**MITSUBISHI ELECTRIC**

**700 series**

# INVERTER
# FR-A700
# INSTALLATION GUIDELINE
## FR-A740-00023 to 12120-EC

Thank you for choosing this Mitsubishi Inverter.
Please read through this Installation Guideline and a CD-ROM enclosed to operate this inverter correctly.
Do not use this product until you have a full knowledge of the equipment, safety information and instructions.
Please forward this Installation Guideline and the CD-ROM to the end user.

## CONTENTS

A700

## This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect the inverter until you have read through this Installation Guideline and appended documents carefully and can use the equipment correctly. Do not use the inverter until you have a full knowledge of the equipment, safety information and instructions. In this Installation Guideline, the safety instruction levels are classified into "WARNING" and "CAUTION".

| ⚠**WARNING** | Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury. |
| ⚠**CAUTION** | Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only. |

Note that even the ⚠**CAUTION** level may lead to a serious consequence according to conditions. Please follow strictly the instructions of both levels because they are important to personnel safety.

### 1. Electric Shock Prevention

⚠**WARNING**

- While power is on or when the inverter is running, do not open the front cover. Otherwise you may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Even if power is off, do not remove the front cover except for wiring or periodic inspection.You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, check to make sure that the operation panel indicator is off, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.
- This inverter must be earthed (grounded). Earthing (Grounding) must conform to the requirements of national and local safety regulations and electrical codes. (JIS, NEC section 250, IEC 536 class 1 and other applicable standards).
- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the inverter before wiring. Otherwise, you may get an electric shock or be injured.
- Perform setting dial and key operations with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.
- Do not replace the cooling fan while power is on. It is dangerous to replace the cooling fan while power is on.
- Do not touch the printed circuit board with wet hands. You may get an electric shock.

### 2. Fire Prevention    ⚠**CAUTION**

- Mount the inverter to non-combustible surface such as metal or concrete. Mounting it to or near combustible material can cause a fire.
- If the inverter has become faulty, switch off the inverter power. A continuous flow of large current could cause a fire.
- When using a brake resistor, make up a sequence that will turn off power when an alarm signal is output. Otherwise, the brake resistor may excessively overheat due to damage of the brake transistor and such, causing a fire.
- Do not connect a resistor directly to the DC terminals P/+, N/−. This could cause a fire.

### 3. Injury Prevention    ⚠**CAUTION**

- Apply only the voltage specified in the instruction manual to each terminal. Otherwise, burst, damage, etc. may occur.
- Ensure that the cables are connected to the correct terminals. Otherwise, burst, damage, etc. may occur.
- Always make sure that polarity is correct to prevent damage, etc. Otherwise, burst, damage, etc. may occur.
- While power is on or for some time after power-off, do not touch the inverter as it is hot and you may get burnt.

### 4. Additional Instructions

Also note the following points to prevent an accidental failure, injury, electric shock, etc.

#### (1) Transportation and installation

⚠**CAUTION**

- When carrying products, use correct lifting gear to prevent injury.
- Do not stack the inverter boxes higher than the number recommended.
- Ensure that installation position and material can withstand the weight of the inverter. Install according to the information in the instruction manual.
- Do not install or operate the inverter if it is damaged or has parts missing. This can result in breakdowns.
- When carrying the inverter, do not hold it by the front cover or setting dial; it may fall off or fail.
- Do not stand or rest heavy objects on the product.
- Check the inverter mounting orientation is correct.
- Prevent other conductive bodies such as screws and metal fragments or other flammable substance such as oil from entering the inverter.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- Use the inverter under the following environmental conditions. Otherwise, the inverter may be damaged.

| Environment | Ambient temperature | LD, ND (initial setting), HD | -10°C to +50°C (non-freezing) |
| | | SLD | -10°C to +40°C (non-freezing) |
| | Ambient humidity | | 90% RH or less (non-condensing) |
| | Storage temperature | | -20°C to +65°C *1 |
| | Atmosphere | | Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt) |
| | Altitude, vibration | | Maximum 1000m above sea level for standard operation. After that derate by 3% for every extra 500m up to 2500m (92%) 5.9m/s² or less *2 (conforming to JIS C 60068-2-6) |

*1 Temperature applicable for a short time, e.g. in transit.
*2 2.9m/s² or less for the 04320 or more.

#### (2) Wiring    ⚠**CAUTION**

- Do not install a power factor correction capacitor or surge suppressor/radio noise filter (capacitor type filter) on the inverter output side.
- The connection orientation of the output cables U, V, W to the motor will affect the direction of rotation of the motor.

#### (3) Test operation and adjustment    ⚠**CAUTION**

- Before starting operation, confirm and adjust the parameters. A failure to do so may cause some machines to make unexpected motions.

#### (4) Operation    ⚠**WARNING**

- When you have chosen the retry function, stay away from the equipment as it will restart suddenly after an alarm stop.
- The [STOP RESET] key is valid only when the appropriate function setting has been made. Prepare an emergency stop switch separately.
- Make sure that the start signal is off before resetting the inverter alarm. A failure to do so may restart the motor suddenly.
- The load used should be a three-phase induction motor only. Connection of any other electrical equipment to the inverter output may damage the inverter as well as equipment.
- Performing pre-excitation (LX signal and X13 signal) under torque control (real sensorless vector control) may start the motor running at a low speed even when the start command (STF or STR) is not input. The motor may run also at a low speed when the speed limit value = 0 with a start command input. Perform pre-excitation after making sure that there will be no problem in safety if the motor runs.
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in manuals. Doing so may lead to fault or damage of the inverter.

⚠**CAUTION**

- The electronic thermal relay function does not guarantee protection of the motor from overheating.
- Do not use a magnetic contactor on the inverter input for frequent starting/stopping of the inverter.
- Use a noise filter to reduce the effect of electromagnetic interference. Otherwise nearby electronic equipment may be affected.
- Take measures to suppress harmonics. Otherwise power supply harmonics from the inverter may heat/damage the power factor correction capacitor and generator.
- When a 400V class motor is inverter-driven, please use an insulation-enhanced motor or measures taken to suppress surge voltages. Surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When parameter clear or all clear is performed, reset the required parameters before starting operations. Each parameter returns to the initial value.
- The inverter can be easily set for high-speed operation. Before changing its setting, fully examine the performances of the motor and machine.
- In addition to the inverter's holding function, install a holding device to ensure safety.
- Before running an inverter which had been stored for a long period, always perform inspection and test operation.
- For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

#### (5) Emergency stop    ⚠**CAUTION**

- Provide a safety backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter fails.
- When the breaker on the inverter input side trips, check for the wiring fault (short circuit), damage to internal parts of the inverter, etc. Identify the cause of the trip, then remove the cause and power on the breaker.
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.

#### (6) Maintenance, inspection and parts replacement    ⚠**CAUTION**

- Do not carry out a megger (insulation resistance) test on the control circuit of the inverter.

#### (7) Disposing of the inverter    ⚠**CAUTION**

- Treat as industrial waste.

General instructions

Many of the diagrams and drawings in instruction manuals show the inverter without a cover, or partially open. Never run the inverter in this status. Always replace the cover and follow instruction manuals when operating the inverter.

