that the grounding connections do not create a loop.

Improper grounding   Proper grounding

⚠ CAUTION
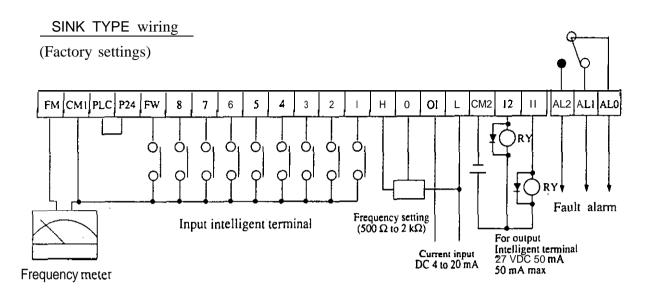
External or remote over load protection required, if multiple motors to be connected.
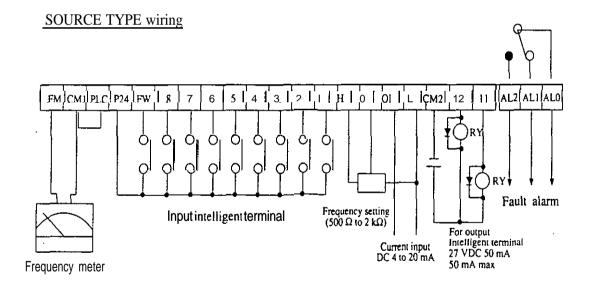
For models J300-450LFU and -550LFU only , connect to branch circuit protected at maximum 300% of output current rating.

Suitable for use on a circuit capable of delivering not more than 10,000 rms symmetrical amperes,*** volts maximum,
(where *** ≐ input voltage)
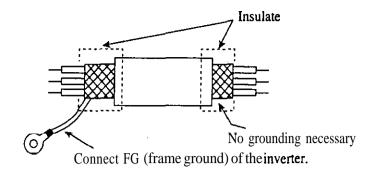
5.2   Wiring of Control Circuit Terminals

SINK TYPE wiring
(Factory settings)

| FM | CM1 | PLC | P24 | FW | 8 | 7 | 6 | 5 | 4 | 3 | 2 | I | H | 0 | OI | L | CM2 | 12 | 11 | AL2 | AL1 | AL0 |

Frequency meter

Input intelligent terminal

Frequency setting
(500 Ω to 2 kΩ)

Current input
DC 4 to 20 mA

For output
Intelligent terminal
27 VDC 50 mA
50 mA max

Fault alarm

SOURCE TYPE wiring

| FM | CM1 | PLC | P24 | FW | 8 | 7 | 6 | 5 | 4 | 3 | 2 | I | H | 0 | OI | L | CM2 | 12 | 11 | AL2 | AL1 | AL0 |

Frequency meter

Input intelligent terminal

Frequency setting
(500 Ω to 2 kΩ)

Current input
DC 4 to 20 mA

For output
Intelligent terminal
27 VDC 50 mA
50 mA max

Fault alarm

NOTE 1:   When an output intelligent terminal is used, be sure to install a surge absorbing
diode in parallel with the relay (RY). Otherwise, the surge voltage created when
the relay (RY) goes ON or OFF may damage the output intelligent terminal cir-
cuit.

NOTE 2:   Use a twisted and shielded wire for the signal line, and cut the shielded covering
as shown in the diagram below. Make sure that the length of the signal line is 20
meters or less.

Insulate

No grounding necessary

Connect FG (frame ground) of the inverter.

NOTE 3:   When the frequency setting signal is turned on and off with a contact. use a relay which will not cause contact malfunctions, even with the extremely weak currents and voltages, such as crossbar twin contacts, etc.

NOTE 4:   Use relays which do not have contact defects at 24 V DC, 3 mA for the other terminals.

NOTE 5:   Separate the main circuit wiring from the relay control circuit wiring. If they must cross, be sure that they cross at a right angle.

Main circuit power line
(R, S, T, U, V, W, PP. P, R.B. N, L1, L2, L3, T1, 1-2, T3. +, -, etc.)

Right angle

Signal input line
(FM. CM1, PLC, P24. FW, 8, 7, 6, 5, 4, 3, 2, 1
H, 0.01. L. CM2. 12, 1 1. AL0, AL1, ALZ)

Separate by 10 cm or more.
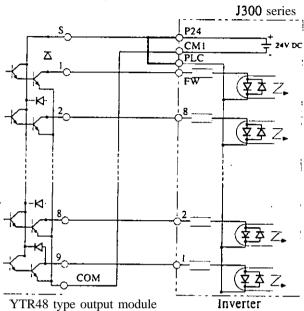
NOTE 6:   Do not short between the terminals H and Land between the terminals P24 and CM1 of the control circuit.

NOTE 7:   Insulate the common terminal L for frequency analog command input and the common terminal (COMMON) of the peripheral equipment such as the sequencer before starting use.

5.3   Connection to the Programmable Controller

(I) When the internal interface power source is used

① This is an example when the sink type transistor output (open collector output) module of the sequencer is connected

Note: Make sure of the short-circuit bar or wire between the terminals PLC and P24.

② This is an example when the source type transistor output (open collector output) module of the sequencer is connected

Note: Make sure of the short-circuit bar or wire between the terminals CMI and PLC.

YTR48 type output module
(by Hitachi)
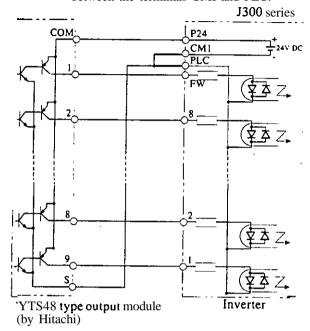
YTS48 type output module
(by Hitachi)

(2) When the external interface power source is used

① This is an example when the sink type transistor output (open collector output) module of the sequencer is connected

Note: Remove the short-circuit bar or wire between the terminals CM1 and PLC or P24 and PLC.
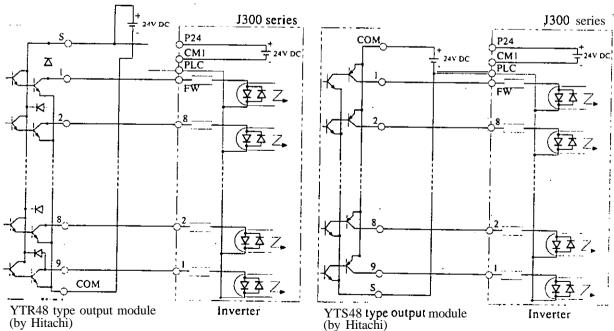
② This is an example when the source type transistor output (open collector output) module of the sequencer is connected

Note: Remove the short-circuit bar or wire between the terminals CMI and PLC or P24 and PLC.

YTR48 type output module
(by Hitachi)

YTS48 type output module
(by Hitachi)
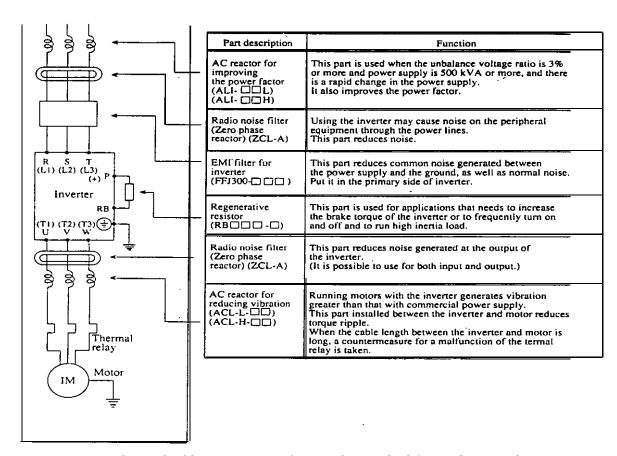
Note: Be sure to turn the inverter on after the controller and external power source are turned on.
(Otherwise. the data in the inverter may be changed.)

5-7

5.4 Wiring Equipment, Options (**EMI** filter, etc.)

Standard equipment
Power supply
ELB
Magnetic contactor

(200V class)

Inverter model	Wiring (AWG or Kcmil)							Applicable equipment	
	Constant torqe		Variable torqe		Power lines	Signal lines	Signal lines	Earth leakage breaker (ELB)	Electromagnetic contactor
	Motor output (kW)	Power lines R,S,T,U,V W,P,N	Motor output (kW)	Power lines R,S,T,U,V W,P,N	External resistor RB1,2,3, P,RB	FM,CM1,PCL FW,8,7,6,5,4,3, 2,1,H,O,OL,L, CM2,12,11	P24,AL0,AL1 AL2		
J300-055LF	5.5	AWG 8 or more	7.5	AWG 8 or more	10 or more	AWG 18 Shielded wire	AWG 16 or more	EX50C(30A)	H20
J300-075LF	7.5	AWG 6 or more	11	AWG 6 or more	10 or more			EX50C(30A)	H20
J300-110LF	11	AWG 4 or more	15	AWG 4 or more		When the number of shielded wires to be used is 11 or more, the section of each shielded wire should be AWG 20		EX50C(50A)	H25
J300-150LF	15	AWG 3 or more	22	AWG 3 or more				EX60B(60A)	H35
J300-220LF	22	AWG 1/0 or more	30	AWG 1/0 or more				RX100(75A)	H50
J300-300LF	30	AWG 3/0 or more	37	AWG 3/0 or more				RX100(100A)	H65
J300-370LF	37	AWG 4/0 or more	45	AWG 4/0 or more				RX100(100A)	H80
J300-450LF	45	300 or more	55	300 or more				RX225(150A)	H100
J300-550LF	55	350 or more	75	350 or more				RX225(175A)	H125

(400V class)

Inverter model	Wiring							Applicable equipment	
	Constant torqe		Variable torqe		Power lines	Signal lines	Signal lines	Earth leakage breaker (ELB)	Electromagnetic contactor
	Motor output (kW)	Power lines R,S,T,U,V W,P,N	Motor output (kW)	Power lines R,S,T,U,V W,P,N	External resistor RB1,2,3, P,RB	FM,CM1,PCL FW,8,7,6,5,4,3, 2,1,H,O,OL,L, CM2,12,11	P24,AL0,AL1 AL2		
J300-055HF	5.5	AWG 8 or more	7.5	AWG 8 or more	10 or more	AWG 18 Shielded wire	AWG 16 or more	EX50C(30A)	H20
J300-075HF	7.5	AWG 8 or more	11	AWG 8 or more	10 or more			EX50C(30A)	H20
J300-110HF	11	AWG 8 or more	15	AWG 8 or more		When the number of shielded wires to be used is 11 or more, the section of each shielded wire should be AWG 20.		EX50C(50A)	H25
J300-150HF	15	AWG 6 or more	22	AWG 6 or more				EX60B(60A)	H35
J300-220HF	22	AWG 4 or more	30	AWG 4 or more				RX100(75A)	H50
J300-300HF	30	AWG 4 or more	37	AWG 4 or more				RX100(100A)	H65
J300-370HF	37	AWG 2 or more	45	AWG 2 or more				RX100(100A)	H80
J300-450HF	45	AWG 1 or more	55	AWG 1 or more				RX225(150A)	H100
J300-550HF	55	AWG 3/0 or more	75	AWG 3/0 or more				RX225(175A)	H125
J300-750HF	75	300 or more	90	300 or more				RX225(225A)	H150
J300-900HF	90	300 or more	110	300 or more				RX225(250A)	H220
J300-1100HF	110	350 or more	132	350 or more				RX400(350A)	H250
J300-1320HF	132	AWG 4/0 parallel	160	AWG 4/0 parallel				RX400(400A)	H400
J300-1600HF	160	300 parallel	220	300 parallel				RX600(600A)	H600
J300-2200HF	220	350 parallel	260	350 parallel				RX600(600A)	H600

Part description	Function
AC reactor for improving the power factor (ALI-☐☐L) (ALI-☐☐H)	This part is used when the unbalance voltage ratio is 3% or more and power supply is 500 kVA or more, and there is a rapid change in the power supply. It also improves the power factor.
Radio noise filter (Zero phase reactor) (ZCL-A)	Using the inverter may cause noise on the peripheral equipment through the power lines. This part reduces noise.
EMI filter for inverter (FFJ300-☐ ☐☐)	This part reduces common noise generated between the power supply and the ground, as well as normal noise. Put it in the primary side of inverter.
Regenerative resistor (RB☐☐☐ -☐)	This part is used for applications that needs to increase the brake torque of the inverter or to frequently turn on and off and to run high inertia load.
Radio noise filter (Zero phase reactor) (ZCL-A)	This part reduces noise generated at the output of the inverter. (It is possible to use for both input and output.)
AC reactor for reducing vibration (ACL-L-☐☐) (ACL-H-☐☐)	Running motors with the inverter generates vibration greater than that with commercial power supply. This part installed between the inverter and motor reduces torque ripple. When the cable length between the inverter and motor is long, a countermeasure for a malfunction of the termal relay is taken.

NOTE 1: The applicable equipment is for Hitachi standard four pole squirrel-cage motor
NOTE 2: Be sure to consider the capacity of the circuit breaker to be used.
NOTE 3: Be sure to use bigger wires for power lines if the distance exceeds 20m.
NOTE 4: Be sure to use an grounding wire same size of power line 'or similar.

(*) Use AWG 16 wire for the alarm signal wire.
Classify the detective current of the earth leakage breaker depending on the total distance between the inverter and the motor.
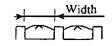
length	Detective current (mA)
100 m and less	30
300 m and less	100
600 m and less	200

NOTE 5: When using CV wire and metal tube, the leakage current is around 30 mA/km.
NOTE 6: The leakage current becomes eight times because IV wires have a high dielectric constant. Therefore. "se an one class larger earth leakage breaker according to the left table.

5-9

5.5 Terminal

(I) Main circuit terminal

Terminal layout	Type	Screw diameter	Width (mm)
G⊕(PE) R(L1) S(L2) T(L3) RB(RB) P(+) N(Đ) U(T1) V(T1) W(T1) G⊕(PE)	055, 075LF 055,075HF	M5	13
G⊕(PE) R(L1) S(L2) T(L3) P(+) N(Đ) U(T1) V(T1) w(Tl) G⊕(PE)	011, 150LF 011,150HF	M6	17.5
	220 to 370LF	M8	23
	450, 550LF	M10	35
G⊕(PE) R(L1) S(L2) T(L3) PD(+1) P(+) N(Đ) U(T1) V(T1) W(T1) G⊕(PE) — Internal short circuit bar	220 to 370HF	M6	17.5
	450, 550HF	M8	23
G⊕(PE) R(L1) S(L2) T(L3) PD(+1) P(+) N(Đ) U(T1) V(T1) W(T1) G⊕(PE) — Internal short circuit bar	750, 900HF	M10	35
	1100HF	M10	40
	1320 to 2200HF	M16	51

Main circuit

Terminal symbol	Terminal description	Function
R, S, T (L1),(L2),(L3)	Main power	Connect the power supply
U, V, W (T1),(T2),(T3)	Inverter output	Connect the motor
P, RB (+),(RB)	External braking resistor	Connect a braking resistor (option) * Only the 055LF/HF and 075LF/HF are equipped RB terminals .
P. N (+),(-)	Dynamic braking unit	Connect a dynamic braking unit (option)
⊕ (PE)	Ground	Ground (connect grounding to avoid electric shock)
PD (+1)	External choke coil	Connect a choke coil (DCL) for harmonics current reduction
⊕	Ground at case	Ground (connect grounding to avoid electric shock)

Braking resistor DCL Braking Units ELB Power supply

Internal short circuit bar

Remove the internal short circuit bar when DCL is connected.

(2) Control circuit terminal

The intelligent I/O terminals 1 to 8 and 11 and 12 are initialized as shown below at factory before shipment.

FM	CM1	PLC	P24	FW	REV	CF1	USP	CH1	FRS	JG	AT	RS	H	O	OI	L	CM2	RUN	FA1	AL2	AL1	AL0
					↑	↑	↑	↑	↑	↑	↑	↑						↑	↑			
FM	CM1	PLC	P24	FW	8	7	6	5	4	3	2	1	H	O	OI	L	CM2	12	11	AL2	AL1	AL0

	Terminal symbol	Terminal description and function	Standard setting of intelligent terminal		Remarks
ιput ιonitor ignal	FM	Frequency monitor			Dry contact Close: ON (run) Open: OFF (stop) Min. ON time: 20 ms or more
	CM1	Common for monitor			
	PLC	Common terminal for the external power source of the sequencer (PLC)			
	P24	Internal power source for the frequency monitor and intelligent input terminal			
	FW	Forward operation			
	8	Intelligent input terminal 8	REV	Reverse operation	
	7	Intelligent input terminal 7	CF1	Multistage speed (First stage)	
	6	Intelligent input terminal 6	USP	Prevention function of restart upon power on.	
	5	Intelligent input terminal 5	CH1	2 stage acc./dec.	Note: If the power is turned on when the input terminals 1 to 5 are kept on, all the data stored in the inverter is initialized. Therefore, never turn the power on in such a state.
	4	Intelligent input terminal 4	FRS	Free run input signal	
	3	Intelligent input terminal 3	JG	Jogging	
	2	Intelligent input terminal 2	AT	Current input selection	
	1	Intelligent input terminal 1	RS	Reset (NOTE 1)	
requency ɔmmand ιput	H	Power supply for frequency command			10 VDC
	O	Voltage frequency command			0-5 VDC (nominal), 0-10 VDC (nominal)(Input impedance 30 kΩ
	OI	Current frequency command			DC 4-20 mA (nominal) Input impedance 250Ω
	L	Common for frequency command			
'utput gnal	CM2	Common for intelligent output terminal			
	12	Intelligent output signal 12	RUN	Run signal	27 VDC 50 mA max
	11	Intelligent output signal 11	FA1	Frequency arrival signal	
ault alarm ιtput	AL0				
	AL1	Normal: AL0-AL1 close Abnormal. Power off: AL0-AL1 open	Contact rating 250 VAC 2.5 A (Resistor load) 0.2 A (cos∠=0.4) 30 VDC 3.0 A (Resistor load) 0.7 A (cos∠=0.4)	Min 100 VAC 10 mA 5 VDC 100 mA	
	AL2				

| AL2 | AL1 | AL0 |

> ⚠ **CAUTION**
> Alarm connection may contain hazardous live voltage even when inverter is disconnected. In case of removing flont cover for maintenance or inspection. confirm that incoming power for alarm connection is surely disconnected.

NOTE1: Terminal RS can use only contact a (normally open). It cannot use contact b (normally closed).

5.6 Control Circuit Terminals
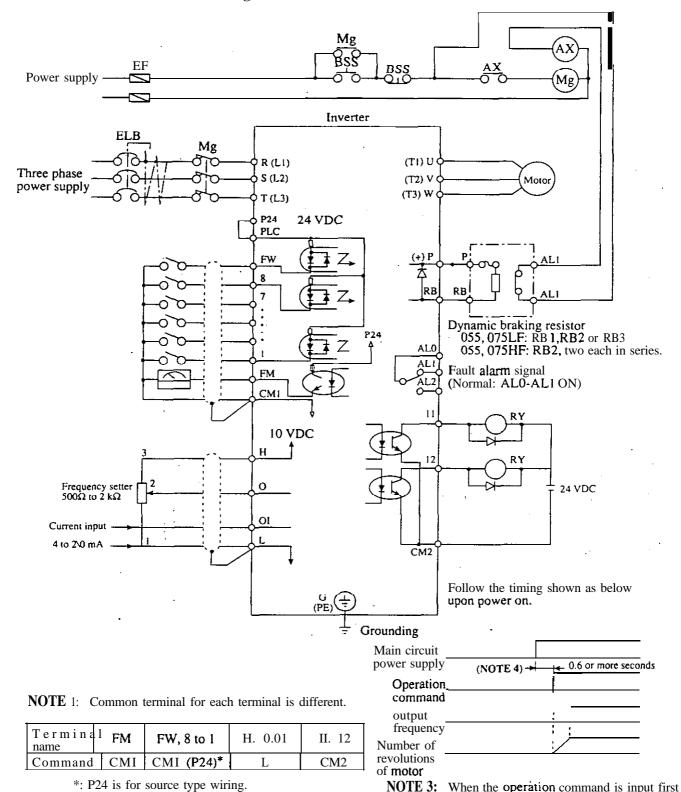
Terminal symbol	Terminal name		Description
FM	Monitor terminal		Analog: Output frequency, current, torque Digital: Output frequency x frequency convened value (Set in the remote operator monitor mode), max. pulse: 3.6 kHz
CMI	Common terminal I		Common terminal for the monitor terminal
PLC	Internal interface common		Common terminal for the external power source of the sequencer
P24	Input signal power source		Internal power source for the contact input terminal and frequency monitor terminal. 24 VDC. Common for the FW terminal and intelligent input terminals
FW	Forward run/stop terminal		OUTPUT frequency
REV	Reverse run/stop		
CF1	Multistage speed	SW1	
CF2		SW2	
CF3 (NOTE 1)		SW3	
JG	Jogging		Jogging run
DB	External DC braking		DC braking input signal
STN	Initialization		Initialization (shipment status at factory) input
SET	2nd function		The output frequency setting, base and maximum frequencies, control method, motor constant, acceleration or deceleration time, manual torque boost setting, and electronic thermal setting are changed in batch.
CH1	Two-stage acceleration or deceleration		The acceleration or deceleration time or selection of two-stage accration or deceleration is changed by turning the contact ON.
FRS	Free run stop		The inverter stops and the motor stops free run FRS functions when the contact is opened. (European version)
EXT	External trip		External trip input signal (The contact is open.)
USP	Power-ON restart prevention		Restart prevention when the power is turned on in the RUN state (The contact is open.)
CS	Commercial power source switching		Switch signal from the commercial power source to inverter drive (Note: When the terminal is used, a trip is also conceled.)
SFT	Terminal software lock		The data of all funcitons except for output frequency setting is locked. See 12-9 [F-25].
AT	Analog input command		Analog input voltage-current switching (When the contact is ON, current input signal to OI-L is acrive.)
RS	Reset		Trip or alarm signal is reset.
UP	Remote control function, acceleration		When the contact is turned ON, the operation is accelerated. (Available only when the frequency command is sent to the operator.)
DWN	Remote control function, deceleration		When the contact is turned ON, the operation is decelerated. (Available the frequency command is sent to the operator.)

Terminal symbol	Terminal name	Description
H	Frequency command power terminal	• Initialization of a voltage signal by an external command is between 0 and 10 VDC. (Switching from 0 to 5V is executed by A48.) When inputting 4 - 20 mA, turn the input terminal at ON.
O	Frequency command terminal (voltage command)	
OI	Frequency command terminal (current command)	VRO (500 Ω to 2 kΩ) DC0 to 10 V DC0 to 5V Input impedance 30 kΩ DC4 to 20 mV Input impedance 250 kΩ
L	Frequency command common terminal	When a current is inputted from between OI and L and the value is 4 m/ the output frequency may 0.6 Hr. If this occurs. set a value more than t| frequency which is outputted by [A 4] start frequency setting. (NOTE 2)
CM2	Common terminal 2	Common terminal for intelligent output terminal
FAI	Frequency arrival signal	When each operator is used, and arrival signal can be outputted at an optional frequency.
RUN	Signal during run	The transistor output is turned ON during running. (Outputted even during DC injection braking)

OTQ	Over-torque signal	The transistor output is turned ON when the torque is more than the set value.
		  The set value can be changed by the remote operator.
		  Use this function only under the sensor less vector control.

AL0		

AL1	Fault alarm terminal	Normal: AL0-AL1 close Abnormal, Power off: AL0-AL1 open
		
		Contact rating
		250 VAC 2.5 A (Resistor load) Min100Vac
		        0.2 A(Cosø=0.4) 10 mA
		30 VDC 3.0 A (Resistor load) 5 VDC
		        0.7 A(cosø=0.4) 100 mA

AL2		

NOTE 1: To set four or more multispeeds, use the CM terminal.

NOTE 2:   When an inconvernience occurs in the above characteristics, adjust it using
A80 and A81. The sum of both analog input signals is outputted
When selecting one of analog input current and voltage, make sure that the other
is not inputted.

5.7　Terminal Connection Diagram

Power supply

Three phase power supply

Inverter

R (L1)
S (L2)
T (L3)

P24
PLC

FW
8
7
.
.
.
1

FM
CMI

10 VDC

H
O
OI
L

Frequency setter
500Ω to 2 kΩ

Current input
4 to 20 mA

G (PE)

Grounding

(T1) U
(T2) V
(T3) W

Motor

24 VDC

(+) P

RB

AL0
AL1
AL2

Dynamic braking resistor
055, 075LF: RB 1,RB2 or RB3
055, 075HF: RB2, two each in series.

Fault alarm signal
(Normal: AL0-AL1 ON)

RY
RY

24 VDC

CM2

Follow the timing shown as below upon power on.

Main circuit power supply

Operation command

output frequency

Number of revolutions of motor

(NOTE 4) → 0.6 or more seconds

NOTE 1:　Common terminal for each terminal is different.

Terminal name	FM	FW, 8 to 1	H. 0.01	II. 12
Command	CMI	CMI (P24)*	L	CM2

*: P24 is for source type wiring.

NOTE 2:　The regenerative resistor has a temperature sensor. When it works, turn off power supply to the inverter o set the deceleration time longer.

NOTE 3:　When the operation command is input first and the main circuit power is turned ON, and direct start results and a trip occurs.

NOTE 4:　Do not input the operation command simultaneously when the main circuit is turned on.

6. OPERATION

6.1 Before Starting Operation

Prior to the test run, check the following.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                          ⚠ WARNING                                       │
├─────────────────────────────────────────────────────────────────────────┤
```

* Be sure to turn on the input power supply after mounting the surface cover. While being energized, be sure not to remove the cover.
  Otherwise, there is a danger of electric shock.

* Be sure not to operate the switches with wet hands.
  Otherwise, there is a danger of electric shock.

. While the inverter is energized, be sure not to touch the inverter terminals even during stoppage.
  Otherwise, there is a danger of electric shock.

• If the re-try mode is selected, it may suddenly restart during the trip stop. Be sure not to approach the machine. (Be sure to design the machine so that personnel safety will be secured even if it restarts.)
  Otherwise, there is a danger of injury.

* Even if the power supply is cut for a short period of time, it may restart operation after the power supply is recovered if the operation command is given. If it may incur danger to personnel, be sure to make a circuit so that it will not restart after power recovery.
  Otherwise, there is a danger of injury.

* The Stop Key is effective only when the function is set. Be sure to prepare the Key separately from the emergency stop.
  Otherwise, there is a danger of injury.

* After the operation command is given, if the alarm reset is conducted, it will restart suddenly. Be sure to set the alarm reset after checking the operation command is off.
  Otherwise, there is a danger of injury.

* Be sure not to touch the inside of the energized inverter or to put a bar into it.
  Otherwise, there is a danger of electric shock and/or fire.

⚠ CAUTION

- Radiating fin and discharging resistor will have high temperature. Be sure not to touch them.
  Otherwise, there is a danger of getting burned.

- Low to high speed operation of the inverter can be easily set. Be sure to operate it after checking the tolerance of the motor and machine.
  Otherwise, there is a danger of injury.

- If a motor is operated at a frequency higher than 60Hz, be sure to check the speeds of the motor and the machine with each manufacturer, and after getting their consent, operate them.
  Otherwise, there is a danger of machine breakage.

Note:

(I) Make sure that the power lines (input power supply R(L1), S(L2) and T(L3), and output terminals, U(T1), V(T2) and W(T3) are connected correctly.

(2) Make sure that there are no mistakes in the signal line connections.

(3) Make sure that the inverter case (⏚) is grounded.

(4) Make sure that terminals other than those specified are not grounded.

(5) Make sure that the inverter is installed vertically on a wall, and a nonflammable material such as a steel plate is used as a mounting surface.

(6) Make sure that them are no short-circuits caused by stray pieces of wire, solderless terminals or other objects left from wiring work. Also, make sure that no tools have been left behind.

(7) Make sure that the output wires are not short-circuited or grounded.

(8) Make sure that there are no loose screws or terminals.

(9) Make sure that the maximum frequency setting matches the machine specifications,

---

Be sure to refer to page 10-2 when conducting insulation resistance and withstand voltage tests. Never test terminals other than those which are indicated.

6.2 Test Run

Factory settings
Maximum frequency: 60 Hz   Forward operation

An example of a general connection diagram is shown below,
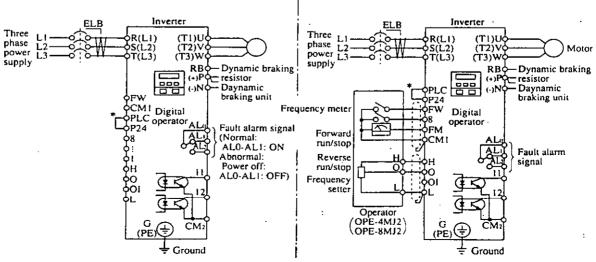
Operating with digital operator:
When setting frequency, run and stop with digital operator.
(The same way as remote operator (DOP) or copy with (DRW).)

Running from external command:
When setting frequency, run and stop from external command (FW,RV Terminal.)
The following shows run from the operation box (OPE-4MJ2,OPE-8MJ2)

*: For sink type wiring.

6-3
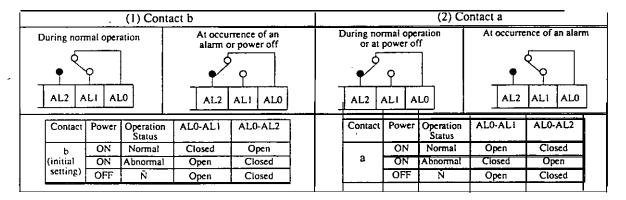
Operating with digital operator:　　　　**Runnign from external command:**

Procedure

(1) Turn on ELB to supply power to the inverter. Make sure that the POWER LED on the digital operator turns ON.

(2) Press the [FUNC] key once to display [d 0].

(3) Press ⊓ of the digital operator four times to display [F 9].

(4) Press the [FUNC] key and then press the ⊓ key to set [00]. Press the [FUNC] key to establish the data.

(5) Press the ⊓ key four times to display [d 0].

(6) Press ⊓ of the digital operatort five times to dispaly [F 2].

(7) Press the [FUNC] key and then the [▲] key so as to increase to frequency or the [▲] key so as to decrease the frequency.
(When the [▲]or ⊓ key is pressed continuously, the frequency is changed con-. tinuously.)

When the) key is pressed, [F 2] is displayed.

(8) Check the output frequemcy and rotation direction. When the [▲]or ⊓ key is pressed to display [F 4] and then the ⌐FUNC⌐key is pressed, the rotation direction can be checked. [F   ] indicates forward rotation and [r   ] indicates reverse rotation. When the rotation direction is checked, press the [FUNC] key. When the rotation direction cannot be found, operate the equipment at a low frequency to check the rotation direction.

(9) Presst the [RUN] key. The equipment starts running.

(10) Press the [STOP/RESET] key. The equipment decelerates and stops.

(4) Press the [FUNC] key and then press the ⊓ key to set [03]. Press the [FUNC] key to establish the data.

(5) Press the ⊓ key four times to display [d 0].

(6) Short the terminals FW and P24 (CM I *) of the control terminal block.

(7) Apply a voltage between the terminals 0 and L to start running.

(8) Open the terminals FW and P24 (CM I *) of the control terminal block to stop deceleration.

*: Symbols are indicated for Sink type wiring. Refer to page S-5.

. The failure alarm signal is generated from the terminal AL0 and AL1 when a failure happens. At this time the contents of the failure are displayed on the digital operator.

- Whether the alarm terminal output is to be. turned on or off during normal run can be selected by the extension function $\boxed{C\ 21}$.

  The alarm output terminals at initial setting are as follows (1).

  The alarm output terminals are valiable as follows (2) by setting $\boxed{C\ 21}$.

. (1) Contact b				(2) Contact a			
During normal operation		At occurrence of an alarm or power off		During normal operation or at power off		At occurrence of an alarm	

Contact	Power	Operation Status	AL0-AL1	AL0-AL2	Contact	Power	Operation Status	AL0-AL1	AL0-AL2
b (initial setting)	ON	Normal	Closed	Open	a	ON	Normal	Open	Closed
	ON	Abnormal	Open	Closed		ON	Abnormal	Closed	Open
	OFF	N̄	Open	Closed		OFF	N̄	Open	Closed

- Contact specification

Maximum	Minimum
250 VAC 2.5 A (Resistor load) 0.2 A $(\cos_\angle=0.4)$	100 VAC 10 mA
30 VDC 3.0 A (Resistor load) 0.7 A $(\cos_\angle=0.4)$	SVDC 100 mA
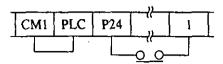
Working voltage: Max. 50 V

- Saving the alarm signal
  When an alarm signal is outputted, the alarm signal data is stored even if the input power is turned off and the contents can be checked by turning the power on once again. However, when the input power is turned off, the inverter control power is also turned off. As a result, when the power is turned on next, the alarm contact output is reset (deleted). Therefore, when saving the alarm contact output, let the external sequence receive and save it and then turn off the inverter input power.
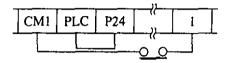
- When the alarm contact output is set ON during normal run, a time delay occurs until the contact is closed when the power is turned on. Therefore, when using the alarm contact output, set a time delay of about 2 seconds when the power is turned on.

Resetting (Any one of A, B and C is possible)

| CM1 | PLC | P24 | | 1 |

When the internal interface power source
P24-CM 1 is used (Source type wiring)

| CM1 | PLC | P24 | | 1 |

When the internal interface power source
P24-CM1 is used (Sink type wiring)

A) Turn control terminal 1 on. (In the initialization at factory before shipment, intelligent input terminal 1 is allocated to the reset RS terminal.)

B) Press STOP/RESET on the digital operator. (This is effective only when an alarm occurs.)

C) Open the power receiving breaker of the inverter, and make sure that the Charge lamp on the control board goes out. (See page 3-I.) Then, close the power receiving breaker.

NOTE: When the control circuit terminal RS is used, never short-circuit RS-P24 (CM1*) for four seconds or more. Otherwise, a communication error R-ERROR COMM<2> may occur (Although the digital operator display is [- | -], the inverter is normal). When the above error occurs, open the RS terminal and press the operator key.,

*: For sink type wiring
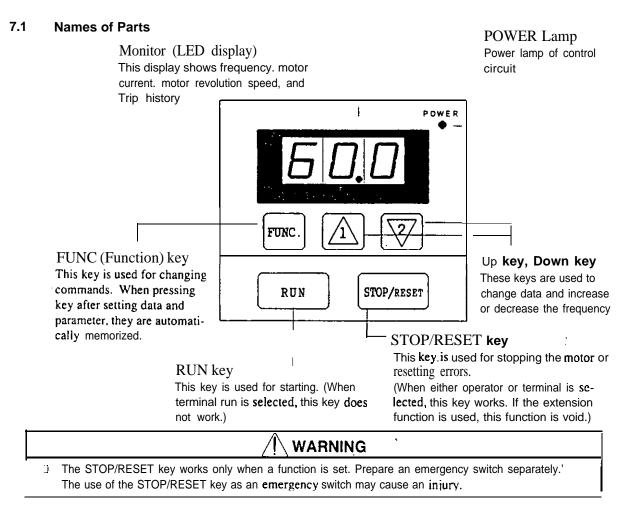
How to return to the initialization (state before shipment)

When returning the equipment to the initial state set at factory before shipment for some reason, see page 7- 14.

7. OPERATION OF THE DIGITAL OPERATOR

The standard type digital operator is modified so as to be used easily by minimizing key operations. Data can be set simply.

7.1 Names of Parts

Monitor (LED display)
This display shows frequency. motor current. motor revolution speed, and Trip history

POWER Lamp
Power lamp of control circuit

FUNC (Function) key
This key is used for changing commands. When pressing key after setting data and parameter, they are automatically memorized.

Up key, Down key
These keys are used to change data and increase or decrease the frequency

STOP/RESET key
This key is used for stopping the motor or resetting errors.
(When either operator or terminal is selected, this key works. If the extension function is used, this function is void.)

RUN key
This key is used for starting. (When terminal run is selected, this key does not work.)

⚠ **WARNING**

⌐ The STOP/RESET key works only when a function is set. Prepare an emergency switch separately.'
The use of the STOP/RESET key as an emergency switch may cause an injury.

7.2 Operation Procedure
(Example that the frequency is set and the equipment starts running)

Display after power is turned on

Press the FUNC key once.

Press the ▲ key five times.

Press the FUNC key once and set the frequency by using the ▲ and ▼ keys.

The frequency which is set by the FUNC key is stored.

Press RUN

Start run

When selecting the monitor mode, press ▲ and ▼ to display d 0 .

Press the FUNC key once.

(Frequency monitor)
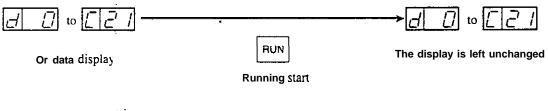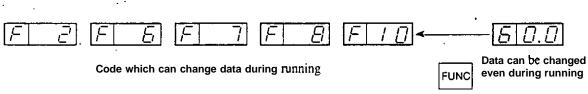
7.3   Key Description

[▲][▼] Data display ⎫ The key are used to select the code and change the data. When
      Code display ⎬ the ⬜ key is pressed once, the monitor mode $d\ \ 0$ is displayed
      UP/DOWN key ⎭ first and then $d\ \ 1$, $d\ \ 2$, $F\ 1\ 1$, ... are one by one. f

key is pressed once again when $F\ 1\ 4$ is displayed, the display is returned to $d\ \ 0$.

If an optional code **is** selected when $F\ 1\ 4$ is displayed and the

[FUNC] key IS pressed, the extension function mode can be selected.

[FUNC]   [Function key] This key allows the selection of commands and memorizes parameters.
When this key is pressed once in the state of $d\ \ 0$, $F\ 1\ 1$, the data state is set. When the key is pressed once in the state of $F\ 1\ 4$, the extension function code selection state is set.

$d\ \ 0 - F\ 1\ 1$ screen transition $F\ 1\ 4$ screen transition

[RUN]   [RUN key] . This key starts the run.
The set value of F4 determines a forward run or a reverse run.

[STOP/RESET]   [STOP/RESET key]. . This key stops the run.
When a trip occurs, this key becomes the reset key.

7.4 Explanation of Screen Display

- When the inverter is turned on, the latest display appears. However, when the display unit for data of the commands F2 to F14 is turned off, the commands (F2 to F14) are displayed. (d10 and d11 excluded)

- Data during running in any function mode or extension function mode can be displayed. Even if data cannot be changed during running, data can be monitored.

- In each of the function modes $\boxed{F\ \ 2}$, $\boxed{F\ \ 6}$, $\boxed{F\ \ 7}$, $\boxed{F\ \ 8}$, and $\boxed{F\ 10}$, data can be changed even during running. In other function modes and extension function modes, data cannot be set during running.

$\boxed{d\ \ 0}$ to $\boxed{C\ 2\ 1}$ ⟶ $\boxed{d\ \ 0}$ to $\boxed{C\ 2\ 1}$

Or data display

$\boxed{RUN}$

Running start

The display is left unchanged

$\boxed{F\ \ 2}$ $\boxed{F\ \ 6}$ $\boxed{F\ \ 7}$ $\boxed{F\ \ 8}$ $\boxed{F\ 10}$ ⟵ $\boxed{6\ 0.0}$

Code which can change data during running

$\boxed{FUNC}$ **Data can be changed even during running**

7.5 Transition of Each Code

<Monitor mode>

Code	Description
d 0	output frequency monitor
d 1	Motor revolution speed monitor
d 2	Output current monitor
d 3	Frequency converted value monitor
d 10	Trip monitor
d 11	T&history monitor

<Function mode>

Code	Description
F 2	Output frequency setting
F 4	Running direction setting
F 6	Acceleration time setting
F 7	Deceleration time setting
F 8	Manual torque boost setting
F 9	Run command, frequency command
F 10	Analog meter adjustment
F 11	Motor receiving voltage
F 14	Extension function setting

When the FUNC key is pressed once to set the extension function, the screen is changed to the extension function code selection screen. When a code is selected from the codes A 0 to C21 and the FUNC key is pressed. the screen is changed to the relevant extension function settig screen.

To extension function code setting

<Extension function mode>

Code	Description
A 0	Control method setting
A 1	Motor capacity setting
A 2	Motor poles setting
A 3	Speed control response constant setting
A 4	Start frequency adjustment
A 5	Maximum frequency limiter setting
A 6	Minimum frequency limiter setting
A 7	Jump frequency setting 1
A 8	Jump frequency setting 2
A 9	Jump frequency setting 3
A 10	Carrier frequency setting
A 11	Frequency command sampling; frequency setting
A 12	Multispeed first speed setting
A 13	Multispeed second speed setting
A 14	Multispeed third speed setting
A 23	Electronic thermal level adjustment
A 24	Electronic thermal characteristic selection
A 25	Motor pole number setting for motor speed monitor
A 26	External frequency setting start
A 27	External frequency setting end
A 34	Instantaneous restart selection
A 38	Dynamic braking usage ratio
A 39	Optional arrival frequency for acceleration
A 40	Optional arrival frequency for deceleration
A 44	Monitor signal selection
A 47	Frequency convened value setting
A 48	Analog input selection
A 49	Frequency arrival signal output method
A 54	Restarting after FRS signal selection

Code	Description
A 58	Reduced voltage soft start setting
A 59	Running mode selection
A 61	Jogging frequency setting
A 62	Base frequency setting
A 63	Maximum frequency setting
A 64	Maximum frequency selection
A 80	Frequency command output frequency adjust (c-t. terminal)
A 81	Frequency command/ output frequency adjust (OI–L terminal)
A 86	Selection of reset terminal performance
A 90	P gain setting of PID funciton
A 91	I gain setting of PID function
A 92	D gain setting of PID funciton
A 94	Selection of PID funciton
A 95	Setting method of PID reference value
A 96	Setting of PID reference value
A 97	Auto tuning setting
A 98	Motor data selection
A 99	Ro-To option selection
C 0	Input terminal setting I
C 1	Input terminal setting 2
C 2	Input terminal setting 3
C 3	Input termianl setting 4
C 4	Input terminal setting 5
C 5	Input terminal setting 6
C 6	Input terminal setting 7
C 7	Input terminal setting 8
C 10	Output terminal setting I I
C 11	Output terminal setting I2
C 20	Input terminal a and b contact setting
C 21	Output terminal a and b contact setting

7.6 Digital Operator Initialization List

(1) Monitor mode, function mode
- The standard set value of each code number is displayed.
- The extension functions shown on page 7-6 can be set by the $F14$ extension function setting function.

| Display order | Function name | Type | Screen display | | | Initial value | Settable for 2nd function | Set value |
			Code display	Settable during running	Monitor/set value			
1	Output frequency monitor	Monitor	d 0	—	0.00-9.99/10.0-99.9/100-400	—	—	
2	Motor revolution speed monitor	Monitor	d 1		0.00-9.99/10.0-99.9/100-600	—	—	
3	Output current monitor	Monitor	d 2	—	0.0-999	—	—	
4	Frequency converted value monitor	Monitor	d3	—	0.00-9.99/10.0-99.9/100.-999. 100-999/Γ10-Γ99	—	—	
5	Trip Monitor	Monitor	d10	—	—	—	—	
6	Trip history monitor	Monitor	d11	—	—	—	—	
7	Output frequency setting	Set value	F 2	√	0.00-9.99/10.0-99.9/100-400	0.00	√	
8	Running direction setting	Set value	F 4	Not possible	F/r (forward run/reverse run)	F	—	
9	Acceleration time setting 1	Set value	F 6	√	0.01-9.99/10.0-99.9/100-999	30.0	√	
10	Deceleration time setting 1	Set value	F 7	√	0.01-9.99/10.0-99.9/100-999	30.0	√	
11	Manual torque boost setting	Set value	F 8	√	00-99 NOTE 3	11	√	
12	Runn command, frequency command setting	Set value	F 9	Not possible	00-15 NOTE 1	03	—	
13	Analog meter adjustment	Set value	F10	√	00-250	172	—	
14	Motor receiving voltage	Set value	F11	Not possible	200-2301380-480 NOTE 2	230/460	—	
15	Extension function setting	Set value	F14	Not possible	A 0-A99/C 0-C21	A 0	—	

NOTE **1:** In the standard configuration, four values from 0 to 3 can be selected. When an optional PC board is mounted, 16 values from 0 to 15 can be selected. Refer to F-9.

NOTE 2: For the 200 V class, one of 200, 215, 220, and 230 can be selected.
For the 400 V class, one of 380, 400, 415, 440, 460 and 480 can be selected.

NOTE 3: Set torque boost in 70 to 90 when using VP1, VP2 or VP3 in V/F control mode

(2) Extension function mode

- Each function name and **settable** range to the extension function mode are shown below.
- Set the extension function code to be changed by $\boxed{F\ /\ Y}$.
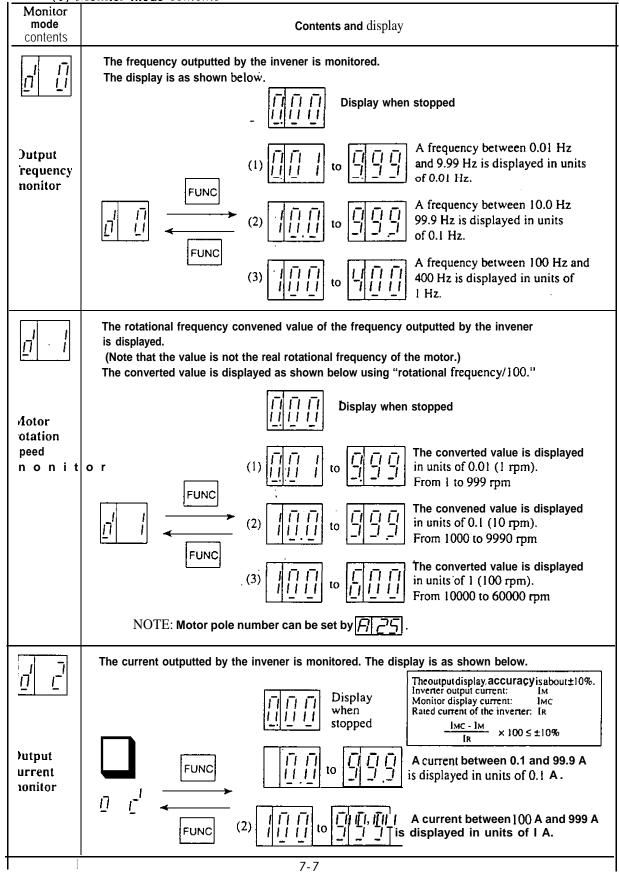
| Display order	Extension function name	Code display	Settable during running	Screen display — Setting range	Initial value	Settable for 2nd function	Remarks	Set value
1	Control method setting	A 0	N̄	0-5	0	√		
2	Motor capacity setting	A 1	N̄	3.7 to 160		√	NOTE 1	
3	Motor poles setting	A 2	N̄	2/4/6/8	4	√		
4	Speed control response constant setting	A 3	N̄	0.00-9.99/10.0-99.9/100	2.00	√		
5	Start frequency adjustment	A 4	N̄	0.10-9.99	0.50	N̄		
6	Maximum frequency limiter setting	A 5	N̄	0-120 (400)	0	N̄		
7	Minimum frequency limiter setting	A 6	N̄	0-120 (400)	0	N̄		
8	Jump frequency setting 1	A 7	N̄	0-400	0	N̄		
9	Jump frequency setting 2	A 8	N̄	0-400	0	N̄		
10	Jump frequency setting 3	A 9	N̄	0-400	0	N̄		
11	Carrier frequency setting	A10	N̄	2.0-16.0	(16.0)	N̄	See 7-18	
12	Frequency command sampling frequency	A11	N̄	1-8	8	N̄		
13	Multispeed first speed setting	A12	N̄	0-120 (400)	0	N̄		
14	Multispeed second speed setting	A13	N̄	0-120 (400)	0	N̄		
15	Multispeed third speed setting	A14	N̄	0-120 (400)	0	N̄		
16	Electronic thermal level adjustment	A23	N̄	20-120	100	√		
17	Electronic thermal characteristic selection	A24	N̄	0-2	1	√		
18	Motor pole number setting for motor speed monitor	A25	N̄	2 to 48	4	N̄		
19	External frequency setting start	A26	N̄	0-120 (400)	0	N̄		
20	External frequency setting end	A27	N̄	0-120 (400)	0	N̄		
21	Instantaneous restart selection	A34	N̄	0-3	0	N̄		
22	Dynamic braking usage ratio	A38	N̄	0.0-99.9/100	(1.5)	N̄	See 7-21	
23	Optional arrival frequency for acceleration	A39	N̄	0-400	0	N̄		
24	Optional arrival frequency for deceleration	A40	N̄	0-400	0	N̄		
25	Monitor signal selection	A44	N̄	0-3	0	N̄		
26	Frequency converted value setting	A47	N̄	0.0-99.9	1.0	N̄		
27	Analog input selection	A48	N̄	0-1	1	N̄		
28	Frequency arrival signal output method	A49	N̄	0-2	0	N̄		
29	Restarting after FRS signal selection	A54	N̄	0-1	1	N̄		
30	Reduced voltage soft start setting	A58	N̄	0-6	6	N̄		
31	Running mode selection	A59	N̄	0-2	0	N̄		
32	Jogging frequency setting	A61	N̄	0-9.99	1.00	N̄	Frequencies below the start frequency cannot be set.	
33	Base frequency setting	A62	N̄	30-120 (400)	60	√		
34	Maximum frequency setting	A63	N̄	30-120 (400)	60	√		
35	Maximum frequency selection	A64	N̄	120/400	120	N̄		
36	Frequency command/output frequency adjust (O-L terminal)	A80	N̄	0-255	N̄	N̄	NOTE 2	
37	Frequency command/output frequency adjust (OI-L terminal)	A81	N̄	0-255	N̄	N̄	NOTE 2	
38	Selection of reset terminal performance	A86	N̄	0, 1	0	N̄		
39	P gain setting of PID funciton	A90	N̄	0.1-0.5	1.0	N̄		
40	I gain setting of PID funciton	A91	N̄	0.0-15.0	1.0	N̄		
41	D gain setting of PID function	A92	N̄	0.0-100	0.0	N̄		
42	Selection of PID funciton	A94	N̄	0-4	0	N̄		
43	Setting method of PID reference value	A95	N̄	0, 1	0	N̄		
44	Setting of PID reference value	A96	N̄	0.00-200	0.00	N̄		
45	Auto tuning setitng	A97	N̄	0-2	0	N̄		
46	Motor data selection	A98	N̄	0-2	0	√		
47	Ro-To option selection	A99	N̄	0-1	0	N̄		
48	Input terminal setting 1	C 0	N̄	0-3, 5-9, 11-16, 18-28	18	N̄		
49	Input terminal setting 2	C 1	N̄	0-3, 5-9, 11-16, 18-28	16	N̄		
50	Input terminal setting 3	C 2	N̄	0-3, 5-9, 11-16, 18-28	5	N̄		
51	Input terminal setting 4	C 3	N̄	0-3, 5-9, 11-16, 18-28	11	N̄		
52	Input terminal setting 5	C 4	N̄	0-3, 5-9, 11-16, 18-28	9	N̄		
53	Input terminal setting 6	C 5	N̄	0-3, 5-9, 11-16, 18-28	13	N̄		
54	Input terminal setting 7	C 6	N̄	0-3, 5-9, 11-16, 18-28	1	N̄		
55	Input terminal setting 8	C 7	N̄	0-3, 5-9, 11-16, 18-28	0	N̄		
56	Output terminal setting 11	C10	N̄	0-2	0	N̄		
57	Output terminal setting 12	C11	N̄	0-2	1	N̄		
58	Input terminal a and b contact setting	C20	N̄	00-FF	00	N̄		
59	Output terminal a and b contact setting	C21	N̄	00-07	04	N̄		
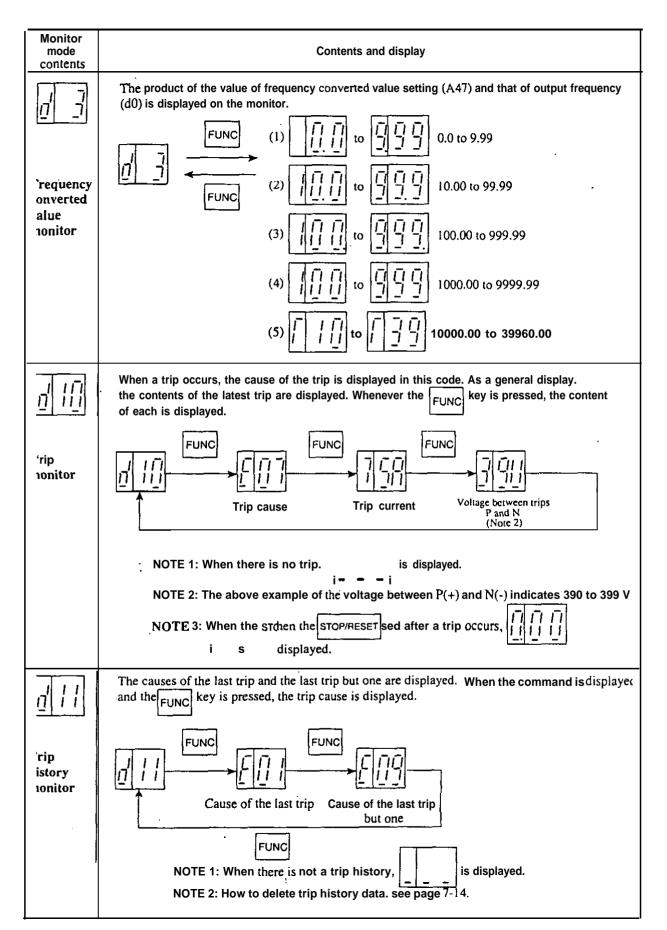
NOTE 1: The most applicable motor capacity of the inverter is set.
NOTE 2: The initial setting of each inverter is adjusted when shipping from the works.

7.1 Explanation of Modes
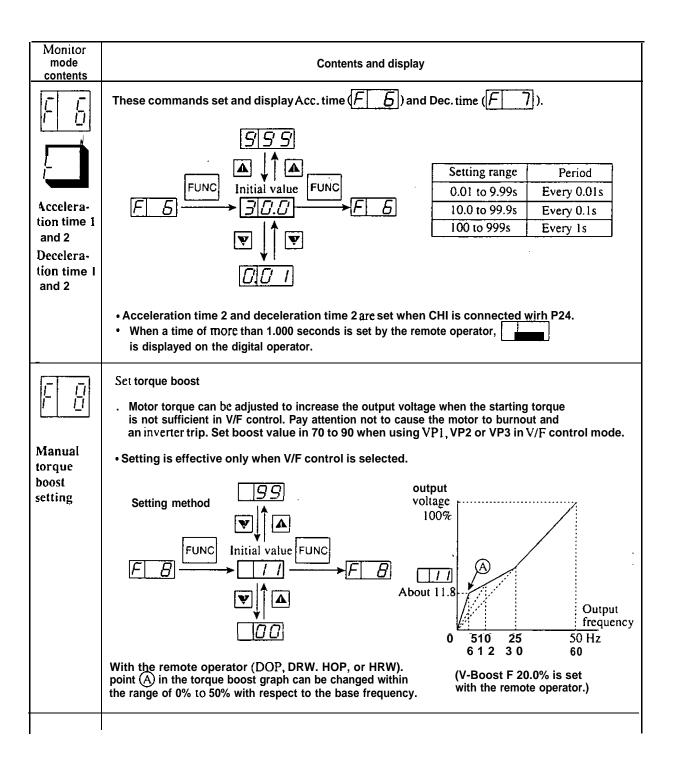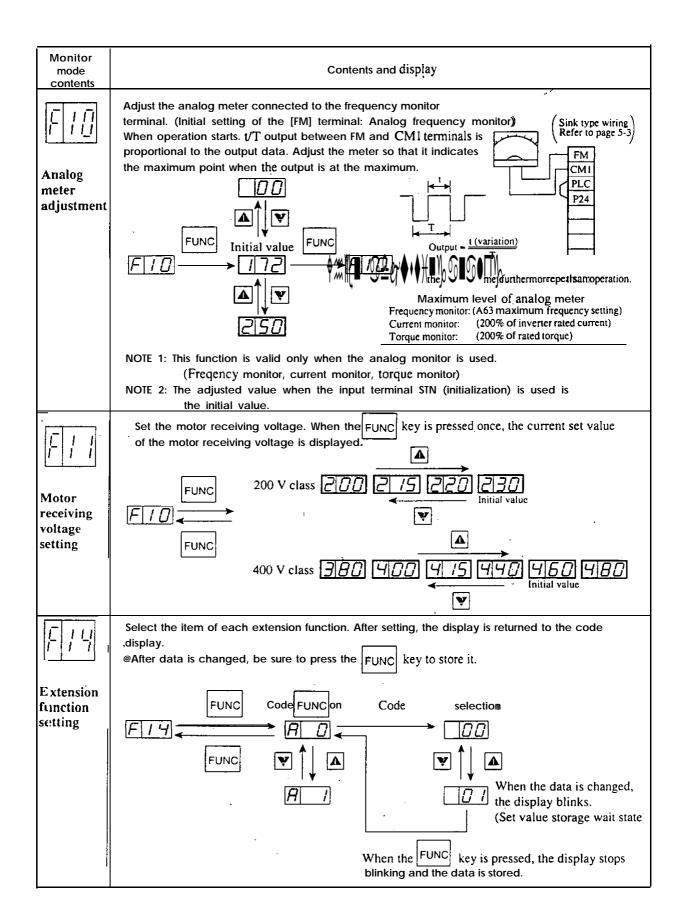
(1) Monitor mode contents

Monitor mode contents	Contents and display
Output frequency monitor (d0)	**The frequency outputted by the invener is monitored.** **The display is as shown below.** Display when stopped (1) to — A frequency between 0.01 Hz and 9.99 Hz is displayed in units of 0.01 Hz. (2) to — A frequency between 10.0 Hz 99.9 Hz is displayed in units of 0.1 Hz. (3) to — A frequency between 100 Hz and 400 Hz is displayed in units of 1 Hz.
Motor rotation speed monitor (d1)	**The rotational frequency convened value of the frequency outputted by the invener is displayed.** **(Note that the value is not the real rotational frequency of the motor.)** **The converted value is displayed as shown below using "rotational frequency/100."** Display when stopped (1) to — The converted value is displayed in units of 0.01 (1 rpm). From 1 to 999 rpm (2) to — The convened value is displayed in units of 0.1 (10 rpm). From 1000 to 9990 rpm (3) to — The converted value is displayed in units of 1 (100 rpm). From 10000 to 60000 rpm NOTE: **Motor pole number can be set by** $A25$.
Output current monitor (d2)	**The current outputted by the invener is monitored. The display is as shown below.** Display when stopped The output display accuracy is about ±10%. Invener output current: I_M Monitor display current: I_{MC} Rated current of the invener: I_R $$\frac{I_{MC} - I_M}{I_R} \times 100 \leq \pm 10\%$$ to — A current between 0.1 and 99.9 A is displayed in units of 0.1 A. (2) to — A current between 100 A and 999 A is displayed in units of 1 A.

Monitor mode contents	Contents and display
Frequency converted value monitor	The product of the value of frequency converted value setting (A47) and that of output frequency (d0) is displayed on the monitor. (1) 0.0 to 9.99 (2) 10.00 to 99.99 (3) 100.00 to 999.99 (4) 1000.00 to 9999.99 (5) 10000.00 to 39960.00
Trip monitor	When a trip occurs, the cause of the trip is displayed in this code. As a general display. the contents of the latest trip are displayed. Whenever the [FUNC] key is pressed, the content of each is displayed. Trip cause Trip current Voltage between trips P and N (Note 2) NOTE 1: When there is no trip. is displayed. NOTE 2: The above example of the voltage between P(+) and N(-) indicates 390 to 399 V NOTE 3: When the ST, then the [STOP/RESET] sed after a trip occurs, is displayed.
Trip history monitor	The causes of the last trip and the last trip but one are displayed. When the command is displayed and the [FUNC] key is pressed, the trip cause is displayed. Cause of the last trip Cause of the last trip but one NOTE 1: When there is not a trip history, is displayed. NOTE 2: How to delete trip history data. see page 7-14.

(2) Function mode

Monitor mode contents	Contents and display

![FC] Output frequency setting	Methods for setting the output frequency are as follows:
	1. Digital operator .... Refer to this setting.
	2. Control circui, terminal --------------- ·Refer to this setting.
	   (multistage speed command)
	3. External analog input ---------------- Refer to page 6-2.
	   (0 to IO V. 0 to 5 V. 4 to 20 mA)
	4. Remote operator ---------------------- Refer to the explanation of each remote operator.
	   (new type, general purpose)
	5. Optional PCB .... Refer to each optional PCB operation:

(I) Setting from the digital operator

A frequency between 0.01 Hz and 9.99 Hz is set in units of 0.01 Hz.

A frequency between 10.0 Hz and 99.9 Hz is set in units of 0.1 Hz.

A frequency between 100 Hz and 400 Hz is set in units of 1 Hz.

Initial set value

When the [▲] or [⬜] key is pressed continuously. the value is changed continuously.

(2) Setting from the control circuit terminal (multispeed setting)

The output frequency at the multispeed can be se, as specified below. When the running mode is the process stepping mode. switch it to the multistage speed mode by the remotè operator.

① Connect the multispeed terminal for setting the frequency to CMI.

(The relationship between multispeeds I to 7 and the control circuit terminals is as shown below.)

Multispeed	Control circuit terminal		
	1	2	3 (*1)
Multispeed 1	ON	OFF	OFF
Multispeed 2	OFF	ON	
Multispeed 3	ON	ON	
Multispeed 4	ON	OFF	ON
Multispeed 5	OFF	ON	
Multispeed 6	ON	ON	
Multispeed 7	OFF	OFF	

Example of terminal connection for sink type
Refer l" page J-J.

*1: By initialization. the multispeed can be set up to the third stage. When CF3 is set by terminal allocation (in this case, intelligent input terminal 5 is allocated). up to the 7th stage can be set (set by the extension function mode C4).
Intelligent input terminal allocation: CO to C7
Set value: 3 (CF3)

② Set an optional output frequency using the [▲] or [⬜] key.

③ Press the FUNC/E key once to store the se, output frequency.

NOTE 2: |F C| is displayed.

④ Press the [⬜] key once. (Check whether the output frequency, which is se,. is displayed.)

⑤ By repeating (1) to (4). the output frequency in the multispeed mode can be se,.

NOTE 3:   Whenever any data is changed. be sure to press the [FUNC] key before starting the next setting. Note that when the [FUNC] key is not pressed, the data will not be se,.

NOTE 4:   When setting to over 120 Hz, the changing over maximum frequency is necessary. Remote operator or copy unit must be used.
(When the value is switched to 400 by F-30. an output frequency of up to 400 Hz can be se,.)

Monitor mode contents	Contents and display
$F4$ Running direction	**Set the motor direction.** Set the motor direction when running by pressing the ⬜ key. **NOTE: The setting during run is impossible.** ⬜ → FUNC → Initial set value F Forward run FUNC → Reverse run Switching can be done by pressing

Monitor mode contents	Contents and display
$\boxed{F\ 6}$ $\searrow$ Accelera-tion time 1 and 2 Decelera-tion time 1 and 2	These commands set and display Acc. time ($\boxed{F\quad 6}$) and Dec. time ($\boxed{F\quad 7}$). $\boxed{9\ 9\ 9}$ ▲ ↓↑ ▲ $\boxed{F\ 6}$ →[FUNC] Initial value [FUNC]→ $\boxed{F\ 6}$ $\boxed{3\ 0.0}$ ▼ ↓↑ ▼ $\boxed{0\ 0\ 1}$ • Acceleration time 2 and deceleration time 2 are set when CHI is connected with P24. • When a time of more than 1.000 seconds is set by the remote operator, $\boxed{\blacksquare}$ is displayed on the digital operator.

Setting range table:

Setting range	Period
0.01 to 9.99s	Every 0.01s
10.0 to 99.9s	Every 0.1s
100 to 999s	Every 1s

| $\boxed{F\ 8}$ Manual torque boost setting | Set torque boost

. Motor torque can be adjusted to increase the output voltage when the starting torque is not sufficient in V/F control. Pay attention not to cause the motor to burnout and an inverter trip. Set boost value in 70 to 90 when using VP1, VP2 or VP3 in V/F control mode.

• Setting is effective only when V/F control is selected.

Setting method
$\boxed{9\ 9}$
▼ ↓↑ ▲
$\boxed{F\ 8}$ →[FUNC] Initial value [FUNC]→ $\boxed{F\ 8}$
$\boxed{1\ 1}$
▼ ↓↑ ▲
$\boxed{0\ 0}$

With the remote operator (DOP, DRW. HOP, or HRW). point Ⓐ in the torque boost graph can be changed within the range of 0% to 50% with respect to the base frequency.

output voltage 100%
$\boxed{1\ 1}$
About 11.8
0   510   25   50 Hz
    6 1 2   3 0   60
Output frequency

(V-Boost F 20.0% is set with the remote operator.) |

Monitor mode contents	Contents and display

Switching the run command and frequency command setting modes

Set the run command and frequency command sending destinations. The standard specification selection range is from 00 to 03.

F 9

Run command-ing method

Frequency command-ng method

Initial value

Set value	Run command to	Frequency command to
00	Digital operator	Digital operator
0 1	Digital operator	**Terminal block**
02	Terminal block	Digital operator
03	Terminal block	Terminal block
04	Digital operator	Option 1
05	Option 1	Digital operator
06	Option 1	Option 1
07	Digital operator	Option 2
08	Option 2	Digital operator
09	Option 2	Option 2
10	Terminal block	Option 1
11	Option 1	Terminal block
12	Terminal block	Option 2
13	Option 2	Terminal block
14	Option 1	Option 2
15	Option 2	Option 1

Setting method

15

▼ ▲

F 9 →(FUNC)→ Initial value 03 →(FUNC)→ F 9

NOTE1: The run command and frequency command sending destinations can be set to any of the terminal, operator. option 1, and option 2. Select the relevant set value.

NOTE2: When option 1 or option 2 is selected for "Run command to" and "Frequency command to," the digital operator and terminal block cannot issue commands. Set option 1 or option 2 (set values 04 - 15) only for operation or frequency commands from the optional PC board.

Monitor mode contents	Contents and display
F 10 — Analog meter adjustment	Adjust the analog meter connected to the frequency monitor terminal. (Initial setting of the [FM] terminal: Analog frequency monitor) When operation starts. t/T output between FM and CM1 terminals is proportional to the output data. Adjust the meter so that it indicates the maximum point when the output is at the maximum. (Sink type wiring Refer to page 5-3) NOTE 1: This function is valid only when the analog monitor is used. (Freqency monitor, current monitor, torque monitor) NOTE 2: The adjusted value when the input terminal STN (initialization) is used is the initial value.
F 11 — Motor receiving voltage setting	Set the motor receiving voltage. When the FUNC key is pressed once, the current set value of the motor receiving voltage is displayed. 200 V class: 200 215 220 230 (Initial value) 400 V class: 380 400 415 440 460 480 (Initial value)
F 14 — Extension function setting	Select the item of each extension function. After setting, the display is returned to the code display. @After data is changed, be sure to press the FUNC key to store it. When the data is changed, the display blinks. (Set value storage wait state) When the FUNC key is pressed, the display stops blinking and the data is stored.

Maximum level of analog meter
Frequency monitor: (A63 maximum frequency setting)
Current monitor: (200% of inverter rated current)
Torque monitor: (200% of rated torque)

Returning to the initialization (State set at factory before shipment)

When returning the equipment to the initial state set at factory before shipment for some reason, follow the following procedure.

1) Allocate STN (set value $\boxed{7}$) to one of the input intelligent terminals. (Use $\boxed{C I}$ to $\boxed{C 7}$ in the extension function mode to set the intelligent terminals.)

   (However, $\boxed{C 0}$ cannot be used since resetting RS is initially set.)

2) Short-circuit the STN terminal and P24 (CM1*), then turn power off and on. (When the power is turned off, do not turn it on again until the CHARGE lamp of the logic PCB goes off.)

3) Keep the STN terminal open for more than 6 seconds. (When keying, resetting, or turning power off is performed within 6 seconds, the equipment may not be initialized.)

4) Turn the power off after more than 6 seconds. (When the power is turned off within 6 seconds, the equipment may not be initialized.)

How to Delete Trip History Data ($\boxed{d 10}$, and $\boxed{d 11}$)

To delete trip history data for some reason, follow the instructions shown below using the remote operator (DOP or HOP) or copy unit (DRW or HRW).

1. Using the remote operator (DOP-OA) or copy unit (DRW-OA)

    (1) Display $\boxed{\text{INIT} \text{TCNT}}$ (trip history count clear) or the function mode initial setting $\boxed{\text{F-38} \text{INIT}}$.

    (2) Move the cursor to beneath the initial set values. Select CLR and store it.

    I) Turn the power off once and then turn it on. or close the reset terminal RS-P24 (CM1*) for approx. a second. By this, trip history data is deleted.

    2) When trip history is deleted, data of [F-38] is set to [CNT]. Trip counting restarts.

2. Using high-performance remote operator (HOP-OJ) or high-performance copy unit (HRW-OJ)

    (1) Display [TCNT 0: CNT] (trip history count clear) or the function mode initial setting [2-I INIT].

    (2) Enter a count clearing value [0: CLR] from the 10-key pad.

    I) Turn the power off once and then turn it on. or close the reset terminal RS-P24 (CM I*) for approx. a second. By this, trip history data is deleted.

    2) When trip history is deleted, data of [2-IINIT] is set to [CNT]. Trip counting restarts.
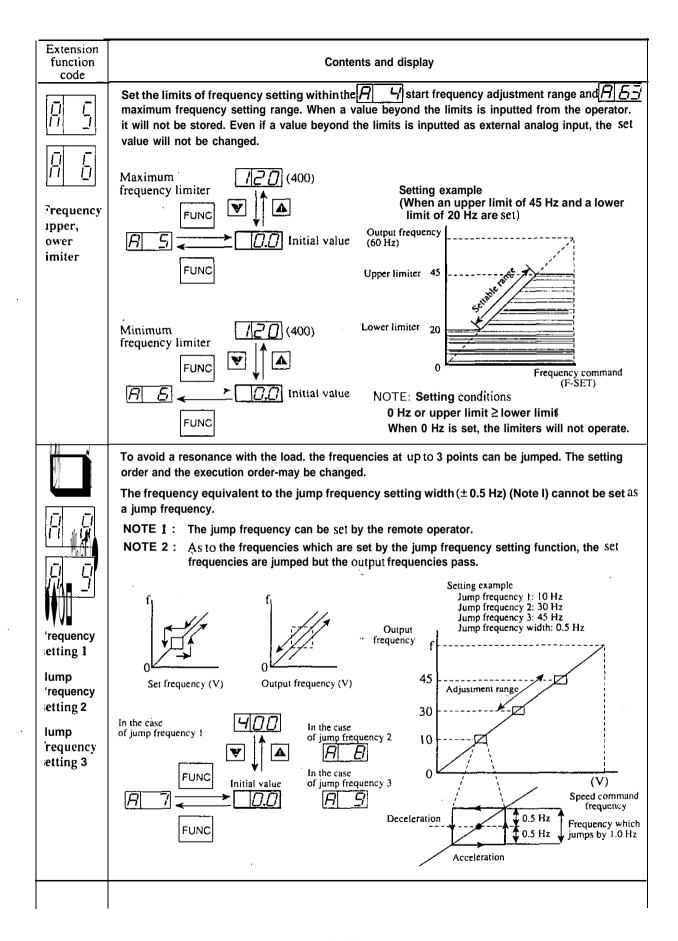
    NOTE: Symbols * are indicated for Sink type wiring.
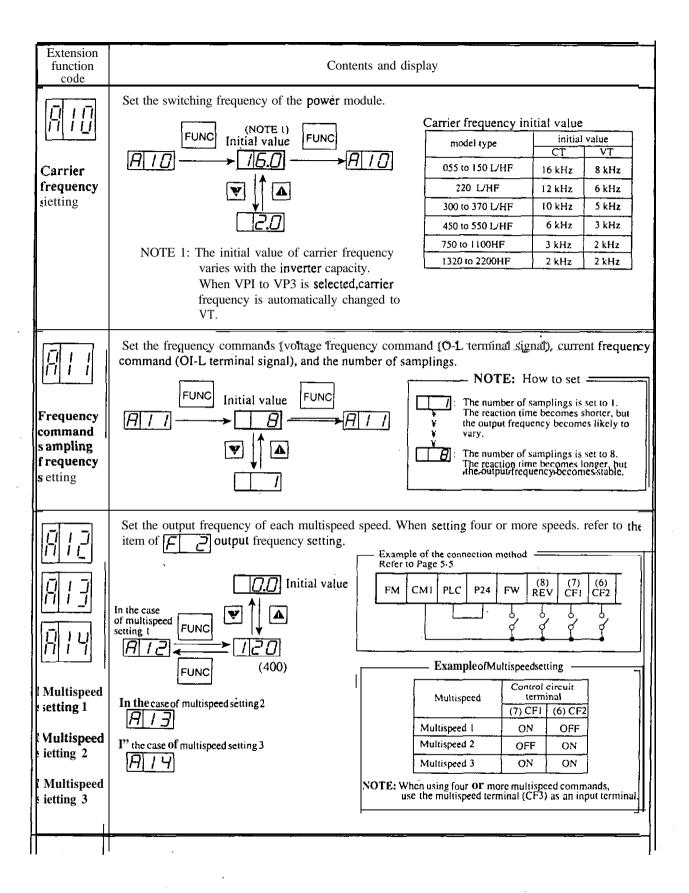
(3) Extension function mode contents
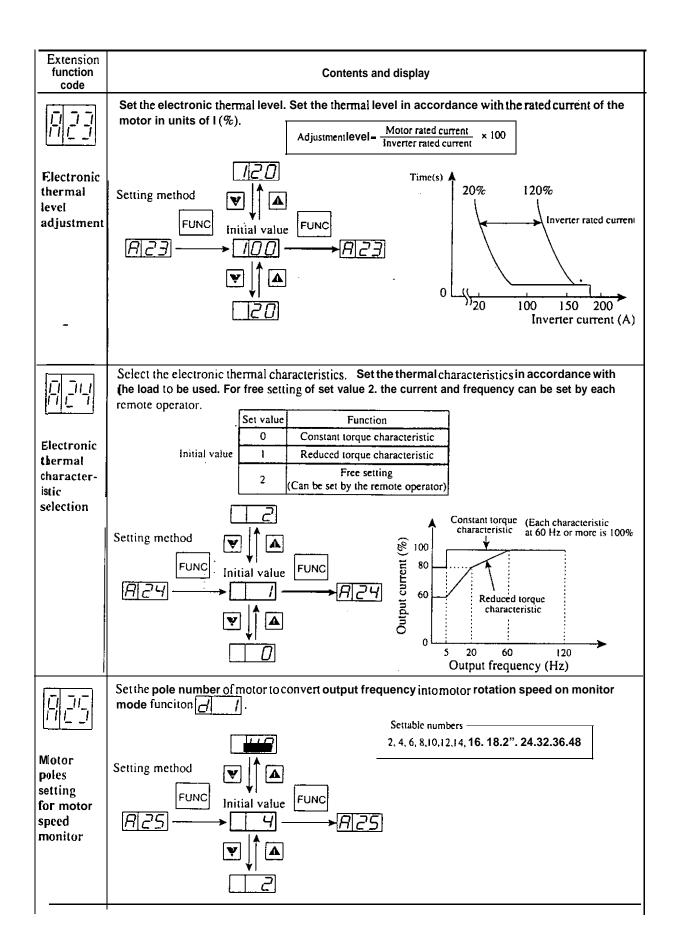
Extension function code	Contents and display
A 0 Control method setting	Set the control method. Select one of the following control codes. **0** — V/f control (VC) Constant torque characteristics **1** — V/f control (VP1) Reduced torque characteristics, 1.5 power NOTE : set torque boost in 70 to 90. **2** — V/f control (VP2) Reduced torque characteristics, 1.7 power NOTE : set torque boost in 70 to 90 **3** — V/f control (VP3) Reduced torque characteristics, 2.0 power NOTE : set torque boost in 70 to 90 **4** — Sensorless vector control (SLV) **5** — Vector control with sensor (V2) NOTE : Vector control INV only (Feedback board is nesessary)
A 1 A 2 Motor capacity, motor poles setting	Set the motor capacity and number of motor poles according to the motor to be used. The maximum rating of the applicable d-pole motor for each inverter is set initially. Motor capacity No. of motor poles NOTE : When the data does not match that of the mootor. satisfactory characteristics may not be obtained during the sensorless vector running. The full performances may not be demonstrated if the rating of a motor used is low or less than the maximum applicable rating when the sensor-less vector function is used. The sensor-less vector operation is disabled when two or more motors are running. Set this data properly according to the motor used if its rating is not the same as the maximum applicable rating in V/f operation.
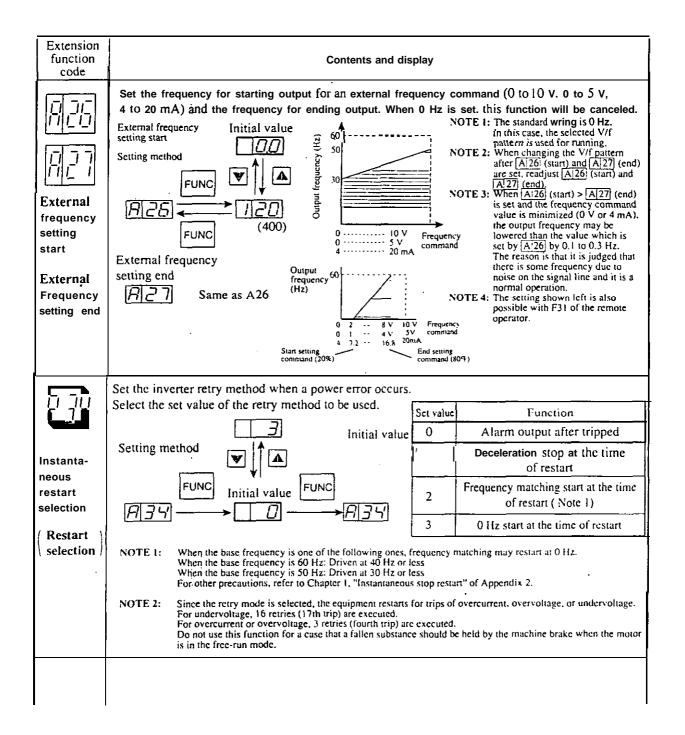
Extension function code	Contents and display
A 3 Speed control **response** constant setting	Set the response speed (ASR system gain) between the inverter and motor. When increasing or decreasing the current motor response speed. adjust the ASR system gain. When the set value is decreased, the response speed is increased. When the set value is increased, the response speed is decreased. **0.00** ⇄ **9.99** A constant between 0.01 and 9.99 is set in units of 0.01 **A 3** ⇄ **2.00** (FUNC Initial value) **10.0** ⇄ **99.9** A constant between 10.0 and 99.9 is set in units of 0.1. **100** ⇄ **655** A constant between 100 and 655 is set in units of 1
A 4 start **frequency adjustment**	Set the frequency for starting output of the inverter. Set a frequency between 0. 1 Hz and 9.99 Hz in units of 0.01 Hz **9.99** ▼↑▲ **A 4** → **0.50** → **A 4** (FUNC Initial value FUNC) ▼↑▲ **0.10** Output voltage V Adjustment range 0 0.10 9.99 f Maximum frequency When the start frequency is increased. the acceleration or deceleration time is decreased.

Extension function code	Contents and display
⌸ ⌸ (A 5) ⌸ ⌸ (A 6) ?requency upper, lower imiter	Set the limits of frequency setting within the [A 4] start frequency adjustment range and [A 63] maximum frequency setting range. When a value beyond the limits is inputted from the operator. it will not be stored. Even if a value beyond the limits is inputted as external analog input, the set value will not be changed. Maximum frequency limiter [120] (400) FUNC ▼ ▲ [A 5] → [0.0] Initial value FUNC Minimum frequency limiter [120] (400) FUNC ▼ ▲ [A 6] → [0.0] Initial value FUNC Setting example (When an upper limit of 45 Hz and a lower limit of 20 Hz are set) NOTE: Setting conditions 0 Hz or upper limit ≥ lower limit When 0 Hz is set, the limiters will not operate.
(symbols) ⌸ ⌸ ⌸ ⌸ 'requency etting 1 Jump 'requency etting 2 Jump 'requency etting 3	To avoid a resonance with the load. the frequencies at up to 3 points can be jumped. The setting order and the execution order-may be changed. The frequency equivalent to the jump frequency setting width (± 0.5 Hz) (Note I) cannot be set as a jump frequency. NOTE 1 : The jump frequency can be set by the remote operator. NOTE 2 : As to the frequencies which are set by the jump frequency setting function, the set frequencies are jumped but the output frequencies pass. Setting example Jump frequency 1: 10 Hz Jump frequency 2: 30 Hz Jump frequency 3: 45 Hz Jump frequency width: 0.5 Hz In the case of jump frequency 1 [400] ▼ ▲ FUNC Initial value [A 7] → [0.0] FUNC In the case of jump frequency 2 [A 8] In the case of jump frequency 3 [A 9]

Extension function code	Contents and display
A10 **Carrier frequency sietting**	Set the switching frequency of the power module. **A10** →[FUNC]→ (NOTE 1) Initial value **16.0** →[FUNC]→ **A10** [▼] [▲] → **2.0** NOTE 1: The initial value of carrier frequency varies with the inverter capacity. When VPI to VP3 is selected, carrier frequency is automatically changed to VT. **Carrier frequency initial value** <table><tr><td rowspan="2">model type</td><td colspan="2">initial value</td></tr><tr><td>CT</td><td>VT</td></tr><tr><td>055 to 150 L/HF</td><td>16 kHz</td><td>8 kHz</td></tr><tr><td>220 L/HF</td><td>12 kHz</td><td>6 kHz</td></tr><tr><td>300 to 370 L/HF</td><td>10 kHz</td><td>5 kHz</td></tr><tr><td>450 to 550 L/HF</td><td>6 kHz</td><td>3 kHz</td></tr><tr><td>750 to 1100HF</td><td>3 kHz</td><td>2 kHz</td></tr><tr><td>1320 to 2200HF</td><td>2 kHz</td><td>2 kHz</td></tr></table>
A11 **Frequency command sampling frequency setting**	Set the frequency commands (voltage frequency command (O-L terminal signal), current frequency command (OI-L terminal signal), and the number of samplings. **A11** →[FUNC]→ Initial value **8** →[FUNC]→ **A11** [▼] [▲] → **1** **NOTE: How to set** **1** : The number of samplings is set to 1. The reaction time becomes shorter, but the output frequency becomes likely to vary. **8** : The number of samplings is set to 8. The reaction time becomes longer, but the output frequency becomes stable.
A12 **A13** **A14** **l Multispeed setting 1** **l Multispeed setting 2** **l Multispeed setting 3**	Set the output frequency of each multispeed speed. When setting four or more speeds, refer to the item of **F 2** output frequency setting. **0.0** Initial value In the case of multispeed setting l [FUNC] [▼] [▲] **A12** ⇄ **120** [FUNC] (400) In the case of multispeed setting 2 **A13** I" the case of multispeed setting 3 **A14** **Example of the connection method** Refer to Page 5-5 | FM	CM1	PLC	P24	FW	(8) REV	(7) CF1	(6) CF2 | **Example of Multispeed setting** <table><tr><td rowspan="2">Multispeed</td><td colspan="2">Control circuit terminal</td></tr><tr><td>(7) CF1</td><td>(6) CF2</td></tr><tr><td>Multispeed 1</td><td>ON</td><td>OFF</td></tr><tr><td>Multispeed 2</td><td>OFF</td><td>ON</td></tr><tr><td>Multispeed 3</td><td>ON</td><td>ON</td></tr></table> NOTE: When using four or more multispeed commands, use the multispeed terminal (CF3) as an input terminal.

Extension function code	Contents and display
A23 Electronic thermal level adjustment	Set the electronic thermal level. Set the thermal level in accordance with the rated current of the motor in units of I (%). $$\text{Adjustment level} = \frac{\text{Motor rated current}}{\text{Inverter rated current}} \times 100$$ Setting method $\boxed{A23} \longrightarrow \boxed{100} \longrightarrow \boxed{A23}$ Initial value FUNC ... FUNC ▼ ▲ → 120 ▼ ▲ → 20 Time(s) graph: 20%, 120%, Inverter rated current 0 ... 20 100 150 200 Inverter current (A)
A24 Electronic thermal character-istic selection	Select the electronic thermal characteristics. Set the thermal characteristics in accordance with the load to be used. For free setting of set value 2. the current and frequency can be set by each remote operator. | Set value	Function
0	Constant torque characteristic
1	Reduced torque characteristic
2	Free setting (Can be set by the remote operator) | Initial value → 1 Setting method $\boxed{A24} \longrightarrow \boxed{\ \ 1} \longrightarrow \boxed{A24}$ Initial value ▼ ▲ → 2 ▼ ▲ → 0 Graph: Output current (%) vs Output frequency (Hz) Constant torque characteristic (Each characteristic at 60 Hz or more is 100%) Reduced torque characteristic 100, 80, 60, 0 ... 5 20 60 120
A25 Motor poles setting for motor speed monitor	Set the pole number of motor to convert output frequency into motor rotation speed on monitor mode funciton $\boxed{d\ \ \ 1}$. Settable numbers 2, 4, 6, 8,10,12,14, **16. 18.2". 24.32.36.48** Setting method $\boxed{A25} \longrightarrow \boxed{\ \ 4} \longrightarrow \boxed{A25}$ Initial value ▼ ▲ ▼ ▲ → 2

Extension function code	Contents and display

A26 / A27

External frequency setting start

External Frequency setting end

Set the frequency for starting output for an external frequency command (0 to 10 V. 0 to 5 V, 4 to 20 mA) and the frequency for ending output. When 0 Hz is set. this function will be canceled.

External frequency setting start   Initial value

Setting method

[FUNC] [▼] [▲]

A26 → 120 (400)

[FUNC]

External frequency setting end

A27   Same as A26

NOTE 1: The standard wring is 0 Hz. In this case, the selected V/f pattern is used for running.
NOTE 2: When changing the V/f pattern after A26 (start) and A27 (end) are set, readjust A26 (start) and A27 (end).
NOTE 3: When A26 (start) > A27 (end) is set and the frequency command value is minimized (0 V or 4 mA). the output frequency may be lowered than the value which is set by A26 by 0.1 to 0.3 Hz. The reason is that it is judged that there is some frequency due to noise on the signal line and it is a normal operation.
NOTE 4: The setting shown left is also possible with F31 of the remote operator.

A34

Instantaneous restart selection

(Restart selection)

Set the inverter retry method when a power error occurs.
Select the set value of the retry method to be used.

Setting method

3   Initial value

[▼] [▲]

[FUNC] Initial value [FUNC]

A34 → 0 → A34

Set value	Function
0	Alarm output after tripped
1	Deceleration stop at the time of restart
2	Frequency matching start at the time of restart (Note 1)
3	0 Hz start at the time of restart

NOTE 1: When the base frequency is one of the following ones. frequency matching may restart at 0 Hz.
When the base frequency is 60 Hz: Driven at 40 Hz or less
When the base frequency is 50 Hz: Driven at 30 Hz or less
For other precautions, refer to Chapter 1. "Instantaneous stop restart" of Appendix 2.

NOTE 2: Since the retry mode is selected, the equipment restarts for trips of overcurrent, overvoltage, or undervoltage.
For undervoltage, 16 retries (17th trip) are executed.
For overcurrent or overvoltage, 3 retries (fourth trip) are executed.
Do not use this function for a case that a fallen substance should be held by the machine brake when the motor is in the free-run mode.

Extension function code	Contents and display

Row 1: A38 - Dynamic braking usage ratio

```
 A 38
```

Dynamic
braking
usage ratio

Set the usage ratio (%) for 100 seconds of BRD.
When the BRD operation exceeds this setting,
the operation will be stopped.

Setting method

```
 1 00
```
▼ ▲

```
El  Initial value   FUNC
A38 ────→ [ 1.5 ] ────→ A38
```
▼ ▲

```
 0.0
```
Function contents

RD ON
| t1 | | t2 | | t3 |
| ON | | ON | | ON |

100 seconds

$$T = \frac{(t1 + t2 + t3)}{100 \text{ seconds}} \times 100$$

NOTE 1: The internal BRD circuit is not mounted in an inverter other than the types 055L/I and 075L/HF.

NOTE 2: When 0 % is set, the BRD will not be operated.

NOTE 3: When T exceeds the set value, the BRD will be stopped.

NOTE 4: When mounting an external BRD unit, se the usage ratio to [0.0] and remove th external resistors.

NOTE 5: The initial settings of 110-550L/HF are 0.0%.

NOTE 6: Conditions when using the external resistor are shown in the table.

Inverter requiring an external resistor

Model	055, 075LF	055, 075HF
External resistor	RB1 to RB3 (17 ohm or more)	RB2, two each in serie: (70 ohm or more,
Usage ratio	Max. 10 (%)	Max. 10 (%)

NOTE 7: This function cannot be used for the inverter types 110 to 550L/HF which have no built-in BRD (dynamic braking) circuit.

Row 2: A39 / A40

```
 A 39
```
```
 A 40
```

Arrival
optional
frequency
at accelera
ti3"

Arrival
optional
frequency
at decelera-
tion

When [A49] frequency arrival signal output method 2 is selected, an output signal is outputted at an optional frequency. When frequency arrival signal output method I is selected, an output signal is outputted at an optional frequency or more. For acceleration [A39] and deceleration [A40], the frequency. is set in units of 0.1 Hz (in units of I Hz for 100·Hz or more).

Setting method

In the case of optional arrival frequency of acceleration   FUNC

```
 4 00
```
▼ ▲

Initial value
```
A39 ←────→ [ 0.0 ]
```
FUNC

In the case of optional arrival frequency of deceleration   FUNC