# 1 INSTALLATION OF THE INVERTER AND INSTRUCTIONS

## • Inverter Type

FR - A740 - 00126 - EC

| Symbol | Voltage Class |
|--------|---------------|
| A740 | Three-phase 400V class |

| Symbol | Type number |
|--------|-------------|
| 00023 to 12120 | Displays the rated current |

### Capacity plate

Capacity plate: FR-A740-00126-EC xxxxxx

Inverter type    Serial number

### Rating plate

Rating plate

Inverter type → MITSUBISHI    INVERTER
MODEL → FR-A740-00126-EC
Input rating → INPUT : XXXXX

Output rating → OUTPUT : XXXXX
ND (50°C) XXA    LD (50°C) XXA
HD (50°C) XXA    SLD (40°C) XXA

Serial number → SERIAL :

PASSED
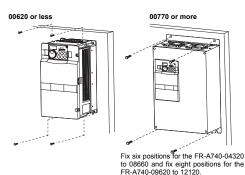
| | Overload current rating | Ambient temperature |
|-----|-------------------------|---------------------|
| SLD | 110% 60s, 120% 3s | 40°C (104°F) |
| LD | 120% 60s, 150% 3s | 50°C (122°F) |
| ND | 150% 60s, 200% 3s | 50°C (122°F) |
| HD | 200% 60s, 250% 3s | 50°C (122°F) |
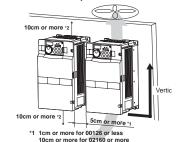
### • Installation of the inverter

Installation on the enclosure

**00620 or less**

**00770 or more**



Fix six positions for the FR-A740-04320 to 08660 and fix eight positions for the FR-A740-09620 to 12120.

---- CAUTION ====
• When encasing multiple inverters, install them in parallel as a cooling measure.
• Install the inverter vertically.



10cm or more *2

10cm or more *2

5cm or more *1

Vertic

*1 1cm or more for 00126 or less
   10cm or more for 02160 or more
*2 20cm or more for 02160 or more

### • General Precaution

The bus capacitor discharge time is 10 minutes. Before starting wiring or inspection, switch power off, wait for more than 10 minutes, and check for residual voltage between terminal P/+ and N/- with a meter etc., to avoid a hazard of electrical shock.

### • Environment
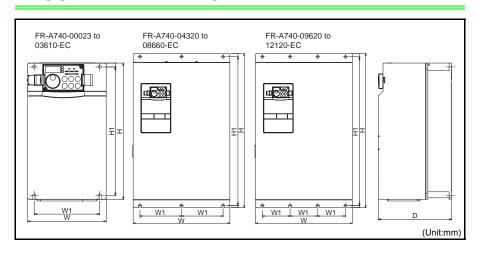
Before installation, check that the environment meets following specifications.

| | | |
|---|---|---|
| Ambient temperature | LD, ND (initial setting),HD: -10°C to + 50°C (non-freezing) SLD: -10°C to + 40°C (non-freezing) |  |
| Ambient humidity | 90%RH or less (non-condensing) | |
| Storage temperature | -20°C to + 65°C | |
| Ambience | Indoors (No corrosive and flammable gases, oil mist, dust and dirt.) | |
| Altitude, vibration | Below 1000m, 5.9m/s$^2$ or less (2.9m/s$^2$ or less for the 04320 or more) | |

==== CAUTION ====
• Install the inverter on a strong surface securely and vertically with bolts.
• Leave enough clearances and take cooling measures.
• Avoid places where the inverter is subjected to direct sunlight, high temperature and high humidity.
• Install the inverter on a non-combustible wall surface.
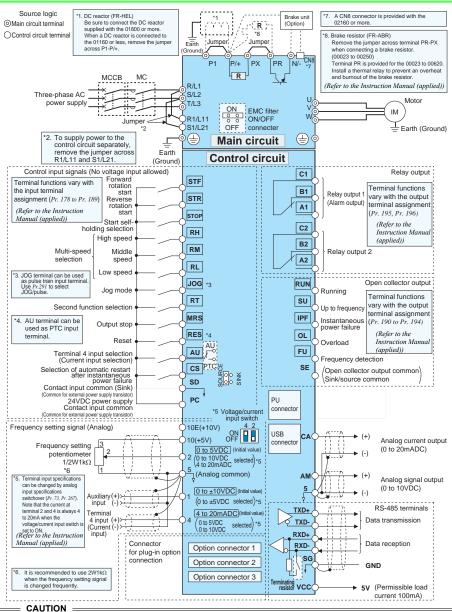
# 2 OUTLINE DRAWING

FR-A740-00023 to 03610-EC

FR-A740-04320 to 08660-EC

FR-A740-09620 to 12120-EC

(Unit:mm)

| Inverter Type | W | W1 | H | H1 | D |
|---|---|---|---|---|---|
| FR-A740-00023-EC | 150 | 125 | 260 | 245 | 140 |
| FR-A740-00038-EC | | | | | |
| FR-A740-00052-EC | | | | | |
| FR-A740-00083-EC | | | | | |
| FR-A740-00126-EC | | | | | |
| FR-A740-00170-EC | 220 | 195 | | | 170 |
| FR-A740-00250-EC | | | | | |
| FR-A740-00310-EC | | | 300 | 285 | 190 |
| FR-A740-00380-EC | | | | | |
| FR-A740-00470-EC | 250 | 230 | 400 | 380 | 190 |
| FR-A740-00620-EC | | | | | |
| FR-A740-00770-EC | 325 | 270 | 550 | 530 | 195 |
| FR-A740-00930-EC | 435 | 380 | 550 | 525 | 250 |
| FR-A740-01160-EC | | | | | |
| FR-A740-01800-EC | | | | | |
| FR-A740-02160-EC | 465 | 400 | 620 | 595 | 300 |
| FR-A740-02600-EC | | | | | |
| FR-A740-03250-EC | | | 740 | 715 | 360 |
| FR-A740-03610-EC | | | | | |
| FR-A740-04320-EC | 498 | 200 | 1010 | 985 | 380 |
| FR-A740-04810-EC | | | | | |
| FR-A740-05470-EC | 680 | 300 | | | |
| FR-A740-06100-EC | | | | | |
| FR-A740-06830-EC | | | | | |
| FR-A740-07700-EC | 790 | 315 | 1330 | 1300 | 440 |
| FR-A740-08660-EC | | | | | |
| FR-A740-09620-EC | 995 | 300 | 1580 | 1550 | |
| FR-A740-10940-EC | | | | | |
| FR-A740-12120-EC | | | | | |

# 3 WIRING

Source logic
◎ Main circuit terminal
○ Control circuit terminal

*1. DC reactor (FR-HEL)
Be sure to connect the DC reactor supplied with the 01800 or more. When a DC reactor is connected to the 01160 or less, remove the jumper across P1-P/+.

*7. A CN8 connector is provided with the 02160 or more.

*8. Brake resistor (FR-ABR)
Remove the jumper across terminal PR-PX when connecting a brake resistor. (00023 to 00250)
Terminal PR is provided for the 00023 to 00620. Install a thermal relay to prevent an overheat and burnout of the brake resistor.
*(Refer to the Instruction Manual (applied))*

Brake unit (Option)

Earth (Ground)   Jumper   Jumper

P1   P/+   PX   PR   N/-   CN8 *7

R

**Main circuit**

MCCB   MC

Three-phase AC power supply

R/L1
S/L2
T/L3
R1/L11
S1/L21

Jumper *2

ON / OFF   EMC filter ON/OFF connecter

Earth (Ground)

Motor
U
V
W
IM
Earth (Ground)

*2. To supply power to the control circuit separately, remove the jumper across R1/L11 and S1/L21.

**Control circuit**

## Control input signals (No voltage input allowed)

Terminal functions vary with the input terminal assignment (*Pr. 178 to Pr. 189*)
*(Refer to the Instruction Manual (applied))*

Forward rotation start — STF
Reverse rotation start — STR
Start self-holding selection — STOP
High speed — RH
Middle speed — RM
Low speed — RL

Multi-speed selection

*3. JOG terminal can be used as pulse train input terminal. Use *Pr.291* to select JOG/pulse.

Jog mode — JOG *3
Second function selection — RT
Output stop — MRS
Reset — RES *4

*4. AU terminal can be used as PTC input terminal.

Terminal 4 input selection (Current input selection) — AU
Selection of automatic restart after instantaneous power failure — CS

AU / PTC
SOURCE / SINK

Contact input common (Sink) (Common for external power supply transistor) — SD
24VDC power supply
Contact input common (Common for external power supply transistor) — PC

## Frequency setting signal (Analog)

10E(+10V)
10(+5V)

Frequency setting potentiometer 1/2W1kΩ *6
3
2
1

*5. Terminal input specifications can be changed by analog input specifications switchover (*Pr. 73, Pr. 267*). Note that the current at terminal 2 and 4 is always 4 to 20mA when the voltage/current input switch is set to ON.
*(Refer to the Instruction Manual (applied))*

Auxiliary input (+) (-)
Terminal 4 input (Current input) (+) (-)

2
5

*5 Voltage/current input switch
ON / OFF   4   2

0 to 5VDC (Initial value)
0 to 10VDC   selected *5
4 to 20mADC
(Analog common)

1
4

0 to ±10VDC (Initial value)
0 to ±5VDC   selected *5

4 to 20mADC (Initial value)
0 to 5VDC
0 to 10VDC   selected *5

*6. It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.

Connector for plug-in option connection

Option connector 1
Option connector 2
Option connector 3

Terminating resistor

## Relay output

C1
B1   Relay output 1
A1   (Alarm output)

C2
B2   Relay output 2
A2

Terminal functions vary with the output terminal assignment (*Pr. 195, Pr. 196*)
*(Refer to the Instruction Manual (applied))*

## Open collector output

RUN — Running
SU — Up to frequency
IPF — Instantaneous power failure
OL — Overload
FU — Frequency detection

SE — Open collector output common (Sink/source common)

Terminal functions vary with the output terminal assignment (*Pr. 190 to Pr. 194*)
*(Refer to the Instruction Manual (applied))*

PU connector

USB connector

CA   (+)   (-)   Analog current output (0 to 20mADC)

AM   (+)   (-)   Analog signal output (0 to 10VDC)
5

## RS-485 terminals

TXD+
TXD-   Data transmission
RXD+
RXD-   Data reception
SG   GND
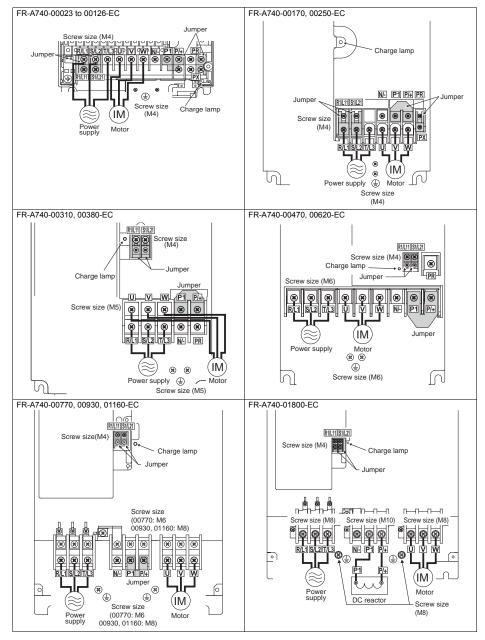
VCC   5V (Permissible load current 100mA)

## CAUTION

· To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables.
· After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean.
When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
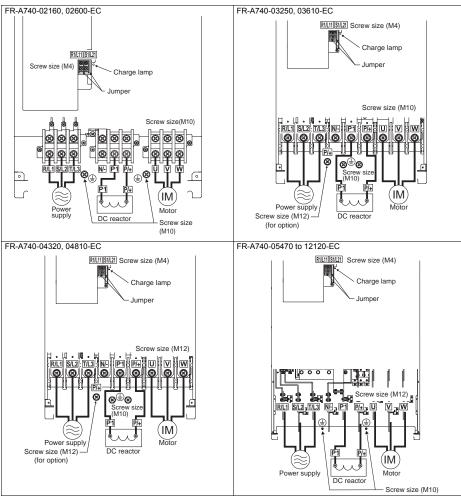
# 3.1 Main circuit terminal
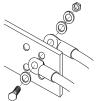
## (1) Terminal layout and wiring

### 400V class


FR-A740-00023 to 00126-EC


FR-A740-00170, 00250-EC


FR-A740-00310, 00380-EC


FR-A740-00470, 00620-EC


FR-A740-00770, 00930, 01160-EC


FR-A740-01800-EC

**FR-A740-02160, 02600-EC**



R1/L11 S1/L21

Screw size (M4)

Charge lamp

Jumper

Screw size(M10)

R/L1 S/L2 T/L3    N/-  P1  P/+    U V W

Power supply

DC reactor

Screw size (M10)

Motor

IM

**FR-A740-03250, 03610-EC**



R1/L11 S1/L21  Screw size (M4)

Charge lamp

Jumper

Screw size (M10)

R/L1 S/L2 T/L3  N/-  P1  P/+  U V W

P/+

Screw size (M10)

Power supply

Screw size (M12)
(for option)

DC reactor

Motor

IM

**FR-A740-04320, 04810-EC**



R1/L11 S1/L21 Screw size (M4)

Charge lamp

Jumper

Screw size (M12)

R/L1 S/L2 T/L3  N/-  P1  P/+  U V W

P/+

Screw size (M10)

Power supply

Screw size (M12)
(for option)

DC reactor

Motor

IM

**FR-A740-05470 to 12120-EC**



R1/L11 S1/L21  Screw size (M4)

Charge lamp

Jumper

Screw size (M12)

R/L1 S/L2 T/L3  N/-  P1  P/+ U  V W

P1  P/+

Power supply

DC reactor

Motor

IM

Screw size (M10)

=== **CAUTION** ===

· The power supply cables must be connected to R/L1, S/L2, T/L3. Never connect the power cable to the U, V, W of the inverter. Doing so will damage the inverter. (Phase sequence needs not to be matched.)
· Connect the motor to U, V, W. At this time, turning on the forward rotation switch (signal) rotates the motor in the counterclockwise direction when viewed from the motor shaft.
· When wiring the inverter main circuit conductor of the 05470 or more, tighten a nut from the right side of the conductor. When wiring two wires, place wires on both sides of the conductor. (Refer to the drawing below.) For wiring, use bolts (nuts) provided with the inverter.

## (2) Applied cable size

Select the recommended cable size to ensure that a voltage drop will be 2% max.

If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency.

The following table indicates a selection example for the wiring length of 20m.