```
 4 00
```
▼ ▲

Initial value
```
A40 ←────→ [ 0.0 ]
```
FUNC

At the time of acceleration, an output signal is turned ON in a range from the set frequency -0.5 Hz to the set frequency +1.5 Hz. At the time of deceleration, an output signal is turned ON in a range from the set frequency +0.5 Hz to the set frequency -1.5 Hz.

Output frequency f

A40 setting ... 0.5 Hz, -1.5 Hz

A39 setting ... -0.5 Hz, 1.5 Hz

Output signal (FA1) ON Running time

60 ms   60 ms

7-21

Extension function code	Contents and display

A44

Monitor signal selection

Select the output monitors signal at the control circuit terminal FM from the table indicated below.

Setting method

Initial value

Set value	Function
0	**Analog output frequency monitor**
1	Analog current monitor
2	Analog torque monitor (Note)
3	Digital output frequency monitor

	Output monitor signal	Output full-scale value
Analog	Frequency monitor	**A63** Maximum frequency
	Current monitor	200% of the rated current
	Torque monitor	200% of the rated torque

NOTE: Use the analog torque monitor function only in the sensorless state. Under the V/f control, an appropriate value is outputted. The accuracy is ±20% (a rough value).

A47

Frequency converted value setting

Set a converted value for frequency converted value monitoring. The product of this setting and the ouptut frequency (d0) is displayed as the value for the frequency converted value monitor (d3).

Setting method

Initial value

A48

Analog input selection

Set the maximum voltage to be supplied between the terminals 0 and L.

Setting method

Initial value

VR0
(500 Ω to 2kΩ)

DC0 TO 5V
DC0 TO 10V
Input impedance
30 kΩ

Terminal connection example

Set value	Function
0	Max. 5 V input
1	Max. 10 V input

Initial value

Extension function code	Contents and display

A 49

Frequency arrival signal output method

When selecting the frequency arrival signal at the output terminal. select the arrival signal output method.

Setting method

A49 → Initial value 0 → A49

Set value	Function	
0	At the time of constant speed arrival	Initial value
I	Optionally set frequency or more	
2	Only optionally set frequency	

Set optional frequencies of set value I and set value 2 by A39 and A40 .

NOTE 1: The frequency arrival signal can be allocated only to one of the intelligent output terminals. It cannot be outputted to an individual output terminal for acceleration and deceleration.

NOTE 2: Selection of arrival signal output method for relay option board (J-RY) can bc done by remote oprator and F-48 funciton.

[Diagram: Output frequency (Hz), 0.5Hz, F 2 setting, 1.5Hz; Arrival signal 60 ms ON Time]
0 : At the time of constant speed arrival

[Diagram: Output frequency (Hz), 0.5Hz A39 setting, A40 setting, 1.5Hz; Arrival signal 60 ms ON Time]
I : Optionally set frequency or more

[Diagram: Output frequency (Hz), 0.5Hz A39 setting 1.5Hz, A40 setting 1.5Hz, 0.5Hz; Arrival signal ON ON Time, 60 ms, 60 ms]
2 : Only optionally set frequency

A 54

Restarting after FRS signal selection

Select an operation after a free run stop.

Set ☐ 00 and ☐ 0 I with the ☐ and ☐ keys.

Setting method

Initial value

A54 ⇄ 0 I

FUNC ▼ ↕ ▲

00

Set value	Function	
0	f matching	
I	0 start	Initial value

Extension function code	Contents and display

A58

Reduced voltage soft start setting

Adjust reduced voltage start.

FUNC → Initial value → FUNC

A58 → [6] → A58

▼ ↕ ▲

[0]

NOTE: How to set

[0]: There is no reduced voltage. The rush current at the start of the inverter is increased but the motor reaction time is decreased.

[6]: The effect of the reduced voltage is large. The rush current is reduced but the motor reaction time is increased.

A59

Running mode selection

Select the running mode. Set the running mode to be used.

Setting method [2]

Initial value

▼ ↕ ▲

FUNC   FUNC

A59 → [0] → A59

Initial value

Set value	Function
0	Normal running mode
1	Energy conservation running mode
2	Fuzzy most suitable acceleration and deceleration mode

NOTE: When the fuzzy most suitable acceleration and deceleration are selected and the load inertia (motor shaft conversion) is more than about 20 times of that of the individual motor, an overvoltage trip may occur. If this occurs, reset the mode to the normal running mode. For other precautions, refer to "Precautions for fuzzy most suitable acceleration and deceleration" of Appendix 1.

A61

Jogging frequency setting

Set the running command so as to be inputted to the terminal.
(Set F9 to 02 or 03.)

Since jogging is a direct input operation and may be easily tripped, set the jogging frequency to 5 Hz or less.

Setting method [9.99]

▼ ↕ ▲

FUNC   FUNC

A61 → [1.00] → A61

Initial value

▼ ↕ ▲

[0.00]

NOTE:
No frequency can be set between 0.01 Hz and 0.09 Hz.

(REV) (JG)

| CM1 | FW | 8 | 3 |

SWFW   SWJG

Operation timing

SWJG

20 msec min

SWFW

Motor rotation   Free run

The free run operation is performed immediately after SWFW is turned OFF.

No jogging operation is performed when the set value is smaller than the start frequency A4.

Extension function code	Contents and display

A62 / A63

Base frequency setting

Maximum frequency setting

Set the $\boxed{A\ 62}$ base frequency and $\boxed{A\ 63}$ maximum frequency.

Setting method

Initial value

(400)

When the frequency is set so that the base frequency is larger than the maximum frequency, the base frequency is forced to be made equal to the maximum frequency at the start of running.

Setting example

(A62) base frequency and (A63) maximum frequency: 60 Hz

(A62) base frequency: 60 Hz (A63) maximum frequency: 120 Hz

NOTE 1: When a frequency more than the base frequency 60 Hz is used, the motor is not a general purpose motor but a special motor. Therefore, the maximum applicable motor set value is different. When the kW display is the same, the inverter capacity may be increased.

NOTE 2: Set the base frequency according to the specifications of the motor. When the base frequency is set to less than 50 Hz, the motor may be burned.

Freely setting range

A64

Maximum frequency selection

Select 120 Hz or 400 Hz as the upper limit that can be set in the maximum frequency setting (A63).

Initial value

A80 / A81

Frequency command output frequency adjust (O-L, 0I-L)

Adjust the relationship between the external frequency command and the inverter output frequency.

$\boxed{A\ 80}$: Voltage command (O-L)

$\boxed{A\ 81}$ Current command (0I-L)

This function is factory-set to the appropriate pdiition. If this setting is changed unnecessarily, the correct relationship between the external frequency command and output frequency is no longer maintained. This will result in poor control performance. Adjust the setting of this function only when the output frequency does not conform to the external command.

Adjustment method

Voltage command: Put voltage command (10V of 5V) to O-L terminal. and adjust $\boxed{A\ 80}$ unit output frequency comes to maximum.

Current command: Put current command (4-20mH) to 0I-L terminal, and adjust $\boxed{A\ 81}$ unit output frequency comes to maximum.

7-25

Extension function code	Contents and display

A85 — Selection of reset terminal performance

Possible to select a performance of a release timing of alarm signal when giving reset signal from [RS] terminal

A86 → FUNC → Initial value [0] → FUNC → A85

▼ ▲

[1]

Set value	Performance	
0	Reset signal from [RS] terminal	
	Alarm output	
1	Reset signal from [RS] terminal	
	Alarm output	

A90 / A91 / A92 — Proportional gain setting / Integral gain setting / Differential gain setting

These functions are used to set PID control operation gains.

A90 P (Proportional) gain. **A91** I (Integral) gain, **A92** D (Differential) gain

Set each gain.

Setting method

[5.0]

FUNC ▼ ▲ FUNC

A90 → [1.0] → A90

Initial value

▼ ▲

[0.0]

	Gain adjusting range
P	0.0 to 5.0
I	0.0 to 15.0 s
D	0 to 100.0

A94 — PID control selection

This function is used to control the PID functions incorporated in the inverter.
This function is also used to select a feed-back signal input and set a magnification of the integral gain setting value.
For details of PID control, refer to "Appendix 8 PID Control Functions".

Setting method

[4]

▼ ▲

FUNC FUNC

A94 → [0] → A94

Initial value

Setting value	Feed-back signal input terminal	I (Integral) gain magnification
0	Built-in PID function disabled.	
1	Analog current (OI-L)	× 1
2	Analog voltage (O-L)	× 1
3	Analog current (OI-L)	× 10
4	Analog voltage (O-L)	× 10

Note 1: Set "0" for the use of a PID optional board.
Note 2: Do not assign a feed-back signal input and an target frequency command to the same terminal. If assigned, the PID function will be disabled.

Extension function code	Contents and display
$\boxed{A\;95}$ Target value setting method selection	This function is used to select a method to enter the target value for executing each PID function. **Setting method** $\boxed{A\;95} \longrightarrow \boxed{\quad 0} \longrightarrow \boxed{A\;95}$ **Initial value** 	Set value	Performance
0	The target value depends on the $\boxed{A\;96}$ level set value.
1	The target value is set using the $\boxed{F\quad 9}$ frequency setting method. | **NOTE 1:** Set "1" when a PID optional board (J-PI) is used. The value entered to the OS terminal of J-PI is assumed as the target value. **NOTE 2:** The target value at set "1" is O-L, 01-L input signal, $\boxed{F\quad 2}$ setting or multispeed setting.
$\boxed{A\;96}$ Internal target value level setting	This function is used to set a target value level of PID controlling within 0 to 200%. This function is valid when 0 is set for $\boxed{A\;95}$ **Setting method** $\boxed{A\;96} \longrightarrow \boxed{\quad 0} \longrightarrow \boxed{A\;96}$ **Initial value** If an analog voltage is entered as a feedback value, the feedback voltage (0 to10V) corresponds to this target value level setting (0 to 200%). In other words, if, when 5V is entered as the target feedback value of a sensor, it is convened to an internal target value, set 100% as this internal target value.
$\boxed{A\;97}$ Auto tuning setting	Select whether to start auto tuning as well as a mode. When 1 or 2 is set, auto tuning is started during the first operation. $\boxed{A\;97} \longleftrightarrow \boxed{\quad 0}$ Initial value | Set value	Function	
---	---	---
0	Auto tuning is not performed.	← Initial value
1	Normal measurement mode (The motor runs.)	
2	R1, R2, or L measurement mode (The motor does not run.)		 (For details of auto tuning, see Appendix I.)
$\boxed{A\;98}$ Motor data selection	Select the motor constant used for sensorless vectror control (SLV). $\boxed{A\;98} \longrightarrow \boxed{\quad 0} \longrightarrow \boxed{A\;98}$ **Initial value** | Set value	Data used	
---	---	---
0	Old Hitachi general-purpose motor data	← Initial value
1	New Hitachi general purpose motor data (ÒThe MotorÓ)	
2	Auto tuning data		

Extension function code	Contents and display

A terminal function is allocated to each of the input intelligent terminals I to 8. When using a function other than the standard set functions or changing the terminal order, set the function for each terminal. The minimum input signal acceptance time of the input intelligent terminals is about 20 ms.

Extension function code: `C 0` to `C 7`

nput
erminal
etting
to 8

Arrary of codes and intelligent terminals

Code	Function name	Terminal rating plate	Initial setting
C 0	Input terminal setting 1	1	18
C 1	Input terminal setting 2	2	16
C 2	Input terminal setting 3	3	5
C 3	Input terminal setting 4	4	11
C 4	Input terminal setting 5	5	9
C 5	Input terminal setting 6	6	13
C 6	Input terminal setting 7	7	1
C 7	Input terminal setting 8	8	0

PCB terminal array

FM
CM1
PLC
P24
FW
8
7
6
5
4
3
2
1
H

Input intelligent terminal section

Setting method

Press the FUNC key once for the terminal code to be set.

The set values of the terminals which are set at present are displayed. Display the set value of the terminal to be used from the function list indicated below by pressing the key ⬛ and ⟱ and then press the FUNC key.

The display is returned to the code display and the terminal function is changed;

Enter the set value of the terminal name to be used by pressing the ke ▲ and ▼.

`C 0` → FUNC → `18` ———— ● ◆ ⊠ ☺ → `C 0`

Setting example: The RS (reset) function changed to the SFT (treminal software lock) function.

Input terminal function list

Set value	Abbreviation	Function name	Set value	Abbreviation	Function name
0	REV	Reverse	11	FRS	Free run
1	CF1	Multispeed 1	12	EXT	External trip
2	CF2	Multispeed 2	13	USP	USP function
3	CF3	Multispeed 3	14	CS	Commercial power source switching
5	JG	Jogging	15	SFT	Terminal software lock
6	DB	External DC braking	16	AT	Analog input voltage/current switching
7	STN	Initialization	18	RS	Reset
8	SET	2nd function	27	UP	Remote operation function, acceleration
9	CH1	2-stage acceleration and deceleration	28	DWN	Remote operation function, deceleration

Precautions for terminal setting

Same terminals cannot be set between `C 0` and `C 7`.
When moving a terminal name to another terminal. set another terminal which is not to be ued at the setting source before inputting the set value to the setting destination and then select the terminal name which is to be set at the setting destination.

Extension function code	Contents and display

Output terminal setting II and 12

A terminal function is allocated to each of the output intelligent terminals I I and I 2. When using a function other than the standard set functions or changing the terminal order. set the function for each terminal.

Arrary of codes and intelligent terminals

Code	Function name	Terminal rating plate	Initial setting
~~C10~~	~~Output terminal setting 11~~		0
C11	Output terminal setting 12	I2	1

Input terminal function list

Set value	Abbrevia-tion	Function name
0	FA1	Frequency arrival signal
1	RUN	Signal during running
2	OTQ	Overtorque signal (Note)

PCB terminal array