### 400V class (when input power supply is 440V)

| Applicable Inverter Type | Terminal Screw Size *4 | Tightening Torque N·m | Crimping Terminal | | Cable Sizes | | | | | | | | |
| | | | R/L1, S/L2, T/L3 | U, V, W | HIV, etc. (mm²) *1 | | | | AWG/MCM *2 | | PVC, etc. (mm²) *3 | | |
| | | | | | R/L1, S/L2, T/L3 | U, V, W | P/+, P1 | Earth (Ground) Cable | R/L1, S/L2, T/L3 | U, V, W | R/L1, S/L2, T/L3 | U, V, W | Earth (Ground) Cable |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FR-A740-00023 to 00126-EC | M4 | 1.5 | 2-4 | 2-4 | 2 | 2 | 2 | 2 | 14 | 14 | 2.5 | 2.5 | 2.5 |
| FR-A740-00170-EC | M4 | 1.5 | 2-4 | 2-4 | 2 | 2 | 3.5 | 3.5 | 12 | 14 | 2.5 | 2.5 | 4 |
| FR-A740-00250-EC | M4 | 1.5 | 5.5-4 | 5.5-4 | 3.5 | 3.5 | 3.5 | 3.5 | 12 | 12 | 4 | 4 | 4 |
| FR-A740-00310-EC | M5 | 2.5 | 5.5-5 | 5.5-5 | 5.5 | 5.5 | 5.5 | 8 | 10 | 10 | 6 | 6 | 10 |
| FR-A740-00380-EC | M5 | 2.5 | 8-5 | 8-5 | 8 | 8 | 8 | 8 | 8 | 8 | 10 | 10 | 10 |
| FR-A740-00470-EC | M6 | 4.4 | 14-6 | 8-6 | 14 | 8 | 14 | 14 | 6 | 8 | 16 | 10 | 16 |
| FR-A740-00620-EC | M6 | 4.4 | 14-6 | 14-6 | 14 | 14 | 22 | 14 | 6 | 6 | 16 | 16 | 16 |
| FR-A740-00770-EC | M6 | 4.4 | 22-6 | 22-6 | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A740-00930-EC | M8 | 7.8 | 22-8 | 22-8 | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A740-01160-EC | M8 | 7.8 | 38-8 | 38-8 | 38 | 38 | 38 | 22 | 1 | 2 | 50 | 50 | 25 |
| FR-A740-01800-EC | M8 | 7.8 | 60-8 | 60-8 | 60 | 60 | 60 | 22 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A740-02160-EC | M10 | 14.7 | 60-10 | 60-10 | 60 | 60 | 60 | 38 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A740-02600-EC | M10 | 14.7 | 60-10 | 60-10 | 60 | 60 | 80 | 38 | 3/0 | 3/0 | 50 | 50 | 25 |
| FR-A740-03250-EC | M10-M12 | 14.7 | 80-10 | 80-10 | 80 | 80 | 80 | 38 | 3/0 | 3/0 | 70 | 70 | 35 |
| FR-A740-03610-EC | M10-M12 | 14.7 | 100-10 | 100-10 | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A740-04320-EC | M12-M10 | 24.5 | 150-12 | 150-12 | 125 | 150 | 150 | 38 | 250 | 250 | 120 | 120 | 70 |
| FR-A740-04810-EC | M12-M10 | 24.5 | 150-12 | 150-12 | 150 | 150 | 150 | 38 | 300 | 300 | 150 | 150 | 95 |
| FR-A740-05470-EC | M12-M10 | 24.5 | 100-12 | 100-12 | 2×100 | 2×100 | 2×100 | 60 | 2×4/0 | 2×4/0 | 2×95 | 2×95 | 95 |
| FR-A740-06100-EC | M12-M10 | 24.5 | 100-12 | 100-12 | 2×100 | 2×100 | 2×125 | 60 | 2×4/0 | 2×4/0 | 2×95 | 2×95 | 95 |
| FR-A740-06830-EC | M12-M10 | 24.5 | 150-12 | 150-12 | 2×125 | 2×125 | 2×125 | 60 | 2×250 | 2×250 | 2×120 | 2×120 | 120 |
| FR-A740-07700-EC | M12-M10 | 24.5 | 150-12 | 150-12 | 2×150 | 2×150 | 2×150 | 100 | 2×300 | 2×300 | 2×150 | 2×150 | 150 |
| FR-A740-08660-EC | M12-M10 | 24.5 | C2-200 | C2-200 | 2×200 | 2×200 | 2×200 | 100 | 2×350 | 2×350 | 2×185 | 2×185 | 2×95 |
| FR-A740-09620-EC | M12-M10 | 24.5 | C2-200 | C2-200 | 2×200 | 2×200 | 2×200 | 100 | 2×400 | 2×400 | 2×185 | 2×185 | 2×95 |
| FR-A740-10940-EC | M12-M10 | 24.5 | C2-250 | C2-250 | 2×250 | 2×250 | 2×250 | 100 | 2×500 | 2×500 | 2×240 | 2×240 | 2×120 |
| FR-A740-12120-EC | M12-M10 | 24.5 | C2-250 | C2-250 | 3×200 | 2×250 | 3×200 | 2×100 | 2×500 | 2×500 | 2×240 | 2×240 | 2×120 |

*1 For the 01800 or less, the cable size is that of the cable (HIV cable (600V class 2 vinyl-insulated cable) etc.) with continuous maximum permissible temperature of 75°C. Assumes that the ambient temperature is 50°C or less and the wiring distance is 20m or less.
For the 02160 or more, the recommended cable size is that of the cable (LMFC (heat resistant flexible cross-linked polyethylene insulated cable) etc.) with continuous maximum permissible temperature of 90°C. Assumes that the ambient temperature is 50°C or less and wiring is performed in an enclosure.

*2 For the 01160 or less, the recommended cable size is that of the cable (THHW cable) with continuous maximum permissible temperature of 75°C. Assumes that the ambient temperature is 40°C or less and the wiring distance is 20m or less.
For the 01800 or more, the recommended cable size is that of the cable (THHN cable) with continuous maximum permissible temperature of 90°C. Assumes that the ambient temperature is 40°C or less and wiring is performed in an enclosure. (Selection example for use mainly in the United States.)

*3 For the 01160 or less, the recommended cable size is that of the cable (PVC cable) with continuous maximum permissible temperature of 70°C. Assumes that the ambient temperature is 40°C or less and the wiring distance is 20m or less.
For the 01800 or more, the recommended cable size is that of the cable (XLPE cable) with continuous maximum permissible temperature of 90°C. Assumes that the ambient temperature is 40°C or less and wiring is performed in an enclosure. (Selection example for use mainly in Europe.)

*4 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, and a screw for earthing (grounding).
For the 03250 and 03610, screw sizes are different (<R/L1, S/L2, T/L3, U, V, W, a screw for earthing (grounding)> - <P/+ for option connection>)
For the 04320 or more, screw sizes are different. (<R/L1, S/L2, T/L3, U, V, W> - <a screw for earthing (grounding)>)

The line voltage drop can be calculated by the following formula:

$$\text{line voltage drop [V]} = \frac{\sqrt{3} \times \text{wire resistance[m}\Omega\text{/m]} \times \text{wiring distance[m]} \times \text{current[A]}}{1000}$$

Use a larger diameter cable when the wiring distance is long or when it is desired to decrease the voltage drop (torque reduction) in the low speed range.

· Tighten the terminal screw to the specified torque.
  A screw that has been tighten too loosely can cause a short circuit or malfunction.
  A screw that has been tighten too tightly can cause a short circuit or malfunction due to the unit breakage.
· Use crimping terminals with insulation sleeve to wire the power supply and motor.

## (3) Total wiring length

The overall wiring length for connection of a single motor or multiple motors should be within the value in the table below.
(The wiring length should be 100m maximum for vector control.)

| *Pr. 72 PWM frequency selection* **setting** (carrier frequency) * | 00023 | 00038 | 00052 or more |
|---|---|---|---|
| 2 (2kH) or less | 300m | 500m | 500m |
| 3 (3kHz), 4 (4kHz) | 200m | 300m | 500m |
| 5 (5kHz) to 9 (9kHz) | 100m | | |
| 10 (10kHz) or more | 50m | | |

When driving a 400V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
Take the following measures (1) or (2) in this case.

(1) Use a "400V class inverter-driven insulation-enhanced motor".
(2) Connect the surge voltage suppression filter (FR-ASF-H) to the 01800 or less and the sine wave filter (MT-BSL/BSC) to the 02160 or more on the inverter output side.

· Especially for long-distance wiring, the inverter may be affected by a charging current caused by the stray capacitances of the wiring, leading to a malfunction of the overcurrent protective function or fast response current limit function or a malfunction or fault of the equipment connected on the inverter output side. If fast-response current limit function malfunctions, disable this function. (For *Pr. 156 Stall prevention operation selection, refer to* 📖 *Instruction Manual (applied).*)
· For details of *Pr. 72 PWM frequency selection , refer to* 📖 *Instruction Manual (applied).* (When using an option sine wave filter (MT-BSL/BSC) for the 02160 or more, set "25" (2.5kHz) in *Pr. 72*.)
  For explanation of surge voltage suppression filter (FR-ASF-H) and sine wave filter (MT-BSL/BSC), refer to the manual of each option.
· Do not perform vector control with a surge voltage suppression filter (FR-ASF-H) or sine wave filer (MT-BSL/BSC) connected.

## (4) Cable size of the control circuit power supply (terminal R1/L11, S1/L21)

· Terminal screw size: M4
· Cable size: 0.75mm$^2$ to 2mm$^2$
· Tightening torque: 1.5N·m

# 3.2 Control circuit terminals

## (1) Terminal layout

| CA | SD | PC |
|---|---|---|

| A1 | B1 | C1 | A2 | B2 | C2 | RL | RM | RH | RT | AU | STOP | RES | STF | STR | PC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| PC | AM | 10E | 10 | 2 | 5 | 4 | 1 | SE | RUN | SU | IPF | OL | FU | MRS | JOG | CS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## (2) Instructions for wiring of the control circuit terminal

1) Terminals 5, PC and SE are common to the I/O signals and isolated from each other. Do not earth (ground).
   Avoid connecting the terminal PC and 5 and the terminal SE and 5.
2) Use shielded or twisted cables for connection to the control circuit terminals and run them away from the main and power circuits (including the 200V relay sequence circuit).
3) Use two or more parallel micro-signal contacts or twin contacts to prevent a contact faults when using contact inputs since the control circuit input signals are micro-currents.



Micro signal contacts          Twin contacts

4) Do not apply a voltage to the contact input terminals (e.g. STF) of the control circuit.
5) Always apply a voltage to the alarm output terminals (A, B, C) via a relay coil, lamp, etc.
6) It is recommended to use the cables of 0.75mm$^2$ gauge for connection to the control circuit terminals.

   If the cable gauge used is 1.25mm$^2$ or more, the front cover may be lifted when there are many cables running or the cables are run improperly, resulting in an operation panel contact fault.
7) The wiring length should be 30m maximum.

# 4  PRECAUTIONS FOR USE OF THE INVERTER

The FR-A700 series is a highly reliable product, but incorrect peripheral circuit making or operation/handling method may shorten the product life or damage the product.
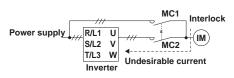Before starting operation, always recheck the following items.

(1)  Use crimping terminals with insulation sleeve to wire the power supply and motor.

(2)  Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Never perform such wiring.

(3)  After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

(4)  Use cables of the size to make a voltage drop 2% maximum.
If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency.
Refer to *page 6* for the recommended cable sizes.

(5)  The overall wiring length should be 500m maximum.
(The wiring length should be 100m maximum for vector control.)
Especially for long distance wiring, the fast-response current limit function may be reduced or the equipment connected to the inverter output side may malfunction or become faulty under the influence of a charging current due to the stray capacity of the wiring. Therefore, note the overall wiring length. *(Refer to page 7.)*

(6)  Electromagnetic wave interference
The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. An EMC filter can minimize noise interference.

(7)  Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the inverter output side.
This will cause the inverter to trip or the capacitor, and surge suppressor to be damaged. If any of the above devices is installed, immediately remove it.

(8)  Before starting wiring or other work after the inverter is operated, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.

(9)  A short circuit or earth (ground) fault on the inverter output side may damage the inverter modules.
· Fully check the insulation resistance of the circuit prior to inverter operation since repeated short circuits caused by peripheral circuit inadequacy or an earth (ground) fault caused by wiring inadequacy or reduced motor insulation resistance may damage the inverter modules.
· Fully check the to-earth (ground) insulation and inter-phase insulation of the inverter output side before power-on. Especially for an old motor or use in hostile atmosphere, securely check the motor insulation resistance etc.

(10) Do not use the inverter input side magnetic contactor to start/stop the inverter.
Always use the start signal (ON/OFF of STF and STR signals) to start/stop the inverter.

(11) Across P/+ and PR terminals, connect only an external regenerative brake discharge resistor.
Do not connect a mechanical brake.

(12) Do not apply a voltage higher than the permissible voltage to the inverter I/O signal circuits.
Contact to the inverter I/O signal circuits or opposite polarity may damage the I/O devices. Especially check the wiring to prevent the speed setting potentiometer from being connected incorrectly to short terminals 10E-5.

(13) Provide electrical and mechanical interlocks for MC1 and MC2 which are used for commercial power supply-inverter switch-over.

When the wiring is incorrect or if there is a commercial power supply-inverter switch-over circuit as shown on the right, the inverter will be damaged by leakage current from the power supply due to arcs generated at the time of switch-over or chattering caused by a sequence error.

(Commercial operation can not be performed with the vector dedicated motor (SF-V5RU, SF-THY).)



(14) If the machine must not be restarted when power is restored after a power failure, provide a magnetic contactor in the inverter's input side and also make up a sequence which will not switch on the start signal.

If the start signal (start switch) remains on after a power failure, the inverter will automatically restart as soon as the power is restored.

(15) Instructions for overload operation

When performing an operation of frequent start/stop with the inverter, rise/fall in the temperature of the transistor element of the inverter will repeat due to a continuous flow of large current, shortening the life from thermal fatigue. Since thermal fatigue is related to the amount of current, the life can be increased by reducing current at locked condition, starting current, etc. Decreasing current may increase the life. However, decreasing current will result in insufficient torque and the inverter may not start. Therefore, choose the inverter which has enough allowance for current (up to 2 rank larger in capacity).

(16) Make sure that the specifications and rating match the system requirements.

(17) A motor with encoder is necessary for vector control. In addition, connect the encoder directly to the backlash-free motor shaft. An encoder is not necessary for real sensorless vector control.

# 5 PARAMETER LIST

## 5.1 Parameter list

For simple variable-speed operation of the inverter, the initial setting of the parameters may be used as they are. Set the necessary parameters to meet the load and operational specifications. Parameter setting, change and check can be made from the operation panel (FR-DU07).

**REMARKS**

· ◎ indicates simple mode parameters. (initially set to extended mode)
· The shaded parameters in the table allow its setting to be changed during operation even if "0" (initial value) is set in *Pr.77 Parameter write selection*.