```
CM2
 12
 I I

AL2
ALI
AL0
```

The setting method is the same as that of the input terminals $A\ I8$ to $A\ 25$.

NOTE: The torque of the overtorque signal can be set by the remote operator. The initial values of motoring and regeneration are 100% torque. The overtorque signal can be used only under the sensorless vector control.

Setting method

Press the FUNC key once for the terminal code to be set.

The set values of the terminals which are set at present are displayed. Display the set value of the terminal to be used from the function list indicated below by pressing the key ▲ and ▼ and then press the FUNC key.

The display is returned to the code display and the terminal function is changed

Enter the set value of the terminal name to be used by pressing the keys ▲ and ▼.

$C10$ → FUNC → $\boxed{\ \ I}$ → $\boxed{\ \ 2}$ → FUNC → $C10$

Precautions for terminal setting

Same terminals cannot be set between $C\ 10$ and $C\ 11$.

When moving a terminal name to another terminal. set another terminal which is not to be ued at the setting source before inputting the set value to the setting destination and then select the terminal name which is to be set at the setting destination.

Extension function code	Contents and display

 [C20] Input terminal a and b contact setting	The input intelligent terminals 4 to I can be changed individually to the a contact or b contact specification. Select the set value by pressing the keys ▢ and ▢ by combining the contacts a and b with reference to the table indicated below.

Example: When the set value is A: ⌐ Contact a: Input terminals 3. I
                                                              └ Contact b: Input terminals 4, 2

Setting method

[C20] ──FUNC──▶ [00] ── Press the ▲ key 10 times. ──● ₥ ✋ O ──FUNC──▶ [C20]

Select the contact specification with reference to the table indicated below.

Initial setting

Initial value [00]

Set the high order to 0.

Set value	F	E	d	C	b	A	9	8	7	6	5	4	3	2	1	0
4	b	b	b	b	b	b	b	b	a	a	a	a	a	a	a	a
3	b	b	b	b	a	a	a	a	b	b	b	b	a	a	a	a
2'	b	b	a	a	b	b	a	a	b	b	a	a	b	b	a	a
I	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a

(left label: Input terminal)

a: Contact a specificati (Shorted when pow is turned ON)

b: Contact b specificat: (Opened when pow is turned ON)

Input terminal a and b contacts function list

 [C21] Output terminal a and b contact setting	The output intelligent terminal I I and I 2 and alarm output terminal can be changed individually to the a contact or b contact specification. Select the set value by pressing the keys ▢ and ▢ by combining the contacts a and b with reference to the table indicated below.

Example: When the set value is [07]: ⌐ Alarm output: Contact b
                                                            └ Terminals I I and I 2: Contact b ₁

Setting method

[C21] ──FUNC──▶ [04] ── Press the ▲ key 3 times. ──▶ [07] ──▶ [C21]

Initial setting

Initial value [04]

Set the high order to 0.

Set value	7	6	5	4	3	2	1	0
11	b	a	b	a	b	a	b	a
12	b	b	a	a	b	b	a	a
Alarm	b	b	b	b	a	a	a	a

(left label: Output terminal)

(NOTE)

Output terminals I I and 12 –
a: Contact a specification (Shorted when power is turned ON)
b: Contact b specification (Opened when power is turned ON)

Output terminal code list

NOTE: For details of the Alarm terminal, see page 6-5.

8. PROTECTION FUNCTIONS

The J300 series inverters are equipped with protection functions against overcurrent, overvoltage, and undervoltage which protect the inverter. If the protection functions are engaged. the output is shut down, motor runs free and holds that condition until it is reset.

Description	Contents		Display
Over current protection	A current due to the alternating current CT between the power module and output terminal {U(T1), V(T2), W(T3)} is detected.	Constant speed	E 0 1
	When the motor is restricted or decelerated suddenly. a large current flows through the inverter and causes a fault. Therefore, when an abnormal current is detected by the alternating current CT and it exceeds	Dec.	E 0 2
	a specified value. the output is cut off. (An abnormal current is also detected in the power module. Refer to E 3 1, E 3 2, E 3 3, and E 3 4.)	Acc.	E 0 3
Overload protection (NOTE 1)	When a motor overload is detected by the electronic thermal function. the output of the inverter is cut off.		E 0 5
Braking resistor overload	When the braking time exceeds the setting by A 3 8 braking duly factor. an overvoltage the output of the inverter is cut off.		E 0 6
Overvoltage protection	When the converter voltage exceeds a certain level due to regenerative energy from the motor. this protection function engages. and the output of inverter is cut off.		E 0 7
EEPROM error (NOTE 2)	When the memory built in has problems due to noise or excessive temperature rise. this protective function engages. and the output of inverter is cut off.		E 0 8
Undervoltage protection	A decrease of the input voltage of an inverter results in improper function of the control circuit. It also generates motor heat and causes low torque. Output is cut off when the input voltage goes down to less than 150-160V/300-320V(200/400Vclass).		E 0 9
CT error	Abnormality on built-in CT and the output of the inverter is cut off.		E 10
CPU error	Malfunction or abnormality on built-in CPU and the output of the inverter is cut off.		E 1 1
External trip	An abnormality signal from external equipment cuts off the output of the inverter. (When external trip function is selected)		E 1 2
USP error	It indicates an error when power is turned on while the inverter is being run. (When USP function is selected)		E 1 3
Ground fault protection	The inverter is protected by detection of ground faults between the inverter output and the motor upon power on. There may be the possibility of power module failure.		E 1 4
Input overvoltage	When the input voltage is higher than the specified value. it is detected 100 seconds after power is turned on and the output is cut off. However, when a voltage higher than approx. 250 to 270 V (200V class), 500 to 530 V (400 V class) is inputted. it is higher than the rated value of the pan in use. so that the pan may nor be protected and damaged.		E 1 5
Instantaneous power failure (NOTE 4)	When an instantaneous power failure for more than 1S ms occurs. the output is cut off. When the instantaneous power failure time is long, the fault signal is released. Note that when restart is selected, the equipment restarts when the running command remains.		E 1 6

Description	Contents		Display
Optional connection error	An error occurs in the optional connection (connector, etc.).	Option 1	$\boxed{E\ I\ 7}$
		Option 2	$\boxed{E\ I\ 8}$
Optional PCB error	An error message outputted from the optional PCB　　NOTE 5	Option 1	$\boxed{E\ I\ 9}$
		Option 2	$\boxed{E\ 2\ 0}$
Phase failure protection error	When a phase failure is detected on the receiving side {R(L1), S(L2), T(L3)} of the inverter, the output is cut off. (NOTE 3)		$\boxed{E\ 2\ 4}$
Power module protection	The detector which is built in the power module operates. When the output side of the inverter is shorted or the motor is restricted, a large current flows through the inverter and causes a fault. Therefore. when a current in the power module or an abnormal temperature of the main device is detected and it exceeds a specified value, the output is cut off.	Constant speed	$\boxed{E\ 3\ I}$
		Deceleration	$\boxed{E\ 3\ 2}$
		Acceleration	$\boxed{E\ 3\ 3}$
		Stop	$\boxed{E\ 3\ 4}$

NOTE 1: If a trip occurs, press the RESET key or short the reset terminal RS-CM I assigned as a control circuit terminal after a delay of 10 seconds.

NOTE 2: A trip can be cleared by pressing the RESET key or shorting the reset terminal RS-CM I assigned as a control circuit terminal. Resetting the power supply cannot clear a trip. (To reset the power supply is to turn power off and turn it on again after the CHARGE lamp at the upper right corner of the control PC board goes off.) Check again whether the set data is correct.

NOTE 3: Power OFF during motor deceleration may cause an input phase failure error.

NOTE 4: The instantaneous ride-thru period of 15ms may be shortend depending on the power supply voltage or load.

NOTE 5: When the J-FB is installed, an error is displayed for each factor as shown below.

　　　　Encoder line break: $\boxed{E\ 6\ 0}$
　　　　Overspeed: $\boxed{E\ 6\ I}$
　　　　Positioning error: $\boxed{E\ 6\ 2}$
　　　　Thermistor line break: $\boxed{E\ 6\ 4}$
　　　　Motor overheat: $\boxed{E\ 6\ 5}$
　　　　Malfunction or banormality on built-in CPU of the option: $\boxed{E\ 6\ 7}$

Other display

Display	Contents
$\boxed{-\ -\ -}$	It is displayed when the reset signal is kept supplied or an error occurs between the digital operator and inverter. When one of the keys $\boxed{\ }$, $\boxed{\ }$, and $\boxed{\text{FUNC}}$ ipressed. it is recovered. When it is not recovered. turn power on once again.
$\boxed{\ \ \_\ \_}$	It is displayed when a data set value more than 3 digits in length (for example. $\boxed{F06}$ 1000) is set,
$\boxed{-\ -\ -}$	It is displayed when power is turned off.
$\boxed{\_\ \_\ \_}$	There is no trip history available.
$\boxed{0\ 0\ 0}$	This is not an abnormal operation because the instantaneous stop restart function is being performed. (When I to 3 is selected by the extension function $\boxed{A34}$.)
$\boxed{\_\ \_\ 0}$	The autotuning operation terminates normally.
$\boxed{\_\ \_\ J}$	The autotuning operation terminates abnormally.
$\boxed{-\ -\ U}$	Waiting due to insufficient voltage. 'After recovery. the original display appears.

9. TROUBLESHOOTING

9.1 Error Messages and Diagnosis

When the inverter goes wrong. it operates as indicated below. Find the cause and take.
contermeasures.

Error Messages and Diagnosis

Symptom					Cause	How to reset	Check	Countermeasure
Circuit breaker (MCB)	Electromagnetic contactor (Mg)	Thermal relay (THRY)	Display on the digital operator (display on the LCD of the remote operator)	Failure alarm relay	(explanation of message)	(NOTE 1)	Check	Countermeasure
			E01 (OC. Drive)	○	Overcurrent detected by the AC CT while the motor was running at a constant speed (overcurrent during operation)	A	Check whether a load was changed rapidly.	Do not change loads rapidly.
							Check whether there is a shoned output or ground fault.	Check whether the output lines or motor is shorted.
			E02 (OC. Decel)	○	Overcurrent detected by the AC CT during motor deceleration (overcurrent during deceleration)	A	Check whether the speed was decreased rapidly.	Set a longer deceleration time.
							Check whether there is a shoned output or ground fault.	Check whether the output lines or motor is shorted.
			E03 (OC. Accel)	○	Overcurrent detected by the AC CT during motor acceleration (overcurrent during acceleration)	A	Check whether a load was changed rapidly.	Do not change loads rapidly.
							Check whether there is a shorted output or ground fault.	Check whether the output lines or motor is shorted.
							Check whether the start frequency is too high.	Lower the start frequency.
							Check whether the torque boost is too high.	Lower the torque boost.
							Check whether the motor is locked.	Check the motor or loads.
			E05 (Over. L)	0	Overloaded inverter (operation under an overload)	A	Check for an overload.	Lower the load ratio.
							Check whether the electronic thermal level is correct. (Check whether the level has been changed.)	Set an appropriate level.

NOTE 1: How to reset
  A: Stop the inverter. Then. connect the <RS> and <CM I > control terminals or press the STOP/RESET key on the operator.
  B: Opeate the circuit breaker and electromagnetic contactor (turn the power on again)
  C: Stop the inverter. Then. reset the thermal relay.

9-1

Symptom									
Circuit breaker (MCB)	Electromagnetic contactor (Mg)	Thermal relay (THRY)	Display on the digital operator (display on the LCD of the remote operator)	Failure alarm relay	Cause (explanation of message)	How to reset	Check	Countermeasure	
			E06 (OL. BRD)	0	The regenerative braking time is longer by the value set by BRD%ED.	A	Check the braking resistor use ratio set in A38.	• Set a longer deceleration time. • Set a larger operation duty cycle. • Set A38 to 0.0.	
			E07 (Over. V)	0	Overvoltage in the DC smoothing circuit	A	Check whether the speed was decreased rapidly.	Set a longer deceleration time.	
							Check whether the motor was run from the load side.	Do not use consecutive regenerative loads.	
							Check whether there is a ground fault.	Check whether the output lines or motor is shorted.	
			E08 (EEPROM)	0	EEPROM error	'A	Check whether there is a large-noise source near the inverter.	Move the noise source away.	
							Check whether the ambient temperature is too high.	Replace the cooling fan.	
			E09 (Under. V)	○	Defective power supply (insufficient voltage)	A	Check whether the voltage is lowered.	Check the power supply.	
							Check whether the MCB or Mg has a poor contact.	Replace the MCB or Mg.	
							Check whether 10 or more instantaneous power outages within 100 ms occurred in 10 minutes.	Check the power supply.	
			E10 (CT)	0	cl-error	A	Check whether the CT is defective.	Repair the Cf.	
			E11 (CPU)	**0**	CPU error	A	Check whether there is a large-noise source near the inverter.	Move die noise source away.	
							Check whether the inverter is defective.	Repair the inverter.	
			E12 (EXTERNAL)	0	External trip	A	Check whether there was a defective external unit when rhe external trip function war selected.	Eliminate the error from the external unit.	
			E13 (USP)	0	USP error	A	Check whether power was turned on while the inverter was running when rhe USP function was selected.	Eliminate the error from the external unit.	

Circuit breaker (MCB)	Electromagnetic contactor (Mg)	Thermal relay (THRY)	Symptom — Display on the digital operator (display on the LCD of the remote operator)	Failure alarm relay	Cause (explanation of message)	How to reset	Check	Countermeasure
			E14 (GND. Flt)	○	Ground fault on the output side of the inverter	A	Check the wiring between the inverter and motor and also check the motor for a ground fault. (Use a megger.)	Correct the portions having a ground fault.
─			E15 (OV. SRC)	○	Excessive received voltage	A	Check whether an excessive voltage was received during an operation other than deceleration.	• Lower the voltage to be received. • Reduces fluctuations of the received voltage. • Install an AC reactor on the input side.
─			E16 (Inst. P-F)	○	Defective power supply (instantaneous power outage)	A	Check whether the voltage is lowered.	Restore the power supply to normal.
							Check whether the MCB or Mg has a poor contact.	Replace the MCB or Mg.
─	─		E17 (NG. OPl)	○	Incorrectly connected option-1 PC board	A	Check the connectors and other connections for abnormal conditions.	Repair the defective connections.
─	─	─	E18 (NG. OP2)	○	Incorrectly connected option-2 PC board	A	Check the connectors and other connections for abnormal conditions.	Repair the defective connections.
─			E19 (OPl)	○	Defective option-1 PC board	A	Refer to the instruction manual.	
─		─	E20 (OP2)	○	Defective option-2 PC board	A	Refer to the instruction manual.	
─	─	─	E24 (PH. Fail)	○	Defective power supply (missing phase)	A	Check the power supply connections for abnormal conditions.	Repair the abnormal portions.
							Check whether the MCB or Mg has a poor contact.	Replace the MCB or Mg.
─			E31 (PM. Drive)	○	(NOTE 1) Failure detected by a detector in the power module while the motor was running at a constant speed, or excessive temperature rise in the inverter	A	Check whether a load was changed rapidly.	Do not change loads rapidly.
							Check whether there is a shorted output or ground fault.	Check whether the output lines or motor is shorted.
─			E32 (PM. Decel)	○	(NOTE 1) Failure detected by a detector in the power module during motor deceleration, or excessive temperature rise in the inverter	A	Check whether the speed was decreased rapidly.	Set a longer deceleration time.
							Check whether there is a shorted output or ground fault.	Check whether the output lines or motor is shorted.

NOTE 1: The failures detectable in the power module are overcurrents, excessively hot main devices. and insufficient voltages from the gate circuit power supply.

Circuit breaker (MCB)	Internal relay (THRY)	Display on the digital operator (display on the LCD of the remote operator	Failure alarm relay	Cause (explanation of message)	How to reset	Check	Countermeasure
		E33 PM. Accel		NOTE 1) Failure detected by a detector in the power module during motor acceleration, or excessive temperature rise in the inverter	A	Check whether the speed was increased rapidly.	Set a longer acceleration time.
						Check whether a load was chawed rapidly.	Do nor change loads rapidly.
						Check whether there is a shorted output or ground fault.	Check whether the output lines or motor is shorted.
						Check whether the start frequency is too high.	Lower the start frequency.
						Check whether the torque boost is too high.	Lower the torque boost.
						Check whether the motor is lcrked.	Check the motor or loads.
		E34 PM. ERR)		NOTE 1) Failure detected by a detector in the power module while the motor was stopping. or excessive temperature rise in the inverter	A	Check whether the installation is vertical and the wall is a nonflammable wall such as an iron plate.	Check the installation.
						Check whether the cooling fan is running and the ambient temperature is too high.	Replace the cooling fan.
						Check the internal power supply.	Repair the internal power supply.
						Check the main devices.	Repair main devices.
		E60 (OP1 0) to **E67** (OP1 7)		defective J-FB PC board	A	Refer to the manual supplied with the J-FB PC board.	
		E70 (OP2 0) to **E77** (OP27)		defective J-FB PC board	A	refer to the manual supplied with the I-FB PC board.	

NOTE 1: The failures detectable in the power module are overcurrents, excessively hot main devices. and insufficient voltages from the gate circuit power supply.

Symptom					Cause	How to reset	Check	Countermeasure
Circuit breaker (MCB)	Electromagnetic contactor (Mg)	Thermal relay (THRY)	Display on the digital operator (display on the LCD of the remote operator)	Failure alarm relay	(explanation of message)		Check	Countermeasure
		○	—	—	—	C	Check for an overload.	Lower the load ratio.
							Check whether the thermal relay is set to an appropriate value.	Set the thermal relay to an appropriate value.
○			—	—	—	B	Check whether there is a short or ground fault in the power supply.	Remove the short or ground fault.
							Check whether the MCB capacity is sufficient.	Increase the MCB capacity.
							Check whether the inverter module or converter module is defective.	Repair the inverter module o converter module.
	○			—	Power outage	B	Check for a power outage.	Restore the power supply to normal.
							Check whether the MCB or Mg has a poor contact.	Replace the MCB or Mg.

9.2 Trouble shooting

Symptom		Probable cause	Countermeasure
The motor will not run.	The inverter outputs U(T1), V(T2) and W(T3) are not supplying voltage.	• Is power being supplied to terminals R(L1), S(L2) and T(L3)? If it is, the POWER lamp should be on.	. Check terminals R(L1), S(L2), T(L3), U(T1) V(T2), and W(T3). . Turn on the power supply.
		• Is the display E ☐☐ ?	· Press ▼ ☐ and check the content. Then press the reset key.
		▪ Is the operation instruction RUN ON? • Is terminal FW (or REV) connected to terminal CMI?	. Set to ON. *Connect terminal CMI to terminal FW (or REV) on the printed-circuit board. (When the terminal mode is selected.)
		• Has the frequency setter been turned on by pushing FUNC key and then ☐ @ key. • Are the printed-circuit board terminals H, 0 and L connected to the potentiometer? • Are the terminals connected to the external and internal interface power source the terminal mode is selected?	. Push down keys and set. • When terminal mode is selected, connect the potentiometer to H, 0, and L. and then set. • In the case of the internal interface power source, short the terminals P24 and PLC or CM I and PLC. • In the case of the external interface power source, turn the PLC terminal on.
		. Has RS/FRS been left ON?	. Release reset. . Contact FRS.
		• Is the mode key ☐F☐☐9☐ setting correct?	• Read the explanation of the function mode once again. (Page 7-12) F9 frequency/run commanding method
	Inverter outputs U(T1), V(T2) and W(T3) are supplying voltage.	• Has the motor seized or is the load too great?	• Release seizure or lighten the load. *Test the motor independently.
	The optional remote operator is used. (copy unit)	• Are the remote operator and equipment body switched coorrectly ? • Is the setting of the DIP switch on the back of the remote operator correct ?	• Check the operation of the optional remote operator. (copy unit) ON ☐ 1 2 3 4 ☐ OFF ☐☐☐☐ 1: OFF 2: ON (Same as VWA, J100)
The direction of the motor is reversed.		• Are the connections of output terminals U(T1), V(T2) and W(T3) correct? . Is the phase sequence of the motor forward or reverse in respect to U(T1), V(T2) and W(T3)?	• Make the connections according to the phase sequence of the motor. (In general. forward should be in the sequence: U(T1), V(T2) and W(T3).)
		• Are the terminals on the printed-circuit board correct?	• Short the FW terminal for forward rotation or the intelligent input terminal 8 (the intelligent input terminal 8 is allocated to run command REV by initialization at factory before shipment) for reverse rotation to the CMI terminal (Sink type).

Symptom		Probable cause	Countermeasure
he rpm f the iotor /ill not icrease.		After checking the wiring of the frequency setter. the rpm still does not increase when the setter is turned.	Replace the frequency setter.
		Are terminals 7 and CM l, terminal 6 and CMI ON (Sink type)?	Turn off terminal 7 and 6. (When the frequency and multistage speed are fixed at a given frequency, the speed potentiometer Will be invalid.)
		Is the load too great?	Decrease the load. When the load is too great, the limiting function will be activated, so that the rotational speed will be lower than the setting.
'he rpm f the iotor oes not iatch the iverter.		Is the maximum frequency setting correct? Are the number of motor poles, the gear ratio. and pulley ratio correct?	Check the speed-change ratio.
he data icorrect.	The data is returned to the initial setting.	The STN terminal is turned ON and the power is turned on. The input terminals l to 5 are turned ON and then power is turned on.	Turn the STN terminal OFF. Input the data again. Replace the logic PCB.
	The data has not changed.	Was the power turned off without pushing the FUNC key after the data was changed with ▢ ▢ keys.	Input the data and push the FUNC key onc
		The data is memorized upon power off. Is the time from power OFF to ON less than six seconds?	Take six seconds or more when turning powe OFF and ON after changing the data.
	Data copied by the copy unit is not input.	Is the power turned off for five seconds or more after the display changed from REMT to INV. (HRW-OJ)	Copy again and turn the power off five seconds or more after copying.
he data not ianged.	Frequency setting can not be changed. Run and stop can not be done.	The change of the terminal mode and digital operator mode were correct?	Confirm the change in $\boxed{F \quad 9}$ setting mode.
	The data can not be changed.	Is the input terminal SFT ON ? Is the software lock mode set at MD2 or MD3 ? Note: If software lock is ON because of use with an explosion proof motor. do not release the software locks.	Turn the SFT terminal OFF. Turn the switch OFF.

Symptom		Probable cause	Countermeasure
Overload (Electronic thermal trip) (Low Frequency zone)		Is the $\boxed{F} \quad \boxed{8}$ torque boost too high ? Do the electronic thermal characteristics match the set characteristics of the motor ?	Decrease the torque boost. Reset the electronic thermal characteristics and level.
The input voltage trips.		Is the input voltage high ? Is the equipment stopped with the inverter DC voltage increased after sudden deceleration ?	Lower the input voltage. Set a deceleration time which is a little longer. Increase the AVR set value above the current input voltage and lower the V gain by the ratio.

10. MAINTENANCE AND INSPECTION

10.1 Maintenance and Inspection Precautions

⚠ WARNING

* Be sure to turn off the power supply during maintenance and inspection.

* After the power supply has been turned off, you must always wait 10 minutes so that DC bus capacitors can discharge then start maintenance and inspection after the CHARGE lamp on the printed-circuit board has gone out. (Immediately after the lamp has gone out, there will be a residual voltage of about 50 V DC in the DC bus intermediatecircuit.)
  Perform the work after the CHARGE lamp has stopped flickering.

* Make sure that only qualified persons will perform maintenance, inspection and part replacement. (Before starting the work, remove metallic objects from your person (wristwatch, bracelet, etc.)
  (Be sure to use tools protected with insulation.)
  Otherwise, there is a danger of electric shock and/or injury.

⚠ CAUTION

* When removing connectors, never pull the wires. (Wires for cooling fan and thermal relay)
  Otherwise, there is a danger of fire due to wire breakage and/or injury.

• General precautions

Always keep the unit clean so that dust or other foreign matter does not enter the inverter. Take special care in regard to breaking lines and connection mistakes. Firmly connect terminals and connectors. Keep electronic equipment away from moisture and oil. Dust, steel filings and other foreign matter can damage insulation. causing unexpected accidents, so take special care.
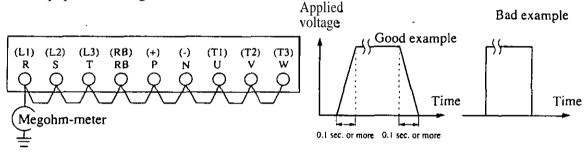
10.2 Inspection Items

(1) Daily inspection
(2) Periodic inspection (Approximately once a year)   ⎫ See 10-3.
(3) Insulation resistance tests, withstand voltage tests ⎭

Conduct these tests by short-circuiting the terminals as shown below. and by following the conditionsdescribed.

. In regard to insulation resistance tests, measure the terminals below and the grounding at 500 VDC, and make sure that 5 Megohms or greater is indicated.

• Do not perform the withstand voltage test. When it should be done, in regard to withstand voltage tests, supply the terminals below and the grounding with 1500 VAC (200 V class), 2000 VAC (400 V class) for one minute, and make sure that there are no abnormalities.

• Do not conduct insulation resistance tests and withstand voltage tests for terminals other than those indicated below.

• Increase or decrease the applied voltage for the withstand voltage test slowly and turn the equipment 0 V again.

(L1)	(L2)	(L3)	(RB)	(+)	(-)	(T1)	(T2)	(T3)
R	S	T	RB	P	N	U	V	W

Megohm-meter

Applied voltage

Good example

Bad example

Time

Time

0.1 sec. or more   0.1 sec. or more

NOTE 1:   If the inverter is used under high temperature and heavy load conditions, its operating life will be significantly reduced.

NOTE 2:   If the inverter has been stored for three years or more, apply the following conditions.

1) Apply 80% of the rated voltage of the capacitor for I hour at normal temperature.
2) Increase the voltage to 90% and apply it for I hour.
3) Apply the rated voltage for 5 hours.

NOTE 3:   Precautions in handling printed-circuit boards.
When maintenance and inspection of printed-circuit boards is necessary, be sure to follow the precautions below.

• Prevent damage caused by static electricity. The IGBT of the inverter module, the MCUs and ICs on a printed-circuit board can be destroyed by static electricity, so be sure to ground work benches, soldering irons, and yourself before working on a printed-circuit board.

Daily Inspection and Periodic Inspection (1/3)

Inspection location	Inspection item	Inspection content	Inspection cycle Daily	Inspection cycle Periodic	Inspection method	Criteria	Standard replacement period	Instruments
Overall	Ambient environment	Check ambient temperature, humidity. dust, corrosive gases. oil mist. etc.	✓			Ambient temperature between -10 to +50°C; no icing. Ambient humidity 20 to 90%; no dew condensation	—	Thermometer
	Devices overall	Check for abnormal vibrations and noise.	✓		Visual and aural inspection.			Hygrometer
	Power supply voltage	Check the input line voltage.	✓		Measure the voltage between inverter terminals R(L1), S(L2) and T(L3).	No abnormalities. 200 to 220 V. 50 Hz 200 to 230 V. 60 Hz 380 to 415 V. 50 Hz 400 to 460 V, 60 Hz		Tester
Main circuit	Overall	(1) Insulation resistance test (between main circuit terminals and grounding terminal) (2) Check installation for looseness. (3) Check for evidence of overheating in the various components. (4) Clean		✓ ✓ ✓ ✓	(1) Increase righting Making a check on the terque is needed for the increase tightening of the module! such as a power module. diode module. Do not execute increse tightening with no torque gauge prepared. 2) Tighten. 3) Visual inspection.	No abnormalities in (I) and (2). Tightening torque (kgf.cm) . M3: 8 IO • M4: 12 - 15 . M5: 20 - 25 . M6: 25 - 30 • M8: 100 - 135 • M10: 150 - 200 Tightening torque for IPM and Diode modules (kgf.cm) . M4: IO-15 . M5: 15-20 • M6: 20-25	—	500 v class Megohmmeter

Inspection location	Inspection item	Inspection content	Inspection cycle		Inspection method	Criteria	Standard replacement period	Instruments
			Regularly	Periodic				
Main ircuit	Terminal board	No damage.		✓	Visual inspection	No abnormalities.	—	—
	Smoothing capacitor	(1) Check for leaking	✓	No (2).	Visual inspection of (1) and (2).	No abnormalities in (1) and (2).	5 years (Note 1) 1)	—
		(2) Check for swelling	✓					
	Relays	(I) Check for stuttering noise when operating		✓	(I) Aural inspection.	(I) No abnormalities	5 years	—
	Resistors	(1) Check for large cracks or changes in color		✓	(1) Visual inspection	(I) No abnormalities.		—
	Cooling fan	(I) Check for abnormal vibrations and noise	✓		(I) Rotate manually with power off and increase tightening	(I) Smooth rotation	2 - 3 years	—
		(2) Check for dust	✓		(2) Visual inspection	(2) No abnormality		

0-4

Daily Inspection and Periodic Inspection (3/3)

Inspection location	Inspection item		Inspection content	Inspection cycle'		Inspection method	Criteria	Standard replacement period	Instrument
				Regularly	Periodic				
Control circuit	Operation check		(I) Check the balance of the output voltage of individual phases when operating the invener independently. (2) Conduct a sequence protection operation test, and make sure that there are no errors in the protection and display circuits.		✔ ✔	(I) Measure the voltage between the phases of inverter output terminals U, V, and W. (2) Simulate operation of the inverter protection circuit.	(I) Within 2% voltage difference between phases. (2) Operate without any abnormalities.		—
	Component check, including printed-circuit boards	Overall	(I) No abnormal odor or changes in color. (2) No significant corrosion.		✔ ✔	Visual inspection	No abnormalities	—	—
		Capacitor	No fluid leakage or deformation.	✔		Visual inspection	No abnormalities	5 years (Note 1)	—
Display	Digital operation panel		(I) No illegible display (2) No lack of character (3) No blown out LEDs	✔ ✔ ✔		Visual inspection	Normal operation Display can be read out.	7 years	—

Note I. The life of the capacitor is affected by the ambient temperature. Refer to the ambient temperature - capacitor life curve shown in Appendix 5.

Note 2. The invener must be cleaned periodically. If dust accumulates on the fan and heat sink, it can cause overheating of the invener.

10-5

10.3   Measurement Method for I/O Voltage, Current, and Power

General measuring instruments for I/O voltage, current, and power are indicated below. The voltage to be measured is the fundamental wave effective voltage and the power to be measured is the total effective value.

Table 3 Parts to be measured
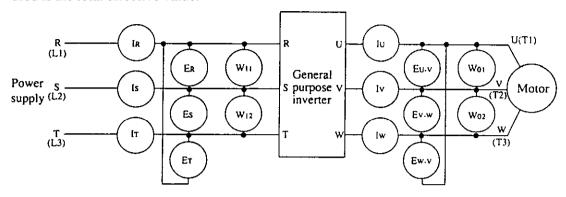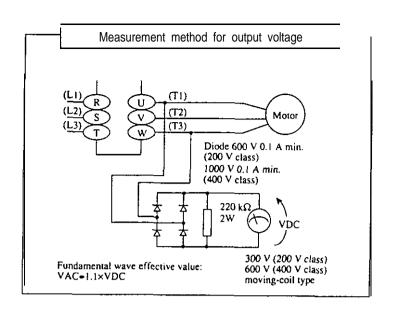
Measurement item	Pans to be measured	Measuring instrument	Remarks	Reference value
Supply voltage E_1	Between R and S, S and T. T and R (E_R)(E_S)(E_T)	Moving-iron type voltmeter or rectifier type voltmeter	Fundamental wave effective value	
Supply current I_1	R, S, T (I_R)(I_S)(I_T)	Moving-iron type ammeter	Total effective value	
Supply power W_1	Between R and S, S and T (W_{11})(W_{12})	Electrodynamic type wattmeter	Total effective value	
Supply power factor Pf_1	Calculate the supply power factor from the measured supply voltage. E_1, supply current I_1 and supply power W_1. $$Pf_1 = \frac{W_1}{\sqrt{3}\,E_1 I_1} \times 100\,(\%)$$			
Output voltage E_0	Between U and V. V and W. W and U (E_U)(E_V)(E_W)	Rectifier type voltmeter	Total effective value	
Output current I_0	U, v. w (I_U)(I_V)(I_W)	Moving-iron type ammeter	Total effective value	
Output power W_0	Between U and V. V and W (W_{01})(W_{02})	Electronic type wattmeter	Total effective value	
Output power factor Pf_0	Calculate the output power factor from the output voltage E, output current I, and output power W. $$Pf_0 = \frac{W_0}{\sqrt{3}\,E_0 I_0} \times 100(\%)$$			

NOTE 1:   Use a meter indicating a fundamental wave effective value for voltage, and meters indicating total effective values for current and power.

NOTE 2:   The inverter output waveform is a distorted wave, and low frequencys may cause errors. However, the measuring instruments and methods indicated above provide comparatively accurate values.

NOTE 3:   A tester (general purpose) may not be suited often to measurement of a distorted wave.

10-6

Measurement method for output voltage

(L1) R   U (T1)
(L2) S   V (T2)   Motor
(L3) T   W (T3)

Diode 600 V 0.1 A min.
(200 V class)
1000 V 0.1 A min.
(400 V class)

220 kΩ
2W   VDC

Fundamental wave effective value:
VAC=1.1×VDC

300 V (200 V class)
600 V (400 V class)
moving-coil type

11. STANDARD SPECIFICATIONS

11.1 Common Standarsd Specifications

Item			Description		
Input voltage			200 V class		400 V class
Model Name (Type)			055 LF | 075 LF | 110 LF | 150 LF | 220 LF | 300 LF | 370 LF | 450 LF | 550 LF		055 HF | 075 HF | 110 HF | 150 HF | 220 HF | 300 HF | 370 HF | 450 HF | 550 HF | 750 HF | 900 HF | 100 HF | 1320 HF | 1600 HF | 220 HF
Enclosure (NOTE 1)			Semienclosed type (IP20)	Open type (IP00)	Semienclosed type (IP20) | Open type (IP00)
Rated AC input power supply (V)			Three-phase (3 wires), 200 to 220 or 200 to 230 V±10%, 50 or 60 Hz±5%		Three-phase (3 wires), 380 to 415 or 400 to 460 V±10%, 50 or 60 Hz±5%
Rated output voltage (V) (NOTE 2)			Three-phase, 200 to 230 V (Corresponding to the input voltage)		Three-phase, 380 to 460 V (Corresponding to the input voltage)
Output frequency range (NOTE 3)			0.1 to 400 Hz		
Frequency accuracy			Digital command ±0.01% and analog command ±0.1% for the maximum frequency command		
Frequency setting resolution			Digital setting: 0.01 Hz/60 Hz, Analog setting: Maximum frequency/1000		
Voltage/frequency characteristics			V/f variable, high start torque, standard starting torque (constant torque, reduced torque)		
Acceleration/deceleration time			0.01 to 3000 seconds, acceleration and deceleration individually set		
Starting torque (NOTE 4)			150% or more (1 Hz)		
Braking torque	Dynamic braking (NOTE 5) Feedback to capacitor		About 20% | About 10 to 20%	About 20%	About 10 to 15%
	Dynamic braking using external resistor or unit (BRD)		Braking resistor optional for 055 and 075L, use braking unit (BRD) for 220 to 550L.		Braking resistor optional for 055 and 075H, use braking unit (BRD) for 220 to 2200H.
	DC injection braking		Operated at the DC braking frequency or by external input		
Input signals	Frequency selling	Digital operator	Set by □ and □		
		External signals	2 W 500 Ω to 2 kΩ potentiometer. 0 to 5 VDC (nominal), 0 to 10 VDC (nominal) (input impedance 30 kΩ), 4 to 20 mA (nominal) (input impedance 250 Ω)		
	Forward/ reverse run, stop	Digital operator	RUN / STOP (or for forward run or reverse run. the function mode should be switched.)		
		External signals	FW (forward run command)/stop		
		Intelligent input terminal	REV (reverse run command), FRS (free run stop command), CFI to CF3 (multistage speed setting). USP (USP function). JG (jogging command), CH I (2-stage acceleration and deceleration). DB (external DB command). RS(reset input). STN (initialization). SF? (software lock). AT (current input selection), CS (commercial power source switching). SET (2nd setting selection), EXT (external trip). UP (remote control, acceleration). DOWN (remote control. deceleration)		
Output signals	Intelligent output terminal		FAI (speed arrival signal). RUN (signal during run). OTQ (overtorque signal)		
	Frequency monitoring		Analog output frequency monitor (0 to 10 VDC full scale,! mA max.). digital frequency signal by remote operator, analog current monitor, analog torque monitor		

Item	Description		
Input voltage		200 v class	400 v class
Model Name (Type)		055LF 075LF 110LF 150LF 220LF 300LF 370LF 450LF 550LF	055HF 075HF 110HF 150HF 220HF 300HF 370HF 450HF 550HF 750HF 900HF 1100HF 1320HF 1600HF 2200HF
Fault alarm contact (AL0-AL1)	OFF when an inverter alarm occurs		
Other characteristics	AVR function. data batch setting. V/F characteristic switching. curve acceleration and deceleration. upper and lower limiters, S-stage speed, start frequency fine adjustment, trip history monitor (up to three times stored), fuzzeleration and deceleration. autotuning, etc.		
Protection functions	Overcurrent, overvoltage. undervoltage, electronic thermal. abnormal temperature. grounding current, overload restriction. etc.		
General specifi-cations — Vibrations (NOTE 6)	5.9 m/S^2 (0.6G) 10 - 55 Hz for 0550 to 075L /H 2.0 m/S^2 (0.2G) 10 - 55 Hz for 220 to 550L and 220 to 1100H		
General specifi-cations — Operation location	Altitude of 1000 m or less, indoors (free of corrosive gas and dust)		
General specifi-cations — Paint color	Regel gray No. 1 (Munsell 9. 1 Y 7.4/0.6 semigloss, cooling fan of aluminum ground color)		
Options	Remote operator. copy unit, cable for digital operator. braking resistor. reactor for improving power factor, noise filter for inverter, fitting for conduit tube connection, fitting for removing cooling fins		
Estimated mass (kg)		7.5 7.5 13 13 21 37 37 51 51	7. 7. 13 13 21 36 36 46 46 70 70 80 130 130 130

NOTE 1: Protective structure is based upon JEM1030- 1977.

NOTE 2: The output voltage will decrease if input voltage decreases

NOTE 3: Confirm with the motor manufacturer the motors maximum rpm when using a motor running at frequency higher than 50/60 Hz.

NOTE 4: When using the standard four-pole motor, select the high start torque (SLV) at the rated voltage (200 V class: 200, 220, 230 V; 400 V calss: 400, 415, 440. 460 V).
(For details, contact the dealer you purchased the product.)

NOTE 5: Torque will be reduced when the base frequency exceeds 50/60 Hz.
The dynamic braking torque is about 70% for 055LF or about 60% for 075LF when one of the 200 V class RB I to RB3 (17Ω or more) is used at the shorttime rating or about 60% for 055HF or about 50% for 075HF when the 400 V class RB2 x 2 series (70 Ω or more) is used.

NOTE 6: According to the test method shown is JIS C 09 I I (I 984).

11.2 Individual Specification (USA version (J300- .... LFU, HFU))

Item			Description	

Input voltage: 200 v class / 400 V class

Model Name (Type)	055 LF	075 LF	110 LF	150 LF	220 LF	300 LF	370 LF	450 LF	550 LF	055 HF	075 HF	110 HF	150 HF	220 HF	300 HF	370 HF	450 HF	550 HF	750 HF	900 HF	1100 HF	1320 HF	1600 HF	2200 HF
Applicable motor rating 4P, max. (W/HP) (NOTE 1) — Constant torque	5.5/7.5	7.5/10	11/15	15/20	22/30	30/40	37/50	45/60	55/75	5.5/7.5	7.5/10	11/15	15/20	22/30	30/40	37/50	45/60	55/75	75/100	90/120	110/150	132/200	160/250	220/300
Variable torque (NOTE 2)	7.5/10	11/15	15/20	22/30	30/40	37/50	45/60	55/75	75/100	7.5/10	11/15	15/20	22/30	30/40	37/50	45/60	55/75	75/100	90/120	110/150	132/200	160/250	220/300	260/350
Continuous output (kVA) — Constant torque 200 V	8.3	11	16	22	33	42	50	63	76															
230 V	10	13	18	25	38	48	58	73	88															
380 V										8.6	10.5	15	21	32	38	49	59	72	89	103	137	158	207	250
400 V										9.0	11	16	22	33	40	52	62	76	94	108	144	166	218	263
460 V										10.4	12.7	18	25	38	46	60	72	88	108	124	166	191	251	303
Variable torque 200 V	9	12	18	25	37	47	56	71	86															
230 V	11	14	21	29	43	54	65	82	99															
380 V										9.6	12	17	24	36	43	55	66	82	103	118	158	199	250	286
400 V										10.1	12.5	18	25	37	45	58	70	86	108	118	166	209	263	301
460 V										11.6	14.3	21	29	43	52	67	80	99	124	143	191	241	303	347
Rated output current (A) — Constant torque	24	32	46	64	95	121	145	182	220	13	16	23	32	48	58	75	90	110	135	156	208	240	315	380
Variable torque (NOTE 3)	27	36	52	72	107	136	163	205	248	14.6	18	26	36	54	65	84	101	124	156	180	240	302	380	435
Carrier frequency (Hz) — Constant torque	16	16	16	16	12	10	6	6	6	16	16	16	16	12	10	6	6	6	3	3	2	2	2	2
Variable torque (NOTE 3)	16	16	16	16	12	10	6	6	6	16	16	16	16	12	10	6	6	6	2	2	2	2	2	2
Overload current capacity — Constant torque	150%, for 1 minute																							
Variable torque (NOTE 3)	125%, for 1 minute																							
General specifications — Ambient temperature CT (NOTE 4)	-10 to 50 degree C																							
VT (NOTE 5)	-10 to 40 degree C																							
Humidity	20 to 90% RH																							

NOTE 1: The applicable motor is a Hitachi standard four-pole motor. When using another motor, make sure that the rated motor current does not exceed the rated inverter **current.**

NOTE 2: Applicable motor raring at variable torque is valid with the condition that output current does not exceed the rating at variable torque.

NOTE 3: When a V/F pattern (VP1, VP2, or VP3) for variable torque is selected ($A□□$ for the digital operator or F04 for the remote operator). the setting data are automatically changed by the inverter.
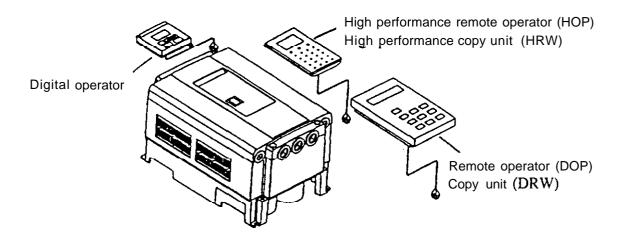
NOTE 4: CT: Constant torque.

NOTE 5: VT: Variable torque.

12. FUNCTIONS WHEN USING THE OPTIONAL REMOTE OPERATOR

12.1   Connecting the remote operator

Be sure to turn the power supply off when connecting the connector.

Digital operator

High performance remote operator (HOP)
High performance copy unit (HRW)

Remote operator (DOP)
Copy unit (DRW)

(I)   Insert the connector straight into the remote operator and inverter unit
        printed-circuit board.

(2)   Turn on the power supply.

(3)   Make sure that the liquid crystal display of the remote operator is lit
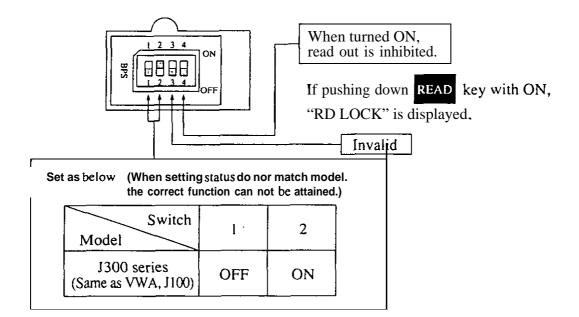
        When the power supply of the inverter is turned on, FS000.0..... of the monitoring mode
        will be displayed. If, however, any of the following is displayed when the inverter is
        turned off, they will be displayed when power is turned on again.

        .   Frequency setting, multi-speed setting or other frequency displays, motor rotational
            speed display, frequency conversion display, or output current display.

NOTE: When conflicting data is set, a warning WARN..... will be displayed. For 6 seconds
         thereafter. do not perform the key operation, reset operation, running operation, power-OFF
         operation. (Otherwise, a communication error may occur in the operator.)

NOTE: See the operation manual of the remote operator for instructions.
In addition, see the following pages for details on its various functions. Set the dip-switches
mounted on the backside of the remote operator and copy unit as below.

When turned ON,
read out is inhibited.

If pushing down READ key with ON,
"RD LOCK" is displayed.

Invalid

Set as below (When setting status do nor match model.
the correct function can not be attained.)

Switch Model	1	2
J300 series (Same as VWA, J100)	OFF	ON

12.2 Monitor mode

Monitor mode list when the remote operator (DOP) and copy unit (DRW) are used
- Monitor mode initial values and display contents
  Initial display contents. initialization. and change ranges are displayed
  in the table indicated below.

Y : Setting can be changed during operation
N : Setting can not be changed during operation
Display only

Display sequence	Monitor name	Display content	Initial value	Setting range	Setting and change are possible?	Remarks
1	Frequency setting and output frequency	① ② FS0000.0 □ 0.0Hz	0.0 Hz	0 to 120 (400)	Y	(I) displays the setting (2) displays the output • □ is displayed when run instruction is ON. F: Forward run R: Reverse run
		① ② TM 0.0 □ 0.0Hz	0.0 Hz			
	Multistage-speed setting and output frequency	1SOOOO.O □ 0.0Hz	0.0 Hz			
		2SOOOO.0 □ 0.0Hz				
		3SOOOO.0 □ 0.0Hz				
	Jogging frequency setting	JGOOOO.O □ 0.0Hz	I.O Hz	0 to 9.9	Y	A trip occurs easily at 5 Hz or more.
	Expansion multistage speed	4S0000.0 □ 0.0Hz ⋮ 7S0000.0 □ 0.0Hz	0.0 Hz	0 to 120 (400)	Y	• Valid when the multistage speed terminal 3 is selected. • The multistage speed are displayed when the input terminal is connected. • For terminal setting, refer to F-34 "Input terminal setting".
2	Acceleration time setting	ACC1 0030.00S	30.0S	0.01 to 3000.00	Y	
3	Deceleration time setting	DEC1 0030.00S	30.0S	0.01 to 3000.00	Y	
4	Frequency setting command	F-SET-SELECT REM	TRM	TRM/REM OP1/OP2	N	REM: Setting from the remote operator
5	Operation command	F/R-SELECT REM	TRM	TRM/REM OP1/OP2	N	TRM: Setting from the inverter terminal
6	Motor pole count setting and revolution speed monitor	RPM 4P 0RPM	4P	2 to 48	Y	Synchronized speed display
7	Frequency converted value setting and converted value monitor	/Hz01.0 0.00	1.0	0 to 99.9	Y	The arithmetic value by the frequency converted value is displayed. (NOTE I)
8	Current monitor	① ② Im 0.0 A 0.0%	—	—		The (I) section depends on the INV rated current. The (2) section displays the rate to the rated output current.
9	Torque monitor	[Torque 0 %				
10	Manual torque boost adjustment	V-Boost code <I I >	II	0 to 99	Y	

NOTE I: The terminal output when the digital output frequency monitor is set at the FM terminal of the control circuit is the "output frequency x frequency convened value". The upper limit of output is 3.6 kHz.

Display sequence	Monitor name	Display content	Initial value	Setting range	Setting and change are possible?	Remarks
11	Manual torque boost frequency adjustment	V-Boost F 10.0%	10.0%	0 to 50.0	Y	
12	Output voltage gain adjustment	V-Gain 100%	100%	20 to 100	Y	
13	Jogging frequency adjustment	Jogging 1.00 Hz	1.0 Hz	0 to 9.99	Y	A trip occurs easily at 5 Hz or more.
14	Analog meter adjustment	ADJ 172	172	0 to 250	Y	
15	Terminal input status monitor	TERM LLLLLLLLL Terminal··· FW 7 5 3 1 8 6 4 2		When the terminal is ON: H When the terminal is OFF: L		

Display sequence	Monitor name	Display content	Trip cause, contents	Remarks
16	Warning monitor	WARN #	Normal state	When the equipment is normal. # is displayed. When a value which is larger than the upper or smaller than the lower limit is set, a warning is displayed.
		WARN Flw>Fs	Frequency setting error	
17	Alarm display	ERR1 #		Not occurred
	Trip monitor	ERR1 OVER.V	<Trip cause 1> Trip cause	The message is displayed on a priority basis when an alarm occurs.
		ERR1 31.0 Hz	Output frequency when tripped	
		ERR1 12.5 A	Output current when tripped	Trip cause Overvoltage trip
		ERR1 787.0 Vdc	Voltage between P and N when tripped	
		ERR1 RUN 0Y 10D	Cumulative years and months when tripped	
18	Total alarm count	ERROR COUNT 0		Not occurred
		ERROR COUNT 25	Total trip count	
19	Trip history monitor	ERR2 #		Not occurred
	Last trip contents	ERR2 OC.Accel	<Trip cause 2> Trip cause	Trip cause Overcurrent trip for acceleration
		ERR2 5.0 Hz	Output frequency when tripped	
		ERR2 20.1 A	Output current when tripped	
		ERR2 580.0 Vdc	Voltage between P and N when tripped	
		ERR2 RUN 0Y 7D	Cumulative years and months when tripped	
	Contents of last trip but one	ERR3 #		Not occurred
		ERR3 EXTERNAL	<Trip cause 3> Trip cause	Trip cause External trip
		ERR3 0.0 Hz	Output frequency when tripped	
		ERR3 0.0 A	Output current when tripped	
		ERR3 560.0 Vdc	Voltage between P and N when tripped	
		ERR3 RUN 0 Y 1D	Cumulative years and months when tripped	

12.3 Function mode

Function mode list when the remote operator is used

- Function mode initial values and display contents
  Initial display contents, initialization, and change ranges are displayed in the table indicated below.

isplay quence	(Function mode 1, Function No.	Function name	(Function mode 2) Initialization display contents	Initialization	Setting, change contents	Setting contents
1	F-00	Base frequency setting	F-BASE 0060 Hz	60 Hz	30 to 120 (400)	• When 120 Hz is switched to 400 Hz by F-30. a frequency more than 120 Hz can be set.
2	F-01	Maximum frequency selling	F-MAX 0060 Hz	60 Hz	30 to 120 (400)	
3	F-02	Start frequency adjustment	Fmin 0.50 Hz ·	0.5 Hz	0.1 to 9.9	• The equipment starts running at this set value.
4	F-03 Input voltage	Motor input voltage setting	AVR AC 460 V	230/460	200,215,220,230 /380,400,415 440.460.480	• The motor input voltage is set.
		AVR function for decelera-lion	AVRDEC OFF	OFF	ON/OFF	. ON or OFF of the AVR function for deceleration is set. When dynamic braking torque is necessary for deceleration. OFF is xi.
5	F-04	Control method setting	CONTROL v c	VC	VC, VP1, VP2, VP3, SLV, V2	. VC, VP1, VP2, VP3: V/F characteristics SLV:Sensorless vector contro V2:Sensor vector control
6	F-05 constant (NOTE 1)	Autotuninf Motor setting	AUX AUTO NOR	NOR	NOR/AUT/NRT	• At the first running after AUT/NRT is set, the autotuning measurement operation is executed.
		Motor data selection	AUX DATA NOR	NOR	NOR: Old Hitachi general purpose TMO: New Hitachi general purpose AUT: Auto-tuning data	• The autotuning motor data before starting autotuning measurement is data equivalent to NOR.
	.	.... capacity setting	AUX K 005.50 kW	Rated capacity of each inverter	3.7 to 160	• Set a capacity smaller than the rated capacity as capacity data.
		Motor pole CO"", selling	AUX P 4p	4P	2.4.6.8	• The number of poles of the motor to be used is set.
		Motor constant R1 setting	AUX R1 1.004	Rated capacity of each inverter	0 to 65.535	
		Motor constant R2 setting	AUX R2 '0.776	Rated capacity of each inverter	0 to 65.535	
		Motor constant L setting	AUX L 13.16 mH	Rated capacity of each inverter	0 to 655.35	

NOTE 1: The motor constants R1, R2, L, M, J. Kp, Ti, and KPP vary with the capacity.

Display sequence	Function No.	Function name	Initialization display contents	Initialization	Setting, change contents	Setting contents
6	F-05 Motor constant	Motor M setting constant	AUX M 123.60 mH	Ratedcapacity ofeachinverter	0 to 655.35	• Primary self inductance per phase.
		Motor J setting constant	AUX J 0.44 kgm² .	Ratedcapacity ofeachinverter	0 to 655.35	• Motor and machine inertia
		Motor constant Kp setting	AUX Kp 002.00	2.0	0 to 100.00	• Smaller: High response • Larger: Low response
		Motor constant Ti setting	AUX Ti 00100 ms	100 ms	0 to 10000	• Set this item after the feedback option PCB is installed.
		Motor constant KPP setting	AUX KPP 001.00	1.0	0 to 100.00	• Set this item after the feedback option PCB is installed.
7	F-06 Acceleration time	Acceleration time setting	ACC I 0030.00 s	30.00 s	0.01 to 3000	• When the fuzzy most suitable acceleration and deceleration (F-10) are set, the time displayed here is invalid. though it can be set.
		2-stage acceleration time setting	ACC 2 0015.00 s	15.00s	0.01 to 3000	• The accelerationtime can be used when the input terminal CH I is shorted. • For input terminal selection, refer to F-34 input terminal.
		Curve pattern selection for acceleration	ACC LINE L	L	L (Linear). S (S curve,, u (U curve), RU (reverse u curve)	• The curve pattern is set for acceleration and deceleration respectively.
		Acceleration and deceleration curve constant selection	ACC GAIN 02	2 (common to acceleration and deceleration)	I to 10	• When the constant is set for one of acceleration and deceleration, it is common to both acceleration and deceleration. . See appendix 4.
8	F-07 Deceleration lime	Deceleration time setting	DEC I 0030.00 s	30.00 s	0.01 to 3000S	. When the fuzzy most suitable accelerationand deceleration (F-10) are set, the time displayed here is invalid. though it can be set.
		2-stage deceleration time setting	DEC 2 0015.00 s	15.00s	0.01 to 3ooos	• The deceleration lime can be used when the input terminal CH I is shorted. • For input terminal selection. refer to F-34 input terminal.
		Curve pattern selection for deceleration	DECLINE L	L	L (Linear). S (S curve), u (U curve), RU (reverse u curve,	• The curve pattern is set for acceleration and deceleration respectively.
		Acceleration and deceleration curve constant selection	DEC GAIN 02	2 (common to acceleration and deceleralion)	I to 10	. When the constant is set for one of acceleration and deceleration, it is common toboth acceleration and deceleration. . See appendix 4.

isplay quence	(Function mode I) Function No.	Function name	(Function mode 2) Initialization display contents	Initialization	Setting. change contents	Setting contents
9	F-08 Accelera- tion halt	Accelera- don stop frequency setting	Fsp F 0000.0 Hz	0 Hz	0 to 400.0	• The frequency at which the acceleration operation is stopped temporarily is set.
		Accelera- tion stop time setting	Fsp TIME 00.0 s	0 s	0 to 60.0	• The time that the acceleration is stopped temporarily at a certain frequency during acceleration is set.
10	F-09	Pattern command- ing method selection	PARAM REM	REM	REM/ OP1/OP2 (Option connected)	• The parameter setting com- manding source is selected. REM (each operator), OPI (option I), OP2 (option 2)
11	F-IO Running mode					
		Running mode selection	RUN MODE NOR	NOR	NOR/OEN/ GOD	NOR: Normal running OEN: Energy conservation running COD: Fuzzy most suitable acceleration and deceleration running
		Restarting after FRS signal selection	RUN FRS ZST	ZST	fST/ZST	fST: Restart after frequency maching ZST: 0 Hz start
12	F-1 Multistage speed	Multistage speed 1speed setting	SPD I 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminal CF1 is set and used.
		Multistage speed 2-speed setting	SPD 2 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminal CF2 is set and used.
		Multistage speed 3-speed setting	SPD 3 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminals CF1 and CF2 are set and used.
		Multistage speed d-speed setting	SPD 4 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminals CF1 and CF3 are se, and used.
		Multistage speed S-speed setting	SPD 5 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminals CF2 and CF3 are set and used.
		Multistage speed 6-speed setting	SPD 6 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminals CF1, CF2. and CF3 are set and used.
		Multistage speed 7-speed setting	SPD 7 0000.00 Hz	0 Hz	0 to 120.0 (400)	• The input terminal CF3 is set and used.

Disp xque	(Function mode 1) Function NO.	(Function mode 1) Function name	(Function mode 2) Initialization display contents	Initializatic	Setting, change contents	Setting contents
13	F-20 DC njection braking	DC braking selection	DCB SW OFF	OFF	ON/OFF	• DC braking ON: DC braking available OFF: DC braking unavailable
		DC brakin type selection	DCB KIND LVL	LVL	LVL/EDG	• DC braking method selection; LVL: Level operation EDG: Edge operation
		DC brakin frequency selection	DCB F 0000.5 Hz	0.5 Hz	0 to 400.0 Hz	• The frequency at which the DC braking starts is set.
		DC brakin force selec tion (at start)	DCB V-STA 00	0	0 to 20	• The DC braking force at start is set.
		DC brakin; force selec tion (at stop)	DCB V-STP 00	0	0 to 20	• The DC braking force at stop is set.
		DC brakin; time selec tion (at start)	DCB T-STA 000.0 s	0 s	0 to 6W.0	• The DC braking time at start is set.
		DC brakin; time selec tion (at stop)	DCB T-STP 000.0 s	0 s	0 to 600.0	• The DC braking time at stop IS set.
		DC braking output cut- off time	DCB STOP-T 0.00 s adjustment	0 s	0 to 5.00	The output frequency is lowered to the DC braking frequency and the free run rime during execution of DC braking is set.
14	F-21	Dynamic traking setting	BRD-%ED 001.5%	1.5%	0 to 100.0	. The allowable usage ratio of the braking resistor for 100 seconds is set. (NOTE 1)
15	F-22 he lowable sage tio of e aking sistor r 100 conds set.	Allowable instantaneous powerfailure time setting	IPS TIME 1.0 s	1.0 s	0.3 to 25 s	• When an instantaneous power failure occurs, the allowable time until the power failure is recovered is set.
		Reclosing standby after instantaneous powerfailure recovered	IPS WAIT 001.0 s	1.0 s	0.3 to 100.0 s	• The waiting time until the rerunning starts after an instantaneous power failure occurs and is recovered is set.
		Instantaneous powerfailure restart selection	IPS POWR ALM	ALM	ALM/FTP/ RST/ZST	ALM: Alarm output ZST: 0 Hz start retry FTP: Retry after frequency matching is stopped RST: Rerunning start retry
		Tripselection during stop at under voltage	IPS TRIP OFF	OFF	ON/OFF	When an instantaneous power failure occurs: ON: Trip OFF: Non-trip
16	F-23 ctronic ermal	Electronic thermal characteristic selection	E-THM CHAR SUB	SUB	CRT/SUB/FRE	• Electronic thermal characteris- tic setting CRT: Constant torque characteristic SUB: Reduced torque charac- teristic FRE: Free characteristic
		Electronic thermal level setting	E-THM LEVEL 100%	100%	20 to 120%	

NOTE 1: Initial setting of usage ratio   1.5% — 055-075L/HF   0% I 10-550UHF

Displa sequence	(Function mode 1)		(Function mode 2)	Initialization	Setting, change contents	Setting contents
	Function NO.	Function name	Initialization display contents			
16	F-23 Electronic thermal (NOTE 2)	Electronic thermal characteristic free setting current (1)	E-THM A1 8.5A	Rated capacity of each inverter	0 to 600.0 A	
		Electronic thermal characteristic free setting frequency(1)	E-THM F1 0000 Hz	Rated capacity of each invener	0 to 400 Hz	
		Electronic thermal characteristic free setting current (2)	E-THM A2 8.5A	Rated capacity of each invener	0 to 600.0 A	
		Electronic thermal characteristic free setting frequency(2)	E-THM F2 5 Hz	Rated capacity of each invener ,	0 to 400 Hz	
		Electronic thermal characteristic free setting current (3)	E-THM A3 13.0 A	Rated capacity of each invener	0 to 600.0 A	
		Electronic thermal characteristic free setting frequency(3)	E-THM F3 73 Hz	Rated capacity of each invener	0 to 400 Hz	
17	F-24 Overload restriction	Overload restriction level setting	OLOAD LEVEL125%	125%	50 to 150%	Under the sensorless vector control, an overload is detected from both the overload restriction and torque limiter.
		Overload restriction constant setting	OLOAD CONST01.C	1.o	0.3 to 31.0	Khe" the setting is 31.O in SLV or V2 control mode. the overload restriction has no ffect.
		Valid selection for overload restriction acceleration	OLOAD ACC ON	ON	ON: Valid for acceleration Keep the function ON for operation.	Even if the function is set to OFF, the overload restriction is "valid only for the first cceleration when the forward nd reverse run command is urned on.
18	F-25	Software lock selection	S-LOCK MD1	MD1	MD0/MD1 MD2/MD3	MD0, MD1: Terminal software ock (SFT) MD2, MD3: Software lock NOTE 1)

NOTE 1: When MD0 is set and the input terminal SFT is turned ON, the data of all functions is locked.   When MD2 is set (stored). the data of all the functions is locked,   During locking, no data can be changed.   MD1, MD3 can set only the output frequency.

NOTE 2: Electronic thermal characteristic free setting current and frequency depends on the inverter rating.

Display sequence	(Function mode 1) Function No.	(Function mode 1) Function name	(Function mode 2) Initialization display contents	Initialization	Setting, change contents	Setting contents
19	F-26 Frequency limiter	Frequency lower limiter setting	LIMIT L　·　0000.0 Hz	0 Hz	0 to 120.0 (400) Hz	The lower limit of the frequency to be set is set. When the low limit is 0, the setting is invalid
		Frequency upper limiter setting	LIMIT H　0000.0 Hz	0 Hz	0 to 120.0 (400) Hz	The upper limit of the frequen to be set is set. When the upp limit is 0, the setting is invalid.
20	F-27 Jump frequency	Jump frequency setting (1)	JUMP F1　0000.0 Hz	0 Hz	0 to 400 Hz	• The section where frequenci are to be jumped is set. • Up to three locations can be set. • When the number of locatior is 0, the setting is invalid.
		Jump frequency setting (2)	JUMP F2　0000.0 Hz	0 Hz	0 to 400 Hz	
		Jump frequency setting (3)	JUMP F3　0000.0 Hz	0 Hz	0 to 400 Hz	
		Jump frequency width setting	JUMP W　0.5 Hz	0.5 Hz	0 to 9.9 Hz	• The frequency width where frequencies are jumped is set
21	F-28	STOP key validity selection during terminal running	S T O P - S W　ON	ON	ON: STOP key valid OFF: STOP key invalid	Whether or not to make the STOP key valid during termin; running is selected. In the Remote mode. the STOP key i always valid.
22	F-29	Running direction selection	F/R SW　FRE	FRE	FWD/REV/ FRE	FWD: Only forward run REV: Only reverse run FRE: Both forward run and reverse run valid
		Reverse run prevention selection	F/R PREV　OFF	OFF	ON/OFF	Reverse run prevention ON: OFF:
		Reduced voltage soft start setting	F/R RVS　6	6	0 to 6	
23	F-30	Maximum frequency selection	F-MAX-L　120 Hz	120 Hz	120/400 Hz	Maximum frequency switching 120: 120 Hz　400: 400 Hz
24	F-31 External analog frequency command	Analog input voltage selection	IN ANA　10 V	10 V	10/5	Input voltage maximum level 10: Max. 10 V　5: Max. 5 V
		External frequency start setting	IN EXS　0000.0 Hz	0 Hz	0 to 120.0 (400)	• Frequency at which the external input starts
		External frequency end setting	IN EXE　0000.0 Hz	0 Hz	0 to 120.0 (400)	• Frequency at which the external input is maximized
		External frequency start setting rate	IN EX%S　000%	0%	0 to 100	• Input start level
		External frequency end selling rate	IN EX%E　100%	100%	0 to 100	• Input maximum level
		External command start pint selection	IN LEVEL　0 Hz	0 Hz	0 Hz/ExS	EXS:　Start at EX%S setting rate or less

isplay :quence	(Function mode 1) Function NO.	(Function mode 1) Function name	(Function mode 2) Initialization display contents	Initialization	Setting,change contents	Setting contents
		Frequency command sampling frequency setting	IN F-SAMP 8	8	1 to 8	
25	F-32 Frequency arrival output signal	Arrival signal output pattern selection	ARV PTN CST	CST	CST/PAT/ANY	CST: Output a, constant frequency arrival PAT: Output of more than set frequency ANY: Output of only se, frequency
		Arrival frequency rate setting for acceleration	ARV ACC 0.0 Hz	0 Hz	0 to 400.0	
		Arrival frequency rate setting for deceleration	ARV DEC 0.0 Hz	0 Hz	0 to 400.0	
26	F-33 Over-torque signal (NOTE 1)	Overtorque signal rate setting (for power running)	OV-TRQ V 100%	100%	0 to 250	• During control of SLV and V2: Power running overtorque level • During control of VC and VPI to VP3: Warning level for power running regenerative overload • When 0 is set: Any signal is not output.
		Overtorque signal rate setting (for regen-eration)	OV-TRQ R 100%	100%	0 to 250	• During control of SLV and V2: Regenerative overtorque level • During control of VC and VPI to VP3: No effect • When 0 is set: Any signal is not output.
27	F-34 Intelligent terminal input terminal setting	Input terminal 1 setting	IN-TM 1 RS	RS reset terminal	RS and 17 other terminals	
		Input terminal 2 setting	IN-TM 2 AT	AT current input selection terminal	AT and 17 other terminals	
		Input terminal 3 setting	IN-TM 3 JG	JG jogging terminal	JG and17 other terminals	
		Input terminal 4 setting	IN-TM 4 FRS	FRS free run terminal	FRS and I7 other terminals	
		Input terminal 5 setting	IN TM 5 CHI	CHI 2-stage acceleration and deceleration terminal	CHI and 17 other terminals	

NOTE 1: When setting 20% or less. the error will increase (± 20% or more). Therefore. set 20% or more.

Display sequence	(Function mode 1)		(Function mode 2)	Initialization	Setting,change contents	Setting contents
	Function No.	Function name	Initialization display contents			
27	F-34 Intelligent terminal input terminal setting	Input terminal 6 setting	IN-TM 6 USP	USP Power-ON restart prevention1	USP and 17 other terminals	
		Input terminal 7 setting	IN-TM 7 CFI ⌐	CFI Multi-stage input terminal	CFI and 17 other terminals	
		Input terminal 8 setting	IN-TM 8 REV	REV reverse run command input terminal	REV and 17 other terminals	
		Input terminal I NO/NC setting	IN-TMOIC-I NO	NO	NO/NC	. Input terminal setting NO: ON when short-circuited NC: ON when opened
		Input terminal 2 NO/NC setting	IN-TM OK-2 NO	NO	NO/NC	• Input terminal setting NO: ON when short-circuited NC: ON when opened
		Input terminal 3 NO/NC setting	IN-TM OX-3 NO	NO	NO/NC	• Input terminal setting NO: ON when short-circuited NC: ON when opened
		Input terminal 4 NO/NC setting	IN-TM O/C-4 NO	NO	NO/NC	• Input terminal seuing NO: ON when short-circuited NC: ON when opened
28	F-35 Intelligent terminal output terminal selling	Output terminal II setting	OUT-TM I FAI	FAI	FAI/RUN/OTQ	Output terminal seuing FAI: Frequency arrival signal RUN: Signal during run OTQ: Overtorque signal
		Output terminal I2 setting	OUT-TM 2 RUN	RUN	FAI/RUN/OTQ	Output terminal setting FAI: Frequency arrival signal RUN: Signal during run OTQ: Overtorque signal
		Alarm output NO/NC setting	OUT-TM OK-A NC	NC	NC/NO	. Alarm output terminal contacts a and b setting NC: b contact NO: a contact
		Output II NO/NC setting	OUT-TM O/C-I NO terminal	NO	NO/NC	. Output terminal I contacts a and b seuing NO: b contact NC: a contact Refer to C 21
		Output terminal I2 NO/NC	OUT-TM O/C-2 NO	NO	NO/NC	• Output terminal I2 contacts a and b setting Short- NO: a contact NC: b contact
29	F-36	Carrier frequency setting	CARRIER 16.0kHz	16.0 kHz	2.0 to 16.0 Hz Selectable in 0. I saps	. The IPM carrier frequency is set. . The setting value varies with the capacity.

Display sequence	(Function mode 1)		(Function mode 2)	Initialization	Setting, change contents	Setting contents
	Function No.	Function name	Initialization display contents			
30	F-37	Monitor signal selection	MONITOR　　　A-F	A-F	A-F/A/T/D-F	• The FM terminal monitor signal output is selected. A-F: Analog frequency T: Torque monitor A: Current monitor D-F: Digital frequency
31	F-38 Initialization	Trip history count clear	INIT TCNT　　　CNT	CNT	CNT/CLR	• Trip count deletion selection CNT: Trip counting is continued. CLR: The trip count is cleared.
		Debug mode display selection	INIT DEBG　　　OFF	OFF NOTE 1	ON/OFF	• Debug mode setting ON or OFF OFF: The debug mode is turned off. ON: The debug mode is turned on.
		Digital operator rotation direction selection	INIT DOPE　　　FWD	FWD	FWD/REV	• The digital operator running direction is set. FWD: Forward run REV: Reverse run
		Selection of reset performance	INIT RESET　　　ON	ON	ON/OFF	ON: Alarm release when reset on OFF: Alarm release when reset off
32	F-39 Option setting	Encode pulse number setting	OP P　　　01024 pulse	1024	255 to 65535	Effective with option board (J-FB)
		Control mode selection	OP MODE　　　ASR	ASR	ASR/APR	
		Ro-To option selection	OP RO-TO　　　OFF	OFF	OFF/ON	Keep OFF. (No use)
33	F-40 Orientation setting	Stop position setting switching	OR POS　　　IN	IN	IN/OUT	Effective with option board (J-FB)
		Stop position setting	OR P　　　00000 pulse	0	0 to 4095	
		Speed setting	OR FC　　　0005.0 Hz	5.0 Hz	0 to 400 Hz	
		Direction setting	OR TURN　　　FWD	FWD	FWD/REV	
		Completion range setting	OR L　　　00005 pulse	5	0 to 10000	
		Completion delay time setting	OR TW　　　0.00 s	0	0 to 9.99	

NOTE 1 : Keep debug mode "OFF ", this is factory use only.

Display sequence	(Function mode 1) Function NO.	(Function mode 2) Function name	(Function mode 2) Initialization display contents	Initialization	Setting, change contents	Setting contents
34	F-41 Electronic gear setting	Position setting switching	PO EGRP FB	FB	FB/REF	Effective with option board (J-FB)
		Numerator of ratio	PO EGR-N 00001	1	1 to 9999	
		Denominator	PO EGR-D 00001	1	1 to 9999	
		Feed forward gain	PO FFWG 000.00	0	0 to 655.35	
		Position loop gain	PO G 000.50 rad/s	0.5 rad/s	0 to 100	
35	F-42 Torque limit setting (Note 1)	Torque limit setting switching	TRQ LIMIT REM	REM	REM/OP1/OP2	REM: Each operator PO1: Option 1 PO2: Option 2
		Plus torque limit	TRQ FWD 150%	150%	20 to 150%	
		Minus torque limit	TRQ REV 150%	150%	20 to 150%	Regenerative mode
36	F-43 PID control setting	PID target value input method switching selection	PID IN-SEL IN	IN	IN/OUT	
		PID target value setting	PID LVL 000.00%	0%	0 to 200%	
		P gain setting	PID P 1.0	1.0	0.1 to 5.0	
		I gain setting	PID I 01.0S	1.0	0 to 15.0	
		D gain setting	PID D 000.0	000.0	0 to 100	
		Selection	PID MODE MD0	MD0	MD0 to 4	
37	F-46 Communication protocol setting	Transmission speed selection	COM BAU 00600 bps	600	300/600/1200/ 2400/4800/9600/ 19200	Effective with option board (J-CM)
		Station number selection	COM NUMBER 01	1	1 to 32	
		Transfer bit length selection	COM LENGTH 8	8	8/7	
		Parity ON / OFF selection	COM PAR-SEL1 ON	ON	ON/OFF	
		Parity even / odd selection	COM PAR-SEL2 EVN	EVN	EVN/ODD	
		Stop bit length selection	COM STOPBIT 2	2	2/1	

NOTE 1: Smaller levels of torque limit and overload restriction are given top priority and valid for any control method.

isplay juence	(Function mode I)		(Function mode 2)	Initialization	Setting, change contents	Setting contents
	Function No.	Function name	Initialization display contents			
38	F-47 Option PCB erro setting	Main body operation selection for option PCB error I	OP-ERRI STP	STP	STP/RUN	Effective with option board
		Main body operation selection for option PCB I error 2	OP-ERR2 STP	STP	STP/RUN	
39	F-48 Selection of relay output	Setting for R Y A terminal	RELAY RYA RUN	RUN	CST/PAT /ANY/RUN /OTQ/NOR	Effective with option board (J-RY)
		Setting for RYB terminal	RELAY RYB CST	CST		CST: Arrival signal (constant speed) PAT: Arrival signal (set frequency or more)
		Setting for RYC terminal	RELAY RYC OTQ	OTQ		ANY: Arrival signal (set frequency only) RUN: Running signal OTQ: Over torque signal at SLV. SLV2/Overload signal at V/F control NOR: No output

12- 15

12.4 Protection function display list when the remote operator is used

There are protection functions for overcurrent, overvoltage, and undervoltage provided to protect the inverter. When one of the functions is performed, the output is cut off, and the motor is put into the free run state, and the status is kept until the inverter is forced to reset.

Name	Digital operator display		Remote operator(DOP) copy unit(DRW)display ERR1 ＊＊＊＊
Overcurrent protection	Constant speed	E 0 1	OC.Drive
	Deceleration	E 0 2	OC.Decel
	Acceleration	E 0 3	OC.Accel
Overload protection		E 0 5	Over.L
Braking resistor overload		E 0 6	OL.BRD
Overvoltage protection		E 0 7	Over.V
EEPROM error		E 0 8	EEPROM
Undervoltage protection		E 0 9	Under.V
CT error		E 10	CT
CPU error		E 1 1	CPU
External trip		E 12	EXTERNAL
USP error		E 13	USP
Ground fault protection		E 14	GND.Flt

Name	Digital operator display		Remote operator(DOP) copy unit(DRW)display ERR1 ＊＊＊＊
Input overvoltage		E 15	OV.SRC
Instantaneous power failure		E 16	Inst.P-F
Option connection error	Option 1	E 17	NG.OP1
	Option 2	E 18	NG.OP2
Option PCB error (NOTE 2)	Option 1	E 19	OP1
	Option 2	E 20	OP2
Phase failure protection error	(NOTE 1)	E 24	PH.Fail
Power module protection	Constant speed	E 3 1	PM.Drive
	Deceleration	E 32	PM.Decel
	Acceleration	E 33	PM.Accel
	Stop	E 34	PM.ERR
Undervoltage standby		_ _ U	UV.WAIT

For error contents, see page 8-1.

Other displays

Display	Cause	Description
-R-ERROR COMM<＊>	Communication error ＊=1. Protocol error =2. Time-out error	This is displayed when an error occurs between the inverter and remote operator. When the STOP key or another key is pressed, the original display appears. When the original display does not appear, turn the power off and then on once again. Check whether any connectors are loose.
R-ERROR INV.RUN	During inverter running	If one of the displays on the left occurs when the copy unit is used to read or copy, take the corresponding countermeasure. • INV. RUN: Stop the running. • INV. TRIP: Press the STOP key to release the trip. • INV. TYPE: The inverter type of the copy source is different from that of the copy destination. Use the same type of inverter to read or copy.
R-ERROR INV.TRIP	Under inverter trip	
R-ERROR INV.TYPE	Inverter type mismatch	
R-ERROR RD LOCK	Inverter read lock	The fourth switch of the DIP switch on the back of the remote operator is ON. When reading data, turn the switch OFF.
RESTART ＊＊＊.＊s	Instantaneous power failure restart function in operation	This indicates that the instantaneous power failure restart function is being performed. • RESTART: 0 start is in execution. • ADJUST: Frequency matching is in execution.
ADJUST ＊＊＊.＊s		
UV WAIT	Undervoltage	The supply voltage is lowered to the undervoltage level. When this display appears, turn the power on once again.
POWER OFF	Power OFF	The undervoltage after the power is turned off is displayed.
Tuning OK	Autotuning function end display	This is displayed after the autotuning measurement is finished. • Tuning OK: The measurement terminates normally. • Tuning NG: The measurement fails.
Tuning NG		

NOTE 1: Power OFF during motor deceleration may cause an input phase failure error.
NOTE 2: When the J-FB is installed, an error is display for each factor as shown below.
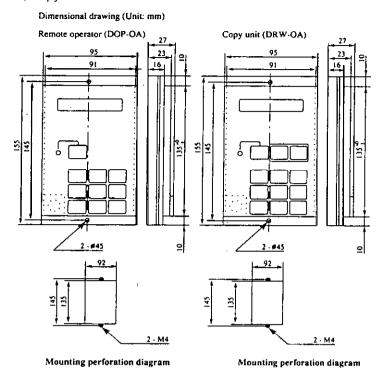
	Digital operator display	DOP. DRW
Encoder line break:	E 60	OP1 0
Overspeed:	E 6 1	OP1 1
Positioning error:	E 62	OP1 2
Thermistor line break:	E 64	OP1 4
Motor overheat:	E 65	OP1 5
Malfunction or abnormality on built-in CPU of the option:	E 67	OP1 7

12-16
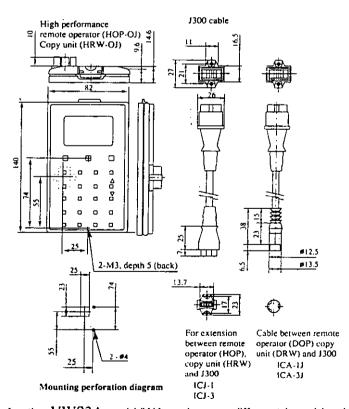
12.5   Warning Error List

The following warning errors are displayed on the warning monitor in the monitor mode. Check the set value. When an attempt is made to set a value larger than the set range, the set value may be rewritten as shown below.

	Warning error display	Forced rewriting	Description	Alarm output	Recovery method
1	Fmax > Fch	Fmax ← Fch	Fch: Frequency for maximum frequency switching (120, 400)		
2	Fb > Fmax	Fb ← Fmax	Fmax : Maximum frequency		
3	Fs > Fmax	Fs ← Fmax	Fmin: Start frequency Fb: Base frequency		
4	Fm > Fmax	Fm ← Fmax	Fs: Set frequency		
5	Flw > Fmax	Flw ← Fmax	Fm: Multistage speed setting frequency		
6	Fup > Fmax	Fup ← Fmax	Flw: Lower limiter frequency Fup: Upper limiter frequency		
7	Fes > Fmax	Fes ← Fmax	Fp: Jump frequency Fes: External set analog start frequency		
8	Fee > Fmax	Fee ← Fmax	Fee: External set analog end frequency		
9	Fs > Fup	Fs ← Fup	Fj: Jogging frequency		
10	Fm > Fup	Fm ← Fup			
11	Fmin > Fup	Fmin ← Fup			
12	Flw > Fs	Flw → Fs		OFF	Change the frequency to the correct value. (Note that when the equipment is operated without the frequency being corrected, he set contents are automatically rewritten to the contents for "Forced Rewriting".
13	Flw > Fm	Flw → Fm			
14	Fmin > Fs	Fmin → Fs			
15	Fmin > Fm	Fmin → Fm			
16	Fmin > Fj	Fmin → Fj			
17	Fmin > Flw	Fmin → Flw			
18	Fp > Fs	Fp Fs			
19	Fp > Fj	FP Fj			
20	Fp > Fm	Fp Fm			

12-17

12.6 Dimensions

Remote operator, copy unit

Dimensional drawing (Unit: mm)

Remote operator (DOP-OA)   Copy unit (DRW-OA)

Mounting perforation diagram   Mounting perforation diagram

High performance
remote operator (HOP-OJ)
Copy unit (HRW-OJ)   J300 cable

2-M3, depth 5 (back)

Mounting perforation diagram

For extension   Cable between remote
between remote   operator (DOP) copy
operator (HOP),   unit (DRW) and J300
copy unit (HRW)   ICA-1J
and J300   ICA-3J
ICJ-1
ICJ-3

NOTE 1: The cables for the VWS3A and VWA series are different in cable shape from those
for the J300. The cables for the J300 are the same as those for the J100. To change
only cables, various cables are in stock.

12.7 Copy Unit Function

Operation example (Procedure to transfer the data of invener A to B.C. and D inverters)			
Se-quence	Operation	Key	Operation result
I	Set data is read out from the inverter A (It is stored into the memory.	READ	Inverter A Copy unit
2	Turn off the power supply to inverter A and remove the cable.		
3	Connect the cable to inverter B and turn on the power.		——
4	Copy data stored in the copy unit is written to inverter B.	COPY	Data copy
5	Cut off the power supply to inverter B. (* 1)		Copy unit Inverter B Inverter C Inverter D
6	Perform the above processes from 3 to 5 sequentially for inverters C and D. That is, the same process as at for inverter B.		

Operation example (Process to change and transfer to inverters B, C and D)			
, the remote key. with copy unit.	Connect the cable and press the remote key. Change the data of the inverter unit.	MON FUN STR ▲ ▼	Data change Copy unit Inverter A
Inverter A 2 to 6	Read out the data from inverter A (It is stored into the memory area of the copy unit). The following procedures are the same those of the operation I.	READ	Inverter A Copy unit ·

12.8   Data to be copied by the copy unit

Precautions for copying

The **copy units,** DRW and HRW cannot copy some of parameters. For the details, see Appendix 7.

Do not carry out data copy and transfer between different version (ex. J300-E1 ←J300-E4). Since settable range is different, data may not be transfered correctly or an error may be occurred.

13. SERVICE

When inquiring about inverter trouble, please be ready to inform the distributor where you purchased your unit or the nearest service station the following.

(1) Type

(2) Purchased date

(3) Production No. (MFG. No.)

(4) Malfunction symptoms

If the contents are unclear due to an old nameplate, give only the clear items. To reduce the non-operation time, it is recommended to stock a spare inverter.

> **warranty**
>
> The warranty period under normal installation and handling conditions shall be one (1) year after the date of delivery. The warranty shall cover the repair of only the inverter to be delivered.

1. Service in the following cases, even within the warranty period, shall be charged to the purchaser.

   (a) Malfunction or damage caused by misoperation or remodelling or improper repair

   (b) Malfunction or damage caused by a drop after purchase and transportation

   (c) Malfunction or damage caused by tire, earthquake, flood, thunderbolt, or other natural calamities, pollution or abnormal voltage.

2. When service is required for the product at your worksite, all expenses associated with field repair shall be charged to the purchaser.

3. Always keep it handy. Please do not loose it. We are sorry but this manual cannot re-issued.

Appendix 1   Manual for New Functions
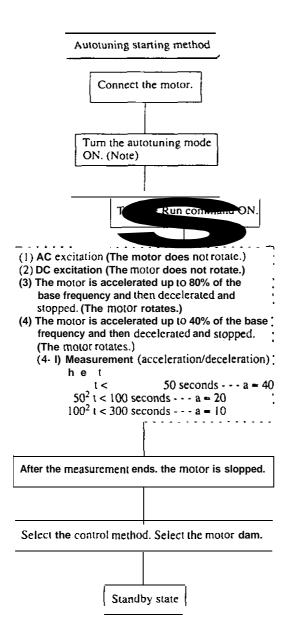
1. Autotuning

[Outline of the function]

This is a function for automatically setting the motor circuit constant necessary for the sensorless vector.

When the autotuning function is performed by a motor which is designed according to JIS C 4210 and then the sensorless vector is controlled, even a motor (Hitachi general purpose motor) whose constant is unknown at an output frequency of 1 Hz can generate a torque of 150%.

An Hitachi general purpose motor is given a constant which is a default value. Therefore, in every case, the characteristics will be obtained without trouble. When the characteristics cannot be obtained, measure the motor circuit constant by the autotuning function.

(1) Before executing the autotuning function, make sure the following set values.

    1) a) Base frequency

        b) Motor capacity

        c) No. of motor poles

        Set the values according to a motor which uses a, b, and c.

    2) Make sure that 0 Hz is not set. (When 0 Hz is set, the autotuning function will not be performed.)

    3) Cancel all the DC braking settings. (DC braking is not set by initialization.)

    4) Make an motor input voltage setting (F-03 AVR AC ☐) according to the motorrating.

(2) Drive the motor for about 60 to 120 seconds. (During autotuning, the motor automatically runs in the order of (1) to (4) given on the left and the motor constant is measured. Therefore, make sure before starting operation that no problems are caused to the load to be connected during the automatic running from (1) to (4).)

Example:

When the base frequency is 120 Hz, the motor runs up to 80% of the base frequency in (3), that is, 96 Hz and then decelerates and stops.
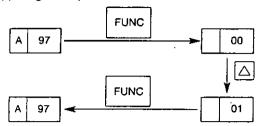
The status for using the autotuning data is set.

Running under sensorless vector control is available.

Autotuning starting method

Connect the motor.

Turn the autotuning mode ON. (Note)

Run command ON.

(1) AC excitation (The motor does not rotate.)
(2) DC excitation (The motor does not rotate.)
(3) The motor is accelerated up to 80% of the base frequency and then decelerated and stopped. (The motor rotates.)
(4) The motor is accelerated up to 40% of the base frequency and then decelerated and stopped. (The motor rotates.)
   (4-1) Measurement (acceleration/deceleration)

$$t < 50 \text{ seconds} \cdots a = 40$$
$$50^2 \ t < 100 \text{ seconds} \cdots a = 20$$
$$100^2 \ t < 300 \text{ seconds} \cdots a = 10$$

After the measurement ends. the motor is stopped.

Select the control method. Select the motor dam.

Standby state

Autotuning start

[Setting method]
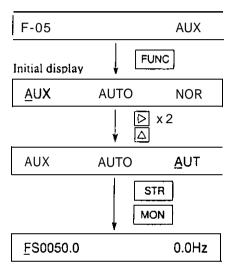
(I) Digital operator

Display the $\boxed{A\ 9\ 7}$ software switch and set it to the data (01) for starting autotuning setting.

When the equipment starts running after the data is set, the autotuning measurement is executed.

(2) Remote operator

F-05 motor constant setting is displayed.
Display the AUX AUTO screen and select AUT or NRT.

Autotuning
NOR: Setting OFF and autotuning end
AUT: Autotuning measurement start (Motor rotates)
NRT: Autotuning measurement start (Motor does not rotates)

When the equipment starts running after the data is set, the autotuning measurement is executed.

When the autotuning operation terminates, "Display at end" indicated on A-4 page is displayed.
When the autotuning operation temiantes normally, see the "running method by autotuning data" indicated on A-5 page.
When the autotuning fails, set "measurement start" once again and perform rerunning.
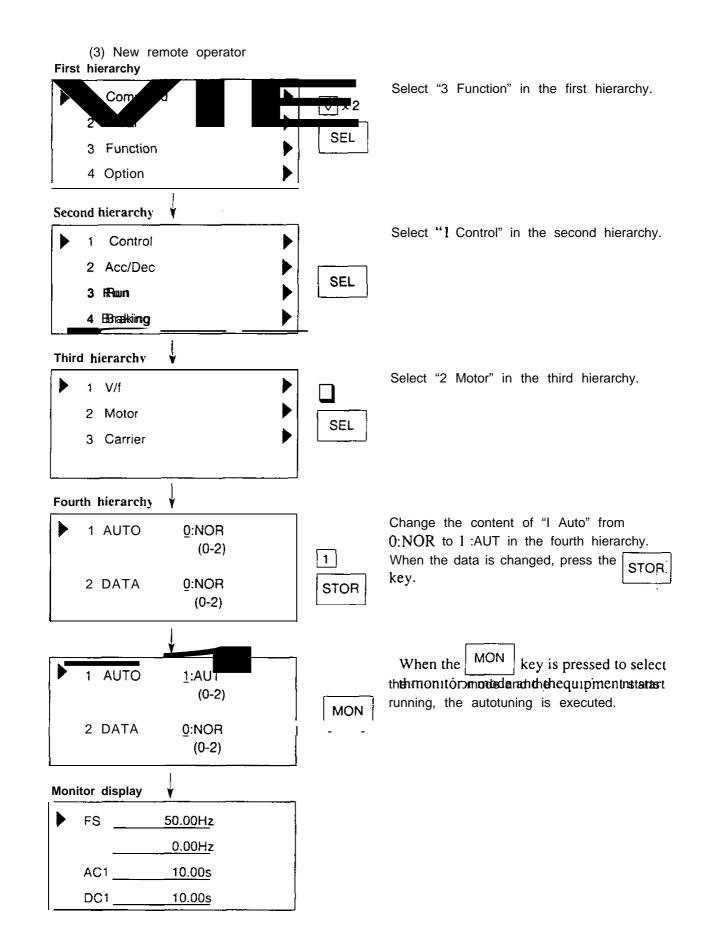
When $\boxed{A\ 9\ 7}$ is set to $\boxed{\ \ \boxed{02}}$ on the digital operator or NRT is selected on the remote operator, auto tuning is performed in a mode in which the motor does not run (only AC excitation and DC excitation are possible). Then, the value of motor constants R1, R2. and L are measured.

Precautions

I. When the autotuning function is executed in the state that the DC braking is set. the accurate motor constant will not be **set.** Cancel the DC braking the then start measurement.

2. By the autotuning function, a capacity between the applicable motor capacity and motor capacity under one frame can be set.

3. When acceleration or speeding up is not to be performed in the operation for accelerating up to 80% of the base frequency, tower the set value of manual torque boost.

4. The autotuning measurement time is about 2 minutes or so. However, the measurement time may be increased depending on the load inertia. When the measurement time exceeds 5 minutes, press the STOP key so as to decrease rhe set value of manual torque boost and enter the run command once again.

5. Be sure if motor is in standstill before you carry out an autotuning. Autotuning data carried out when motor is still running may be not correct.

6. Do not interrupt an autotuning with power off or any stop command except emergency case. It may case data lose.

In it is occurred, make an initialization and reprogram what you need, and carryout autotuning again.

(3) New remote operator

First hierarchy

Com___	___
2 ___	$\boxed{\vee} \times 2$
3 Function ▶	$\boxed{\text{SEL}}$
4 Option ▶	

Select "3 Function" in the first hierarchy.

Second hierarchy ↓

▶ 1 Control ▶	
2 Acc/Dec ▶	$\boxed{\text{SEL}}$
3 Run ▶	
4 Braking ▶	

Select "1 Control" in the second hierarchy.

Third hierarchy ↓

▶ 1 V/f ▶	$\boxed{\square}$
2 Motor ▶	$\boxed{\text{SEL}}$
3 Carrier ▶	

Select "2 Motor" in the third hierarchy.

Fourth hierarchy ↓

▶ 1 AUTO 0:NOR	$\boxed{1}$
(0-2)	
2 DATA 0:NOR	$\boxed{\text{STOR}}$
(0-2)	

Change the content of "1 Auto" from 0:NOR to 1:AUT in the fourth hierarchy. When the data is changed, press the $\boxed{\text{STOR}}$ key.

▶ 1 AUTO 1:AUT	
(0-2)	$\boxed{\text{MON}}$
2 DATA 0:NOR	
(0-2)	— —

When the $\boxed{\text{MON}}$ key is pressed to select the monitor mode and the equipment starts running, the autotuning is executed.

Monitor display ↓

▶ FS ___ 50.00Hz	
___ 0.00Hz	
AC1 ___ 10.00s	
DC1 ___ 10.00s	

A-3

Display when the autotuning terminates
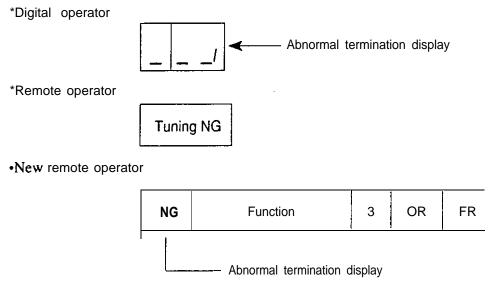
[Display in the normal state]

. When the autotuning terminates normally, the following is displayed. When one of the keys is pressed, the original screen is displayed.

    *Digital operator

            ←————— Normal termination display

    *Remote operator

Tuning END

   •New remote operator

OK	Function	3	OR	FR

         └————— Normal termination display

[Display in the failure state]

• If the autotuning is executed when the motor is not connected to the inverter, the following is displayed and the measurement is stopped. As a motor constant when the measurement fails, the last value is set. When one of the keys is pressed, the original screen is displayed. When executing the measurement once again, change the autotuning measurement setting to "Start" and enter the run command in the same way.

    *Digital operator

            ←————— Abnormal termination display

    *Remote operator

Tuning NG

   •New remote operator

NG	Function	3	OR	FR

         └————— Abnormal termination display

When running the inverter using the autotuning data after the autotuning measurement terminates, make settings by the method indicated on the next page.

Running method by autotuning data

When running the inverter using the autotuning data:
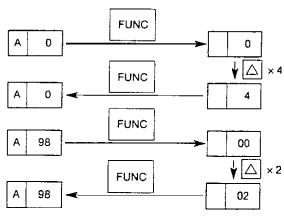
    1. A-O : The control method is set at SLV (sensorless vector control).

    2. A-98   : The motor data is set on the autotuning side by the software switch,

Make the above two settings.

NOTE: When no torque is outputted during the sensorless vector run after the above settings are made, make the following settings. Increase the set value of R1 of each remote operator (motor constant) before starting running.
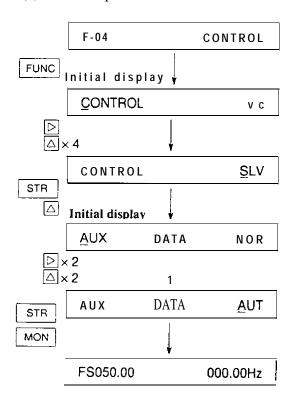
[Setting method]

(1) Digital operator

1. Select [4] (sensorless vector control) by the [00] control method.

    0: Constant torque characteristic
    I: Reduced torque characteristic (I.5 power)
    2: Reduced torque characteristic (I.7 power)
    3: Reduced torque characteristic (2.0 power)
    4: Sensorless vector control

2. Set the motor constant data to the data which is ,[A 9 8] measured by the autotuning function using the software switch.

    (Refer to the [A98] software switch of the operation manual.)
    (When executing the second setting, change the switch.)

By the above two settings, running by the autotuning data is available.

(2) Remote operator

1 Select [SLV] (sensorless vector control) by the F-04 control method.

    VC: Constant torque characteristic
    VPI: Reduced torque characteristic (1.5 power)
    VP2: Reduced torque characteristic (I.7 power)
    VP3: Reduced torque characteristic (2.0 power)
    SLV: Sensorless vector control
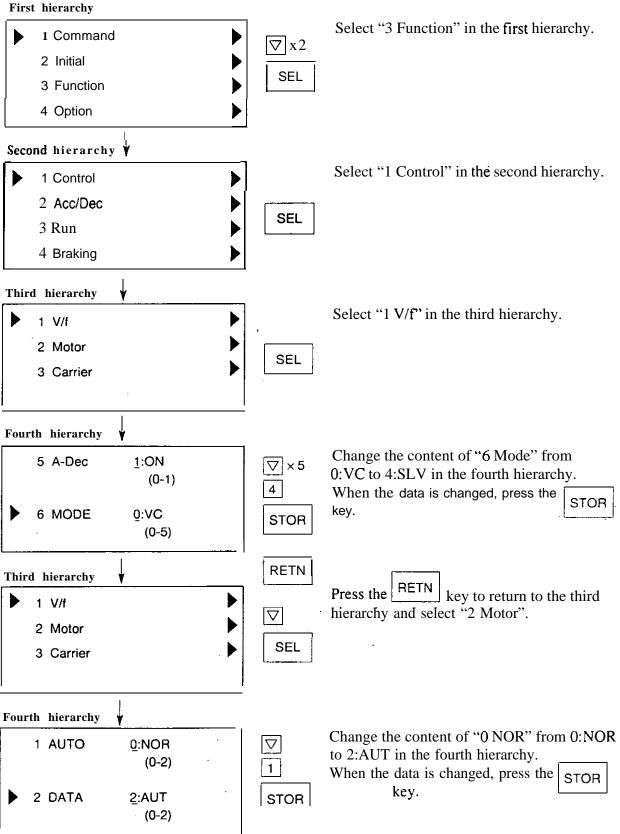
2. Set the [AUT] autotuning data by motor data selection of the F-05 motor constant.

By the above two settings, running by the autotuning data is available.

(3) New remote operator

First hierarchy

▶ 1 Command	▶
2 Initial	▶
3 Function	▶
4 Option	▶

▽ x2

SEL

Select "3 Function" in the first hierarchy.

Second hierarchy ↓

▶ 1 Control	▶
2 Acc/Dec	▶
3 Run	▶
4 Braking	▶

SEL

Select "1 Control" in the second hierarchy.

Third hierarchy ↓

▶ 1 V/f	▶
2 Motor	▶
3 Carrier	▶

SEL

Select "1 V/f" in the third hierarchy.

Fourth hierarchy ↓

5 A-Dec	1:ON	(0-1)
▶ 6 MODE	0:VC	(0-5)

▽ ×5

4

STOR

Change the content of "6 Mode" from
0:VC to 4:SLV in the fourth hierarchy.
When the data is changed, press the STOR
key.

RETN

▽

SEL

Press the RETN key to return to the third
hierarchy and select "2 Motor".

Third hierarchy ↓

▶ 1 V/f	▶
2 Motor	▶
3 Carrier	▶

Fourth hierarchy ↓

1 AUTO	0:NOR	(0-2)
▶ 2 DATA	2:AUT	(0-2)

▽

1

STOR

Change the content of "0 NOR" from 0:NOR
to 2:AUT in the fourth hierarchy.
When the data is changed, press the STOR
key.

When the monitor mode is selected, running by the autotuning data starts.

[NOTES]

*1: If the desired characteristic cannot be obtained in a sensorless vector control operation with auto tuning measured data, adjust the motor constant according to the detected symptom shown below.
(DOP, DRW, HOP, and HRW functions of the remote operator are needed for this adjustment.)

Operation Status	Symptom	Adjustment	Adjusting Item (DOP/DRW Function No.)
Power running (status with an accelerating torque)	When low frequenc (a few Hz) torque is insufficient	Increase the motor constant RI in relation to auto tuning data step by step within 1.2 times.	[F-05 AUX R1]
	When the speed fluctuation coeffi- cient becomes minus	Increase the motor constant R2 in relation to auto tuning data step by step within 1.2 times.	IF-05 AUX R2]
	When the speed fluctuation coeffi- cient becomes plus	Decrease the motor constant R2 in relation to auto tuning data step by step within 0.8 times.	[F-OS AUX R2]
Regeneration (status with a decelerating torque)	When low frequenc (a few Hz) torque is insufficient	1) Increase the motor constant R1 in relation to auto tuning data step by step within 1.2 times.	[F-OS AUX RI]
		2) Decrease the motor constant M in relation to auto tuning data step by step within 0.8 times.	[F-OS AUX MI
		I) Decrease the carrier frequency set value.	[F-36 CARRIER] (A 10 for digital operator
		Combine the methods I) to 3) above to adjust the motor constant.	
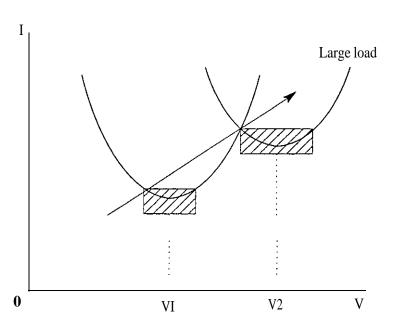
2. Energy conservation running

[Outline of the function]

This is a function for automatically setting the output voltage corresponding to the load during the V/F control running and suppressing useless power.
The function is effective for a load of reduced torque characteristics such as a fan and pump.
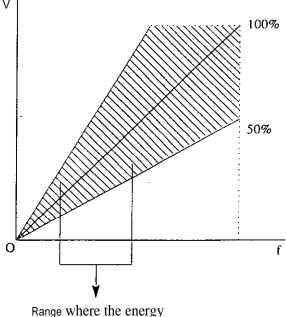
When the load of an induction motor is constant as shown in the drawing on the right, there is a voltage at which the current is minimized. When the current is minimized, the power is also minimized. The function automatically searches this voltage.

[Precautions]

I. The output voltage is decreased so as to minimize the current. The search limits are the voltage of torque constant characteristic $\pm 50\%$.

2. The function is performed under comparatively slow control. Therefore, when a sudden load change (such as an impact load) occurs, the motor may stall.
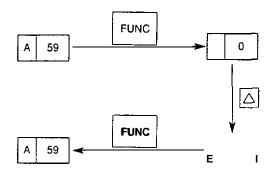
Range where the energy conservation is effective

A-8

[Setting method]
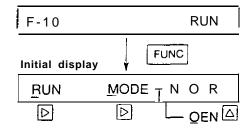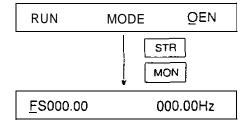
(1) Digital operator

Select [1] by [A 5 9] running mode selection.
Running mode selection

- 0: Normal running
- 1: Energy conservation running
- 2: Fuzzy most suitable acceleration and deceleration running

When the running starts after the data is set, the energy conservation running is performed.

(2) Remote operator

Initial display

F-10 running mode selection is displayed. Display the RUN MODE screen and select "OEN".

Running mode selection
   NOR: Normal running
   OEN: Energy conservation running
   GOD: Fuzzy most suitable acceleration and deceleration running

When the running starts after the data is set, the energy conservation running is performed.

A-9

(3) New remote operator

First hierarchy

▶ 1 Command	▶
2 Initial	▶
3 Function	▶
4 Option	▶

▽ ×2

SEL

Select "3 Function" in the first hierarchy.

Second hierarchy

▶ 1 Control	▶
2 Acc/Dec	▶
3 Run	▶
4 Braking	▶

▽ ×2

SEL

Select "3 Run" in the second hierarchy.

Third hierarchy

▶ 1 Freg.	▶
2 Pattern	▶
3 SPD	▶

▽

SEL

Select "'2 Pattern" in the third hierarchy.

Fourth hierarchy

▶ 1 MODE	0:NOR
	(0-2)

1

STR

Change the content of "2 MODE" from 0:NOR to 2:OEN in the fourth hierarchy. When the data is changed, press the STR key.

▶ 1 MODE	2:OEN
	(0-2)

MON

When the MON key is pressed to select the monitor mode and the equipment starts running, the fuzzy most suitable acceleration and deceleration running is executed.

Monitor display

▶ FS	50.00Hz
	0.00Hz
AC1	10.00s
DC1	10.00s

3. Fuzzy most suitable acceleration and deceleration

[Outline of the function]

The fuzzy most suitable acceleration and deceleration function realizes acceleration and deceleration characteristics using the inverter capability at its maximum under fuzzy control to eliminate troublesome setting of the acceleration and deceleration time.

The acceleration time is a time for acceleration at the current specified by the overload restriction constant.

The deceleration time is a time for decelerating so that the current does not exceed 150% of the specified one or the DC voltage in the inverter circuit does not exceed 385V. (770 V for the 400V class.)
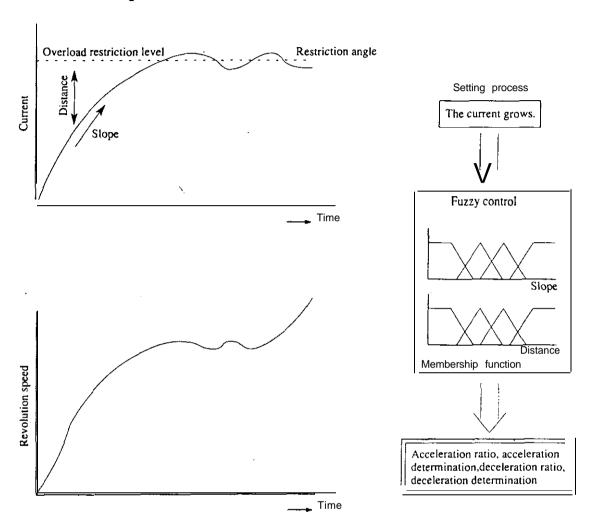
The function sets the acceleration and deceleration time automatically in response to a change in the load or inertia in real time.

[Precautions]

1. This function is not suitable for a machine which requires a constant acceleration and deceleration time. The acceleration and deceleration time varies with the magnitude of the load or inertia.
2. When the inertia of the machine is more than about 20 times of that of the motor shaft, a trip may occur.
3. The acceleration and deceleration time of the same motor always varies with a change of the current.
4. The fuzzy most suitable acceleration and deceleration setting function is valid only under the V/F control. In the high start torque running mode (under the sensorless vector control), the normal running is performed..
5. If the jogging running is executed when the fuzzy most suitable acceleration and deceleration setting function is selected, the jogging operation cannot be performed due to the fuzzy control.
6. When the load is more than the rated one, the deceleration time may be increased.
7. When acceleration and deceleration (the cycle is 2 [s] or less) are repeated frequently, a trip may occur.
8. If an external braking unit is used, the motor cannot stop within the deceleration time set with a braking resistor. In such a case, do not use the fuzzy acceleration/deceleration function.
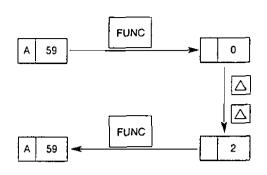
[Principle]

The acceleration and deceleration ratio or acceleration and deceleration are set in accordance with the fuzzy rule from the distance to the overload restriction level and the start slopes of current and voltage.

[Setting method]
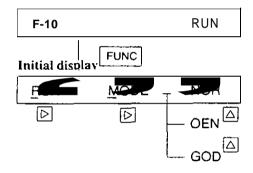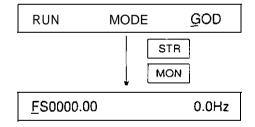
(1) Digital operator

Select ☐ 2 by A 5 9 running mode selection.

Running mode selection

0: Normal running
1: Energy conservation running
2: Fuzzy most suitable acceleration and decelerationrunning

When the running starts after the data is set, the most suitable acceleration and deceleration running is performed.

(2) Remote operator

| F-10 | RUN |

Initial display

| RUN | MODE | GOD |

| FS0000.00 | 0.0Hz |

F-IO running mode selection is displayed. Display the RUN MODE screen and select "GOD".

Running mode selection
NOR: Normal running
OEN: Energy conservation running
GOD: Fuzzy most suitable acceleration and deceleration running
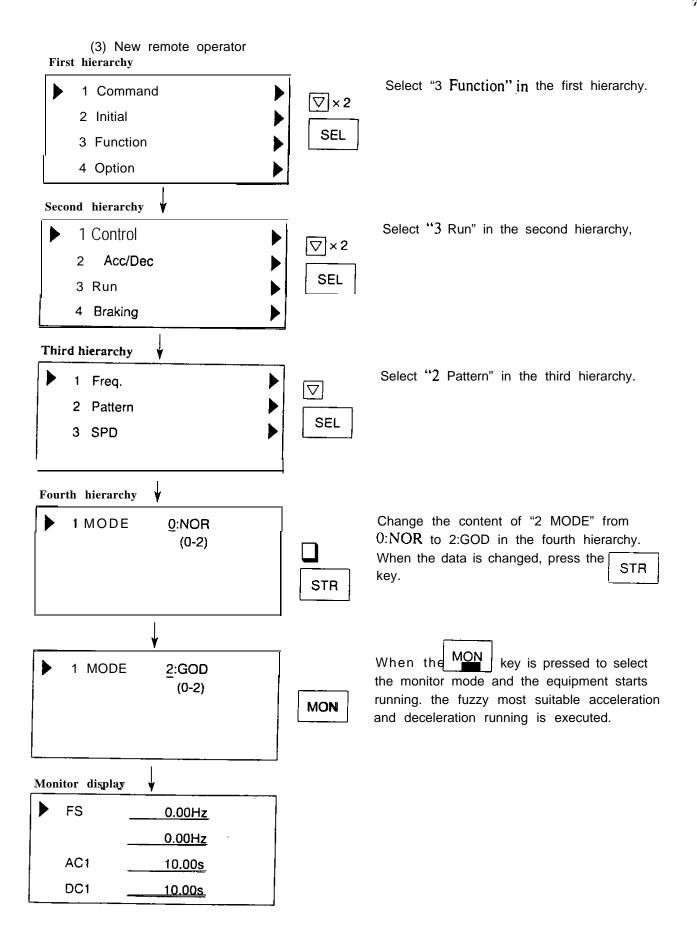
When the running starts after the data is set, the most suitable acceleration and deceleration running is performed.

* When the running starts after the data is set, the acceleration and deceleration time display is as shown below. During the fuzzy most suitable acceleration and deceleration running, the acceleration and deceleration time display in the monitor mode is invalid. (The time can be set but the display is invalid. It becomes valid once again during the normal running.)

(3) New remote operator

First hierarchy

▶ 1 Command	▶
2 Initial	▶
3 Function	▶
4 Option	▶

▽ × 2

SEL

Select "3 Function" in the first hierarchy.

Second hierarchy ↓

▶ 1 Control	▶
2 Acc/Dec	▶
3 Run	▶
4 Braking	▶

▽ × 2

SEL

Select "3 Run" in the second hierarchy,

Third hierarchy ↓

▶ 1 Freq.	▶
2 Pattern	▶
3 SPD	▶

▽

SEL

Select "2 Pattern" in the third hierarchy.

Fourth hierarchy ↓

▶ 1 MODE	0:NOR
	(0-2)

☐

STR

Change the content of "2 MODE" from 0:NOR to 2:GOD in the fourth hierarchy. When the data is changed, press the | STR | key.

↓

▶ 1 MODE	2:GOD
	(0-2)

MON

When the | MON | key is pressed to select the monitor mode and the equipment starts running. the fuzzy most suitable acceleration and deceleration running is executed.

Monitor display ↓

▶ FS	0.00Hz
	0.00Hz
AC1	10.00s
DC1	10.00s

A-14

Appendix 2 Instantaneous Power Failure Restart and Commercial Power Source Switching

1. Instantaneous power failure restart

[Function Outline]

This function allows an inverter operation to be selected according to the subject system as follows when an instantaneous power failure occurs.
- Retry mode: When FTP/RST/ZST is set at IPS POWR
- Alarm mode: When ALM is set at IPS POWR
- f matching: The rotation speed and the phase are detected while the motor is on a free running to restart the operation accordingly1

⚠ **WARNING**
▢   When the invener stops due to a trip with retry mode selected, the motor restarts suddenly. Stand clear of the machine. Otherwise, you may be injured. (Design the machine in such a way that persons are protected against a restart of the machine.)

[Setting Method]

Remote operator [F-22]		Digital operator	At instantaneous power failure	At low voltage	Aovercurrent/ overvoltage/ powermoduleerror	At oth error
PS TIME	0.3 to 25.0	—	Set an allowable instantaneous power failure time.	—	—	—
PS WAIT	0.3 to 100.0	—	Set a wait time after an instantaneous power failure/power restoration in the retry mode or after an error.			—
PS POWR	ALM	0	Tripping with an instantaneous power failure within the IPS TIME. If an operation command is issued for an instantaneous power failure detected out of the IPS TIME. restart the operation ((Hz start).	Tripping	Tripping	Trippi
	FTP	1	The f matching stops with an instantaneous power failure detected within the IPS TIME. The invener trips with an' instantaneous power failure detected out of the PIS TIME.	The f matching slops if power is restored within 40s. The invcner trips unless power is restored within 40s.	The f matching is retried.	
	RST	2	The f matching is restarted if the instantaneous power failure is within the IPS TIME. The invener trips if the instantaneous power failure is not within the IPS TIME.	The f matching is restarted if power is restored within 40s. The invener trips unless power is not restored within 40s.		
	ZST	3	The invener is restarted at 0 Hz if the instantaneous power failure is within the PIS TIME. The invener trips if the instantaneous power failure is not within the IPS TIME.	The invcner is started at 0 Hz if power is restored within 40s. The invener trips unless paver is restored within 40s.		
'STRIP	OFF	—	No retry at an instantaneous powe ailure and no trip at low voltage during the inverter stop.		—	—
	ON	—	Retry or under voltage trip is performed during the invener stop or running.		—	—

NOTE: Since the retry mode is selected, the equipment restarts for trips of overcurrent, overvoltage, or undervoltage. For undervoltage, 16 retries (17th trip) are executed. For overcurrent or overvoltage, 3 retries (fourth trip) are executed.

Do not use this function for a case that a fallen substance should be held by the machine brake when the motor is in the free-run mode.

In the following cases, the equipment may start at the lowest frequency (called 0 start).

1) When the reclosing standby time (function mode F-22, IPS WAIT) after the instantaneous power failure is recovered is set to 3 seconds or more

2) When the output frequency is more than 60 Hz

3) When the base frequency is 60 Hz: Driven at 30 Hz or less

   When the base frequency is 50 Hz: Driven at 25 Hz or less

4) When the induced voltage of the motor attenuates earlier (for example, a pump or high-speed gear which causes the motor to decelerate for several seconds or less)

NOTE: The inverter control power holding time may be slightly different depending on the inverter rating, the load status, remote operator (copy unit) connection status, and input voltage.

<Time chart for retry mode>

An instantaneous power failure trip (Inst.p-f) occurs because t2>t0.

The operation restarts because t2>=t0.

The running restarts when a running command is issued because t2>t1.
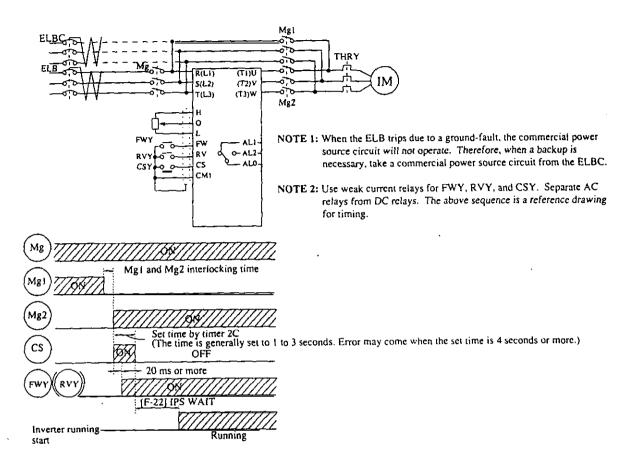
t0: Instantaneous power failure time   t1: Control power holding time when power is tuned OFF   t2: F-22 (IPS TIME se, value)
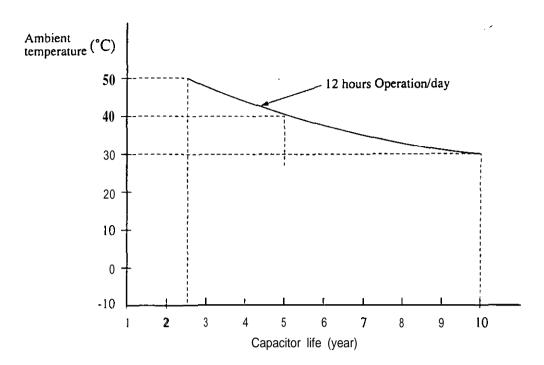
2. Commercial power source switching

tal ope

Function code

F	9

Set value	Run command to	Frequency command to
03	Terminal	Terminal

⇒ Set the terminal mode.

Extension function code

C	3

Function name	Terminal rating plate	Set value
Input terminal setting 3	3	14

⇒ Select the CS terminal.

NOTE: Allocate the commercial power source switching input terminal CS to one of the input terminal settings I to 8 (C 0 to C 7). In this example. the terminal CS is allocated to the input terminal setting 3.

Remote operator (DOP) or copy unit (DRW)

Monitor mode

F-SET-SELECT TRM
F/R-SELECT TRM

⇒ Set TRM (terminal mode)

Function mode F-34

IN-TM3	CS

⇒ Select the CS terminal.

NOTE: Allocate the commercial power source switching input terminal CS to one of the input terminal settings I to 8 (IN-TM I to IN-TM8). In this example. the terminal CS is allocated to the input terminal selling 3.

NOTE 1: When the ELB trips due to a ground-fault, the commercial power source circuit will not operate. Therefore, when a backup is necessary, take a commercial power source circuit from the ELBC.

NOTE 2: Use weak current relays for FWY, RVY, and CSY. Separate AC relays from DC relays. The above sequence is a reference drawing for timing.

Connection example diagram and timing for commercial power source switching running

Appendix 3 Capacitor Life Curve
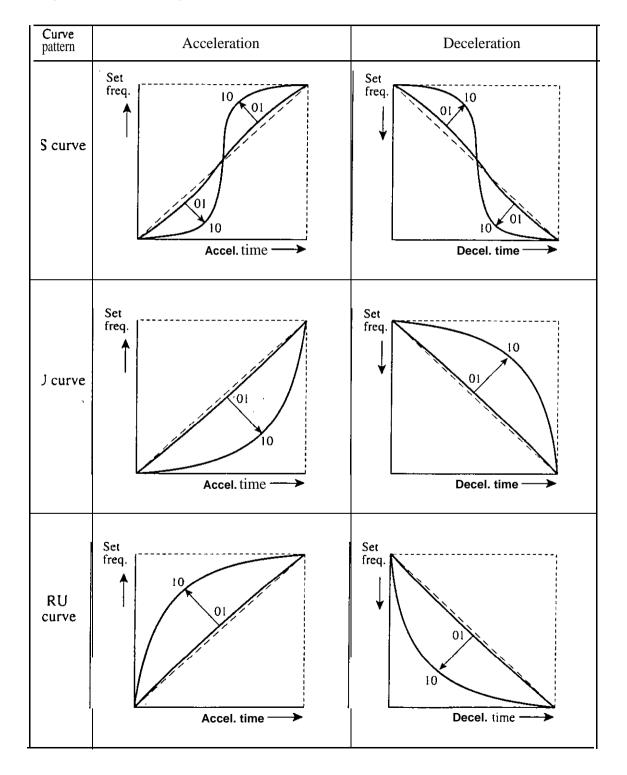
* The ambient temperature herein means the temperature around the inverter body. If the inverter is housed in a panel, the ambient temperature corresponds to the temperature in the panel.
* Even when the ambient temperature is within the rating, the capacitor life is shortened if ventilation is impeded due to bad installation conditions or dust.

Appendix 4 Acceleration/Deceleration Curve Constants

This function can vary the curvature when the acceleration curve pattern (or deceleration curve pattern) is selected to S curve, U curve or RU (reverse U) curve in the function mode (F-06). If the acceleration curve pattern or deceleration curve pattern is selected, the selected pattern applies to both acceleration and deceleration.

The larger number causes a greater curvature.

Curve pattern	Acceleration	Deceleration
S curve		
J curve		
RU curve		

No.	Operation conditions	Phenomena	Improvements NOTE: The setting methods shown below apply to DOP and DRW operations.	Display, etc.
1	Trial running of motor only	The motor runs unsmoothly, and the revolution fails to increase. The motor current pulsates.	1. When V/f control or sensor-less vector control is selected ┌─ Function mode ─┐ ● F-36 CARRIER 16.0 kHz → 8.0 kHz Decrease the initial value.	12.3 Function mode F-36 (P.12-14)
2	Light load, low inertia load			
3	Acceleration and deceleration of light load or low inertia load	Revolution 0.1 sec. 0.1 sec. Revolution The motor revolution fails to increase smoothly	2. When V/f control is selected ┌─ Function mode ─┐ ● F-04 CONTROL VC ● F-05 AUX R1 00.223 → 00.323 Increase the initial value. 3. When sensor-less vector control is selected ┌─ Function mode ─┐ . F-04 CONTROL SLV . F-05 AUX DATA NOR a. AUX J 001.22 kgm^2 → 000.22 kgm' Decrease the initial value. b. AUX Kp 002.00 → 003.00 Increase the initial value. Use a and b solely or combine any of a and b to adjust the motor constant.	12.3 Function mode F-04 (P.12-5) 12.3 Function mode F-05 (P.12-5) NOTE: Select AUTif the automatic tuning data is used.) Use the second function for switching operation of two motors.

Operation conditions	Phenomena	Improvements NOTE: The setting methods shown below apply to DOP and DRW operations.	Display, etc.

Quickly varying load	
	
	The motor revolution varies when the load varies.
		When sensor-less vector control is selected
		
		┌─ Function mode ─────────────┐
		• F-04
		  CONTROL SLV
		• F-05
		  AUX DATA NOR
		
		a. AUX J 001.22 kgm² → 003.22 kgm²
		                       Increase the initial value.
		
		b. AUX Kp 002.00 → 001.00
		                 Decrease the initial value.
			NOTE: Select AUT if the automatic tuning data is used.)

NOTE: When sensor-less vector is selected, driving of motor at low speed whose
constant is different from the factory settings may cause reverse run.
In this case, measure the motor constant using the automatic tuning mode
or reduce the setting value of primary resistor (RI) of the motor.

No.	Operation conditions	Phenomena	Improvements NOTE: The setting methods shown below apply to DOP and DRW operations.	Display, etc.
5	Parallel motor operation	Operation cannot be started at high torque, since the inverter does not know the load sharing of the motors.	1. When sensor-less vector control is selected Function mode • F-04 CONTROL SLV → VC Reset to V/f control. Select the motor capacity which is the most approximate to the total capacity of the motors used. (For example, 7.5 kW, 5.5 kW, and 3.7 kW.) Function mode Total capacity of the motors: 7.5 + 5.5 + 3.7 = 16.7kW • F-05 AUX K 022.00 kW → 015.00 kW Select the most approximate value to the total capacity. If two or more motors are changed in operation, select the most approximate value to the motor capacity. Example 1: One 5.5 kW motor is used • F-05 AUX K 022.00 kW → 005.50 kW Select the most approximate value. Example 2: One 5.5 kW motor is changed into parallel operation of four 5.5 kW motors Total capacity of the motors: 5.5 × 4 = 22.0 kW • F-04 AUX K 005.50 kW → 022.00 kW Select the most approximate value.	12.3 Function mode F-04 (P.12-5) A | I The sensor-less vector control is not applicable to multi-motor parallel operation.

Appendix 6 Supplementaly Explanation of the Function Mode

- The explanation of the function mode is displayed on the DOP or DRW type of the remote operator.
  As for the operating methods with other remote operators, refer to the corresponding table of the operator display.
- After data is changed, be sure to push down the STR key.
  No data is stored in the inverter body.
- Change data when the inverter is stopped. (except when the inverter is stopped during trip, and stopped when ON between the reset terminal RS and CM1.)
- In the function mode, the motor cannot be started running.
  Select the monitor mode beforehand.

Function name: Second function setting   Function No. F-34

Intelligent input terminal [SET]   to be set   (F-00. F-O 1, F-04. F-OS)

Function contents

It is possible to run two motors with one inverter by switching the control circuit terminal [SET]. The changing of the SET terminal can be executed only when the inverter is stopped.

Function which can be set with the second function

[Monitor mode]

1. Output frequency setting
2. Acceleration and deceleration time setting (NOTE)
   (Function mode)
   F-06
   Acceleration time setting
   F-07
   Deceleration time setting
3. Manual torque boost setting

[Function mode]

1. F-00
   Basic frequency setting
2. F-01
   Maximum frequency setting
3. F-04
   Control method
4. F-OS
   Motor constant setting

NOTE:

When selecting the second function. 2-stage acceleration and deceleration time setting can not be set and used. When setting and using the Z-stage acceleration and deceleration time, select the first function (when [SET] terminal is OFF).

Setting contents

1. Setting method 1: Digital operator

Set [8] in any of the input terminals [C 0] to [C 7].

[Setting example]

Set the Z-stage accel. and dcccl. function of [C 4] to the second function.

[FUNC] [▼] [FUNC]

[C 4] - [9] - [8] - [C 4]

Setting method 2: Remote operator

Set the settings [SET] in any of the input terminals 1 to 8.
When using the high performance remote operator, input [8] SET with the ten key.

2. Function changing method

After the input terminal of the setting function cod and SET arc short circuited, the second function setting can be started.
When the short cuicuit is recovered, the function returns to the original setting (the first function).

3. Setting method of each function

Set same as the normal setting.
When checking the function mode. confirm it with the terminal status ON/OFF.

Initial settings

Initial settings which can be set with the second functioi is same as the factory settings.

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Appendix 7 List for display and data read/copy with each operators

(1) Monitor mode

Y: Possible
N: Not possible

Monitor name	Display with HOP, HRW		Display with DOP. DRW		Function No with digital operator Data read/copy se,					valu
					Alterability	No.	Data	HRW	DRW	
Frequency setting										
First setting	FS	0.00 Hz	FS0000.0	0.0 Hz	Y	F2	0.00	Y	Y	
Second setting	FS	0.00 Hz	FS0000.0	0.0 Hz	Y	F2	0.00	Y	N	
Multistage speed setting	IS	0.00 Hz	IS0000.0 (2)	0.0 Hz	Y	F2	0.00	Y	N	
	7s	0.00 Hz	7SOOO0.0	0.0 Hz						
Analog frequency selling	TM	0.00 Hz	TM 0.0 (4)	0.0 Hz	Y	F2	0.00	N	N	
logging frequency setting	JG	1.00 Hz	JG 1.0 (5)	0.0 Hz	Y	F2	1.00	Y	Y	
Option I frequency display *1	O1	0.00 Hz	O1 0.0 (6)	0.0 Hz	Y	F2	0.00	Y	N	
Option 2 frequency display *1	02	0.00 Hz	02 0.0 (7)	0.0 Hz	Y	F2	0.00	Y	N	
Output frequency setting		0.00 Hz	FS0000.0 (8)	0.0 Hz	Y	d0	0.00	—	—	
Acceleration time setting										
First setting	ACI	30.00 s	ACC I	0030.00 s	Y	F6	30.0	Y	Y	
Second setting	ACI	30.00 s	ACCI	0030.00 s	Y	F6	30.0	Y	N	
2-step acceleration lime setting	AC2	15.00 s	ACC2	0015.00 s	Y	F6	15.0	Y	N	
Deceleration time selling										
First setting	DC1	30.00 s	DEC1	0030.00 s	Y	F7	30.0	Y	Y	
Second setting	DCI	30.00 s	DECI	0030.00 s	Y	F7	30.0	Y	N	
2-step deceleration time setting	DC2	15.00 s	DEC2	0015.00 s	Y	F7	15.0	Y	N	
Motor pole number setting RPM		1:4 P	RPM 4P (13)	ORPM (14)	Y	A25	4	Y	Y	
Motor rpm monitored		ORPM			Y	d1	0.00	—	—	
Converted frequency setting	/Hz	1.0	/Hz 01.0 (15)	0.00 (16)	Y	A47	1.00	Y	Y	
Converted frequency monitor		0.00			Y	d3	0.00	—	—	
Output current monitor	Im	0.0 A	Im 0.0 A (17)	0.0 % (18)	Y	d2	0.00	—	—	
Output current rate monitor		0.0 %			N	—	—	—	—	
Torque monitor	Torque	0 %	Torque	0 %	N	—	—	—	—	
Manual torque boost adjustment										
First setting	V-Boost	I	V-Boost	code<11>	Y	F8	II	Y	Y	
Second setting	V-Boost	1 1	V-Boost	code<11>	Y	F8	II	Y	N	
Manual torque boost frequency adjustment										
First setting	V-Boost	F 10.0 %	V-Boost	F 10.0 %	N	—	—	Y	N	
Second setting	V-Boost	F 10.0 %	V-Boost	F 10.0 %	N	—	—	Y	N	
Output voltage gain adjustment	V-Gain	100 %	V-Gain	100 %	N	—	—	Y	Y	
ogging frequency setting	Jogging	1.00 Hz	Jogging	1.00 Hz	Y	A61	1.00	Y	Y	
Analog meter adjustment	ADJ	172	ADJ	172	Y	F10	172	Y	N	
Terminal input status monitor	TERM LLLLLLLLLL		TERM LLLLLLLLLL		N	—	—	—	—	
Alarm display										
First setting	WARN	#	WARN	#	N -	-		Y	N	

*1 Represents an indication for commanding frequency from the optional PCB.

Monitor name	Display with HOP, HRW		Display with DOP, DRW		Function No. with digital operator Alterability	No.	Data	read/copy HRW	DRW	set Value
Trip cause factor 1	ERR1	#	ERR1	#	Y	d10	---	N	N	
Trio frequency 1	ERR1	0.0 Hz	ERR1	0.0 Hz	N	—	—	N	N	
Trip current 1	ERR1	0.0 A	ERR1	0.0 A	Y	d10	---	N	N	
Trip time P-N voltage 1	ERR1	0.0 Vdc	ERR1	0.0 Vdc	Y	d10	---	N	N	
Integrated count 1 of cause time running days	ERR1 R	0 Y 0 D	ERR1 R	0 Y 0 D	N	—	—	N	N	
Integrated error count	ERR COUNT 0		ERR COUNT 0		N	—	—	N	N	
Trip cause 2	ERR2	#	ERR2	#	Y	d11	---	N	N	
Trip frequency 2	ERR2	0.0 Hz	ERR2	0.0 Hz	N	—	—	N	N	
Trip current 2	ERR2	0.0 A	ERR2	0.0 A	N	—	—	N	N	
Trip time P-N voltage 2	ERR2	0.0 Vdc	ERR2	0.0 Vdc	N	—	—	N	N	
Integrated count of error time running days	ERR2 R	OYOD	ERR2 R	OYOD	N	—	- -	N	N	
Trip cause 3	ERR3	#	ERR3	#	Y	d11	---	N	N	
Trip frequency 3	ERR3	0.0 Hz	ERR3	0.0 Hz	N	—	—	N	N	
Trip current 3	ERR3	0.0 A	ERR3	0.0 A	N	—	—	N	N	
Trip time P-N voltage 3	ERR3	0.0 Vdc	ERR3	0.0 Vdc	N	—	—	N	N	
Integrated count of error	ERR3 R	O Y O D	ERR3 R	OYOD	N	—	—	N	N	

(2) Function mode

Y: Possible
N: Not possible

Function mode	Display with HOP, HRW		Display with DOP. DRW		Function No. with digital operator Alterability	No.	Data	read/copy HRW	DRW	set valu
	Layer	Data display	No.	Data display						
Frequency command	1-	1F-SET 1:REM	Monitor	F-SET-SELECT REM	Y	F9	0	Y	Y	
Operation command		2F/R 1:REM	Monitor	F/R-SELECT REM				Y	Y	
Parameter selection		3PARM 0:REM	F-09	PARAMREM	N	—	—	Y	Y	
Trip history count clear	2-	1TCNT 0:CNT	F-38	INITTCNTCNT	N	—	—	Y	Y	
Debug mode display selection		2DEBG 0:OFF		INITDEBGOFF	N	—	—	N	N	
Digital operator rotating direction selection		3DOPE 0:FWD		INITDOPERWD	Y	F4	F	Y	Y	
Reset performance selection		4RESET 0:ON		INITRESETON	Y	F86	0	Y	Y	
Base frequency setting First setting	3-1-1	1F-BASE 50Hz	F-00	F-BASE0050Hz	Y	A62	50	Y	Y	
Second setting		1F-BASE 50Hz		F-BASE0050Hz	Y	A62	50	Y	N	
Max. frequency setting First setting		2F-MAX 50Hz	F-01	F-MAX0050Hz	Y	A63	50	Y	Y	
Second setting		2F-MAX 50Hz		F-MAX0050Hz	Y	A63	50	Y	N	
Start frequency setting		3Fmin 0.5Hz	F-02	Fmin 0.50Hz	Y	A4	0.50	Y	N	
Motor voltage setting		4A-AC 0:200V	F-03	AVRAC200V	Y	F11	200	Y	Y	
AVR function ON/OFF during deceleration		5A-DEC 0:ON		AVRDECON	N	—	—	Y	Y	

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Function mode	Display with HOP, HRW		Display with DOP, DRW		Function No with digital operator			Data read/copy		set value
	Layer	Data display	No.	Data display	Alterability	No.	Data	HRW	DRW	
Control method										
First setting	3-1-1	6MODE 0: VC	F-04	CONTROL VC	Y	A0	0	Y	Y	
Second setting		6MODE 0: VC		CONTROL VC	Y	A0	0	Y	N	
Auto tuning setting	3-1-2	1AUTO 0: NOR	F-05	AUX AUTO NOR	Y	A97	0	Y	N	
Motor data selection										
First setting		2DATA 0: NOR		AUX DATA NOR	Y	A98	0	Y	N	
Second setting		2DATA 0: NOR		AUX DATA NOR	Y	A98	0	Y	N	
Motor capacity selection										
First setting		3K6:5.50kW		AUX K0050 kW	Y	A1	5.50	Y	Y	
Second setting		3K6:5.50kW		AUX K0050 kW	Y	A1	5.50	Y	N	
Motor pole number selection										
First setting		4P 1:4P ·		AUX P 4P	Y	A2	04	Y	Y	
Second setting		4P 1:4P		AUX P 4P	Y	A2	04	Y	N	
Motor constant R1 setting										
First setting		5R1 0.251		AUX R1 0.0251	N	—	—	Y	Y	
Second setting		5R1 0.251		AUX R1 0.0251	N	—	—	Y	N	
Motor constant R2 setting										
First setting		6R2 0.194		AUX R2 0.0194	N	—	—	Y	Y	
Second setting		6R2 0.194		AUX R2 0.0194	N	—	—	Y	N	
Motor constant L setting										
First setting		7L 3.29mH		AUX L 003.29 mH	N	—	—	Y	Y	
Second setting		7L 3.29mH		AUX L 003.29 mH	N	—	—	Y	N	
Motor constant M setting										
First setting		8M 30.90 mH		AUX M 030.90 mH	N	—	—	Y	Y	
Second setting		8M 30.90 mH		AUX M 030.90 mH	N	—	—		N	
Motor constant J setting										
First setting		9J 0.44		AUX J 000.44 kgm^2	N	—	—	Y	Y	
Second setting		9J 0.44		AUX J 000.44 kgm^2	N	—	—	Y	N	
Motor constant Kp setting										
First setting		aKp 2.00		AUX Kp 2.00	Y	A3	2.00	Y	Y	
Second setting		aKp 2.00		AUX Kp 2.00	Y	A3	2.00	Y	N	
Motor constant Ti setting										
First setting		bTi 100ms		AUX Ti00100 ms	N	—	—	Y	Y	
Second setting		bTi 100ms		AUX Ti00100 ms	N	—	—	Y	N	
Motor constant Kpp setting										
First setting		cKpp 1.00		AUX Kpp001.00	N	—	—	Y	Y	
Second setting		cKpp 1.00		AUX Kpp001.00	N	—	—	Y	N	
Carrier frequency setting	3-1-3	1CARRY 16.0kHz	F-36	CARRIER 16.0 kHz	Y	A10	16.0	Y	Y	
Acceleration time setting										
First setting	3-2-1	1A1 30.00s	F-06	ACC1 0030.00 s	Y	F6	30.0	Y	Y	
Second setting		1A1 30.00s		ACC1 0030.00 s	Y	F6	30.0	Y	N	
2-step acceleration setting		2A2 15.00s		ACC2 0015.00 s	Y	F6	15.0	Y	N	
Acceleration time curve pattern setting		3LINE 0: L		ACCLINE L	N	—	—	Y	Y	
Acceleration/deceleration curve		4GAIN 2		ACCGAIN 02	N	F7	30.0	Y	Y	

A-27

Function mode	Display with HOP, HRW		Display with DOP, DRW		Function No with digital operator			Data read/copy		set value
	Layer	Data display	No.	Data display	Alterability	No.	Data	HRW	DRW	
Deceleration time setting										
First setting	3-2-2	1DI 30.00s	F-07	DEC1 0030.00s	Y	F7	30.0	Y	Y	
Second setting		1DI 30.00s		DEC1 0030.00s	Y	F7	30.0	Y	N	
2-step deceleration time setting		2D2 15.00s		DEC2 0015.00s	Y	F7	15.0	Y	N	
Deceleration time curve pattern selection		3LINE 0:L		DECLINE L	N	—	—	Y	Y	
Acceleration/deceleration curve constant selection		4GAIN 2		DEC GAIN 02	N	—	—	Y	Y	
Acceleration time stop frequency setting	3-3-1	1F 0.0Hz	F-08	FspF 0000.0 Hz	N	—	—	Y	Y	
Acceleration time stop time setting		2TIME 0.0s		FspTIME 00.0s	N	—	—	Y	Y	
Multi-step speed/process stepping selection	3-3-2		F-10							
Operation mode selection		1MODE 0:NOR		RUN MODE NOR	Y	A59	0	Y	N	
Free run stop		2FRS 1:ZST		RUN FRS ZST	Y	A54	01	Y	Y	
1st speed of Multistage speed	3-3-3	1S1 0.00Hz	F-11	SPD1 0000.00 Hz	Y	A12	0.0	Y	N	
2nd speed of Multistage speed		2S2 0.00Hz		SPD2 0000.00 Hz	Y	A13	0.0	Y	N	
3rd speed of Multistage speed		3S3 0.00Hz		SPD3 0000.00 Hz	Y	A14	0.0	Y	N	
4th-7th speed of Multistage speed		4S4 0.00Hz to 7S7 0.00Hz		SPD4 0000.00 Hz to SPD7 0000.00 Hz	Y	F2	0.0	Y	N	
DC braking selection	3-4-1	1SW 0:OFF	F-20	DCB SW OFF	N	—	—	Y	Y	
DC braking type selection		2KIND 1:LVL		DCB KIND LVL	N	—	—	Y	Y	
DC braking frequency selection		3F 0.5Hz		DCB F 0000.5 Hz		—	—	Y	Y	
DC braking power selection (starting time)		4V-STA 0		DCB V-STA 00	N	—	—	Y	Y	
DC braking power selection (stopping time)		5V-STP 0		DCB V-STP 00	N	—	—	Y	Y	
DC braking time selection (starting time)		6V-STA 0.0s		DCB V-STA 000.0 s	N	—	—	Y	Y	
DC braking time selection (stopping time)		7T-STP 0.0s		DCB T-STP 000.0 s	N	—	—	Y	Y	
DC braking output OFF time adjustment		8STOP-T 0.00s		DCB STOP-T 0.00 s	N	—	—	Y	Y	
Regeneration braking setting	3-4-2	1%ED 1.5%	F21	BRD-%ED 001.5%	Y	A38	1.5	Y	Y	
Electronic thermal characteristics selection										
First setting	1-S-1	1CHAR 1:SUB	F23	E-THM CHAR SU	Y	A24	1	Y	Y	
Second setting		1CHAR 1:SUB		E-THM CHAR SUB	Y	A24	1	Y	N	
Electronic thermal level setting										
First setting		2LEVEL 100%		E-THM LEVEL 100%	Y	Au	100	Y	Y	
Second setting		2LEVEL 100%		E-THM LEVEL 100%	Y	A23	100	Y	N	
Electronic thermal characteristics free setting (current value 1)		3A1 15.8A		E-THM A1 15.8 A	N			Y	N	
Electronic thermal characteristics free setting (frequency 1)		4F1 0Hz		E-THM F1 0000 Hz	N	—	—	Y	N	
Electronic thermal characteristics free setting (current value 2)		5A2 15.8A		E-THM A2 15.8 A	N	—	—	Y	N	

Function mode	Display with HOP, HRW		Display with DOP. DRW		Function No.with digital operator			Data read/copy		set value
	Layer	Data display	No.	Data display	Alterability	No.	Data	HRW	DRW	
Electronic thermal characteristics free setting(frequency2)	3-5-1	6F2　0Hz	F-23	E-THM F2 0000 Hz	N	—	—	Y	N	
Electronic thermal characteristics free setting(current value3)		7A3　24.0A		E-THM A3 24.0 A	N	—	—	Y	N	
Electronic thermal characteristics free setting(frequency3)		8F3　73Hz		E-THM F3 0073 Hz	N	—	—	Y	N	
Overload limit level setting	3-5-2	1LEVEL　125%	F-24	OLOAD LEVEL125%	N			Y	Y	
Overload limit constant setting		2CONST 1.0		OLOAD CONST 01.0	N	—	—	Y	y	
Overload limit selection during acceleration		3ACC　1:ON		OLOAD ACC ON	N	—	—	Y	Y	
Frequency lower limiter setting	3-5-3	1LIML　0.0Hz	F-26	LIMIT L 0000.0 Hz	Y	A5	0.0	Y	Y	
Frequency upper limiter setting		2LIMH　0.0Hz		LIMIT H 0000.0 Hz	Y	A6	0.0	Y	Y	
Jump frequency(1)		3F1　0.0Hz		JUMP F1 0000.0 Hz	Y	A7	0.0	Y	Y	
Jump frequency(2)		4F2　0.0Hz		JUMP F2 0000.0 Hz	Y	A8	0.0	Y	Y	
Jump frequency(3)		5F3　0.0Hz		JUMP F3 0000.0 Hz	Y	A9	0.0	Y	Y	
Jump frequency width setting		6WIDTH 0.5Hz		JUMP W 0.5Hz	N	—	—	Y	Y	
Allowable instantaneous time	3-5-4	1TIME　1.0s	F-22	IPS TIME 1.0s	N	—	—	Y	Y	
Reclosing stand-by after instantaneous power failure recovered		2WAIT　1.0s		IPS WAIT 001.0s	N	—	—	Y	Y	
Instantaneous power failure restart selection		3POWR　0:ALM		IPS POWR ALM	Y	A34	0	Y	Y	
Trip selection during stop at under voltage		4TRIP　1:OFF		IPS TRIP OFF	N	—	—	Y	Y	
Max.frequency selection	3-5-5	1MAXF　0: 120Hz	F-30	F-MAX-L120Hz	Y	A64	120	Y	Y	
Software lock selection		2SLOCK　1:MD1	F-25	S-LOCK MD1	N	—	—	Y	Y	
STOP key validity selection		3STOP　1:ON		F-STOP-SW ON	N	—	—	Y	Y	
Running direction selection		4F/R　2:FRE	F-29	F/R SW FRE	N	—	—	Y	Y	
Reverse run prevention		5PREV.　0:OFF		F/R PREV OFF	N	—	—	Y	Y	
Reduced voltage soft start setting		6RVS　6		F/R RVS 6	Y	A58	6	Y	N	
Analog input voltage selection	3-6-1	1V　1:10	F-31	IN ANA 10V	Y	A48	1	Y	Y	
External frequency start setting		2EXS　0.0Hz		IN EXS 0000.0 Hz	Y	A26	0.0	Y	Y	
External frequency end setting		3EXE　0.0Hz		IN EXE 0000.0 Hz	Y	A21	0.0	Y	N	
External frequency start rate setting		4EX%s　0%		IN EX%S 000%	N			Y	N	
External frequency end rate setting		5EX%E　100%		IN EX%E 100%	N	—	—	Y	N	
External frequency start point setting		6LEVEL　0Hz		IN LEVEL 0Hz	N	—	—	Y	Y	
Frequency command sampling frequency setting		7F-SAMP8		INF-SAMP8	Y	A11	8	Y	N	
Arrival signal output pattern selection	3-6-2	1PTN　0:CST	F-32	ARV PTN CST	Y	A49	0	Y	Y	
Arrival frequency setting for acceleration		2ACC　0.0Hz		ARV ACC 0.0Hz	Y	A39	0	Y	Y	
Arrival frequency setting for deceleration		3DEC　0.0Hz		ARV DEC 0.0Hz	Y	A40	0	Y	Y	
Overtorque signal rate for plus torque		4V　100%	F-31	OV-TRQ V 100%	N	—	—	Y	N	
Overtorque signal rate for minus torque		5R　100%		OV-TRQ R 100%	N	—	—	Y	N	

Function mode	Display with HOP. HRW		Display with DOP, DRW		Function No with digital operator			Data read/copy set		
	Layer	Data display	NO.	Data display	Alterability	N o .	D a t a	H R W	D R W	alue
Input terminal 1 setting	s-6-s	1I-1	18:RS I	_F-34	IN-TM1RS	Y	C 0	18	Y	N	
Input terminal 2 setting		2I-2	16:AT		IN-TM2AT	Y	C 1	16	Y	N	
Input terminal 3 setting		3I-3	5:JG		IN-TM3JG	Y	C 2	5	Y	N	
Input terminal 4 setting		4I-4	11:FRS		IN-TM4FRS	Y	C 3	11	Y	N	
Input terminal 5 setting		5I-5	9:CH1		IN-TM5CH1	Y	C 4	9	Y	N	
Input terminal 6 setting		6I-6	2:CF2		IN-TM6CF2	Y	C 5	2	Y	N	
Input terminal 7 setting		7I-7	1:CF1		IN-TM7CF1	Y	C 6	1	Y	N	
Input terminal 8 setting		8I-8	0:REV		IN-TM8REV	Y	C 7	0	Y	N	
Input terminal 1 NO/NC setting		9I-OC1	0:NO		IN-TM0/C-1NO	Y	C20	00	Y	N	
Input terminal 2 NO/NC setting		aI-OC2	0:NO		IN-TM0/C-2NO				Y	N	
Input terminal 3 NO/NC setting		bI-OC3	0:NO		IN-TM0/C-3NO				Y	N	
Input terminal 4 NO/NC setting		cI-OC4	0:NO		IN-TM0/C-4NO				Y	N	
Output terminal 11 setting		d0-1	0:FA1		OUT-TM1FA1	Y	C10	0	Y	N	
Output terminal 12 setting		e0-2	1:RUN		OUT-TM2RUN	Y	C11	1	Y	N	
Alarm output NO/NC setting		f0-OCA	1:NC		OUT-TM 0/C-A NC	Y	C21	04	Y	N	
Output terminal 11 NO/NC setting		g0-OC1	0:NO		OUT-TM 0/C-1 NO				Y	N	
Output terminal 12 NO/NC setting		h0-OC2	0:NO		OUT-TM 0/C-2 NO				Y	N	
Monitor signal selection	1-6-4	1SEL	0:A-F	F-37	MONITORA-F	Y	A44	O!	Y	Y	
Host operation at OP1 error	4-1	1OP1	1:STP	F-47	OP-ERR1STP	N	- -	- -	Y	N	
Host operation at OP2 error		2OP2	1:STP		OP-ERR2STP	N	—	—	Y	N	
Encode pulse number setting	4-2	1ENC-P	1024pls	F-39	OPP01024pulse	N	—	—	Y	N	
Control mode selection		2MODE	0:ASR		OPMODEASR	N	—	—	Y	N	
Ro-top option selection		3RO-TO	0:OFF		OP-RO-TOOFF	Y	A99	0	Y	Y	
Stop position setting switch	4-3	1POS	0:IN	F-40	ORPOSIN	N	—	—	Y	Y	
Stop position setting		2P	0 pls		OR P00000 pulse	N	—	—	Y	N	
Speed setting		3FC	5.0Hz		ORFC0005.0Hz	N	—	—	Y	N	
Direction setting			0:FWD		FWD	N	—	—	Y	Y	
Completion range setting		5LIMIT	5 pls		OR L.0005 pulse	N	—	—	Y	N	
Completion delay time setting		6TW	0.0ms		OR TW00.0ms	N	—	—	Y	N	
Electronic gear setting position selection	4-4	1EGRP	0:FB	F-41	POEGRPFB	N	—	—	Y	Y	
Numerator of electronic gear ratio		2EGR-N	1		POEGR-N00001	N	—	—	Y	N	
Denominator of electronic gear ratio		3EGR-D	1		POEGR-D00001	N	—	—	Y	N	
Feed forward gain			0.00		.00	N	—	—	Y	N	
Position loop gain		5G	0.50rad		PO G 000.50 rad/s	N	—	—	Y	N	
Torque limiter setting selection	4-5	1LIMIT	0:IN	F-42	TRQLIMITIN	N	—	—	Y	N	
Plus torque limiter setting		2FWD	150%		TRQFWD150%	N	—	—	Y	N	
Minus torque limiter setting		3REV	150%		TRQREV150%	N	—	—	Y	N	
PID target value setting method selection	4-6	1 I-SEL	0:IN	F-43	PIDIN-SELIN	Y	A95	0	Y	Y	
PID target value setting		2LVL	0.00%		PIDLVL.000.0%	Y	A96	000	Y	N	
P gain setting		3P	1.0		PIDP 1.0	Y	A90	1.0	Y	N	
I gain setting		4I	1.0s		PIDI 1.00s	Y	A91	1.0	Y	N	
D gain setting		5D	10.0		PIDD 0100.0	Y	A92	0.0	Y	N	
PID selection		6MODE	0:MD0		PIDMODEMD0	Y	A94	0	Y	N	
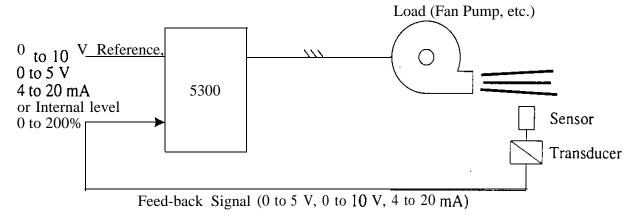
Function mode	Display with HOP, HRW		Display with DOP, DRW		Function No.with digital operator			Data read/copy		set value
	Layer	Data display	NO.	Data display	Alterability	No.	Data	HRW	DRW	
Transmission speed selection	4 7	1 BAUD 1:600 bps	F-46	COM BAUD 0600 bp	N	—	—	Y	N	
Station number selection		2 NUMBER 1		COM NUMBER 01	N	—	—	Y	N	
Bit length selection		3 LENGTH 0:8		COMLENGTH8	N	—	—	Y	Y	
Parity ON/OFF selection		4 PAR-1 1:ON		COMPAR-SEL1 ON	N	—	—	Y	Y	
Odd/even parity selection		5 PAR-2 0:EVN		COM PAR-SEL2 EVN	N	—	—	Y	Y	
Stop bit length selection		6 STOPBIT 0:2		COMSTOPBIT2	N	—	—	Y	Y	
Relay output terminal RYA signal selection	4-8	1 RYA 3:RUN	F-48	RELAYRYA RUN	N	—	—	Y	N	
Relay output terminal RYB signal selection		2 RYB 0:CST		RELAYRYBCST	N	—	—	Y	N	
Relay output terminal RYC signal selection		3 RYC 4:OTQQ		RELAYRYCOTQ	N	—	—	Y	N	
Extension function setting		Setting only for digital operator			Y	F14	A 0	N	N	
Voltage command adjustment		Setting only for digital operator			Y	A80		N	N	
Current command adjustment		Setting only for digital operator			Y	A81		N	N	

Appendix 8 PID Function

1. Function

The PID (Proportional, Integral, Differential) control functions can apply to controlling of the air (water) amount of a fan pump, etc., as well as controlling of pressure within a fixed value. Set the reference signal according to the frequency setting method or the internal level,

Set the feed-back signal according to the analog voltage input (0 to 5V or 0 to IOV) or analog current input (4 to 20 mA).

[Wiring Sketch]

Feed-back Signal (0 to 5 V, 0 to 10 V, 4 to 20 mA)

2. PID Gain

If the response is not stabilized in a PID control operation, adjust the gains as follows according to the symptom of the inverter.

- The change of controlled variable is slow even when the target value is changed..

  — Increase the P gain.

. The change of controlled variable is fast, but not stable.

  — Decrease the P gain.

- It is difficult to make the target value match with the controlled variable.

  — Decrease the I gain.

- Both the target value an the controlled variable are not stable. They match after oscillation.

  -Increase the I gain.

- The response is slow even when the P'gain is increased.

  — Increase the D gain.

. The response is not stabilized due to oscillation even when the P gain is increased.

  — Decrease the D gain.

3. Data Setting Method

(I) Digital operator

Refer to $\boxed{A\ 9\ 0}$ $\boxed{A\ 9\ 1}$ $\boxed{A\ 9\ 2}$ $\boxed{A\ 9\ 4}$ $\boxed{A\ 9\ 5}$ $\boxed{A\ 9\ 6}$ of the extended funciton mode contents (pages 7-26 and 7-27).
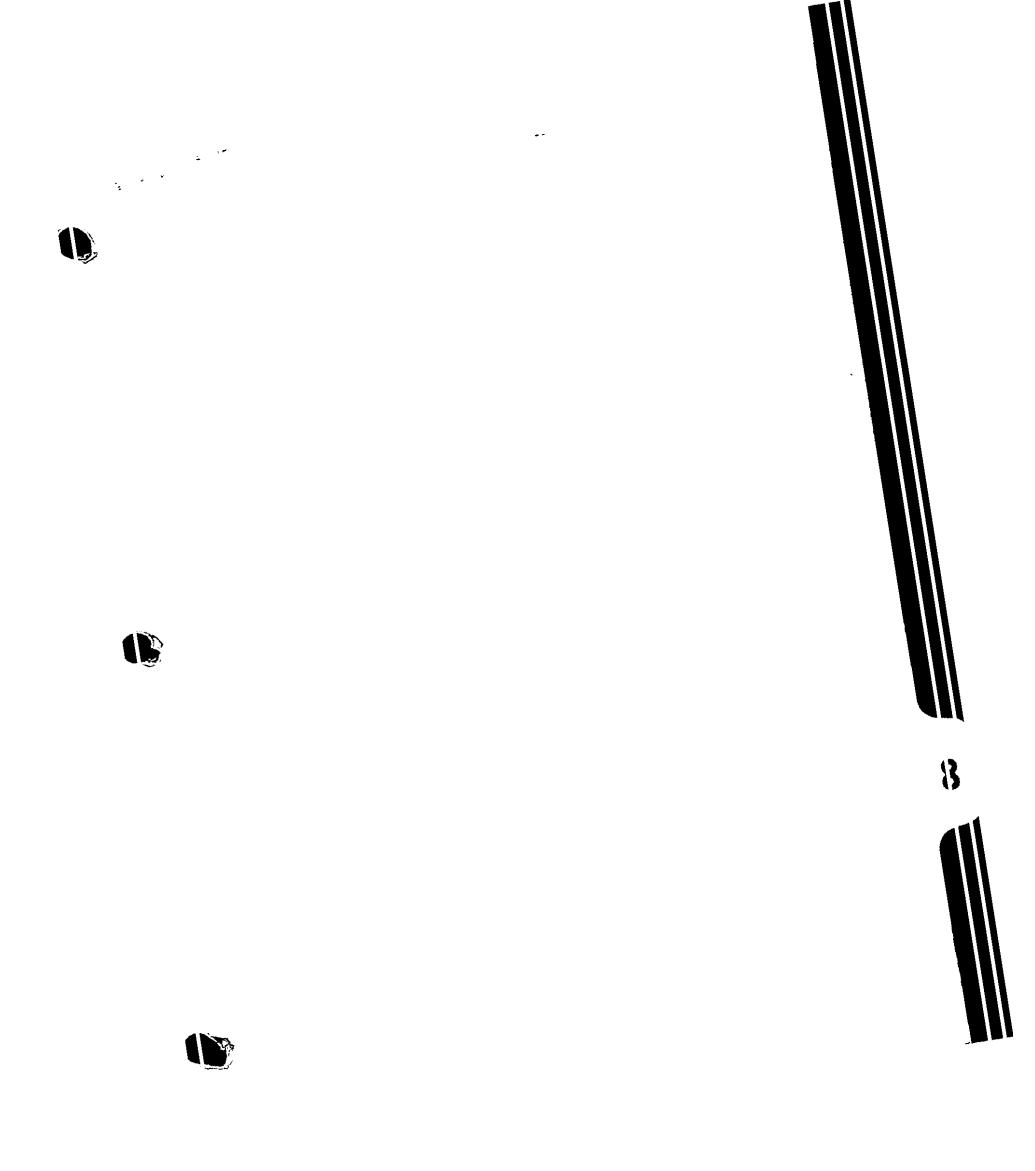
(2) Remote operator

Setting item   Setting range

PID IN-SEL	IN	The PID LVL set value is assumed as the target value.	
	OUT	The target value depends on the frequency setting method.	
$\boxed{F\ 4\ 3}$ PID LVL	0 to 200%		
PID P	0 to 5.0		
PID I	0 to 15.0		
PID D	0 to 100.0		
PID MODE	MD0	Built-in PID control OFF	
	MDI	An analog current input is used as the feed-back signal.	
	MD2	An analog voltage input is used as the feed-back signal.	
	MD3	An analog current input is used as the feed-back signal. I gain × 10.	
	MD4	An analog voltage input is used as the feed-back signal. I gain × IO.	

Notes:
- If the target value signal is to be entered to an external terminal, the signal should not be assigned to the terminal used by the feed-back signal input. If assigned, no PID operation is possible.
- The [PID LVL] value (0 to 200%) corresponds to 0 to IOV of analog voltage input. In other words, if the target value input of 5V is converted to an internal level, set 100% for the [PID LVL].
- If target values are to be entered with current (01-L input), turn on the AT terminal.

A-33

HITACHI INVERTER

L1 00 SERIES

INSTRUCTION MANUAL

Single phase input 200V class
Three phase input 200V class
Three phase input 400V class

Hitachi, Ltd.

NB541XD

Tokyo Japan

SAFETY

For the Best Results with L100 Series inverter, read this manual and all of the warning sign attached to the inverter carefully before installing and operating it, and follow the instructions exactly. Keep this manual handy for your quick reference.

Definitions and Symbols

A safety instruction (message) is given with a hazard alert symbol and a signal word; WARNING or CAUTION. Each signal word has the following meaning throughout this manual.

This symbol means hazardous high voltage. It used to call your attention to items or operations that could be dangerous to your and other persons operating this equipment.
Read these message and follow these instructions carefully.

This is the 'Safety Alert Symbol..' This symbol is used to call your attention to items or operations that could be dangerous to your or other persons operating this equipment. Read these messages and follow these instructions carefully.

WARNING WARNING

Indicates a potentially hazardous situation which. if not avoided. can result in serious injury or death.

CAUTION CAUTION

Indicates a potentially hazardous situation which. if not avoided, can result in minor to moderate injury. or serious damage of product.

The matters described under | ⚠ CAUTION | may, if not avoided. lead to serious results depending on the situation. Important matters are described in CAUTION (as well as WARNING). so be sure to observe them.

NOTE   NOTE: Notes indicate an area or subject of special merit, emphasizing either the product's capabilities or common errors in operation or maintenance.

⚡ HAZARDOUS HIGH VOLTAGE

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there might be exposed components with cases or protrusions at or above line potential. Extreme care should be taken to protect against shock.
Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on an electronic controllers or rotating electrical equipment.

PRECAUTIONS

⚠ **WARNING :** This equipment should be installed, adjusted and serviced by qualified electrical maintenance personal familiar with the construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.

⚠ **WARNING :** The user is responsible for ensuring that all driven machinery, drive train mechanism not supplied by Hitachi, Ltd., and process line material are capable of safe operation at an applied frequency of 150% of the maximum selected frequency range to the AC motor. Failure to do so can result in destruction of equipment and injury to personnel should a single point failure occur.

⚠ **WARNING :** For protection, install a leak breaker type with a high frequency circuit capable of large currents to avoid an unnecessary operation. The ground fault protection circuit is not designed to protect personal injury.

⚠ **WARNING :** HAZARD OF ELECTRICAL SHOCK. DISCONNECT INCOMING POWER BEFORE WORKING ON THIS CONTROL.

⚠ **CAUTION:** These instructions should be read and clearly understood before working on L100 series equipment.

⚠ **CAUTION:** Proper grounds, **disconnecting** devices and **other** safety devices and their location are the **responsibility** of the user and **are not provided** by Hitachi, Ltd.

⚠ **CAUTION:** Be sure to connect a motor thermal switch or overload device to the L100 series controller to assure that the inverter will shut down in the event of an overload or an overheated motor.

⚠ **CAUTION: DANGEROUS VOLTAGE EXISTS UNTIL POWER LIGHT IS OFF.**

⚠ **CAUTION:** Rotating shafts and above ground electrical potentials can be hazardous. Therefore, it is strongly recommended that all electrical work conform to the National Electrical Codes and local regulations. Installation, alignment and maintenance should be performed only by qualified personnel.
Factory recommended test procedures, included in the instruction manual, should be followed. Always disconnect electrical power before working on the unit.

⚠ WARNING   This equipment has high leakage current and must be permanently(fixed) hard wired to earth via two independent cable.

⚠ MOTORS
  a) Class I motor must be connected to protective earth via low resistive path (< 0.1ohm)
  b) Any motor used must be of suitable rating.
  c) Motors may have hazardous moving parts, in this event suitable protection must be provided.

⚠ CAUTION
  Alarm connection may contain hazardous live voltage even when inverter is disconnected. In case of removing front cover for maintenance or inspection, confirm that incoming power for alarm connection is surely disconnected.
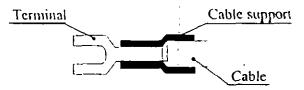
⚠ CAUTION
  Hazardous (main) terminals for any interconnection (motor. contact breaker, filter etc) must be inaccesible in end installation.

⚠ CAUTION
  This equipment should be installed in IP54 or equivalent(see EN60529). The end application must be in accordance with BS EN60204-1(with reference to manual page4-1 and 4-2,the diagram measurements to be suitably amended).

⚠ CAUTION
  Connection to field wiring terminals must be reliably fixed having two independent means of support.Using terminal with cable support (figure below),or cable gland,cable clamp etc

  Terminal   Cable support

                              Cable

⚠ CAUTION
  A double pole disconnection device must be fitted to the incoming mains supply close to the inverter. Additionally, a protection device meeting IEC947-1/IEC947-3 must be fitted at this point(protection device data shown in page S-8)

The above instructions,together with any other requirements highlighted in this manual,must be complied with for continued LVD compliance.

Precautions for EMC (Electro Magnetic Compatibility)

It is required to satisfy the EMC directive (89/336/EEC) when using L100 inverter in EU country.
To satisfy EMC directive and to comply with standard, the followings should be kept.

> ⚠WARNING:
> This equipment should be installed, adjusted and serviced by qualified personal familiar with construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.

I. Power supply to L100 inverter
    1) Voltage fluctuation ± 10% or less.
    2) Voltage unbalance ± 3% or less.
    3) Frequency variation ± 4% or less.
    4) Voltage distortion THD = 10% or less.

2. Installation
    1) Use filler designed for L100 inverter.

3. Wiring
    1) Sielded wire(screened cable) is required for motor wiling. and length is less than 50m.
    2) Carrier frequency must be setting less than 5kHz to satisfy EMC requirement
    3) Separate the main circuit wiring from signal/process circuit wiring.

4. Environment condition
When using a filter, keep the following condition.
    1) Ambient temperature : -10 to 40℃
    2) Humidity : 20 to 90 % RH (no dew condensation)
    3) Vibrations : 5.9 m/s^2(0.6 G) 10 - 55Hz
    4) Location : 1000 meter or less altitude, indoor (no corrosive gas or dust)

Revision History Table

No.	Revision Contents	The Date of Issue	Operation Manual No.
1	Correction of the specification for the reset terminal. (Page 5-11 ; NOTE 2) Correction of the initial data [C 31] , [C32]. (Page 8-14)	September,1997	NB541XC
2	Addition of 5.5kw and 7.5kw model. Addition of insulation resistance test. Addition of the reactive current setting parameter [b32].	July,1998	NB541XD

TABLE OF CONTENTS

1. SAFETY PRECAUTIONS

1. Installation

/!\ CAUTION	
⚠ Be sure to install the unit on flame resistant material such as metal. Otherwise, there is a danger of fire.	p. 4-1
⚠ Be sure not to place anything inflammable in the vicinity. Otherwise, there is a danger of fire.	p. 4-1
⚠ Be sure not to let the foreign matter enter such as cut wire refuse, spatter from welding. iron refuse. wire. dust, etc. Otherwise, there is a danger of fire.	p. 4-1
⚠ Be sure to install it in a place which can bear the weight according to the specifications in the text (4. Installation). Otherwise, it may fall and there is a danger of injury.	p. 4-1
⚠ Be sure to install the unit on a perpendicular wall which is not subject to vibration. Otherwise, it may fall and there is a danger of injury.	p. 4-1
⚠ Be sure not to install and operate an inverter which is damaged or parts of which are missing. Otherwise, there is a danger of injury.	p. 4-1
⚠ Be sure to install it in a room which is not exposed to direct sunlight and is well ventilated. Avoid environments which tend to be high in temperature, high in humidity or to have dew condensation, as well as places with dust, corrosive gas. explosive gas. inflammable gas. grinding-fluid mist, salt damage, etc. Otherwise. there is a danger of fire.	p. 4-1
⚠ Be sure that the wall surface is a nonflammable material, such as steel plate.	p. 4-2

2. Wiring

⚠ WARNING

⚠ "Use 60/75℃ Cu wire only" or equivalent. "Use 75℃ (only for 055LFU) Cu wire or equivalent".	.... p. 5-1
⚠ "Open Type Equipment".	.... p. 5-1
⚠ "A Class 2 circuit wired with Class I wire" or equivalent.	.... p. 5-1
⚠ "Suitable for use on a circuit capable of delivering not more than 5,000 rms symmetrical amperes. 240 V maximum". For models with suffix N or L.	.... p. 5-1
⚠ "Suitable for use on a circuit capable of delivering not more than 5,000 rms symmetrical amperes. 480 V maximum". For models with suffix H.	p. 5-1
⚠ Be sure to ground the unit. Otherwise, there is a danger of electric shock and/or fire.	.... p. 5-1
⚠ Wiring work shall be carried out by electrical experts. Otherwise, there is a danger of electric shock and/or tire.	.... p. 5-1
⚠ Implement wiring after checking that the paver supply is off. It might incur electric shock and/or fire.	... p. 5-1
⚠ After installing the main body, carry out wiring. Otherwise, there is a danger of electric shock and/or injury.	.... p. 5-1

⚠ CAUTION

⚠ Make sure that the input voltage is: p. 5-2

   Single/Three phase 200 to 240 V 50/60 Hz(Up to 2.2kW)

   Three phase 200 to 240V 50/60Hz(Above 2.2kW)

   Three phase 380 to 460 V 50/60Hz

⚠ Be sure not to input a single phase to a 3 phase type.   p. s-2

Otherwise, there is a danger of fire.

⚠ Be sure not to connect AC power supply to the output terminals   p. s-2
(U, V, W).

Otherwise. there is a danger of injury and/or fire.

```
        INPUT              OUTPUT
   Note)
   (L1)        (N)      (T1) (T2) (T3)
   L1   L2   L3          U    V   W
```

Note: L1. N: Single phase 200 to 240V 50/60 Hz
L1, L2, L3: Three phase 200 to 240V 50/60 Hz
Three Phase 380 to 460V 50/60 Hz

Power supply

⚠ Fasten the screws with the specified fastening torque. Check so that   p. s-2
there is no loosening of screws.
Otherwise, there is a danger of fire.

⚠ Remarks for using earth leakage circuit breakers in the mains supply:

Frequency inverters with CE-filters (RFI-filter) and screened motor
cables have a higher leakage current against earth. Especially in the
moment of switching on this can cause unintentional triggerings of
earth leakage circuit breakers. Because of the rectifier on the input
side of the inverter there is the possibility to stall the switch-off
function through amounts of DC-current. The following should be
observed:

   Only short time-invariant and pulse current-sensitive earth leakage
   circuit breakers with higher trigger current should be used.
   Other components should be secured with separate earth leakage
   circuit breakers.

   Earth leakage circuit breakers in front of an inverter are not an
   absolute protection against direct touching.

⚠ Be sure to set the fuse(s) (the same phase as the main power supply)   .... p. 5-2
in the operation circuit.
Otherwise. there is a danger of fire.

⚠ As for motor leads, earth leakage breakers and electromagnetic   p. 5-2
contactors, be sure to use the equivalent ones with the specified
capacity (rated).
Otherwise, there is a danger of fire.

3. Control and operation

⚠ WARNING	
⚠ Be sure to turn on the input power supply after closing the front case. While being energized, be sure not to open the front case. Otherwise, there is a danger of electric shock.	p. 6-1
⚠ Be sure not to operate the switches with wet hands. Otherwise, there is a danger of electric shock.	p. 6-1
⚠ While the inverter is energized, be sure not to touch the inverter terminals even during stoppage. Otherwise, there is a danger of electric shock.	p. 6-1
⚠ If the retry mode is selected, it may suddenly restart during the trip stop. Be sure not to approach the machine. (Be sure to design the machine so that personnel safety will be secured even if it restarts.) Otherwise, there is a danger of injury.	p. 6-1, p. 8-11
⚠ Even if the power supply is cut for a short period of time, it may restart operation after the power supply is recovered if the operation command is given. If it may incur danger to personnel, be sure to make a circuit so that it will not restart after power recovery. Otherwise, there is a danger of injury.	p. 6-1
⚠ The Stop Key is effective only when the function is set. Be sure to prepare the Key separately from the emergency stop. Otherwise, there is a danger of injury.	p. 6-1
⚠ After the operation command is given, if the alarm reset is conducted, it will restart suddenly. Be sure to set the alarm reset after checking the operation command is off. Otherwise, there is a danger of injury.	p. 6-1 p. 7-12
⚠ Be sure not to touch the inside of the energized inverter or to put a bar into it. Otherwise, there is a danger of electric shock and/or fire.	p. 6-1
⚠ When the power is turned on when the running command is on, the motor starts rotation and it is dangerous. Before turning the power on, confirm that the running command is not on.	p. 7-4
⚠ When the Stop key function is ineffective, pressing the Stop key does nor cancel the stop and trip. Be sure to provide an emergency stop switch separately. When the operation command destination is a digital operator, this selection es ineffective.	p. X-27

⚠ CAUTION	
⚠ Cooling fin will have high temperature. Be sure not to touch them. Otherwise, there is a danger of getting burned.	p. 6-2
⚠ Low to high speed operation of the inverter can be easily set. Be sure to operate it after checking the tolerance of the motor and machine. Otherwise, there is a danger of injury.	p. 6-2
⚠ If a motor is operated at a frequency higher than standard selling value(50Hz/60Hz),be sure to check the speeds of the motor and the machine with each manufacturer, and after getting their consent, operate them. Otherwise, there is a danger of machine breakage.	p. 6-2
⚠ Check the following before and during the test run. Otherwise, there is a danger of machine breakage. • Was the short-cut bar between + I and + removed? . Was the direction of the motor correct? • Was the inverter tripped during acceleration or deceleration? • Were the rpm and frequency meter correct? . Were there any abnormal motor vibrations or noise?	p. 6-4

4. Maintenance, inspection and part replacement

⚠ WARNING	
⚠ After a lapse of more than 5 minutes after turning offlhe input power supply. perform the maintenance and inspection. Otherwise, there is a danger of electric chock.	p. I I-I
⚠ Make sure that only qualified persons will perform maintenance, inspection and part replacement. (Before starling the work. remove metallic objects from your person (wristwatch, bracelet, etc.) (Be sure to use tools protected with insulation.) Otherwise, there is a danger of electric shock and/or injury.	.... p. I I I

⚠ WARNING	
⚠ When removing connectors. never pull the wires. (Wires for cooling fan and logic p.c.board) Otherwise, there is a danger of fire due to wire breakage and/or injury.	.... p. II-I

5. Others

⚠ WARNING
⚠ **Never modify the unit.** **Otherwise, there is a danger of electric shock and/or injury.**

⚠ CAUTION
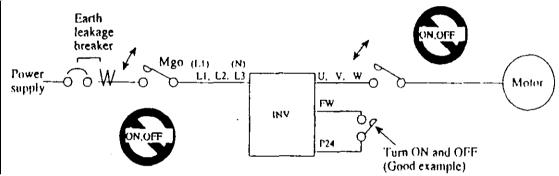
⚠ **Withstand voltage tests and** Insulation resistance tests (megger tests) are executed before the units are shipped, so that there is no need to conduct these tests before operation.

⚠ **Do not attach or remove wiring or connectors when power is applied. Also, do not check signals during operation.**

⚠ **Do not stop operation by switching off the electromagnetic contactors on the primary or secondary sides of the inverter.**

When there has been an instantaneous power failure, and if an operation instruction has been given, then the unit may restart operation after the power failure has ended. If there is a possibility that such an occurrence may harm humans. then install an electromagnetic contactor **(Mgo)** on the power supply side, so that the circuit does not allow automatic restarting after the power supply recovers. If the optional remote operator is used and the retry function has been selected. this will also cause automatic restarting when an operation instruction has been input. so please be careful.

⚠ CAUTION

⚠ Do not insert leading power factor capacitors or surge absorbers between the output terminals of the inverter and the motor.

⚠ Be sure to ground the grounding terminal, ⏚

⚠ When inspecting the unit, after turning the power supply off be sure to wail 5minutes before opening the cover.

⚠ MOTOR TERMINAL SURGE VOLTAGE SUPPRESSION FILTER (FOR THE 400 V CLASS)

in a system using an inverter of the voltage control PWM system. a surge voltage caused by the cable constants such as the cable length (especially when the distance between rhe motor and invener is IO m or more) and cabling method may occur at the motor terminal.

A dedicated filter of the 400 V class for suppressing this surge voltage is available. Please order one.

⚠ PROTECTION AGAINST NOISE INTERFERENCE FROM INVERTER
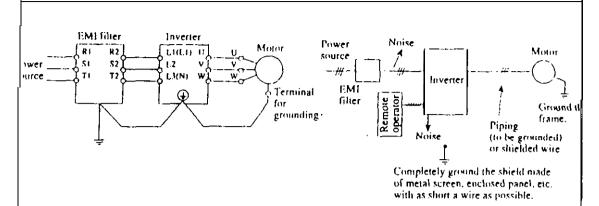
The invener uses many semiconductor switching elements such as transistors and IGBTs. Thus, a radio set or measuring instrument located near the inverter is susceptible to noise interference.

To protect the instruments from erroneous operation due to noise interference, they should be installed well apart from the inverter. It is also effective to shield the whole inverter structure.

Addition of an EMI filter on the input side of the inverter also reduces the effect of noise from commercial power line on external devices.

Note that external dispersion of noise from the power line can be minimized by connecting an EMI filter on the primary side of inverter.

⚠ CAUTION

Completely ground the shield made
of metal screen, enclosed panel, etc.
with as short a wire as possible.

⚠ EFFECTS OF DISTRIBUTOR LINES ON INVERTERS

In the cases below involving a general-purpose inverter, a large peak current flows on the power supply side, sometimes destroying the convener module. Where such situations are foreseen. or the paired equipment must be highly reliable, install an AC reactor between the power supply and the inverter.

(A) The unbalance factor of the power supply is 3% or higher.

(B) The power supply capacity is at least 10 times greater than the inverter capacity (and the power supply capacity, 500 kVA or more).

(C) Abrupt power supply changes are expected.

Examples:

(1) Several inverters are interconnected with a short bus.

(2) A thyristor converter and an inverter are interconnected with a short bus.

(3) An installed phase advance capacitor opens and closes.

In cases (A), (B) or(C). we recommend installing an AC reactor of 3% (in 3 voltage drop at rated current) with respect to the supply voltage on the power supply side.

⚠ When occurring an EEPROM error ($\boxed{E}\ \boxed{P}$), be sure to confirm the setting value again.

⚠ When selling b contact to the forward or reverse command ([FW],[RV] terminal), the inverter starts automatically. Do not set to b contact without a purpose.

GENERAL CAUTION
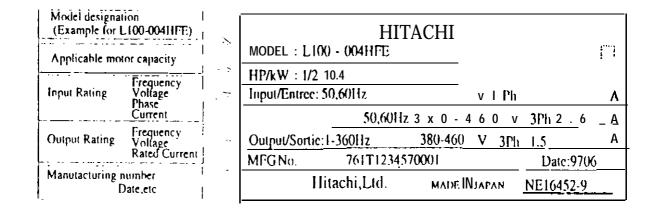
In all the illustrations in this manual, covers and safety devices are occasionally removed to describe the details. When the product is operated, make sure that the covers and safety devices are placed as they were specified originally and operate it according to the instruction manual.

Before installation and wiring, be sure to check the following:

. Make sure that there was no damage during transportation the unit.

. After unpacking the unit, make sure that the package contains one inverter and one operation manual
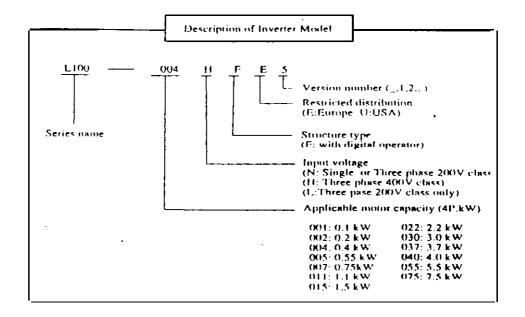
. Make sure that the product is the one you ordered by checking the specifications label on the side of the unit.

Model designation (Example for L100-004HFE)	
Applicable motor capacity	
Input Rating	Frequency Voltage Phase Current
Output Rating	Frequency Voltage Rated Current
Manufacturing number	Date,etc

HITACHI

MODEL : L100 - 004HFE				
HP/kW : 1/2 10.4				
Input/Entrée: 50,60Hz		v 1 Ph		A
	50,60Hz 3 x 0 - 4 6 0	v	3Ph 2 . 6	_ A
Output/Sortie:1-360Hz	380-460	V	3Ph 1.5	A
MFG No.	761T123457000 I		Date:9706	
Hitachi,Ltd.	MADE IN JAPAN		NE16452-9	

Contents of Specifications Label

If you discover any problems, contact your sales agent immediately.

Description of Inverter Model

L100 —— 004 H F E 5

- Version number (_,1,2..)
- Restricted distribution (E:Europe U:USA)
- Structure type (F: with digital operator)
- Input voltage
  (N: Single or Three phase 200V class
  (H: Three phase 400V class)
  (L:Three pase 200V class only)
- Applicable motor capacity (4P,kW)

001: 0.1 kW	022: 2.2 kW
002: 0.2 kW	030: 3.0 kW
004, 0.4 kW	037: 3.7 kW
005: 0.55 kW	040: 4.0 kW
007: 0.75kW	055: 5.5 kW
011: 1.1 kW	075: 7.5 kW
015: 1.5 kW	

Series name

3. APPEARANCE AND NAMES OF PARTS

3.1 Mechanical guidance and parts name

Switch cover ,Front case and Rear cover of the inverter

Front case

Key cover

Case

Cooling fin

Screw

Front case

Key cover

Case

Cooling fin

Key cover can be opened by hand without any tool.
And the signal wires can be connected to the control circuit terminals
Also the function keys are available.

Screw

Control circuit
terminals

Ground terminal
(M4 Screw)

Control circuit
terminals

Ground terminal
(M4 Screw)

Front case can be opened after losen screw as above.
And the wires can be connected to main circuit terminals and alarm terminals

Alarm terminals

Rear cover

Main circuit terminals

Logic P.C.Board

Alarm
terminals

Rear
cover

Main circuit
terminals

Logic PC Board

Alarm terminals

Rear cover

Main circuit terminals

Control circuit terminals

Logic PC Board

Alarm terminals

Rear cover

Main circuit terminals

Control circuit terminals

⚠ CAUTION

⚠ **Be sure In install the** unit on flame resistant material **such as** metal.
Otherwise, there **is a** danger of fire.

⚠ Be sure not to **place** anything **inflammable** in the vicinity.
Otherwise, there **is a danger of fire.**

⚠ **Be sure** not to let the **foreign** matter enter such **as** cut wire refuse. spatter from **welding. iron refuse. wire, dust.** etc.
Otherwise, there **is a danger of** fire.

⚠ **Be sure** to install it in **a place which can bear** the **weight according to the specifications** in the text **(4. Installation).**
Otherwise. it may fall and there **is a** danger of injury.

⚠ Be sure to install the unit **on a** perpendicular **wall which is** not subject to vibration.
Otherwise, it may fall **and** there **is a** danger of **injury.**
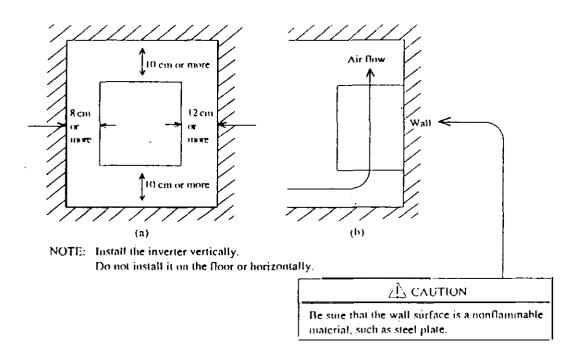
⚠ Be sure to **install the** unit with **opening** the front case and tighten the **mounting screw** bolt.Otherwise,it **may Call and** there **is a** danger of injury.

⚠ Be sure not to **install and operate an** inverter **which is** damaged or parts of **which are missing.**
Otherwise, there **is a danger of injury.**

⚠ **He** sure to install it in **a** room which **is** not exposed to direct sunlight **and is well** ventilated. **Avoid environments which** tend to **be high in** temperature, **high in** humidity or to have **dew condensation.** as well as places with dust, **corrosive gas.** explosive gas, inflammable gas, grinding-fluid mist, salt damage, etc.
Otherwise, there **is a danger of** fire.

Inverter should be mounted vertically on no-flamable wall to prevent from over heating and fire.
Make sure following clearance around the inverter to keep cooling air flow.
This equipment should be mounted in IP54 or equivalent.
Foreign object should not be dropped into the equipment especially conductive chips,which may
cause not only mulfunction and damage but also electrical and fire hazard.
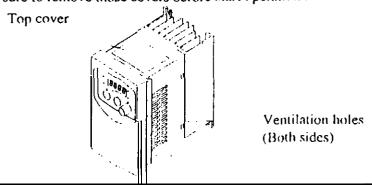
(a)   (b)

NOTE: Install the inverter vertically.
       Do not install it on the floor or horizontally.

⚠ CAUTION
Be sure that the wall surface is a nonflammable material, such as steel plate.

Cover all ventilation holes on the inverter during installation to prevent from any foreign
objects dropped into the equipment.
Be sure to remove those covers before start operation .

Top cover

Ventilation holes
(Both sides)

Be sure to check the ambient temperature - 10 to 40°C . In case of 50°C, set the carrier frequency 2 kHz or less and derate output current 80% or less and remove the top cover.

Higher ambient temperature cause shorter equipment life.
If there are some hot equipment near the inverter, keep it away from inverter as far as possible.
When the inverter is installed in a cubicle and/or a box, temperature around inverter should be
kept as above rating.   Consider ventilation and clearance around the inverter.

For safety reason,front cover should be closed and don't open it during operation.
For safety requirement, the end application must be in accordance with BS EN 60204-1.

5. WIRING

⚠ WARNING

⚠ "Use 60/75 ℃ Cu wire only" or equivalent.
"Use 75 C (only for 055LFU) Cu wire or equivalent".

⚠ "Open Type Equipment".

⚠ "A Class 2 circuit wired with Class 1 wire" or equivalent.

⚠ "Suitable for use on a circuit capable of delivering not more than 5,000 rms symmetrical amperes, 240 V maximum". For models with suffix N or L.

⚠ "Suitable for use on a circuit capable of delivering not more than 5,000 rms symmetrical amperes, 480 V maximum". For models with suffix H.

⚠ Be sure to ground the unit.
Otherwise, there is a danger of electric shock and/or fire.

⚠ Wiring work shall be carried out by electrical experts.
Otherwise, there is a danger of electric shock and/or fire.

⚠ Implement wiring after checking that the power supply is off
It might incur electric shock and/or fire.

⚠ After installing the main body, carry out wiring.
Otherwise, there is a danger of electric shock and/or injury.

⚠ **Make sure** that the input voltage **is:**

Single/Three **phase 2OO** to **240 V** 5O/6O Hz(Up to 2.2kW)

Three phase 2OO lo 24UV 5O/6OHz(Above 2.2kW)

Three **phase 380** to **460 v** 5O/6O Hz

⚠ Be sure not to connect AC power supply to the output terminals
(U, V, W).
Otherwise, **there is a danger of injury** and/or **fire.**

```
            INPUT                    OUTPUT
    ┌──────────────────────────────────────────┐
    │ Note)                                     │
    │ (L1)      (N)          (T1) (T2) (T3)      │
    │ LI   L2   L3            U    V    W        │
    └──────────────────────────────────────────┘
```

Note: L1,N :   Single phase 200 to 240 V 50/60Hz.

L1,L2,L3: Three phase 200 to 240 V 50/60Hz.

Three phase 380 to 460 V 50/60Hz.

Power supply

⚠ Fasten the **screws with** the **specified** fastening torque. **Check so that** there is no **loosening of screws.**
Otherwise. there is a danger of **fire.**

⚠ Remarks for using earth leakage circuit breakers in the mains supply:

Frequency inverters with CE-filters (RFI-filter) and screened motor cables have a higher leakage current **against earth. Especially in the** moment of **switching on this can cause** unintentional triggerings of earth leakage **circuit breakers.** Because of the **rectifier on** the input **side** of the inverter there **is** the possibility to stall the switch-off function through amounts of DC-current. **The following should be observed:**

Only short time-invariant and **pulse** current-sensitive earth leakage circuit **breakers** with higher **trigger current** should **be** used.

Other components **should be** secured **with separate** earth leakage **circuit** breakers.

Earth leakage circuit breakers in front of an inverter are not an absolute protection **against** direct touching.

⚠ Be sure to set the fuse(s) (the **same** phase as the main power **supply)** in the **operation circuit.**
Otherwise. there is a danger of fire.

⚠ **As** for motor leads, **earth leakage** breakers **and** electromagnetic contactors, be **sure** to **use the equivalent ones with** the specified capacity (rated).
Otherwise, there is a danger of **fire.**

⚠ Double pole disconnection device must be fitted to **the incoming mains supply close** to the **inverter.** And protection device meeting IEC947-1/IEC947-3 must be fitted at this point.

⚠ Connection to **wiring terminal** must be reliably fixed with two means of support.

5.1   Wiring the power supply and motor

Main circuit terminals and alarm terminals will be exposed after front case open
Refer page 3-1 APPEARANCE AND NAME OF PARTS.

— Alarm Terminal
— Ground Terminal
— Main Circuit Terminal

ex.L100-004NF_

Ground

Fault Alarm

Power supply
(Power source)

Motor

Inverter

Thermal
Relay

Thermal
Relay

· Don't connect power source to any terminals except L1,L2,L3/N

· Don't connect any wires to no-assigned terminals on upper side.
  Those terminals are used for internal circuit.

· Refer to page 5-10 Terminal dimensions.

· When pallarel motor operation is required, put thermal relays for each motor.
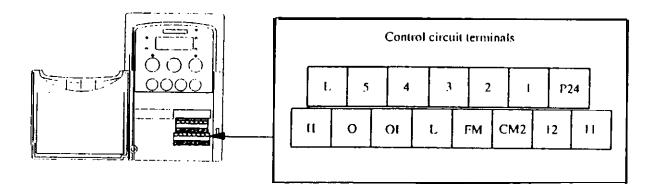
· Make sure power source type and terminals as below
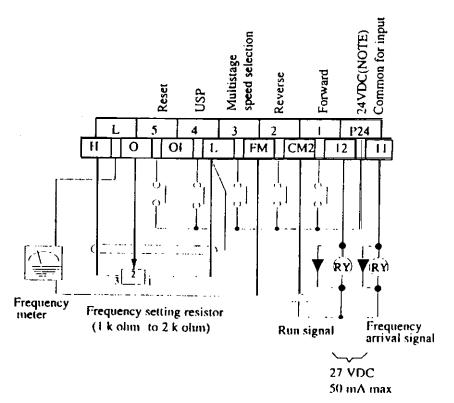
  AC power type   Applicable terminals
  Single Phase , 50/60Hz...............Terminal L1,L3/N
  Three Phase , 50/60Hz...............Terminal L1,L2,L3/N

· Don't remove short bar between (+1) and (+) terminals.

Control circuit terminals

Control circuit terminals

L	5	4	3	2	1	P24

H	O	OI	L	FM	CM2	I2	I1
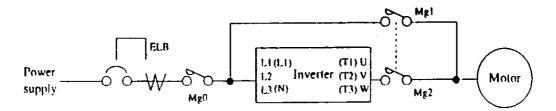
Control circuit terminal diagram (For example)

Frequency meter

Frequency setting resistor (1 k ohm to 2 k ohm)

Run signal

Frequency arrival signal

27 VDC
50 mA max

NOTE: See page 5-11 for changing function.

NOTE 1: When changing the power supply of the motor between the inverter and commercial power, be sure to install mechanically interlocked switches Mg1 and Mg2.
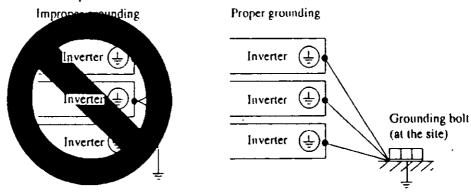
NOTE 2: Install an earth leakage breaker at the input of the inverter. (Select an earth leakage breaker whose sensitive current level is raised in high frequency range.)

When the cable between the inverter and motor is more than 10 m long, the thermal relay may malfunction due to high-frequency waves. To prevent this, install an AC reactor on the output side of the inverter or use a current sensor rather than a thermal relay.
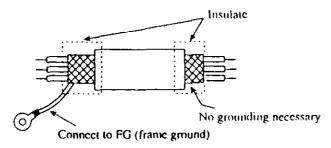
NOTE 3: Be sure that the specified grounding is carried out. Be sure to separate the unit's grounding pole from those of other heavy electric machinery, and avoid using common grounding poles.

If multiple inverters are used, make sure that the grounding connections do not create a loop.
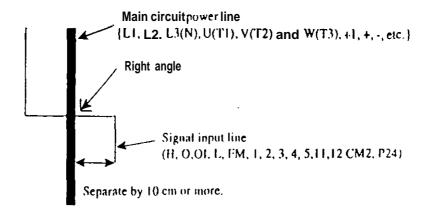
NOTE 4: When a frequency arrival signal is used, be sure to install a surge absorbing diode in parallel with the relay. Otherwise, the surge voltage created when the relay goes ON or OFF may damage the AK output circuit.

NOTE 5: ‘ Use a twisted and shielded wire for the signal line, and cut the shielded covering as shown in the diagram below. Make sure that the length of the signal line is 20 meters or less. If the line must be longer than 20 meters, please use a VX application control device RCD-A (remote control device) or CVD-E (insulated signal converter).

Insulate

No grounding necessary

Connect to FG (frame ground)

NOTE 6: When the frequency setting signal is turned on and off with a contact, use a relay which will not cause contact malfunctions, even with the extremely weak currents and voltages. such as crossbar twin contacts, etc.

NOTE 7: Use relays which do not have contact defects at 24 V DC. 3 mA for the other terminals.

NOTE 8: Separate the main circuit wiring from the relay control circuit wiring. If they must cross, be sure that they cross at a right angle.

Main circuit power line
(L1, L2. L3(N). U(T1), V(T2) and W(T3), +1, +, -, etc.)

Right angle

Signal input line
(H, O, OI. L, FM, 1, 2, 3, 4, 5, 11, 12 CM2, P24)

Separate by 10 cm or more.
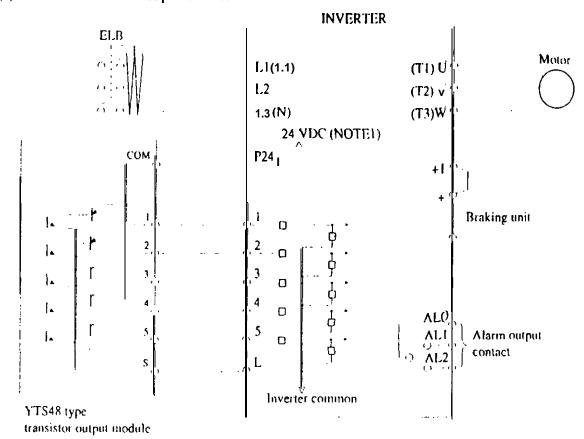
NOTE9: Do not short circuit the terminals P24 and L,H,OI,FM by mistake.
The control power supply may cause a failure.

NOTE10: Do not short-circuit the terminals H and L.
The control power supply may cause a failure

Connection to the Programmable Controller

(1) When the internal interface power source is used

NOTE 1: Do not short circuit the terminals P24 and L by mistake.
The control power supply may cause a failure.

5.2 Wiring Equipment, Options

⚠CAUTION: Provide the wiring equipment in accordance with the safety codes required by jurisdictional authorities.

If specified in the standard or laws and regulations, follow their instructions.

| Motor output (kW) | Inverter model | Wiring | | Applicable equipment |
		Power lines	Signal lines	Fuse(class J) rated 600V
0.2	L100-002NFE L100-002NFU		(*) 0.14 to 0.75 mm² Shielded wire	10A
0.4	L100-004NFE L100-004NFU	AWG16/1.3mm²		10A
0.55	L100-005NFE			10A
0.75	L100-007NFE L100-007NFU	AWG14/2.1mm²		15A
1.1	L100-011NFE			15A
1.5	L100-015NFE L100-015NFU	AWG12/3.3mm²		20A (single ph.) 15A (three ph.)
2.2	L100-022NFE L100-022NFU	AWG10/5.3mm²		30A (single ph.) 20A (three ph.)
3.7	L100-037LFU	AWG12/3.3mm²		30A
5.5	L100-055LFE L100-055LFU	AWG10/5.3mm²		40A
7.5	L100-075LFE L100-075LFU	AWG 8/8.4mm²		50A
0.4	L100-004HFE L100-004HFU			3A
0.75	L100-007HFE L100-007HFU	AWG16/1.3mm²		6A
1.5	L100-015HFE L100-015HFU			10A
2.2	L100-022HFE L100-022HFU			10A
3.0	L100-030HFE			15A
4.0	L100-040HFE L100-040HFU	AWG14/2.1mm²		15A
5.5	L100-055HFE L100-055HFU			20A
7.5	L100-075HFE L100-075HFU	AWG12/3.3mm²		25A

NOTE 1: Field wiring connection must be made by a UL Listed and CSA Certified closed-loop terminal connector sized for the wire gauge involved.
Connector must be fixed using the crimp tool specified by the connector manufacturer.
NOTE 2: Be sure to consider the capacity of the circuit breaker to be used.
NOTE 3: Be sure to use bigger wires for power lines if the distance exceeds 20 m.
NOTE 4: Install an earth leakage breaker meeting requirements of IEC947-1/IEC947-3 at the input.
(*) Use 0.75 mm² wire for the alarm signal wire.
Wire stripping lenght : 5 to 6 mm.
Max wire sleeve diameter except for the alarm signal wire : 2mm.
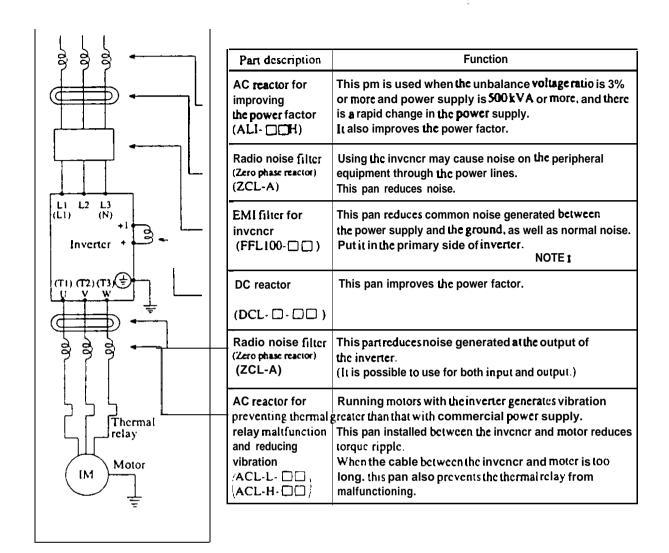
Part description	Function
AC reactor for improving the power factor (ALI-☐☐H)	This pm is used when the unbalance voltage ratio is 3% or more and power supply is 500 kVA or more, and there is a rapid change in the power supply. It also improves the power factor.
Radio noise filter (Zero phase reactor) (ZCL-A)	Using the inverter may cause noise on the peripheral equipment through the power lines. This pan reduces noise.
EMI filter for inverter (FFL100-☐☐)	This pan reduces common noise generated between the power supply and the ground, as well as normal noise. Put it in the primary side of inverter. NOTE 1
DC reactor (DCL-☐-☐☐)	This pan improves the power factor.
Radio noise filter (Zero phase reactor) (ZCL-A)	This part reduces noise generated at the output of the inverter. (It is possible to use for both input and output.)
AC reactor for preventing thermal relay malfunction and reducing vibration (ACL-L-☐☐, (ACL-H-☐☐)	Running motors with the inverter generates vibration greater than that with commercial power supply. This pan installed between the inverter and motor reduces torque ripple. When the cable between the inverter and motor is too long. this pan also prevents the thermal relay from malfunctioning.

NOTE 1: FFL100 series filter is required for EMC directive(Europe),C-TICK(Australia) but others are not for this purpose.
Reactor and others of the above table except EMI filter are for general use for noise reduction.
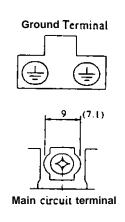
5.3 Terminal

(1) Terminal dimensions
Main circuit terminal

Terminal layout	Type	Screw diameter	Width (mm)
	002NF 004NF	M3.5	7.1
	007NF ~ 022NF 037LF 004HF ~ 040HF	M4	9
	055,075LF 055,075HF	M5	13

Ground Terminal

Main circuit terminal

Type	002NF 004NF		007NF~022NF 037LF 004HF~040HF		055,075LF 055,075HF	
	Screw diameter	Width (mm)	Screw diameter	Width (mm)	Screw diameter	Width (mm)
Main circuit	M3.5	7.1	M4	9	M5	13
Control circuit	M2	–	M2	–	M2	–
Alarm circuit	M3	–	M3	–	M3	–
Grounding	M4	–	M4	–	M5	–

Control circuit terminal

L	5	4	3	2	1	P24
H	O	OI	L	FM	CM2	12	11

Alarm Circuit Terminal

AL0	AL1	AL2

(2) Main circuit terminal function

Terminal symbol	Terminal description	Function	
L1 L2 L3 (L1), (N)	Main power	Connect the power supply L1,L2,L3 --- Three phase L, N --- Single phase	
U,V,W T1,T2,T3	Inverter output	Connect the motor	
+1,+	External DC Reactor	Usually the short-cut bar is attached between terminals +1 and +. When the DC Reactor is to be connected, be sure to remove the short-cut bar.	
+, -	Braking unit	Connect the optional braking unit (when braking torque is required).	Make sure that the short-cut bar attached between +1 and + is not removed except when the DC reactor is to be mounted.
⏚	Ground	Ground (connect grounding to avoid electric shock)	

Tightening torque

Screw	Tightening torque
M2	0.2 N·m (max. 0.25 N·m)
M3	0.5 N·m (max. 0.6 N·m)
M3.5	0.8 N·m (max. 0.9 N·m)
M4	1.2 N·m (max. 1.3 N·m)
M5	2.0 N·m (max. 2.2 N·m)

(3)Control circuit

	Terminal symbol	Terminal description and function			Initial setting (-FE/-FU)	Remarks
Input signal	5	Intelligent input terminals 1 to 5			Reset input (Note 2)	Dry contact Close: ON (run) Open: OFF (stop) Min. ON time: 12 ms or more
	4	Forward running command	Reverse running command	External trip	Multispeed 2/USP	
	3	Multistage speed (First stage)	Jogging	USP function (Note 1)	Multispeed 1/Analog input	
	2	Multistage speed (Second stage)	Analog input command	Reset (Note 2)	Reverse running command	
	1	Multistage speed (Third stage)	2 stage acc./dec time	Terminal software lock	Forward running command	
		Multistage speed (Forth stage)	Free run stop	PTC (Note 3)		
	P24	Common for input signals				24VDC max. 30 mA
Monitor signal	FM	Analog frequency monitor/Digital frequency monitor/Analog output current monitor			Analog frequency monitor	
	L	Common for monitor				
Frequency command input	H	Power supply for frequency command				10 VDC max.10mA
	O	Voltage frequency command				0-10 VDC (nominal) (Input impedance 10 kΩ)
	OI	Current frequency command				DC 4-20 mA (nominal) Input impedance 250Ω
	L	Common for frequency command				
Output signal	11	Intelligent output terminal Arrival signal at constant speed. Arrival signal at set speed. RUN signal.Overload signal. Deviation signal at PID control. Alarm signal			Arrival signal at constant speed	27 VDC 50 mA max
	12				Run signal	
	CM2	Common for output signals				
Fault alarm output	AL0	[AL0] [AL1] [AL2]			Contact rating 250 VAC 2.5 A (Resistor load)	Min 100 VAC
	AL1				0.2 A (cos∠=0.4)	10 mA
	AL2	Normal : AL0-AL1 close Abnormal, Power off:AL0-AL1 open (Initial setting)			30 VDC 3.0 A (Resistor load) 0.7 A (cos∠=0.4)	5 VDC 100 mA

NOTE 1:   USP: Prevention function of restart upon power on.
NOTE 2:   The reset terminal can not be changed from "a contact" (NO) to "b contact" (NC)
NOTE 3: See page 7- 14.

6. OPERATION

6.1 BeforeStarting Operation

Prior to the lest run, check the following.

⚠ WARNING
⚠ **Be sure to turn on the input power supply after cloning the front case. While being energized. be sure not to open the front case.** Otherwise, there is a danger of electric shock.
⚠ **Be sure not to operate the switches with wet hands.** Otherwise. there is a danger of electric shock.
⚠ **While the inverter is energized, be sure not to touch the inverter terminals even during stoppage.** Otherwise. there is a danger of electric shock.
⚠ **If the retry mode is selected, it may suddenly restart during the trip stop. Be sure not to approach the machine. (Be sure to design the machine so that personnel safely will be secured even if it restarts.)** Otherwise. there is a danger of injury.
⚠ **Even if the power supply is cut for a short period of time, it may restart operation after the power supply is recovered if the operation command is given. II it may incur danger to personnel, be sure to make a circuit so that it will not restart after power recovery.** Otherwise, there is a danger of injury.
⚠ **The Stop Key is effective only when the function is sel. Be sure to prepare the Key separately from the emergency stop.** Otherwise. there is a danger of injury.
⚠ **After rhe operation command is given. if the alarm reset is conducted. it will restart suddenly. Be sure to set the alarm reset after checking the operation command is off.** Otherwise, there is a danger of injury.
⚠ **Be sure not to touch the inside of the energized inverter or lo put a bar into il.** Otherwise. there is a danger of electric shock and/or fire.

⚠ CAUTION

⚠ Cooling fin will have high temperature. Be sure not to touch them.
Otherwise, there is a danger of getting burned.

⚠ Low to high speed operation of the inverter can be easily set. Be sure to operate it after checking the tolerance of the motor and machine.
Otherwise, there is a danger of injury.

⚠ If a motor is operated at a frequency higher than standard setting value(50Hz/60Hz), be sure to check the speeds of the motor and the machine with each manufacturer, and after getting their consent, operate them.
Otherwise, there is a danger of machine breakage.

Note:

(1) **Make sure that the power lines (input power supply L1(L1), L2 and L3(N), and output terminals, U(T1), V(T2) and W(T3) are connected correctly.**

(2) **Make sure that there are no mistakes in the signal line connections**

(3) **Make sure that the ground terminal (⏚) is grounded.**

(4) **Make sure that terminals other than those specified are not grounded**

(5) **Make sure that the inverter is installed vertically on a wall, and a nonflammable material such as a steel plate is used as a mounting surface.**

(6) **Make sure that there are no short-circuits caused by stray pieces of wire. solderless terminals or other objects left from wiring work. Also, make sure that no tools have been left behind.**

(7) **Make sure that the output wires are not short-circuited or grounded.**

(R) **Make sure that there are no loose screws or terminals.**

(9) **Make sure that the maximum frequency setting matches the machine specifications**

(10) **With the front case opened, do not operate the inverter. Make sure that the front case is completely closed and locked with the screw before operating the inverter.**

Never test withstand voltage tests. Because this inverter has the surge absorber between the main circuit terminal and the ground.

6.2 Test Run

An example of a general connection diagram is shown below
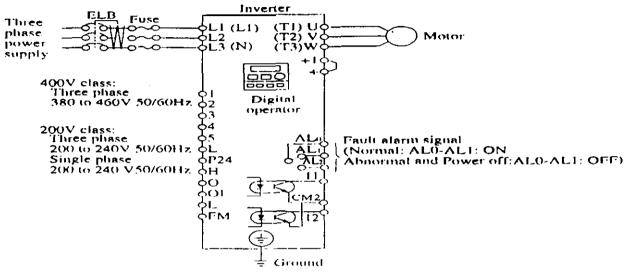
Operating with digital operator:
To set frequency. run and stop is used by digital operalor
Frequency setting: Potentiometer on the digital operator
Run and stop:key pad on the digital operator

Procedure(Operating with digital operator)

(1) Turn on supply power to the inverter. Make sure that the [POWER] LED on the digital operator goes ON.

(2) Set [A 02] to [02] .

(3) Set [A 01] to [00] .

(4) Check to turn on the lamp above the potentiometer and turn the potentiometer.

(5) Start running after pressing (RUN) once and turn on the RUN lamp

(6) Check output frequency by monitor mode [d 01].

(7) Press (STOP RESET) and decelerate to a stop.

⚠ CAUTION
Check the following after the test run is complete. Otherwise, there is a danger of machine breakage. · Was the direction of the motor correct? · Was the inverter tripped during acceleration or deceleration? · Were the frequency meter correct? · Were there any abnormal motor vibrations or noise? When overcurrent tripping or overvoltage tripping occurs during the test run, increase the acceleration time or deceleration time.

Factory settings (-FE / -FU)
Maximum frequency: 50 Hz/60 Hz Forward operation

7.1 List of Control Circuit Terminals

Terminal symbol	Function		Contents
FW (00)	Forward run/stop		SWF Contact (close): Forward run (open): Stop
RV (01)	Reverse run/stop		SWR Contact (close): Reverse run (open): Stop
CF1 (02)	Multistage speed	1	
CF2 (03)		2	
CF3 (04)		3	
CF4 (05)		4	
JG (06)	Jogging		Jogging run
PTC (19)	PTC thermistor Thermal protection		When thermistor is connected with this terminal, the thermal protection can be used. The common is the terminal [L]. NOTE: Refer to p.7-14 about details.
AT (16)	Analog current input sellection		Analog input voltage-current swiching(When this terminal is ON,current input signal to [OI]-[L] is active.)
2CH (09)	2 stage acceleration and deceleration		When the terminal [2CH] is turned on, the acceleration and deceleration can be executed by the 2nd stage acceleration and deceleration time.
FRS (11)	Free run stop		When the terminal [FRS] is turned on, the inverter stops output and the motor enters the free run state.
EXT (12)	External trip		When the terminal [EXT] is turned on, the inverter enters the trip state, stops output, and displays E12 .
USP (13)	Power reclosing restart prevention		When the terminal [USP] is turned on, the restart when the power is turned on with the running command kept on can be prevented.
RS (18)	Reset		When the terminal [RS] is turned on, the trip state can be canceled. During turning on,the output is stopped. NOTE: The function cannot be used in the N.C. contact state.
SFT (15)	Software lock		When the terminal [SFT] is turned on, the data of each function is locked.
P24	24 V DC Common for input		Common terminal for the intelligent input terminals

Terminal symbol		Function	Contents
frequency command	H	Power supply terminal to command a frequency	• The external voltage signal is 0 to 9.6 V (10 V nominal).
	O	Frequency command terminal (voltage command)	
	OI	Frequency command terminal (current command)	NOTE: If there is no setting for [AT] at the input intelligent terminal,the sum of both analog input signals is outputted. When selecting one of analog input current or voltage, make sure that the [AT] is allocated to the input intelligent terminal
	L	Frequency command common	
	FM	Frequency monitor	• Analog frequency monitor/Digital frequency monitor/Analog output current monitor
	FA1 (01) FA2 (02)	Frequency arrival signal	• When [FA1]/[FA2] is selected as a terminal, at the time of constant speed arrival, two types of methods for outputting a frequency more than an optionally set frequency can be executed. Output terminal specification Open collector output 27 V DC max 50 mA max
	RUN (00)	RUN signal	• When [RUN] is selected as a terminal, the inverter outputs when the motor is driven.
	OL (03)	Overload signal	• This signal is outputted when the motor current is more than the set value.
	OD (04)	Deviation signal at PID control	• This signal is outputted when the difference between reference and feed-back is greater than the set value at PID control.
	AL (05)	Alarm signal	• When an alarm occurs,this signal is outputted .
CM2		Output Signal Common terminal	• Common terminal for intelligent output terminal (Output terminals are open collector output and isolated from L common)
AL0 AL1 AL2		Alarm terminal	In the normal state: AL0 and AL1 are closed. In the abnormal state or when power is turned off: AL0 and AL2 are closed. Contact rating 250 V AC 2.5 A (resistance load) 0.2 A (cos∅= 0.4) 30 V DC 3.0 A (resistance load) 0.7 A (cos∅= 0.4) [Minimum 100 V AC 10 mA 5 V DC 100 mA]

Within the O/OI diagram section:

H | O | OI | L   H | O | OI | L   H | O | OI | L

VRO
(1k W to 2 kW)

0 to 9.6 VDC (nominal 10 V)
Input impedance 10 kW

4 to 19.6 mA DC
(nominal 20 mA)
Input impedance 250 '

Within FA section diagrams:

Frequency   Frequency

FA1 terminal | On during this period   FA2 terminal | On during this period   Time

CM2 | 12 | 11   (RY)

"N.O. contact" is set by initialization for terminal 11,12. When"N.C. contact" is to be used. switch the contact setting by C 31. C 32.

Terminal name: Monitor terminal [FM] (Analog, digital)	Function No. to be set	C 23 , b 81 b 86
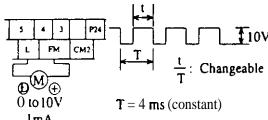
Function contents

Monitor output frequency signal or the current of the inverter is output from the control circuit terminal.
Monitor output current signal is output as an analog signal only.

(I) Analog Frequency Monitor Signal
The meter outputs duty cycle in proportion to the output frequency with full scale at the maximum frequency.

0 to 10V   T = 4 ms (constant)
1 mA
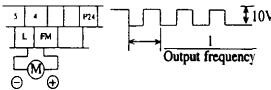
NOTE: This is a dedicated indicator, so that it cannot be used as a line speed signal.
Indication accuracy after adjustment: About ±5% (The accuracy of some meters may exceed this value.)

(2) Digital Frequency Monitor Signal
Pulse train of a frqucncy which is converted the output frequency is output.
(The convert value is setting by b 86 .)
The duty is about 50%.

(3) Analog Current Monitor Signal
The duty cycle in proportion to the output current with full scale at 200% of the rated current of the inverter.
Specification of analog meter follows the analog frequency monitor specifications.

Setting contents

I. Select Frequency Monitor(Analog/Digital) or Current Monitor by C 23 .

2. When the analog meter is used. adjust the meter so that the needle of the meter indicates the maximum value at the time of maximum frequency by b 81 (analog meter adjustment).

3. In the case of digital frequency monitor, it is able to convert the scale by b 86 .

NOTE: The converted value of digital frequency monitor is limited IO about 3.6 kHz.
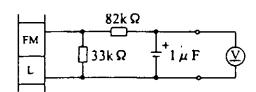
Accuracy of output current monitor

.ccuracy : ± 20%
            (A half base frequency or higher)
he indication value may exceed this accuracy by
ie load current condition.   :
ise the moving tron type ammeter for the precise
n-rent measurement.

Circuit for FM signal monitor for process control (just only for monitor)

7.3 Function Contents of Intelligent Input Terminals
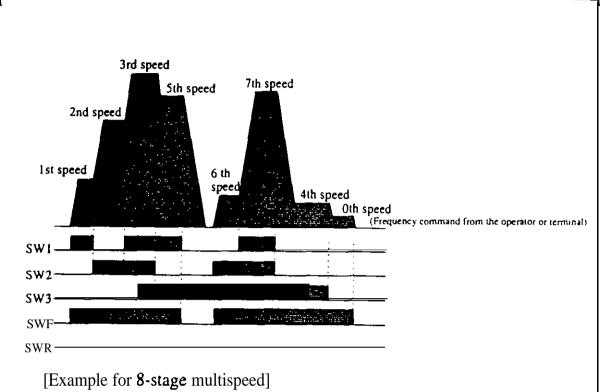
Terminal name: Forward running/stop terminal [FW]	Function No. to be set: [C 01] to [C 05] / [A 02]

Function content

. When the running command is inputted via the terminal [FW], the terminal executes the forward running command or stop command.

Terminal setting method

Digital operator
Set the set value [00] in one of the input terminals [C 01] to [C 05].

⚠ WARNING

When the power is turned on when the running command is on, the motor starts rotation and it is dangerous. Before turning the power on. confirm that the running command is not on.

Precautions

· When the running command is inputted via the forward running terminal [FW] and reverse running terminal [RV] at the same time, the running command enters a state which is the same as stop.
· Note that when the [FW] terminal is set to 'N.C. contact', the running automatically starts.
Set the value [01] to the [A 02], then this terminal is available.

Terminal name: Reverse running/stop terminal [RV]	Function No. to be set: [C 01] to [C 05] / [A 02]

Function content

. When the running command is inputted via the terminal [RV], the terminal executes the reverse running command or stop command.

Terminal setting method

Digital operator
Set the set value [01] in one of the input terminals [C 01] to [C 05].

⚠ WARNING

When the power is turned on when rhe running command is on, the motor starts rotation and it is dangerous. Before turning the power on, confirm that the running command is not on.

Precautions

. When the running command is inputted via the forward running terminal [FW] and reverse running terminal [RV] at the same rime. the running command enters a stare which is the same as stop.
. Note that when the [RV] terminal is set to 'NC. contact', the running automatically starts.
· Set the value [01] to the [A 02], then this terminal is available.

Terminal **name**: Multistage speed [CF1], [CF2], [CF3], [CF4]	Function No. to be set $\boxed{C\ 01}$ to $\boxed{C\ 05}$, $\boxed{F\ 01}$ $\boxed{A\ 20}$ to $\boxed{A\ 35}$

[F u n c t i o n]

• When [CF1], [CF2], [CF3], and [CF4] are selected as intelligent input terminals, Multispeed I to Multispeed 15 can be set. When the frequency command from the normal operator (or terminal) is combined with them. up to 16 stages of running are available.

. When the control terminal is set at each speed by the switch, the numerical value displayed at $\boxed{d\ 01}$ indicates the output frequency at the time of each multispeed. Set the speed as shown below.

(I) Turn the running command off.

(2) Turn each switch on and set it to Multispeed n. Display the data section of $\boxed{F\ 01}$.

(3) Set an optional output frequency by pressing the ⓐ and ⓥ keys.

(4) Press the ⓢ key once so as to store the set frequency. If this occurs. $\boxed{F\ 01}$ indicates the output frequency of Multispeed n.

(5) Press the ⓕⓤⓝⓒ key once. (Confirm that the indication is the same as the set frequency.)

(6) When the operations in (I) to (4) are repeated. the frequency of Multispeed n can be set. It can be set also by one of $\boxed{A\ 20}$ to $\boxed{A\ 35}$

Terminal setting method

┌Digital operator ─────────

Set the set values $\boxed{\ 02}$ to $\boxed{\ 05}$ in the input terminals $\boxed{C\ 01}$ to $\boxed{C\ 05}$.

Example of the input terminal connection

Setting of multispeed

Multispeed	Control circuit terminal			
	SW4	SW3	SW2	SW I
Multispeed 0	OFF	OFF	OFF	OFF
Multispeed 1	OFF	OFF	OFF	ON
Multispeed 2	OFF	OFF	ON	OFF
Multispeed 3	OFF	OFF	ON	ON
Multispeed 4	OFF	ON	OFF	OFF
Multispeed 5	OFF	ON	OFF	ON
Multispeed 6	OFF	ON	ON	OFF
Multispeed 7	OFF	ON	ON	ON
Multispeed 8	ON	OFF	OFF	OFF
Multispeed 9	ON	OFF	OFF	ON
Multispeed 10	ON	OFF	ON	OFF
Multispeed 11	ON	OFF	ON	ON
Multispeed 12	ON	ON	OFF	OFF
Multispeed 13	ON	ON	OFF	ON
Multispeed 14	ON	ON	ON	OFF
Multispeed 15	ON	ON	ON	ON

. Multispeed 0 is set by the frequency command of $\boxed{A\ 01}$ selection.

Precautions

· After any data is changed, be sure to press the (STR) key every time and then set the next one. Note that when the (STR) key is not pressed, no data will be set.

· When a frequency more than 50Hz(60Hz) is to be set, it is necessary to switch the maximum frequency $\boxed{A\ 04}$.

[Example for 8-stage multispeed]

Terminal name: Analog input command **[AT]**	**Function No.** C 01 lo C 05 IO be set A 01

Function content

. When the terminal [AT] is turned on, it is possible to set the output frequency by current input signal (DC4~20mA) at [OI]-[L].

Function switching method

While the switch between the terminals [AT] and [P24] is on. it is possible to set the output frequency by the current input signal at [OI]-[L].
When the terminal is turned off. the voltage input signal at [O]-[L] is available.

AT

Terminal setting method

Digital operator

Set the set value . 16 in one of the input terminals C 01 to C 05

I Precautions

If there is no setting for [AT] at the input intelligent terminal, the sum of both analog input value is outputted.
When selecting one of analog input value (current or voltage), make sure that the [AT] is allocated to the input intelligent terminal.
Be sure to set the value 01 to A 01.
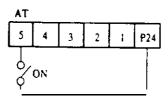
Terminal name: Second stage acceleration and deceleration [2CH]	Function No. [C 01] to [C 05], to be set [A 92], [A 93], [A 94]

Function content	2 stage acceleration and deceleration time setting method

Function content
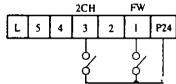
. When the terminal [2CH] is turned on, the equipment can be accelerated or decelerated (acceleration time 2. deceleration time 2) by the 2 stage acceleration and deceleration time.

2 stage acceleration and deceleration time setting method

Use [A 92] (acceleration time 2) and [A 93] (deceleration time 2) to set the 2 stage acceleration and deceleration time (acceleration rim 2. deceleration time 2).

Function switching method

While the switch between the set terminals [2CH] and [P24] is on, the equipment operates by the 2 stage acceleration and deceleration time (acceleration time 2. deceleration time 2).
When the terminal is turned off, the equipment is returned to the original acceleration and deceleration time (acceleration time 1, deceleration time 1).

Between terminals [2CH] and [P24]	Acceleration and deceleration time for operation
OFF state	Acceleration time 1. Deceleration time 1
ON state	Acceleration time 2. Deceleration time 2

2CH   FW

L	5	4	3	2	1	P24

When [2CH] is allocated to the terminal 3

Precautions

Running command [FW, RV]

[2CH] terminal

Output frequency

Setting [A 94] to [00] enable to switch by this terminal.

Terminal setting method

· Digital operator

Set the set value [09] in one of the input terminals [C 01] to [C 05] .
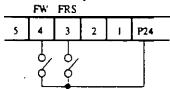
| **Terminal name: Free run stop [FRS]** | Function No. | C 01 to C 05 |
| | IO be set | b 03, b 88, C 11 to C 15 |

Function content

. When the terminal [FRS] is turned on, the
inverter stops output and the motor enters
the free run stare.

Function switching method

. While the switch between the set terminals
[FRS] and [P24] is on. the equipment
operates the FRS operation.

FW FRS

| S | 4 | 3 | 2 | 1 | P24 |

When [FRS] is allocated IO the terminal 3

NOTE: When " b contact " is to be used.
switch the contact setting by
C 11 to C 15
The contact setting cannot be
switched only by selecting FRS by
switching C 01 to C 05 .
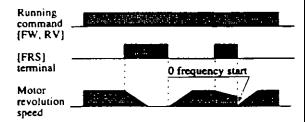
Terminal setting method
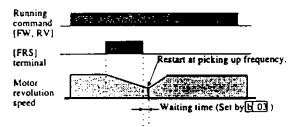
Digital operator

Set the ser value [11] in one of the
input terminals C 01 to C 05

When b 88 is set 00, 0 frequency start
after resetting [FRS].

Running
command
[FW, RV]

[FRS]
terminal   0 frequency start

Motor
revolution
speed

When b 88 is set 01 , restart from the
frequency, which is picked up from the free
running motor

Running
command
[FW, RV]

[FRS]
terminal   Restart at picking up frequency.

Motor
revolution
speed
                    Waiting time (Set by b 03)

| Terminal name: External trip **[EXT]** | Function No. to be set   C 01 to C 05 |

Function content

. When the terminal **[EXT]** is turned on. the inverter enters the trip state by an indication of E 12 and stops output.

Terminal setting method

- Digital operator

Set the set value ☐ 12 in one of the input terminals C 01 to C 05 .

Function switching method

When the switch between the set terminals [EXT] and [P24] is turned on. the equipment enters the trip state.
Even when the switch is turned off, the trip state will not be canceled. Reset the equipmer or turn the power off and on again to cancel the trip state.

```
        EXT    FW
  L   5   4   3   2   1   P24
```

When [EXT] is allocated to the terminal 3

Running command [FW, RV]	
[EXT] terminal	
Motor revolution speed	Free run
[RS] terminal	
Alarm output terminal	

| Terminal name: | Prevention function of restart upon power on [USP] | Function No. to be set | [C|01] to [C|05] |

Function content

. If the running command is set when power is turned on, the inverter starts running immediately after it is activated. The USP function prevents it so that the inverter will not execute sudden running.

. To reset an alarm and restart running. rum the running command off or perform a reset operation by the terminal [RS] or the @ key.

Refer to the lime chart indicated below.

Terminal setting method

Digitaloperaror

Set the value [|13] in one of the input terminals [C| 01] to [C| 05]

Function switching method

While the switch between the set terminals [USP] and [P24] is on, the equipment execute the USP operation. If the power is turned on when the running command is inputted, the equipment enters the USP trip state ([E|13]

When (USP] is allocated to the terminal 3
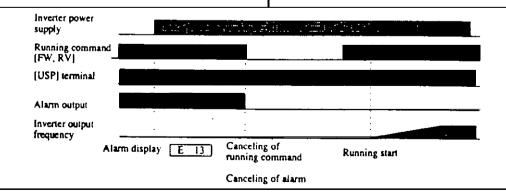
Precautions

Note that when a USP error occurs and it i: canceled by resetting in the state that rhe running command from rhe terminal is inputted. the inverter restarts running imme diately.

Even when the trip state is canceled by turning the terminal [RS] on and off after an under voltage protection ([E| 9]) occurs, this function will be performed. When the running command is inputted immediately after the power is turned on. a USP error will be caused. When this function is used. input the running command after three (3) seconds since the power is turned on.

Inverter power supply

Running command [FW. RV]

[USP] terminal

Alarm output

Inverter output frequency

Alarm display [E| 13]   Canceling of running command   Running start

Canceling of alarm

Terminal name: Reset [RS]	Function No. to be set	[C 01] to [C 05] 1

Function content

. The trip content can be canceled

Terminal setting method

Digital operator
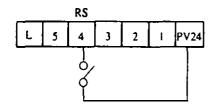
Set the set value [18] in one of the
input terminals [C 01] to [C 05].

Function switchine method

. When the switch between the set terminals
[RS] and [P24] is turned on and off, the
equipment executes the reset operation.

```
           RS
 | L | 5 | 4 | 3 | 2 | 1 | PV24 |
```
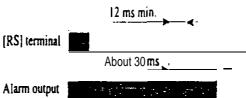
⚠ WARNING

After the operation command is given.
if the alarm reset is conducted. it will
restart suddenly. Be sure to set the
alarm reset after checking that the
operation command is off.
Otherwise. there is a danger of injury.

Precautions

. When the control terminal [RS] is kept on
continuously for more than 4 seconds
before using it, the display of the remote
operator becomes R-ERROR COMM<2>
(the display of the digital operator [OPE-J] is
[ ]). However, the inverter is normal.
To return the display to the original one.
open the terminal [RS] and press one of the
keys of the operator.
When the [RS] terminal is turned off from'
on. it becomes valid.

. The (STOP/RESET) key of the digital operator is
valid only when an alarm occurs.

. Only' N.O. contact' can be set to the [RS]
terminal. The terminal cannot be used in
the' N.C. contact 'state.

. Even when the power is turned off or on.
the function of the terminal is the same as
that of the reset terminal.

12 ms min.

[RS] terminal

About 30 ms

Alarm output

. The (RUN) key on the inverter is available for
a few second after reset signal coming with
the remote operator connected.

. When the [RS] is turned on while the motor
is running ,the motor will be free running.

Terminal name: Jogging [JG]	Function No. $\boxed{C \; 01}$ to $\boxed{C \; 05}$ to be set $\boxed{A \; 02}$, $\boxed{A \; 38}$, $\boxed{A \; 39}$
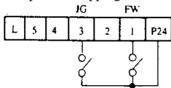
Function content

• When the terminal [JG] is turned on and
the run command is issued, the inverter
perform the jogging operation.

Function switching method

. While the switch between the set terminals
[JG] and [P24] is on. the equipment
operates the JG opcrarion.
The frequency at jogging operation is set
by $\boxed{A \; 38}$.
. Set the value $\boxed{01}$ (terminal mode) in the
$\boxed{A \; 02}$ (Run command)
. Since jogging is a direct input operation,
set the jogging frequency $\boxed{A \; 38}$ to 5 Hz
or less to prevent tripping,

```
            JG      FW
  L   5   4   3   2   1   P24
              o/      o/
              o       o
```

When [JG] is allocated to the terminal 3

Terminal setting method

Digital operator
Set the set value $\boxed{06}$ in one of the
input terminals $\boxed{C \; 01}$ to $\boxed{C \; 05}$.

[JG]
terminal

run command
[FW,RV]

Motor
revolution
speed

According to the setting of $\boxed{A \; 39}$.
00 : Free run stop
01 : Deceleration and stop
02 : DC braking und stop

NOTE: No jogging operation is performed
when the set value of jogging
frequency $\boxed{A \; 38}$ is smaller than
rhe start frequenc $\boxed{b \; 82}$, or the
value is 0 Hz.

Precautions

. Be sure IO stop the motor when switching
this function[JG] for certain operation.

Terminal name: PTC [PTC]	Function No. C 05

7

Function content

. When the registance value of the thermis-
tor connected with this terminal is more
than 3 k ohm ± 10%,the equipment
operates the trip operation(Cut off the
output and indicates the trip status
(E 351).
Use this function to protect the motor
driven by this equipment.
(Thermal protection)

Thermistor

L	5	4	3	2	1	

Terminal setting method

Digital operator
Set the set value [19] in the input
terminal C 05

NOTE: This function is assigned to the input
terminal 5 only.
If this function is assigned without
connection the thermistor,the
equipment operates the trip operation.
Be sure the thermistor is connected
with the terminal 5,and then restart

Terminal name: Terminal software lock [SFT]	Function No. to be set	C 01 to C 05 b 31

Function content

. When the terminal |SFT] is turned on, the data of all the functions except the output frequency is locked. When the data is locked. no data can be changed.

Terminal setting method

·Digital operator
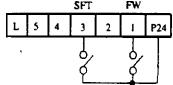
Set the set value ▢15 in one of the input terminals C 01 to C 05.

Function switching method

When the switch between the set terminals [SFT] and [P24] is turned on, the equipment enters the software lock state.