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| ◎ 0 | Torque boost | 0 to 30% | 6/4/3/2/1% *1 |
| ◎ 1 | Maximum frequency | 0 to 120Hz | 120/60Hz *2 |
| ◎ 2 | Minimum frequency | 0 to 120Hz | 0Hz |
| ◎ 3 | Base frequency | 0 to 400Hz | 50Hz |
| ◎ 4 | Multi-speed setting (high speed) | 0 to 400Hz | 50Hz |
| ◎ 5 | Multi-speed setting (middle speed) | 0 to 400Hz | 30Hz |
| ◎ 6 | Multi-speed setting (low speed) | 0 to 400Hz | 10Hz |
| ◎ 7 | Acceleration time | 0 to 3600/360s | 5/15s *3 |
| ◎ 8 | Deceleration time | 0 to 3600/360s | 5/15s *3 |
| ◎ 9 | Electronic thermal O/L relay | 0 to 500/0 to 3600A *2 | Inverter rated output current |
| 10 | DC injection brake operation frequency | 0 to 120Hz, 9999 | 3Hz |
| 11 | DC injection brake operation time | 0 to 10s, 8888 | 0.5s |
| 12 | DC injection brake operation voltage | 0 to 30% | 4/2/1%*3 |
| 13 | Starting frequency | 0 to 60Hz | 0.5Hz |
| 14 | Load pattern selection | 0 to 5 | 0 |
| 15 | Jog frequency | 0 to 400Hz | 5Hz |
| 16 | Jog acceleration/ deceleration time | 0 to 3600/360s | 0.5s |
| 17 | MRS input selection | 0, 2, 4 | 0 |
| 18 | High speed maximum frequency | 120 to 400Hz | 120/60Hz *2 |
| 19 | Base frequency voltage | 0 to 1000V, 8888, 9999 | 8888 |
| 20 | Acceleration/deceleration reference frequency | 1 to 400Hz | 50Hz |
| 21 | Acceleration/deceleration time increments | 0, 1 | 0 |
| 22 | Stall prevention operation level (torque limit level ) | 0 to 400% | 150% |
| 23 | Stall prevention operation level compensation factor at double speed | 0 to 200%, 9999 | 9999 |
| 24 to 27 | Multi-speed setting (4 speed to 7 speed) | 0 to 400Hz, 9999 | 9999 |
| 28 | Multi-speed input compensation selection | 0, 1 | 0 |
| 29 | Acceleration/deceleration pattern selection | 0 to 5 | 0 |
| 30 | Regenerative function selection | 0, 1, 2, 10, 11, 20, 21 | 0 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 31 | Frequency jump 1A | 0 to 400Hz, 9999 | 9999 |
| 32 | Frequency jump 1B | 0 to 400Hz, 9999 | 9999 |
| 33 | Frequency jump 2A | 0 to 400Hz, 9999 | 9999 |
| 34 | Frequency jump 2B | 0 to 400Hz, 9999 | 9999 |
| 35 | Frequency jump 3A | 0 to 400Hz, 9999 | 9999 |
| 36 | Frequency jump 3B | 0 to 400Hz, 9999 | 9999 |
| 37 | Speed display | 0, 1 to 9998 | 0 |
| 41 | Up-to-frequency sensitivity | 0 to 100% | 10% |
| 42 | Output frequency detection | 0 to 400Hz | 6Hz |
| 43 | Output frequency detection for reverse rotation | 0 to 400Hz, 9999 | 9999 |
| 44 | Second acceleration/ deceleration time | 0 to 3600/360s | 5s |
| 45 | Second deceleration time | 0 to 3600/360s, 9999 | 9999 |
| 46 | Second torque boost | 0 to 30%, 9999 | 9999 |
| 47 | Second V/F (base frequency) | 0 to 400Hz, 9999 | 9999 |
| 48 | Second stall prevention operation current | 0 to 220% | 150% |
| 49 | Second stall prevention operation frequency | 0 to 400Hz, 9999 | 0Hz |
| 50 | Second output frequency detection | 0 to 400Hz | 30Hz |
| 51 | Second electronic thermal O/L relay | 0 to 500A, 9999, 0 to 3600A, 9999 *2 | 9999 |
| 52 | DU/PU main display data selection | 0, 5 to 14, 17 to 20, 22 to 25, 32 to 35, 50 to 57, 100 | 0 |
| 54 | CA terminal function selection | 1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52, 53, 70 | 1 |
| 55 | Frequency monitoring reference | 0 to 400Hz | 50Hz |
| 56 | Current monitoring reference | 0 to 500/0 to 3600A *2 | Inverter rated output current |
| 57 | Restart coasting time | 0, 0.1 to 5s, 9999/ 0, 0.1 to 30s, 9999 *2 | 9999 |
| 58 | Restart cushion time | 0 to 60s | 1s |
| 59 | Remote function selection | 0, 1, 2, 3 | 0 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|------|---------------|---------------|
| 60 | Energy saving control selection | 0, 4 | 0 |
| 61 | Reference current | 0 to 500A, 9999/ 0 to 3600A, 9999 *2 | 9999 |
| 62 | Reference value at acceleration | 0 to 220%, 9999 | 9999 |
| 63 | Reference value at deceleration | 0 to 220%, 9999 | 9999 |
| 64 | Starting frequency for elevator mode | 0 to 10Hz, 9999 | 9999 |
| 65 | Retry selection | 0 to 5 | 0 |
| 66 | Stall prevention operation reduction starting frequency | 0 to 400Hz | 50Hz |
| 67 | Number of retries at alarm occurrence | 0 to 10, 101 to 110 | 0 |
| 68 | Retry waiting time | 0 to 10s | 1s |
| 69 | Retry count display erase | 0 | 0 |
| 70 | Special regenerative brake duty | 0 to 30%/ 0 to 10% *2 | 0% |
| 71 | Applied motor | 0 to 8, 13 to 18, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54 | 0 |
| 72 | PWM frequency selection | 0 to 15/ 0 to 6, 25 *2 | 2 |
| 73 | Analog input selection | 0 to 7, 10 to 17 | 1 |
| 74 | Input filter time constant | 0 to 8 | 1 |
| 75 | Reset selection/ disconnected PU detection/ PU stop selection | 0 to 3, 14 to 17, 100 to 103, 114 to 117 | 14 |
| 76 | Alarm code output selection | 0, 1, 2 | 0 |
| 77 | Parameter write selection | 0, 1, 2 | 0 |
| 78 | Reverse rotation prevention selection | 0, 1, 2 | 0 |
| ◎ 79 | Operation mode selection | 0, 1, 2, 3, 4, 6, 7 | 0 |
| 80 | Motor capacity | 0.4 to 55kW, 9999/ 0 to 3600kW, 9999 *2 | 9999 |
| 81 | Number of motor poles | 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 9999 | 9999 |
| 82 | Motor excitation current | 0 to 500A, 9999/ 0 to 3600A, 9999 *2 | 9999 |
| 83 | Motor rated voltage | 0 to 1000V | 400V |
| 84 | Rated motor frequency | 10 to 120Hz | 50Hz |
| 89 | Speed control gain (magnetic flux vector) | 0 to 200%, 9999 | 9999 |
| 90 | Motor constant (R1) | 0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2 | 9999 |
| 91 | Motor constant (R2) | 0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2 | 9999 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|------|---------------|---------------|
| 92 | Motor constant (L1) | 0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2 | 9999 |
| 93 | Motor constant (L2) | 0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2 | 9999 |
| 94 | Motor constant (X) | 0 to 500Ω (0 to 100%), 9999/ 0 to 100Ω (0 to 100%), 9999 *2 | 9999 |
| 95 | Online auto tuning selection | 0 to 2 | 0 |
| 96 | Auto tuning setting/status | 0, 1, 101 | 0 |
| 100 | V/F1(first frequency) | 0 to 400Hz, 9999 | 9999 |
| 101 | V/F1(first frequency voltage) | 0 to 1,000V | 0V |
| 102 | V/F2(second frequency) | 0 to 400Hz, 9999 | 9999 |
| 103 | V/F2(second frequency voltage) | 0 to 1,000V | 0V |
| 104 | V/F3(third frequency) | 0 to 400Hz, 9999 | 9999 |
| 105 | V/F3(third frequency voltage) | 0 to 1,000V | 0V |
| 106 | V/F4(fourth frequency) | 0 to 400Hz, 9999 | 9999 |
| 107 | V/F4(fourth frequency voltage) | 0 to 1,000V | 0V |
| 108 | V/F5(fifth frequency) | 0 to 400Hz, 9999 | 9999 |
| 109 | V/F5(fifth frequency voltage) | 0 to 1,000V | 0V |
| 110 | Third acceleration/ deceleration time | 0 to 3600/ 360s, 9999 | 9999 |