```
        SFT      FW
 L | 5 | 4 | 3 | 2 | 1 | P24
```

When |SFT] is allocated to the terminal 3

Precautions I
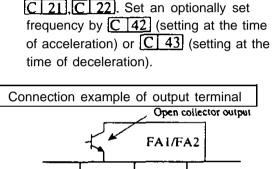
- When the [SFT] terminal is turned on, only the output frequency can be changed.
. Software lock can be made possible also for the output frequency by b 31
Software lock by the operator is also possible without the [SFT] terminal being used.
(b 31)

Terminal name: Frequency arrival signal [FA1]/[FA2] Function No. to be set   C 21, C 22 C 43

Function content

. When [FA1]/[FA2] is selected as an intelligent output terminal, at the time of constant speed arrival, two types of methods for outputting a frequency more than an optionally set frequency can be executed. Select the output method by C 21, C 22. Set an optionally set frequency by C 42 (setting at the time of acceleration) or C 43 (setting at the time of deceleration).

Connection example of output terminal

Open collector output

FA1/FA2

| CM2 | 12 | 11 |

RY

50 mA max
DC 27 V max

Terminal setting method

Digital operator
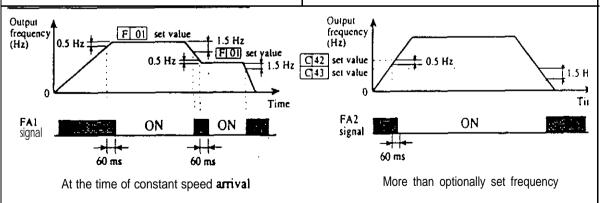
Set the set value [01] / [02] in the output terminal C 21 / C 22.

Precautions

. At the time of acceleration, an output signal at a frequency between the set frequency 0.5 Hz to + 1.5 Hz is turned on.
. At the time of deceleration, an output sign; at a frequency between the set frequency + 0.5 Hz to -1.5 Hz is turned on.

NOTE: The delay time of the output signal is **60** ms generally.

Output frequency (Hz)

0.5 Hz   F 01 set value   1.5 Hz
0.5 Hz   F 01 set value 1.5 Hz
C 42 set value
C 43 set value

Time

FA1 signal   ON   ON
60 ms   60 ms

At the time of constant speed arrival

Output frequency (Hz)

C 42 set value   0.5 Hz
C 43 set value

0.5 Hz

1.5 H

Tii

FA2 signal   ON
60 ms

More than optionally set frequency

NOTE: When an arrival signal is outputted. a delay of about 60 ms occurs.

Terminal name: Run signal [RUN]	Function No. $\boxed{C}\boxed{21}$, $\boxed{C}\boxed{22}$ 10 be set
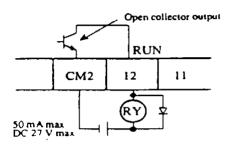
Function content

. When [RUN] is selected as an intelligent output terminal. the inverter outputs a RUN signal when the motor is driven.

Connection example of output terminal.

Open collector output

RUN

CM2	12	11

RY

50 mA max
DC 27 V max

Terminal setting method

Digital operator
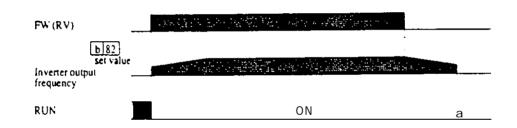
Set the set value $\boxed{\quad \boxed{00}}$ in the output terminal $\boxed{C}\boxed{21}$, $\boxed{C}\boxed{22}$.

Precautions

. RUN signal is outputted simultaneously when a frequency is outputted.

FW (RV)

$\boxed{b}\boxed{82}$
set value

Inverter output frequency

RUN   ON   a

Terminal name: Overload advance notice signal [OL]	Function No. to be set	C 21, C 22 C 41
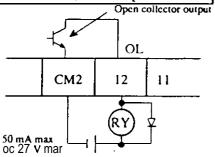
Function content	Terminal setting method
. When an output current more than the set current flows. the terminal outputs a signal.	**Digital operator** Set the set value [03] in the output terminal C 21 /C 22.

Connection example of output terminal

Open collector output

CM2	12	11

OL

RY

50 mA max
oc 27 V mar
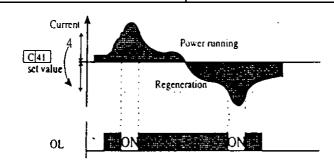
Precautions

A value of 100% is set by initialization. To change the level. change C 41 (overload level).
The accuracy of this level is same as the function of the output current monitor.
(See 7-3)

Current

4

C 41
set value

Power running

Regeneration

OL   ON   ON

Terminal name:Deviation signal al PID control [OD]	Function No. to be set	[C][21] , [C][22] [C][44]
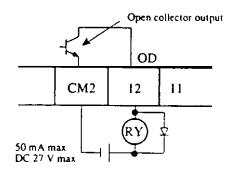
Function content

- This signal is outputted when the difference between reference and feed-back is greater than the set value at PID conuol.

Terminal setting method

Digital operator
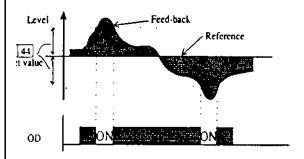
Set the set value [____][04] in the output terminal [C][21] /[C][22].

Connection example of output terminal

Open collector output

OD

| CM2 | 12 | 11 |

RY

50 mA max
DC 27 V max

Precautions,

The difference value is set 3% by initialization. To change this value. change [C][44] (deviation level).

Level

[44]
:t valuc

Feed-back

Reference

OD

ON   ON

Terminal name: **Alarm terminal**	Function No. [C][21], [C][22]
[AL]	to be set

Function content
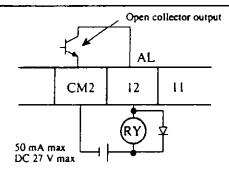
. When an alarm occurs. the function
outputs an alarm signal from the output
terminal which is assigned to the
intelligent output termnal(Open collector
output).

Terminal setting method

Digital operator

· Set the value ☐[05] in the output
terminal [C][21]/ [C][22] .

Open collector output

	AL	
CM2	12	11

(RY)

50 mA max
DC 27 V max

Precautions

. When the alarm output is set to N.C.. a tim
delay occurs until the contact is closed
when the power is turned on. Therefore.
when the alarm contact output is to be usec
set a delay of about 2 seconds when the
power is turned on.

. This terminal is an open collector output.
so the electric specification of [AL] is
different from the contact output terminal
[AL1],[AL2]-[AL0].

· The sequence of this terminal is same as
[AL0]-[AL1] .

. See the description of [AL1],[AL2]-[AL0].

When the power supply is turned off.
the alarm signal output is valid while the
power of control circuit is live.

NOTE: This signal output has the delay time
(generally 300ms) from the fault alarm
output.

7.5   Function Contents of Alarm Terminals

Terminal name: Alarm terminal [AL1, AL2-AL0]	Function No. [C]33] to be set

Function content

. When an alarm occurs. the function outputs an alarm signal from the terminal: [AU)]. [AL1], and [AL2] via the c contact. If this occurs. the operator displays the alarm content.

Terminal setting method

Digital operator

. 'N.O. contact' or 'N.C. contact' can be selected by [C]33].
The initialization is 'N.C. contact *.

Precautions

Holding of an alarm signal
When an alarm signal is outputted, the alarm content will be stored even if the input power is turned off. Therefore. by turning the power on again, the content ca be confirmed. However, when the input power is turned off, the alarm output will reset (canceled) when the power is turned on again. Therefore. to hold the alarm output. hold the alarm once by the extema sequence.
. When the alarm contact output is set to N.C., a time delay occurs until the contact is closed when the power is turned on. Therefore, when the alarm contact output to be used. set a delay of about 2 seconds when the power is turned on.
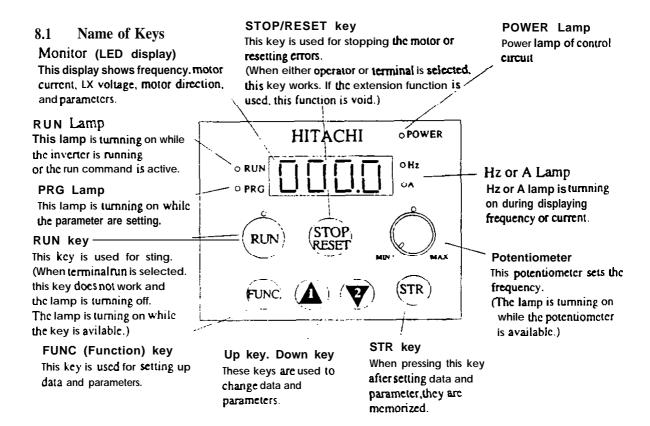
Contact specification

Maximum		Minimum
AC 250V, 2.5A (load R) 0.2A (cos 0 =0.4)		AC 100 V. 10 mA
DC 30 Vm. 3.0A (load R) 0.7A (cos 0 =0.4)		DC 5 V, 100 mA
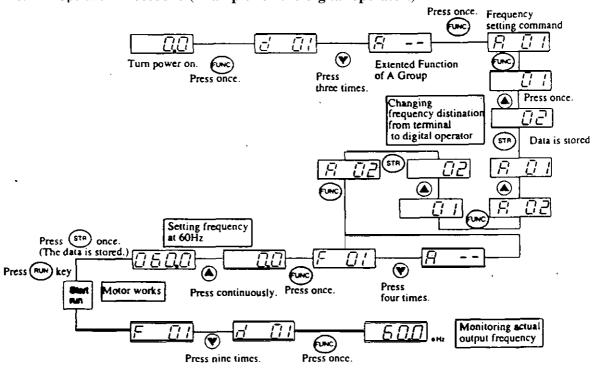
'The alarm output terminals are connected as shown in Fig. (a) at the time of initialization. The) can be changed as shown in Fig. (b) by setting [C]33].

(a)N.C. contact (at the time of initialization)		(b)N.O.contact	
During normal running	When an alarm occurs a power is turned off	During normal running or when power is turned off	When an alarm occurs
ALO ALI AL2	ALO ALI AL2	ALO ALI AL2	ALO ALI AL2

Contact	Power	Running state	ALO-ALI	ALO-AL2
N.C. (Iniualized value)	ON	Normal	Closed	Open
	ON	Trip	Open	Closed
	OFF	—	Open	Closed

Contact	Power	Running state	ALO-ALI	ALO-AL2
N.O.	ON	Normal	Open	Closed
	ON	Trip	Closed	Open
	OFF	—	Open	Closed

8. OPERATION OF THE DIGITAL OPERATOR

8.1   Name of Keys

Monitor (LED display)
This display shows frequency. motor current, LX voltage, motor direction, and parameters.

RUN Lamp
This lamp is turning on while the inverter is running or the run command is active.

PRG Lamp
This lamp is turning on while the parameter are setting.

RUN key
This key is used for sting. (When terminalrun is selected. this key does not work and the lamp is turning off. The lamp is turning on while the key is avilable.)

FUNC (Function) key
This key is used for setting up data and parameters.

STOP/RESET key
This key is used for stopping the motor or resetting errors.
(When either operator or terminal is selected, this key works. If the extension function is used, this function is void.)

Up key. Down key
These keys are used to change data and parameters.

POWER Lamp
Power lamp of control circuit

Hz or A Lamp
Hz or A lamp is turning on during displaying frequency or current.

Potentiometer
This potentiometer sets the frequency.
(The lamp is turning on while the potentiometer is available.)

STR key
When pressing this key after setting data and parameter,they are memorized.

HITACHI o POWER

o RUN   o Hz
o PRG   o A

RUN   (STOP/RESET)

FUNC (▲) (▼) (STR)

MIN · MAX

8.2   Operation Procedure (Example for the digital operator.)

Press once. Frequency setting command

Turn power on. Press once.   Press three times. Extented Function of A Group

Changing frequency distination from terminal to digital operator

Press once.   Data is stored

Setting frequency at 60Hz

Press (STR) once. (The data is stored.)
Press (RUN) key
Motor works   Press continuously. Press once. Press four times.

Press nine times. Press once. Monitoring actual output frequency

8-1

8.3 Key Description

(FUNC) [Function key] This key allows the chang from parameter area to daw area and extended function entrance alternately.

When each time the key is pressed, the display changes as follows.

NOTE: After the data is changed. be sure to press the (STR) key.

(▲) (▼) [Up key. Down key] These keys change rhe values of data, and parameters.

d 01 Output frequency monitor	d 08 Trip Monitor
d 02 Output current monitor	d 09 Trip history monitor
d 03 Running direction monitor	F 01 Set the output frequency
d 04 Feedback data of PID control monitor	F 02 Set the acceleration time 1
d 05 Condition of input terminal monitor	F 03 Set the deceleration time 1
d 06 Condition of output terminal monitor	F 04 Set the motor direction
d 07 Output frequency converted value monitor	A -- Entrance of A group extended function
	b -- Entrance of B group extended function
	C -- Entrance of C group extended function

(RUN) [RUN key]. . This key sw the run.
The set value of |F 04| determines forward run or reverse run.
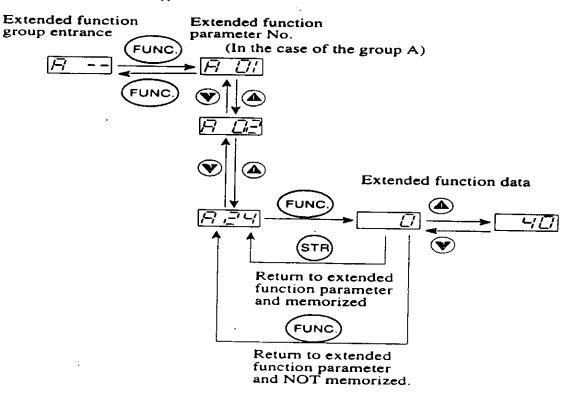
(STOP RESET) . [STOP/RESET key] This key stops the run.
When a trip occurs. this key becomes the reset key.

Data setting for extended function

When an extended function is to be used, select the extended function group from $\boxed{A\ \text{-}}\ \boxed{b\ \text{-}}\ \boxed{C\ \text{-}}$

by using the keys $\triangle$ and $\triangledown$ so as to enter the extended function mode.

Extended function group entrance

Extended function parameter No.
(In the case of the group A)

Extended function data

$\boxed{A\ \text{--}}$ — (FUNC.) → $\boxed{A\ 01}$

(FUNC.) $\triangledown \updownarrow \triangle$

$\boxed{A\ 03}$

$\triangledown \quad \triangle$

$\boxed{A\ 24}$ — (FUNC.) → $\boxed{\quad 0}$ $\triangle$ → $\boxed{40}$ $\triangledown$

(STR)

Return to extended function parameter and memorized

(FUNC.)

Return to extended function parameter and NOT memorized.

' Explanation of display at power on

When the inverter is turned on, the display which is displayed when the power is turned off before it is turned on appears. (Except the extended function mode.)

a.4 Initialization List of Digital Operator

(1-1) Monitor mode

Display order	Function name	Type	Parameter display	Settable during running	Range of set value	Initializ-ation
1	Output frequency monitor	Monitor-ing	d01	—	Display from 0.5Hz to 360.0Hz. Light on "Hz" LED	—
2	Output current monitor	Monitor-ing	d02	—	Display from 0.01 to 999.9A Light on "A" LED.	—
3	Running direction monitor	Monitor-ing	d03	—	" F "... " ▭ "...Stop " r "...Reverse	—
4	Feedback data of PID control monitor	Monitor-ing	d04	—	Display the converted feed back value scaled by "A75".	—
5	Condition of input intelligent terminal monitor	Monitor-ing	d05	—	Display the condition of input intelligent terminal. ON / OFF terminal No 5 4 3 2 1	—
6	Condition of output intelligent terminal monitor	Monitor-ing	d06	—	Display the condition of output intelligent terminal and alarm. ON / OFF terminal No AL 2 1	—
7	Output frequency converted value monitor	Monitor-ing	d07	—	Display the output frequency converted value scaled by "b86" Display =(output frequency) * ("b86" value) (1)0.01 to 99.99 [1 1 . 1 1] (11.11) (2)100.0 to 999.9 [1 1 1 . 1] (111.1) (3)1000 to 9999 [1 1 1 1 .] (1111) (4)10000 to 99990 [1 1 1 1] (11110)	—

Accuracy of output current monitor

Accuracy : ± 20%
    (A half base frequency or higher)
The indication value may exceed this accuracy by the load current condition.
Use the moving tron type ammeter for the precise current measurement .

8	Trip monitor	Monitoring	d08	—	Display latest trip contents -Display order and operation **Alarm cause** **press FUNC key** Output frequency at trip **press FUNC key** Motor current at trip **press FUNC key** DC voltage at trip **press FUNC key** "d08" display ·There is no latest trip $\boxed{\quad - \quad - \quad - \quad}$	
9	Trip history monitor	Monitoring	d09	—	Display last 2times trip except latest trip. Displays only alarm cause "d09" display **press FUNC key** Cause of the last trip **press FUNC key** Cause of the last trip but one **press NNC key** "d09" display If there is no trip,display $\boxed{\quad - \quad - \quad - \quad}$	

(1-2)Basic function mode

This mode can be set the basic function.

Display order	Function name	Type	Parameter display	Settable during running	Range of set value and contents	Initialization
1	Output frequency setting	Set value	F01	possible	0.5-360.0Hz / Resolution ± 0.1Hz (1)Digital Operator on the front case In this function,the output frequency can be set in the inverter by using the key pad. But it is necessary to set the frequency distination to the digital operator("A01"=02). (2)Multispeed The output frequency in the multispeed mode can be set as specified following; Connect the multispeed terminal for setting the frequency,that is to say,to set the frequency of each multispeed must be made the relation between multipeed 1 to 15 on the terminal. (3)Remote operator,Terminal, Potentiometer In setting the frequency from the remote operator (DOP),the terminal(O-L,O1-L) or the potentiometer on the front case,data of this function is just monitored the frequency from each device.	0.0Hz
2	Acceleration 1	Set value	F02	possible	0.1 second to 3000 seconds [Resolution of setting] 0.1 - 999.9 ········0.1 second 1000 - 3000 ········1 second	10 seconds
3	Deceleration 1	Set value	F03	possible	0.1 second to 3000 seconds [Resolution of setting] 0.1 - 999.9 ········0.1 second 1000 - 3000 ········1 second	10 seconds
4	Running direction setting	Set value	F04	Not possible	Set the motor direction Set the motor direction when running by pressing (RUN) key. 00···forward run 01···reverse run	00
5	Extended function of A group setting	Set value	A - -	possible	Extended function of A group can be entered from "A--" function.A group regards control setting or function setting.	
6	Extended function of b group setting	Set value	B - -	possible	Extended function of B group can be entered from "b--" function. B group regards protection setting or others.	
7	Extended function of C group setting	Set value	C - -	possible	Extended function of C group can be entered from "C--" function.C group regards intelligent terminal setting.	

(2)Extended function mode A group

Display order	Function name	Type	Parameter display	Settable during running	Range of set value	Initializ ·ation (-FE/-FU)
Basic parameter setting							
1	Frequency distination setting (Multi speed 0 setting)	Set value	A01	Not possible	Method to command output frequency is selected by this function. 00 ···· Potentiometer on the front case 01 ···· Control terminal on the logic board (0,0I input) 02 ···· Digital operator ([F01] setting)	01
2	Running command distination setting	Set value	A02	Not possible	Method to command running is selected by this function. 01 ···· Control terminal on the logic board 02 ···· Digital operator	01
3	Base frequency setting	Set value	A03	Not possible	50 to maximum frequency / Setting resolution 1Hz	50/60Hz
4	Maximum frequency setting	Set value	A04	Not possible	base frequency to 360Hz / Setting resolution 1Hz (NOTE 1)	50/60Hz
analogue input setting							
5	External frequency setting start	Set value	A11	Not possible	0 to 360Hz /Setting resolution 0.1Hz This function set the start frequency when the inverter receives 0V or 4mA analog input	0Hz
6	External frequency setting End	Set value	A12	Not possible	0 to 360Hz /Setting resolution 0.1Hz This function set the end frequency when the inverter receives 10V or 20mA analog input.	0Hz
7	External frequency setting start rate	Set value	A13	Not possible	0 to 100% /Setting resolution 1% This function set the rate of starting point of analog input for full scale(10V or 20mA). In other words,the bias of analog input can be set.	0%
8	External frequency setting end rate	Set value	A14	Not possible	0 to 100% /Setting resolution 1% This function set the rate of endding point of analog input for full scale(10V or 20mA). In other words,the bias of analog input can be set.	100%
9	External frequency start pattern setting	Set value	A15	Not possible	This function should set the starting pattern if the start frequecy and starting rate of analog input are set some value as following; 00 ···· Start frequency 01 ···· 0Hz start	01
10	Time constant of the filter of analog input setting	Set value	A16	Not possible	1 to 8 This value is average time of calculating filter.For example,8 is 8times average for analog input	a
Multispeed frequency setting							
11	Multispeed frequency setting	Set value	A20-A35	possible	0.5 to 360.0Hz/ setting resolution 0.1Hz These parameter are set frequency of multistage speed. Standard(0th) speed can be set A20 parameter, and they can be set from first multispeed (A21) to fifteenth multispeed(A35)	All parameter are 0Hz

isplay rder	Function name	Type	Parameter display	Settable during running	Range of set value	Initializ-ation
12	Jogging frequency setting	Set value	A38	possible	0.5 to 9.99Hz / setting resolution 0.01Hz The jogging frequency is inching operation by external signal from terminal.	1.0Hz
13	Stop mode of jogging	Set value	A39	Not possible	00 ··· Freerun stop after stop signal 01 ··· Deceleration stop after stop signal 02 ··· Dc braking after stop signal	00

/F characteristic

14	Selection of method of torque boost	Set value	A41	Not possible	Selected which is manual torque boost or automatic torque boost. 00 ····· Manual torque boost 01 ····· Automatic torque boost	00
15	Value of manual torque boost setting	Set value	A42	possible	Set voltage of manual torque boost Motor torque can be adjusted to increase the output voltage when the starting torque is not sufficient in V/F control. Pay attention not to cause the motor to burnout and an inverter trip. V 100% A42=11 →11 8% 0 frequency 6.0Hz 30.0Hz f base = 60.0Hz A43=10.0%	11
16	Manual torque boost frequency adjustment	Set value	A43	possible	Set the point A in the above torque boost graph within the range of 0% to 50% of the base frequency.	10.0%
17	V/F characteristic setting	Set value	A44	Not possible	Set V/F characteristic 00 ··· Constant torque characteristic 01 ··· Reduced torque characteristic V 100% Constant Torque Reduced Torque 0 frequency	00
18	V-Gain setting	Set value	A45	possible	Set the voltage gain of V/F characteristic V 100% 50% 0 frequency A44	100

braking setting

19	Selection of DC braking operation	Set value	A51	Not possible	Selected which DC braking is avilable or not. 00 ··· not available 01 ··· available	00
20	DC braking frequency setting	Set value	A52	Not possible	0.5 to 10.0 Hz / setting resolution 0.1Hz The frequency at which the DC braking is set.	0.5
21	DC braking waiting time setting	Set value	A53	Not possible	0.1 to 5.0 seconds / setting resolution 0.1 second This time is interval from end of running to start of DC braking. At this interval the motor is free running. DC braking Running A53 A55	0.0
22	DC braking force setting	Set value	A54	Not possible	0 to 100% / setting resolution 1% Set the force of DC braking	0
23	DC braking time setting	Set value	A55	Not possible	0.1 to 60 seconds / setting revolution 0.1 second Set time during DC braking operates.	0.0

nction in relation to frequency

24	Frequency upper limiter setting	Set value	A61	Not possible	0.5 to 360.0 Hz / setting resolution 0.1Hz Set the limits of frequency setting within the maximum frequency. If 0.0Hz is set, upper limiter is not available. output frequency A61 upper limiter settable range A62 lower limiter frequency command	0.0Hz
25	Frequency lower limiter setting	Set value	A62	Not possible	0.5 to 360.0 Hz / setting resolution 0.1Hz Set the limits of frequency setting within upper limiter frequency. If 0.0Hz is set, lower limiter is not available.	0.0Hz
26	Jump frequency setting	Set value	A63,A65, A67	Not possible	0.0 to 360.0 Hz /setting resolution 0.1Hz.0.0 Hz is not available To avoid a resonance with load,the frequencies at up to 3 points can be jumped.The frequency equivalent to the jump frequeny setting cannot be set. A63	0.0Hz
27	Jump frequency width setting	Set value	A64,A66, A68	Not possible	0.0 to 10.0 Hz /setting resolution 0.1Hz The frequency width where frequencies are jumped is set. A64	0.5Hz
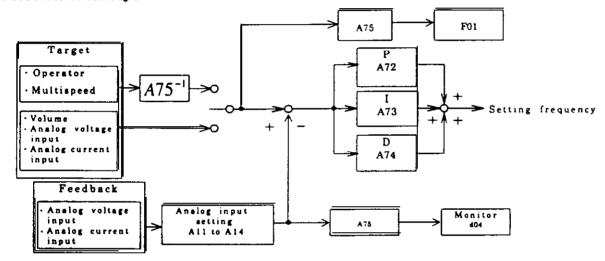
Display order	Function name	Type	Parameter display	Settable during running	Range of set value and contents	Initializ-ation (-FE/-FU)
PID control						
28	Selection of PID control	Set value	A71	Not possible	This parameter selects which PID control operates or not. 00 ··· PID control is not available 01 ··· PID control is available	00
29	P(proportion) gain setting	Set value	A72	possible	0.2 to 5.0 times /setting resolution 0.1 time This function is used to set proportional gain of PID control operation.	1.0
30	I(Integral) gain setting	Set value	A73	possible	0.0 to 150.0 seconds /setting resolution 0.1 second This function is used to set integral gain of PID control operation	1.0
31	D(Differential) gain setting	Set value	A74	possible	0.0 to 100.0 seconds /setting resolution 0.1 second This function is used to set differential gain of PID control operation.	0.0
32	Scale conversion of PID control setting	Set value	A75	Not possible	0.01 to 99.99 / setting resolution 0.01 This function is used to convert target value which feedback is fit.	1.0
33	feedback destination setting	Set value	A76	Not possible	Set the destination which feedback come from. 00 ··· OI terminal(current input) 01 ··· O terminal(voltage input) (NOTE 2 : PID feedback diagram)	00
AVR function						
34	Selection of AVR function	Set value	A81	Not possible	Select the operation of AVR function 00 ··· AVR function is available at all range of operation 01 ··· AVR function is not available at all range of operation 02 ··· AVR function is not available at deceleration AVR function is that the output voltage from the inverter keeps constant even if input power varies.	02
35	Selection of voltage of AVR function for the motor	Set value	A82	Not possible	200/220/230/240/ for 200V class inverter 380/400/415/440/460 for 400V class inverter This function is used to select the output voltage which is given the motor.However the inverter cannot output the voltage over input power source.	230/230 400/460
Second acceleration(acc) and deceleration(dec) function						
36	Second acceleration time setting	Set value	A92	possible	0.1 to 999.9seconds / setting resolution 0.1 second 1000 to 3000 seconds /setting resolution 1 second Acceleration 2 is worked by 2CH terminal input or setting changed frequency.	15.0
37	Second deceleration time setting	Set value	A93	possible	0.1 to 999.9seconds / setting resolution 0.1 second 1000 to 3000 seconds /setting resolution 1 second Deceleration 2 is worked by 2CH terminal input or setting changed frequency.	15.0
38	Selection of method to use second acceleration / deceleration (acc2/dec2)	Set value	A94	Not possible	00 ··· 2CH input from terminal 01 ··· changed frequency from acc/dec1 to acc/dec 2 frequency ↑ acc1 acc2 A95 → time 2CH or A95	00
39	Changed frequency from acc1 to acc2 setting	Set value	A95	Not possible	0.0 to 360.0Hz / setting frequency 0.1Hz When output frequency reaches this frequency ,acceleration time changes from acc1 to acc2. (NOTE 3)	0.0
40	Changed frequency from dec1 to dec2 setting	Set value	A96	Not possible	0.0 to 360.0Hz / setting frequency 0.1Hz When output frequency reaches this frequency ,acceleration time changes from dec2 to dec1. (NOTE 3)	0.0

Display order	Function name	Type	Parameter display	Settable during running	Range of set value and contents	Initialization
41	Pattern of acceleration setting	Set value	A97	Not possible	Set the pattern of acceleration 1 and accelration2 00 --- linear 01 --- S-curve	00
42	Pattern of deceleration setting	Set value	A98	Not possible	Set the pattern of acceleration 1 and decelration2 00 --- linear 01 --- S-curve	00

NOTE 1 : To keep the motor stability,the output frequency exceeds the maximum frequency set by [A04].(Max.1.5Hz)

        Adjust the output frequency setting.

NOTE 2 : PID feedback diagram

NOTE 3 : When the acceleration or the deceleration time is set small value (less than 1.0 s),the actual changed

        frequency delays to the set value.

Display order	Function name	Type	Parameter display	Settable during running	Range of set value and contents	Initializ. ation
Restart mode						
1	Selection of restart mode (NOTE 1)	Set value	b01	Not possible	Select the inverter retry method. 00 --- Alarm output after tripped 01 --- 0Hz start at the time of restart 02 --- Frequency matching start at the time of restart 03 --- Frequency matching at the time of restart and then deceleration stop and display Trip information. Trips of restart are overcurrent trip,overvoltage trip and undervoltage trip.The number of restart is 3 times at overcurrent trip and overvoltage trip, and 16 times at undervoltage trip.	00
2	Allowable undervoltage power failure time setting	Set value	b02	Not possible	0.3 to 25 seconds / setting resolution 0.1 second When an undervoltage power failure occurs,the allowable time until the power failure is recover is set. If the time of the undervoltage power failure is over this parameter, the inverter trips even if the restart mode is selected.	1.0
3	Retry waiting time setting	Set value	b03	Not possible	0.3 to 100 seconds /setting resolution 0.1 second The restart waiting time after an undervoltage power failure is recovered is set.	1.0
Electronic thermal						
5	Level of electronic thermal setting	Set value	b12	Not possible	Set a level of electronic thermal which is range between 50% to 120% for the rated current of the inverter. It can be set by ampere. Range of setting ----- 0.5 * (Rated current of the inverter) to 1.2 * (Rated current of the inverter) setting resolution ------- 0.01A	Rated current for each inverter (NOTE 2)
6	Selection of electronic thermal characteristic	Set value	b13	Not possible	Select the characteristic of electronic thermal whether CRT(constant torque characteristic) or SUB(reduced torque characteristic) The thermal characteristic accords with the load to be used because the motor protects. 00 -- SUB 01 -- CRT	01
Overload restriction						
7	Selection of overload restriction operation mode	Set value	b21	Not possible	This function is used to select the mode to operate overload restriction. 00 --- Not available 01 --- Available at acceleration and constant speed 02 --- Available at constant speed At deceleration,overload restriction function is not available always	01
8	Level of overload restriction setting	Set value	b22	Not possible	Set a level of overload restriction which is range between 50% to 150% for the rated current of the inverter. It can be set by ampere. Range of setting ----- 0.5 * (Rated current of the inverter) to 1.5 * (Rated current of the inverter) setting value -------Current (A) setting resolution 1% of the rated current	Rated current *1.25 for each inverter (NOTE 2)
9	Rate of deceleration at overload restriction	Set value	b23	Not possible	Set the deceleration rate at operation of overload restriction function 0.1 to 30.0 / setting resolution 0.1.	1.0

NOTE 1 : In case the restart mode [b 01] is set [00] , if inverter is reset by long power failure with the run command setting,inverter restarts immediately after power coming. See the other warning at p.1- 3.

NOTE 2 : The initialize data of 005N , 011N , 030H are set the value which same as 007N , 016N , 040H .

So be sure to set the value again for each motor driven by the inverter.

Display order	Function name	Type	Parameter display	Settable during running	Range of set value and contents	Initialization (-FE/-FU)
Other protection		.				
10	Selection of software lock mode	Set value	b31	Not possible	Software lock is the function that cannot be changed any parameter except this function. This function is set by the set-maker in order to avoid that end-user change the parameter and missoperation of the system. 00 ··· It is impossible to change all parameter except this function when SFT from terminal is on. 01 ··· It is impossible to change all parameter except this function and frequency setting function when SFT from terminal is on. 02 ··· It is impossible to change all parameter except this function as soon as 02 is set. 03 ··· It is impossible to change all parameter except this function and frequency setting function as soon as 03 is set.	01
11	Reactive Current setting (NOTE 3)	Set value	b32	Not possible	Setting resolution : 1% Amps of inverter rated current . Set the no load current of motor at the down sized motor,multiple motor or 230V / 460V motor driving.	Rated Current *0.58 for each inverter
Others						
13	Analog meter adjustment	Set value	b81	possible	This function is used to adjust the analog meter connected to the frequency monitor(FM). 0 to 255 / setting resolution 1	80
14	Start frequency adjustment	Set value	b82	Not possible	0.5 to 9.9 Hz / setting resolution 0.1Hz Set the frequency for starting output of the inverter.	0.5
15	Carrier frequency setting (NOTE 1)	Set value	b83	Not possible	0.5 to 16.0 kHz / setting resolution 0.1kHz Set the carrier frequency for PWM waveform output of the inverter. When the carrier frequency over 12kHz is set,the rated current of the inverter has to be reduced.	5
16	Selection data initialization or clear of trip history (NOTE 2)	Set value	b84	Not possible	Select whether it is data initialization or trip history clear. 00 ·· Trip history clear 01 ·· Data initialization The method of this function is that : 1)set the this function 00 or 01, 2) (FUNC) ,(▲) (▼) on the operator are pressed at same time, 3)and then continue this condition and press (STOP) key. 4)Wait 2 seconds holding the key(FUNC) (▲) (▼) the display will blink " d 00 ". Then release the all keys. 5) Then the initialize operation starts.	00
17	Selection of initialized data	Set value	b85	Not possible	Select the initalized date 00 ··· Japan version 01 ··· Europe version 02 ··· US version 03 ··· Exclusive version(Do not set)	01/02
18	Frequency converted value setting	Set value	b86	possible	Set the frequency converted value which is related d07 monitor 0.1 to 99.9 / setting resolution 0.1	1.0
19	Selection of STOP key meaning	Set value	b87	Not possible	Decide the STOP key meaning when running destination is terminal 00 ·· STOP key is available at terminal condition 01 ·· STOP key is not available at terminal condition	00
20	Selection of operation at FRS signal canceled	Set value	b88	Not possible	Select the operation after freerun function is canceled. 00 ··· Restart from 0Hz 01 ···Restart from the frequency which is picked up at the real speed of the motor.	00
21	Selection of the contents for digital operator (OPE-J)	Set value	b89	possible	Select the monitoring data for using the digital operator. 01 ··· Output frequency monitoring (d 01) 02 ··· Output current monitoring (d 02) 03 ··· Running direction monitoring (d 03) 04 ··· Feedback data of PID control monitoring (d 04) 05 ··· Condition of input intelligent terminal monitoring (d 05) 06 ··· Condition of output intelligent terminal monitoring (d 06) 07 ··· Scale conversion data of output frequency monitoring (d 07)	01

NOTE 1 : While the DC braking is performed,the carrier frequency is held to 1kHz automaticaly.
NOTE 2 : This function is not performed when the remote operator is connected.
Take off the remote operator and operate from the key pad on the inverter.
NOTE 3 : The set value links with the detection current of output current monitor,electric thermal protection and overload limit.

(4)Extended function of C group

These function have relation with terminal.

Display order	Function name	Type	Parameter display	Settable during running	Range of set value and contents	Initializ ation (-FE/-FU)
Input terminal(function)						
1	Function of terminal 1 setting	Set value	C01	Not possible	Set the function of input terminal 1 (codes) 00 -- FW(forward command) 01 -- RV (reverse command) 02 -- CF1(multispeed1) 03 -- CF2 (multispeed2) 04 -- CF3(multispeed3) 05 -- CF4(multispeed4) 06 --JG(jogging command) 09 -- 2CH(2-stage acceleration and deceleration) 11 -- FRS(Free run command) 12 -- EXT(External trip) 13 -- USP(USP function) 15 -- SFT(Software lock) 16 -- AT(analog input voltage/current switching) 18 -- RS(reset)	00/00
2	Function of terminal 2 setting	Set value	C02	Not possible	Set the function of input terminal 2 (codes)-- same C01	01/01
3	Function of terminal 3 setting	Set value	C03	Not possible	Set the function of input terminal 3 (codes)-- same C01	02/16
4	Function of terminal 4 setting	Set value	C04	Not possible	Set the function of input terminal 4 (codes)-- same C01	03/13
5	Function of terminal 5 setting	Set value	C05	Not possible	Set the function of input terminal 5 (codes)-- same C01 and there is additional code. 19 -- PTC(motor thermistor input)	18/18
Input terminal(condition)						
6	Condition of terminal 1 setting	Set value	C11	Not possible	Set the condition of input terminal 1 which is normally open or normally close. 00 -- normally open [NO] 01 -- normally close [NC]	00/00
7	Condition of terminal 2 setting	Set value	C12	Not possible	Set the condition of input terminal 2 which is normally open or normally close.	00/00
8	Condition of terminal 3 setting	Set value	C13	Not possible	Set the condition of input terminal 3 which is normally open or normally close.	00/00
9	Condition of terminal 4 setting	Set value	C14	Not possible	Set the condition of input terminal 4 which is normally open or normally close.	00/01
10	Condition of terminal 5 setting	Set value	C15	Not possible	Set the condition of input terminal 5 which is normally open or normally close.	00/00
Output terminal(function)						
11	Function of terminal 11 setting	Set value	C21	Not possible	Set the function of output terminal 11 (code) 00 --- RUN(signal during running) 01 --- FA1(frequency arrival signal:at the time of constant speed arrival) 02 ---FA2(frequency arrival signal:at the time of set frequency or more) 03 --- OL(overload signal) 04 --- OD(deviation signal at PID control) 05 --- AL(alarm signal)	01
12	Function of terminal 12 setting	Set value	C22	Not possible	Set the function of output terminal 12 (code) ...... same C21	00
13	Function of FM terminal setting	Set value	C23	Not possible	Set the function of frequency monitor FM (code) 00 --- A-F(monitor of analog output frequency) 01 --- A(monitor of analog output current) 02 --- D-F(monitor of digital output frequency)	00

14	Condition of terminal 11 setting	Set value	C31	Not possible	Set the condition of intelligent output terminal 11 which is normally open or normally close. 00 -- normally open 01 -- normally close	00
15	Condition of terminal 12 setting	Set value	C32	Not possible	Set the condition of intelligent output terminal 11 which is normally open or normally close. 00 -- normally open 01 -- normally close	00
16	Condition of terminal AL setting	Set value	C33	Not possible	Set the condition of alarm relay which is normally open or normally close. (See 7-21) 00 -- normally open 01 -- normally close	01

Function relation with output terminal

17	Level of overload signal setting	Set value	C41	Not possible	Set the level of overload signal which is range between 0% and 200% for rated current of the inverter. Range of setting ----- 0.0 * (Rated current of the inverter) to 2.0 * (Rated current of the inverter) setting resolution ------- 0.01A motor current / overload signal diagram with C41	Rated current of each inverter
18	Arrival frequency setting for acceleration	Set value	C42	Not possible	Set the frequency that the arrival signal should be outputted at acceleration. 0.0 to 360Hz output frequency diagram with C42, C43, arrival signal	0.0
19	Arrival frequency setting for deceleration	Set value	C43	Not possible	Set the frequency that the arrival signal should be outputted at acceleration. 0.0 to 360Hz	0.0
20	Level of deviation signal setting	Set value	C44	Not possible	This function sets deviation level between target and feedback at PID control. 0.0 to 100.0% / setting resolution 0.1% 100% means fullscale PID control diagram with Feedback, Target, C44, Deviation signal	3.0

9. PROTECTIVE FUNCTIONS

The L100 series inverters trip by protective functions against overcurrent, overvoltage, and undervoltage which protect the invencr. If the protective functions are engaged, the output is shut down, motor runs free and holds that condition until it is reset.

Trip	Contents	Display
Over current protection	When output of an inverter is short circuited. the motor is locked or drives sudden heavy load,the inverter output current exceeds a certain level,and the inverter output is cut off.	-Constant speed E 0 1 -at Deceleration E 0 7 1 -at Acceleration E 0 3 1 -at the others E 0 4
Overload protection	When a motor overload is detected by the electronic thermal function, the output of the inverter is cut off.	E 0 5
Overvoltage protection	When the inverter DC bus voltage exceeds a certain level due to regenerative energy from the motor,this protection engages and the output of the invencr is cut off.	E 0 7
EEPROM error (NOTE1)	When the memory built in has problems due to noise or excessive temperature rise,this protection engages and the output of the invencr is cut off.	E 0 8 1
Undervoltage protection	A decrease of DC bus voltage of an invencr results in improper function of the control circuit. It also generates the motor hea and causes low torque. Output is cut off when the DC bus voltage goes down to less than a certain level.	E 0 9 1
CPU error1	Malfunction or abnormality on built-in CPU and the output of the inverter is cut off.	E 1 0 E 2 2
External trip	An abnormality signal from external equipment cuts off the output of the invener. It is necessary to assign the external trip on the intelligent terminal.	E 1 2
USP error	It indicates an error when power is turned on while the inverter is being run. (When USP function is selected)	E 1 3
Ground fault protection	The inverter is protected by detection of ground faults between the inverter output and the motor upon power on before the inverter works. This protection is provided for the inverter,not for humans.	E 1 4
Input overvoltage	When the input voltage is higher dun the specified value,it is detected 100 seconds after power is turned on and the output is cut off.	E 1 5
Thermal protection	When the temperature of the inverter module is higher,the thermal sensor in the invencr module detects the higher temperature of power chip and the invener is cut off.	E 2 1
PTC error	When the resistance value of the external thermistor is too large,the equipment detects the abnormal condition of the thermistor and then cut off the output. (When PTC function is selected)	E 3 5

NOTE 1: If an EEPROM error occurs, be sure to confirm the setting value again

If the power is turned off while the [RS] is held [ON],the EEPROM error occurs

at the power is turned on in the next time.

Other display

Contents	Display
Under stand-by condition at power on. At reset signal coming.	⌜5555⌝ ⌜ccc⌝ ⌜11111⌝
It is displayed when the under voltage or the power is shut off.	⌜- - -⌝
It displays the rest time of retry waiting time after the power recovery of undervoltage when selecting the retry mode.	⌜oooo⌝
During the initialization of the parameters 　　　　　　[EU] : European version 　　　　　　[USA] : American version 　　　　　　[JP] : Japanese version	⌜5 EU⌝ ⌜5USA⌝ ⌜5 JP⌝
During the initialization of the trip history data	⌜5 HC⌝
During the copy operation by the copy unit.	⌜COPY⌝
No data(Trip history. PID feedback data).	⌜- - -⌝

For display contents when the remote operator or copy unit is used. see page 13-1 and the subsequent pages.

10. TROUBLESHOOTING

Symptom		Probable cause	Countermeasure
The motor will nor run.	The inverter outputs u. V and W are not supply ing voltage.	* Is the parameter selling of the frequency command destination[A01]corrccr? . Is the parameter setting of the running command destination[A02]correct?	. Make sure of the Parameter setting [A01]. *Make sure of the parameter setting [A02].
		. Is power being supplied to terminals L1, L2, and L3(N)? If it is. the POWER lamp should be on.	• Check terminals L1, L2, and L3(N), U, V. and W. • Turn on the Power supply.
		• Is the display E □□?	. Press (FUNC) and check the content. Then press the reset key.
		. Is the allocation of intelligent input terminal correct ? . Is the operation instruction RUN ON? . Is terminal FW (or RV) connected to terminal P24? .	. Make sure of the allocation of the terminal [C 01] ~ [C OS]. . Set to ON. . Connect terminal P24 to terminal FW (or RV) (When the terminal mode is selected.)
		Has the frequency setter been turned on by pushing (▲)(▼) key to select [F 01] and then @@ key. . Are the control circuit terminals H. 0 and L connected to the potentiometer?	. Push down keys and set. . When terminal mode is selected, connect th potentiometer to H, O, and L. and then set.
		. Has RS/FRS been left ON?	. Release reset.
	Inverter outputs U, V. and w are supplying voltage.	. Has the motor the load too heavy?	. Reduce the load. Test the motor independently.
	The optional remote operator is used. (copy unit)	. Arc the operational settings between the remote operator and inverter unit correct?	. Check the operation of the optional remote operator. (copy unit) ON | 1 2 3 4 | 1: OFF OFF | ▮▮▮▮ | 2: ON (Same as J300)
The direction the motor is reversed.		. Arc the connections of output terminals U. V. and W correct? . Is the phase sequence of the motor forward or reverse in respect to U. V. and W?	. Make the connections according to the phase sequence of the motor. (In general, forward should be in the sequence: U. V, and W.)
		. Arc the control terminal connection correct? • Is the parameter [F 04] set correctly ?	. Terminal FW for forward. and RV for reverse.

Symptom		Probable cause	Countermeasure
The rpm of the motor will not increase.		• After checking the wiring of the frequency setter, the rpm still doer no, increase when the setter is turned.	• Replace the frequency setter.
		. Is the load too heavy?	• Reduce the load. • When the load is too heavy, the overload restriction will be activated, so that the rotational speed will be lower than the setting.
Rotation is "Instable.		. Is the fluctuation in load too great? . Is the power supply voltage fluctuating? • Is some peculiar frequency causing the problem?	• Increase the capacity. (Both of the motor and inverter.) . Decrease the fluctuation. • Change the output frequency slightly. . Change the carrier frequency(b83 p.8-12)
The rpm of the motor does not match the inverter.		. Is the maximum frequency setting correct ?	• Check the V/F pattern against the motor specifications.
The data is incorrect.	The data has not changed.	• Was the power turned off without pushing the (STR) key after the data was changed with (▲)(▼) keys.	. Input the data and push the (STR) key once.
		• The data is memorized upon power off. Is the time from power OFF to ON less than six seconds?	•Take six seconds or more when turning power OFF and ON after changing the data.
	Data copied by the copy unit is not input.	• Is the power turned off within six seconds after the display changed from REMT to INV.	. Copy again and keep the power on during six seconds or more after copying.

Symptom		Probable cause	Countermeasure
The data s nor changed.	Frequency setting can not be changed. Run and stop can not be done.	• The change of the terminal mode and digital operator mode were correct?	• Confirm the change in [A 01] , IA 02] setting mode. (See page 8-7.)
	The data can not be changed.	• Is software lock ON? • Is software lock ON with software lock selection [b 31] • Is the switch 4 mounted on the back of the remote operater (copy unit) ON? (See page 13-2)	. Open SFT terminal and PV24. . Change the data of [b 311. • Turn the switch OFF.

Precautions for data setting

When changing any set data by one of the following methods , keep the equipment unoperated for 6 seconds or more after the selected method is executed. When any key is pressed. or the reset operation is performed. or the power is turned off within 6 seconds. correct data may not be set.

1) Changing the data and pressing the [STR] key to store the data

2) Operating the ECOPY key when copying another inverter data using the copy unit (DRW) (See page 13-12.)

11. MAINTENANCE AND INSPECTION

11.1   Maintenance and Inspection Precautions

⚠ WARNING

⚠ After a lapse of more than 5 minutes after turning off the input power supply.
perform the maintenance and inspection.
Otherwise, there is a danger of electric shock

⚠ Make sure that only qualified persons will perform maintenance. inspection and pan
replacement. (Before starting the work. remove metallic objects from your person
(wristwatch. bracelet, etc.)
(Be sure IO use tools protected with insulation.)
Otherwise, there is a danger of electric shock and/or injury.

⚠ CAUTION

⚠ When removing connectors, never pull the wires. (Wires for cooling fan and logic
P.C. board)
Otherwise, there is a danger of fire due to wire breakage and/or injury

---
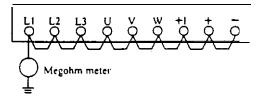
. General precautions

Always keep rhe unit clean so that dust or other foreign matter does not enter the inverter.
Take special care in regard to breaking lines and connection mistakes. Firmly connect
terminals and connectors. Keep electronic equipment away from moisture and oil. Dust,
steel filings and other foreign matter can damage insulation. causing unexpected accidents.
so take special care.

11.2 Inspection Items

(I) Daily inspection
(2)   periodic inspection (Approximately once a year)
(3) Insulation resistance test

Conduct the insulation resistance test by short circuiting the terminals as shown below.

Use 500V DC megohm meter, and make sure that 5M ohm or greater is indicated

> Never test withstand voltage test. Because this inverterhas the surge absorber between the main circuit terminal and the ground.

We recommend that the following pans be stocked to reduce down time

Recommended Spare Parts

Pan description	Symbol	Quantity		Remarks
		Used	Spare	
Cooling fan	FAN	i	l	022NF* 037LF* to 075LF* 015HF* to 075HF*
Case		l	l	Frontcase Key cover case Rearcover

I I-2

Daily Inspection and Periodic Inspection (1/3)

Inspection location	Inspection item	Inspection content	Inspection cycle		Inspection method	Criteria	Standard replacement period	Instruments
			Daily	Periodic				
Overall	Ambient environment	Check ambient temperature. humidity. dust. corrosive gases, oil mist. etc.	✓			Ambient temperature between -10 to +40℃; no icing. Ambient humidity 20 to 90%: no dew condensation.		Thermometer
	Devices overall	Check for abnormal vibrations and noise.	✓		Visual and aural inspection.			Hygrometer
	Power supply voltage	Check the input line voltage.	✓		Measure the voltage between inverter terminals LI. L2. snd L3(N).	No abnormalities. (200V class) 200 to 240V 50/60Hz (400V class) 380 to 460V 50/60Hz		Tester
Main circuit	Overall	(1) Insulation resistance test. (2) Check installation for looseness. (3) Check for evidence of overheating in the various components. (4) Clean.		✓ ✓ ✓	(1) Tighten. (2) Visual inspection.	No abnormalities. Tightening torque (except for terminal block) M3: 0.5 - 0.6 N.m M4: 0.98 - 1.3 N·m ·M5: 1.5 - 2.0 N·m		500V DC Mcgohm mete

-3

Daily Inspection and Periodic Inspection (2/3)

Inspection location	Inspection item	Inspection content	Inspection cycle		Inspection method	Criteria	Standard replacement period	Instruments
			Daily	Periodic				
Main circuit	Terminal block	No damage.		✔	Visual inspection	No abnormalities.		
	Smoothing capacitor	(1) Check for leaking (2) Check for swelling	✔ ✔		Visual inspection of (1) and (2).	No abnormalities in (1) and (2).		
	Relays	(1) Check for stuttering noise when operating		✔	(1) Aural inspection.	(1) No abnormalities.		
	Resistors	(1) Check for large cracks or changes in color		✔	(1) Visual inspection	(1) No abnormalities.		Tester
	Cooling fan	(I) Check for abnormal vibrations and noise (2) Check for dust	✔ ✔		(I) Rotate manually with power off. (2) Increase tightening	(1) Smooth rotation (2) No abnormality	2 3 years	

11-4

Inspection location	Inspection item		Inspection content	Inspection cycle		Inspection method	Criteria	Standard replacement period	Instruments
				Daily	Periodic				
Control circuit	Operation check		(1) Check the balance of the output voltage of individual phases when operating the inverter independently.		✓	(1) Measure the voltage between the phases of inverter output terminals U. V. and W.	(1) Within 2% voltage difference between phases.	—	—
			(2) Conduct a sequence protection operation test, and make sure that there are no errors in the protection and display circuits.		✓	(2) Simulate operation of the inverter protection circuit.	(2) Operate without any abnormalities.		
	Component check, including printed-circuit boards	Overall	(1) No abnormal odor or changes in color.		✓	Visual inspection	No abnormalities		—
			(2) No significant corrosion.		✓				
		Capacitor	No fluid leakage or deformation.	✓		Visual inspection			—
Display	Digital operation panel		(1) No illegible display	✓		Visual inspection	Normal operation		—
			(2) No lack of character	✓			Display can be read out.		
			(3) No blown out LEDs	✓					

NOTE: 1. The life of capacitor will be affected by the ambient temperature. See Appendix 4 Capacitor Life Curve.

2. The inverter must be cleaned periodically. If dust accumulates on the fan and heat sink, it can cause overheating of the inverter.

113   Measurement Method for I/O Voltage, Current, and Power

General measuring instruments for I/O voltage. current, and power are indicated below. The voltage to be measured is the fundamental wave effective voltage and the power to be measured is the total effective value.

Table 3 Parts to be measured
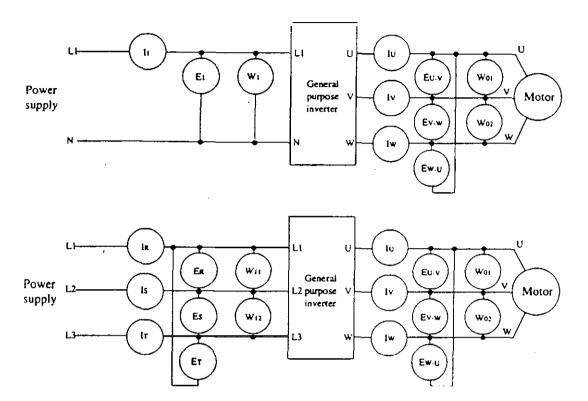
Measurement item	Parts to be measured	Measuring instrument	Remarks	Reference value
Supply voltage E_1	Between L1 and L2, L2 and L3, L3 and L1 (ER) (ES) (ET)	Moving-iron type voltmeter or rectifier type voltmeter	Fundamental wave effective value	Commercial supply voltage (200 V class) 200-240 V, 50/60 Hz (400 V class) 380-460 V 50/60 Hz
Supply current I_1	L1, L2, L3 (IR)(IS)(IT)	Moving-iron type ammeter	Total effective value	
Supply power W_1	Between L1 and L2, L2 and L3 (W11)(W12)	Electrodynamic type wattmeter	Total effective value	
Supply power factor Pf_1	Calculate the supply power factor from the measured supply voltage, E_1, supply current I_1 and supply power W_1. $$Pf_1 = \frac{W_1}{\sqrt{3} \cdot E_1 \cdot I_1} \times 100(\%)$$			
Output voltage E_0	Between U and V, V and W, W and U (EU)(EV)(EW)	Rectifier type voltmeter	Total effective value	
Output current I_0	U, V, W (IU)(IV)(IW)	Moving-iron type ammeter	Total effective value	
Output power W_0	Between U and V, V and W (W01)(W02)	Electronic type wattmeter	Total effective value	
Output power factor Pf_0	Calculate the output power factor from the output voltage E, output current I, and output power W. $$Pf_0 = \frac{W_0}{\sqrt{3} \cdot E_0 \cdot I_0} \times 100(\%)$$			

NOTE 1: Use a meter indicating a fundamental wave effective value for voltage. and meters indicating total effective values for current and power.

NOTE 2: The inverter output waveform is a distorted wave, and low frequencys may cause errors. However, the measuring instruments and methods indicated above provide comparatively accurate values.

NOTE 3: A tester (general purpose) may not be suited often to measurement of a distorted wave.

Model name (L100-)		002 NFE	004 NFE	005 NFE	007 NFE	011 NFE	015 NFE	022 NFE			
1 200V Class ,		002 NFU	004 NFU		007 NFL		015 NFU	022 NFU	037 LFU	055 LFU	075 LFU
Protective structure (NOTE 1)						IP20					
Over voltage category						III					
Maximum motor size (4P, kW)(NOTE 2)		0.2	0.4	0.55	0.75	1.1	1.5	2.2	3.7	5.5	7.5
Maximum capacity (kVA)	230v	0.5	1.0	1.1	1.5	1.9	2.8	3.9	6.3	9.5	12.7
	240 V	0.5	1.0	1.2	1.6	2.0	2.9	4.1	6.6	9.9	13.3
Input supply phase		002~022NF - ; Single-phase/Three-phase 037~075LF - ; Three-phase									
Rated input AC voltage (V)		200V -10%~240V +5% , 50/60 Hz ±5%									
Rated output voltage (V) (NOTE 3)		Three-phase 200 to 240V (Corresponds to input voltage.)									
Rated input current (A) (Single-phase/Three-phase)		3.1/1.8	5.8/3.4	6.7/3.9	9.0/5.2	11.2/6.5	16.0/9.3	22.5113.	- /20.0	-130.0	-140.0
Rated output current (A) (NOTE 4,		1.4	2.6	3.0	4.0	5.0	7.1	10.0	15.9	24.0	32.0
Output frequency range (NOTE 5)		0.5 to 360 Hz									
Frequency accuracy(at 25 ±10°C)		Digital command:±0.01% of Max. frequency Analog command:±0.2 % of Max. frequency									
Frequency setting resolution		Digital setting : 0.1 Hz , Analog setting : Max. frequency devided by 1000									
Voltage/frequency characteristics		Constant or Reduced torque with any variable voltage/frequency.									
Overload current capacity		150%, 60 seconds									
Acceleration/deceleration time		0.1 to 3000 seconds, in selectable linear or non-linear mode, second acceleration/deceleration usable.									
Starting torque		100% or more (When torque boost has been set)									
Braking torque	Dynamic braking (NOTE 6) Feedback to capacitor	Approx. 100%					Approx. 70%		Approx. 20%		
	DC injection braking	Braking is ON at the min. frequency or less. Braking can be selected by the operator. (Min. frequency, braking time and braking force can be set.)									

Model designation (L100-) [200V Class]	002 NFE	004 NFE	005 NFE	007 NFE	011 NFE	015 NFE	022 NFE			
	002 NFU	004 NFU	/	007 NFU	/	015 NFU	022 NFU	037 LFU	055 LFU	075 LFU

Input signals	Frequency setting	Digital operator	Settings with the potentiometer or ▲ ▼ in the key pad.
		External signals	0 - 10 VDC (Input impedance 10 kΩ) 4 - 20 mA(Input impedance 250Ω) 1kΩ to 2 kΩ (1 W) Variable resistor
	Forward/ reverse run, stop	Digital operator	RUN/STOP switch (The forward run (FW) when shipped from the factory)
		External signals	Intelligent input terminal (FW / RV)
	Intelligent input terminal		FW : Forward run/stop RV: Reverse run / stop CF1~4: Multi-stage speed JG : Jogging command AT : Analog current input selection 2CH: Change of 2nd accel/decel time FRS: Free run EXT: External trip USP: USP function RS: Reset SFT: Software lock PTC: Thermal protection
Output signals	Intelligent output terminal		FA1/FA2 : Frequency arrival signal RUN: RUN signal OL: Overload previous notice siganl OD : Deviation signal at PID control AL : Alarm signal
	Frequency monitoring		Analog meter (0 - 10 VDC full-scale max 1 mA) Selection of the digital frequency signal ,analog frequency signal or analog output current monitor.
Fault alarm contact			ON when the inverter trips.(1c contact)
Other functions			automatic voltage regulation,retry,analog gain/vias adjustment, frequency jump,upper/lower limiter, output frequency display, trip history monitoring. carrier frequency setting(0.5~16kHz) , PID control, automatioc torque boost , etc.
Protection functions			overcurrent, overvoltage, undervoltage, electronic thermal, temperature abnormality, ground fault upon starting, overload limit

Model name (L100-)	002 NFE	004 NFE	005 NFE	007 NFE	011 NFE	015 NFE	022 NFE	/		
[200V Class]	002 NFU	004 NFU	/	007 NFU	/	015 NFU	022 NFU	037 LFU	055 LFU	075 LFU

General specifi-cations	Ambient temperature (NOTE 7)	-10 to 50°C
	Storage temperature/ Humidity	-25 to 70°C (during short-term transportation period) / 20 to 90% RH (no dew condensation)
	Vibration	5.9 m/S² (0.6G) 10 - 55 Hz
	Installation location	1,000 meter or less altitude, indoors (IP54 or equivalent)
	External color	Blue

Options	remote operator, copy unit, cable for digital operator, reactor for improving power factor, noise filter for inverters,OPE-J

Estimated mass (kg)	0.85	1.3	2.2	2.8	5.5	5.1

NOTE 1:   Protective structure is based upon EN60529

NOTE 2:   The applicable motor is a Hitachi standard four-pole motor. When using another motor. make sure that the rated motor current does not exceed the rated inverter current.

NOTE 3:   The output voltage will decrease if input voltage decreases.

NOTE 4:   The initial data setting value of 005N / 01 IN are same as 007N / 015N.
So be sure to set the value b 12 (Level of the electric thermal) and b 22
(Level of overload restriction setting) of 005N / 007N for each motors.

NOTE 5:   Confirm with the motor manufacturer the motors maximum rpm when using a motor running at frequency higher than 50/60 Hz.

NOTE 6:   Torque will be reduced when the base frequency exceeds 50 Hz

NOTE 7:   In range of 40 to 50°C . reduce carrier frequency 2kHz and derate output current 80% , and remove the top cover.
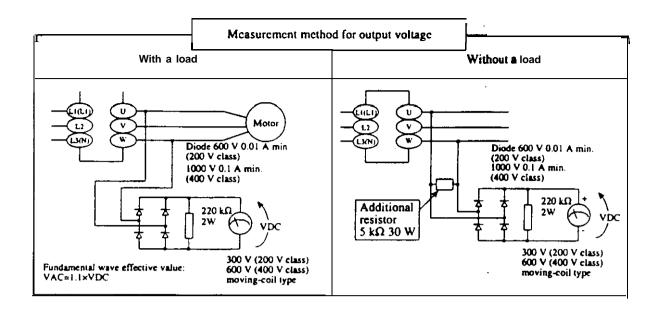
Model name (L100-)	004 **HA**	007 HA	015 HFE	022 HFE	010 HFE	040 HFE	055 HFE	075 HFE
[400V Class]	004 HFU	007 HFU	015 HFU	022 HFU		040 HFU	055 HFU	075 HFU

Protective structure (NOTE 1)	IP20	

Over voltage category	III							
Maximum motor size (4P, kW)(NOTE 2)	0.4	0.75	1.5	2.2	3.0	4.0	5.5	7.5
Maximum (kVA)^y 460 V	1.1	1.9	3.0	4.3	6.2	6.8	10.3	12.7

Input supply phase	Three-phase (For Low Voltage directive, supply 4 wire earthed neutral)
Rated input AC voltage (V)	380V -10%–460V +10% , 50/60 Hz ±5%
Rated output voltage (V) (NOTE 3)	Three-phase 380 to 460V (Corresponds to input voltage.)

Rated input current (A)	2.0	3.3	5.0	7.0	10.0	11.0	16.5	20.0
Rated output current (A)(NOTE 4)	1.5	2.5	3.8	5.5	7.8	8.6	13.0	16.0

Output frequency range (NOTE 5)	0.5 to 360 Hz	
Frequency accuracy(at 25 ±10¡C)	Digital command:±0.01% of Max. frequency Analog command:±0.2 % of Mar. frequency	
Frequency setting resolution	Digital setting : 0.1 Hz , Analog setting : Max. frequency dcvidcd by 1000	
Voltage/frequency characteristics	Constant or Reduced torque with any variable voltage/frequency.	
Overload current capacity	150%. 60 seconds	
Acceleration/deceleration time	0.1 to 3000 seconds, in selectable linear or non-linear mode, second acceleration/deceleration usable.	
Starting torque	100% or more (When torque boost has been set)	
Braking torque	Dynamic braking (NOTE 6) Feedback to capacitor	Approx.100% Approx. 70% Approx.20%
	DC injection taking	Braking it ON at the min. frequency or less. Braking cm be selected by the operator. (Min. frequency, braking time and braking force can be set.)

Model name (L100-)			004 HFE	007 HFE	015 HFE	022 HFE	030 HFE	040 HFE	055 HFE	075 HFE
[400V Class]			004 HFU	007 HFU	015 HFU	022 HFU		040 HFU	055 HFU	075 HFU
Input signals	Frequency setting	Digital operator	Settings with the potentiometer or ▲ ▼ in the key pad.							
		External signals	0 - 10 VDC (Input impedance 10 kΩ) 4 - 20 mA(Input impedance 250Ω) 1kΩ to 2 kΩ (1 W) Variable resistor							
	Forward/ reverse run, stop	Digital operator	RUN/STOP switch (The forward run (FW) when shipped from the factory)							
		External signals	Intelligent input terminal (FW / RV)							
	Intelligent input terminal		FW : Forward run/stop RV: Reverse run / stop CFI-4: Multi-aagc speed JG : Jogging command AT: Analog current input selection 2CH: Change of 2nd accel/decel time FRS: Free run EXT: External trip USP: USP function RS: Reset SFT: Software lock PTC: Thermal protection							
Output signals	Intelligent output terminal		FA1/FA2 : Frequency arrival signal RUN: RUN signal OL: Overload previous notice siganl OD : Deviation signal at PID control AL : Alarm signal							
	Frequency monitoring		Analog meter (0 - 10 VDC full-scale Max,1 mA) Selection of the digital frequency signal ,analog frequency signal or analog output current monitor.							
Fault alarm contact			ON when the inverter trips.(1c contact)							
Other functions			automatic voltage regulation,retry,analog gain/vias adjustment, frequency jump,upper/lower limiter, output frequency display, trip history monitoring. carrier frequency setting(0.5~16kHz) , PID control, automatioc torque boost , etc.							
Protection functions			overcurrent, overvoltage, undervoltage, electronic thermal, temperature abnormality, ground fault upon starting, overload limit							

Model name (L100-)	004 HFE	007 HFE	015 HFE	022 HFE	030 HFE	040 HFE	055 HFE	075 HFE
(400V Class)	004 HFU	007 HFU	015 HFU	022 HFU		040 HFU	055 HFU	075 HFU

General specifications	Ambient temperature (NOTE 7)	-10 to 50°C							
	Storage temperature/ Humidity	-25 to 70°C (during short-term transportation period) / 20 to 90% RH (no dew condensation)							
	Vibration	5.9 m/S² (0.6G) 10 - 55 Hz							
	Installation location	1,000 meter or less altitude, indoors (IP54 or equivalent)							
	External color	Blue							

Options	remote operator, copy unit, cable for digital operator, reactor for improving power factor, noise filter for inverters,OPE-J

Estimated mass (kg)	1.3	1.7	2.8	5.5	5.7

NOTE 1: Protective structure is based upon EN60529

NOTE 2: The applicable motor is a Hitachi standard four-pole motor. When using another motor, make sure that the rated motor current does not exceed the rated inverter current.

NOTE 3: The output voltage will decrease if input voltage decreases.

NOTE 4: The initial data setting value of 030H are same as 040H.
So be sure to set the value $\boxed{b\ 12}$ (Level of the electric thermal) and $\boxed{b\ 22}$ (Level of overload restriction setting) of 030H for the motor.
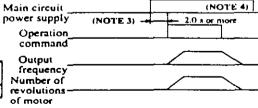
NOTE 5: Confirm with the motor manufacturer the motors maximum rpm when using a motor running at frequency higher than 50/60 Hz.

NOTE 6: Torque will be reduced when the base frequency exceeds 50 Hz.

NOTE 7: In range of 40 to 50°C. reduce carrier frequency 2kHz and derate output current 80% , and remove the top cover.

Measurement method for output voltage

With a load

Motor

Diode 600 V 0.01 A min
(200 V class)
1000 V 0.1 A min.
(400 V class)

220 kΩ
2W

VDC

Fundamental wave effective value:
VAC=1.1×VDC

300 V (200 V class)
600 V (400 V class)
moving-coil type

Without a load

Diode 600 V 0.01 A min.
(200 V class)
1000 V 0.1 A min.
(400 V class)

Additional
resistor
5 kΩ 30 W

220 kΩ
2W

VDC

300 V (200 V class)
600 V (400 V class)
moving-coil type

Terminal Connection Diagram

NOTE 1: Common terminal for each terminal is different.
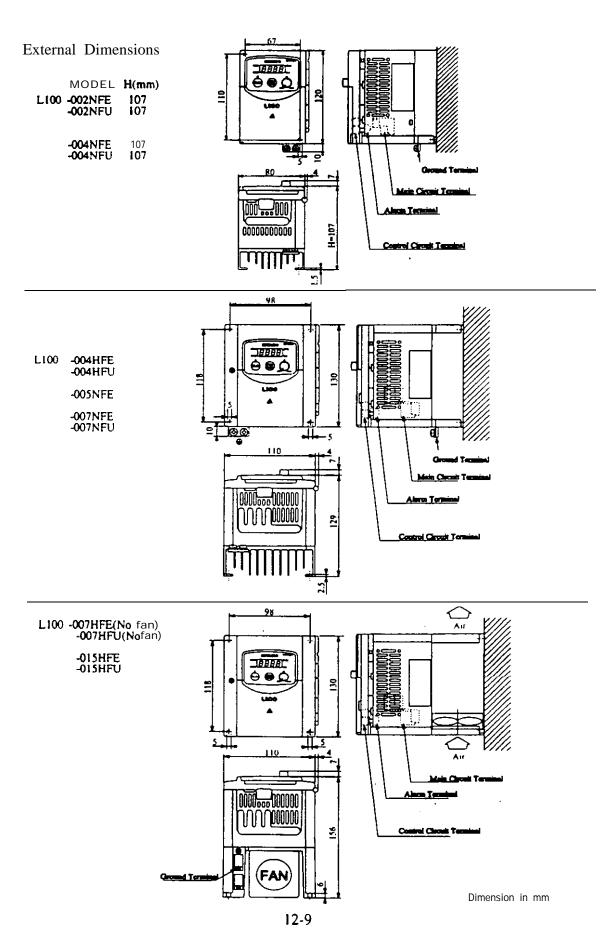
Terminal name	1, 2, 3, 4, 5	FM	H, O, OI	11, 12
Common	P24		L	CM2
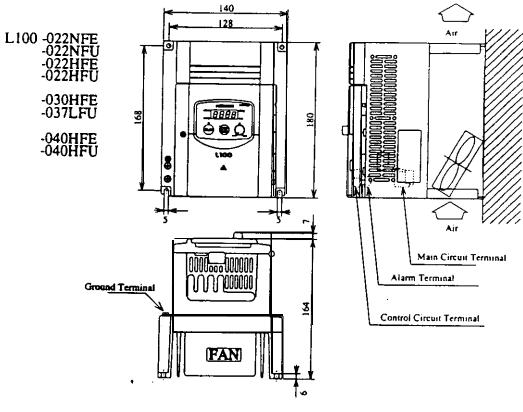
NOTE 2: When the operation command is input first and the main circuit power is turned ON, a direct start results and a trip occurs.

NOTE 3: Do not input the operation command simultaneously when the main circuit is turned on.

NOTE 4: Do not turn OFF the main circuit power during running.

External Dimensions

MODEL	H(mm)
L100 -002NFE	107
-002NFU	107
-004NFE	107
-004NFU	107

L100 -004HFE
-004HFU

-005NFE

-007NFE
-007NFU

L100 -007HFE(No fan)
-007HFU(Nofan)

-015HFE
-015HFU

Ground Terminal

Main Circuit Terminal

Alarm Terminal

Control Circuit Terminal

Dimension in mm

L100 -011NFE
-015NFE
-015NFU

140
128
168
180
5
10
5

Ground Terminal
Main Circuit Terminal
Alarm Terminal
Control Circuit Terminal

7
153
3.5

L100 -022NFE
-022NFU
-022HFE
-022HFU

-030HFE
-037LFU

-040HFE
-040HFU

140
128
168
180
5
5

Air
Air

Main Circuit Terminal
Alarm Terminal
Control Circuit Terminal

Ground Terminal

7
164
6

FAN

L100 -055LFU
　　　-055HFE
　　　-055HFU

　　　-075LFU
　　　-075HFE
　　　-075HFU

Air

Ground Terminal
Main Circuit Terminal
Alarm Terminal
Control Circuit Terminal

Air
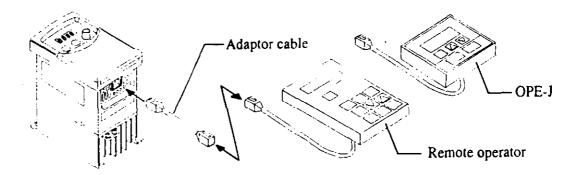
13. FUNCTIONS WHEN USING THE OPTIONAL REMOTE OPERATOR

13.1 Connecting the remote operator

Before connect the optional remote operator (digital operator,OPE-J) , turn the power supply(power source) off.
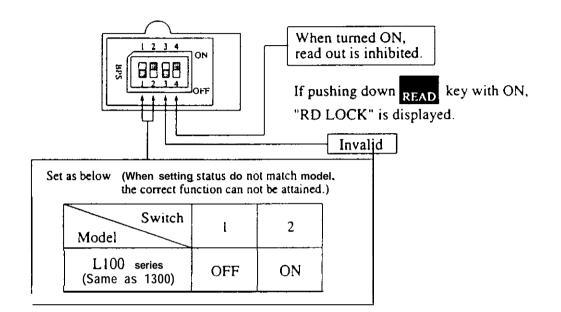
(1) Connect the remote operator cable with the inverter

(2) Turn the power supply (power source) on

(3) Make sure that the liquid crystal display(LCD) of the remote operator is lit

When the power supply of the inverter is turned on, FS000.0.....of the monitoring mode will be displayed, If. however, any of the following is displayed at the moment of the invener is turned off, they will be displayed again when the power is turned on at the next time.

> • Only the copy unit (DRW-OA2) is able to copy the data of L100 series.The old type (DRW-0A) is not available for L100 series.Do not use the copy unit (DRW-OA) for this function.

NOTE : Do not connect or disconnect the remote operator.during the power is supplied to the invener.

NOTE : When the remote operator is connected , the key pad of the inverter is not available

NOTE : When OPE-J is connected, the keys of OPE-J are not available except for (STOP RESET) .
(See p.8-12 "B89")

When turned ON,
read out is inhibited.

If pushing down **READ** key with ON,
"RD LOCK" is displayed.

Invalid

Set as below   (When setting status do not match model,
the correct function can not be attained.)

Switch Model	1	2
L100 series (Same as 1300)	OFF	ON

Setting and change are possible?

Y : Selling CM be changed during operation
N : Setting can not be changed during operation
– : Display only

Display sequence	Monitor name	Display content	Standard setting	Setting range	Y/N/-	Remarks	Digital operator
1	Frequency setting destination and output frequency

Multistage-speed setting and output frequency | ① ②
FS 000.0 :::::: 0.0Hz
TM 000.0 :::::: 0.0Hz
VR 000.0 :::::: 0.0Hz
JG 000.0 :::::: 0.0Hz

1S 005.0 :::::: 0.0Hz

15S040.0 :::::: 0.0Hz | 000.0

000.0

000.0

000.0 | 000.0 to 360.0 | Y | (1) displays the setting.
(2) displays the output.
• :::::: is displayed when run instruction is ON.

F: Forward run
R: Reverse run

Displayed during multistage operation.

TM : Terminal setting
VR : Potentiometer
JG : Jogging | Monitor

d 01

Setting

F 01 |
| | PID reference value setting | FSP000.0 :::::: 0.0Hz
TMP000.0 :::::: 0.0Hz
VRP000.0 :::::: 0.0Hz
1P 000.0 :::::: 0.0Hz

15P000.0 :::::: 0.0Hz | 000 | | | | |
| 2 | Acceleration time setting | ACC1 0010.0S | 10.0 (15.0) | 0.1 to 3000.0 | Y | | F 02 |
| 3 | Deceleration time setting | DEC1 0010.0S | 10.0 (15.0) | 0.1 to 3000.0 | Y | | F 03 |
| 4 | Frequency setting command | F-SET-SELECT VR | TRM | VR/TRM /REM | N | VR : Inverter pot. meter
TRM: Inverter terminal
REM: Remote operator | A 01 |
| 5 | Operation command method | F/R-SELECT REM | TRM | TRM /REM | N | | A 02 |
| 6 | Frequency converted value setting and converted value monitor | /Hz01.0 0.00 | 01.0 | 0.1 to 99.9 | Y | The arithmetic value by the frequency converted value is displayed. | D 07

b 86 |
| 7 | Output current display | ① ②
Im 0.0 A 0.0% | – | – | Y | (1) displays the rated current of the inverter
(2) displays output current | d 02 |
8	Reactive current setting	I0 A	–	0 to 32	Y	Initial setting Inverter rated current * 0.58	b 32
9	Manual torque boost adjustment	V-Boost Code<11>	11	00 to 99	Y		A 42
10	Boost F setting	V-Boost F 10.0%	10%	0.0 to 50.0%	Y		A 43
11	Torque boost mode selection	V-Boost Mode 0	0	0 /1	N		A 41
12	Output voltage gain adjustment	V-Gain 100%	100	50 to 100	Y		A 45
13	Jogging frequency adjustment	Jogging 1.00Hz	1.0Hz	0 to 9.99	Y		A 38
14	Jogging mode selection	Jog Mode 0	0	0 to 2	N		A 39
15	Analog meter adjustment	ADJ 80	80	80	Y		b 81
16	Panel display selection	PANEL d01	d01	d01 to d07	Y		b 89
17	Terminal monitor	TERM LLL LLLLL	–	–	–		d 05
d 06

Display sequence	Monitor name	Display content	Trip cause,cintents	Remarks
18	Alarm display	ERR1 -#		Not occuerd
	Trip monitor	ERR1 OVER. V	<Trip cause 1> Trip cause	The message is displayed on a priori basis when an alarm occurs. Trip cause Overvoltage trip
		ERR1 31.0Hz	Output frequency when tripped	
		ERR1 12.5A	Output current when tripped	
		ERR1 787.0Vdc	Voltage between P and N when tripped	
		ERR1 RUN 000002H	Cumulative hours when tripped	
19	Total alarm count	ERROR COUNT 0		Not occuerd
		ERROR COUNT 25	Total trip count	
20	Trip history monitor	ERR2 #		Not occuerd
	Last trip contents	ERR2 OC.Accel	<Trip cause 2> Trip cause	Trip cause Overcurrent trip for acceleration
		ERR2 5.0Hz	Output frequency when tripped	
		ERR2 20.1 A	Output current when tripped	
		ERR2 560.0 Vdc	Voltage between P and N when tripped	
		ERR2 RUN 000002H	Cumulative hours when tripped	
	Contents of last trip but one	ERR3 #		Not occuerd
		ERR3 EXTERNAL	<Trip cause 3> Trip cause	Trip cause External trip
		ERR3 5.0Hz	Output frequency when tripped	
		ERR3 20.1 A	Output current when tripped	
		ERR3 560.0 Vdc	Voltage between P and N when tripped	
		ERR3 RUN 000001H	Cumulative hours when tripped	

NOTE: When data is changed. be sure to press the [STR] key.(Otherwise, the changed data may not be stored.)

The following functions can be obtained with connection of L-100-series to the remote operator (DOP) or the copy unit (DRW).

Function mode

Display sequence	o.	Function name	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Setting range	Digital operator
1	00	Base frequency setting	F-BASE 060 Hz	50Hz	60Hz	50.0 to MAX freq.	A03
2	01	Maximum frequency setting	F-MAX. 060 Hz	50Hz	60Hz	50.0 to 360.0	A04
3	02	Start frequency adjustment	Fmin. 0.5 Hz	0.5	0.5	0.5 to 9.9 (Hz)	b82
4	03	Motor input voltage setting	AVR AC 200 v	230V/400V	30V/460V	200,220,230,240/ 380,400,415,440,460	A82
		AVR function for deceleration	AVR MODE DOFF WFF	DOFF	DOFF	ON/OFF/DOFF	A81
5	04	Control method setting	CONTROL VC	VC	VC	vc , VP1	A44
6	06	Acceleration time1 setting	ACC 1 0010.0 s	10.0 s	10.0 s	0.1 to 3000.0	F02
		2-stage acceleration selection	ACC CHG TM	TM	TM	TM / FRE	A94
		Acceleration time 2 setting	ACC 2 0015.0 s	15.00 s	15.00 s	0.1 to 3000.0	A92
		Acceleration time change frequency setting	ACC CHFr 000.0Hz	0.0Hz	0.0Hz	0.0 to 360.0	A95
		Pattern selection for acceleration	ACC LINE L	L	L	L / S	A97
7	07	Deceleration time 1 setting	DEC 1 0010.0 s	10.0s	10.0 s	0.1 to 3000.0	F03
		Deceleration time 2 setting	DEC 2 0015.0 s	015.0 s	015.0 s	0.1 to 3000.0	A93
		Deceleration time change frequency setting	DEC CHFr 000.0Hz	0.0Hz	0.0Hz	0.0 to 360.060.0	A9A96
		Pattern selection for deceleration	DEC LINE L	L	L	L / S	A98
8	10	Restarting after FR: signal selection	RUN FRS ZST	ZST	ZST	fST/ZST	b88
9	11	Multistage speed 1 speed setting	SPD 1 005.0Hz	0Hz	0Hz	0.0 to x.0.0	A21
		Multistage speed 2 speed setting	SPD 2 005.0Hz	0Hz	0Hz	0.0 to 360.0	A22
		Multistage speed 15 speed setting	SPD 15 005.0Hz	0Hz	6H.?	0.0 to 360.0	A35

13-5

isplay sequence	No.	Function name	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Setting range	Digital operator
10	F-20	DC braking selection	DCB SW OFF	OFF	OFF	ON/OFF	A51
		DC braking frequency setting	DCB F 00.5Hz	0.5Hz	0.5Hz	0.0 to 10.0Hz	A52
		DC braking delay time setting	DCB WAIT 0.0 s	0.0 s	0.0 s	0.0 to 5.0 s	A53
		DC braking force setting	DCB V 000	0	0	0 to 100	A54
		DC braking time setting	DCB T 00.0 s	0.0 s	0.0 s	0 to 60	A55
11	F-22	Allowable instantaneous power failure	IPS UVTIME 01.0 s	1.0 s	1.0 s	0.3 to 25.0	b02
		Reclosing standby after instantaneous power failure recovered	IPS WAIT 010.0 s	1.0 s	1.0 s	0.3 to 100.0	b03
		Instantaneous power failure restart selection	IPS POWR ALM	ALM	ALM	ALM/FTP /RST/ZST	b01
12	F-23	Electronic thermal characteristic selection	E-THM CHAR SUB	CRT	CRT	CRT/SUB	b13
		Electronic thermal level setting	E-THM LVL 16.50A	Rated output current	Rated output current	50 to 120 % of Rated output current	b12
13	F-24	Overload limit level setting	OLOAD LVL 20.63A	Rated output current *1.25(A)	Rated output current *1.25(A)	50 to 150 % of Rated output current	b22
		Overload limit constant setting	OLOAD CONST 01.0	1.0	1.0	0.1 to 30.0	b23
		Overload limit mode selection	OLOAD MODE ON	ON	ON	OFF/ON/CRT	b21
4	F-25	Software lock selection	S-LOCK MD1	MD1	MD1	MD0/MD1 /MD2/MD3	b31
15	F-26	Frequency lower limiter setting	LIMIT L 000.0Hz	0.0Hz	0.0Hz	0.0 to 360.0	A62
		Frequency upper limiter setting	LIMIT H 000.0Hz	0.0Hz	0.0Hz	0.0 to 360.0	A61
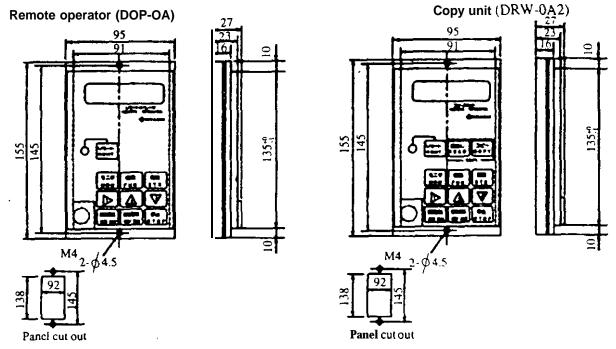
Display sequence	No.	Function mm	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Setting range	Digital operator
16	F-27	Jump frequency setting (1)	JUMP F1 000.0Hz	0Hz	0Hz	0.0 to 360	A63
		Jump frequency setting (2)	JUMP F2 000.0Hz	0Hz	0Hz	0.0 to 360	A65
		Jump frequency setting (3)	JUMP F3 000.0Hz	0Hz	0Hz	0.0 to 360	A67
		Jump frequency width setting (1)	JUMP W1 00.5Hz	0.5Hz	0.5Hz	0.0 to 360	A64
		Jump frequency width setting (2)	JUMP W2 00.5Hz	0.5Hz	0.5Hz	0.0 to 360	A66
		Jump frequency width setting (3)	JUMP W3 00.5Hz	0.5Hz	0.5Hz	0.0 to 360	A68
17	F-28	STOP key validity selection during terminal running	STOP-SW ON	ON	ON	ON/OFF	b87
18	F-31	External frequency start setting	IN EXS 000.0Hz	0Hz	0Hz	0.0 to 360	A11
		External frequency end setting	IN EXE 000.0Hz	0Hz	0Hz	0.0 to 360	A12
		External frequency start setting rate	IN EX%S 000%	0%	0%	0 to 100	A13
		External frequency end setting rate	IN EX%E 100%	100%	100%	0 to 100	A14
		External frequency start point setting	IN LEVEL 0Hz	0Hz	0Hz	0Hz/EXS	A15
		Frequency command sampling setting	IN F-SAMP 8	8	8	1 to 8	A16
19	F-32	Arrival frequency setting for acceleration	ARV ACC 000.0Hz	0Hz	0Hz	0.0 to 360	C42
		Arrival frequency setting for deceleration	ARV DEC 000.0Hz	0Hz	0Hz	0.0 to 360	C43
20	F-33	Overload previous notice level setting	OV Load 16.50A	Rated current	Rated current	Rated current * 0–200%	C41
		Overdifferetial signal output level	OV PID 003.0%	3%	3%	0.0 to 100.0	C44
21	F-34	Intelligent input terminal 1 setting	IN-TM 1 FW	FW	FW	FW and 13 other terminals	C01
		Intelligent input terminal 2 setting	IN-TM 2 RV	RV	RV	RV and 13 other terminals	C02
		Intelligent input terminal 3 setting	IN-TM 3 CF1	CF1	AT	CF1 and 13 other terminals	C03
		Intelligent input terminal 4 setting	IN-TM 4 CF2	CF2	USP	CF2 and 13 other terminals	C04
		Intelligent input terminal 5 setting	IN-TM 5 RS	RS	RS	RS and 13 other terminals	co5

Display se-quence	No.	Function name	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Setting range	Digital operator
(21)	F-34	Input terminal 1 NO/NC setting	IN-TM O/C-1 NO	NO	NO	NO/NC	C11
		Input terminal 2 NO/NC setting	IN-TM O/C-2 NO	NO	NO	NO/NC	C12
		Input terminal 3 NO/NC setting	IN-TM O/C-3 NO	NO	NO	NO/NC	C13
		Input terminal 4 NO/NC setting	IN-TM O/C-4 NO	NO	NC	NO/NC	C14
		Input terminal 5 NO/NC setting	IN-TM O/C-5 NO	NO	NO	NO/NC	C15
22	F-35	Output terminal 11 setting	OUT-TM 1 FA1	FA1	FA1	RUN/FA1/FA2 /OL/OD/AL	C21
		Output terminal 12 setting	OUT-TM 2 RUN	RUN	RUN	RUN/FA1/FA2 /OL/OD/AL	C22
		Alarm output terminal NO/NC setting	OUT-TM O/C-A NC	NC	NC	NO/NC	C33
		Output terminal 11 NO/NC setting	OUT-TM O/C-1 NO	NO	NO	NO/NC	C31
		Output terminal 12 NO/NC setting	OUT-TM O/C-2 NO	NO	NO	NO/NC	C32
23	F-36	Carrier frequency setting	CARRIER 12.0kHz	5.0kHz	5.0kHz	0.5 to 16.0kHz	b83
24	F-37	Monitor signal selection	MONITOR A-F	A-F	A-F	A-F/A/D-F	C23
25	F-38	Initial setting selection	INIT SEL EUR	EUR	USA	JPN/EUR/USA /(SP1)	b85
		Debug mode display selection	INIT DEBG OFF	OFF	OFF	ON/OFF	C91
		Digital operator rotation diction selection	INIT DOPE FWD	FWD	FWD	FWD/REV	F04
		Initial mode selection	INIT MODE TRP	TRP	TRP	TRP/DATA	b84
26	F-43	PID function selection	PID SW OFF	OFF	OFF	OFF/ON	A71
		P gain setting	PID P 1.0	1.0	1.0	0.2 to 5.0	A72
		I gain setting	PID I 001.0 s	1.0	1.0	0.0 to 150	A73
		D gain setting	PID D 000.0	0.0	0.0	0.0 to 100.0	A14
		PID scale rate setting	PID CONV 01.00	1.00	1.00	0.01 to 99.9	A75
		Feedback PID selection	PID INPT CUR	CUR	CUR	CUR/VOL	A16

13-8
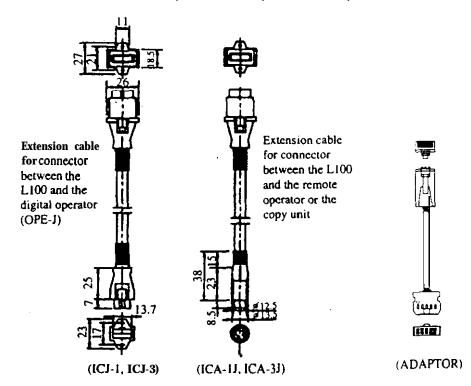
	Contents		Display
Over-current protection	The output current of the inverter is detected. When it exceeds the specified value, the output is turned off.	Constant speed.	`Drive`
		Decel.	`OC. Decel`
		Accel.	`OC. Accel`
		Other	`Over. C`
Overload protection	When a motor overload is detected by the electronic thermal function. the output of the invencr is cut off.		`over. L`
Over-voltage protection	When the DC bus voltage exceeds a certain level due to regenerative energy from the motor. this protection function engages. and the output of invcner is cut off.		`Over. V`
	This is an error display when the input voltage supplied to the invcner exceeds the specified value.		`OV. SRC`
EEPROM error	When the memory built in has problem by noise and excessive temperature rise. protective function works and output of inverter is cut off.		`EEPROM`
Under-voltage protection	A decrease of the input voltage of an inverter results in improper function of the control circuit. It also generates motor heat and causes low torque.		`Under. V`
CPU error	Malfunction or abnormality on built in CPU and the output of the invcner is cuts off.		`CPU I`
			`CPU2`
External trip	An abnormality signal from external equipment cuts off the output of the inverter. (When the external trip function is selected)		`EXTERNAL`
USP error	It indicates an error when power is turned on while the inverter is being run. (When USP function is selected)		`USP`
Ground fault protection	The inverter is protected by detection of ground fault between the inverter output and rhc motor upon power on. There may be the possibility of power module failure.		`GND. Flt`
PTC error	When the resistance value of the external thermistor is too large , the equipment detects the abnormal condition of the thermistor and then cut off the output. (When PTC function is selected)		`PTC`
Thermal protection	When the temperature of the inverter module exceeds a detection level, the output of invcner is cut off.		`OH FIN`

Remote operator/Copy unit

Dimension (unit:mm)

Remote operator (DOP-OA)

Copy unit (DRW-0A2)

Panel cut out

Panel cut out

L100 CABLE (Same as J 100)

Extension cable
for connector
between the
L100 and the
digital operator
(OPE-J)

Extension cable
for connector
between the L100
and the remote
operator or the
copy unit

(ICJ-1, ICJ-3)

(ICA-1J, ICA-3J)

(ADAPTOR)
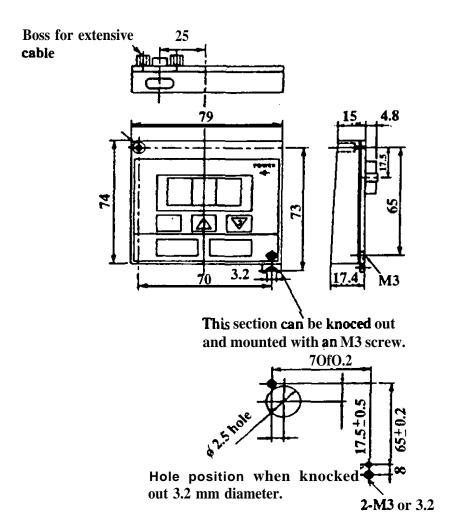
NOTE 1: For connection to L100, use the accessory modular jack cable adaptor.

Digital operator (OPE-J)

Dimension (unit:mm)

Boss for extensive cable   25

79

74   73

70   3.2

15   4.8

17.5

65

17.4   M3

This section can be knoced out
and mounted with an M3 screw.

70f0.2

φ2.5 hole

17.5±0.5   65±0.2

8

Hole position when knocked
out 3.2 mm diameter.

2-M3 or 3.2

NOTE : Digital operator (OPE-J) is available for monitoring only, when it is connected
wirh L100 inverter.(See 8-12 [b 89])
Only the [STOP] key on the OPE-J is avalable, the other keys do not function.

Copy unit function

Operation example (Procedure to transfer the data of inverter A to B,C, and D inverters)			
Se-quence	Operation	Key	Operation result
1	Set data is read out from the inverter A (It is stored into the memory).	READ	Inverter A → Copy unit
2	Turn off the power supply to inverter A and remove the cable.	——	——
3	Connect the cable to inverter B and turn on the power.	——	——
4	Copy data stored in the copy unit is written to inverter B.	COPY (* 1)	Data copy
5	Cut off the power supply to inverter B. (* 1)	——	Copy unit → Inverter B Inverter C Inverter D
6	Perform the above processes from 3 to 5 sequentially for inverters C and D. That is, the same process as at for inverter B.	——	

Operation example (Process to change and transfer to inverters B, C and D)			
1	Connect the cable and press the remote key. Change the data of the inverter with copy unit.	MON FUN STR ▶ ▼ ▼	Copy unit → Data change → Inverter A
2 to 6	Read out the data from inverter A (It is stored into the memory area of the copy unit). The following procedures are the same those of the operation 1. Change the data setting first.	READ	Inverter A → Copy unit

*1   When pressing any key or resetting the unit after the [COPY] key is pressed, be sure to wait for at least six seconds. (When any key is pressed, the unit is reset, or the power is turned off within six seconds, the data may not be copied.)

NOTE : Only the copy unit (DRW-0A2) is able to copy the data of L100 series.
        The old type (DRW-0A) is not available for L100 series
        Do not use the copy unit (DRW-OA)for this function.

NOTE 1: The following settings cannot be copied by the copy function. Note that the current set
data is saved as it is.

. Monitor mode
Trip history monitor
(Counts of latest three alarms)

. Function mode
F-25 Software lock setting

NOTE 2: Do not copy the setting from the 200 V class to the 400 V class or from the 400 V class
to the 200 V class. (When the setting is copied to a different voltage class by mistake.
reset F-03 (motor input voltage setting).)
NOTE 3: Do not copy the setting from the Japanese version to the European or American version
or from the European or American version to the Japanese version.
NOTE 4: When the V/f control setting data is copied from a different capacity (for example, copied
from L100-004NFE to L100-022NFE), change F-23,F-24 and F-33 in relation with the
current value of the applied motor.

When inquiring about inverter trouble, please be ready to inform the shop where you purchased your unit or following address if you are in Europe.

Hitachi Europe GmbH
Am seestern 18 (Euro.center)
40547 Dusseldorf. Germany
TEL : 0211-5283-O
FAX : 021 1-5283-649

(1) Type

(2) Purchased date

(3) Manufacturing No. (MFG. No.)

(4) Malfunction symptoms

> If the contents are unclear due to an old nameplate, give only the clear items. To reduce the non-operation time. it is recommended IO stock a spare invener.

Warranty

The warranty period under normal installation and handling conditions shall be one (I) year after the date of delivery The warranty shall cover the repair of only the invener to be delivered.

I.   Service in the following cases, even within the warranty period, shall be charged to the purchaser.

(a)   Malfunction or damage caused by misoperarion or remodelling or improper repair

(b)   Malfunction or damage caused by a drop after purchase and transportation

(c)   Malfunction or damage caused by fire. earthquake, flood, thunderbolt. or other natural calamities. pollution or abnormal voltage.

2.   When service is required for rhe product at your worksite, all expenses associated with field repair shall be charged to the purchaser.

3.   Always keep it handy. Please do not loose it. We are sorry but this manual can not be re-issued.

Appendix 1 L100 series data setting values

L100 series inverters provide many functions and their **parameters can be set by the user.**
It is recommended to record the parameters that have been set by the user, **in order to speed the** investigation and repair in the event of a failure.

Inverter model   L100 [_____]

MFG. No.   [_____]

This information is written on the specification label located on the right side of the inverter.

For the digital operator

Display sequence	Function name	Standard setting		Set value
		-FE	-FU	
F01	Output frequency setting	0.0	0.0	
F02	Acceleration 1	IO.0	10.0	
F03	Deceleration I	10.0	10.0	
F04	Running direction setting	00	00	

(2) Extention Function Mode

(I) Extended function mode A group

Parameter display	Function name	Initialization (Europe)	Initialization (USA)	Set value
A01	Frequency distination setting	01	01	
A02	Run command distination setting	01	01	
A03	Base frequency selling	50.0	60.0	
A04	Maximum frequency setting	50.0	60.0	
A11	External frequency setting start	0	0	
A12	External frequency setting End	0	0	
A13	External frequency setting start rate	0	0	
A14	External frequency setting end rate	100	100	
A15	External frequency start pattern setting	01	01	
A16	Time constant of the filter of analog input setting	8	8	
A20-A35	Multispeed frequency setting	All data are 0.0Hz.	All data are 0.0Hz.	
A38	Jogging frequency setting	1.0	1.0	
A39	Stop mode of jogging	00	00	
A41	Selection of method of torque boost	0	0	
A42	Value of manual torque boost setting	11	11	
A43	Manual torque boost frequency adjustment	10.0	10.0	
A44	V/F characteristic setting	00	00	
A45	IV-Cain setting	100	100	
A51	Selection of DC braking operation	00	00	
A52	DC braking frequency setting	0.5	0.5	
A53	DC braking waitingtime setting	0.0	0.0	
A54	DC baking force setting	0	0	
A55	DC braking time setting	0.0	0.0	
A61	Frequency upper limiter setting	0.0	0.0	

Parameter Display	Function name	Initialization (Europe)	Initialization (USA)	Set value
A62	Frequency lower limiter setting	0.0	0.0	
A63,A65 ,A67	Jump frequency selling	0.0	0.0	
A64,A66 ,A68	Jump frequency width setting	0.5	0.5	
A71	Selection o f PID control	00	00	
A12	P(proportion) gain setting	1.0	1.0	
A73	I(Integral) gain setting	1.0	1.0	
A14	D(Differential) gain setting	0.0	0.0	
A75	Scale conversion of PID control setting	1.00	1.00	
A76	Feedback signal destination setting	00	00	
A81	Selection of AVR function	02	02	
A82	Selection of voltage of AVR function for the motor	2301400	230/460	
A92	Second acceleration time setting	IS.0	15.0	
A93	Second Deceleration time setting	IS.0	15.0	
A94	Selection of method to use second acceleration I deceleration (acc2/dec2)	00	00	
A95	Changed frequency from acc I to acc2 setting	0.0	0.0	
A96	Changed frequency from dcc I to dec2 setting	0.0	0.0	
A91	Pattern of acceleration setting	0 0	00	
A98	Pattern of deceleration setting	00	'00	

(2) Extended function mode of B group

Parameter display	Function name	Initialization (Europe)	Initialization (USA)	Set value
b01	Selection of restart mode	00	00	
b02	Allowable undervoltage power failure time setting	1.0	1.0	
b03	Reclosing standby time after under voltage power failure recovered setting	1.0	1.0	
b12	Level of electronic thermal selling	Rated current for each inverter	Rated current for each inverter	
b13	Selection of electronic thermal characteristic	01	01	
b21	Selection of overload restriction operation mode	01	01	
b22	Level of overload restriction setting	Rated current * 1.25 for each inverter	Rated current * 1.25 for each inverter	
b23	Rate of deceleration al overload restriction	1.0	1.0	
b31	Selection of software lock mode	01	01	
b32	Reactive current setting	Rated current * 0.58	Rated current * 0.58	
b81	Analog meter adjustment	80	80	
b82	Start frequency adjustment	0.5	0.5	
bg3	Carrier frequency selling (kHz)	5.0	5.0	
b84	Selection data initialization or clear of trip history	00	00	
b85	Selection of initialized data	01	0 2	
bg6	Frequency convened value setting	1.0	1.0	
b87	Selection of STOP key ON/OFF	00	00	
b88	Selection of operation at FRS signal canceled	00	a l	
bg9	Selection of OPE-J monitor	01	01	

(3)Extended function of C group

These function have relation with terminal.

Parameter display	Function name	Initialization (Europe)	Initialization (USA)	Set value
C01	Function of terminal 1 setting	00	00	
C02	Function of terminal 2 setting	01	01	
C03	Function of terminal 3 setting	02	16	
C04	Function of terminal 4 setting	03	13	
C05	Function of terminal 5 setting	18	18	
C11	Condition of terminal 1 setting	00	00	
C12	Condition of terminal 2 setting	00	00	
C13	Condition of terminal 3 setting	00	00	
C14	Condition of terminal 4 setting	00	01	
C15	Condition of terminal 5 setting	00	00	
C21	Function of terminal 11 setting	01	01	
C22	Function of terminal 12 setting	00	00	
C23	Function of FM terminal setting	00	00	
C31	Condition of terminal 11 setting	00	00	
C32	Condition of terminal 12 setting	00	00	
C33	Condition of terminal AL setting	01	01	
C41	Level of overload signal setting	Rated current of each inverter	Rated current of each inverter	
C42	Arrival frequency setting for acceleration	0.0	0.0	
C43	Arrival frequency setting for deceleration	0.0	0.0	
C44	Level of PID deviation signal setting	3.0	3.0	

Appendix 2 L100 series data setting values (For the remote operator)

L100 series inverters provide many functions and their parameters can be set by the user.
It is recommended to record the parameters that have been set by the user. in order to speed the
investigation and repair in the event of a failure.

Inverter model   L100 [_____]   This information is written on the
nameplate located on the

MFG. No.   [_____]   side cover of the inverter.

Monitor mode

Display sequence	Monitor name	Display content	Set value
1	Frequency setting and output frequency	① FS00.0 ② 000.0Hz	
		1S 005.0. ...0.0Hz	
	Multistage-speed setting and output frequency	. . . .	
		1SS040 0 0.0Hz	
2	Acceleration time setting	ACC1 0010.0S	
3	Deceleration time setting	DEC1 0010.0S	
4	Frequency setting command	F-SET-SELECT TRM	
5	Operation command method	F/R-SELECT TRM	
6	Frequency converted value setting and converted value monitor	/Hz01.0 0.00	
7	Output current display	① Im 0.0 A ② 0.0%	
8	Reactive current setting	I0 A	
9	Manual torque boost adjustment	V-Boost Code<11>	
10	Boost F setting	V-Boost F 10.0%	
11	Torque boost mode selection	V-Boost Mode 0	
12	Output voltage gain adjustment	V-Gain 100%	
13	Jogging frequency adjustment	Jogging 1.00Hz	
14	Jogging mode selection	Jog Mode 00	
15	Analog meter adjustment	ADJ 80	

Display sequence	Monitor name	Display content	Set value
16	Panel display selection	PANEL d01	
17	Terminal monitor	TERM LLL LLLLL	
18	Alarm display	ERR1 #	
	Trip monitor	ERR1 OVER. V	
		ERR1 31.0Hz	
		ERR1 12.5A 1	
		ERR1 787.0Vdc	
		ERR1 RUN 000002H	
19	Total alarm count	ERROR COUNT 0	
		ERROR COUNT 25	
20	Trip history monitor	ERR2 #	
	Last trip contents	ERR2 OC.Accel	
		(ERR2 5.0Hz	
		ERR2 20.1 A	
		ERR2 560.0 Vdc	
		ERR2 RUN 000002H	
	Contents of last tip but one	ERR3 #	
		ERR3 EXTERNAL	
		ERR3 5.0Hz	
		ERR3 20.1 A	
		ERR3 560.0 Vdc	
		ERR3 RUN 000001H	

Function mode

Displ e- uenc	NO.	Function name	Display content (Function mode 2)	Standard wing	FE FU	Set value
1	?-00	Base frequency setting	F-BASE 0060 Hz	50Hz	60Hz	
2	?-01	Maximum frequency setting	F-max. 0060 Hz	50Hz	60Hz	
3	?-02	Start frequency adjustment	Fmin. 00.5 Hz	0.5	0.5	
4	?-03	Motor input voltage setting	AVR AC 200 V	230V/400V	230V/460V	
		AVR function for deceleration	AVR MODE DOFF	DOFF	DOFF	
5	?-04	Control method setting	CONTROL VC	VC	VC	
6	?-06	Acceleration time1 setting	ACC 1 0010.0 s	10.0 s	10.0 s	
		2-stage acceleration selection	ACC CHG TM	TM	TM	
		Acceleration time 2 setting	ACC 2 0015.0 s	15.00 s	15.00 s	
		Acceleration time change frequency setting	ACC CHFr 000.0Hz	0.0Hz	0.0Hz	
		Pattern selection for acceleration	ACC LINE L	L	L	
	-07	Deceleration time 1 setting	DEC 1 0010.0 s	10.0s	10.0 s	
		Deceleration time 2 setting	DEC 2 0015.0 s	015.0 s	015.0 s	
		Deceleration time change frequency setting	DEC CHFr 000.0Hz	0.0Hz	0.0Hz	
		Pattern selection for deceleration	DEC LINE L	L	L	
8	-10	Restarting after FRS signal selection	RUN FRS ZST	ZST	ZST	
9	-11	Multistage speed 1	SPD 1 005.0Hz	0Hz	0Hz	
		Multistage speed 2	SPD 2 005.0Hz	0Hz	0Hz	
		Multistage speed 3	SPD 3 005.0Hz	0Hz	0Hz	
		Multistage speed 4	SPD 4 005.0Hz	0Hz	0Hz	
		Multistage speed 5	SPD 5 005.0Hz	0Hz	0Hz	
		Multistage speed 6	SPD 6 005.0Hz	0Hz	0Hz	
		Multistage speed 7	SPD 7 005.0Hz	0Hz	0Hz	
		Multistage speed 8	SPD 8 005.0Hz	0Hz	0Hz	
		Multistage speed 9	SPD 9 005.0Hz	0Hz	0Hz	
		Multistage speed 10	SPD 10 005.0Hz	0Hz	0Hz	
		Multistage speed 11	SPD 1 1 005.0Hz	0Hz	0Hz	
		Multistage speed 12	SPD 12 005.0Hz	0Hz	0Hz	
		Multistage speed 13	SPD 13 005.0Hz	0Hz	0Hz	
		Multistage speed 14	SPD 14 005.0Hz	0Hz	0Hz	
		Multistage speed 15	SPD 15 005.0Hz	0Hz	0Hz	

Display sequence	No.	Function name	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Set value
10	F-20	DC braking selection	DCB SW OFF	OFF	OFF	
		DC braking frequency setting	DCB F 00.5Hz	0.5Hz	0.5Hz	
		DC braking delay time setting	DCB WAIT 0.0 s	0.0 s	0.0 s	
		DC braking force setting	DCB V 000	0	0	
		DC braking time setting	DCB T 00.0 s	0.0 s	0.0 s	
11	F-22	Allowable instantaneous power failure	IPS UVTIME 1.0 s	1.0 s	1.0 s	
		Reclosing standby after instantaneous power failure recovered	IPS WAIT 010.0 s	1.0 s	1.0 s	
		Instantaneous power failure restart selection	IPS POWR ALM	ALM	ALM	
12	F-23	Electronic thermal characteristic selection	E-THM CHAR SUB	CRT	CRT	
		Electronic thermal level setting	E-THM LVL 16.50A	Rated output current	Rated output current	
13	F-24	Overload limit level setting	OLOAD LVL 20.63A	Rated output current *1.25(A)	Rated output current *1.25(A)	
		Overload limit constant setting	OLOAD CONST 01.0	1.0	1.0	
		Overload limit mode selection	OLOAD MODE ON	ON	ON	
14	F-25	Software lock selection	S-LOCK MD1	MD1	MD1	
15	F-26	Frequency lower limiter setting	LIMIT L 000.0Hz	0.0Hz	0.0Hz	
		Frequency upper limiter selling	LIMIT H 000.0Hz	0.0Hz	0.0Hz	

Display e-quence	No.	Function name	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Set value
16	F-27	Jump frequency setting (1)	JUMP F1 000.0Hz	0Hz	0Hz	
		Jump frequency setting (2)	JUMP F2 000.0Hz	0Hz	0Hz	
		Jump frequency setting (3)	JUMP F3 000.0Hz	0Hz	0Hz	
		Jump frequency width setting (1)	JUMP W1 00.5Hz	0.5Hz	0.5Hz	
		Jump frequency width setting (2)	JUMP W2 00.5Hz	0.5Hz	0.5Hz	
		Jump frequency width setting (3)	JUMP W3 00.5Hz	0.5Hz	0.5Hz	
17	F-28	STOP key validity selection during terminal running	STOP-SW ON	ON	ON	
18	F-31	External frequency start setting	IN EXS 000.0Hz	0Hz	0Hz	
		External frequency end setting	IN EXE 000.0Hz	0Hz	0Hz	
		External frequency start setting rate	IN EX%S 000%	0%	0%	
		External frequency end setting rate	IN EX%E 100%	100%	100%	
		External frequency start point setting	IN LEVEL 0Hz	0Hz	0Hz	
		Frequency command sampling setting	IN F SAMP 8	8	8	
19	F-32	Arrival frequency setting for acceleration	ARV ACC 000.0Hz	0Hz	0Hz	
		Arrival frequency setting for deceleration	ARV DEC 000.0Hz	0Hz	0Hz	
20	F-33	Overload previous notice levelsetting	O V Load 16.50A	Rated current	Rated current	
		Overdifferetial signal output level	OV PID 3.0%	3%	3%	
21	F-34	Intelligent input terminal 1 setting	IN-TM 1 FW	FW	FW	
		Intelligent input terminal 2 setting	IN-TM 2 RV	RV	RV	
		Intelligent input terminal 3 setting	IN-TM 3 CF1	CF1	AT	
		Intelligent input terminal 4 setting	IN-TM 4 CF2	CF2	USP	
		Intelligent input terminal 5 setting	IN-TM 5 RS	RS	RS	

Display sequence	No.	Function name	Display content (Function mode 2)	Standard setting -FE	Standard setting -FU	Set value
(21)	34	Input terminal 1 NO/NC setting	IN-TM O/C-1 NO	NO	NO	
		Input terminal 2 NO/NC setting	IN-TM O/C-1 NO	NO	NO	
		Input terminal 3 NO/NC setting	IN-TM O/C-1 NO	N O	NO	
		Input terminal 4 NO/NC setting	IN-TM O/C-1 NO	NO	NC	
		Input terminal 5 NO/NC setting	IN-TM O/C-1 NO	NO	NO	
22	35	Output terminal 1 1 setting	OUT-TM 1 FAI	FAI	FA1	
		Output terminal 1i! setting	OUT-TM 2 RUN	RUN	RUN	
		Alarm output terminal NO/NC setting	OUT-TM O/C-A NC	NC	NC	
		Output terminal 1 1 NO/NC setting	OUT-TM O/C-1 NC	NO	NO	
		Output terminal 12 NO/NC selling	OUT-TM O/C-2 NC	NO	NO	
23	36	Carrier frequency setting	CARRIER 12.0kHz	5.0kHz	5.0kHz	
24	37	Monitor signal selection	MONITOR A-F	A-F	A-F	
25	38	Initial setting selection	INIT SEL EUR	EUR	USA	
		Debug mode display selection	INIT DEBUG OFF	OFF	OFF	
		Digital operator rotation direction selection	INIT DOPE FWC	FWD	FWD	
		Initial mode selection	INIT MODE TRP	TRP	TRP	
26	43	PID function selection	PID SW OFF	OFF	OFF	
		P gain setting	PID P 1.0	1.0	1.0	
		I gain setting	PID I 001.0 s	1.0	1.0	
		D gain setting	PID D 000.0	0.0	0.0	
		PID scale rate setting	PID CONV 01.00	1.00	1.00	
		Feedback PID selection	PID INPT CUR	CUR	CUR	

Appendix 3 Initialization

If it is necessary to initialize the L100 inverter because of some reason,operate the following way.

At first ,confirm the model name on specification label.

> L100 - #### FE ----> Europen virsion
> L100 - #### FU ----> The United States virsion

Select the initialized data by [b 85]

> European virsion --------------> set the [01]
> The United Stares virsion -----> set the [02]

Initialization by [b 84]
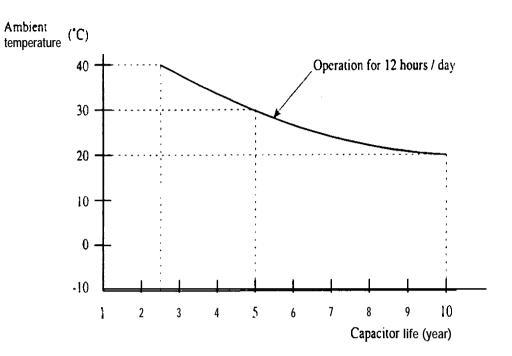
l) Whether it is data initialization or trip history clear.
  Select the Data initialization ---> [01]

2) (FUNC) , (▲) (▼) on the operator arc pressed at same time.

3) And then continue this condition and press the (STOP) key.

4) Wait 2 seconds holding the key (FUNC) .(▲) (▼) the display will blink " d 00 ".

5) The indication is blinking, release the all keys

6) Then the equipment starts the initialize operation

7) When the initialize operation is completed , the display indicates " 00".
  (Output frequency monitor).

NOTE l) Do not rum off the power until the initialize operation is completed.

NOTE 2) The initialize operation can not be performed by the remote operator. the copy unit and OPE-J.

Appendix 4 Capacitor Life Curve

Ambient temperature (°C) vs Capacitor life (year) — Operation for 12 hours / day

* When the inverter is stored in the cabinet. the ambient temperature is the temperature in the cabinet.
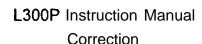
HITACHI INVERTER

L300P SERIES

INSTRUCTION MANUAL

Three phase input 200/400V class

NB601AX

Hitachi, Ltd.

Tokyo Japan

L300P Instruction Manual
Correction

1. Function table (Page 4-7)

Function Mode

Code	Function name	Setting range	Initial data -FE/-FU	Setting on run	Change mode on run	Page
b004	Instantaneous power-failure/under-voltage trip during stop	00(invalid)/01(valid)/ 02(invalid during stop and deceleration by stop command)	00	-	✓	4-34
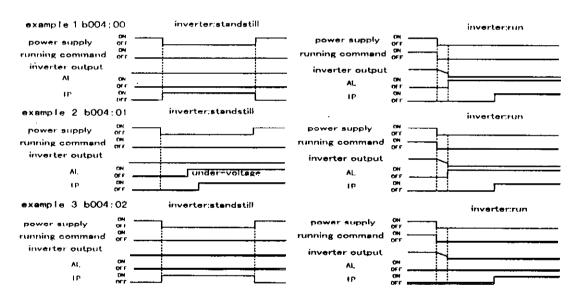
2. Instantaneous power failure /under-voltage (Page4-34)

Set item	Function code	Data	Description
Instantaneous power failure/under-voltage trip during stop	b004	00	Invalid: Trip isn't caused and alarm isn't output.
		01	Valid: Trip is cause and alarm is output.
		02	Invalid Trip isn't caused and alarm isn't output during stop and deceleration by stop command.

When using control power supply terminal Ro~To and connecting DC voltage (P-N) to Ro~To, an under-voltage may be detected at power off and give trip signal. If this may cause any problem to your system, set data in 00 or 02.

- Alarm output at an instantaneous power failure and under-voltage during standstill.

Alarm signal performance when connecting DC voltage (P-N) to Ro-To terminal.

3. Carrier Frequency (Page 4-18)

Correcting about carrier frequency and addition of derating data about 37kW or more.

Voltage class	200V class		400V class	
Contents (kW)	Maximum carrier frequency (kHz)	Derating on carrier frequency = 12kHz	Maximum carrier frequency (kHz)	Derating on carrier frequency = 12kHz
11	12	100%	12	100%
15	12	100%	12	100%
18.5	10	90%	12	100%
22	4	80%	12	100%
30	3	70%	8	90%
37	8	80%	10	80%
45	10	95%	10	95%
55	6	75%	10	95%

⚠ **CAUTION** : Be sure to keep the above-mentioned table.
Otherwise. there is a danger of inverter unit breakage.

Precautions for EMC (Electromagnetic Compatibility)

You are required to safety the EMC directive (89/336/EEC) when using an L300P inverter in a European country. To safety the EMC directive and to comply with standard, follows the checklist below

⚠️**WARNING** : This equipment should be installed. adjusted, and serviced by qualifyed personal familiar with construction and operation of the equipment and the hazards involved. Failure to observe this precausion could result in bodily injury.

1. The power supply to L300P inverter must meet these specifications:

    a. Voltage fluctuation +/-IO% or less.

    b. Voltage imbalance +/-3% or less.

    c. Frequency variation +I-4% or less.

    d. Voltage distortion THD = 10% or less.

2. Installation measure:

    a. Use a filter designed for L300P inverter.

3. Wiring

    a. Shielded wire (screened cable) is required for motor wiring, and the length must be less than 20 meters.

    b. The carrier frequency setting must be less than 3 kHz to satisfy EMC requirements.

    c. Separate the main circuit from the signal/process circuit wiring.

4. Environmental conditions -when using a filter, follow these guidelines:

    a. Ambient temperature: -10 - +40 degrees.

    b. Humidity: 20 to 90% RH (non-condensing)

    c. Vibration: 5.9 m/sec^2 (0.6 G) 10 – 55Hz.

    d. Location: 1000meters or less altitude, indoors (no corrosive gas or dust)

Please exchange [**6**. 1 Standard **specification** list] m **page** 6.1 to the following list.

NBM601X-11
NBM601AX-11
NBM601BX-11

6.1 Standard specification list

Inverter Model			200V class								400V class							
			L300P-110LF	L300P-150LF	L300P-185LF	L300P-220LF	L300P-300LF	L300P-370LF	L300P-450LF	L300P-550LF	L300P-110HF	L300P-150HF	L300P-185HF	L300P-220HF	L300P-300HF	L300P-370HF	L300P-450HF	L300P-550HF
Protection structure (note1)			IP20(NEMA1)															
Max. Applicable Motor 4P (kW) (note2)			11	15	18.5	22	30	37	45	55	11	15	18.5	22	30	37	45	55
Rated input Alternating voltage(kVA)	200V/400V		15.2	20.0	25.2	29.4	39.1	48.4	58.5	72.7	15.2	20.0	25.6	29.7	39.4	48.4	58.8	72.7
	240V/480V		18.2	24.1	30.3	35.3	48.9	58.1	70.2	87.2	18.2	24.1	30.7	35.7	47.3	58.1	70.1	87.2
Rated input alternating voltage			Three-phase 200-240V (+-10%) 50Hz/60Hz								Three-phase 380-480V (+-10%) 50Hz/60Hz							
Rated output voltage (note3)			Three-phase 200-240V (This corresponds to receiving voltage.)								Three-phase 380-480V (This corresponds to receiving voltage.)							
Rated output current (A)			44	58	73	85	113	140	169	210	22	29	37	43	57	70	85	105
Control system			Sine-wave modulation PWM system.															
Output frequency range (note4)			0.1-400Hz															
Frequency accuracy			Digital command +/-0.01% for Max. frequency, analog frequency +/-0.2%(25+-10C)															
Frequency resolving power			Digital setting: 0.01Hz, analog setting:Max. frequency /4000															
Voltage/frequency characteristic			V/f option variable, V/f control, (constant torque, reduced torque)															
Overload current rate			120% for 60 seconds, 150% for 0.5 second															
Acceleration/deceleration time			0.01-3,600 seconds (straight or S-Curve on acceleration, deceleration is optional setting individually), 2nd adjustable setting is possible.															
Control	Regenerative Control (short duration) (note5)		BRD circuit built-in (Discharge resistance is required.)	Regenerative unit is required.							BRD circuit built-in (Discharge resistance is required.)	Regenerative unit is required.						
	DC Braking		On starting and decelerating by stop command, inverter operates under operation setting frequency. Or inverter operates with external input (Braking power, time, frequency can be set.)															
Input signal	Frequency	Operator	Setting by [∧][∨] keys															
		Volume	Setting with potentiometer on the digital operator (Built-in as standard) (Analog setting)															
		External Signal	DC 0 to 5V, -5 to +5V, 0 to 10V, -10 to +10V (input impedance 10k ohm), 4-20mA (input impedance 100 ohm)															
		External port	Setting with RS485 communication															
	Run/Stop	Operator	Run/Stop (forward changes with code)															
		External signal	Forward Run/Stop (1a connect), reverse command is impossible on assigning of terminal (selection of 1a, 1b is possible), input of 3 wires is possible.															
		External port	Setting with RS485.															
	Intelligent input terminal		Use by selecting terminals from; Reverse command (RV), multi-speed1-4 (CF1-CF4), jogging (JG), external dc braking (DB), 2nd control (SET),2nd acceleration (2CH), free-run stop (FRS), external trip (EXT), USP function (USP), commercial change (CS),software lock (SFT), analog input voltage / current / select (AT), reset inverter (RS), 3 wire run (STA),3 wire keep (STP), 3 wire direction selection (F/R), PID selection valid/invalid (PID), PID integrating reset (PIDC), remote control,up function (UP), remote control down function (DWN), remote control data clear (UDC), multi-speed bit 1-7(SF1-SF7),overload restriction change (OLR), no assign (NO)															
	Thermistor input terminal		1 terminal															
Output	Intelligent output terminal		2 relay outputs (1a contact), relay(1c contact), output relay selection as follows; (selection from during running, on arrival with constant speed, over setting frequency, PID over-deviation)															
	Intelligent monitor output terminal		Analog voltage output, analog current output, pulse line output															
Display monitor			Output frequency, output current, frequency conversion value, trip history, input output terminal state, input electric power, output voltage.															
Other function			V/f free setting (5 points), Upper / lower frequency limiter, Frequency jump, Curve adjustable speed, Manual torque boost level / Braking point,Analog meter adjustment, Starting frequency, Carrier frequency adjustment, Electronic thermal free setting, External start/end (frequency/rate),Analog input selection, Trip retry, Reduced voltage start, Overload restriction															
Carrier frequency range			0.5-12 kHz															
Protection function			Over-current, over-voltage, under-voltage, electronic thermal level, abnormal trouble, ground fault current on starting, instantaneous stop, USP error, open-phase error, control resistor overload, CT error, external trip, communication error															
Usage surroundings	Frequency temperature /Preservation temperature (note6) /humidity		-10 to 40 degrees (note7) / -20 to 65 degrees / 20 to 90% RH (installed with no dew condensation)															
	Vibration (note7)		5.9m²/S (0.6G), 10-55Hz				2.94m²/S (0.3G), 10-55Hz				5.9m²/S (0.6G), 10-55Hz				2.94m²/S (0.3G), 10-55Hz			
	Using place		Under 1,000m above sea level, indoors (installed away from corrosive gasses, dust)(note8)															
Paint color			Blue (D.I.C14 version No.436)				Gray(MUNSELL 8.5YR6.2/0.2)				Blue (D.I.C14 version No.436)				Gray(MUNSELL 8.5YR6.2/0.2)			
Options			Remote operator, copy unit, cable for each operator, braking resistor, regenerative control unit, alternating reactor, D.C. reactor, EMC Mains filter, higher harmonic control unit, LCR filter, applied control installation															
Remote operator			OPE-SR, cable for remote operation ICS-1(1m), ICS3(3m) (note9)															
Schematic mass (kg)			5	5	12	12	12	20	30	30	5	5	12	12	12	20	30	30

(Note 1) Protective system based on JME1030.

(Note 2) Applicable motor indicates HITACHI three-phase motor. When you use other motor, set so that the motor current doesn't exceed the rated current of the inverter.

(Note 3) Output voltage will reduce when the power voltage is reduced. (Except when AVR function is selected.)

(Note 4) When you operate motor over 50/60Hz, inquire about the allowable max.revolution time of motor etc. from motor manufacturer.

(Note 5) Braking resistance isn't installed in the inverter. When the inverter requires a high regenerative torque, use optional braking resistance and regenerative braking unit.

(Note 6) Protective temperature is temperature during transportation.

(Note 7) This based on the test methods of JIS C0911(1984).

(Note 8) When the inverter is used in a place with dust, we recommend the optional varnish coating specification. Before it is required.

(Note 9) When you use cable for remote operation, please remove connector. Please refer to 1.3 Appearance.

(Note) Insulation distance is based on UL, CE standard.

SAFETY

For the Best Results with **L300P** Series inverter, read this manual and all of the warning sign attached to the inverter carefully before installing and operating it, and follow the instructions exactly. Keep this manual handy for your quick reference.

Definitions and Symbols

A safety instruction (message) is given with a hazard alert symbol and a signal word;
WARNING or **CAUTION.** Each signal word has the following meaning throughout this manual.

This symbol means hazardous high voltage. It used to call your attention to items or operations that could be dangerous to your and other persons operating this equipment.
Read these message and follow these instructions carefully.

This is the "Safety Alert Symbol:.' This symbol is used to call your attention to items or operations that could be dangerous to your or other persons operating this equipment. Read these messages and follow these instructions carefully.

! WARNING **W A R N I N G**
Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

! COUTION **CAUTION**
Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage of product.
The matters described under ⚠CAUTION may, if not avoided, lead to serious results depending on the situation. Important matters are described in CAUTION (as well as WARNING), so be sure to observe them.

NOTE **NOTE**
Notes indicate an area or subject of special merit, emphasizing either the product's capabilities or common errors in operation or maintenance.

⚠ HAZARDOUS HIGH VOLTAGE

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there might be exposed components with cases or protrusions at or above line potential. Extreme care should be taken to product against shock.

Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses. whenever working on an electronic controllers or rotating electrical equipment.

PRECAUTION

⚠**WARNING** : .This is equipment should be installed, adjusted and serviced by qualified electrical maintenance personal familiar with the construction and operation of the equipment and the hazards involved. Failure to observe this precaution could results in bodily injury.

⚠**WARNING** : The user is responsible for ensuring that all driven machinery, drive train mechanism not supplied by Hitachi, Ltd., and process line material are capable of safe operation at an applied frequency of 150% of the maximum selected frequency range to the AC motor. Failure to do so can result in destruction of equipment and injury to personnel should a single point failure occur.

⚠**WARNING :** For protection, install a leak breaker type with a high frequency circuit capable of large currents to avoid an unnecessary operation. The ground faults protection circuit is not designed to protect personal injury.

⚠**WARNING** : HAZARD OF ELECTRICAL SHOCK. DISCONNECT INCOMING POWER BEFORE WORKING ON THIS CONTROL.

⚠**WARNING :** SEPARATE MOTOR OVERCURRENT, OVERLOAD AND OVERHEATING PROTECTION IS REQUIRED TO BE PROVIDED IN ACCORDANCE WITH THE SAFETY CODES REQUIRED BY JURISDICTIONAL AUTHORITIES.

⚠ **CAUTION :** These instructions should be read and clearly understood before working on L300P series equipment.

⚠ **CAUTION** : Proper ground&disconnecting devices and other safety devices and their location are the responsibility of the user and are not provided by Hitachi, Ltd.

⚠ **CAUTION :** Be sure to connect a motor thermal switch or overload devices to the L300P series controller to assure that inverter will shut down in the event of an overload or an overheated motor.

⚠ **CAUTION** : DANGEROUS VOLTAGE EXISTS UNTIL CHARGE LIGHT IS OFF.

⚠ **CAUTION** : Rotating shafts and above ground electrical potentials can be hazardous. Therefore, it is strongly recommended that all electrical work conform to the National Electrical Codes and local regulations. Installation. alignment and maintenance should be performed only by qualified personnel. Factory recommended test procedures, included in the instruction manual, should be followed. Always disconnect electrical power before working on the unit.

NOTE : POLLUTION DEGREE 2
The inverter must be used environment of the degree 2.
Typcal constructions that reduce the possibility of conductive pollution are;

1) The use of an un-ventilated enclosure
2) The use of a filtered ventilatied enclosure when the ventilation is fan forced that is, ventilation is accomplished by one or more blowers within the enclosure that provide a positive intake and exhaust.

R&i&n History Table

No.	Revision Contents	The Date of Issue	Operation Manual No.
1	Initial Release of Manual NB601AX	Sep. 1999	NB601AX

1. Instrallation and Wiring

⚠WARNING

Do not remove the rubber bush. Due to the possibility that a wire may be
damaged, shorted or may have a ground fault with the edge of the wiring p.2-1
cover.

Be sure to ground the unit. Otherwise, there is a danger of electric shock
and/or fire.   p.2-5
   Otherwise. there is a danger of electric shock and/or injury.

Only qualified personnel shall carry out wiring work.
   Otherwise, there is a danger of electric shock and/or tire. p.2-5

Implement wiring after checking that the power supply is off.
   Otherwise, there is a danger of electric shock and/or injury. p.2-5

Be sure to implement wiring after installing the body.
   Otherwise, there is a danger of electric shock and/or injury.   p.2-5

⚠ CAUTION

Install using non-combustible materials (metal etc.)
   It is a fire risk.   p.2-1

Do not install combustible materials nearby.
   It is a fire risk. p.2-1

Do not carry unit by top cover. always carry by supporting base of unit.
   There is a risk of falling and injury.   p.2-1

Do not allow substance of cutting waste, sputtering of welding, waste of iron,
wire and dust etc. to come into contact with the unit.   p.2-1
   It is a fire risk.

Make sure the surface the unit is installed onto can support the weight of the
unit comfortably. p.2-1
   There is a risk of falling and injury.

⚠ **CAUTION**

Do not install or operate the unit if the unit appears damaged.
  There is a risk of injury. ·········· **p.2-1**

Avoid locations of high temperatures, high humidity, dew condensation, dust.
corrosive gases, explosive gases, combustible gases, coolant mist and sea
damage etc. Install indoors, to avoid direct sunlight and the unit should be ·········· **p.2-1**
well ventilated.

Be sure that the rated voltage matches the AC power supply voltage of the
unit. ········ **p.2-5**
  Otherwise. there is the danger of injury and/or fire.

Be sure not to connect an AC power supply to the output terminals.
  Otherwise, there is the danger of injury and/or fire. ······ **p.2-5**

Be sure not to connect an AC power supply to the output terminals.
  Otherwise, there is the danger of injury and/or fire. · · · · **p.2-5**

Be sure not to connect the resistor to the direct current terminals (PD. P, and
N). ·········· **p.2-5**
  Otherwise. there is the danger of tire.

Be sure to install the earth leakage circuit breaker on the inputting side.
  Otherwise, there is in the danger of fire. · · · · · **p.2-5**

Be sure to use power cables, earth leakage breakers and electromagnetic
contactors that are rated correctly. ·········· **p.2-5**
  Otherwise, there is the danger of fire.

Do not use the electromagnetic contactors to stop the Motor running always
use the Inverters internal controls. ·········· **p.2-5**
  Otherwise. there is the danger of injury and/or fire.

2. Operation

⚠ **CAUTION**

Make sure that the direction of the motor is correct. It is in danger of injury or machine damage.	. . . .	p.3-4
Make sure there is no abnormal noise and vibration. It is in danger of injury or machine damage	. . . .	p.3-4

TABLE OF CONTENTS

Chapter 5 Maintenance, Inspection

Chpter 6 Specification

1.1 Inspection upon Unpacking

1.1.1 Inspection of the unit
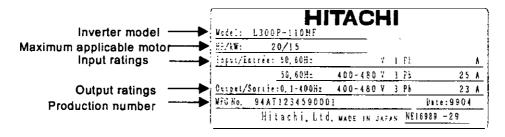
Open the package and pick out the **inverter,** please check the following item.

If you discover any unknown parts or the unit is in bad condition. please contact your supplier or the local Hitachi Distributor.

(1) Make sure that there was no damage (injury. falling or dents in the body) during transportation of the unit.

(2) **After** unpacking the unit. make **sure** that the package contains one operation manual for the **Inverter.**

(3) Make **sure** that the product is **the one you** ordered by checking the specification label.

Specifications label

Picture 1-1 Position of specification

HITACHI

Inverter model	Model: L300P-110HF
Maximum applicable motor	HP/kW: 20/15
Input ratings	Input/Intrée: 50,60Hz

	50,60Hz	400-480 V 3 Ph	25 A
Output ratings	Output/Sortie:0.1-400Hz	400-480 V 3 Ph	23 A
Production number	MFG No. 94AT1234590001	Date:9904

Hitachi. Ltd. MADE IN JAPAN NE16989 -29

Picture 1-2 Contents of specifications label

1.1.2 Operation manual

This operalion manual is the manual for the HITACHI **Inverter L300P** Series.

Before operation of the **Inverter,** read the manual carefully. After Reading this manual. keep it to hand for **·future** reference.

When using optional units for this **inverter;** please refer to the operation manuals packed with the optional' units.

This operation manual was correct at the time of going to press.

1.2 Question and Warranty of the Unit

1.2.1 Request upon asking

If you have any questions regarding damage to the unit. unknown parts or for general enquiries please contact your supplier or the local Hitachi Distributor with the following information.

      (1) Inverter Model

      (2) Production Number (MFG. NO)

      (3) Date of Purchase

      (4) Reason for Calling

           Damaged part and its condition etc.

           Unknown parts and their contents etc.

12.2 Warranty for the unit

The warranty period of the unit is one year after the purchase date.

However within the warranty period. the warranty will be void if the fault is due to;

      (1) Incorrect use as directed in this manual, or attempted repair by unauthorised personnel

      (2) Any damage sustained. other than from transportation (Which should be reported immediately)

      (3) Using the unit beyond the limits of the specification.

      (4) Act of God (Natural Disasters: Earthquakes. Lightning. etc)

The warranty is for the inverter only, any damage caused to third party equipment by malfunction of the inverter is not covered by the warranty.

Any examination or repair after the warranty period (one year) is not covered. And within the warranty period any repair and examination which results in information showing the fault was caused by any of the items mentioned above.. the repair and examination cost are not covered.

If you have any questions regarding the warranty please contact either your supplier or the local Hitachi Distributor.
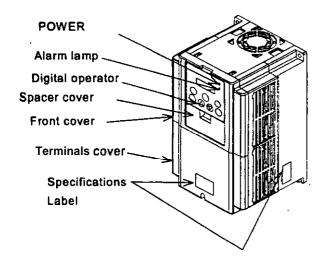
Please refer to the back cover for a list of the local Hitachi Distributors.
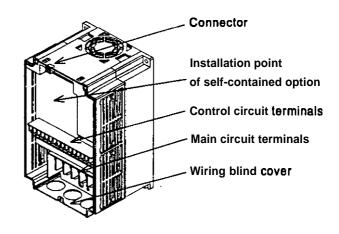
1.3 Appearance

1.3.1 Appearance and Names of Paris

Appearance from the front   Front cover removed

POWER

Alarm lamp

Digital operator

Spacer cover

Front cover

Terminals cover

Specifications
Label

Connector

Installation point
of self-contained option

Control circuit terminals

Main circuit terminals

Wiring blind cover

2.1 Installation

⚠️WARNING

Do not remove the rubber bush. Due to the possibility that a wire may be damaged. shorted or may have a around fault with the edge of the wiring cover.

⚠ CAUTION

Install using non-combustible materials (metal etc.)

   It is a fire risk.

Do not install combustible materials nearby.

   It is a fire risk.

Do not carry unit by top cover. always carry by supporting base of unit.

   There is a risk of falling and injury.

Do not allow substance of cutting waste, sputtering of welding, waste of iron, wire and dust etc. to come into contact with the unit.

   It is a fire risk.

Make sure the surface the unit is installed onto can support the weight of the unit comfortably.

   There is a risk of falling and injury.

Do not install or operate the unit if the unit appears damaged.

   There is a risk of injury.

Avoid locations of high temperatures, high humidity, dew condensation, dust, corrosive gases, explosive gases. combustible gases. coolant mist and sea damage etc. Install indoors, to avoid direct sunlight and the unit should be well ventilated.

2.1.1 Installation
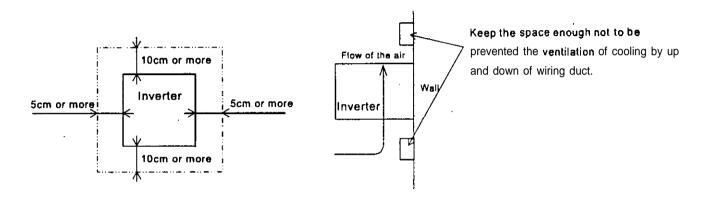
1. Transportation

   This inverter has plastic parts. So handle with care.

   Do not over tighten the wall mounting fixings as the mountings may crack, causing is a risk of falling.

   Do not install or operate the inverter if there appears to be damage or parts missing.

2. Surface for Mounting of Inverter

   The temperature of the Inverter heatsink can become very high (the highest being about 150°C). The surface, which you are mounting the Inverter onto, must be made of a non-flammable material (i.e steel) due to the possible risk of fire. Attention should also be made to the air gap surrounding the Inverter. Especially when there is a heat source such as a breaking resistor or a reactor.

3. Operating Environment-Ambient Temperature

   The ambient temperature surrounding the Inverter should not exceed the allowable temperature range (usually -10 to 50°C).

   The temperature should be measured in the air gap surrounding the Inverter. shown in the diagram above. If the temperature exceeds the allowable temperature, the component life will become shortened especially in the case of the Capacitors.

4.Operating Environment • Humidity

   The humidity surrounding the Inverter should be within the limit of the allowable percentage range (usually 5% to 90%). Under no circumstances should the Inverter be in an environment where there is the possibility of moisture entering the Inverter.
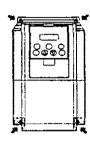
   Also avoid having the Inverter mounted in a place that is exposed lo the direct sunlight.
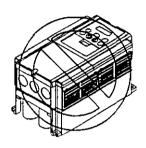
5. Operating Environment-Air
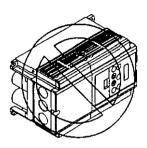
   Install the Inverter avoiding any place that has dust, corrosive gas, explosive gas. combustible gas, mist of coolant and sea damage.

6. Mounting Position

   Mount the Inverter in a vertical position using screws or bolts. The surface you mount onto should also be free from vibration and can easily hold the weight of the Inverter.
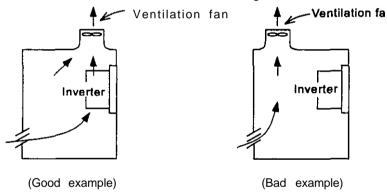
7. Ventilation within an Enclosure

   If you are installing one or more Inverters in a" enclosure a ventilation fan should be installed. Below is a guide to the positioning of the fan to take the airflow into consideration. The positioning Of Inverter, cooling fans and air intake is very important. If these positions are wrong. airflow around the Inverter decreases and the temperature surrounding the Inverter will rise. So please make sure that the temperature around is within the limit of the allowable range.

   (Good example)   (Bad example)

8. External cooling of Inverter

   It is possible to install the inverter so that the heatsink is out of the back of the enclosure. This method has two advantages. cooling of the Inverter is greatly increased and the size of the enclosure will be smaller.

   To install it with the heatsink out of the enclosure. a metal fitting option is required to ensure heat transfer.

   Do not install in 8 place where water. oil mist, flour and dust etc can come in contact with the inverter as there are cooling fans fitted to the heatsink.
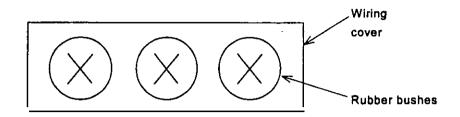
9. Approximate loss for each capacity

Inverter capacity (kW)	11	15	16.5	22	30	37	45	55
70% of rated output (W)	435	575	698	620	1100	1345	1625	1975
100% of rated output (W)	600	600	975	1150	1550	1900	2300	2600
100% of rated efficiency(%)	94.5	94.6	94.7	94.6	94.6	94.9	94.9	94.9

2.1.2 Blind cover of wiring parts
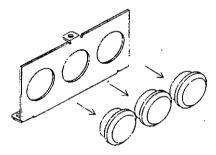
(1) Cable entry through Rubber Bushes

The wiring should be done after making a cut in the rubber bushes with nippers or cutters.

(2) Cable entry through Conduit

After taking out the rubber bushes, connect the conduit.

Note: Except for when connecting conduit, Do not take out the rubber bushes. It is possible that the wiring insulation is broken and a possible earth fault is caused.

2.2 Wiring

⚠WARNING

Be sure to ground the unit. Otherwise, there is a danger of electric shock and/or fire
    Otherwise. there is a danger of electric shock and/or injury.
Only qualified personnel shall carry out wiring work.
    Otherwise. there is a danger of electric shock and/or fire.
Implement wiring after checking that the power supply is off.
    Otherwise, there is a danger of electric shock and/or injury.
Be sure to implement wiring after installing the body.
    Otherwise, there is a danger of electric shock and/or injury.

⚠ CAUTION

Be sure that the rated voltage matches the AC power supply voltage of the unit.
    Otherwise, there is the danger of injury and/or fire:
Be sure not to connect an AC power supply to the output terminals.
    Otherwise, there is the danger of injury and/or fire.
Be sure not to connect the resistor to the direct current terminals (PD. P, and N).
    Otherwise, there is the danger of fire.
Be sure to install the earth leakage circuit breaker on the inputting side.
    Otherwise, there is in the danger of fire,
Be sure to use power cables, earth leakage breakers and electromagnetic contactors that are rated correctly.
    Otherwise, there is the danger of fire,
Do not use the electromagnetic contactors to stop the Motor running always use the Inverters internal controls.
    Otherwise, there is the danger of injury and/or fire.
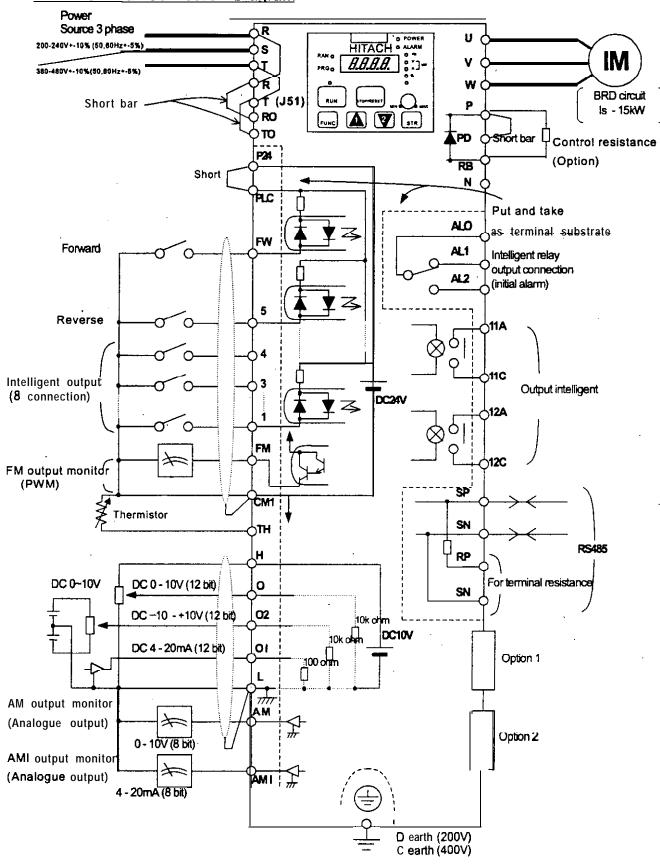
2.2.1 Terminal Connection Diagram

Power
Source 3 phase
200-240V+-10% (50,60Hz+-5%)
380-480V+-10%(50,60Hz+-5%)

Short bar

HITACH

BRD circuit
Is - 15kW

PD
Short bar
Control resistance
(Option)

Short

Put and take
as terminal substrate

Forward

Intelligent relay
output connection
(initial alarm)

Reverse

Intelligent output
(8 connection)

Output intelligent

FM output monitor
(PWM)

Thermistor

RS485

For terminal resistance

DC 0~10V
DC 0 - 10V (12 bit)
DC -10 - +10V (12 bit)
DC 4 - 20mA (12 bit)

10k ohm
10k ohm
DC10V
100 ohm

Option 1

AM output monitor
(Analogue output)
0 - 10V (8 bit)

Option 2

AMI output monitor
(Analogue output)
4 - 20mA (8 bit)

D earth (200V)
C earth (400V)

2 - 6

(1) Explanation of main circuit terminals

Symbol	Terminal Name	Explanation of contents
R, S, T (L1, L2, L3)	Main power	Connect alternating power supply. When using regenerative converter and RG series, don't connect.
U, V, W (T1, T2, T3)	Inverter output	Connect three-phase motor.
PD, P (+1, +)	D.C.reactor	Remove the short bar between PD and P, connect optional Power fac:or reactor (DCL-XX).
P, RB (+, RB)	External braking resistor	Connect optional External braking resistor.
P, N (+, -)	External braking unit	Connect optional Braking unit (BRD-XX). (Installed on 11kW and 15kW)
G ⏚	Inverter earth terminals	It is earth terminals of inverter case.

(2) Explanation of control circuit terminal

		Symbol	Terminal Name	Explanation of contents	
Analogue	Power	Source	L	Analogue power common	It is common terminal of frequency command signal (0, 02, 01) and analogue output, AM, AMI. Don't earth.	
		H	Frequency power	It is the DC+10V power for terminals.	Allowable load current 20mA
	Frequency setting	O	Frequency command power terminal (voltage)	When inputting DC 0 - 10V, it is maximum frequency on 10V. When maximum frequency is expected to be on being less than 10V, set with A014.	Input impedance 10k ohm / Allowable maximum voltage 12V
		O2	Frequency command support (voltage)	When inputting DC 0 - +-10V, this signal is added to frequency command of O or OI terminal.	Input impedance 10k ohm / Allowable maximum load voltage +-12V
		OI	Frequency command Terminal (current)	When inputting DC 4 - 20mA, 20mA is maximum frequency. When only At terminal is ON, this input signal is effective.	Input impedance 100 ohm / Allowable maximum current 24mA
	Monitor	AM	Digital monitor (voltage)	Output one selected from monitor item, output frequency, output current, torque, output voltage, input electric power, electric thermal rate.	Allowable maximum current 2mA
		AMI	Analogue monitor (current)		Allowable output less than impedance 250 ohm
		FM	Digital monitor (voltage)	Output the output frequency with digital besides above monitor.	Allowable maximum current 1.2mA / Maximum frequency 3.6kHz
Digital (connection)	Power	Source	P24	Interface power	It is DC24V power for connection input signal. When selecting source logic, it's for connection input common.	Allowable maximum output current 100mA
		CM1	Interface power common	The common terminal is FW terminal, 1 - 5 terminal, TH terminal, FM terminal, Don't earth.	
		PLC	Intelligent input common	Change sink type and source type by short bar on control terminals. P24-PLC : Sink type CM1-PLC : Source type	
	Input Signal	FW	Forward command	About FW signal, ON is Forward and OFF is stop command.	Allowable maximum voltage 27V / Input ON condition of terminal voltage Over 18V / Input OFF condition of terminal voltage Under 3V
	Operation/function/Selection etc Setting	1 2 3 4 5	Input intelligent	Select 5 functions from 33 functions, and divide between 1 terminal and 5 terminals.	
	Output	11A	Intelligent output terminal 11	Select output function and assign it output terminal 11	Contact specification Maximum
		11C	Common terminal	It is common terminal of intelligent output terminal 11.	Maximum AC250V,5A (R load) 0.2A (L load)
		12A	Intelligent output terminal 12	Select output function and assign it output terminal 12	1A (L load) DC30V,5A,(R load)
		12C	Common terminal	It is common terminal of intelligent output terminal 12	1A (L load)
	Condition	AL1 AL2	Alarm output terminal	Assign output function. Output is c contact.	Maximum AL1-AL0 AC250V,2A (R load) 0.2A (L load) AL2-AL0 AC250V,1A,(R load) 0.2A (L load) minimum AC100V 10mA
	Output	AL0	Common terminal	It is common terminal of alarm output terminal.	
Analogue	Sensor	TH	Thermistor input terminal	When a Thermistor signal is inputted to terminals TH and CM1, the inverter checks for over-temperature and will cause trip event and turn off output motor	Allowable maximum resistance 10k ohm ,minimum power 100mW

2.2.2 Main circuit wiring

(1) Warning on wiring

When carrying out work on the Inverter wiring make sure to wait for at least ten minutes before you remove the cover. Making sure to check that the charge lamp is not illuminated.

A final check should always be made with a voltage meter.

After removing the power supply, there is a time delay before the capacitors will dissipate their charge.

1. Main power terminals(R, S, T)

Connect the main power terminals (R, S, and T) to the power supply through a electromagnetic contactor or an earth-leakage breaker.

We recommend connecting the electromagnetic contactor to the main power terminals. Because when the protective function of inverter operates, it isolates the power supply and prevent the spread of damages and accidents.

This unit is for the three-phase power supply. It isn't for the single-phase power supply. If you require a single phase power supply unit, please contact us.

2. Inverter output terminats (U, V, and W)

Wire with thicker wire than the applicable wire to control the voltage drop.

Particularly when outputting low frequencies, the torque of the motor will reduce by the voltage drop of the wire.

Do not install power factor correction capacitors or a surge absorber to the output.

The inverter will trip or sustain damage to the capacitors or the surge absorber.

In the case of the cable length being more than 20 meters, it is possible that a surge voltage will be generated and damage to the motor is caused by the floating capacity or the inductance in the wire (400V especially).

An EMC Mains Filter is available. please contact us.

In the case of two or more motors, install a thermal relay to each motor.

3. Direct current reactor (DCL) connection terminals (PD. P)

These are the terminals to connect the current reactor DCL (Option) to help improve the power factor.

The short bar is connected to the terminals when shipped from the factory, if you are to connect a DCL you will need to disconnect the short bar first.

When you don't use a DCL. don't disconnect the short bar.

4. External braking resistor connection terminals (P, RB)

The regenerative braking circuit (BRD) is built-in es standard up to the 15kw Inverter.

When braking is required, install en external-braking resistor to these terminals.

The cable length should be less than 5 metres, and twist the two connecting wires to reduce inductance.

Don't connect any other device other than the external braking resistor to these terminals.

When installing en external braking resistor make sure that the resistance is correctly rated to limit the current drawn through the BRD.

5. Regenerative breaking unit connection terminals

The Inverters rated more than 18.5kw don't contain a BRD circuit. If regenerative braking is required an external BRD circuit (Option) is required along with the resistor (Option).

Connect external regenerative braking unit terminals (P, N) to terminals (P,N) on the inverter. The braking resistor is then wired into the External Braking unit and not directly to the Inverter.

The cable length should be less than 5 meters. and twist the two connecting wires to reduce inductance.

6. Earth (G ⏚)

Make sure that you securely ground the Inverter and motor for prevention of electric shock.

The inverter and motor must be connected to an appropriate safety earth and follow the local standard. Failure

to do so constitutes an electrical shock hazard.

(2) Wiring of main circuit terminals

The wiring of main circuit terminals for **inverter** is the following picture.

Wiring of terminals	Corresponding type
	L300P-110 150LF/HF Ro-To : M4 Other : M6
	L300P-185LF L300P-185-370HF **Ro-To** : M4 Other : M6
	L300P-370LF L300P-450,550HF Ro-To : M4 Other : M8
	L300P-220~300LF Ro-To : M4 Earth terminal : M6 Other : M8
	L300P-550LF Ro-To : M4 Earth terminal : M6 Other. : MI0

(3) Wiring Equipment

Refer to '(4) Common applicable tools'

Note1: The applicable tools indicate for Hitachi standard four-pole squirrel-cage Motor.

Note2: Select applicable tools for breakers examining the capacity of breakers.

(Use Inverter type.)

Note3: It needs bigger wires for power lines, if the distance exceeds 20m.

Note4: Use earth-leakage breakers (ELB) for safety.

*Use 0.75mm² for Alarm output contact.

Separate by the sum(wiring distance from Inverter to power supply. from inverter to motor for the sensitive current of leak breaker (ELB).

Wiring distance	Sensitive Current(mA)
100m and less	50
300m and less	100

Note5: When using CV line and wiring by rigid metal conduit, leak flows.

Note6: IV line is high dielectric constant. So the current increase 8 times. Therefore, use the sensitive current 5 times as large as that of the left list. And if the distance of wire is over 100m. use CV line.

Name	Function
Input reactor(harmonic control, electrical coordination, power-factor improvement)(ALI-***)	This part Is used when the unbalance voltage rate Is 3% or more and power supply is 500 kVA or more, and there Is a rapid change In the power supply/. It also improves the power factor.
Radio noise filter (zero-phase reactor)(ZCL-*)	Using the inverter may cause noise on the peripheral radio through the power lines. This part reduces noise.
Noise filter for inverter (JF-***)	This part reduces common noise generated between the power supply and the ground. as well as normal noise. Put It In the primary side of Inverter.
Input radio noise filter (capacitor filter)(CFI-*)	This part reduces radiation noise emitted from wire at the Input.
Direct reactor(DCL-*-**)	This part control harmonic from Inverter.
Breaking resistor Regenerative breaking unit	This part Is used for applications that need to increase the brake torque of the Inverter or to frequently turn on and off and to run high Inertia load.
Output noise filter(ACF-C*)	This part reduces radiation noise emitted from wire by setting between inverter and motor. And It reduces wave fault to radio and TV, It Is used for preventing malfunction of sensor and measuring Instruments.
Radio noise filter(zero-phase reactor(ZCL-***)	This part reduces noise generated at the output of the Inverter. (It Is possible to use for both Input and output.)
Output alternation reactor Reducing vibration. thermal Relay, preventing misapplication (ACL-*-**)	Running motors with the Inverter generates vibration greater than that with commercial power supply. This part Installed between the Inverter and motor reduces torque ripple. When the cable length between the Inverter and motor Is long (10m or more), a countermeasure for a malfunction of the thermal relay by harmonic due to switching on Inverter Is taken by Inserting reactor. There is the way to use current sensor In stead of thermal relay.
LCR filter	Sine-wave filter at the output.

ELB

Electric contactor

R S T PD
Power supply
P
R0   RB
T0   N
U V W
Inverter

IM

Motor

(4) Common applicable tools
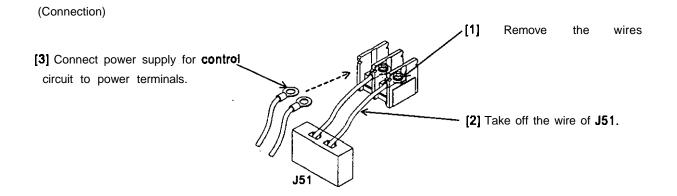
Motor Output (kW)	Applicable Inverter model	Power lines R,S,T,U,V, W,P,PD,N	External resister Between P and RB	Screw size of terminal	Terminal	Torque Nm	Applicable tools	
							Leak breaker (ELB)	Electro-magnetic controller (Mg)
200V class 11	L300P-110LF	14 mm² or more	5.5 mm²	M6	14-6	2.5	RX100(75A)	H50
15	L300P-150LF	22 mm² or more	5.5 mm²	M6	22-6	2.5	RX100(100A)	H65
18.5	L300P-185LF	30 mm² or more	-	M6	38-6	2.5	RX100(100A)	H80
22	L300P-220LF	38 mm² or more	-	M8	38-8	6	RX225B(150A)	H100
30	L300P-300LF	60 mm² or more	-	M8	60-8	6	RX225B(200A)	H125
37	L300P-370LF	100 mm² or more (38×2)	-	M8	100-8	6	RX225B(225A)	H150
45	L300P-450LF	100 mm² or more (38×2)	-	M10	100-10	6	RX225B(225A)	H200
55	L300P-550LF	150 mm² or more (60×2)	-	M10	150-10	6	RX400B(350A)	H250
400V class 11	L300P-110HF	5.5mm² or more	5.5 mm²	M6	5.5-6	2.5	EX50C(50A)	H25
15	L300P-150HF	8mm² or more	5.5 mm²	M6	8-6	2.5	EX60B(60A)	H35
18.5	L300P-185HF	14 mm² or more	-	M6	14-6	2.5	EX60B(60A)	H50
22	L300P-220HF	14 mm² or more	-	M6	14-6	2.5	RX100(75A)	H50
30	L300P-300HF	22 mm² or more	-	M6	22-6	2.5	RX100(100A)	H65
37	L300P-370HF	38 mm² or more	-	M6	38-6	2.5	RX100(100A)	H80
45	L300P-450HF	38 mm² or more	-	MB	38-8	6	RX225B(150A)	H100
55	L300P-550HF	60 mm² or more	-	M8	60-8	6	RX225B(175A)	H125

5) Connecting power to the control circuit, separating from main power

When the protection circuit of inverter is activated and the electromagnetic contactor on the input supply to the inverter isolates the power supply, the control circuit power supply from the inverter will also switch off and the alarm output signal will not be held.

The power terminals Ro and To are designed to allow a supply to go direct to the control circuit and therefore keep the alarm output signal on.

In this case. please connect power terminals Ro and To. to the primary side of the electromagnetic contactor. (inverter unit side of ACL. EMI filter, on using input ACL. EMI filter).

(Connection)

[3] Connect power supply for control circuit to power terminals.

[1] Remove the wires

[2] Take off the wire of J51.

J51
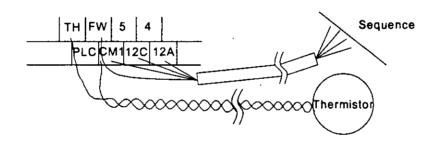
2.2.3 Terminal Connection Diagram

(1) Wiring

1. **Both** the CM1 and L terminal is insulated to both the common terminal of the input and output signals.
   Do not short or earth these common terminals.

2. Use twisted screened cable. for the input and output wires of the control circuit terminals.
   Connect the screen to the common terminal.

3. Limit connection wires to 20m. When it is necessary to wire over 20m, use a VX applied controller RCD-A (Remoter operation bar) or a CVD-E (Insulated signal transducer).

4. Separate the control circuit wiring from the main power and relay control wiring.

5. If control and power wires must cross make sure they cross et 90 degrees to each other.

6. When connecting a thermistor to the TH and CM1 terminal. twist the thermistor cables separate from the rest.

7. When using relays for the FW terminal or an intelligent input terminal use a control relay es they are designed to work with 24Vdc.

6. When the relay is used as an intelligent output. connect a diode for surge protection parallel to the coil.

9. Do not short the **analogue** voltage terminals H and L or the internal power terminals PV24 and CM1.
   There is risk of Inverter damage.

(2) Layout of control circuit terminals

H	O2	AM	FM	TH	FW	5	4	3	2	1	AL1	
L	'O	OI	AMI	P24	PLC	CM1	1x	12A	11C	11A	PLO	AL2
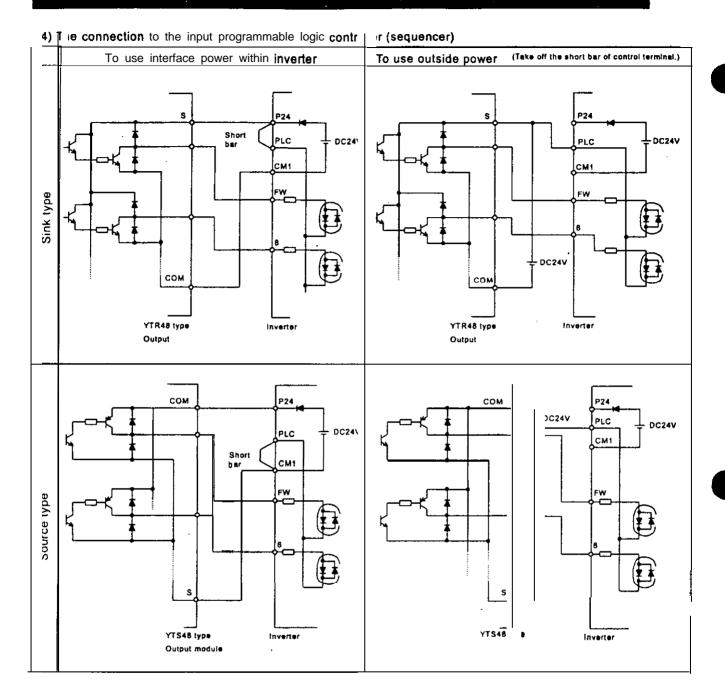
The terminal screw size: M3

(3)Change of input logic type

The logic type of intelligent input terminals is sink type (Factory Default).
To change the input logic type into source type, take off the short bar between P24 and PLC on the control terminal and connect it between PLC end CM1.

4) The connection to the input programmable logic controller (sequencer)

To use interface power within inverter	To use outside power (Take off the short bar of control terminal.)

Sink type

YTR48 type Output — Inverter

YTR48 type Output — Inverter

Source type

YTS48 type Output module — Inverter

YTS48 — Inverter

2-14

3.1 Ooeration

This inverter requires two different signals in order for the **Inverter** lo operate correctly. The **Inverter requires** both en operation setting and **a** frequency setting.

The following Indicates the details of each method of operation end the **necessary** instructions for **operation.**

(1) Operation **setting** and **a** frequency setting by the terminal control.
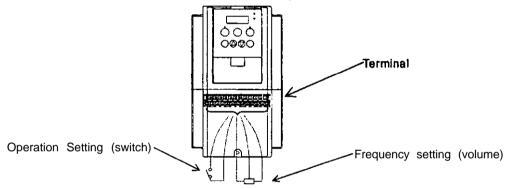
This is the method by connecting signals from the outside (the frequency setting, the starting switch etc.) with the control circuit terminals.

The operation is started when the operation setting (FW, RV) **is** turned ON while the **input** power is turned ON.

NOTE: The methods of the setting frequency with **terminal are** the voltage setting and the **electric** setting.

And they **are** selective by each system. The control circuit terminal list shows this in detail.

(Necessary things for operation)

[1] The operation setting: switch, relay etc.

[2] The frequency setting: signals from volume or outside **(DCO-10V, DC-10-10V, 4-20mA** etc.)

Terminal

Operation Setting (switch)

Frequency setting (volume)
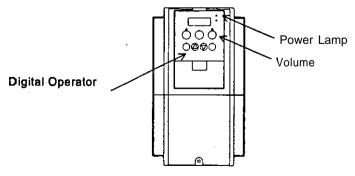
(2) Operation Setting and frequency setting with the digital operator.

This is the method for operation from the digital operator, which comes equipped with the inverter es standard. or the remote operator keypad.

When the digital operator sets the operation, the terminals **(FW,** RV) don't need to be linked.

And it is possible to select frequency from the digital operator es **a** method of the frequency setting too.

(Necessary things for operation)

[1] Remote Operator (It's unnecessary in case of digital operator operation)

Power Lamp

Volume

Digital Operator
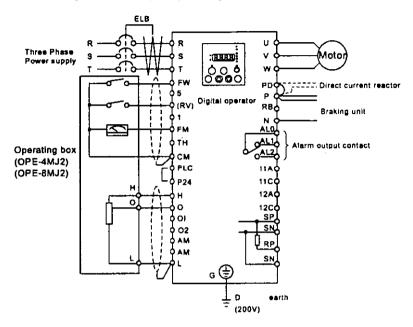
(3) Operation setting and frequency setting from both digital operator and terminal operator

This is the method of inverter operating from both of the above two operating methods

It is possible that the operation setting and the frequency setting can be selected for both **the** digital operator and the terminal operator each separately.

3.2 Test Run

This is the common connection example. Please refer to 4.1 Digital Operator, for the detailed use of the digital operator (OPE-SR).

(1) To input the operation setting and the frequency setting from terminal control.

(Arrangements)

[1] Please make sure that the connections are correctly secure.

[2] Turn the ELB ON to supply power to the inverter.

(The red LED 'POWER' on the digital operator should illuminate.)

[3] Set terminal with the frequency setting selection.

Set A001 as indication code. press the (FUNC) keyonce. (Two figures are shown.)

Set 01 with the (△) key or the (▽) key, press the (STR) key once to set the frequency setting for terminal. (Indication code turns back to A001.)

[4] Set terminal with the operation setting selection.

Set A002 as indication code, press the (FUNC) key once. (Two figures are shown.)

Set 01 with the (△) key or the (▽) key; press the (STR) key once to set the operation setting for terminal (Indication code turns back to A002.)

[5] Set monitor mode.

When monitoring the output frequency. set indication code to d001, and press the (FUNC) key once.

Or when monitoring the operating direction, set indication code to d003. press the (FUNC) key once.

[6] Input starting operation setting.
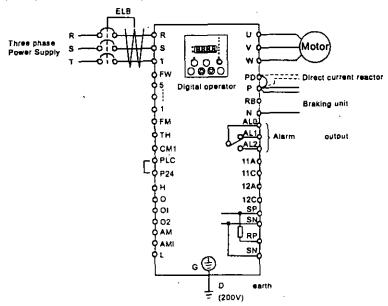
Turn ON between [FW] and [CM1] of terminal.

Impress voltage between [0] and [L] of terminal to start operation.

[7] Input ending operation setting.

Turn OFF between [FW] and [CM] to stop slowly down.

(2) Operation setting and the frequency setting from the digital operator
'(Copy unit (SRW) is also same use.)

(Arrangements)

[1] Please make sure that there isn't matter about the connection

[2] Turn the ELB on to supply power to the inverter.
(The red LED 'POWER" on the digital operator should illuminate.)

[3] Set operator with the frequency setting selection.
Set A001 as indication code. press the (FUNC) key once
(Two figures are shown.)

Set 02 with the (△) key or the (▽) key, press the (STR) key once to set the frequency setting for the operator.
(Indication code turns back to A001 .)

[4] Set operator with the operation setting selection.
Set A002 as indication code. press the (FUNC) key once.
(Two figures are shown.)

Set 02 with the (△) key or the (▽) key. press the (STR) key once to set the operation setting for the operator.
(Indication code turns back to A002.)

[5] Set the output frequency

Set F001 as indication code. as press the (FUNC) key once.

(Indication code of four figures is shown.)

Set to the desired output frequency with the (△) key or the (▽) key. press the (STR) key once to store it.

(Indication code turns back to F001.)

[6] Set the operation direction.

Set FO04 as indication code. press the (FUNC) key once

(00 or 01 is shown.)

Set operation direction to 00 in case of forward, or to 01 in case of reverse with the (△) key or the (▽) key. Press the (STR) key once to establish it.

(Indication code turns back to FO04.)

[7] Set monitor mode.

When monitoring the output frequency, set indication code to d001, and press the (FUNC) key once.

Or when monitoring the operation direction, set indication code to d003. press th(FUNC)FUNC key once.

(Indication code are ⊟ forward, ⊟ reverse or ⊟ stop.)

[8] Press the (RUN) key to start operating.

(The green LED 'RUN' turns on a light, and the indication changes in response to the monitor mode set.)

[9] Press the (STOP/RESET) key to decelerate to a stop.

(When the frequency turn back to 0, the green LED "RUN' light will switch off.)

⚠ **CAUTION**

Make sure that the direction of the motor is correct. It is in danger of injury or machine **damage.**

Make sure there is no abnormal noise and vibration. It is in danger of injury or machine damage.
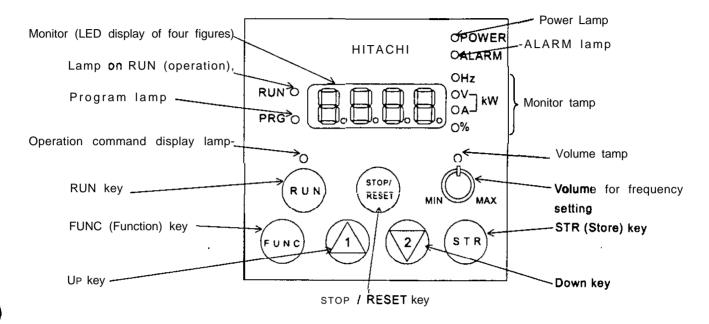
Make sure that there is no tripping during the acceleration and deceleration and check that the revolution per minute and the frequency meter are correct.

When overcurrent tripping or overvoltage tripping occurs during the test run. increase the acceleration time or the deceleration time.

4.1 About Digital Operator (OPE-SR)

Explanation of operating the digital operator (OPE-SR)
L300P series operates by using the digital operator, which is fitted es standard.

1. Name and contents of each part of the digital operator

Name	Contents
Monitor	Dis la of fre uency, output current and set value
Lamp on RUN (Operation)	Light on when the inverter is running
Program lamp	Light on when displaying set value of each function in monitor section Light will flash On and Off as a warning (when set value is incorrect)
POWER lamp	Power lamp of control circuit
ALARM lamp	Light on when the Inverter trips
Monitor lamp	Lamp display state of monitor section. Hz : Frequency V : Voltage A : Current kW : Electric power % : Rate
Volume lamp	Light on when the frequency can be set by the volume for frequency setting
Operation command Display lamp	Light on only when operating command (RUN/STOP) is set in operator
Run key	Run command to start the motor. But this is only valid when operation command is from the operator. (Be sure that the operation command display lamp is illuminated.)
Stop (stop/reset) key	This key is used to stop motor, or reset an alarm.
Volume for frequency setting	This can be used to set the output frequency. But this is only valid when the frequency command part is set in volume.
FUNC (Function) key	The key containing monitor mode, basic setting mode, extension functions mode.
STR (Store) key	The key to store the data set. (On changing set value, must be pushed or value is lost.)
UP/DOWN key	The keys to change extension function mode, function mode and set value.
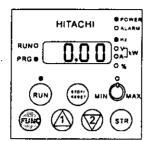
2. Operating method

(1) Method to display monitor mode, basic setting mode. extension function mode

Power on

⬇

[1] Display of monitor contents set
(Display 0.00 in initial state)

HITACHI · POWER ○ ALARM
RUN○ 0.00 ○Hz ○V ○A kW ○%
PRG●
RUN STOP/RESET MIN MAX
FUNC ① ② STR
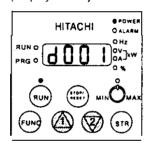
When power is turned off while the basic setting mode or the extension setting mode is displayed. The display will be different from the one above when the power is restored.

Push the FUNC key.

[2] Display monitor code No.
(Display d001)

HITACHI · POWER ○ ALARM
RUN○ d001 ○Hz ○V ○A kW ○%
PRG○
RUN STOP/RESET MIN MAX
FUNC ① ② STR
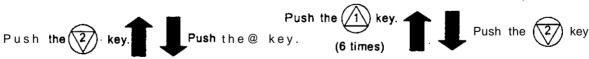
Monitor mode is displayed by pushing FUN (Function) key once when display of Monitor mode No.

Push the ② key. Push the @ key.

(Display d002)

HITACHI · POWER ○ ALARM
RUN○ d002 ○Hz ○V ○A kW ○%
PRG○
RUN STOP/RESET MIN MAX
FUNC ① ② STR

[5] Display monitor code No.
(Display d001)

HITACHI · POWER ○ ALARM
RUN○ d001 ○Hz ○V ○A kW ○%
PRG○
RUN STOP/RESET MIN MAX
FUNC ① ② STR

Return to the state of [2].

Push the ① key.
(6 times)

Push the ② key.
(6 times)

[4] Display extension function mode
(Display A - - -)

HITACHI · POWER ○ ALARM
RUN○ A - - - ○H ○V ○A kW ○%
PRG○
RUN STOP/RESET MIN MAX
FUN ① ② STR
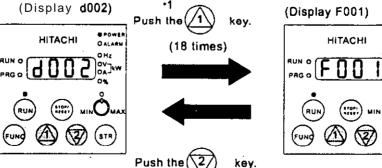
Extension function mode
Display in the order of

A←→b←→C←→H←→P←→U

Push the ① key.
(6 times)

Push the ② key.
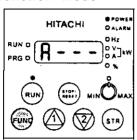
[3] Display code No. of basic setting mode.
(Display F001)

·1
Push the ① key.
(18 times)

HITACHI · POWER ○ ALARM
RUN○ F001 ○Hz ○V ○A kW ○
PRG○
RUN STOP/RESET MIN MAX
FUNC ① ② STR

Push the ② key.
(18 times)

*1(3) Refer to setting method of function code.
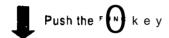
(2) Selling method of function

Change operation command part. (Operator ——► Control terminal)

[1] Display extension
function mode
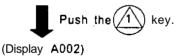
Make monitor display 'A - - -" by referring to (1)
displaying method.
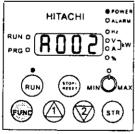
Now operating command part is by the operator. so
operating command display lamp should illuminate..

Push the F U N C **k e y**
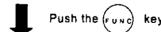
[2] Display code No. of function mode

Push the (1) key.

(Display A002)

Push the (FUNC) key.
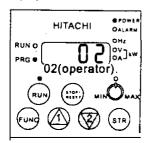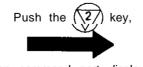
[3] Display contents of function mode

02(operator).

[5] Display extension function
mode (Display A - - -)

It is possible to shift to other extension
function modes, monitor modes and basic
modes in this state

Push the FUNC key.
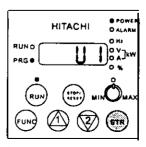
[4] Display code No. of monitor mode.
(Display A002)

The changed set value is confirmed by pushing
the STR key.

Operation command display lamp light will switch
off so that operation command is now changed to
the control terminal.

Push the (STR) key

Push the (2) key,

Operation command part displays

Program (PRG) light on by
displaying contents of function
mode
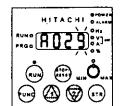
Change operation command
part to control terminal 01.

(3) Setting method of **function** code

Code No. of monitor modes. basic setting modes and extension function codes can be set easily.

Indicate the method to change code No.d001 of monitor mode to function code No. A029 simply.

[1] Display code No. of monitor mode.

(Displayd001)

[2] Change extension function mode

°d° blinks.

Push the (1) key.
(2 times)

(Display A001)

'A' blinks.
The figure lighting is decided by pushing STR key.

Push the (STR) key.
(Confirm °A°)

[3] Change third figure of function code No.

 Push the (STR) key.

(Confirm °0°)

First figure '0' blinks.
Don't change third figure and push the STR key and confirm 0.

(Display A029)

Push the (STR) Key

(Decide °9°)

°9° of first figure blinks.

Push the (1) (2) key together.

Push the (2) or (1) key.
(2 times) (9 times)

[5] Change first figure of function code No.

First figure. '1' blinks.

Push the (STR) key.

(Display A021)

Second figures. "2' blinks.

Push the (1) key.
(2 times)

[4] Change second figure of function code No.

[6] Finish setting function

Finish setting A029
(Note) When you input code No. there isn't in the code list. 'A' of left end blinks again. Confirm code No and input it again.

4.2 Code list

Monitor code (Note1)

Dis-play code	Function name	L300P monitor or data range (digital operator)	Initial data	Setting On Running	Change mode during running	Page
d001	output frequency monitor	0.00-99.99/100.0-400.0(Hz)				4-10
d002	output current monitor	0.0-999.9(A)				4-10
d003	Operation direction				-	4-10
d004	PID feedback monitor	0.00-99.99/100.0-999.9/1000. -9999. / 1000-9999/(100-{999 (10000-999900)	-	l	-	4-10
d005	Intelligent input terminal monitor	(Example) FW, terminal2, and 1: ON Terminal 5, 4, 3 :OFF	-	-		4-11
d006	Intelligent output terminal monitor	(Example) Terminal2, 1:ON AL :OFF	-	-	-	4-11
d007	Frequency conversion monitor	0.00-99.99/100.0-999.9/1000. -9999. / 1000-3996	-	-	-	4-12
d013	Output voltage monitor	0.0-600.0 V	-	-	-	4-12
d014	Electric power monitor	0.0-999.9 kW	-	-	-	4-12
d016	Accumulated time monitor during RUN	0.-9999./1000-9999/(100-{999 hr	-	-	-	4-13
d017	Power ON time monitor	0.-9999./1000-9999/(100-{999 hr	-	-	-	4-13
d080	Number of trip time monitor	0.-9999./1000-6553(10000-65530) (time)	-	-	-	4-13
d081	Trip monitor 1	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(hr) power ON time(hr)	-	-	-	4-13
d082	Trip monitor 2	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(hr) power ON time(hr)	-	-	-	4-13
d083	Trip monitor 3	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(hr) power ON time(hr)	-	-	-	4-13
6084	Trip monitor 4	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(hr) power ON time(hr)	-	-	-	4-13
d085	Trip monitor 5	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(hr) power ON time(hr)	-	-	-	4-13
d086	Trip monitor 6	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(hr) power ON time(hr)	-	-	-	4-13
d090	Warning monitor	Warning code	-	-	-	4-76
F001	Output frequency	0.0, starting frequency-Max. frequency (2nd max. frequency)(Hz)	0.00	✓	✓	4-14
F002	1st acceleration time	0.01-99.99/100.0-999.9/1000.-3600.(s)	30.00	✓	✓	4-16
F202	2nd acceleration time	0.01-99.99/100.0-999.9/1000. -3600. (s)	30.00	✓	✓	4-16
F003	1st deceleration time	0.01-99.99/100.0-999.9/1000. -3600. (s)	30.00	✓	✓	4-16
F203	2nd deceleration time	0.01-99.99/100.0-999.9/1000. -3600. (s)	30.00	✓	✓	4-16
F004	Operation direction selection	00(forward)/01(reverse)	00	-		4-16

(Note1) Change mode during run by selection of b031 (software lock selection).

(Note2) Do not forget to press "STR" key when you change the display.

Function Mode

Code		Function name	Setting range	Initial data -FE/-FU	Setting on run	Change mode on run	Page
Base setting	A001	Frequency setting selection	00(VR)/01(terminal)/02(operator)/03(RS485)/04 (option1)/05(option2)	01	-	-	4-14
	A002	Operation setting selection	01(terminal)/02(operator)/03(RS485)/04(option1)/05(option2)	01	-	-	4-15
	A003	Base frequency	30. - Maximum. frequency(Hz)	50./60.	-	-	4-17
	A203	Base frequency, 2nd motor	30. - 2nd Maximum. frequency (Hz)	50./60.	-	-	4-17
	A004	Maximum frequency	30. - 400. (Hz)	50./60.	-	-	4-18
	A204	Maximum frequency, 2nd motor	30. - 400. (Hz)	50./60.	-	-	4-18
Analog input setting	A005	AT terminal selection	00(Changing of O and OI with AT terminal)/01(Changing of O and O2 with AT terminal)	00	-	-	4-19
	A006	O2 selection	00(single)/01(auxiliary speed of O, OI) [no reversible] /02(auxiliary speed of O, OI [reversible]	00	-	-	4-19
	A011	O start	0.00-99.99/100.0-400.0 (Hz)	0.00	-	✓	4-20
	A012	O end	0.00-99.99/100.0-400.0 (Hz)	0.00	-	✓	4-20
	A013	O start rate	0.-100.0 (%)	0.	-	✓	4-20
	A014	O end rate	0.-100.0(%)	100.	-	✓	4-20
	A015	O start selection	00 (external starting frequency)/01(OHz)	01	-	✓	4-20
	A016	O, OI, O2 sampling	1.-30.(times)	8.	-	✓	4-21
Multistage speed · jogging frequency setting	A019	Multi-speed selection	00(binary : range is to 16 stage speed with 4 terminals)/01(bit : range is to 6 stage speed with 5 terminals)	00	-	-	4-43
	A020	Multi-speed 0	0.00, starting frequency-maximum. frequency(Hz)	0.00	✓	✓	4-43
	A220	Multi-speed 0, 2nd motor	0.00, starting frequency-2nd maximum frequency(Hz)	0.00	✓	✓	4-43
	A021	Multi-speed1	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A022	Multi-speed2	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A023	Multi-speed3	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A024	Multi-speed4	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A025	Multi-speed5	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A026	Multi-speed6	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A027	Multi-speed7	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A028	Multi-speed8	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A029	Multi-speed9	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A030	Multi-speed10	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A031	Multi-speed11	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A032	Multi-speed12	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A033	Multi-speed13	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A034	Multi-speed14	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A035	Multi-speed15	0.00, starting frequency-maximum frequency(Hz)	0.00	✓	✓	4-43
	A038	Jogging frequency	0.00, starting frequency-9.99(Hz)	1.00	✓	✓	4-44
	A039	Jogging selection	00(free-run on JG stop / invalid on running) / 01(stop decelerating on JG stop / invalid on running) / 02(DC braking on JG stop/invalid on running) / 03(free-run on JG stop/valid on running(JG after stop decelerating]) / 04 (stop decelerating on JG stop/valid on running) / 05 (DC braking on JG stop/valid on operating)	00	-	✓	4-44
V/f characteristic	A041	Torque boost selection	00 (manual torque boost) / 01 (automatic torque boost)	00	-	-	4-24
	A241	Torque boost selection, 2nd motor	00 (manual torque boost) / 01 (automatic torque boost)	00	-	-	4-24
	A042	Manual torque boost	0.0-20.0(%)	1.0	✓	✓	4-24
	A242	Manual torque boost, 2nd motor	0.0-20.0(%)	1.0	✓	✓	4-24
	A043	Manual torque boost point	0.0-50.0(%)	5.0	✓	✓	4-24
	A243	Manual torque boost point, 2nd motor	0.0-50.0(%)	5.0	✓	✓	4-24
	A044	1st control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	-	-	4-22
	A244	2nd control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	-	-	4-22
	A045	Output voltage gain	20. - 100.	100.	✓	✓	4-21
Direct current braking	A051	DC braking selection	00(invalid)/01(valid)	00	-	✓	4-25
	A052	DC braking frequency	0.00-60.00(Hz)	0.50	-	✓	4-25
	A053	DC braking wait time	0.0 - 5.0(s)	0.0	-	✓	4-25
	A054	DC braking power	0. - 70. (%)	0.	-	✓	4-25
	A055	DC braking time	0.0 - 60.0(s)	0.0	-	✓	4-25
	A056	DC braking edge/level selection	00(edge action)/01(level action)	01	-	✓	4-25
	A057	DC braking power (starting time)	0. - 70. (%)	0.	-	✓	4-25
	A058	DC braking time (starting time)	0.00-60.0(s)	0.0	-	✓	4-25
	A059	DC carrier frequency	0.5-12(kHz) Derating	3.0	-	-	4-25

Function Mode

	Code	Function name	Setting range	Initial data -FEI-FU	Setting on run	Change mode on run	Page
	A061	1ˢᵗ frequency upper limiter	0.00, 1ˢᵗ frequency lower limiter-maximum frequency(Hz)	0.00	-	✓	4-28
	A261	2ⁿᵈ frequency upper limiter	0.00, 2ⁿᵈ frequency lower limiter-2ⁿᵈ setting maximum frequency(Hz)	0.00	-	✓	4-28
	A062	1ˢᵗ frequency lower limiter	0.00, start frequency-maximum frequency(Hz)	0.00	-	✓	4-28
	A262	2ⁿᵈ frequency lower limiter	0.00, start frequency-2ⁿᵈ setting maximum frequency(Hz)	0.00	-	✓	4-28
	A063	Jump frequency1	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-29
	A064	Jump frequency Width 1	0.00-10.00(Hz)	0.50	-	✓	4-29
	A065	Jump frequency2	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-29
	A066	Jump frequency Width 2	0.00-10.00(Hz)	0.50	-	✓	4-29
	A067	Jump frequency3	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-29
	A068	Jump frequency Width 3	0.00-10.00(Hz)	0.50	-	✓	4-29
	A069	Acceleration stop frequency	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-29
	A070	Acceleration stop time	0.00-60.0(s)	0.0	-	✓	4-29
PID control	A071	PID selection	00(invalid)/01(valid)	00	-	✓	4-30
	A072	PID-P gain	0.2-5.0	1.0	✓	✓	4-30
	A073	PID-I gain	0.0-3600.(s)	1.0	✓	✓	4-30
	A074	PID-D gain	0.00-100.0(s)	0.00	✓	✓	4-30
	A075	PID scale	0.01-99.99(%)	1.00	-	✓	4-30
	A076	PID feedback selection	00(feedback : OI)/01(feedback : O)	00	-	✓	4-30
AVR	A081	AVR selection	00(ON always)/01(OFF always)/02(OFF on decelerating)	02	-	✓	4-17
	A082	Motor voltage selection	200/215/220/230/240, 380/400/415/440/460/480, 575/600(V)	230/230 460/460	-	-	4-17
Operation mode/ adjustable function	A085	Operation mode selection	00(normal operation)/01(energy-saving operation)	00	-	-	4-31
	A086	Energy-saving response-accuracy adjustment	0.0-100.0(s)	50.0	✓	✓	4-31
	A092	Acceleration time2	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	✓	✓	4-32
	A292	2ⁿᵈ acceleration time2	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	✓	✓	4-32
	A093	Deceleration time2	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	✓	✓	4-32
	A293	2ⁿᵈ deceleration time2	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	✓	✓	4-32
	A094	2ⁿᵈ stage adjustable selection	00(change with 2CH terminal)/01(change with setting)	00	-	-	4-32
	A294	2ⁿᵈ stage adjustable selection(2ⁿᵈ motor)	00(change with 2CH terminal)/01(change with setting)	--			4-32
	A095	2ⁿᵈ acceleration frequency	0.00-99.99/100.0-400.0(Hz)	0.00			4-32
	A295	2ⁿᵈ acceleration frequency(2ⁿᵈ motor)	0.00-99.99/100.0-400.0(Hz)	0.00			4-32
	A096	2ⁿᵈ deceleration frequency	0.00-99.99/100.0-400.0(Hz)	0.00	-	-	4-32
	A296	2ⁿᵈ deceleration frequency (2ⁿᵈ motor)	0.00-99.99/100.0-400.0(Hz)	0.00	-	-	4-32
	A097	Acceleration pattern selection	00(straight line)/01(S-curve)/02(U-curve)/03(reverse U-curve)	00	-	-	4-33
	A098	Deceleration pattern selection	00(straight line)/01(S-curve)/02(U-curve)/03(reverse U-curve)	00	-	-	4-33
External frequency adjustment	A101	OI start	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-20
	A102	OI end	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-20
	A103	OI start rate	0.-100. (%)	20.	-	✓	4-20
	A104	OI end rate	0.-100. (%)	100.	-	✓	4-20
	A105	OI start selection	00(external start frequency)/01(0Hz)	01	-	✓	4-20
	A111	O2 start	-400.--100./-99.9-0.00-99.9/100.-400.(Hz)	0.00	-	✓	4-20
	A112	O2 end	-400.--100./-99.9-0.00-99.9/100.-400.(Hz)	0.00	-	✓	4-20
	A113	O2 start rate	-100. - 100. (%)	-100.	-	✓	4-20
	A114	O2 end rate	-100. - 100. (%)	100.	-	✓	4-20
Accel/Decel	A131	Acceleration curve constant	01(small swelling)-10(large swelling)	02	-	✓	4-33
	A132	Deceleration curve constant	01(small swelling-10(large swelling)	02	-	✓	4-33
Instantaneous power failure restart	b001	Retry selection	00(trip)/01(0Hz start)/02(start after equal frequency)/03(trip after equaling frequency and deceleration stop)	00	-	✓	4-34
	b002	Allowable under-voltage power failure time	0.3-1.0(s)	1.0	-	✓	4-34
	b003	Retry wait time	0.3-100.(s)	1.0	-	✓	4-34
	b004	Instantaneous power-failure/under-voltage trip during stop	00(invalid)/01(valid)	00	-	✓	4-34
	b005	Instantaneous power-failure/under-voltage retry time selection	00(16 times)/01(free)	00	-	✓	4-34
	b006	Open-phase selection	00(invalid)/01(valid)	00	-	✓	4-35
	b007	Frequency setting to match	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-34
Electronic thermal	b012	Electronic thermal level	0.2*constant current-1.20*constant current(A)	Rated Current of inverter	-	✓	4-36
	b212	Electronic thermal level (2ⁿᵈ motor)	0.2*constant current-1.20*constant current(A)	Rated Current of Inverter	-	✓	4-36
	b013	Electronic thermal characteristic selection	00/(reduced characteristic)01(constant characteristic)/02(free setting)	01	-	✓	4-36
	b213	Electronic thermal characteristic selection (2ⁿᵈ motor)	00/(reduced characteristic)01(constant torque characteristic)/02(free setting)	01	-	✓	4-36
	b015	Free electronic thermal frequency 1	0.-400.(Hz)	0.	-	✓	4-37
	b016	Free electronic thermal current 1	0.0-1000.(A)	0.0	-	✓	4-37
	b017	Free electronic thermal frequency 2	0.-400.(Hz)	0.	-	✓	4-37
	b018	Free electronic thermal current 2	0.0-1000. (A)	0.0	-	✓	4-37
	b019	Free electronic thermal frequency 3	0.-400.(Hz)	0.	-	✓	4-37
	b020	Free electronic thermal current 3	0.0-1000.(A)	0.0	-	✓	4-37

Function Mode

	Code	Function name	Setting range	Initial data -FE/-FU	Setting on run	Change on run mode	Page
Overload limit	b021	Overload restriction selection	00(invalid)/01(enabled on acceleration / constant speed)/02(enabled on constant speed)	01	-	✓	4-38
	b022	Overload restriction level	0.50* rated current-1.50* rated current(A)	Rated current of inverter x 1.20	-	✓	4-38
	b023	Overload restriction limit constant	0.10-30.00(s)	1.00	-	✓	4-38
	b024	Overload restriction 2 selection	00(invalid)/01(valid on acceleration / constant speed)/02(valid on constant speed)	01	-	✓	4-38
	b025	Overload restriction level 2	0.50*rated current-1.50*rated current(A)	Rated current of inverter x1.20	-	✓	4-38
	b026	Overload restriction constant 2	0.10-30.00(s)	1.00	-	✓	4-38
Lock	b031	Software lock mode selection	00(Impossible to change the data except this item when SFT terminal is ON)/ 01(Impossible to change the data except setting frequency item when SFT terminal is ON)/02(impossible to change the data except this item)/ 03(impossible to change the data except setting frequency item)/ 10(possible to change data on operating)	01	-	✓	4-45
Free V/f setting	b100	Free V/f frequency 1	0.- Free V/f frequency2(Hz)	0	-	.	4-23
	b101	Free V/f voltage 1	0.-800.0(V)	0.0	-	.	4-23
	b102	Free V/f frequency 2	0.- Free V/f frequency3(Hz)	0	-	.	4-23
	b103	Free V/f voltage 2	0.-800.0(V)	0.0	-	.	4-23
	b104	Free V/f frequency 3	0.- Free V/f frequency4(Hz)	0	.	.	4-23
	b105	Free V/f voltage 3	0.-800.0(V)	0.0	-	.	4-23
	b106	Free V/f frequency 4	0.- Free V/f frequency5(Hz)	0	-	.	4-23
	b107	Free V/f voltage 4	0.-800.0(V)	0.0	-	.	4-23
	b108	Free V/f frequency 5	0.- Free V/f frequency6(Hz)	0	-	.	4-23
	b109	Free V/f voltage 5	0.-800.0(V)	0.0	-	.	4-23
	b110	Free V/f frequency 6	0.- Free V/f frequency7(Hz)	0	-	.	4-23
	b111	Free V/f voltage 6	0.-800.0(V)	0.0	-	.	4-23
	b112	Free V/f frequency 7	0.-400.(Hz)	0	-	.	4-23
	b113	Free V/f voltage 7	0.-800.0(V)	0.0	-	.	4-23
Intelligent input terminal setting	C001	Intelligent input 1 setting	01/(RV:Reverse is valid)/02(CF1:Multi-speed1)/ 03(CF2:Multi-speed2)/ 04(CF3:Multi-speed3)/ 05(CF4:Multi-speed4)/ 06(JG:Jogging)/ 07(DB:External DC braking)/08(SET:2nd control)/	18/18	-	✓	4-42
	C002	Intelligent input 2 setting	09(2CH:two-stage adjustable speed)/11(FRS:Free-run)/ 12(EXT:External trip)/13(USP:Unattended start protection)/ 14(CS:commercial change)/15(SFT:software lock)/ 16(AT:Analog input voltage/current select)/18(RS:Reset Inverter)/	16/16	-	✓	4-42
	C003	Intelligent input 3 setting	20(STA:3wire run)/ 21(STP:3wire keep)/22(F/R:3wire forward/reverse)/ 23(PID:PID selection valid/invalid)/24(PIDC:PID integrating reset)/ 27(UP:Remote control UP function)/	03/13	-	✓	4-42
	C004	Intelligent input 4 setting	28(DWN:Remote control DOWN function)/ 29(UDC:Remote control data clear)/ 32(SF1:Multi-speed bit1)/ 33(SF2:Multi-speed bit2)/34(SF3:Multi-speed bit3)/ 35(SF4:Multi-speed bit4)/36(SF5:Multi speed bit5)/	02/02	-	✓	4-42
	C005	Intelligent input 5 setting	37(SF6:Multi-speed bit6)/38(SF7:Multi-speed bit7)/ 39(OLR:Overload restriction change)/no(NO:No assign)	01/01	-	✓	4-42
Input terminal setting intelligent	C011	Intelligent input1 a/b (NO/NC) selection	00(NO)/01(NC)	00/00	-	✓	4-42
	C012	Intelligent input2 a/b (NO/NC) selection	00(NO)/01(NC)	00/00	-	✓	4-42
	C013	Intelligent input3 a/b (NO/NC) selection	00(NO)/01(NC)	00/01	-	✓	4-42
	C014	Intelligent input4 a/b (NO/NC) selection	00(NO)/01(NC)	00/00	-	✓	4-42
	C015	Intelligent input5 a/b (NO/NC) selection	00(NO)/01(NC)	00/00	-	✓	4-42
	C019	Input FW a/b (NO/NC) Selection	00(NO)/01(NC)	00/00	-	✓	4-42
Intelligent output terminal setting	C021	Intelligent output 11 setting	00(RUN:running)/01(FA1:Frequency arrivaltype1 signal)/ 02(FA2:frequency arrival type2 signal)/03(OL:Overload advance notice signal)/04(OD:Output deviation for PID control)/05(AL:Alarm signal)/	01	-	✓	4-51
	C022	Intelligent output 12 setting		00	-	✓	4-51
	C026	Alarm relay output	06(FA3:Only setting frequency)/08(IP:On instantaneous stop)/ 09(UV:Under voltage)/11(RNT:RUN time over)/12(ONT:ON time over)/ 13(THM:thermal caution)	05	-	✓	4-51
	C027	FM selection	00(Output frequency)/01(Output current) / 03(Digital output frequency)/04(Output voltage)/ 05(Input electric power)/06(thermal load rate)/07(LAD frequency)	00	-	✓	4-56
	C028	AM selection	00(Output frequency)/01(Output current)/04(Output voltage)/ 05(Input electric power)/06(thermal load rate)/07(LAD frequency)	00	-	✓	4-57
	C029	AMI selection	00(Output frequency)/01(Output current)/04(Output voltage)/ 05(Input electric power)/06(Thermal load rate)/07(LAD frequency)	00	-	✓	4-57
Output terminal state setting. Output level setting	C031	Intelligent output 11 a/b	00(NO)/01(NC)	00	-	✓	4-52
	C032	Intelligent output 12 a/b	00(NO)/01(NC)	00	-	✓	4-52
	C036	Alarm relay output a/b	00(NO)/01(NC)	01	-	✓	4-52
	C040	Overload advance notice signal output mode	00(On accel. And decel. constant speed)/01(Only constant speed)	01	-	✓	4-39
	C041	Overload advance notice level	0.0-2.0*rated current(A)	Inverter rated current	-	✓	4-38
	C042	Frequency arrival setting for acceleration.	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-53
	C043	Arrival frequency setting for deceleration.	0.00-99.99/100.0-400.0(Hz)	0.00	-	✓	4-53
	C044	PID deviation setting level	0.0-100.0(%)	3.0	-	✓	4-31

Function Mode

	Code	Function name	Setting range	Initial data	Setting on run	Change mode on run	Page
Communication function	C070	Data command	02(operator)/03(RS485)/04(option1)/05(option2)	02	-	-	4-61
	C071	Communicating transmission speed	03(2400bps)/04(4800bps)/05(9600bps)/06(19200bps)	04	-	✓	4-61
	C072	Communication code	1. -32.	1.	-	✓	4-61
	C073	Communication bit	7(7bit)/8(8bit)	7	-	✓	4-61
	C074	Communication parity	00(no parity name)/01(even parity)/02(odd parity)	00	-	✓	4-61
	C075	Communication stop bit	1(bit)/2(bit)	1	-	✓	4-61
	C078	Communication waiting time	0.-1000.(ms)	0.	-	✓	4-61
Analog meter setting	C081	O adjustment	0.-9999./1000-6553(10000-65530)	Setting on forwarding	✓	✓	-
	C082	OI adjustment	0.-9999./1000-6553(10000-65530)	Setting on forwarding	✓	✓	-
	C083	O2 adjustment	0.-9999./1000-6553(10000-65530)	Setting on forwarding	✓	✓	-
	C085	Thermistor adjustment	0.0 - 1000.	105.0	✓	✓	4-57
	C086	AM offset adjustment	0.0 - 10.0(V)	0.0	✓	✓	4-57
	C087	AMI adjustment	0. - 255.	50	✓	✓	4-57
	C088	AMI offset adjustment	0. - 20.0(mA)	Setting on forwarding	✓	✓	4-57
The others	b034	RUN time/Power ON time level	0.-9999./1000-6553(10000-65530)hr	0.	-	✓	4-55
	b035	Operation direction restrict	00(Reverse is valid)/01(Only forward)/02(Only reverse)	00	-	×	4-14
	b036	Start reduced voltage	00(Start reduced voltage time small)-06(Start reduced voltage time large)	06	-	✓	4-40
	b037	Display selection	00(all display)/01(each function display)/02(User setting / main setting)	00	-	✓	4-59
	b080	AM adjustment	0. - 255.	150	✓	✓	4-57
	b081	FM adjustment	0. - 255.	60	✓	✓	4-56
	b082	Start frequency adjustment	0.10-9.99(Hz)	0.50	-	✓	4-40
	b083	Carrier frequency setting	0.5-12.0(kHz) Derating enable.	3.0	-	✓	4-18
	b084	Initialize mode	00(Trip history clear)/01(Data initialization)/02(Trip history clear + data initialization)	00	-	-	4-58
	b085	Country code for initialization	00(Interior)/01(EC)/02(USA)	01/02	-	-	4-58
	b086	Frequency scalar conversion factor	0.1-99.9	1.0	✓	✓	4-12
	b087	STOP key enable	00(valid)/01(invalid)	00	-	✓	4-15
	b088	Resume on FRS cancellation mode	00(0Hz start)/01(Start f-equaling)	00	-	✓	4-46
	b090	BRD usage ratio	0.0-100.0(%)	0.0	-	✓	4-41
	b091	Stop mode selection	00(deceleration stop)/01(Free-run stop)	00	-	-	4-15
	b092	Cooling fan control	00(Always ON)/01(ON during run. After power ON, then for 5 minutes on stop is implied.)	00	-	-	4-41
	b095	BRD selection	00(invalid)/01(valid<invalid during stop>)/02(valid<valid during stop>)	00	-	✓	4-41
	b096	BRD ON level	330-380/660-760(V)	360/720	-	✓	4-41
	b098	Thermistor selection	00(invalid)/01(Positive temperature coefficient enable)/02 (NTC enable)	00	-	✓	4-57
	b099	Thermistor error level	0. - 9999. (ohm)	3000.	-	✓	4-57
	C061	Thermal warning level	0. - 100. (%)	80	-	✓	4-36
	C091	Debug mode selection	00(No display)/01(Display)	00	-	✓	-
	C101	UP/DWN selection	00(No frequency data)/01(Keep frequency data)	00	-	✓	4-49
	C102	Reset selection	00(Trip cancel during ON)/01(Trip cancel during OFF)/ 02(Valid only during trip<Cancel during ON>)	00	✓	✓	4-48
	C103	Reset f frequency matching selection	00(0Hz start)/01(Start f-equaling)	00	-	✓	4-46
	C121	O zero adjustment	0.-9999./1000-6553(10000-65530)	Set on forwarding	✓	✓	—
	C122	OI zero adjustment	0.-9999./1000-6553(10000-65530)	Set on forwarding	✓	✓	—
	C123	O2 zero adjustment	0.-9999./1000-6553(10000-65530)	Set on forwarding	✓	✓	—
	H003	1st allowable motor selection	0.20-75.0(kW)	Set on forwarding	-	-	4-60
	H203	2nd allowable motor selection	0.20-75.0(kW)	Set on forwarding	-	-	4-60
	H004	1st motor pole selection	2/4/6/8(pole)	4	-	-	4-60
	H204	2nd motor pole selection	2/4/6/8(pole)	4	-	-	4-60
	H006	1st stabilized factor	0. - 255.	100.	✓	✓	4-60
	H206	2nd stabilized factor	0. - 255.	100.	✓	✓	4-60
	P001	Option1 operation selection on error	00(TRP)/01(RUN)	00	-	✓	4-60
	P002	Option2 operation selection on error	00(TRP)/01(RUN)	00	-	✓	4-60
	U001	User1 selection	no/d001-P002	no	-	✓	4-59
	U002	User2 selection	no/d001-P002	no	-	✓	4-59
	U003	User3 selection	no/d001-P002	no	-	✓	4-59
	U004	User4 selection	no/d001-P002	no	-	✓	4-59
	U005	User5 selection	no/d001-P002	no	-	✓	4-59
	U006	User6 selection	no/d001-P002	no	-	✓	4-59
	U007	User7 selection	no/d001-P002	no	-	✓	4-59
	U008	User8 selection	no/d001-P002	no	-	✓	4-59
	U009	User9 selection	no/d001-P002	no	-	✓	4-59
	U010	User10 selection	no/d001-P002	no	-	✓	4-59
	U011	User11 selection	no/d001-P002	no	-	✓	4-59
	U012	User12 selection	no/d001-P002	no	-	✓	4-59

4.3 Exdanation of function

4.3.1 Monitor mode

Output freauencv monitor

Indication code d001 displays the frequency the inveter outputs

The data is displayed as follows.

When d001 is displayed, the monitor lamp 'Hz' is illuminated.

(Display)

        0.00 - 99.99 : Display is in 0.01Hz unit.

        100.0 - 400.0 : Display is in 0.1Hz unit.

> ┌── Relation code ──┐
> d001: Output frequency
> monitor

Output current monitor

Indication code d002 displays the output current value.

The data is displayed as follows.

In case of displaying d002, the monitor lamp 'A' is illuminated

(Display)

        0.0 - 999.9 : Display is in 0.1A unit.

> ┌── Relation code ──┐
> d002: Output current
> monitor

Ooeration directon monitor

Indication code d003 displays the direction that the Inverter output is

Rotating. Forward, reverse or stop.

On operating the inverter (in case of forward or reverse). the RUN lamp

will illuminate.

(Display)

    F : Forward

    0 : stop

    r : Reverse

> ┌── Relation code ──┐
> d003: Operation direction
> monitor

PID feedback monitor

When you select PID function (01) in A071. the inverter displays the feedback

value changed by A075 (PID scale).

" Display of monitor part " = " Feedback quantity " x " PID scale "

        (Frequency command value)   (A075)

(Setting)

    A071 : 0.1(PID is effective)

    A075 : 0.01-99.99(Display is 0.01-99.99(Set with the 0.01 unit)

(Display)

        0.00 - 99.99 : Display is in 0.01 unit.

        100.0 - 999.9 : Display is in 0.1 unit.

        1000 - 9999 : Display is in 1 unit.

        (100 - (999 : Display is in 10 unit.

> ┌── Relation code ──
> d004: PID feedback monitor
> A071:PID selection
> A075: PID scale
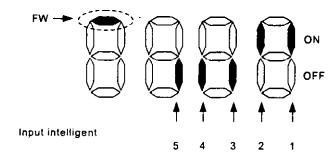
Intelliaent input monitor

The LED display will monitor the state of the intelligent inputs.
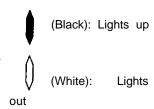
(Example)

FW; input intelligent 2,1:ON

Input intelligent 5, 4. 3:OFF

Display

(Black): Lights up

(White):   Lights out

In case of FW

Lights up: ON

Lights out: OFF

FW →

ON

OFF

Input intelligent

5   4   3   2   1

Intelligent output monitor
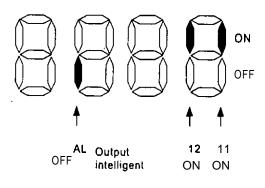
The LED display will monitor the state of the intelligent outputs

Relation code

d006: Output intelligent monitor

(Example)

Output intelligent 12. 11: ON

Output alarm A: OFF

Display

(Black): Lights up

(White): Lights out

ON

OFF

AL Output
OFF   intelligent

12   11
ON   ON

Freauencv conversion monitor

This inverter displays the value changed by the Inverter output frequency and the value set in b086 on the monitor part.

'Monitor part of display' = " output freque"cy(d001)' x " output frequency factor(b086)"

(Display) Display of d007

0.00 - 99.99: Display is in 0.01 unit.

100.0 • 999.9: Display is in 0.1 unit.

100. - 9999.: Display is in 1 unit.

1000 - 3996   :Display is in 10 unit.

(Range of setting) The setting range of b066

0.1 - 99.9 :Set it with the 0.1 unit.

(Example)Output frequency (d001):50.00Hz

When the frequency conversion factor (b086) is 1.1,

the frequency conversion monitor (d007) displays '55.00' as '50 x 1 .1 = 55.00

> Relation code
> d007: Frequency conversion monitor
> b086: Frequency conversion factor

Outut voltaae monitor

This inverter displays the output voltage of the inverter converted into the alternating Voltage.

The monitor lamp "V" should illuminate while the contents of d013 are displayed.

> Relation code
> d013: Output voltage monitor

(Display)

0.0 — 600.0   :Display is in 0.1V unit

Inut electric Dower monitor

Display output electric power from inverter.

The monitor lamp "kw" ("V" and "A") should illuminate while the contents of d014 is displayed.

> Relation code
> d014: Input electric power monitor

(Display)

0.0 — 999.9   :Display is in 0.1 kw unit.

Accumulated time monitor on RUN

The operation time of inverter is **accumulated** and the value is displayed.
(Display)

    0. • 9999.   : Display is in 1 hour units.

    1000 ‑ 9999 : Display is in 10 hour units.

    (100 ‑ (999   : Display is in 100 hour units.

> **Relation code**
>
> d016: Accumulated time
> monitor on RUN

Power ON time monitor

This accumulates the time running to the inverter and displays the value.
(Display)

    0. - 9999.   : Display is in 1 hour units.

    1000 ‑ 9999   : Display is in 10 hour units.

    (100 - (999   : Display is in 100 hour units.

> **Relation code**
>
> d017: Power ON time
> monitor

Trip time monitor

This displays the number of inverter trips.
(Display)

    0.   . 9999. : Display is in 1 times unit.

    1000 ‑ 6553 : Display is in 10 times unit.

> **Relation code**
>
> d080: Trip time monitor

Trip monitor I-6

This displays the details for the last six protective trips.

   The trip monitor 1 displayed the details of the last trip.

(Display contents)

[1] Trip Code (Display anything from E01 to E79.)(Notes1)

[2] Output frequency on tripping (Hz)

[3] Output current on tripping (A)
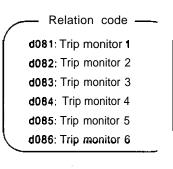
[4] The direct voltage (between P and N) on tripping (V)
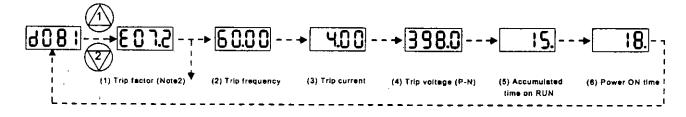
[5] The accumulated time inverter was operating until'tripping (hr)

[6] The accumulated time inverter was run until tripping (hr)

(Note 1) Please refer to the pages 4.4 Protection function list (2) Trip monitor display.

> Relation code
>
> d081: Trip monitor 1
> d082: Trip monitor 2
> d083: Trip monitor 3
> d084: Trip monitor 4
> d085: Trip monitor 5
> d086: Trip monitor 6

The methods of trip monitor

(1) Trip factor (Note2)   (2) Trip frequency   (3) Trip current   (4) Trip voltage (P-N)   (5) Accumulated time on RUN   (6) Power ON time

(Note2) In case of no Iripping, [_ _ _] is displayed.

4.3.2 Function mode

Setting of the output frequency

Setting the output frequency of the motor.

The output frequency is set by F001, when the frequency command select (A001) is set to 02.

Please refer to the frequency command select (A001) about other methods of frequency setting.

When a frequency is set in F001, the same value is automatically set in both Multispeed 0 (A020 and the second set of motor data multispeed 0 (A220) when the SET terminal is ON.

In the case of using SET, you will need to assign 08(SET) to an intelligent input terminal.

```
┌──── Relation code ────┐
│ F001   :Output frequency       │
│ A001   :Frequency command select │
│ A020/A220: 1st/2nd multistage   │
│          speed zero             │
│ C001-C005: Output intelligent  │
└─────────────────────────┘
```

Set item	Function code	Data	Contents
Output frequency	F001	0.0, start frequency-First/Second highest frequency	Unit : Hz "F001" = "A020"
Multistage speed zero	A020-A220		Second control setting of "F001" = "A220"

Operation direction

This is effective when the operating command is set by the digital operator.

```
┌──── Relation code ────┐
│ F004: Operation direction │
│       select              │
└─────────────────────────┘
```

Function code	Data	contents
FO04	00	Forward
	01	Reverse

Selection with limits of operation direction

The direction of the motor can be restricted.

```
┌──── Relation code ────┐
│ b035: Selection with limits │
│    of operation direction   │
└─────────────────────────┘
```

Function code	Data	Contents
b035	00	Forward/reverse is effective.
	01	Only forward
	02	Only reverse

Frequency command selection

Select the method of frequency command.

When 0-10Vdc is inputted to the frequency command by 02-L terminal. operation direction of motor reverses.

On output frequency monitor d001, you can't get information about forward/reverse. So be sure with operation direction monitor d002.

```
┌──── Relation code ────┐
│ A001:Frequency command │
│    selection           │
└─────────────────────────┘
```

Function code	Data	contents	
A001	00	Setting frequency with the potentiometer the digital operator has.	
	01	Setting frequency with control terminals (Terminals: O-L. 01-L. 02-L)	
	02	Setting frequency with digital operator(F001), remote operator.	
	03	Setting frequency with RS485 terminals for communication.	
	04	Setting frequency with option board 1.	
	05	Setting frequency with option board 2.	

Ooeration command selection

Select the control of RUN/STOP commands.

Operation command from the control terminals (Terminal)

Start/Stop by ON/OFF of control terminals.

Forward : FW-CM1 terminal

Reverse : RV-CM1 terminal

Put 01(RV) to an intelligent Input terminal.

When using the FW terminal, it is possible to change the contact from NO to NC by settin a orb '(respectively)) in C019.

When operating from the digital operator, set operation direction in FO04.

or operate Start/Stop with RUN key/STOP key on the digital operator.

```
┌─────────── Relation code ───────────┐
│  A002     :Operation command        │
│              selection               │
│  C001-C005: Input intelligent        │
│  C019     :inputting                 │
│              FW a/b (NO/NC) selection │
│  F004     :Operation direction select│
└──────────────────────────────────────┘
```

Setting item	Function code	Data	Contents
Operation command selection	A002	01	Start/Stop with control terminals(Terminal).(FW, RV)
		02	Start/Stop with digital operator, remote operator.
		03	Start/Stop with RS485 terminals for communications.
		04	Start/Stop with option board 1.
		05	Start/Stop with option board 2.
Input FW a/b (NO/NC) selection	co19 C011-C015	00	a contact (NO)
		01	b contact (NC)

Selection on stop

When stop is commanded from the digital operator or the control terminals (Terminal). select the stop after slowing-down according to slowing-down time or the free run stop.

When the second cycle is started while in free run stop, the inverter follows the free-run stop selection b088 and restarts.

(Refer to the item of free-run stop.)

```
┌─────────── Relation code ───────────┐
│ b091      :Selection on stop        │
│ F003/F203: First/Second deceleration time │
│ b003      :Waiting time for retrying │
│ b007      :Frequency setting of      │
│              frequency coincidence   │
│ b088      :Select for free-run stop  │
└──────────────────────────────────────┘
```

Setting item	Function code	Data	contents
Selection on Stop	b091	00	Normal stop (Decelerated stop)
		01	Free-run stop
Selection of free-run stop	b088	00	0Hz start
		01	Start frequency matching
Frequency setting of frequency matching	b007	0.00-400.0	Unit : Hz
Wailing time for retrying	b003	0.3-100.	Unit: second

Selection of Stop key

Even though the control terminals are selected for the operation command, you can still set whether the stop key of operator (digital operator etc) is effective or not.