| 111 | Third deceleration time | 0 to 3600/ 360s, 9999 | 9999 |
| 112 | Third torque boost | 0 to 30%, 9999 | 9999 |
| 113 | Third V/F (base frequency) | 0 to 400Hz, 9999 | 9999 |
| 114 | Third stall prevention operation current | 0 to 220% | 150% |
| 115 | Thrid stall prevention operation frequency | 0 to 400Hz | 0 |
| 116 | Third output frequency detection | 0 to 400Hz | 50Hz |
| 117 | PU communication station number | 0 to 31 | 0 |
| 118 | PU communication speed | 48, 96, 192, 384 | 192 |
| 119 | PU communication stop bit length | 0, 1, 10, 11 | 1 |
| 120 | PU communication parity check | 0, 1, 2 | 2 |
| 121 | Number of PU communication retries | 0 to10, 9999 | 1 |
| 122 | PU communication check time interval | 0, 0.1 to 999.8s, 9999 | 9999 |
| 123 | PU communication waiting time setting | 0 to 150ms, 9999 | 9999 |
| 124 | PU communication CR/LF presence/absence selection | 0, 1, 2 | 1 |
| ◎ 125 | Terminal 2 frequency setting gain frequency | 0 to 400Hz | 50Hz |
| ◎ 126 | Terminal 4 frequency setting gain frequency | 0 to 400Hz | 50Hz |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 127 | PID control automatic switchover frequency | 0 to 400Hz, 9999 | 9999 |
| 128 | PID action selection | 10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101 | 10 |
| 129 | PID proportional band | 0.1 to 1000%, 9999 | 100% |
| 130 | PID integral time | 0.1 to 3600s, 9999 | 1s |
| 131 | PID upper limit | 0 to 100%, 9999 | 9999 |
| 132 | PID lower limit | 0 to 100%, 9999 | 9999 |
| 133 | PID action set point | 0 to 100%, 9999 | 9999 |
| 134 | PID differential time | 0.01 to 10.00s, 9999 | 9999 |
| 135 | Electronic bypass sequence selection | 0, 1 | 0 |
| 136 | MC switchover interlock time | 0 to 100s | 1s |
| 137 | Start waiting time | 0 to 100s | 0.5s |
| 138 | Bypass selection at an alarm | 0, 1 | 0 |
| 139 | Automatic switchover frequency from inverter to bypass operation | 0 to 60Hz, 9999 | 9999 |
| 140 | Backlash acceleration stopping frequency | 0 to 400Hz | 1Hz |
| 141 | Backlash acceleration stopping time | 0 to 360s | 0.5s |
| 142 | Backlash deceleration stopping frequency | 0 to 400Hz | 1Hz |
| 143 | Backlash deceleration stopping time | 0 to 360s | 0.5s |
| 144 | Speed setting switchover | 0, 2, 4, 6, 8, 10, 102, 104, 106, 108, 110 | 4 |
| 145 | PU display language selection | 0 to 7 | 1 |
| 148 | Stall prevention level at 0V input | 0 to 220% | 150% |
| 149 | Stall prevention level at 10V input | 0 to 220% | 200% |
| 150 | Output current detection level | 0 to 220% | 150% |
| 151 | Output current detection signal delay time | 0 to 10s | 0s |
| 152 | Zero current detection level | 0 to 220% | 5% |
| 153 | Zero current detection time | 0 to 1s | 0.5s |
| 154 | Voltage reduction selection during stall prevention operation | 0, 1 | 1 |
| 155 | RT signal function validity condition selection | 0, 10 | 0 |
| 156 | Stall prevention operation selection | 0 to 31, 100, 101 | 0 |
| 157 | OL signal output timer | 0 to 25s, 9999 | 0s |
| 158 | AM terminal function selection | 1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52, 53 | 1 |
| 159 | Automatic switchover frequency range from bypass to inverter operation | 0 to 10Hz, 9999 | 9999 |
| ◎ 160 | User group read selection | 0, 1, 9999 | 0 |
| 161 | Frequency setting/key lock operation selection | 0, 1, 10, 11 | 0 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 162 | Automatic restart after instantaneous power failure selection | 0, 1, 2, 10, 11, 12 | 0 |
| 163 | First cushion time for restart | 0 to 20s | 0s |
| 164 | First cushion voltage for restart | 0 to 100% | 0% |
| 165 | Stall prevention operation level for restart | 0 to 220% | 150% |
| 166 | Output current detection signal retention time | 0 to 10s, 9999 | 0.1s |
| 167 | Output current detection operation selection | 0, 1 | 0 |
| 168 | Parameter for manufacturer setting. Do not set. | | |
| 169 | Parameter for manufacturer setting. Do not set. | | |
| 170 | Watt-hour meter clear | 0, 10, 9999 | 9999 |
| 171 | Operation hour meter clear | 0, 9999 | 9999 |
| 172 | User group registered display/batch clear | 9999, (0 to 16) | 0 |
| 173 | User group registration | 0 to 999, 9999 | 9999 |
| 174 | User group clear | 0 to 999, 9999 | 9999 |
| 178 | STF terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 60, 62, 64 to 71, 9999 | 60 |
| 179 | STR terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 61, 62, 64 to 71, 9999 | 61 |
| 180 | RL terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 9999 | 0 |
| 181 | RM terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 9999 | 1 |
| 182 | RH terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 9999 | 2 |
| 183 | RT terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 9999 | 3 |
| 184 | AU terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 62 to 71, 9999 | 4 |
| 185 | JOG terminal function selection | 0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 9999 | 5 |
| 186 | CS terminal function selection | | 6 |
| 187 | MRS terminal function selection | | 24 |
| 188 | STOP terminal function selection | | 25 |
| 189 | RES terminal function selection | | 62 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 190 | RUN terminal function selection | 0 to 8, 10 to 20, 25 to 28, 30 to 36, 39, 41 to 47, 64, 70, 84, 85, 90 to 99, 100 to 108, 110 to 116, 120, 125 to 128, 130 to 136, 139, 141 to 147, 164, 170, 184, 185, 190 to 199, 9999 | 0 |
| 191 | SU terminal function selection | | 1 |
| 192 | IPF terminal function selection | | 2 |
| 193 | OL terminal function selection | | 3 |
| 194 | FU terminal function selection | | 4 |
| 195 | ABC1 terminal function selection | 0 to 8, 10 to 20, 25 to 28, 30 to 36, 39, 41 to 47, 64, 70, 84, 85, 90, 91, 94 to 99, 100 to 108, 110 to 116, 120, 125 to 128, 130 to 136, 139, 141 to 147, 164, 170, 184, 185, 190, 191, 194 to 199, 9999 | 99 |
| 196 | ABC2 terminal function selection | | 9999 |
| 232 to 239 | Multi-speed setting (8 speed to 15 speed) | 0 to 400Hz, 9999 | 9999 |
| 240 | Soft-PWM operation selection | 0, 1 | 1 |
| 241 | Analog input display unit switchover | 0, 1 | 0 |
| 242 | Terminal 1 added compensation amount (terminal 2) | 0 to 100% | 100% |
| 243 | Terminal 1 added compensation amount (terminal 4) | 0 to 100% | 75% |
| 244 | Cooling fan operation selection | 0, 1 | 1 |
| 245 | Rated slip | 0 to 50%, 9999 | 9999 |
| 246 | Slip compensation time constant | 0.01 to 10s | 0.5s |
| 247 | Constant-power region slip compensation selection | 0, 9999 | 9999 |
| 250 | Stop selection | 0 to 100s,1000 to 1100s 8888, 9999 | 9999 |
| 251 | Output phase failure protection selection | 0, 1 | 1 |
| 252 | Override bias | 0 to 200% | 50% |
| 253 | Override gain | 0 to 200% | 150% |