```
┌──── Relation code ────┐
│ b087: Selection of stop key │
└────────────────────────┘
```

Function code	Data	Contents
b087	00	The stop key is effective.
	01	The stop key is ineffective.

Adjustable time

The acceleration and deceleration time can be set.

Set a long time to accelerate or decelerate slowly or set a short time to accelerate or decelerate quickly.

The time setting is the time it takes to accelerate from zero to the maximum frequency and to decelerate from the maximum frequency to zero.

Relation code

F002/F202: First/Second acceleration time
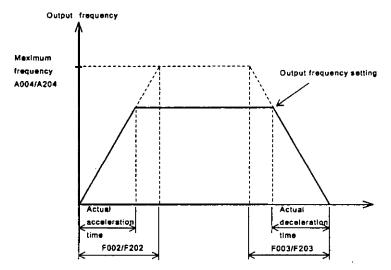
F003/F203: First/Second deceleration time

A004/A204: 1st/2nd maximum frequency

Set item	Function code	Limit of setting	contents
Acceleration time	F002/F202	0.01-3600.	Unit : second Setting acceleration time from zero to maximum frequency.
Deceleration time	F003/F203	0.01-3600.	Unit : second Setting deceleration time from maximum frequency to zero.

However short you set the adjustable time, the adjustable time of the actual motor can't be shorter than the shortest adjustable time determined by the inertial Effect J of the mechanical system and motor torque.

If you set the time shorter than the shortest adjustable time, a protection trip of OC or OV may occur.

Acceleration time t_s

$$t_s = \frac{(J_L + J_M) \times N_M}{9.55 \times (T_s + T_L)}$$

Deceleration time t_B

$$t_B = \frac{(J_L + J_M) \times N_M}{9.55 \times (T_B + T_L)}$$

J_L: J of the load converted into motor shaft (kg/m^2)
J_M: J of the motor (kg/m^2)
N_M: Motor revolving (r/min)
T_s: The maximum motor acceleration torque on inverter driving (Nm)
T_B: The maximum motor deceleration torque on inverter driving (Nm)
T_L: Needed transit torque (Nm)

Base frequency

> Base frequency **and motor voltage**
> AVR function
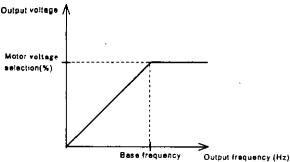
(1) Base frequency and motor voltage

On selection of base frequency and motor voltage, set the output of the inverter (frequency voltage) lo the motor rating.

The Base frequency is the nominal frequency of the motor. this value can be found on-the nameplate of the motor. It is important to match the Base frequency (A003) lo this nominal value or there is risk of damage to the motor.

If a motor has a base frequency higher than 60Hz, it is considered lo be a special motor. In this situation. it is important lo make sure the maximum output current of the inverter is higher than the FLC of the motor.

The Motor Voltage Selection is the nominal voltage of the motor. this value can be found on the nameplate of the motor. It is important to match the Motor Voltage (A082) to this nominal value or there is risk of damage lo the motor.

When changing second base frequency (A203) an intelligent input terminal must be set lo 08(SET) and switched on.

Selling item	Function code !	Setting limit	Contents
Base frequency	A003/A203	30.-1st/2nd maximum firequency	Unit:Hz
Motor **voltage** selection	A082	200/215/220/230/240	Unit:V W'hen inverter is 200V class, selection is possible.
		380/400/415/440/460/480	Unit:V When inverler is 400V class, selection is possible.
		575/600	Unit:V When inverler is 600V class. selection is possible.

(2) AVR function

Even if the incoming voltage changes, this function will keep the output voltage and a constant voltage level. The output voltage lo the motor in this function references lo the voltage selected on motor voltage selection. Select Yes/No of this function on A081 AVR selection.

Function code	Data	Contents	Description
A081	00	Always ON	This function is effective on acceleration, constant speed, deceleration.
	01	Always OFF	This function is ineffective on acceleration,constant speed, deceleration.
	02	On decelerating OFF	This increases a loss of motor and reduces the energy regenerated to inverler on decelerating.

Maximum freauency

Set the maximum frequency value of the inverter.
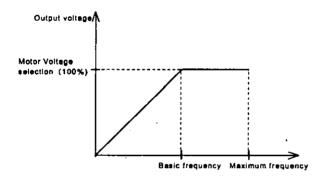
This set value is the maximum frequncey that the inverter will achieve when

It receives top speed reference from the control terminals or the digital operator.

To the change the $1^{st}/2^{nd}$ maximum frequency. set an intelligent input terminal to 08(SET) and switch the input ON.

The Inverter output voltage from the base frequencey to the maximum frequency is the same level as the voltage selected on the motor voltage selection.

Function code	Limit of setting	Contents
A004/A204	30.-400.	Unit : Hz

Carrier freauency

The carrier frequency of the PWM wave-form output from the inverter is adjustable by changing b083.

If the carrier frequency is set higher. the audible noise from motor will be reduced but the RFI noise and the leakage current may be increased.

This function may help to avoid the resonant frequency of the motor or the mechanical system.

Function code	Limit of setting	Contents
b083	0.5-12.0 (Note1)	Unit:kHz

(Note1) The maximum value of the carrier frequency in order to achieve full output current is different depending on the capacity. When raising the carrier frequency. the rated output current will be reduced.

Contents	Maximum carrier frequency	Derating on carrier frequency = 12kHz
11kW	12	100%
15kW	12	100%
18.5kW	10	90%
22kW	6	60%
33kW	3	70%

External analog output

This inverter has three kinds of external analog ouput terminals.

- O-L terminal : 0 - 10Vdc
- OI-L termminal : 4 - 20mA
- 02-L terminal : -10 - 10V

The setting contents of this function is as follows.

Setting item	Function code	Data	Contents		
AT terminal selection	A005	00	Change of O/OI With AT terminal	AT terminal ON : OI-L valid AT terminal OFF : O-L valid	
		01	Change of O/O2 with AT terminal	AT terminal ON : 02-L valid AT terminal OFF : O-L valid	
02 selection	A006	00	Single		
		01	Auxiliary frequency command of O, OI(No reverse)		
		02	Auxiliary frequency command of O, OI(Reverse)		
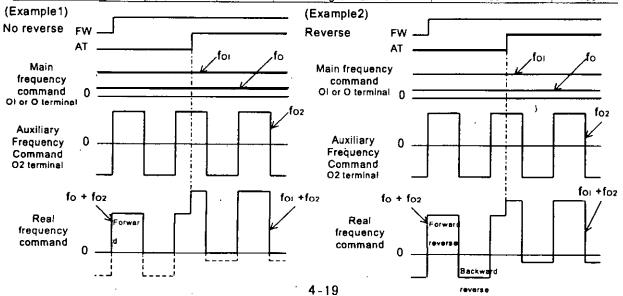
Assign 11(AT) to intelligent input terminal.

The frequency setting is the values from terminals O, OI and 02 when 11(AT) isn't assigned.

The following frequency command methods are available by combining A005. A006 with the intelligent output AT terminal.

In the case that reverse and FW(forward) terminals are ON, the inverter operates reversely when (main frequency command + auxiliarly frequency command)< 0.

	A006	A005	AT terminal	Main frequency command	Existence of Auxiliarly frequency command(02-L)	Existence Of Reverse
Intelligent input terminal on assigning AT	00	00	OFF	O-L	No	No
			ON	OI-L	No	
		01	OFF	O-L	No	
			ON	O2-L	No	Yes
	01 (Example1)	00	OFF	O-L	Yes	No
			ON	OI-L	Yes	
		01	OFF	O-L	Yes	
			ON	O2-L	No	
	02 (Example2)	00	OFF	O-L	Yes	Yes
			ON	OI-L	Yes	
		01	OFF	O-L	Yes	
			ON	O2-L	No	
Intelligent input Terminal when Don't assign AT	00	-	-	O2-L	No	Yes
	01	-	-	Adding O-L and OI-L	Yes	No
	02	-	-	Adding O-L and OI-L	Yes	Yes

(Example1) No reverse

(Example2) Reverse

Output Freauencv Start/End

External analog signal from the control terminals
(frequency command)

O-L terminal : 0 - 10V

OI-L terminal : 4 - 20mA

O2-L terminal : -10 - 10V

Set output frequency for one of the above

<table>
<tr><td colspan="2">Relation code</td></tr>
<tr><td>A011: 0 start</td><td>A103: OI start rate</td></tr>
<tr><td>A012: 0 end</td><td>A104: OI end rate</td></tr>
<tr><td>A013: 0 start rate</td><td>A105: OI start selection'</td></tr>
<tr><td>A014: 0 end rate</td><td>A111: 02 start</td></tr>
<tr><td>A015: 0 start selection</td><td>A112: 02 end</td></tr>
<tr><td>A101 : OI start</td><td></td></tr>
</table>

(1)Start, End of O-L terminal. OI-L terminal
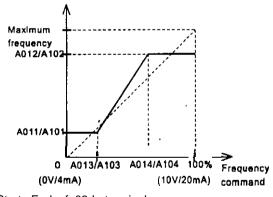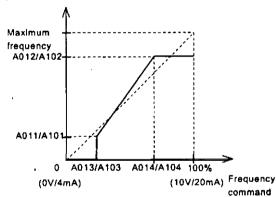
Set item	Function code	Data	Contents
O/OI start	A011/A101	0.00-400.0	Unit : Hz Set starting frequency
O/OI end	A012/A102	0.00-400.0	Unit : Hz Set ending frequency
O/OI start rate	A013/A103	0.-100.	Unit : % set start rate for output frequency command 0-10V, 4-20mA
O/OI end rate	A014/A104	0.-100.	Unit : % Set end rate for output frequency command 0-10V, 4-20mA
O/OI start Selection	A015/A105	00	External start frequency Output frequency from 0 to A013/A103 outputs the value of A011/A101
		01	0Hz Output frequency from 0 to A013/A103 outputs the value of 0Hz

When the input is from 0 to 5V with O-L terminal, set A014 to 50%.

(Example 1) A015/A105 : 00

(Example 2) A015/A105 : 01
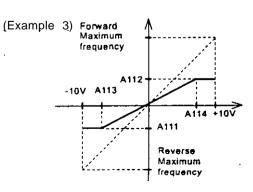
(2) Start, End of 02-L terminal

Set item	Function code	Data	contents	Notes
02 start	A111	-400.~400.	Unit : Hz Set starting frequency	
02 end	AII2	-400.~400.	Unit : Hz Set ending frequency	
02 start rate	AII3	-100.~100.	Unit : % Set starting rate for output frequency command −10-10V (Notes)	(Example 3)
02 end rate	AII4	-100.~100.	Unit : % Set ending rate for output frequency command −10-10V(Notes)	

(Notes) The rates of −10V-10V is following.

-10V- 0V:-100-0%

0V-10V:0-100%

For example. in case of use with 02-L terminal, set -50% to A113. 50% to A114.

(Example 3)

Setting analoa input filter

Set the internal filler of the frequency setting signal of **voltage** or current from **the control terminals**

II is **important** to first **remove the** source of **the** noise lo **the** system.

When stable operation can **not** be achieved due **to the** effect of **electrcal** noise, set **a** larger value.

The response **will** be slower by setting a larger value. The limit of setting is **about 10ms-60ms(set** value : I-30)

Function code	Limit lo set	Contents
A016	1.-30.	Can set with the 1 unit.
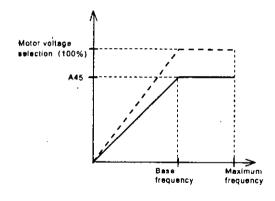
Output voltage gain

Regarding **the** voltage selected on A082 motor voltage selection as 100 %, set **the** rate of **the** voltage which the **inverter** outputs for the voltage selected.

Function code	Limit to set	Contents
A045	20.-100.	Unit:%

Control system (V/f Characteristic)

Set V/f (output voltage/output frequency) characteristic.

To change 1st /2nd control system (V/f characteristic), set

  08(SET) to an intelligent input terminal and switch it ON.

```
─── Relation code ───────────────
A044/A244:1st/2nd control system
b100/b102/b104/b106/b108/b110/b112
        :Free setting V/f frequency1/2/3/4/5/6/7/7
b101/b103/b105/b107/b109/b111/b113
        : Free setting V/f voltage1/2/3/4/5/6/7/7
```
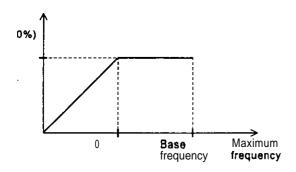
Function code	Data	V/f characteristic
	00	Constant torque characteristic(VC)
A044/A244	01	Reduced torque characteristic(VP1.7power)
	02	Free setting V/f characteristic

(1) Constant torque characteristic (VC)

  Output voltage outputs proportionally lo the output frequency.

  Output voltage outputs proportionally from 0 lo the base frequency. but the output voltage from the base frequency to the maximum frequency is constant regardless of frequency.
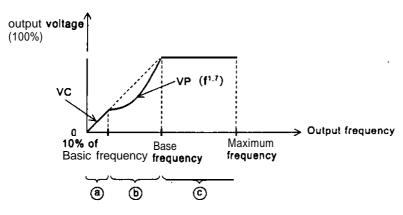
(2) Reduced torque characteristic (VP1.7 power)

  This characteristic can be used when a large starting torque isn't required.

  At low speeds. it can cause improvement of efficiency, low noise and low vibration because of lowering the output voltage.

  V/f characteristic is as follows.

Period ⓐ :The limit from 0 to 10% of base frequency is the constant characteristic.

    (Example) If the base frequency is 60Hz, the limit from 0 lo 6Hz is constant characteristic.

Period ⓑ :The limit from 10% of base frequency to base frequency is reduced torque characteristic.

    The voltage is output in the curve of 1.7 power for frequency.

Period ⓒ :The voltage is constant from the base frequency to the maximum frequency

(3) Free V/f setting

The free V/f setting sets optional V/f characteristics by setting the voltage end frequency in **seven parts.(b100-b113)**
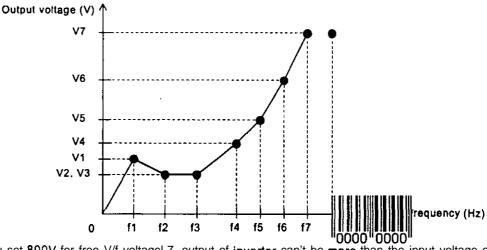
The setting of free V/f setting operates always to be $1 \leq 2 \leq 3 \leq 4 \leq 5 \leq 6 \leq 7$.

Please set first free V/f setting 7 because the initial value is **all 0Hz**.
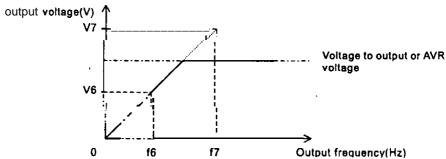
When the free V/f setting is valid. the function of torque **boost(A041/A241)**, base **frequency(A003/A203)**, is **invalid**.

Set item	Function code	Data	Contents
Free V/f frequency7	b112	0.- 400.	
Free V/f frequency6	b110	0.- Free V/f frequency7	
Free V/f frequency5	b108	0.- Free V/f frequency6	
Free V/f frequency4	b106	0.- Free V/f frequency5	Unit : Hz
Free V/f frequency3	b104	0.- Free V/f frequency4	
Free V/f frequency2	b102	0.- Free V/f frequency3	
Free V/f frequency1	b100	0.- Free V/f frequency2	
Free V/f voltage7	b113		
Free V/f voltage6	b111		
Free V/f voltage5	b109		
Free V/f voltage4	b107	0.0 - 800.0	Unit : V (Notes)
Free V/f voltage3	b105		
Free V/f voltage2	b103		
Free V/f voltage1	b101		

(Example)

(Note) Even if you set **800V** for free V/f voltage1-7, output of **inverter** can't be **more** than the input voltage or the AVR setting voltage.

4-23

Toraue boost

A correctly installed motor and careful attention to voltage drop in the wiring will improve the motor torque at low Speed. Setting of A041/A241 will select between manual torque boost and automatic torque boost, the level of torque boost corresponds to the set motor capacity selection (H003/H203) and the motor pole selection (H004/H204).

```
┌──────────── Relation code ────────────┐
│ A041/A241: 1st/2nd torque boost selection │
│ A042/A242:1st/2nd manual operation torque boost │
│ A043/A243:1st /2nd manual operation torque boost │
│        break point │
│ H003/H203:1st/2nd motor capacity selection │
│ H004/H204:1st/2nd motor pole selection │
└────────────────────────────────────────┘
```

Set item	Function code	Data	contents
Torque boost	A041/A241	00	Manual torque boost
		01	Automatic torque boost
Manual torque boost	A042/A242	0.0-20.0	Unit:% Level corresponding to output Voltage (100%)
Manual torque boost break point	A043/A243	0.0-50.0	Unit:% Level corresponding to base frequency

(1) Manual torque boost

The values set up with A042/A242 and A043/A243 is outputted.
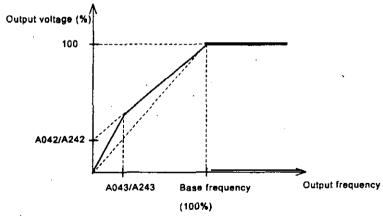
A042/A242 sets a percentage level where the base frequency voltage is 100%.

The level set is the value of torque boost output voltage at 0 Hz.

When using the manual torque boost. it should be noted that overuse will cause saturation of the motor and may cause damage.

The manual torque boost break point is the frequency at which the voltage torgue boost is switched off and normal operation resumes.

To change from A041and A042 to A241and A242 an intelligent input needs to be set to 08(SET) and switched on.

(2) Automatic torque boost

The output voltage is adjusted automatically by the condition of the load.

When using automatic torque boost it is important that the following two parameters are set correctly.

Set item	Function code	Setting limit	contents
Motor capacity selection	H003/H203	0.20-75.0	Unit : kW
Motor pole selection	H004/H204	2/4/6/8	Unit : pole

Direct current braking

A dc voltage can be applied lo the motor windings
in order to lock the motor shaft and avoid overun
at low speeds.
There are Iwo methods of activating the dc braking,
Outside which is through the intelligent input
terminals and Inside which is automatically started
at a specific frequency.

```
———— Relation code ————
A051: DC braking selection
A052: DC braking frequency
A053: DC braking late time
A054: DC braking power
A055: DC braking time
A056: DC braking edge/level selection
AO57: Starting DC braking power
A058: Starting DC braking time
A059: DC carrier frequency
```
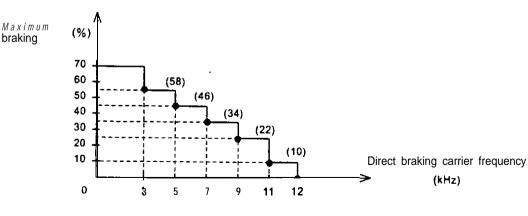
Set item	Functin code	Data	Contents
DC braking selection	A051	00	Inside DC braking : invalid
		01	Inside DC braking : valid
DC braking frequency	A052	0.00-60.00	Unit : Hz When the output reaches the set frequency and Inside DC braking is valid, DC braking is started.
DC braking late time	A053	0.0-5.0	Unit : second After DC braking time is reached, or DB terminal is ON, the late time is a delay before DC braking is started.
DC braking power /Starting DC braking power	A054/A057	0. ↕ 70.	Unt : % Weak (Zero current) Strong (Inverter rating fairly 70% the DC current)
DC braking time	A055	0.0-60.0	Unit : second The DC braking is stopped after this time delay has elapsed. The time is tarted when the late time has elapsed.
DC braking edge/level selection	A056	00	Edge movement (Example 1-6-a)
		01	Level movement (Example 1-6-b)
Starting DC braking time	A056	0.0-60.0	Unit : second It is valid for inside DC braking. When operating command is ON. DC current is started.
DC braking carrier Frequency	A059	0.5-12	Unit : kHz

(1) DC braking carrier frequency

It is possible to alter the DC braking carrier frequency. However. if the DC braking carrier frequency is set higher than 3kHz, the value of maximum braking power level is automatically reduced as follows.
Set DC braking carrier frequency with A059.

Direct braking power limiter

(2) Outside DC braking

Set 07(DB) to an intelligent input terminal.

DC braking is then switched by ON/OFF of OS terminal irrespective of DC braking selection A051.
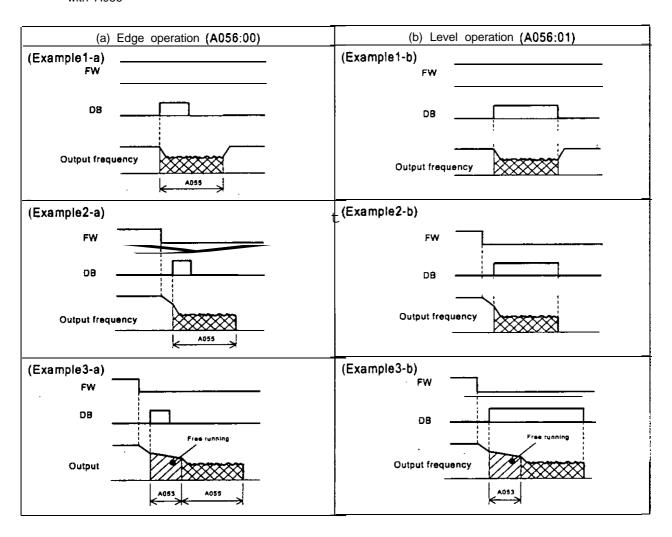
Set strength of DC braking power with A054.

If DC braking late lime A053 is set. the Inverter outpuit is cut off for this time period. the motor will be free running.

After the late time passes. DC braking is started.

Please set DC braking time A055 or DC braking time by OS terminal paying attention to the heat of the motor.

Please set each setting in accordance with the system. after level action or edge action are selected with A056

(a) Edge operation (A056:00)	(b) Level operation (A056:01)
(Example1-a) FW DB Output frequency A055	(Example1-b) FW DB Output frequency
(Example2-a) FW DB Output frequency A055	(Example2-b) FW DB Output frequency
(Example3-a) FW DB Output Free running A053　A055	(Example3-b) FW DB Output frequency Free running A053

(3) Inside DC braking

When the inverter starts, and the DB terminal is not ON the inverter can operate dc braking.

When using inside DC braking, the DC braking selection A051 should be set 01.

Starting DC braking power is set with A057. DC braking time at starting is set with A056.

Braking power setting except starting time, set with A054.

If DC braking late lime A053 is set and the dc braking frequency is reached. the operating command (FW) is switched OFF. The inverter cuts the output and for the set time of A053. free running of the motor will occur. After finishing the set lime in A053. DC braking is started.
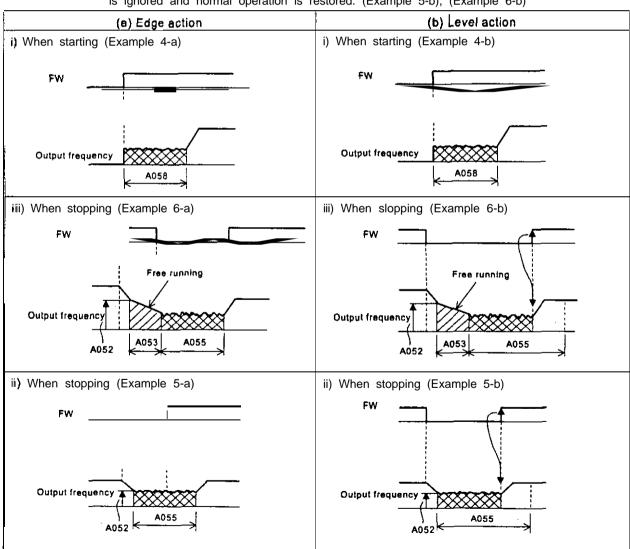
Set the frequency at which the DC braking will operate at with A052.

The operation of Edge/Level selection when using inside DC braking is different.

Edge action: Give priority to A055 DC braking action time, operate DC braking according to set time. After turning operating command (FW) OFF, when output frequency reachs the set value of A052. during setting A055 DC braking is run. Even if operation command is turned ON, during setting time of A055. DC braking is run.(Example 5-a),(Example 6-a)

Level action: Give priority to operaing command, ignore DC braking time A055 and move lo normal operation. When operation command is turned .ON during DC braking. set time of A055 is ignored and normal operation is restored. (Example 5-b), (Example 6-b)

(a) Edge action	(b) Level action
i) When starting (Example 4-a)	i) When starting (Example 4-b)
iii) When stopping (Example 6-a)	iii) When slopping (Example 6-b)
ii) When stopping (Example 5-a)	ii) When stopping (Example 5-b)

Freauencv limiter

This function can set a maximum and minimum limit of the output frequency.

Even if a frequency command exceeds the maximum and minimum limiter the inverter will ignore this value and stop at the values set.

Set first maximum limiter on setting.

Be Sure that the maximum limiter (A061/A261) > minimum limiter (A062/A262).

The maximum and minimum limiter will not operate if 0Hz is set.

```
┌─────── Relation code ───────┐
│ A061/A261: 1st/2nd frequency maximum │
│        limiter                        │
│ A062/A262: 1st/2nd frequency minimum  │
│        limiter                        │
└───────────────────────────────────────┘
```

Set item	Function code	Setting limit	Contents
Frequency max. limiter	A061/A261	0.00. frequency min. limiter - max. frequency	Unit : Hz Setting max. of output frequency
Frequency min. limiter	A062/A262	0.00, starting frequency - max. limiter frequency	Unit : Hz Setting min. of output frequency
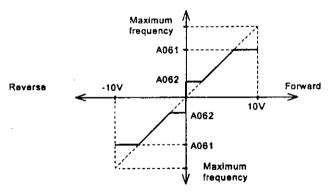
(1) I" use O-L. OI-L case

When frequency command is control terminal (Terminal), by setting Min. limiter, even if OV is input, it is not possible to output less than the frequency Set with Min. limiter.

(2) In use O2-L case

When using the minimum frequency limiter and 0v is inputted into 02 terminal, A062 applies to both forward and reverse directions

(a) When operation command is control terminal (Terminal)(A002:01)

Terminal	Revolution when 02 is OV
FW(ON)	A062 on forward side
REV(ON)	A062 on reverse side

(b) When operation command is operator (A002:02)

FO04	Revolution when O2 is OV
00	A062 on forward side
01	A062 on reverse side

Freauencv Jump Function

Frequency jump can be used to avoid resonance points on machinery.

Frequency jump is to jump the frquency command and avoid usual operation within the limit of the jump frequency.

Output frequency changes continuously according to adjustable time.

It is possible three different points are set for the jump frequency.

Relation code

A063:Jump frequency1
A064:Jump frequency band1
A065:Jump frequency2
A066:Jump frequency band2
A067:Jump frequency 3
A068:Jump frequency band3
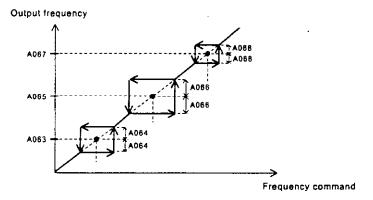
Set item	Function code	Setting limit	Contents
Jump frequency 1/2/3	A063/A065/A067	0.00-400.0	Unit: Hz
			Set the frequency fj of center to jump.(Note)
Jump Width 1/2/3	A064/A066/A068	0.00-10.00	Unit:Hz
			Set 1/2 value of frequency band to jump (Note)

(Note) The frequency to jump is fj + 2 (Hz).

Acceleration stop function

When the inertial moment of a toad is high. this is the function to wait until the slip of the motor on starting becomes smaller.
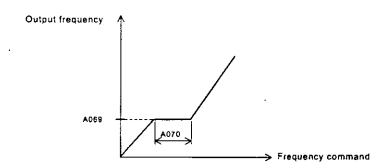
Use when the overcurrent trip occurs an starting.

Relation code

A069:Accelerationation) frequency
A070:Acceleration stop time

Set item	Function code	Data	Contents
Acceleration stop frequency	A069	0.00-400.0 Unit: Hz	Set the frequency to be held.
Acceleration stop time	A070	Unit: s0.0-60.0	Set the time to hold the frequency.

PID Function

This integrated process control function can be used for controls such as constant flow and control for fan and pump applications.

When using this function set A071 to 01 or assign an intelligent input terminal to 23(PID: valid / invalid).

Set item	Function code	Data	Contents
PID selection	A071	00	Invalid
		01	
PID P gain	A072	0.2-5.0	Proportional gain
PID I gain	A073	0.0-3600.	Integration Gain Unit: seconds
PID D gain	A074	0.0-100.0	Derivative gain Unit: seconds
PID scale	A075	0.01-99.99	Unit :%
PID feedback selection	A076	00	OI-L:4-20mA
		01	O-L :0-1 ov
Maximum PID Deviation level	co44	0.0-100.0	Unit :%

Relation code

A001   :Frequency command selection
A005   :AT selection
A006   :O2 selection
A071   :PID selection
A072   :PID P gain
A073   :PID I gain
A074   :PID D gain
A075   :PID scale
A076   :PID feedback selection
d004   :PID feedback monitor
C001-C005:Intelligent input terminal
C021-C022:Intelligent output terminal
CO44 :PID deviation setting level
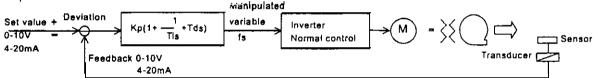
(1) Feedback selection
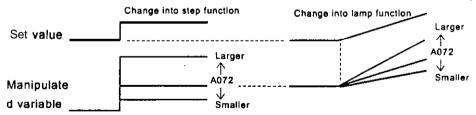
Select which analogue input terminals will be the feedback reference (A076).

Set the set frequency command selection with A001. (It should not be the same as the terminals selected with A076). Or when the control terminal 01 is set with A001, the setting of AT selection A005 is invalid.

The contents changes when 02 is selected with A006.
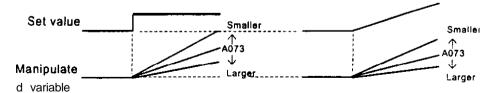
(2) Basic operation of PID control
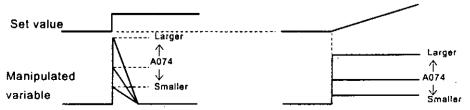
(3) Components of PID Kp:Proportional gain. Ti:Reset time. Td:Rate time. s:Operator, ε :Deviation

[1] P action   This is the action that the manipulated variable is in proportion to the command.

[2] I action   This is the action that the manipulated variable increases with time in a straight line

[3] D action   This is the action that the manipulated variable is in proportion to the changing rate of command,

PI action combines above [I] and [2], PD action does [1] and [3], PID action does [1], [2] and [3]

(4) The adjustment of gain

Please adjust each gain according to the state as the following, when the response on the functional operation PID is not stable.

Inspite of changing command, the change of feedback signal is slow. ——→ Raise P gain.

The feedback signal changes instantly but is not stable. ——————→ Lower P gain.

The command and feedback signal doesn't coincide instantly. ——————→ Lower I gain.

The feedback signal oscillates and is not stable. ——————————→ Raise I gain.

In spite of raising of P gain, the response is slow. ——————————→ Raise D gain.

When P gain is raised, the feedback signal oscillates and is not stable. ——→ Lower D gain.

(5) The Maximum PID Deviation Level/Output

It is possible to establish the maximum deviation level CO44 on PID control. When the PID deviation amount reaches the set level C044, it is possible to set an intelligent output.

CO44 can be set from 0 to 100 and corresponds with the command; from 0 to maximum.

Assign 04 (OD) to intelligent output terminal 11. 12(C021, C022).

(6) Feedback monitor of PID

Feedback signal of PID can be monitored.

The monitor value can be displayed by the product of PID scale A075

"Monitor display" = 'Feedback (%)" x 'A075 setting"

(7) PID integral reset

This is the function to clear integral value of PID action.

Assign 24(PIDC) to intelligent input terminal.

It is cleared whenever PIDC is turned ON.

Don't turn absolutely ON PID terminal during PID action, because there is a possibility of overcurrent trip.

Turn ON PIDC terminal after turning OFF PID action.

Automatic enerw-savina ooeration function

This function regulates the inverter output power automatically to a minimum while operating at constant speed.

This fits for the load of reduced torque characteristic of fans or pumps.

In case of operating by this function, set A085 to '01'.

A086 can adjust the automatic operation, response time.

```
┌─ Relation code ────┐
│ A085:Operation mode     │
│     selection           │
│ A086: Energy-saving response │
│     Accuracy adjustment │
└─────────────────────┘
```

Set item	Function code	Deta	Contents
Operation mode selection	A085	00	Normal operation
		01	Energy-saving operation

Set item	Function code	Deta	Response	Accuracy
Energy saving Response /accuracy Adjustment	A086	0 ↕ 100	Slow ↕ Fast	High ↕ Low

Two-staae Acceleration and Deceleration Function

By setting this function, it is possible to change the rate of acceleration and deceleration.

As methods to change the rate of acceleration and deceleration, you can select the method of changing by intelligent input terminal and the method of automatic changing by optional frequency.

In case of changing by intelligent input terminal, assign 09(2CH) to an Intelligent input terminal
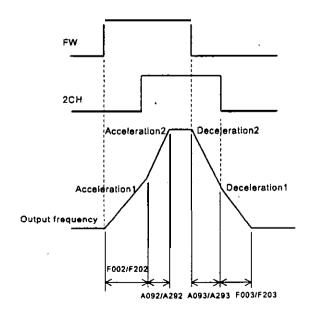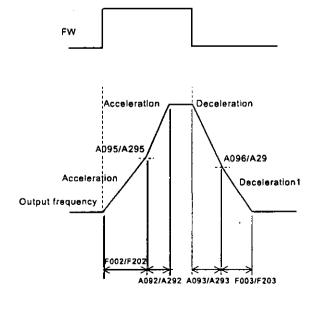
Set item	Function code	Data	contents
Acceleration time 2	A092/A292	0.01-3600.	Unit : second (Example1,2)
Deceleration time 2	A093/A293	0.01-3600.	Unit : second (Examplel.2)
Two-stage acceleration a n d deceleration selection	A094/A294	00	Changing by intelligent input terminal 09 (2CH) (Examplel)
		01	Changing by two-stage acceleration and deceleration frequency (A095/A295, A096/A296) (Example2)
Two-stage acceleration frequency	A095/A295	0.00-400.0	Unit: Hz It is valid when two-stage acceleration and deceleration selection (A094/A294) is 01. (Example2)
Two-stage deceleration frequency	A096/A296	0.00-400.0	Unit: Hz It is valid when two-stage acceleration and deceleration selection (A094/A294) is 01. (Example2)

(Examplel) In to set A094/A294 to 00 case   (Example2) In to set A094/A294 to 01 case

Acceleration and deceleration pattern

(1) Selection of pattern

Pattern of acceleration and deceleration speed is possible to set up corresponding to each system.

Select the pattern of acceleration and deceleration with A097 and A098.
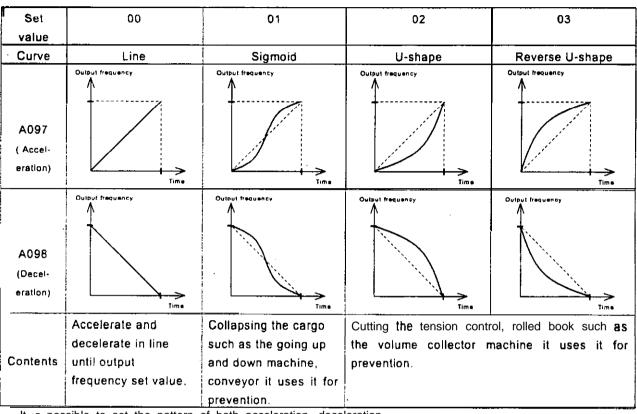
Set value	00	01	02	03
Curve	Line	Sigmoid	U-shape	Reverse U-shape
A097 (Acceleration)				
A098 (Deceleration)				
Contents	Accelerate and decelerate in line until output frequency set value.	Collapsing the cargo such as the going up and down machine, conveyor it uses it for prevention.	Cutting the tension control, rolled book such as the volume collector machine it uses it for prevention.	
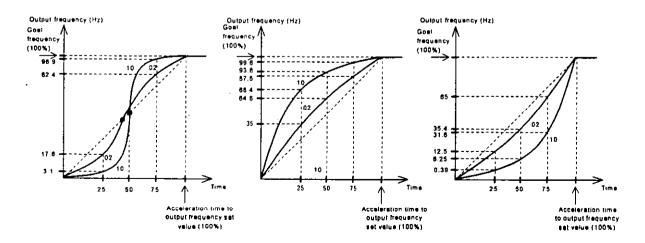
It is possible to set the pattern of both acceleration, deceleration

(2) The curve constant (the swelling degree)

It makes the rough sketch reference and please decide the swelling degeree.

There is the range which the midway adjustable-speed time becomes fast in the S character pattern,

Instantaneous Dower failure / under-voltaae

Instantaneous stop and start

(1) You can select whether the inverter trips or retries (restart) when an instantaneous power failure/under-voltage occurs. When retry function is selected with b001, and an instantaneous Stop/under-voltage trip occurs restart is tried 16 times and a trip will occur after 17 times. And when retry function is selected. and an over-current or an over-voltage occurs, restart is tried 3 times and a trip will occur on the forth time.

When an instantaneous power failure/under-voltage occurs, you can select execution of trip with b004.

To select a retry function with b001. set the following retry mode correspondent to each system.

Relation code

b001	:Retry selection
b002	:Allowable under-voltage power failure time
b003	:Retry delay time
b004	:Instantaneous power failure under-voltage trip during stop
b005	:Instantaneous power failure under-voltage retry time time selection
b007	:frequency setting for matching frequency

Set item	Function code	Data	Description
Retry selection	b001	00	Trip.
		01	Restart from 0Hz on retry.
		02	Start equaling frequency on retry. (examplel)
		03	Start f-equaling and stop decelerating on retry After stop. start trip. (examplel)
Allowable under-voltage power failure time	b002	0.3-1.0	Units : second If the instantaneous power failure time is shorter than the set time, a restart will occur. (examplel) If the instantaneous stop time is longer than set time, trip. (example2)
Retry wait time	b003	0.3-100.	Units:second Delay before motor restart time.
Instantaneous power failure/under-voltage trip during stop	b004	00	Invalid Trip isn't caused and alarm isn't output.
		01	Valid Trip is cause and alarm is output.
Instantaneous power failure/under-voltage retry time selection	b005	00	Restart to 16 times on instantaneous stop under-voltage.
		01	Restart freely on instantaneous stop under-voltage.
Frequency setting for f-equaling	b007	0.00-400.0	Units:Hz When the frequency of the motor during free-run is less than this set frequency, restart with 0Hz is caused. (example3.4)

F-equaling start: The inverter reads the motor RPM and direction and restarts the inverter to match these readings.

Retry function (b001: 02): The timing chart in case of selection is following.
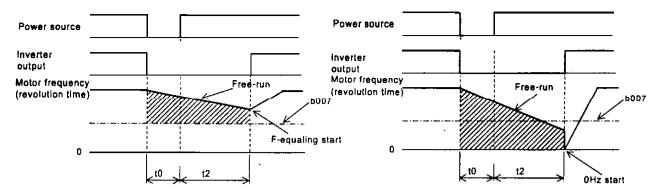
t0 :Instantaneous stop power failure
t1 :Allowable under-voltage power failure time(b002)
t2 :Retry wait time(b003)

(examplel)

Power supply
Inverter
Free-run
Revolving time of
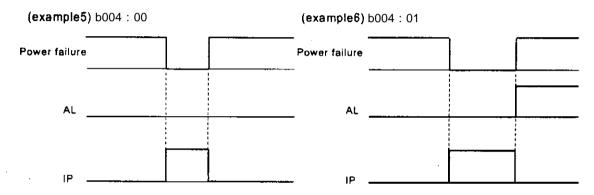
After wait for t2 seconds according to t0 < t1. restart.

(example2)

Power supply
Inverter output
Free-run
Revolving time of motor

Trip according to t0 > t1

(example3) Motor frequency(revolution time) >b007   **(example4) Motor** frequency (revolution time) cbOO7

Power source

Inverter
output

Motor frequency
(revolution time)   Free-run
                                              b007
                         F-equaling start

0

t0   t2

Power source

Inverter
output

Motor frequency
(revolution time)   Free-run
                                          b007

0

t0   t2
                                        0Hz start

(2) Instantaneous power failure during stop alarm output during under-voltage

Select yes/no of alarm output when instantaneous power failure or under-voltage occurs with b004
Alarm outputs while control power of inverter remains.

(example5) b004 : 00   **(example6)** b004 : 01

Power failure

AL

IP

Power failure

AL

IP

(3) It is possible to use an output by assigning the signal (IP: 06) during instantaneous slop. by setting (RNT: 09) during under-voltage to an intelligent output terminal 11. 12(C021, C022) or alarm relay output terminal (C026).

Open phase protection function selection

This is the function to warn when the inverter input supply opens.

Relation code

b006:Open phase selection

Function code	Date	Description
b006	00	Invalid
		Don't trip when the input supply opens..
	01	Valid
		Trip when the input supply opens..

When an open phase occurs. there is a danger that the inverter could produce one of the following states;

(1) Ripple current of main capacitor increases, life of main capacitor shortens remarkably,

(2) In case of load. there is danger that the capacitors or thyristors inside the inverter could be damaged.

(3) There is a risk that the in-rush resistor to limit the current inside the inverter may burn out.

Electrionic thermal function

Set the Inverter according to motor rated current to protect the motor from overloading. overheating and damage.

A warning signal is outputted before tripping on electronic thermal protection.

(1) Electronic thermal level

Function code	Setting range	Description
b012/b212	Rated Current x 0.2 to Rated Current x 1.2	Units:A

(example) L300P-110LF

Motor current:44A

Setting range:8.8 to 52.8A

When electronic thermal level b012=44A, time limit characteristic is right diagram.

(2) Electronic thermal characteristic

Frequency characteristic is added up to set value of b012.
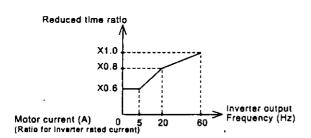
Function code	Deta	Electronic thermal characteristic
b013/b213	00	Reduced torque characteristic
	01	Constant torque characteristic
	02	Free setting

When output frequency of general motor decreases, cooling function of self-cooled fan will fall.

Reduced torque characteristic is calculated according to heat of an HITACHI genera, motor.
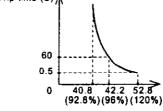
(a) Reduced torque charcteristic

To add to the time limit characteristic set with the reduced time rate b012/b212 by each frequency.
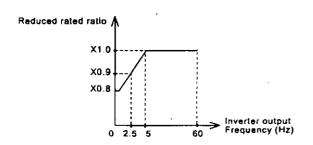
(example)b012 = 44(A), when output frequency = 20Hz
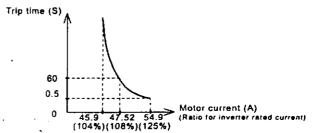
(b) Constant torque characteristic

Set this in to use constant torque motor case.

(Example)b012 = 44(A), when output frequency=2.5Hz.

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BYPASS

VARIABLE FREQUENCY DRIVE

Hitachi VFD Software Parameter Sheet

J100 Series
- OPE
- DOP

5300 Series
- OPE   NB501X
- OPE   NB506X and newer
- DOP   NB501X
- DOP   NB506X and newer
- HOP   NB506X and newer

L100 Series
- OPE
- DOP

L300 Plus Series
- OPE
- DOP

SJ100 Series.
- OPE
- DOP

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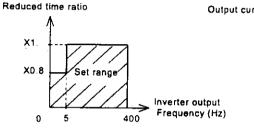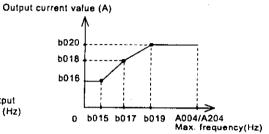
(3) Free/thermal characteristic

It is possible'to set the electronic thermal characteristic freely according to the load in order to protect the motor and the Inverter.
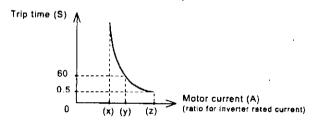
Setting range is shown es follows:

Set item	Function code	Set range	Description
Free electronic thermal frequency 1/2/3	b015/b017/b019	0 to 400	/Units : Hz
Free electronic thermal current 1/2/3	b016/b018/b020	-0.0 0.1 to 999.9	Don't operate. Units : A

Reduced time ratio

Output current value (A)

(Example) b012=44(A), output frequency=b017

(x):b018x116%
(y):b018x120%
(z):b018x150%

(3) Thermal warning

A warning signal is outputted before overheat protection by the electronic thermal protection occurs. Warning level is set with C061.

Assign 13(THM) to en intelligent output terminal (C021, C022) or the alarm relay output (CO61).

Function code	Data	Description
C061	0. 1.-100.	Don't operate. Units : %

4-37

Overload restriction

(1) Overload restriction

The Inverter monitors the motor current on acceleration and constant speed.

When the inverter reaches the overload restriction level, the Inverter will reduce the output frequency automatically to restrict the overload.

This function prevents an over-current trip by inertia during acceleration or radical changes in load at constant speed.

Two kinds of overload restriction function are set with b021, b022, b023 and b024, b025, b026.

To change b021. b022, b023 and b024. b025, b026, assign 39(OLR) to an intelligent input terminal.

The current value this function operates at is set in overload restriction level.

```
Relation code
b021:Overload restriction selection
b022:Overload restriction level
b023:Overload restriction constant
b024:Overload restriction 2 selection
b025:Overload restriction level2
b026:Overload restriction constant2
C001-C005:Intelligent input
C021-C022:intelligent output
C026:Alarm relay output setting
C040:Overload advance notice signa
       output mode
C041: Overload notices level
```

The overload restriction constant is the time to decelerate to 0Hz from max. frequency.

b021, b022. b023 and b024. b025, b026 is changed with OLR.

As this function operates. the acceleration time is longer than setting time.

If the overload restriction constant is set too short, in spite of accelerating. an over-voltage trip is caused with regenerative enegy from the motor on automatic deceleration by this function.
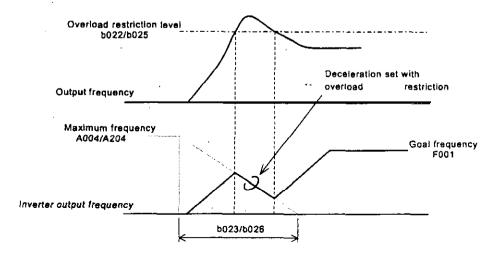
When this function operates in *the* midst of accelerating. the frequency *will* not reach the goal frequency. the Inverter will adjust in the following way.

> Make acceleration time longer.
> Raise torque boost.
> Raise overload restriction level.

Set item	Function code	Data	Description
Overload restriction Selection.	b021/b024	00	Invalid
		01	Acceleration/valid on constant speed.
		02	Valid on constant speed.
Overload restriction level	b022/b025	Rated current x 0.5 to Rated current x 1.5	Units :A Current value overload *restriction* operates.
Overload restriction constant.	b023/b026	0.1 to 30.0	Units :second Deceleration time when overload restriction Operates.

4 - 3 8
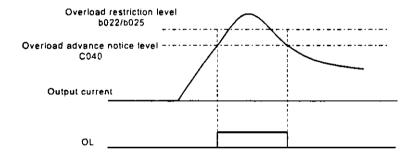
(2) Overload advance notice

When the load is high, it is possible to adjust the load again by outputting an overload advance notice.

It is used to prevent damage to the machine from too much load. i.e. baggage on a conveyor. the Inverter overload protection will operate.

Assign 03(OL) to an intelligent output terminal 11. 12 or the alarm relay output terminal.

Set item	Function code	Data	Description
Overload advance notice signal output mode selection	co40	00	On acceleration. constant speed, this is valid.
		01	On constant speed only, this is valid.
Overload advance notice level	co41	0.0	Don't operate. /Units: A
		0.1 to Rated current x	As load reaches overload advance notice level. OL signal is output.

Overload restriction level
b022/b025

Overload advance notice level
C040

Output current

OL

Start frequency

This frequency is the value the operator must set before the Inverter will give an output.

Mainly used when an operator adjusts the start torque.

By setting the start frequency higher, direct starting is caused and the starting current increases. Therefore an overload is within the restriction range and the inverter has a tendency to trip on over-current protection.

Relation code
b082:Start frequency

Function code	Set range	Description
b082	0.10 to 9.99	Units:Hz

Reduced voltage start selection
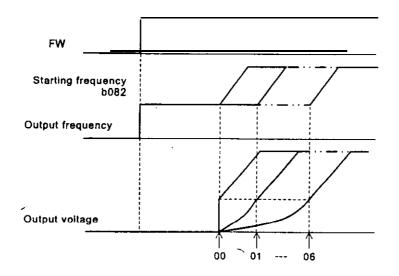
This function is to raise the voltage slowly on motor starting.

The lower this value the more torque is available on starting..

However. by making this value lower. the inverter has a tendency of tripping on over-current protection. because of almost direct starting.

Relation code
b036:Reduced voltage start selection
b082:Start frequency

Function code	Data	Time to take for reduced voltage starting
b036	00	No reduced voltage start
	01 ↑ ↓ 06	Short (about 6ms) ↑ ↓ Long (about 36ms)

BRD (regenerative breaking) function

This function only operates with the L300P - 15kW and lower, as they have the built-in BRD.

This function is to consume regenerative energy from the motor as heat by the use of an external resistor.

Regeneration occurs when the motor is decelerated to quickly and the motor turns into a generator and voltage flows back into the Inverter.

To use the BRD function. set following condition.

Set item	Function code	Data	Description
BRD usage Ratio	b090	0.0	BRD don't operate.
		0.1-100.0	The usage ratio of BRD is set by 0.1% unit. When inverter exceeds the usage ratio. trip. BRD action: ON / ON / ON — 100 second Usage ratio (%) = $\dfrac{(t1+t2+t3)}{100 \text{ second}} \times 100$
Selection of BRD	b095	00	BRD don't operate,
		01	During run: valid (BRD operates.) During stop: invalid (BRD doesn't operate.)
		02	During run. stop, valid (BRD operates.)
BRD ON Level	b096	(Note) 330-380	Units: V In case of 200V class inverter, setting is valid.
		(Note) 660-760	Units: V In case of 400V class inverter. setting is valid,

(Note) BRD ON level is the voltage setting of the DC (direct current) voltage of the inverter.

Coolina fan operating selection

You can select whether the fan operates continuously or operates only when the inverter is in the running operation.

Relation code
b092:Cooling fan
operation selection

Function code	Data	Description
b092	00	Always run
	01	Only during run However, inverter operates for five minutes after power ON, and for five minutes after inverter operation stops.

L-

Intelliaent input terminal setting

It is possible to operate functions by assigning those functions to the intelligent input terminals 1-5 (C001-C005).

The intelligent input terminals I-5 can be selected individually whether the contact input specification is either a NO or a NC contact

Two or more intelligent input terminals can't be assigned to be the same function.

If a" intelligent input is assigned a function which is already assigned to another terminal it will automatically be restored back to the setting before.

Function Code	Data	Description	Reference item
C001- coo5	01	RV:Reverse command	Operation run
	02	CF1:Multi-speed 1 (binary operation)	Multi-speed operation function
	03	CF2:Multi-speed 2 (binary operation	
	04	CF3:Multi-speed 3 (binary operation	
	05	CF4:Multi-speed 4 (binary operation	
	06	JG:Jogging	Jogging operation
	07	DB:External DC braking	DC braking(external DC braking)
	08	SET:2nd Set of Motor Data	2nd Set of Motor Data
	09	2CH:Two-stage adjustable-speed	Two-stage adjustable-speed function
	11	FRS:Free-run stop	Free-run stop
	12	EXT:External trip	External trip
	13	USP:Unattended start protection	Unattended start protection function
	14	CS:Commercial change	Commercial change
	15	SFT:Software lock (control terminal)	Software lock
	16	AT:analog input voltage/current select	Analog external input
	18	RS:Reset inverter	Reset inverter
	20	STA:3 wire run	3 wire input function
	21	STP:3 wire keep	
	22	F/R:3 wire forward/reverse	
	23	PID:PID selection (valid/invalid)	PID function
	24	PIDC:PID integrating reset	
	27	UP:Remote control UP function	UP/DOWN function
	26	DWN:Remote control DOWN function	
	29	UDC:Remote control data clear	
	32	SF1:Multi-speed 1 (bit run)	Multi-speed operation function
	33	SF2:Multi-speed 2 (bit run)	
	34	SF3:Multi-speed 3 (bit run)	
	35	SF4:Multi-speed 4 (bit run)	
	36	SF5:Multi-speed 5 (bit run)	
	37	SF6:Multi-speed 6 (bit run)	
	38	SF7:Multi-speed 7 (bit run)	
	39	OLR:Overload restriction change	Overload restriction
	no	NO:No assign	

Input terminal a/b (NO/NC) selection

It is possible to set a contact input or b contact input to intelligent input terminals 1-5 and FW terminals individually.

Set item	Function code	Data	Description
Intelligent input 1-5 a/b(NO/NC)selection	C011-C015	00	A contact(NO)
		01	B contact(NC)
Input FW a/b(NO/NC)selection	C019	00	A contact(NO)
		01	B contact(NC)

a contact: 'ON' with Close. 'OFF' with Open

b contact: 'ON' with Open, 'OFF' with Close

RS terminal can set only a contact.

Multi-speed operation function

It is possible to set multiple operation speeds and switch between the speeds with the terminals.

Multi-speed operation can be selected by binary operation(max. 16 speeds) with 4 terminals or by bit operation (max. 6 speeds) with 5 terminals.

Set item	Functin c o d e :	set value	Description
Multi-speed selection	A019	00	Change to binary operation 16 speed.
		0 1	Change to bit operation 5 speed
Multi-speed O-15	A020/A220-A035	0.00. start frequency-max. frequency	Units:Hz

(1) Binary operation
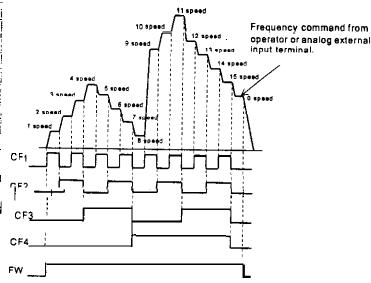
It is possible to set multi-speed 0 to 15 by selecting 02 to 05 (CF1 to CF4) on the intelligent input terminals,
Set frequency setting for speed 1 to 15 with A021-A035.
Set 0 speed with A020/A220 or F001 when frequency command is operator.
Or when frequency command is control terminal (Terminal), set with O, OI, 02 terminal.

Multi-speed	CF4	CF3	CF2	CF1
0 speed	OFF	OFF	OFF	OFF
1 speed	OFF	OFF	OFF	ON
2 speed	OFF	OFF	ON	OFF
3 speed	OFF	OFF	ON	ON
4 speed	OFF	ON	OFF	OFF
5 speed	OFF	ON	OFF	ON
6 speed	OFF	O N	O N	OFF
7 speed	OFF	ON	ON	ON
8 speed	ON	OFF	OFF	OFF
9 speed	ON	OFF	OFF	ON
10 speed	ON	OFF	ON	OFF
11 speed	ON	OFF	ON	ON
12 speed	ON	ON	OFF	
13 speed	ON	ON	OFF	ON
14 speed	ON	ON	ON	OFF
15 speed	ON	ON	ON	ON

(2) Sit operation

It is possible to set multi-speed 0 to 5 by assigning 32 to 36 (SF1-SF7) to the intelligent input terminals.
Set frequency SFI-SF7 to A021-A027.

Multi-speed	SF5	SF4	SF3	SF2	SF1
Ospeed	OFF	OFF	OFF	OFF	OFF
1 speed	-	-			ON
2 speed		-	-	O-N	OFF
3 speed	-	-	ON	OFF	OFF
4 speed	-	ON	OFF	OFF	OFF
5 speed	ON	OFF	OFF	OFF	OFF

When each terminal turns ON simultaneously. the lower number has priority.

In order for the inverter to operate both the frequency and the RUN operation (FW,RV) must be applied.

Joaaina operation

This function can be used to rotate the motor in small steps to allow fine-tuning.
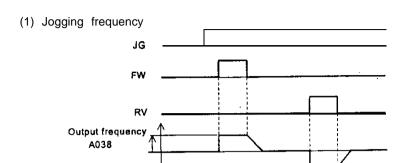
Set an intelligent input terminal to 06(JG).

(1) Jogging frequency
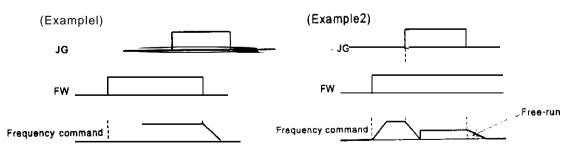
The jogging operation does not "se acceleration, therefore it would be advisable to set the jogging frequency to limit the starting current to a minimum or tripping may occur. Adjust A036 to the jogging frequency required.

Function code	Data	Description
A036	0.0, start frequency-9.99	Units:Hz

(2) Jogging operation selection

Function code	Data	Description	Jogging operation during run Valid / Invalid
A039	00	Free-run on jogging stop	Invalid (example1) (notes)
	01	Decelerating stop on jogging stop.	
	02	Direct braking on jogging stop.	
	03	Free-run on jogging stop.(example2)	Valid (example2) (notes)
	04	Decelerating stop on jogging stop.	
	05	Direct braking on jogging stop.	

(Note) When using the jogging function, turn FW terminal or RV terminal ON after the JG terminal is turned ON. (It is the same when the operation command point is from the operator.)

(Example1)

When setting of A039 is 00,01 or 02 and FW terminal is turned ON beforehand. the inverter doesn't operate jogging.

(Example2)

When setting of A039 is 03.04 or 05 and FW terminal is turned ON beforehand. the inverter output is cut off

Second control function

This control function is used when the Inverter is connected to two different types of motors. By assigning 08(SET) to an intelligent input terminal and turning SET terminal ON/OFF you can switch between two different Inverter set-ups.

Select 2nd control function while the Inverter is in the STOP condition.

The functions which can change with SET terminal

F002/F202 : 1st / 2nd acceleration time

F003/F203: 1st / 2nd deceleration time

A003/A203: 1st / 2nd base frequency

A004/A204: 1st / 2nd max. frequency

A20/A220: 1st / 2nd multi-speed 0 setting

A041/A241: 1st / 2nd torque boost selection

A042/A242: 1st / 2nd manual torque boost

A043/A243: 1st / 2nd manual torque boost point

A044/A244: 1st / $2'''$ control system

A061/A261: 1st / 2nd frequency upper limiter

A062/A262: 1st / $2''''$ frequency lower limiter

A092/A292: 1st / 2nd acceleration time 2

A093/A293: 1st / 2nd deceleration time 2

A094/A294: 1st / 2nd two-stage adjustable speed selection

A095/A295: 1st / 2nd two-stage acceleration frequency

A096/A296: 1st / 2nd two-stage deceleration frequency
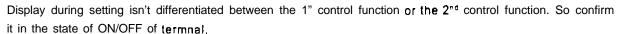
b012/b212: 1st / 2nd electronic thermal level

b013/b213: 1st / 2nd electronic thermal characteristic selection

H003/H203: 1st / 2nd allowable motor selection

H004/H204: 1st / 2nd allowable motor pole selection

H006/H206: 1st / 2nd stabilized constant

Display during setting isn't differentiated between the 1" control function or the 2nd control function. So confirm it in the state of ON/OFF of termnal.

Even if 1" / 2"" control is changed during run. it will not be active until the inverter is stopped.

Software lock mode selection

```
┌─── Relation code ──────────┐
│ b031    :Jogging frequency  │
│ C001-C005: Intelligent input setting │
└────────────────────────────┘
```

This function is used to prevent changing data by mistake.

When you want to use an intellignent input terminal. assign 15(SFT).

Below is the software lock code selection,

Function code	Data	SFT terminal	Description
b031	00	ON/OFF	Write disable except for b031/write enable
	0 1	ON/OFF	Write disable except for b031,F001,A020,A220, A021~A035,A038 / write enable
	02		Write disable except for b031
	03		Write disable except for b031,F001,A020,A220, A021~A035,A038
	10		Write disable except for change mode during running (code list reference)

Free-run stop (FRS)

By operating the free-run stop (FRS) function. the inverter output is cut off.

The motor will free wheel under its own momentum.

This function is used when the motor is to be stopped by the use of a brake, like en electromagnetic brake.

If you stop the motor with a machine brake while the inverter is still Outputting to the motor an over-current trip may occur.

Assign 11(FRS) to en intelligent input terminal.

This free-run stop function will operate when the FRS terminal is ON.

If you turn FRS terminal OFF the inverter will restart after the retry wait time b003 passes

However when the operation command selection A002 is set to control terminal (01). the inverter restarts during free-running

This function will only operate when the FW terminal is ON

On restart it is possible to select 0Hz start or matching frequency start es output methods with the free-run stop selection b088. (Example 1. 2)

When you set the frequency setting b007 to match and the frequency detected is under this setting when the free-run stop is released, the inverter is restarted from 0Hz.

The setting of this function is valid for selection b091 on stopping and reset (RS) action

```
┌─── Relation code ────┐
b088      : Free-run stop selection
b003      : Retry wait time
b007      · frequency setting to match
b091      : Stop mode selection
C001-C005 : intelligent input terminal
└──────────────────────┘
```

Set item	Function code	Data	Description
Free-run stop Selection	b088	00	0Hz star(example 1)
		01	Equaling frequency start (example 2)
Retry wait time	b003	0.3-100.	Units:second Time until restart after FRS terminal is OFF. (This is also used for Instantaneous restart.)
/Frequency setting to match	b007	0.00-400.0	Units:Hz (instantaneous stop. reference to item : of insufficiency) This sets the level to match frequency. (Refer to item of instantaneous stop and restart.)'

(Example1) 0Hz start

(Example2) Equaling start

Start 0Hz regardless of the motor speed.
On 0Hz start. the retry wait time is disregarded.
When 0Hz start is used and the motor speed is still high there is the possibility of over-current trips.

After FRS terminal is switched OFF, the Inverter reads the frequency of the motor and when it reaches the value in b007 the Inverter will begin to RUN again.
On frequency matching start if an over-current trip occurs. try extending the retry time.

Commercial Dower source switching(CS)

This function is used for systems with an excessive amount of starting torque requirements. The motor would be started direct-on-line and then when the motor had started the inverter would take over. This function is comonly used to reduce the costing of the inverter. A system may require 55KW's to start but only 15KW's to run at constant speed, therefore, a 15KW rated inverter would be sufficient when using this function. Assign 14(CS) to an intelligent input terminal.

Using the example below. When the motor has been started direct-on-line, Mg2 is switched OFF and Mg3 is switched on. With the Forward command to the inverter already on the CS terminal is switched on and Mgl is closed. The Inverter will then read the motor RPM and when the CS terminal is switched OFF the retry wait time (b003) is started.
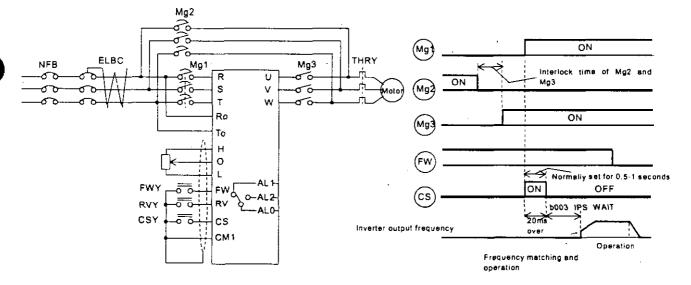
Once the wait time has elapsed the inverter will then start and match the frequency which is set (b007).

When the Earth Leakage Breaker (ELB) trips on ground fault. the commercial circuit will not operate. When a backup is required. take the supply from the commercial circuit ELBC.

For FWY, RVY, CSY, use control relays. The sequence above is reference to the circuit and timing diagram below.

If an over-current trip occurs when frequency matching, extend the retry wait time (b003).

Relation code	
b003	: retry waiting time
b007	: frequency setting to match frequency
C001-C005	: Intelligent input terminal

Connection figure example and timing on commercial power source switching

4-47

Reset (RS)

This function resets the inverter when a protective trip has occured.
The method of reset is to either push the STOP/RESET key on the digital operator or to switch the RS terminal ON.
To reset the inverter with the control terminal, assign 18(RS) to an intelligent input terminal.

Relation code
b003 : Retry waiting time
b007 : Frequency setting to match
C102 : Reset selection
C103 : Reset frequency matching selection

Reset frequency matching selection C103 selects whether the inverter restarts
at 0Hz or the inverter matches the output frequency after the reset operation is complete.
Reset selection C102 selects when the alarm signal is cancelled and whether it is valid or invalid in normal operation.
The RS terminal is valid only when the contact is set to NO
If the RS terminal is in the ON state for mote than 4 seconds, a communication error is caused
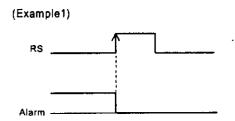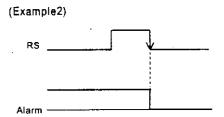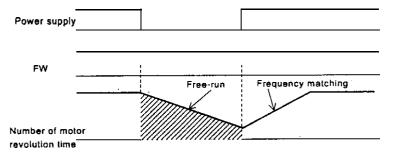
Set item	Function code	Data	Description
Retry waiting time	b003	0.3-100.	Units:seconds (Reference to items of instantaneous power failure or under-voltage) After reset. time until restart is tried.
Frequency setting to match	b007	0.00-400.0	Units:Hz (Reference to items of instantaneous stop/under-voltage)
Reset selection	C102	00	On ON signal, trip cancel (examplel) On normal, this is valid (output cuts off).
		0 1	On OFF signal, trip cancel (example2) On normal, valid (output cuts off)
		02	On ON signal, trip cancel (example1) On normal, this is invalid. (only trip cancel)
Reset frequency setting Selection	C I 0 3	00	0Hz start
		01	Frequency matching start. (example3)

(Example1)

RS
Alarm

(Example2)

RS
Alarm

(Example3) When 01 (frequency matching) is selected with reset frequency matching selection CI 03
it is also possible to operate frequency start on power ON:

Power supply
FW
Free-run Frequency matching
Number of motor revolution time

Unattended start protection (USP)

The USP function is designed as a fail safe lo prevent accidental starting of the Inverter if the RUN signal is ON when the power is restored lo the Inverter.

Either resetting the Inverter or turning the RUN signal OFF can clear the trip.

If the trip is cancelled while the RUN signal is still ON then the inverter will restart automatically.(Example2)

Assign 13(USP) lo an intelligent input terminal.

Unattended start protection is shown as follows;
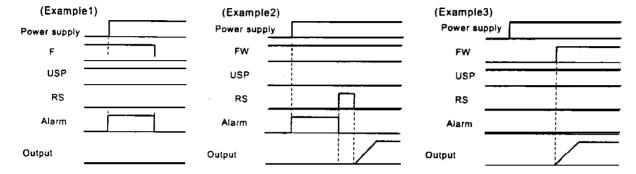
```
┌─── Relation  code ───┐
│ C001-C005: intelligent input terminal │
└──────────────────────┘
```


(Example1)   (Example2)   (Example3)

UP/DOWN selection

The Inverter output frequency can be changed with the UP and DWN intelligent input terminals.

Assign 27(UP) and 28(DWN) to two of the intelligent inputs I-5.

```
┌── Relation code ──┐
│ C101      :UP/DOWN memory selection │
│ C001-C005: Intelligent input terminal │
└───────────────────┘
```
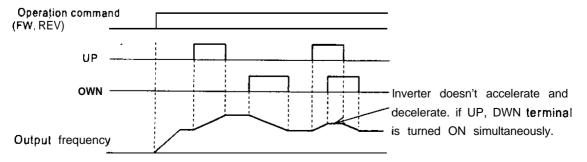
This function is valid only when the frequency command selection A001 is set lo 01 or 02. However. when 01 (control terminal) is set. this can only be used for multi-speed operation.

This function will not operate when the external analog frequency command or the jogging operation is used.

Acceleration lime operates according lo FO02. F003/F202, F203 when UP/DWN lerminal is ON.

To change 1" /2nd control. assign 08(SET) to an intelligent input terminal. change with SET terminal.

II is possible for the Inverter to retain the frequency setting value from the UP/DWN terminals. Parameter CI01 switches the memory On or OFF. It is also possible to clear the memory and return lo the original set frequency.

Assign 29(UDC) lo an intelligent input terminal and switch it on lo clear the memory.

Function code	Data	Description
CI01	0 0	This will not memorize the frequency command adjusted with UP/DWN. When power is turned ON again, set value is returned to the value before it was adjusted with UP/DWN.
	0 1	This memorizes the frequency command adjusted with UP/DWN. When power is turned ON again, set value is kept the value after it was adjusted with UP/DWN.

Operation command (FW, REV)

UP

OWN

Output frequency

Inverter doesn't accelerate and decelerate. if UP, DWN terminal is turned ON simultaneously.

External trip (EXT)

This function can be used to force the Inverter into a trip situation which is switched by an external input. i.e. PLC or relay contact.
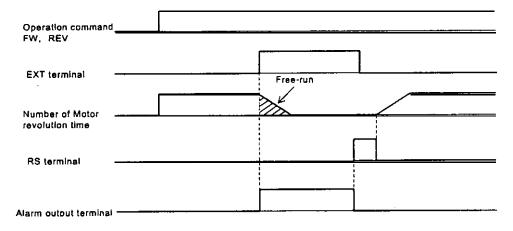
When the EXT terminal is switched ON, the inverter trips on an El2 error and the output is switched OFF.

Assign 12(EXT) to an intelligent input terminal.
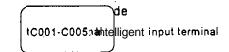
The trip will not be canceled when the terminal is turned OFF.

To cancel the trip, the reset signal must be applied or the Inverter switched OFF and ON again at the Supply.

3 Wire input function

This function is used when a momentary push start/stop control is required.
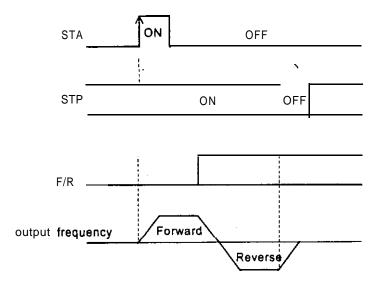
Set the operation command selection A002 to control terminal (01).

Assign all of 20 (STA). 21 (STP) and 22 (F/R) to three of the intelligent input terminals.

If all three inputs are not assigned this function will not operate.

The FW terminal and RV terminal become redundant when the 3 wire control is assigned to the intelligent input terminals.

Output from the 3 wire control terminal is as follows;

Output terminal setting

Any of the following functions can be assigned to the intelligent output terminals (11 or 12) or the alarm relay.

Both intelligent output terminals 11 and 12 and the alarm relay are all relay outputs.

All three output relays can be selected to be either NO or NC (a orb).

Relation code
C021-C022 : Intelligent output
terminal
C026   :Alarm relay output
terminal setting

Data	Description	Reference item
00	RUN:Signal during run	Signal during run
0 1	FA1:Frequency arrival type1 signal	Frequency arrival signal
02	FA2:Frequency arrival type2 signal	
03	OL:Overload advance notice signal	Overload advance notice signal
04	OD:output deviation for PID control	PID function
05	AL:Alarm signal	Protection function
06	FA3:Arrival signal for only setting frequency	Frequency arrival signal
08	IP:Instantaneous stop signal	Instantaneous stop/under-voltage
09	UV:Under voltage signal	
11	RNT:RUN time over	RUN time over
12	ONT:ON time over	Power ON time over
13	THM:Thermal caution	Electric thermal function

Output terminal a/b (NO/NC)selection

This sets the intelligent output terminal 11-12 and alarm relay output terminal contact condition to either NO or NC (a orb).

Each output is changeable individually.

Both intelligent output terminals 11 and 12 and the alarm relay are all relay outputs.

Set item	Function code	Data	Description	
Intelligent output 11-12 A/b(NO/NC) selection	C031-C032	00	A contact(NO)	Contact specification AC 250V 5Amax
		01	B contact(NC)	
Alarm relay output A/b(NO/NC)selection	C036	00	A contact(NO)	Contact specification AL1-AL0:AC 250V 5Amax AL2-AL0:AC 250V 2Amax
		01	B contact(NC)	

a contact: Close with (ON), open with (OFF).
b contact: Open with (ON), close with (OFF).

(1) Specification of the intelligent output terminals 11 and 12
Specification of the intelligent output terminals 11 and 12 is as follows:

Contact Specification

		Resistor load	Inductor load
Maximum		AC250V, 5A DC30V, 5A	AC250V, 1A DC30V, 1A
Minimum		DC1V	1mA
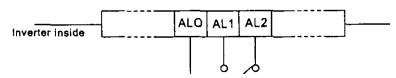
C031, C032 set value	Power supply	Output description	State of output terminal 11 or 12 terminal
00 (a contact)	0 "	ON	Close
		OFF	Open
	Off		Open
01 (b contact)	0 "	ON	Open
		O F F	Close
	Off		open

(2) Specification of the alarm relay output terminal
The specifications of the alarm relay output terminal is a changeover contact. Action is as follows

Example on using as alarm   t - 3

C036 set value	Power source	state of inverter	State of output terminal		Contact Specification		Resistor load	Inductor load
			AL1-AL0	AL2-AL0				
00 (a contact)	0 "	On abnormal	Close	open	AL1-AL0	Maximum	AC250V, 2A DC30V, 8A	AC250V, 0.2A DC300V, 0.6A
		On normal	open	Close		Minimum	AC100V, 10mA DC5V, 100mA	
	Off		open	Close				
01 (b contact)	0"	On abnormal	open	Close	AL2-AL0	Maximum	AC250V, 1A DC30V, 1A	AC250V, 0.2A DC30V, 0.2A
		On normal	Close	Open		Minimum	AC100V, 10mA DC5V, 100mA	
	Off		Open	Close				
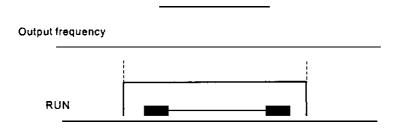
Signal durina run (RUN)

This function is to provide an output signal when the Inverter is in a running condition.

Assign OO(RUN: signal during run) to an intelligent output terminal 11. 12 or the alarm relay output terminal.

The signal is still outputted when the dc braking operates

Operation is as follows;

Output frequency

RUN

Frequency arrival signal (FA1, FA2. FA3)

When the output frequency arrives at the set frequency. an arrival signal is outputted.

Assign 01(FA1:constant speed arrival signal), 02(FA2:over setting frequency) or 06(FA3: only setting frequency) to an intelligent output terminal I!. 12 or the alarm relay output terminal.

Hysteresis frequency arrival signal is the following.

When ON : ON with (1% of setting frequency-maximum frequency)(Hz)

When OFF: OFF with (2% of setting frequency-maximum frequency)(Hz)

However in to set 06(FA3) case when inverter accelerate.

When ON :(1% of setting frequency − maximum frequency)(Hz)

When OFF: (2% of setting frequency + maximum frequency)(Hz)

When inverter decelerates

When ON : (1% of setting frequency + maximum frequency)(Hz)

When OFF: (2% of setting frequency − maximum frequency)(Hz)

Set item	Function code	Data (Hz)	Description
Acceleration arrival frequency/	CO42	0.0	Don't output arrival signal on acceleration.
		0.01-400.0	Output arrival signal on acceleration.
Deceleration arrival frequency	co43	0.0	Don't output arrival signal on deceleration.
		0.01-400.0	Output arrival signal on deceleration.
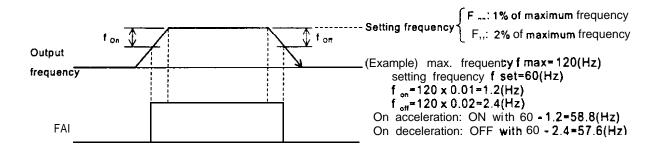
(1) Output on constant speed arrival (01:FA1)
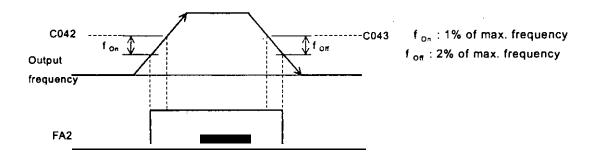
When the inverter arrives at the set frequency with frequency setting (F001, A020) or multi-speed (A021-A035),
the output relay is switched.

Setting frequency $\begin{cases} F_{on}: 1\% \text{ of maximum frequency} \\ F_{off}: 2\% \text{ of maximum frequency} \end{cases}$

(Example) max. frequency $f \max = 120(Hz)$
setting frequency $f \text{ set}=60(Hz)$
$f_{on} = 120 \times 0.01 = 1.2(Hz)$
$f_{off} = 120 \times 0.02 = 2.4(Hz)$
On acceleration: ON with $60 - 1.2 = 58.8(Hz)$
On deceleration: OFF with $60 - 2.4 = 57.6(Hz)$
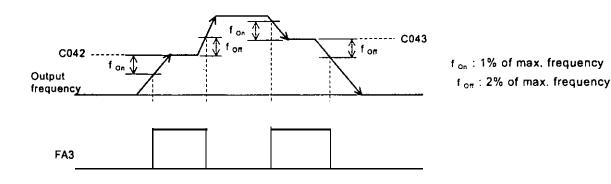
(2) Output over setting frequency (02:FA2)

When the output is over the arrival frequency set in C042. CO43 on adjustable speed time. the output relay is switched.

f_{On} : 1% of max. frequency
f_{off} : 2% of max. frequency

(3) Output setting frequency (06:FA3)

The signal is switched only when the output frequency matches the arrival frequency set in C042. CO43 on adjustable speed time.

f_{On} : 1% of max. frequency
f_{off} : 2% of max. frequency

4-54

RUN time / Dower ON time over (RNT/ONT)

When the accumulated operation time reaches or is Over the setting time in b034, RUN time/power ON time over (RNT/ONT) output is switched.

Function code	Data	Description
b034	0.	Don't operate.
	1. -9999.	Set by 10-hour unit.
	1000-6553	Set by 100 hours unit. (10000-65530 hours)

(1) Run time over (RNT)

Assign 11(RNT) to an intelligent output terminal 11. 12 (C021, C022) or the alarm relay output terminal (C026).

Set ON time level with b034.

(2) Power ON time over (ONT)

Assign 12(ONT) to an intelligent output terminal 11. 12 (C021, C022) or the alarm output terminal, (C026).

Set ON time level with b034.

FM terminal

The FM control terminal can monitor the output frequency and output current. FM terminal is a PWM (Pulse Width Modulation) output.

```
─ Relation code ─
C027: FM selection
b081: FM adjustment
```

(1) FM selection

Select a signal to output from the following options.
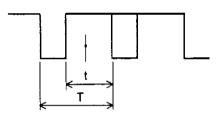
When 03(digital frequency) is set a digital frequency counter meter is required.

Use an analog meter for all other output signals.

Function code	Data	Description	Full scale value
C027	00	Output frequency (example 1)	0-Max. frequency(Hz)
	01	Output current (example 1)	0-200%
	03	Digital output frequency (example 2)	0-Max. frequency(Hz)
	04	Output voltage (example 1)	0-100%
	05	Input electric power (example 1)	0-200%
	06	Thermal load ratio (example 1)	0-100%
	07	LAD frequency (example 1)	0-Max. frequency(Hz)
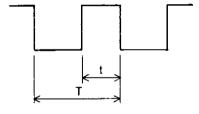
(Example 1) Set value:00, 01. 04. 05. 06, 07

(Example 2) Set value: 03

Period T: constant (6.4m)
Duty t/T : change

Period T: change
Duly t/T : 50%fixed

(2) FM adjustment

This function is used to calibrate a meter connected to the FM terminal.

Function code	set range	Description
b081	0. -255.	Change one by one.

(calibration methods)

(1) Connect meter to FM-CM1.

(2) Adjust b081 so that the meter is reading the same as the output frequency on your scale

(Example) When output frequency is 60Hz, change value of b081 so that meter is 60Hz.

AM terminal, AMI terminal

The AM terminal and the AMI terminal can monitor the output frequency or the output current.

The AM terminal has en analog output of 0-10V.

The AMI terminal has en analog output of 4-20mA.

(1) AM, AMI selection

Select a signal to output from the following options:

Set item	Function code	Data	contents	Full scale value
AM selection/ AMI selection	C028/C029	00	Output frequency	O-Max. frequency(Hz)
		01	/output current	0-200%
		04	output voltage	0-100%
		05	Input electric power	o-200%
		06	Thermal load ratio	0.100%
		07	LAD frequency	O-Max. frequency(Hz)

(2) AM adjustment. AMI adjustment

This function is used to calibrate a meter connected to the AM and AMI terminal.

Set item	Function code	Data	Description
AM adjustment	b080	0. -255.	After offset adjustment with C086, adjust according to memory.
AM offset Adjustment	C086	0.0-10.0	Units:V
AMI adjustment	CO87	0. -250.	/After offset adjustment with COBB, adjust according to/ memory.
AMI offset adjustment	C088	0.0-20.0	Units:mA

External thermistor

Temperature protection of the external machine is possible by the use of a Thermistor fitted to your motor.

Wire the thermistor between control terminals TH and CM1.

Set the following function according to the thermistor specification.,

Set item	Function code	set value	Contents
Thermistor selection	b098	00	Invalid (No temperature protection by external thermistor)
		01	Valid normal temperature/factor resistance element (For PTC)
		02	Valid (For NTC)
Thermistor error level	b099	0. -9999.	Units:OHM Set the resistance value of temperature for trip according to termistor methods.
Thermistor adjustment	CO85	0.0-1000.	Use this es gain adjustment.

Initialization setting

Il is possible at any time to reinitialize the Inverter parameters back to their factory default. The trip history can also be cleared at any time, however, if problems occur it will be difficult to fault find without the trip history for reference. Initialization detaiis are as follows;
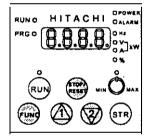
Relation code
b084: initialization selection
b085: Initial data selection
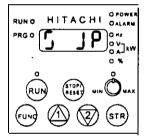
Set item	Function mode	Data	Description'
Initialization selection	b084	00	This clears only trip history.
		01	This only initializes setting value. Setting value becomes the state on factory forwarding.
		02	This clears trip history and initializes setting.
Initial data Selection	b085	00	Initializing setting for Japan.
		01	Initializing setting for Europe
		02	Initializing setting for America.

(Initialization methods)

After setting the above parameters, initialize as follows:

(1) Hold down the FUNC. UP and DOWN key and the" press the STR key. When the display starts to flash and rotate release all the keys.

(2) During initializing, Above display is for Japan. Other displays are below.
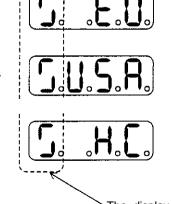
(3) When "d001" is displayed in the monitor, initialization is complete.

During initializing for Europe.

During initializing for America.

During initializing of trip history.

The display revolves on the left

Display selection

This function can be used to limit what the digital operator can display.

Set item	Function code	Data	Description
Display selection	b037	01	Function individual display (Display, no display by item set)(example1)
		02	User setting and b037 Only item set by user selection of UOOI-UOIZ is displayed. (Set U001-U012 first.)
User selection	U001-U012	n o	No assignment.
		d001-P002	Select the code to display. (All code is an object.)

(Example1) When the Display selection (b037) is set to 02, only the programmed parameters are displayed. To set which parameters are displayed insert code groups in parameter U001-U012.

The table below shows which parameter groups can be displayed and what code is used in U001-U012.

No	Function to restrict display	Data	Code to be restricted display.	Note
1	A001	01	A005,A006,A011-A016,A101-A105,	O,OI,O2 terminal
2			A111-A114,C081-C085,C121-C123 function	
3	A002	01,03,04,05	b087	Slop key function
4	A019	00	A028-A035	Multi-speed function
	C001-C005	02,03,04,05		
5	A044	02	b100-B113	Control methods
6	A051	01	A052-A061	DC control
7	A071	01	A072-A076,C044	PID function
8	A094	01	A095-A096	2 stage adjustable frequency
9	b013	02	b015-b020	Electric thermal characteristic
10	b021	01.02	b022-b023	/Overload restriction
11	b024	01,02	b025-b026	Overload restriction2
12	b095	01,02	b090	BRD function
13	C001-C005	08	A203,A204,A220,A241-A244, A261,A262, A292,A293,b212,b213	2nd control
14		11	b088	Free-run stop
15	C021,C022,C026	02.06	C042-C043	Frequency arrival signal
16	A294 C001-C005	01 06	A294-A296	2nd two adjustable frequency

Stabilized factor

When the motor is hunting or unstable. this function can be adjusted to help stabilize the motor.

When the motor is unstable, check the allowable motor selection (H003/H203) and motor pole selection (H004/H204) with your motor. If their code data is different from your motor specification, set the right data.

When R1 of usage motor is less than R1 of regular motor. raise the set value of H006/H206 gradually.

When you operate greater motor than rated capacity of inverter. lower the set value of H006/H206.

The following two functions can also assist to reduce hunting or rattling of a motor.

    (1) Lower the carrier frequency (b063).

    (2) Lower the output voltage gain (A045).

Set item	Function code	Data	Description
Output gain	A045	20. -100.	Units :% Lower this when hunting occurs..
Carrier frequency	b083	0.5-12.0	Units :kHz Lower this when hunting occurs.
Stabilized factor	H006/H206	0. -255.	Raise or lower when hunting occurs.

Ooeration selection on option error

When an add-in option is the cause of a protective trip this function can be used to switch the trip facility off and allow the Inverter to carry on in it's operation.

Set item	Function code	Data	Description
Operation selection on optional error	P001/P002	00	TRP: inverter trip and output alarm when option error occurs.!
		01	RUN: inverter ignores this and continues operation when option error occurs.

Motor constant

Set each constant according to the motor you use.

In case of using several motors in parallel, set the constant values that are closest to the total capacity of the belonging motor.

Reduced torque or instability may occur while using auto torque boost function if these settings are incorrect.

Communication function

Serial communication is possible from the Inverter lo any external equipment using RS465 protocol. This function is built-in as standard and is controlled by the TM2 control terminals.
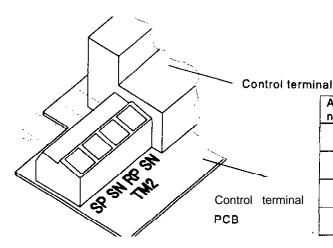
(1) Communication specification

Item	Specification	Notes
Transmission speed	2400/4800/9600/19200 bps	Selection with operator
Communication methods	Half duplex communication methods	
Synchronizing methods	Direct current transmission	
Transmission code	ASCII code	
Transmission methods	Transmission from lower bit	
Communication interface	RS465	
Data bit	7/8 bit	Selection with operator
Parity	No parity/even/odd	Selection with Operator
Stop bit	1/2 bit	Selection with operator
Start methods	One-way start form by command of host side	
Waiting time	10-1000[ms]	Setting with operator
Connect form	1:N (N = Maximum 32)	Station number is selected with operator.
Error check	Overrun /Fleming / BCC / Vertical / Horizontal parity	

<RS485 port specification and connection>
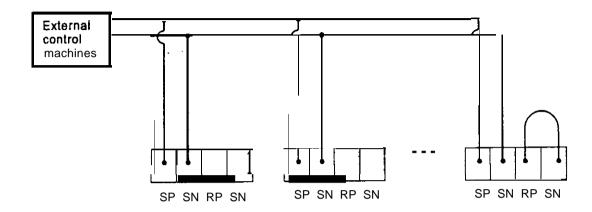
Use TM2 of control terminal PCB for RS485 communication function.

Control terminal

Control terminal PCB

Abbreviation name	Description
S P	Transmission and Reception + side
S N	Transmission and reception - side
R P .	Terminal resistance valid terminal
S N	Terminal resistance valid terminal

Connect each inverter in parallel as shown below. It is necessary to short terminals RP and SN on the last inverter in the link (even if communication is to only one inverter the link should still be made).

By shorting between RP and SN. the terminal resistance is increased and controls the reflection of the signal.
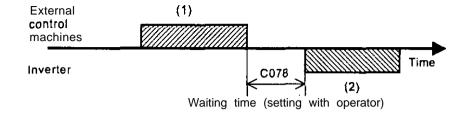
(2) Setting'

The following settings are required to operate RS485 communication

Set item	'unction code	set value	Description
Data command	co70	02	Operator
		03	RS485
		04	Option 1
		05	Option 2
Communicating transmission speed	co71	02	/Loop-back lest
		03	2400 bps
		04	14600 bps
		05	9600 bps
		06	19200 bps
Communication code	CO72	1 to32	This assigns the station number Of the inverter. This is used when you control /more than one simultaneously.
Communication bit	co73	7	7 bit
		6	8 bit
Communication parity	co74	00	No parity
		01	Even parity
		02	Odd parity
Communication bit	C075	$\frac{1}{2}$	1 bit
			2 bit
Communication waiting time	C078	0 to 1000	Units :ms

(3) Communication protocol

The method of the communication protocol is shown below in the time diagram,

Waiting time (setting with operator)

The following is indicated.

(1):Frame transmitted from external control machines to the inverter

(2):Frame replied from inverter to the external control machines

Frame (2) from the inverter is a reply to frame (1) from the external control machine, the active output is not operated.

The commands are shown below:

Command list

Command	Command description	Advisability of all code	Notes
00	Forward / backward /stop command	O	
01	Setting of frequency command	O	
02	Setting of intelligent terminal state	O	
03	Collective reading of monitor data	X	
04	Reading of inverter state	X	
05	Reading of trip history	X	
06	Reading of 1 setting item	X	
07	Setting of 1 set item	O	
08	Returning of each set value to initial value	O	This doesn't operate unless b084 is set to (01 or 02).
09	This checks whether set value can be Conserved to EEPROM or not.	X	
OA	This conserves set value to EEPROM	O	
OB	Recalculation of internal constant.	O	

Explanation of each command is the following.

(i) 00 command : This controls the forward, backward and stop command,

Transmission frame

Frame format

STX	Code	Command	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, and FF(all code communication)
Command	Transmission command	2 byte	00
Data	Transmission data	1 byte	(Note1) Reference
BCC	Bloc check code	2 byte	Exclusive OR of Code, Command and Data
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note1)

Data	Description	Note
0	Stop command	
1	Forward command	
2	Reverse command	

(Example) when you transmit forward command to code 01

(STX)|01|00|1|(BCC)|(CR) . 0 2 1 3 0 3 1 1 3 0   3 0 1 3 1 1 3 3   30|0D
ASCIIconverter

Reply frame

On normal reply : (4) - (i) reference

On abnormal reply : (4) - (ii) reference

(ii) 01 command: This is to set frequency command,

Transmission frame

Frame format

STX	Code	Command	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, and FF (all code communication)
Command	Transmission command	2 byte	01
Data	Transmission data (tenth ASCII code)	6 byte	(Note2) Reference
BCC	Block check code	2 byte	Exclusive OR of Code. Command and Data
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note2) when you set code 01 for 5Hz

(STX)|01|01|000500|(BCC)|(CR)

ASCII conversion   02|30 31|30 31|30 30 30 35 30 30|30 35|0D

Note) the data is 100 times as big as set value.

Example) 5(Hz) → 500 → 000500 ──────────→ 30 30 30 35 30 30
ASCII

Reply frame

On normal reply : (4) - (i) Reference

On abnormal reply : (4) - (ii) reference

(iii) 02 command: This sets the state of the intelligent terminals.

Transmission frame

Frame format

STX	Code	Command	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, and FF (all cord communication)
Command	Transmission command	2 byte	02
Data	Transmission data	16 byte	(Note3) reference
BCC	Block check code	2 byte	Exclusive OR of Code. Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note3) Data (sixteenth) of intelligent terminal and contents

(the details refer to intelligent input terminal function.)

Data (sixteenth)	Description	Data (sixteenth)	Description
0000000000000001	FW: forward command	0000000000100000	STA: 3 wire start
0000000000000002	RV: reverse command	0000000000200000	STP: 3 wire holding
0000000000000004	CF1: multi-speed1(binary operation)	0000000000400000	F/R: 3 wire forward
0000000000000008	CF2: multi-speed2(binary operation)	0000000000600000	PID:PID selection (valid/invalid)
0000000000000010	CF3: multi-speed3(binary operation)	0000000001000000	PIDC: PID integral reset
0000000000000020	CF4: multi-speed4(binary operation)	0000000002000000	
0000000000000040	JG: jogging(inching operation)	0000000004000000	
0000000000000060	DB: external DC control	0000000006000000	UP: remote operation Accelerating speed
0000000000000100	SET: 2"" control	0000000010000000	DWN: remote operation Decelerate speed
0000000000000200	2CH: two stage adjustable speed	0000000020000000	UDC: remote operation data clear
0000000000000400		0000000040000000	
0000000000000600	FRS: free-run stop	0000000060000000	
0000000000001000	EXP: external trip	0000000100000000	SF1: multi-speed(bit run)
0000000000002000	USP: unattended start protection	0000000200000000	SF2: multi-speed(bit run)
0000000000004000	CS: commercial change	0000000400000000	SF3: multi-speed(bit run)
0000000000006000	SFT: software lock (control terminal)	0000000600000000	SF4: multi-speed(bit run)
0000000000010000	AT: analog input voltage/current select	0000001000000000	SF5: multi-speed(bit run)
0000000000020000		0000002000000000	SF6: multi-speed(bit run)
0000000000040000	RS: reset	0000004000000000	SF7: multi-speed(bit run)
0000000000060000		0000008000000000	OLR: overload restriction setting

Example) When you make (forward). (multi-speedl) and (multi-speed2) active on inverter setting of code 01. the calculation of data is

0x0000000000000001+0x0000000000000004+0x0000000000000008 =OxOOOOOOOOOOOOOOOOD

so transmission frame is

(STX)|01|02|00000000000000000D|(BCC)|(CR)

Reply frame

On normal reply : (4) - (i) Reference

On abnormal reply : (4) - (ii) reference

(iv) 03 command: This reads monitor data collectively.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

Replay frame

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	03
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

Frame format

STX	Code	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01.32
Data	Data	104 byte	(Note4) reference
BCC	Block check code	2 byte	Exclusive OR of Code. Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note4) Each monitor value

Monitor item	Units	Compe-titive rate	Data size	Explanation
Output frequency	HZ	x100	8 byte	Tenth ASCII code
output current	A	x10	8 byte	Tenth ASCII code
Revolution direction			8 byte	0: stop. 1: forward, 2:backward
PID feedback monitor	%	x100	8 byte	Tenth ASCII code
Intelligent input monitor			8 byte	'5) reference
Intelligent output monitor			8 byte	'6) reference
Frequency converting monitor		x100	8 byte	Tenth ASCII code'
Output torque monitor	%	XI	8 byte	(00000000) padding data
Output voltage monitor	v	x10	8 byte	Tenth ASCII code
Electric power monitor	kW	x10	8 byte	Tenth ASCII code
			8 byte	(00000000) padding data
RUN time monitor	h	XI	8 byte	Tenth ASCII code
ON time monitor	h	x1	8 byte	Tenth ASCII code

Upper bite----------lower bite

(Note5) Intelligent input terminal monitor

Item	Data
Forward terminal	00000001
1st terminal	00000002
2nd terminal	00000004
3rd terminal	00000008
4th terminal	00000010
5th terminal	00000020

(Note6) Intelligent output terminal monitor

Item	Data
AL	00000001
1st terminal	00000002
2nd terminal	00000004

(v) 04 command: This reads the stale of the inverter.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	0 4
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

Frame formal

STX	Code	Data	BCC	CR

(Note7)

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Data	Data on trip	8 byte	(Note7) reference
BCC	Block check code	2 byte	Exclusive OR of Code. Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	C R (0x0D)

The data to indicate status contents of inverter is constructed from the following three factors [A). B), C)]

Data	Status A	Status B	status c	00 (reservation)

Inverter status A)

Code	Status
00	Initial status
01	Vdc on waiting settlement
02	On stopping
03	On running
04	0" FRS
05	On JG
06	On rea
07	On retading frequency
08	On UV On retrying
09	~ ~~
10	On TRIP
11	0" waiting reset

Inverter status C)

Code	Status
00	•--
01	stop
02	Deceleration speed
03	Constant speed
04	Acceleration speed
05	Forward
06	Reverse
07	Reverse from forward
08	Forward from reverse
09	Forward start
10	Reverse start

Inverter status B)

Code	status
00	On stopping
01	On running
02	On tripping

(vi) 05 command: This reads trip history data.

Transmission frame

Frame format

STX	Code	Command	B C C	C R

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Cord	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	05
BCC	Block check code	2 byte	Exclusive OR of Code. Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

Frame format:

STX	Code	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Data	Each monitor data on trip	440 byte	(Note8) reference
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note8) The monitor data (trip history) on trip memorizes the last six errors with an accumulated count number (Bbyte).

Accumulated count number	Trip history 1

Trip history 6	- - -

Monitor item	Units	Magnification	Data size	Notes
Trip factor	-		Bbyte	Upper
Inverter status A)			8byte	
Inverter status B)	-	-	Bbyte	
Inverter status C)			Bbyte	
'Output frequency	Hz	x10	Bbyte	Tenth ASCII code
Accumulated RUN time	hour	x 1	Bbyte	Tenth ASCII code
output current	A	x10	Bbyte	Tenth ASCII code
current voltage	v	x10	Bbyte	Tenth ASCII code
Power source ON time	hour	xl	Bbyte	Tenth ASCII code

(vii) 06 command: This reads 1 set item.

Transmission frame

Frame format

STX	Code	Command	Parameter	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	0 6
Parameter	Parameter number of data	4 byte	(Note9)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note9) The range of parameter to get.

F001-, A001-, b001-, C001-, H003-, P001-

Replay frame

Frame format

On normal reply : (4) - (i) Reference,

STX	Code	ACK	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
ACK	Control code(ACKnowledge)	1 byte	ACK (0x06)
Data	Data (tenth ASCII code)	8 byte	(Note10)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note10) when data is the selected item; this transmits and receives corresponding to station number.

On abnormal reply : (4) (ii) reference

(viii) 07 command: This sets 1 set item.

Transmission frame

Frame format

STX	Code	Command	Parameter	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station numb& of inverter	2 byte	01-32, FF(all code communication)
Command	Transmission command	2 byte	07
Parameter	Parameter number of data	4 byte	(Note9)
Data	Data of parameter (Tenth ASCII code)	8 byte	(Note10)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5 Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Reply frame

On normal reply : (4) (i) Reference

On abnormal reply : (4) - (ii) Reference

(ix) 06 command: This returns each set value to initial value.

This works in conjunction with initial selection (b064). If b064 is 00. the trip history is cleared

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Cord	Station number of inverter	2 byte	01-32, FF(all code communication)
Command	Transmission command	2 byte	06
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

On normal reply : (4) - (i) Reference

On abnormal reply : (4) -(ii) Reference

(x) 09 command: This checks whether it is possible to store set value to EEPROM or not

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	09
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Transmission frame

Frame format

STX	Code	ACK	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
ACK	Control code(ACKnowledge)	1 byte	ACK (0x06)
Data	Data	2 byte	Allowance with 01
BCC	Block check code	2 byte	Exclusive OR of Code. Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

On normal reply : (4) - (i) Reference

(xi) OA command: This stores the set value to the EEPROM.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	OA
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(xii) OB command: This recalculates the internal motor constants

This function is required when the motor capacity or the number of motor poles is changed by RS485 communication.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	OB
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Reply frame

On normal reply : (4) - (i) Reference

On abnormal reply : (4) - (ii) Reference

(i) Affirmative reply

Reply frame

Frame format

STX	Code	ACK	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
ACK	Control code(ACKnowledge)	1 byte	ACK(0x06)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(ii) 01Inverter reply

Reply frame

Frame format

STX	Code	NAK	Error code	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
NAK	Control code (Negative ACKnowledge)	1 byte	ACK(0x06)
Error code	Error contents of Communication	2 byte	(Note11)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)
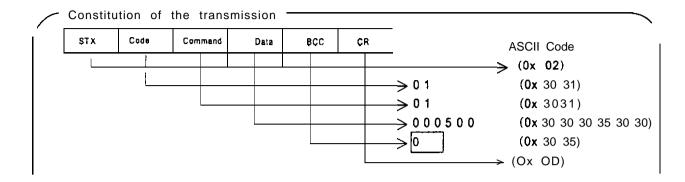
(Note11) Error code list

Error code	contents
01H	Parity error
02H	Sum check error
03H	Framing error
04H	overrun error
05H	Protocol error
06H	ASCII code error
07H	Reception buffer overrun error
08H	Reception time out error
11H	Error for abnormal command
12H	
13H	Practice disapproval error
14H	-
15H	-
16H	Parameter abnormal error
17H	
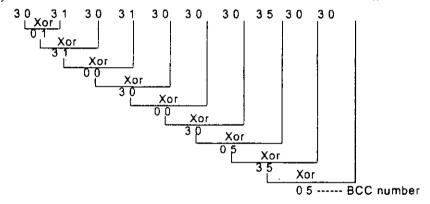
Inverter doesn't reply on all code communication

(5) About the calculation method of BCC (the Block Check Cord)

(Example) 5Hz is set up by using 01 commands (the setting of the frequency command). (when the code of the inverter of the object is '01')

┌─ Constitution of the transmission ──

| STX | Code | Command | Data | BCC | CR |

ASCII Code

→ (0x 02)
→ 0 1   (0x 30 31)
→ 0 1   (0x 3031)
→ 0 0 0 5 0 0   (0x 30 30 30 35 30 30)
→ 0   (0x 30 35)
→ (Ox OD)

BCC is the result that transforms the Code-Data into ASCII Code and took an EXCUSIVE OR (Xor) every lbyte. In the case of the above transmission frame. BCC calculates it as follows.

```
3 0   3 1   3 0   3 1   3 0   3 0   3 0   3 5   3 0   3 0
 └Xor┘
  0 1
   └ Xor ┘
     3 1
      └ Xor ┘
        0 0
         └ Xor ┘
           3 0
            └ Xor ┘
              0 0
               └ Xor ┘
                 3 0
                  └ Xor ┘
                    0 5
                     └ Xor ┘
                       3 5
                        └ Xor ┘
                          0 5 ------ BCC number
```

(Appendix) ASCII code transformation table

Character data	ASCII code
STX	0 2
CR	0 D
0	30
1	31
2	32
3	33
4	3 4
5	35
6	36
7	37
8	38
9	39

Character data	ASCII code
A	4 1
B	4 2
C	4 3
D	4 4
E	4 5
F	4 6

(6) Communication test mode

The communication test mode checks the communication line of RS485

(The communication test mode procedure)

1. Please remove the wiring of terminal unit TM2 of the control terminal unit foundation, to do the loop back check.

2. Please set up the following with the operator of the inverter.

Please set up CO71 (Communication transmission speed selection) to 02 (Loop Sack Test)

3. Shut the power supply of the inverter at first and please turn on the power supply once again

The check is started

4. When the check ends the display is as follows.

Normal :

Abnormal :

5. Please push the reset button of the digital operator or copy unit. And, the setting of CO71 is returned to the setting of an original request.

4.4 Protection function list

4.4.1 Protection functio

Name	Description		Display of digital panel· digital operator	Display of remote operator/ Copy unit ERR1***
Over-current protection	Motor is restricted and decelerates rapidly, excessive current is drawn through the inverter and there is a risk of damage. Current protection circuit operates and the inverter output is switched off.	At constant Speed	E 01	OC. Drive
		On decelertion speed	E 02	OC. Decel
		On acceleration speed	E 03	OC. Accel
		Other	E 04	Over. C
Overload protection (note1)	When the inverter detects an overload in the motor, the internal electronic thermal overload operates and the inverter output is switched off.		E 05	Over. L
Braking resistor overload protection	When BRD exceeds the usage ratio of the regenerative braking resistor, the over-voltage circuit operates and the inverter output is switched off.		E 06	OL. BRD
Over-voltage protection	When regenerative energy from the motor exceeds the maximum level, the over-voltage circuit operates and the inverter output is switched off.		E 07	Over. V
EEPROM error (note2)	When EEPROM in the inverter is subject to radiated noise or unusual temperature rises, the inverter output is switched off.		E 08	EEPROM
Under-voltage	When the incoming voltage of inverter is low, the control circuit can't operate correctly. The under-voltage circuit operates and the inverter output is switched off.		E 09	Under. V
CT error	When an abnormality occurs to a CT (current detector) in the inverter, the inverter output is switched off.		E 10	CT
CPU error	When a mistaken action causes an error to the inbuilt CPU, the inverter output is switched off.		E 11	CPU1
External trip	When a signal is given to the EXT intelligent input terminal, the inverter output is switched off. (on external trip function select)		E 12	EXTERNAL
USP error	This is the error displayed when the inverter power is restored while still in the RUN mode. (Valid when the USP function is selected)		E 13	USP
Ground fault protection	When power is turned ON, this detects ground faults between the inverter output and the motor.		E 14	GND. Flt
Incoming over-voltage protection	When the incoming voltage is higher than the specification value, this detects it for 100 seconds then the over-voltage circuit operates and the inverter output is switched off.		E 15	OV. SRC
Temporary power loss protection	When an instantaneous power failure occurs for more than 15ms, the inverter output is switched off. Once the instantaneous power failure wait time has elapsed and the power has not been restored it is regarded as a normal power failure. However, when the operation command is still ON with restart selection the inverter will restart. So please be careful of this.		E 16	Inst. P-F
Abnormal temperature	When main circuit temperature raises by stopping of cooling fan, the inverter output is switched off.		E 21	OH. FIN
Gate Allay error	Communication error between CPU and gate allay indicate		E 23	GA
Open-phase protection	When an open-phase on the input supply occurs the inverter output is switched off.		E 24	PH. Fail
GBT error	When an instantaneous over-current is detected on the output the inverter output is switched off to protect the main devices.		E 30	IGBT
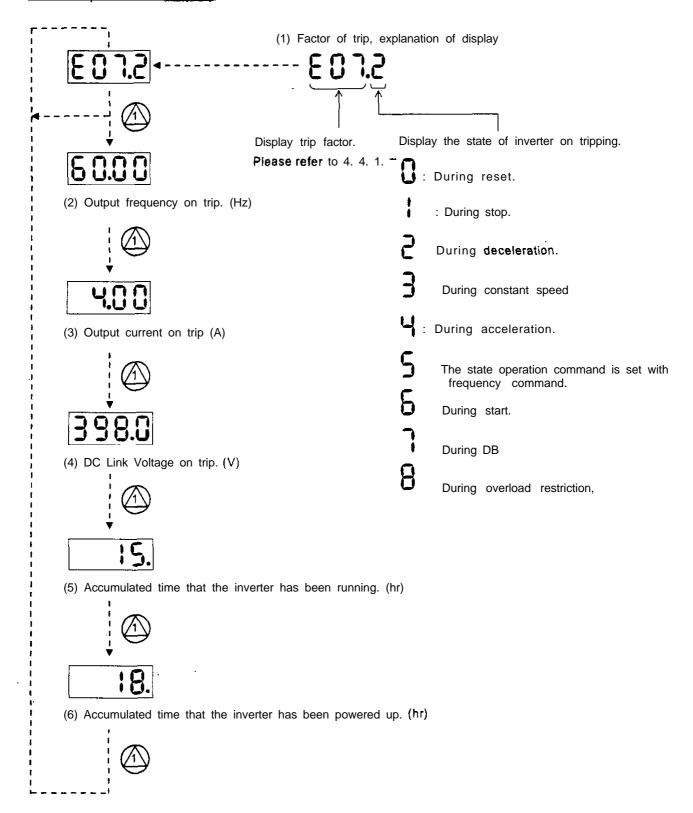
Name	Description	Display of digital panel. digital operator	Display of remote operator/ Copy unit ERR1•••
Thermistor error	When the inverter detects a high resistance on the thermistor input from the motor the inverter output is switched off.	E 35	TH
Option 1 error 0-9	These indicate the error of option 1. You can realize the details each instruction manual.	E60 - E69	OP1 0-9
Option 2 error 0-9	These indicate the error of option 2. You can realize the details by each instruction manual.	E10 - E19	OP2 0-9
During under-voltage waiting	When the incoming voltage of the inverter has dropped, the inverter output is switched off and the inverter waits.	_ _ U	UV. WAIT

Note1: After a trip occurs and 10 minutes pass, restart with reset operation.

Note2: When EEPROM error E08 occurs, confirm the setting data again.

4.4.2 Trip monitor display

(1) Factor of trip, explanation of display

E07.2 ◄-------------- E07.2

Display trip factor.   Display the state of inverter on tripping.

Please refer to 4. 4. 1.

60.00

(2) Output frequency on trip. (Hz)

0 : During reset.

1 : During stop.

2 : During deceleration.

3 : During constant speed

4.00

(3) Output current on trip (A)

4 : During acceleration.

5 : The state operation command is set with frequency command.

6 : During start.

398.0

(4) DC Link Voltage on trip. (V)

7 : During DB

8 : During overload restriction,

15.

(5) Accumulated time that the inverter has been running. (hr)

18.

(6) Accumulated time that the inverter has been powered up. (hr)

4.4.3 Warning Monitor display

Relation code
d090 : warning Monitor

Warning messages will appear when the data set is contradicting to others.

Program lamp (PRG) turns ON during the warning (until the data is changed).

Below is the description of the warnings.

Warning	Codes	<, >	Basic code
001/201	frequency upper limiter A061/A261	>	Maximum frequency A004/A204
002/202	frequency lower limiter A062/A262	>	
004/204	Base frequency AOO:VA203	>	
005/205	output frequency F001, Multi stage speed 0 A020/A220	>	
006/206	Multi stage speed 1-15 A021~A035	>	
012/212	frequency upper limiter A062/A262	>	frequency upper limiter A061/A261
015/215	Output frequency F001, Multi stage speed 0 A020/A220	>	
016/216	Multi stage speed 1-15 A021~A035	>	
021/221	frequency upper limiter A061/A261	<	frequency lower limiter A062/A262
025/225	Output frequency F001, Multi stage speed 0 A020/A220	<	
031/231	frequency upper limiter A061/A261	<	
032/232	frequency lower limiter A062/A262	<	Starting frequency b062
035/235	Output frequency F001, Multi stage speed 0 A020/A220	<	
036	Multi stage speed 1-15 A021~A035	<	
037	Jogging frequency A036	<	
085/285	Output frequency F001, Multi stage speed 0 A020/A220	<>	Jump frequency 1/2/3 +- Jump width A063+-A064 A065+-A066 A067+-A068 (note 1)
086	Multi stage speed 1~15 A021~A035	<>	
091/291	frequency upper limiter A061/A261	>	
092/292	frequency lower limiter A062/A262	>	
095/295	Output frequency F001 Multi stage speed 0 A020/A220	>	Free v/f frequency 7 b112
096	Multi stage speed 1-15 A021~A035	>	
110	Free v/f frequency I-6 b100, b102, b104. b106, b108, b110	>	
	Free v/f frequency 2-6 b102. b104. b106, b108, b110	<	Free v/f frequency 1 b100
	Free v/f frequency 1 b100	>	Free v/f frequency 2 b102
	Free v/f frequency ^ ^ b104, b106, b108, b110	<	
	Free v/f frequency 1,2 b100, b102	>	Free v/f frequency 3 b104
	Free v/f frequency 4-6 b106, b108, b110	<	
	Free v/f frequency 1-3 b100, b102, b104	>	Free v/f frequency 4 b106
	Free v/f frequency 5, 6 b108~b110	<	
	Free v/f frequency I-4 b100, b102. b104. b106	>	Free v/f frequency 5 b108
	Free v/f frequency 6 b110	<	
	Free v/f frequency I-5 b100, b102, b104, b106, b106	>	Free v/f frequency 6 b110
120	Free electronic thermal frequency 2,3 b017, b019		Free electronic thermal frequency 1 b015
	Free electronic thermal frequency 1 b015	>	Free electronic thermal frequency 2 b017
	Free electronic thermal frequency 3 b019	<	
	Free electronic thermal frequency 1. 2 b015. b017	>	Free electronic thermal frequency 3 b019

Warning is cleared when the setting fulfils the above condition.

Data will be changed automatically to the basic code.

(Note 1) The jump frequency will be automatically re-written to the lowest jump frequency (= Jump frequency -jump width)

5.1 Precautions for Maintenance/Inspection

5.1 .1 Daily inspection

Every day before operation check the following;

    [l] Does the motor operate according to the settings?
    [2] Is there any trouble with the surroundings of the installation?
    [3] Is there any trouble with the cooling or ventilation system?
    [4] Is there any abnormal vibration or sound?
    [5] Are their any signs of over-current or discoloration?
    [6] Is their any unusual odour present?

Check the input voltage to the inverter by using a meter during running

    [1] Is the supply voltage constant?
    [2] Are all the phases of the supply balanced?

51.2 Cleaning

    Make sure that the inverter is not dirty when operating.
    Wipe clean with a soft cloth and synthetic detergent or ethanol.

    (Notes) Don't use solvents containing any of the following, acetone, benzene, toluene, alcohol etc. as they can cause melting of the inverter surface, peeling of paint.
    Never clean the display part of the digital operator with detergent or alcohol.

5.1.3 Regular inspection

Inspections should be regularly carried out on the parts that can't be inspected while the inverter is running.

    [1] Is there any trouble with the cooling system? - - - Cleaning of air filter etc.
    [2] Check that all screw terminals and fixings are tight as they may loosen due to vibration of temperature change etc.
    [3] Is there any corrosion, damage to insulators?
    [4] Measurement of insulation resistance.
    [5] Check of cooling fan, smoothing capacitor, relay and exchange if necessary.

5.2 Daily inspection and regular inspection

Inspec-tion Parts	Inspection item	Inspection item	Inspection cycle			Inspection methods	Decision standard	Meter
			Daily	Regular				
				1	2			
Whole	Surrounding	Check temperature of surrounding, humidity, dust.	O			Refer to 2.1 Installing.	Temperature range is between −10 and 40 degrees. No dew present and humidity is below 90%.	Thermomete r, hygrometer, recorder
	Whole equipment	Is there abnormal vibration, abnormal sound?	O			By watching, hearing.	No trouble.	
	Power voltage	Is main circuit voltage normal?	O			Measurement of inverter terminal R, S, T phase voltage	Within alternating voltage allowable change.	Tester, digital multi-meter
Main circuit	Whole	(1)Megger check Between circuit terminal and earth terminal (2)Are all screws terminals tight? (3)Is there any sign of over-voltage? (4)cleaning		O O O		(1)After you remove connector J61 from inside the inverter Take out the wiring of input/output of inverter main circuit terminal and control terminal, measure beween parts shortened terminal R,S,T,U, V,W,P,PD,N,RB and earth terminal with megger. (2)Incremental clamping. (3)Watch.	(1)To be over 5M ohm. (2)(3) No abnormality .	DC500V class megger
	Connection conductor/ electric line	(1)Is there warp in conductor? (2)Is there any damage of coating of wires?		O O		(1)(2) By watching	(1)(2) No abnormality	
	Terminals	Is there any damage?		O		By watching.	No abnormality.	
	nverter parts onverter arts	Resistance check Between each Terminal.			0	Take out connect of inverter, measure terminal between R,S,T and P,N, between U,V,W and P,N with tester x 1 ohm range.	Refer to check method of 5.5 inverter, converter parts.	Analog form tester
	Smoothing capacitor	(1)Is there any liquid? (2)Does relief valve come out? Is there any swell? (3)Measure of allowable static-electricity.	O O		O	(1),(2) By watching. (3)Measure with capacity measure.	(1),(2) No abnormality (3) Over 80% of rated capacity.	Capacity meter
	Relay	(1)Is there abnormal sound in operation? (2)Is there damage to the contacts?		O O		(1)By hearing (2)By watching	(1) No abnormality (2) No abnormality	
	Resistor	(1)Is there any crack, discoloration of resistance insulator. (2)Confirm existence of breaking of wire.		0 0		(1)By watching.cementing resistance. Curl type resistance. Take out connection to other side, measure it with tester.	(1)No abnormality Error to be within 10% of Display resistance.	Tester Digital multi-meter
Control circuit Protec-tion circuit	Operation check	(1)Confirm balance of each output phase voltage with inverter single operation. (2)Operate sequence protection moving test. And no abnormality.		0 0		(1)Measure inverter output terminal U,V,W phase voltage. (2)Short or open protection circuit output of inverter.	(1)Phase voltage balance 200v/400v class is within 4V/8V. (2)On sequence, to operate abnormality.	Digital multi-meter, rectification type voltmeter
Cooling system	Cooling fan	(1)Is there abnormal vibration, abnormal sound? (2)Is there loosening of connecting parts?	O	0		(1)Revolve by hands in the state of tone-on idle. (2) By watching.	(1)Revolving smooth. (2)No abnormality.	
Display	Display	(1)Is the LED lamp illuminated? (2) Cleaning.	O	O		(1)Lamp indicates lamp on operator. (2) Cleaning with cloth.	(1)Confirm light.	·
	Meter	Is direction value Normal?	O			Confirm indication value of board meter.	Satisfy normal value, control value.	Voltage meter, current meter
Motor	Whole	(1)Is there abnormal signal,abnormal sound? (2)Is there any abnormal odour?	O O			(1)By hearing, feeling, watching. (2)Abnormal odour from overheat, damage etc. Confirmation.	(1)(2) No abnormality.	
	Inslated resistance	(1)Megger check (terminal collection - earth terminal)			0	Remove connection to U,V and W and disconnect motor wiring.	(1) To be over 5M ohm.	DC 500V Megger

(Notes) Life time of the capacitors depends on the ambient temperature

5.3 Meaaer test
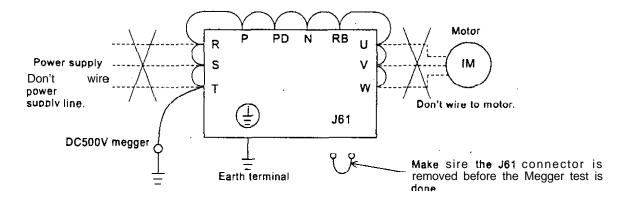
When executing a Megger test on the inverter remove all wires to R, S, T, PD. P, N, RB, U, V and W.

Do not use a megger or buzzer on the control circuit only use a digital multi-meter.

(Megger Voltage 500V DC)

Execute megger test of main circuit after the J61 connector has been removed. Short terminals of R, S, T, PD. P, N, RB, U, V and W.

After the Megger test is complete, reconnect the J61 connector as before.

5.4 Withstand Voltage test

Never perform a withstand voltage test on the inverter.

The inverter main circuit uses semiconductors. Semiconductors can deteriorate when a withstand voltage test is performed.

5.5 The method to check Inverter. converter Dart

A test is possible to check quality.
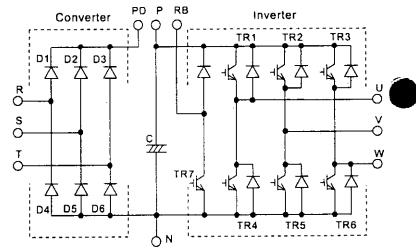
(Preparation)

[1] Take out the power lines (R. S and T) connected to the inverter. the motor connection lines (U, V and W) and the regenerative control resistance (P and RB).

[2] Prepare tester. (Using range of 1 ohm resistance measure range.)

(How to check)

It is possible to check the quality of the charging state of the terminals R. S. T. U, V, W, RB, P and N of the inverter and the pole of the tester by measuring the charging state.

(Notel) Before you measure the voltage between P and N with DC current range. confirm that the smoothing capacitor is discharged fully. execute checks.

(Note2) Almost infinite value is indicated on no conducting.
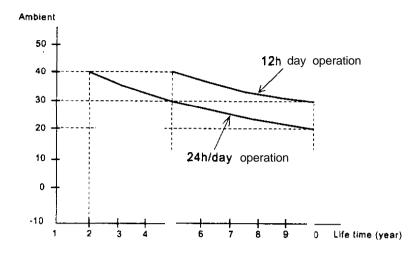
With the effect of the smoothing capacitor, the inverter conducts instantly and an infinite value isn't indicated. Ohm-number 10 ohms is indicated on conducting.

The values indicated will not be exactly the same for each terminal. however they will be very close together. If there is a significant difference a problem may exist.

		Pole of tester ⊕ (Red)	Pole of tester ⊖ (Black)	Measure value
Converter	D1	R	PD	No-conduct
		PD	R	Conduct
	D2	S	PO	No-conduct
		PO	S	Conduct
	D3	T	PD	No-conduct
		PD	T	Conduct
	04	R	N	Conduct
		N	R	No-conduct
	D5	S	N	Conduct
		N	S	No-conduct
	D6	T	N	Conduct
		N	T	No-conduct
Inverter	TR1	U	P	No-conduct
		P	U	Conduct
	TR2	V	P	No-conduct
		P	V	Conduct
	TR3	W	P	No-conduct
		P	W	Conduct
	TR4	U	N	Conduct
		N	U	No-conduct
	TR5	V	N	Conduct
		N	V	No-conduct
	TR6	W	N	Conduct
		N	W	No-conduct
BR part	TR7	RB	P	No-conduct
		P	RB	Conduct
		RB	N	No-conduct
		N	RB	No-conduct

5.6 Capacitor Life Curve

(Note1)

Ambient temperature means the surrounding temperature of the inverter. In case the inverter is installed in a cabinet. ambient temperature is the temperature of the internal air of the cabinet.

(Note2)

DC bus capacitors are recommended to be replaced every 5 years. And if the inverter is used in a worse condition, this recommended replacing period is reduced.

6.1 Standard specification list

Inverter Model		200V class								400V class							
		L300P-110LF	L300P-150LF	L300P-185LF	L300P-220LF	L300P-300LF	L300P-370LF	L300P-450LF	L300P-550LF	L300P-110HF	L300P-150HF	L300P-185HF	L300P-220HF	L300P-300HF	L300P-370HF	L300P-450HF	L300P-550HF
Protection structure (note1)		IP20(NEMA1)															
Max. Applicable Motor 4P (kW) (note2)		11	15	18.5	22	30	37	45	55	11	15	18.5	22	30	37	45	55
Rated input Alternating voltage(kVA)	200V/400V	15.2	20.0	25.2	29.4	39.1	48.4	58.5	72.7	15.2	20.0	25.8	29.7	39.4	48.4	58.8	72.7
	240V/480V	18.2	24.1	30.3	35.3	46.9	58.1	70.2	87.2	18.2	24.1	30.7	35.7	47.3	58.1	70.1	87.2
Rated input alternating voltage		Three-phase 200-240V (+-10%) 50Hz/60Hz								Three-phase 380-480V (+-10%) 50Hz/60Hz							
Rated output voltage (note3)		Three-phase 200-240V (This corresponds to receiving voltage.)								Three-phase 380-480V (This corresponds to receiving voltage.)							
Rated output current (A)		44	58	73	85	113	140	169	210	22	29	37	43	57	70	85	105
Control system		Sine-wave modulation PWM system.															
Output frequency range (note4)		0.1-400Hz															
Frequency accuracy		Digital command +/-0.01% for Max. frequency, analog frequency +/-0.2%(25+-10C)															
Frequency resolving power		Digital setting: 0.01Hz, analog setting:Max. frequency /4000															
Voltage/frequency characteristic		V/f option variable, V/f control. (constant torque, reduced torque)															
Overload current rate		120% for 60 seconds, 150% for 0.5second															
Acceleration/ deceleration time		0.01-3,600seconds (straight or S-Curve on acceleration, deceleration is optional setting individually), 2nd adjustable setting is possible.															

Control

	Regenerative Control (short duration) (note5)	BRD circuit built-in (Discharge resistance is required.)			Regenerative unit is required.					BRD circuit built-in (Discharge resistance is required.)				Regenerative unit is required.			
	DC Braking	On starting and decelerating by stop command, inverter operates under operation setting frequency. Or inverter operates with external input (Breaking power, time, frequency can be set.)															

Input signal

	Freq-uency	Operator	Setting by [▲] [▼] keys														
		Volume	Setting with potentiometer on the digital operator (Built-in as standard) (Analog setting)														
		External Signal	DC 0 to 5V, -5 to +5V, 0 to 10V, -10 to +10V (input impedance 10k ohm), 4-20mA (input impedance 100 ohm)															
		External port	Setting with RS485 communication															
	Run/Stop	Operator	Run/Stop (forward changes with code)															
		External signal	Forward Run/Stop (1a connect), reverse command is impossible on assigning of terminal (selection of 1a, 1b is possible), input of 3 wires is possible.															
		External port	Setting with RS485.															
	Intelligent input terminal		Use by selecting terminals from; Reverse command (RV), multi-speed1-4 (CF1-CF4), jogging (JG), external dc braking (DB), 2nd control (SET),2nd acceleration (2CH), free-run stop (FRS), external trip (EXT), USP function (USP), commercial change (CS),software lock (SFT), analog input voltage / current / select (AT), reset inverter (RS), 3 wire run (STA),3 wire keep (STP), 3 wire direction selection (F/R), PID selection valid/invalid (PID), PID integrating reset (PIDC), remote control up function (UP), remote control down function (DWN), remote control data clear (UDC), multi-speed bit 1-7(SF1-SF7),overload restriction change (OLR), no assign (NO).															
	Thermistor input terminal		1 terminal															

Output

	Intelligent output terminal	2 relay outputs (1a contact), relay(1c contact), output relay selection as follows; (selection from during running, on arrival with constant speed, over setting frequency, PID over-deviation)															
	Intelligent monitor output terminal	Analog voltage output, analog current output, pulse line output															

Display monitor		Output frequency, output current, frequency conversion value, trip history, input/output terminal state, input electric power, output voltage.															
Other function		V/f free setting (5 points), Upper / lower frequency limiter, Frequency jump, Curve adjustable speed, Manual torque boost level / Braking point,Analog meter adjustment, Starting frequency, Carrier frequency adjustment, Electronic thermal free setting, External start/end (frequency/rate),Analog input selection, Trip retry, Reduced voltage start, Overload restriction.															
Carrier frequency range		0.5-12 kHz															
Protection function		Over-current, over-voltage, under-voltage, electronic thermal level, abnormal trouble, ground fault current on starting, instantaneous stop, USP error, open-phase error, control resistor overload, CT error, external trip, communication error.															

Usage surroundings

	Frequency temperature /Preservation temperature (note6) /humidity	-10 to 40 degrees (note7) / -20 to 65 degrees / 25 to 90% RH (installed with no dew condensation)															
	Vibration (note7)	5.9m²/ S (0.6G), 10-55Hz															
	Using place	Under 1,000m above sea level, indoors (installed away from corrosive gasses, dust)(note8)															

Paint color		Blue (D.I.C14 version No.438)															
Options		Remote operator, copy unit, cable for each operator, braking resistor, regenerative control unit, alternating reactor, D.C. reactor, EMC Mains filter, higher harmonic control unit, LCR filter, applied control installation															
Remote operator		OPE-SR, cable for remote operation ICS-1(1m), ICS3(3m)															
Schematic mass (kg)		5	5	12	12	12	20	30	30	5	5	12	12	12	20	30	30

(note1) Protective system bases on JME1030.

(note2) Applicable motor indicates HITACHI three-phase motor. When you use other motor, set so that the motor current doesn't exceed the rated current of the inverter.

(note3) Output voltage will reduce when the power voltage is reduced. (Except when AVR function is selected.)

(note4) When you operate motor over 50/60Hz, inquire about the allowable max.revolution time of motor etc. from motor manufacturer.

(note5) Braking resistance isn't installed in the inverter. When the inverter requires a high regenerative torque, use optional braking resistance and regenerative braking unit.

(note6) Protective temperature is temperature during transportation.

(note7) This bases on the test methods of JIS C0911(1984).

(note8) When the inverter is used in a place with dust, we recommend the optional varnish coating specification. Before it is required.

6.2 Dimension
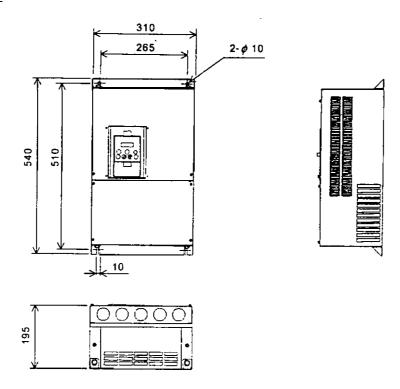
L300P-110,150LF/HF
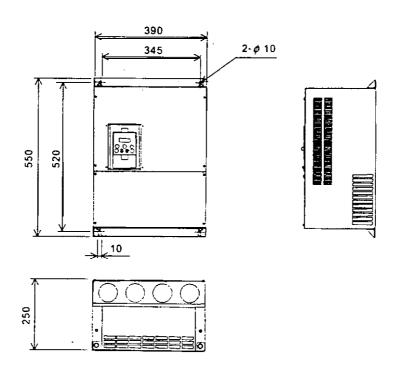
L300P-185-300LF/HF

L300P-370LF/HF

L300P-450,550LF/HF

VFD SALES AND ENGINEERING
275 West 4th Avenue
Vancouver, BC V5Y 1G8
CANADA

Operation manual · <N8497X>

Phone: (604) 7098600   Toll free phone: 1 (877) 539-2542
Fax: (604) 872-8560   Toll free fax: 1 (800) 539-2542

mGi
Technologies Inc.

Hitachi   0   Series Variable Frequency D r i v e   S o f t w a r e

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

DISPLAY CODE	INITIAL VALUE	SET VALUE
F1	Monitor mode	na
F2	Set frequency	
F4	F	
F5	NOTE 1	
F6	NOTE 2	
F7	NOTE 2	
F8	11	
F9	0	
F10	72	
F11	NOTE 3	
F12	A0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C0	1	
C1	10	
C2	7	
C3	11	
C4	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C30	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C20	2	
C21	3	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A0	0	
A1	NOTE 4	
A2	4	
A3	0.0	
A4	0.5	
A5	0	
A6	0	
A7	0	
A8	0	
A9	0	
A10	NOTE 5	
A11	8	
A12	5	
A13	20	
A14	40	
A15	0	
A16	0	
A17	0	
A18	1.0	
A19	1.0	
A20	0.5	
A21	10	
A22	1	
A23	100	
A24	0	
A25	0	
A26	0	
A27	0	
A28	0	
A29	0	
A30	150	
A31	150	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A32	0	
A33	0	
A34	0	
A35	0	
A36	0	
A37	NOTE 3	
A38	5	
A39	100	
A40	100	
A41	1	
A42	1	
A43	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A47	1.0	
A48	0	
A49	2	
A50	1	
A51	0.0	
A52	1	
A53	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A55	0	
A56	1	
A57	0	
A58	1	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A62	60	
A63	60	
A64	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A68	0.50	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A71	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A80	NOTE 5	
A81	NOTE 5	
A82	1.0	
A83	10.0	
A84	0	
A85	1.0	

NOTE 1: 18 for LFU models, 26 for HFU & MFU models.
NOTE 2: 10 sec. for LFU models, 15 sec. for HFU & MFU models.
NOTE 3: 230 for LFU models, 460 for HFU models, 575 for MFU models
NOTE 4: Output kW rating of the VFD.
NOTE 5: DO NOT CHANGE. Factory use only.

VFD SALES AND ENGINEERING   Operation manual - <NB497X>
275 West 4th Avenue
Vancouver. SC **V5Y 1G8**
CANADA

Phone:	(604) 7094600	Toll free phone:	1 (677) **539-2542**
Fax:	(604) **872-8560**	Toll free fax:	1 (600) **539-2542**

Hitachi J100 Series Variable Frequency Drive Software Programming (DOP)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

Monitor Mode

Display Code	Display	Initial Value	Set Value
	ACC1	0010.00S	
	DEC1	0010.00S	
	F-SET-M	Remote	
	F/R-SW	Remote	
	RPM 4P	00000RPM	
	/Hz01.0	0.00	
	If ---A	lm000.0%	na
	PN-V	000V	na
	V Boost Code	<11>	
	V-Gain	100%	
	M-ADJ	72	

Function Mode

Display Code	Display	Initial Value	Set Value
E:00	CONTROL	VF	
E:01	+Fmax	000.0Hz	
E:02	Fmin	000.5Hz	
E:03	H-LIM-F	000.0Hz	
E:04	L-LIM-F	000.0Hz	
E:05	Speed-1	005.0Hz	
E:06	Speed-2	020.0Hz	
E:07	Speed-3	040.0Hz	
E:08	Speed-4	000.0Hz	
E:09	Speed-5	000.0Hz	
E:10	Speed-6	000.0Hz	
E:11	Speed-7	000.0Hz	
E:12	F-DCB	000.5Hz	
E:13	V-DCB	010	
E:14	T-DCB	000.0S	
E:15	E-therm	100%	
E:16	ACCline	Linear	
E:17	DECline	Linear	
E:18	F-START	000.0Hz	
E:19	F-END	L	
E:20	SWITCH1 DCB	OFF	
	SWITCH1 FM	ANA	
	SWITCH1 fmax	120	
	SWITCH1 PWER	ALM	
	SWITCH1 DOP	FWD	
	SWITCH1 FWD	ON	
	SWITCH1 REV	ON	
	SWITCH1 OLMT	ON	

Function Mode

Display Code	Display	Initial Value	Set Value
F:21	SWITCH2 DB	LVL	
	SWITCH2 STOP	ON	
	SWITCH2 Ethm	000	
	SWITCH2 SLOK	OFF	
	SWITCH2 AIN	5V	
F:22	SWITCH3 SOFT	FREE	
	SWITCH3 FARV	2	
	SWITCH3 TRIP	OFF	
	SWITCH3 DEBG	OFF	
	SWITCH3 TCNT	CNT	
F:23	SWITCH4 MON	FM	
F:24	SWITCH5 RUN	1	
	SWITCH5 AVR	ON	
	SWITCH5 LAD	ON	
	SWITCH5 RVS	ON	
F:25	LM.CONS	150%01.0	
F:26	IPS-T	001.0S	
F:27	IPS-R-T	0010.0S	
F:28	BRD-%ED	05.0%	
F:29	SPD-ARV	ACC100%	
F:30	CARRIER	16kHz	
F:31	V-SET	NOTE 1	
F:32	DEC-V	NOTE 1	
F:33	JUMP-F1	000.0Hz	
F:34	JUMP-F2	000.0Hz	
F:35	JUMP-F3	000.0Hz	
F:36	JMP-WID	0.5Hz	
F:37	Olalarm	150%	
F:38	IN-TM 1	CF1	
	IN-TM 2	USP	
	IN-TM 3	2CH	
	IN-TM 4	RS	
	IN-TM 5	REV	
	IN-TM O/C-1	NO	
	IN-TM O/C-2	NC	
	IN-TM O/C-3	NO	
	IN-TM O/C-4	NO	
	IN-TM O/C-5	NO	
F:39	OUT-TM 1	AR	
	OUT-TM O/C-1	NO	
	OUT-TM O/C-A	NC	
F:40	SAMP-F	08	

NOTE 1: 230 for LFU models, 460 for HFU models, 575 for MFU models. (Some exception may apply to older models)
NOTE 2: **BOLD** values can be changed.

VFD SALES AND ENGINEERING
275 West 4th Avenue
Vancouver, BC V5Y 1G8
CANADA

Operation manual - <NB501X>
Logic board: 1499 or lower

Phone: (604) 872-8155
Fax: (604) 872-8560

Toll free phone: (877) 539-2542
Toll free fax: (800) 539-2542

Hitachi J300 Series Variable Frequency Drive Software Programming (OPE)

Date:		Company:			
VFD MODEL:		Contact:			
Serial Number:		Phone:		Fax:	
VFD Tag:		Project:			

NOTE: Only the software parameters different from the "Initial Value" are noted.

DISPLAY CODE	INITIAL VALUE	SET VALUE
F2	0	
F4	F	
F5	02	
F6	30.0	
F7	30.0	
F8	11	
F9	03	
F10	72	
F11	NOTE 1	

F14	A0	na

d0	Output Frequency Monitor
d1	Motor Revolution Speed Monitor
d2	Output Current Monitor
d3	Frequency converted value
d10	Trip Monitor
d11	Trip History Monitor

DISPLAY CODE	INITIAL VALUE	SET VALUE
A0	0	
A1	NOTE 2	
A2	4	
A3	2.00	
A4	0.50	
A5	0	
A6	0	
A7	0	
A8	0	
A9	0	
A10	NOTE 3	
A11	NOTE 5	
A12	0	
A13	0	
A14	0	

A23	100	
A24	1	

A26	0	
A27	0	

A34	0	

A38	NOTE 4	
A39	0	
A40	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A44	0	

A48	1	
A49	0	

A54	0	

A58	NOTE 5	
A59	0	

A61	1.00	
A62	60	
A63	60	

A65	0	

A80	(NOTE3	
A81	NOTE 3	

C0	18	
C1	16	
C2	5	
C3	11	
C4	9	
C5	13	
C6	1	
C7	0	

C10	0	
C11	1	

C20	(00	
C21	04	

NOTE 1: 230 for LFU models, 460 for HFU & MFU models.
NOTE 2: Output kW rating of the VFD.
NOTE 3: DO NOT ADJUST. Factory use only.
NOTE 4: 1.5 for VFDs with DBU, 0.0 for VFDs without DBU.
NOTE 5: For European models only.

VFD SALES AND ENGINEERING
275 West 4th Avenue
Vancouver, BC V5Y 1G8
CANADA

Operation manual - <NB506X>
Logic board: 1876 or higher

Phone: (604) 872-8155
Fax: (604) 872-8560

Toll free phone: (677) 539-2542
Toll free fax: (600) 539-2542

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Technologies Inc.

Hitachi   0 Series Variable Frequency Drive Software Programming (OPE)

Date:		Company:			
VFD MODEL:		Contact:			
Serial Number:		Phone:		Fax:	
VFD Tag:		Project:			

NOTE: Only the software parameters different from the "Initial Value" are noted.

DISPLAY CODE	INITIAL VALUE	SET VALUE
F2	0	
F4	F	

DISPLAY CODE	INITIAL VALUE	SET VALUE
E6	30	
E7	30	
E8	11	
E9	3	
E10	72	
E11	NOTE 1	
E14	A0	na

DISPLAY CODE	INITIAL VALUE	SET VALUE
C0	18	
C1	16	
C2	5	
C3	11	
C4	9	
C5	13	
C6	1	
C7	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C10	0	
C11	1	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C20	0	
C21	4	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A0	0	
A1	NOTE 2	
A2	4	
A3	2	
A4	0.5	
A5	0	
A6	0	
A7	0	
A8	0	
A9	0	
A10	NOTE 3	
A11	8	
A12	0	
A13	0	
A14	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A23	100	
A24	1	
A25	4	
A26	0	
A27	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A34	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A38	NOTE 4	
A39	0	
A40	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A46	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A47	1	
A48	1	
A49	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A54	1	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A58	6	
A59	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A61	1	
A62	60	
A63	60	
A64	120	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A80	NOTE 3	
A81	NOTE 3	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A86	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A90	1	
A91	1	
A92	0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A94	0	
A95	0	
A96	0	
A97	0	
A98	0	
A99	0	

Code	Description
D0	Output Frequency Monitor
D1	Motor Revolution Speed Monitor
D2	Output Current Monitor
D3	Frequency converted value
D80	Trip Monitor
D81	Trip History Monitor

NOTE 1: 230 for LFU models, 460 for HFU models, 575 for MFU models.
NOTE 2: Output kW rating of the VFD.
NOTE 3: DO NOT ADJUST. Factory use only.
NOTE 4: 1.5 for VFDs with DBU, 0.0 for VFDs without DBU.

Technologies Inc.

Hitachi J300 Series Variable Frequency Drive Software Programming (DOP)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

Monitor Mode

Code	Display	Initial Value	Set Value
	ACC1	0030.00S	
	DEC1	0030.00S	
	F-SET-SELECT	TRM	
	F/R-SELECT	TRM	
	RPM 4P	0RPM	
	/Hz01.0	0.00	
	Im 0.0	0.0%	
	Torque	0%	
	V-boost code	<11>	
	V-Gain	100%	
	Jogging	1.0Hz	
	ADJ	072	
	TRM	LLLLLLLL	

NOTE 1: 230 for LFU models, 460 for HFU & MFU models.
NOTE 2: Output kW rating of the VFD.
NOTE 3 Varies depending on model.
NOTE 4: **BOLD** values can be changed

Function Mode

Code	Display	Initial Value	Set Value
00	F-BASE	0060Hz	
01	F-MAX	0060Hz	
02	Fmin	0.50Hz	
03	AVR AC	NOTE 1	
	AVR DEC	OFF	
04	CONTROL	VC	
05	AUX AUTO	NOR	
	AUX DATA	NOR	
	AUX K	NOTE 2	
	AUX P	4P	
	AUX R1	NOTE 3	
	AUX R2	NOTE 3	
	AUX L	NOTE 3	
	AUX M	NOTE 3	
	AUX J	NOTE 3	
	AUX Kp	002.00	
	AUX Ti	00100ms	
	AUX KPP	001.00	
06	ACC1	0030.00s	
	ACC2	0015.00s	
	ACC LINE	L	
	ACC GAIN	02	
07	DEC1	0030.00s	
	DEC2	0015.00s	
	DEC LINE	L	
	DEC GAIN	02	
08	Fsp F	0000.0Hz	
	Fsp TIME	00.0s	
09	PARAM	REM	
0A	RUN KIND	SPD	
	RUN MODE	NOR	
	RUN FRS	fST	

Function Mode

Code	Display	Initial Value	Set Value
11	SPD 1	0000.00Hz	
	SPD 2	0000.00Hz	
	SPD 3	0000.00Hz	
	SPD 4	0000.00Hz	
	SPD 5	0000.00Hz	
	SPD 6	0000.00Hz	
	SPD 7	0000.00Hz	
12	PRC1 F	0000.00Hz	
	PRC1 TF	OFF	
	PRC1 T	0000.0s	
	PRC1 A/D	S1F	
	PRC1 TERM	NOR	
	PRC1 NEXT	1	
13	PRC2 F	0000.00Hz	
	PRC2 TF	OFF	
	PRC2 T	0000.0s	
	PRC2 A/D	S1F	
	PRC2 TERM	NOR	
	PRC2 NEXT	1	
14	PRC3 F	0000.00Hz	
	PRC3 TF	OFF	
	PRC3 T	0000.0s	
	PRC3 A/D	S1F	
	PRC3 TERM	NOR	
	PRC3 NEXT	1	
15	PRC4 F	0000.00Hz	
	PRC4 TF	OFF	
	PRC4 T	0000.0s	
	PRC4 A/D	S1F	
	PRC4 TERM	NOR	
	PRC4 NEXT	1	

Function Mode

Code	Display	Set Value
F-16	PRC5 F	0000.00Hz	
	PRC5 TF	OFF	
	PRC5 T	0000.0s	
	PRC5 A/D	S1F	
	PRC5 TERM	NOR	
	PRC5 NEXT	1	
F-17	PRC6 F	0000.00Hz	
	PRC6 TF	OFF	
	PRC6 T	0000.0s	
	PRC6 A/D	S1F	
	PRC6 TERM	NOR	
	PRC6 NEXT	1	
F-18	PRC7 F	0000.00Hz	
	PRC7 TF	OFF	
	PRC7 T	0000.0s	
	PRC7 A/D	S1F	
	PRC7 TERM	NOR	
	PRC7 NEXT	1	
F-19	PRC8 F	0000.00Hz	
	PRC8 TF	OFF	
	PRC8 T	0000.0s	
	PRC8 A/D	S1F	
	PRC8 TERM	NOR	
	PRC8 NEXT	1	
F-20	DCB SW	OFF	
	DCB KIND	LVL	
	DCB F	0000.5Hz	
	DCB V-STA	00	
	DCB V-STP	00	
	DCB T-STA	000.0s	
	DCB T-STP	000.0S	
	DCB STOP-T	0.00s	
F-21	BRD-%ED	001.5%	
F-22	IPS TIME	1.0s	
	IPS WAIT	001.0s	
	IPS POWR	ALM	
	IPS TRIP	OFF	
F-23	E-THM CHAR	SUB	
	E-THM LEVEL	100%	
	E-THM A1	NOTE 3	
	E-THM F1	NOTE 3	
	E-THM A2	NOTE 3	
	E-THM F2	NOTE 3	
	E-THM A3	NOTE 3	
	E-THM F3	NOTE 3	
F-24	OLOAD LEVEL	125%	
	OLOAD CONST	01.0	
	OLOAD ACC	ON	
F-25	S-LOCK	MD1	
F-26	LIMIT L	0000.0Hz	
	LIMIT H	0000.0Hz	
F-27	JUMP F1	0000.0Hz	
	JUMP F2	0000.0Hz	
	JUMP F3	0000.0Hz	
	JUMP W	0.5Hz	
F-28	STOP-SW	ON	
F-29	F/R SW	FRE	
	F/R PREV	OFF	
	F/R RVS	6	
F-30	F-MAX-L	120Hz	

Function Mode

Code	Display	Set Value
F-31	IN ANA	10V	
	IN EXS	0000.0Hz	
	IN EXE	0000.0Hz	
	IN EX%S	000%	
	IN EX%E	100%	
	IN LEVEL	0Hz	
	IN F-SAMP	8	
F-32	ARV PTN	CST	
	ARV ACC	0.0Hz	
	ARV DEC	0.0Hz	
F-33	OV-TRQ V	100%	
	OV-TRQ R	100%	
F-34	IN-TM1	RS	
	IN-TM2	AT	
	IN-TM3	JG	
	IN-TM4	FRS	
	IN-TM5	CH1	
	IN-TM6	USP	
	IN-TM7	CF1	
	IN-TM8	REV	
	IN-TMO/C-1	NO	
	IN-TMO/C-2	NO	
	IN-TMO/C-3	NO	
	IN-TMO/C-4	NO	
F-35	OUT-TM1	FA1	
	OUT-TM2	RUN	
	OUT-TM O/C-A	NC	
	OUT-TM O/C-1	NO	
	OUT-TM O/C-2	NO	
F-36	CARRIER	16.0kHz	
F-37	MONITOR	A-F	
F-38	INIT TCNT	CNT	
	INIT DEBG	OFF	
	INIT DOPE	FWD	
	INIT RESET	ON	
F-39	OP P	01024pulse	
	OP MODE	ASR	
	OP RO-TO	OFF	
F-40	OR POS	IN	
	OR P	00000pulse	
	OR FC	0005.0Hz	
	OR TURN	FWD	
	OR L	00005pulse	
	OR TW	0.00s	
F-41	PO EGRP	FB	
	PO EGR-N	00001	
	PO EGR-D	00001	
	PO FFWG	000.00	
	PO G	000.50rad/s	
F-42	TRQ LIMIT	REM	
	TRQ FWD	150%	
	TRQ REV	150%	
F-43	PID IN-SEL	IN	
	PID LVL	000.00%	
	PID P	1.0	
	PID I	01.0s	
	PID D	000.0	
	PID MODE	MD0	
F-44	COM BAU	00600bps	
	COM NUMBER	01	
	COM LENGTH	8	
	COM PAR-SEL1	ON	
	COM PAR-SEL2	EVN	
	COM STOPBIT	2	
F-45	OP-ERR1	STP	
	OP-ERR2	STP	

VFD SALES AND ENGINEERING
275 West 4th Avenue
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CANADA

Operation manual - <NB506X>
Logic board: 1878 or higher

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Technologies Inc.

Hitachi J300 Series Variable Frequency Drive Software Programming (DOP)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

Code	Display	Initial Value	Set Value
	ACC1	0030.00S	
	DEC1	0030.00S	
	F-SET-SELECT	TRM	
	F/R-SELECT	TRM	
	RPM 4P	0RPM	
	/Hz01.0	0.00	
	Im 0.0	0.0%	na
	Torque	0%	na
	V-boost code	<11>	
	V-boost F	10.0%	
	V-Gain	100%	
	Jogging	1.0Hz	
	ADJ	172	
	TRM	LLLLLLLL	

(left column label: Not applicable)

NOTE 1: 230 for LFU models, 460 for HFU models, 575 for MFU models.
NOTE 2: Output kW rating of the VFD.
NOTE 3: Value varies depending on models.
NOTE 4: **BOLD** values can be changed.
NOTE 5: This software parameter list applies to J300 manuals, NB506X, XA, XB, & XC.
NOTE 6: This software parameter list applies to logic board number #1878 or higher.

Function Mode

Code	Display	Initial Value	Set Value
F-00	F-BASE	0060Hz	
F-01	F-MAX	0060Hz	
F-02	Fmin	0.50Hz	
F-03	AVR AC	NOTE 1	
	AVR DEC	OFF	
F-04	CONTROL	VC	
F-05	AUX AUTO	NOR	
	AUX DATA	NOR	
	AUX K	NOTE 2	
	AUX P	4P	
	AUX R1	NOTE 3	
	AUX R2	NOTE 3	
	AUX L	NOTE 3	
	AUX M	NOTE 3	
	AUX J	NOTE 3	
	AUX Kp	002.00	
	AUX Ti	00100ms	
	AUX KPP	001.00	
F-06	ACC1	0030.00s	
	ACC2	0015.00s	
	ACC LINE	L	
	ACC GAIN	02	

Code	Display	Initial Value	Set Value
F-07	DEC1	0030.00s	
	DEC2	0015.00s	
	DEC LINE	L	
	DEC GAIN	02	
F-08	Fsp F	0000.0Hz	
	Fsp TIME	00.0s	
F-09	PARAM	REM	
F-10	RUN MODE	NOR	
	RUN FRS	ZST	
F-11	SPD 1	0000.00Hz	
	SPD 2	0000.00Hz	
	SPD 3	0000.00Hz	
	SPD 4	0000.00Hz	
	SPD 5	0000.00Hz	
	SPD 6	0000.00Hz	
	SPD 7	0000.00Hz	
F-20	DCB SW	OFF	
	DCB KIND	LVL	
	DCB F	0000.5Hz	
	DCB V-STA	00	
	DCB V-STP	00	
	DCB T-STA	000.0s	
	DCB T-STP	000.0S	
	DCB STOP-T	0.00s	

Code	Display	Initial Value	Set Value
F-21	BRD-%ED	001.5%	
F-22	IPS TIME	1.0s	
	IPS WAIT	001.0s	
	IPS POWR	ALM	
	IPS TRIP	OFF	
F-23	E-THM CHAR	SUB	
	E-THM LEVEL	100%	
	E-THM A1	8.5A	
	E-THM F1	0000Hz	
	E-THM A2	8.5A	
	E-THM F2	5Hz	
	E-THM A3	13.0Hz	
	E-THM F3	73Hz	
F-24	OLOAD LEVEL	125%	
	OLOAD CONST	01.0	
	OLOAD ACC	ON	
F-25	S-LOCK	MD1	
F-26	LIMIT L	0000.0Hz	
	LIMIT H	0000.0Hz	
F-27	JUMP F1	0000.0Hz	
	JUMP F2	0000.0Hz	
	JUMP F3	0000.0Hz	
	JUMP W	0.5Hz	
F-28	STOP-SW	ON	
F-29	F/R SW	FRE	
	F/R PREV	OFF	
	F/R RVS	6	
F-30	F-MAX-L	120Hz	
F-31	IN ANA	10V	
	IN EXS	0000.0Hz	
	IN EXE	0000.0Hz	
	IN EX%S	000%	
	IN EX%E	100%	
	IN LEVEL	0Hz	
	IN F-SAMP	8	
F-32	ARV PTN	CST	
	ARV ACC	0.0Hz	
	ARV DEC	0.0Hz	
F-33	OV-TRQ V	100%	
	OV-TRQ R	100%	
F-34	IN-TM1	RS	
	IN-TM2	AT	
	IN-TM3	JG	
	IN-TM4	FRS	
	IN-TM5	CH1	
	IN-TM6	USP	
	IN-TM7	CF1	
	IN-TM8	REV	
	IN-TMO/C-1	NO	
	IN-TMO/C-2	NO	
	IN-TMO/C-3	NO	
	IN-TMO/C-4	NO	

Code	Display	Initial Value	Set Value
F-35	OUT-TM1	FA1	
	OUT-TM2	RUN	
	OUT-TM O/C-A	NC	
	OUT-TM O/C-1	NO	
	OUT-TM O/C-2	NO	
F-36	CARRIER	16.0kHz	
F-37	MONITOR	A-F	
F-38	INIT TCNT	CNT	
	INIT DEBG	OFF	
	INIT DOPE	FWD	
	INIT RESET	ON	
F-39	OP P	01024pulse	
	OP MODE	ASR	
	OP RO-TO	OFF	
F-40	OR POS	IN	
	OR P	00000pulse	
	OR FC	0005.0Hz	
	OR TURN	FWD	
	OR L	00005pulse	
	OR TW	0.00s	
F-41	PO EGRP	FB	
	PO EGR-N	00001	
	PO EGR-D	00001	
	PO FFWG	000.00	
	PO G	000.50rad/s	
F-42	TRQ LIMIT	REM	
	TRQ FWD	150%	
	TRQ REV	150%	
F-43	PID IN-SEL	IN	
	PID LVL	000.00%	
	PID P	1.0	
	PID I	01.0s	
	PID D	000.0	
	PID MODE	MD0	
F-46	COM BAU	00600bps	
	COM NUMBER	01	
	COM LENGTH	8	
	COM PAR-SEL1	ON	
	COM PAR-SEL2	EVN	
	COM STOPBIT	2	
F-47	OP-ERR1	STP	
	OP-ERR2	STP	
F-48	RELAY RYA	RUN	
	RELAY RYB	CST	
	RELAY RYC	OTQ	

VFD SALES AND ENGINEERING
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CANADA

Operation manual - <NB506X>
Logic board: 1878 or higher

MGi

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Hitachi J300 Series Variable Frequency Drive Software Programming (HOP)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

Monitor Mode

	Factory	Set		Factory	Set		Factory	Set
FS	0.00Hz		Torque	NOTE 1		WARN	NOTE 2	
AC1	30.00s		V-Boost	11		ERR1	NOTE 2	
DC1	30.00s		V-Boost F	10.0%		ERR2	NOTE 2	
RPM	4P		V-Gain	100%		ERR3	NOTE 2	
/Hz	1.0		Jogging	1.00Hz		Count	NOTE 2	
Im	NOTE 1		ADJ	172				
	NOTE 1		TERM	NOTE 1				

Function Mode

t Layer	d Layer	3rd Layer	4th Layer	Factory	Set	1st Layer	d Layer	d Layer	4th Layer	Factory	Set
Command			1 F-SET	0: TRM		3 Function	tun	SPD	1 1S	0.00Hz	
			2 F/R	0: TRM					2 2S	0.00Hz	
			3 PARM	0: REM					3 3S	0.00Hz	
Initial			1 TCNT	0: CNT					4 4S	0.00Hz	
			2 DEBG	0: OFF					5 5S	0.00Hz	
			3 DOPE	0: FWD					6 6S	0.00Hz	
			4 RESET	0: ON					7 7S	0.00Hz	
Function	Control	1 V/f	1 F-BASE	60Hz			iraking	DCB	1 SW	0: OFF	
			2 F-MAX	60Hz					2 KIND	1: LVL	
			3 Fmin	0.50Hz					3 F	0.5Hz	
			4 A-AC	NOTE 3					4 V-STA	0	
			5 A-DEC	0: OFF					5 V-STP	0	
			6 MODE	0: VC					6 T-STA	0.0s	
		2 Motor	1 AUTO	0: NOR					7 T-STP	0.0s	
			2 DATA	0: NOR					8 STOP-T	0.00s	
			3 K	NOTE 3				BRD	1 %ED	0	
			4 P	1: 4P			'rotect	Ethermal	1 CHAR	1: SUB	
			5 R1	NOTE 3					2 LEVEL	100%	
			6 R2	NOTE 3					3 A1	NOTE 3	
			7 L	NOTE 3					4 F1	0Hz	
			8 M	NOTE 3					5 A2	NOTE 3	
			9 J	NOTE 3					6 F2	5Hz	
			a Kp	NOTE 3					7 A3	NOTE 3	
			b Ti	NOTE 3					8 F3	73Hz	
			c Kpp	NOTE 3				OLoad	1 LEVEL	125%	
		3 Carrier	1 Cari-f	NOTE 3					2 CONST	1	
	Acc/Dec	1 Accel	1 A1	30.00s					3 ACC	1: ON	
			2 A2	15.00s				Freq.	1 LIML	0.0Hz	
			3 LINE	0: L					2 LIMH	0.0Hz	
			4 GAIN	2					3 F1	0.0Hz	
		2 Decel	1 D1	30.00s					4 F2	0.0Hz	
			2 D2	15.00s					5 F3	0.0Hz	
			3 LINE	0: L					6 WIDTH	0.5Hz	
			4 GAIN	2				IPS	1 TIME	1.0s	
	Run	1 Freq.	1 F	0.0Hz					2 WAIT	1.0s	
			2 TIME	0.0s					3 POWR	0: ALM	
		2 Pattern	1 MODE	0: NOR					4 TRIP	1: OFF	
			2 FRS	1: ZST							

1st Layer	2nd Layer	3rd Layer	4th Layer	Factory	Set
3 Function	5 Protect	5 Others	1 MAXF	0: 120Hz	
			2 SLOCK	1: MD1	
			3 STOP	1: ON	
			4 F/R	2: FRE	
			5 PREV	0: OFF	
			6 RVS	6	
	6 Terminal	1 Analog	1 V	1: 10	
			2 EXS	0.0Hz	
			3 EXE	0.0Hz	
			4 EX%S	0	
			5 EX%E	1	
			6 LEVEL	0: 0Hz	
			7 F-SAMP	8	
		2 Signal	1 PTN	0: CST	
			2 ACC	0.0Hz	
			3 DEC	0.0Hz	
			4 V	100%	
			5 R1	100%	
		3 Terminal	1 I-1	18: RS	
			2 I-2	16: AT	
			3 I-3	5: JG	
			4 I-4	11: FRS	
			5 I-5	9: CH1	
			6 I-6	13: USP	
			7 I-7	1: CF1	
			8 I-8	0: REV	
			9 I-OC1	0: NO	
			a I-OC2	0: NO	
			b I-OC3	0: NO	
			c I-OC4	0: NO	
			d O-1	0: FA1	
			e O-2	1: RUN	
			f O-OCA	1: NC	
			g O-OC1	0: NO	
			h O-OC2	0: NO	
		4 Monitor	1 SEL	0: A-F	

1st Layer	2nd Layer	d Layer	4th Layer	Factory	Set
4 Option	1 Op Error		1 OP1	1: STP	
			2 OP2	1: STP	
	2 Select		1 ENC-P	1024pls	
			2 MODE	0: ASR	
			3 R0-T0	0: OFF	
	3 Orient		1 POS	0: IN	
			2 P	0pls	
			3 FC	5.0Hz	
			4 TURN	0: FWD	
			5 LIMIT	5pls	
			6 TW	0.00s	
	4 Position		1 EGRP	0: FB	
			2 EGR-N	1	
			3 EGR-D	1	
			4 FFWD	0.00	
			5 G	0.50rad	
	5 Torque		1 LIMIT	0: REM	
			2 FWD	150%	
			3 REV	150%	
	6 PID		1 I-SEL	0: IN	
			2 LVL	0.00%	
			3 P	1.0	
			4 I	1.0s	
			5 D	0.0	
			6 MODE	0: MD0	
	7 Com.		1 BAU	1: 600bps	
			2 NUMBER	1	
			3 LENGTH	0: 8	
			4 PAR-1	1: ON	
			5 PAR-2	0: EVN	
			6 STOPBIT	0: 2	
	8 RELAY		1 RYA	3: RUN	
			2 RYB	0: CST	
			3 RYC	4: OTQ	

NOTE 1   Value depends on the operation condition.
NOTE 2   Data will be available when there are Warnings or Errors.
NOTE 3   Value depends on VFD model.

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Hitachi L100 Series Variable Frequency Drive Software Programming (OPE)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

DISPLAY CODE	INITIAL VALUE	SET VALUE
F01	0.0	
F02	10.0	
F03	10.0	
F04	00	
A01	01	
A02	01	
A03	60.0	
A04	60.0	
A11	0	
A12	0	
A13	0	
A14	100	
A15	01	
A16	8	
A20	0.0	
A21	0.0	
A22	0.0	
A23	0.0	
A24	0.0	
A25	0.0	
A26	0.0	
A27	0.0	
A28	0.0	
A29	0.0	
A30	0.0	
A31	0.0	
A32	0.0	
A33	0.0	
A34	0.0	
A35	0.0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A38	1.0	
A39	00	
A41	0	
A42	11	
A43	10.0	
A44	00	
A45	100	
A51	00	
A52	0.5	
A53	0.0	
A54	0	
A55	0.0	
A61	0.0	
A62	0.0	
A63	0.0	
A64	0.5	
A65	0.0	
A66	0.5	
A67	0.0	
A68	0.5	
A71	00	
A72	1.0	
A73	1.0	
A74	0.0	
A75	1.00	
A76	00	
A81	02	
A82	NOTE 1	
A92	15.0	
A93	15.0	
A94	00	
A95	0.0	
A96	0.0	
A97	00	
A98	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
b01	00	
b02	1.0	
b03	1.0	
b12	NOTE 2	
b13	01	
b21	01	
b22	NOTE 3	
b23	1.0	
b31	01	
b32	NOTE 4	
b81	80	
b82	0.5	
b83	5.0	
b84	00	
b85	02	
b86	1.0	
b87	00	
b88	00	
b89	01	
C01	00	
C02	01	
C03	16	
C04	13	
C05	18	
C11	00	
C12	00	
C13	00	
C14	01	
C15	00	
C21	01	
C22	00	
C23	00	
C31	00	
C32	00	
C33	01	
C41	NOTE 2	
C42	0.0	
C43	0.0	
C44	3.0	

NOTE 1: 230 for LFU & NFU models. 460 for HFU models.
NOTE 2: Rated output current of the VFD.
NOTE 3: 125% of rated output current of the VFD.
NOTE 4: Only for 055 & 075xFU models. 58% of rated output current of the VFD.

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Hitachi L100 Series Variable Frequency Drive Software Programming (DOP)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

Monitor Mode

Code	Display	Initial Value	Set Value
	FS000.0	0.0Hz	
	ACC1	0010.00S	
	DEC1	0010.00S	
	F-SET-SELECT	TRM	
	F/R-SELECT	TRM	
	/Hz01.0	0.00	
	Im 0.0A	0.0%	na
	V-boost code	<11>	
	V-boost F	10.0%	
	V-Gain	100%	
	Jogging	1.0Hz	
	Jog Mode	0	
	ADJ	80	
	PANEL	d01	
	TRM	LLLLLLLL	na

NOTE 1: 230 for LFU & NFU, 460 for HFU.
NOTE 2: Rated output current.
NOTE 3: 125% of rated output current.
NOTE 4: BOLD values can be changed.

Function Mode

Code	Display	Initial Value	Set Value
F-00	F-BASE	060Hz	
F-01	F-MAX	060Hz	
F-02	Fmin	0.50Hz	
F-03	AVR AC	NOTE 2	
	AVR MODE	DOFF	
F-04	CONTROL	VC	
F-06	ACC1	0010.0S	
	ACC CHG	TM	
	ACC 2	0015.0S	
	ACC CHFr	000.0Hz	
	ACC LINE	L	
F-07	DEC 1	0010.0S	
	DEC 2	0015.0S	
	DEC CHFr	000.0Hz	
	DEC LINE	L	
F-10	RUN FRS	ZST	
F-11	SPD 1	000.0Hz	
	SPD 2	000.0Hz	
	SPD 3	000.0Hz	
	SPD 4	000.0Hz	
	SPD 5	000.0Hz	
	SPD 6	000.0Hz	
	SPD 7	000.0Hz	
	SPD 8	000.0Hz	
	SPD 9	000.0Hz	
	SPD 10	000.0Hz	
	SPD 11	000.0Hz	
	SPD 12	000.0Hz	
	SPD 13	000.0Hz	
	SPD 14	000.0Hz	
	SPD15	000.0Hz	
F-20	DCB SW	OFF	
	DCB F	0000.5Hz	
	DCB WAIT	0.0s	
	DCB V	000	
	DCB T	00.0S	
F-22	IPS UVTIME	01.0s	
	IPS WAIT	001.0s	
	IPS POWR	ALM	
	E-THM LVL	NOTE 2	
F-23	OLOAD LVL	NOTE 3	
	OLOAD CONST	01.0	
	OLOAD MODE	ON	
F-25	S-LOCK	MD1	

Function Mode

Code	Display	Initial Value	Set Value
F-26	LIMIT L	000.0Hz	
	LIMIT H	000.0Hz	
F-27	JUMP F1	000.0Hz	
	JUMP F2	000.0Hz	
	JUMP F3	000.0Hz	
	JUMP W1	00.5Hz	
	JUMP W2	00.5Hz	
	JUMP W3	00.5Hz	
F-28	STOP-SW	ON	
F-31	IN EXS	000.0Hz	
	IN EXE	000.0Hz	
	IN EX%S	000%	
	IN EX%E	100%	
	IN LEVEL	0Hz	
	IN F-SAMP	8	
F-32	ARV ACC	000.0Hz	
	ARV DEC	000.0Hz	
F-33	OV Load	NOTE 2	
	OV PID	003.0%	
F-34	IN-TM1	FW	
	IN-TM2	RV	
	IN-TM3	CF1	
	IN-TM4	CF2	
	IN-TM5	RS	
	IN-TM O/C-1	NO	
	IN-TM O/C-2	NO	
	IN-TM O/C-3	NO	
	IN-TM O/C-4	NC	
	IN-TM O/C-5	NO	
F-35	OUT-TM1	FA1	
	OUT-TM2	RUN	
	OUT-TM O/C-A	NC	
	OUT-TM O/C-1	NO	
	OUT-TM O/C-2	NO	
F-36	CARRIER	5.0kHz	
F-37	MONITOR	A-F	
F-38	INIT SEL	USA	
	INIT DEBG	OFF	
	INIT DOPE	FWD	
	INIT MODE	TRP	
F-39	PID SW	OFF	
	PID P	1.0	
	PID I	001.0s	
	PID D	000.0	
	PID CONV	01.00	
	PID INPT	CUR	

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Hitachi SJ100 Series Variable Frequency Drive Software Programming (OPE)

Date:			Company:		
VFD MODEL:			Contact:		
Serial Number:			Phone:		Fax:
VFD Tag:			Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

DISPLAY CODE	INITIAL VALUE	SET VALUE
F01	0.0	
F02	10.0	
F202	10.0	
F03	10.0	
F203	10.0	
E04	00	
A01	01	
A02	01	
A03	60.0	
A203	60.0	
A04	60.0	
A204	60.0	
A11	0	
A12	0	
A13	0	
A14	100	
A15	01	
A16	8	
A20	0.0	
A21	0.0	
A22	0.0	
A23	0.0	
A24	0.0	
A25	0.0	
A26	0.0	
A27	0.0	
A28	0.0	
A29	0.0	
A30	0.0	
A31	0.0	
A32	0.0	
A33	0.0	
A34	0.0	
A35	0.0	
A38	1.0	
A39	00	
A41	00	
A241	00	
A42	11	
A242	11	
A43	10.0	
A243	10.0	
A44	00	
A244	00	
A45	100	
A51	00	
A52	0.5	
A53	0.0	
A54	0	
A55	0.0	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A61	0.0	
A62	0.0	
A63	0.0	
A64	0.5	
A65	0.0	
A66	0.5	
A67	0.0	
A68	0.5	
A71	00	
A72	1.0	
A73	1.0	
A74	0.0	
A75	1.00	
A76	00	
A81	02	
A82	NOTE 1	
A92	15.0	
A292	15.0	
A93	15.0	
A293	15.0	
A94	00	
A294	00	
A95	0.0	
A295	0.0	
A96	0.0	
A296	0.0	
A97	00	
A98	00	
b01	00	
b02	1.0	
b03	1.0	
b12	NOTE 2	
b212	NOTE 2	
b13	01	
b213	01	
b21	01	
b22	NOTE 3	
b23	1.0	
b31	01	
b81	80	
b82	0.5	
b83	5.0	
b84	00	
b85	02	
b86	1.0	
b87	00	
b88	00	
b89	01	
b90	00	
b91	00	
b92	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C01	00	
C02	01	
C03	16	
C04	13	
C05	09	
C06	18	
C11	00	
C12	00	
C13	00	
C14	01	
C15	00	
C16	00	
C21	01	
C22	00	
C23	00	
C24	05	
C31	00	
C32	00	
C33	01	
C41	NOTE 2	
C42	0.0	
C43	0.0	
C44	3.0	
C81	NOTE 4	
C82	NOTE 4	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C91	NOTE 6	na
C92	NOTE 6	na
C93	NOTE 6	na
C94	NOTE 6	na
C95	NOTE 6	na

DISPLAY CODE	INITIAL VALUE	SET VALUE
H01	00	
H02	00	
H202	00	
H03	NOTE 5	
H203	NOTE 5	
H04	4	
H204	4	
H05	20	
H205	20	
H06	100	
H206	100	
H20	NOTE 4	
H220	NOTE 4	
H21	NOTE 4	
H221	NOTE 4	
H22	NOTE 4	
H222	NOTE 4	
H23	NOTE 4	
H223	NOTE 4	
H24	NOTE 4	
H224	NOTE 4	
H30	NOTE 6	na
H230	NOTE 6	na
H31	NOTE 6	na
H231	NOTE 6	na
H32	NOTE 6	na
H232	NOTE 6	na
H33	NOTE 6	na
H233	NOTE 6	na
H34	NOTE 6	na
H234	NOTE 6	na

NOTE 1:	230 for LFU & NFU, 460 for HFU.
NOTE 2:	Rated current of the VFD.
NOTE 3:	125% of rated current of the
NOTE 4:	Value varies on models.
NOTE 5:	Rated kW capacity of the VFD.
NOTE 6:	DO NOT CHANGE. Factory use only.

mGi
Technologies Inc.

VFD SALES AND ENGINEERING
275 West 4th Avenue
Vancouver, BC V5Y 1G8
CANADA

Operation manual - <NB582X>

Phone:	(604) 709-8600	Toll free phone:	1 (877) 539-2542
Fax:	(604) 872-8560	Toll free fax:	1 (800) 539-2542

Hitachi SJ100 Series Variable Frequency Drive Software Programming (DOP)

Date:		Company:	
VFD MODEL:		Contact:	
Serial Number:		Phone:	Fax:
VFD Tag:		Project:	

NOTE: Only the software parameters different from the "Initial Value" are noted.

Monitor Mode

Code	Display	Initial Value	Set Value
	FS000.0	0.0Hz	
	ACC1	0010.0S	
	ACC2	0015.0S	
	2ACC	0010.0S	
	2ACC2	0015.0S	
	DEC1	0010.0S	
	DEC2	0015.0S	
	2DEC	0010.0S	
	2DEC2	0015.0S	
	F-SET-SELECT	TRM	
	F/R-SELECT	TRM	
	/Hz01.0	0.00	
	Im 0.0A	0.0%	na
	V-boost code	<11>	
	2V-boost code	<11>	
	V-boost F	10.0%	
	2V-boost F	10.0%	
	V-Gain	100%	
	Jogging	1.00Hz	
	Jog Mode	0	
	ADJ-O	100	
	ADJ-OI	100	
	ADJ	80	
	PANEL	d01	
	TRM	LLLLLLLL	na
	RUN	000000H	na
	ERR1	NOTE 1	na
	ERROR COUNT	0	na
	ERR2	NOTE 1	na
	ERR3	NOTE 1	na
	PN-V	300Vdc	NOTE 2
	BRD ON	0%	NOTE 2
	E-Thermal	0%	NOTE 2
	IO F780	00 0000	NOTE 2
	CO D001	00 0000	NOTE 2
	IO	B3C02119	NOTE 2
	CO	B3B02120	NOTE 2
	0400000000000000		NOTE 2
	1400000000000000		NOTE 2

(Not applicable)

Function Mode

Code	Display	Initial Value	Set Value
F-00	F-BASE	060Hz	
	2F-BASE	060Hz	
F-01	F-MAX	060Hz	
	2F-MAX	060Hz	
F-02	Fmin	0.50Hz	
F-03	AVR AC	NOTE 3	
	AVR MODE	DOFF	
F-04	CONTROL	VC	
	2CONTROL	VC	
F-05	AUX AUTO	NOR	
	AUX DATA	NOR	
	2AUX DATA	NOR	
	AUX K	NOTE 4	
	2AUX K	NOTE 4	
	AUX P	4P	
	2AUX P	4P	
	AUX R1	NOTE 5	
	2AUX R1	NOTE 5	
	AUX R2	NOTE 5	
	2AUX R2	NOTE 5	
	AUX L	NOTE 5	
	2AUX L	NOTE 5	
	AUX IO	NOTE 5	
	2AUX IO	NOTE 5	
	AUX J	NOTE 5	
	2AUX J	NOTE 5	
	AUX Kp	20	
	2AUX Kp	20	
	AUX KCD	100%	
	2AUX KCD	100%	
F-06	ACC1	0010.0S	
	2ACC1	0010.0S	
	ACC CHG	TM	
	2ACC CHG	TM	
	ACC 2	0015.0S	
	2ACC 2	0015.0S	
	ACC CHFr	000.0Hz	
	2ACC CHFr	000.0Hz	
	ACC LINE	L	
F-07	DEC 1	0010.0S	
	2DEC 1	0010.0S	
	DEC 2	0015.0S	
	2DEC 2	0015.0S	
	DEC CHFr	000.0Hz	
	2DEC CHFr	000.0Hz	
	DEC LINE	L	
F-10	RUN FRS	ZST	
	RUN STP	DEC	

Code	Display	Initial Value	Set Value
F-11	SPD FS	000.0Hz	
	SPD 2FS	000.0Hz	
	SPD 1	000.0Hz	
	SPD 2	000.0Hz	
	SPD 3	000.0Hz	
	SPD 4	000.0Hz	
	SPD 5	000.0Hz	
	SPD 6	000.0Hz	
	SPD 7	000.0Hz	
	SPD 8	000.0Hz	
	SPD 9	000.0Hz	
	SPD 10	000.0Hz	
	SPD 11	000.0Hz	
	SPD 12	000.0Hz	
	SPD 13	000.0Hz	
	SPD 14	000.0Hz	
	SPD 15	000.0Hz	
F-20	DCB SW	OFF	
	DCB F	00.5Hz	
	DCB WAIT	0.0s	
	DCB V	000	
	DCB T	00.0S	
F-21	BRD-%ED	0.00%	
F-22	IPS UVTIME	01.0s	
	IPS WAIT	001.0s	
	IPS POWR	ALM	
F-23	E-THM CHAR	CRT	
	2E-THM CHAR	CRT	
	E-THM LVL	NOTE 6	
	2E-THM LVL	NOTE 6	
F-24	OLOAD LVL	NOTE 7	
	OLOAD CONST	01.0	
	OLOAD MODE	ON	
F-25	S-LOCK	MD1	
F-26	LIMIT L	000.0Hz	
	LIMIT H	000.0Hz	
F-27	JUMP F1	000.0Hz	
	JUMP F2	000.0Hz	
	JUMP F3	000.0Hz	
	JUMP W1	00.5Hz	
	JUMP W2	00.5Hz	
	JUMP W3	00.5Hz	
F-28	STOP-SW	ON	
F-31	IN EXS	000.0Hz	
	IN EXE	000.0Hz	
	IN EX%S	000%	
	IN EX%E	100%	
	IN LEVEL	0Hz	
	IN F-SAMP	8	

Code	Display	Initial Value	Set Value
F-32	ARV ACC	000.0Hz	
	ARV DEC	000.0Hz	
F-33	OV Load	NOTE 6	
	OV PID	003.0%	
F-34	IN-TM1	FW	
	IN-TM2	RV	
	IN-TM3	AT	
	IN-TM4	USP	
	IN-TM5	2CH	
	IN-TM6	RS	
	IN-TM O/C-1	NO	
	IN-TM O/C-2	NO	
	IN-TM O/C-3	NO	
	IN-TM O/C-4	NC	
	IN-TM O/C-5	NO	
	IN-TM O/C-6	NO	
F-35	OUT-TM1	FA1	
	OUT-TM2	RUN	
	OUT-TM RY	AL	
	OUT-TM O/C-RY	NC	
	OUT-TM O/C-1	NO	
	OUT-TM O/C-2	NO	
F-36	CARRIER	5.0kHz	
F-37	MONITOR	A-F	
F-38	INIT SEL	USA	
	INIT DEBG	OFF	
	INIT DOPE	FWD	
	INIT MODE	TRP	
	INIT FAN-CTL	OFF	
F-43	PID SW	OFF	
	PID P	1.0	
	PID I	001.0s	
	PID D	000.0	
	PID CONV	01.00	
	PID INPT	CUR	
F-50	V-Boost MODE	0	
	2V-Boost MODE	0	
	V-Boost code	11	
	2V-Boost code	11	
	V-Boost F	10.0%	
	2V-Boost F	10.0%	

NOTE 1: Error information
NOTE 2: DO NOT CHANGE. Factory use only.
NOTE 3: 230V for LFU & NFU models, 460V for HFU models.
NOTE 4: Rated kW capacity of the unit.
NOTE 5: Value varies on models
NOTE 6: Rated output current.
NOTE 7: 125% of the rated current.
NOTE 8: BOLD values can be changed.

VFD SALES AND ENGINEERING
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Phone:	(604) 709-8600	Toll free phone:	1 (877) 539-2542
Fax:	(604) 872-8560	Toll free fax:	1 (800) 539-2542

Hitachi L300 Plus Series Variable Frequency Drive Software Programming (OPE)

Date:		Company:		
VFD MODEL:		Contact:		
Serial Number:		Phone:		Fax:
VFD Tag:		Project:		

NOTE: Only the software parameters different from the "Initial Value" are noted.

DISPLAY CODE	INITIAL VALUE	SET VALUE
F001	0.00Hz	
F002	30.0s	
F202	30.0s	
F003	30.0s	
F203	30.0s	
F004	00	

A001	01	
A002	01	
A003	60Hz	
A203	60Hz	
A004	60Hz	
A204	60Hz	

A005	00	
A006	00	
A011	0.00Hz	
A012	0.00Hz	
A013	0.0%	
A014	100.0%	
A015	01	
A016	8	

A019	00	
A020	0.00Hz	
A021	0.00Hz	
A022	0.00Hz	
A023	0.00Hz	
A024	0.00Hz	
A025	0.00Hz	
A026	0.00Hz	
A027	0.00Hz	
A028	0.00Hz	
A029	0.00Hz	
A030	0.00Hz	
A031	0.00Hz	
A032	0.00Hz	
A033	0.00Hz	
A034	0.00Hz	
A035	0.00Hz	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A038	1.0	
A039	00	

A041	00	
A241	00	
A042	1.0	
A242	1.0	
A043	5.0	
A243	5.0	
A044	00	
A244	00	
A045	100	

A051	00	
A052	0.50Hz	
A053	0.0s	
A054	0%	
A055	0.0s	
A056	01	
A057	0%	
A058	0.0s	
A059	3.0kHz	

A061	0.00Hz	
A261	0.00Hz	
A062	0.00Hz	
A262	0.00Hz	
A063	0.00Hz	
A064	0.50Hz	
A065	0.00Hz	
A066	0.50Hz	
A067	0.00Hz	
A068	0.50Hz	
A069	0.00Hz	

DISPLAY CODE	INITIAL VALUE	SET VALUE
A070	0.0s	
A071	00	
A072	1.0	
A073	1.0s	
A074	0.00s	
A075	1.00%	
A076	00	

A081	02	
A082	NOTE 1	

A092	15.00s	
A292	15.00s	
A093	15.00s	
A293	15.00s	
A094	00	
A294	00	
A095	0.00Hz	
A295	0.00Hz	
A096	0.00Hz	
A296	0.00Hz	
A097	00	
A098	00	

A101	0.00Hz	
A102	0.00Hz	
A103	20%	
A104	100%	
A105	01	
A111	0.00Hz	
A112	0.00Hz	
A113	-100%	
A114	100%	

A131	02	
A132	02	

DISPLAY CODE	INITIAL VALUE	SET VALUE
b001	00	
b002	1.0s	
b003	1.0s	
b004	00	
b005	00	
b006	00	
b007	0.00Hz	

DISPLAY CODE	INITIAL VALUE	SET VALUE
b012	NOTE 2	
b212	NOTE 2	
b013	01	
b213	01	
b015	0Hz	
b016	0.0A	
b017	0Hz	
b018	0.0A	
b019	0Hz	
b020	0.0A	
b021	01	
b022	NOTE 3	
b023	1.00s	
b024	01	
b025	NOTE 3	
b026	1.00s	

DISPLAY CODE	INITIAL VALUE	SET VALUE
b031	01	
b034	0hr	
b035	00	
b036	06	
b037	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
b081	150	
b082	0.50Hz	
b083	3.0kHz	
b084	00	
b085	02	
b086	1.0	
b087	00	
b088	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C001	18	
C002	16	
C003	13	
C004	02	
C005	01	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C011	00	
C012	00	
C013	01	
C014	00	
C015	00	
C019	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C021	01	
C022	00	
C026	05	
C027	00	
C028	00	
C029	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C031	00	
C032	00	
C036	01	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C040	01	
C041	NOTE 2	
C042	0.00Hz	
C043	0.00Hz	
C044	3.0Hz	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C061	6 0 %	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C070	02	
C071	04	
C072	1	
C073	7	
C074	00	
C075	1	
C078	0ms	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C081	NOTE 6	
C082	NOTE 6	
C083	NOTE 6	
C085	105	
C086	0.0V	
C087	50	
C088	NOTE 6	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C91	00	

DISPLAY CODE	INITIAL VALUE	SET VALUE
C101	00	
C102	00	
C103	00	
C121	NOTE 6	na
C122	NOTE 6	na
C123	NOTE 6	na

DISPLAY CODE	INITIAL VALUE	SET VALUE
H003	NOTE 5	
H203	NOTE 5	
H004	4	
H204	4	
H006	100	
H206	100	

DISPLAY CODE	INITIAL VALUE	SET VALUE
P001	00	
P002	00	
U001	no	
U002	no	
U003	no	
U004	no	
U005	no	
U006	no	
U007	no	
U008	no	
U009	no	
U010	no	
U011	no	
U012	no	

: NOTE 1: 230 for LFU 8 NFU, 460 for HFU.
: NOTE 2: **Rated** current of the **VFD.**
NOTE 3: **125%** of rated current of the VFD.
NOTE 4: Value varies on model*.
NOTE 5: Rated kW capacity of the VFD.
NOTE 6: DO NOT CHANGE. Factory use only.
NOTE 7: **360** for LFU, 720 for HFU

HOA-MOD

Circuit Breaker

460/3/60

3% INPUT REACTOR

40HP 3PH MOTOR

Customer outputs see legend

Preset Speed

LEGEND:

F1- Main Fuses
F2- Trans. Primary Fuses
F3- Trans. Secondary Fuse
HOA-MOD- Hand-Off-Auto Module

INPUT/OUTPUT TERMINALS

4,5,6   -external interlock (contact rating 120AC/5A)
7, 8   -external run command (contact rating 120VAC/5A)
D   -drain from shielded wire
LS   -common for freq. signal input
CFS   -current (4-20mA) freq. signal
VFS   -voltage (0-10V) freq. signal
AM, L   -O-10V Output
AMI, L   -4-20mA Output
13, CM1 -Preset speed input
RS0, RS1 -run status-dry contact output
FR0, FR1, FR2 -VFD fault status, dry contact output
HR1, HR0 -hand mode status, dry contact output

NOTE:

All status contacts (dry contacts) are rated at 2A/30VDC resistive load.
FR0 and FR1 close on fault condition.
Power supply, motor leads and control wiring are to be in separate conduits.

As Built Drawing May 26-00

Customer Run Command

D(Drain-shielded wire)
LS(Common)
CFS (4-20mA Freq. Signal, Input impedance-250 Ohms)]
VFS (0-10V Freq. Signal, Input impedance-10k Ohms)]

0-10V Output
4-20mA Output

REV	DESCRIPTION	DATE

DRAWN	PDF	DESIGNER	DATE
DATE		SCALE	N.T.S.
APPROVED	DATE		

mgi Technologies Inc.

275 W 4th AVENUE, VANCOUVER, B.C. V5Y 1G8
Tel: 1-877-539-2542   Tel: (604) 539-2542
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Email: office@mgitech.com   Fax: (604) 879-6974

TITLE: L300-300HFU 40Hp Interconnection

DWG No.: 20950E11   REV

Supply, **motor and signal wires to be run in three separate conduits**

LEGEND:

F1- Main Fuses
F2- Trans. Primary Fuses
F3- Trans. Secondary Fuse
HOA-MOD Hand-Off-Auto Module

INPUT/OUTPUT TERMINALS

4, 6	-external interlock (120VAC circuit)
7, 8	-external run command (120VAC circuit)
6, 9	-external fire-freeze alarm (120VAC circuit)
D	-drain from shielded wire
LS	-common for freq. signal input
CFS	-current (4-20mA) freq. signal
VFS	-voltage (0-10V) freq. signal
RS0, RS1	-run status, dry contact output
FM, CM1	-0-10Vdc speed monitor
13, CM1	-Preset speed input
FR0, FR1, FR2	-VFD fault status, dry contact output
HR1, HR0	-hand mode status, dry contact output

All status contacts (dry contacts) are rated at 2A/30VDC resistive load.
FR0 and FR1 close on fault condition.

As **Built Drawing Apr. 26-00**

J300-370MFU 60Hp Hitachi **Inverter**
with Hand-Off-Auto Module

SCALE: N.T.S.	CUSTOMER: Stillwell-Hansen **PO 46228**	DRAWN BY: PDF
DATE: 12/06/99		REVISED BY:

MGI Technologies

FILE or DRAWING NO: 21002E	REVISION: 00