| 255 | Life alarm status display | (0 to 15) | 0 |
| 256 | Inrush current limit circuit life display | (0 to 100%) | 100% |
| 257 | Control circuit capacitor life display | (0 to 100%) | 100% |
| 258 | Main circuit capacitor life display | (0 to 100%) | 100% |
| 259 | Main circuit capacitor life measuring | 0, 1 | 0 |
| 260 | PWM frequency automatic switchover | 0, 1 | 1 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 261 | Power failure stop selection | 0, 1, 2, 11, 12 | 0 |
| 262 | Subtracted frequency at deceleration start | 0 to 20Hz | 3Hz |
| 263 | Subtraction starting frequency | 0 to 120Hz, 9999 | 50Hz |
| 264 | Power-failure deceleration time 1 | 0 to 3600/360s | 5s |
| 265 | Power-failure deceleration time 2 | 0 to 3600s/ 360s, 9999 | 9999 |
| 266 | Power failure deceleration time switchover frequency | 0 to 400Hz | 50Hz |
| 267 | Terminal 4 input selection | 0, 1, 2 | 0 |
| 268 | Monitor decimal digits selection | 0,1, 9999 | 9999 |
| 269 | Parameter for manufacturer setting. Do not set. | | |
| 270 | Stop-on contact/load torque high-speed frequency control selection | 0, 1, 2, 3 | 0 |
| 271 | High-speed setting maximum current | 0 to 220% | 50% |
| 272 | Middle-speed setting minimum current | 0 to 220% | 100% |
| 273 | Current averaging range | 0 to 400Hz, 9999 | 9999 |
| 274 | Current averaging filter time constant | 1 to 4000 | 16 |
| 275 | Stop-on contact excitation current low-speed multiplying factor | 0 to 1000%, 9999 | 9999 |
| 276 | PWM carrier frequency at stop-on contact | 0 to 9, 9999/ 0 to 4, 9999 *2 | 9999 |
| 278 | Brake opening frequency | 0 to 30Hz | 3Hz |
| 279 | Brake opening current | 0 to 220% | 130% |
| 280 | Brake opening current detection time | 0 to 2s | 0.3s |
| 281 | Brake operation time at start | 0 to 5s | 0.3s |
| 282 | Brake operation frequency | 0 to 30Hz | 6Hz |
| 283 | Brake operation time at stop | 0 to 5s | 0.3s |
| 284 | Deceleration detection function selection | 0, 1 | 0 |
| 285 | Overspeed detection frequency (Excessive speed deviation detection frequency) | 0 to 30Hz, 9999 | 9999 |
| 286 | Droop gain | 0 to 100% | 0% |
| 287 | Droop filter time constant | 0 to 1s | 0.3s |
| 288 | Droop function activation selection | 0, 1, 2, 10, 11 | 0 |
| 291 | Pulse train I/O selection | 0, 1, 10, 11, 20, 21, 100 | 0 |
| 292 | Automatic acceleration/ deceleration | 0, 1, 3, 5 to 8, 11 | 0 |
| 293 | Acceleration/deceleration separate selection | 0 to 2 | 0 |
| 294 | UV avoidance voltage gain | 0 to 200% | 100% |
| 299 | Rotation direction detection selection at restarting | 0, 1, 9999 | 0 |
| 331 | RS-485 communication station number | 0 to 31 (0 to 247) | 0 |
| 332 | RS-485 communication speed | 3, 6, 12, 24, 48, 96, 192, 384 | 96 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 333 | RS-485 communication stop bit length | 0, 1, 10, 11 | 1 |
| 334 | RS-485 communication parity check selection | 0, 1, 2 | 2 |
| 335 | RS-485 communication retry count | 0 to 10, 9999 | 1 |
| 336 | RS-485 communication check time interval | 0 to 999.8s, 9999 | 0s |
| 337 | RS-485 communication waiting time setting | 0 to 150ms, 9999 | 9999 |
| 338 | Communication operation command source | 0, 1 | 0 |
| 339 | Communication speed command source | 0, 1, 2 | 0 |
| 340 | Communication startup mode selection | 0, 1, 2, 10, 12 | 0 |
| 341 | RS-485 communication CR/LF selection | 0, 1, 2 | 1 |
| 342 | Communication EEPROM write selection | 0, 1 | 0 |
| 343 | Communication error count | — | 0 |
| 350 *5 | Stop position command selection | 0, 1, 9999 | 9999 |
| 351 *5 | Orientation speed | 0 to 30Hz | 2Hz |
| 352 *5 | Creep speed | 0 to 10Hz | 0.5Hz |
| 353 *5 | Creep switchover position | 0 to 16383 | 511 |
| 354 *5 | Position loop switchover position | 0 to 8191 | 96 |
| 355 *5 | DC injection brake start position | 0 to 255 | 5 |
| 356 *5 | Internal stop position command | 0 to 16383 | 0 |
| 357 *5 | Orientation in-position zone | 0 to 255 | 5 |
| 358 *5 | Servo torque selection | 0 to 13 | 1 |
| 359 *5 | Encoder rotation direction | 0, 1 | 1 |
| 360 *5 | 16 bit data selection | 0 to 127 | 0 |
| 361 *5 | Position shift | 0 to 16383 | 0 |
| 362 *5 | Orientation position loop gain | 0.1 to 100 | 1 |
| 363 *5 | Completion signal output delay time | 0 to 5s | 0.5s |
| 364 *5 | Encoder stop check time | 0 to 5s | 0.5s |
| 365 *5 | Orientation limit | 0 to 60s, 9999 | 9999 |
| 366 *5 | Recheck time | 0 to 5s, 9999 | 9999 |
| 367 *5 | Speed feedback range | 0 to 400Hz, 9999 | 9999 |
| 368 *5 | Feedback gain | 0 to 100 | 1 |
| 369 *5 | Number of encoder pulses | 0 to 4096 | 1024 |
| 374 | Overspeed detection level | 0 to 400Hz | 115Hz |
| 376 *5 | Encoder signal loss detection enable/disable selection | 0, 1 | 0 |
| 380 | Acceleration S-pattern 1 | 0 to 50% | 0 |
| 381 | Deceleration S-pattern 1 | 0 to 50% | 0 |
| 382 | Acceleration S-pattern 2 | 0 to 50% | 0 |
| 383 | Deceleration S-pattern 2 | 0 to 50% | 0 |
| 384 | Input pulse division scaling factor | 0 to 250 | 0 |
| 385 | Frequency for zero input pulse | 0 to 400Hz | 0 |
| 386 | Frequency for maximum input pulse | 0 to 400Hz | 50Hz |
| 393 *5 | Orientation selection | 0, 1, 2 | 0 |
| 396 *5 | Orientation speed gain (P term) | 0 to 1000 | 60 |
| 397 *5 | Orientation speed integral time | 0 to 20s | 0.333s |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 398 *5 | Orientation speed gain (D term) | 0 to 100 | 1 |
| 399 *5 | Orientation deceleration ratio | 0 to 1000 | 20 |
| 414 | PLC function operation selection | 0, 1 | 0 |
| 415 | Inverter operation lock mode setting | 0, 1 | 0 |
| 416 | Pre-scale function selection | 0 to 5 | 0 |
| 417 | Pre-scale setting value | 0 to 32767 | 1 |
| 419 *5 | Position command source selection | 0, 2 | 0 |
| 420 *5 | Command pulse scaling factor numerator | 0 to 32767 | 1 |
| 421 *5 | Command pulse scaling factor denominator | 0 to 32767 | 1 |
| 422 *5 | Position loop gain | 0 to 150sec$^{-1}$ | 25sec$^{-1}$ |
| 423 *5 | Position feed forward gain | 0 to 100% | 0 |
| 424 *5 | Position command acceleration/deceleration time constant | 0 to 50s | 0s |
| 425 *5 | Position feed forward command filter | 0 to 5s | 0s |
| 426 *5 | In-position width | 0 to 32767pulse | 100 |
| 427 *5 | Excessive level error | 0 to 400, 9999 | 40 |
| 428 *5 | Command pulse selection | 0 to 5 | 0 |
| 429 *5 | Clear signal selection | 0, 1 | 1 |
| 430 *5 | Pulse monitor selection | 0 to 5, 9999 | 9999 |
| 450 | Second applied motor | 0 to 8, 13 to 18, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54, 9999 | 9999 |
| 451 | Second motor control method selection | 10, 11, 12, 20, 9999 | 9999 |
| 453 | Second motor capacity | 0.4 to 55kW, 9999/ 0 to 3600kW, 9999 *2 | 9999 |
| 454 | Number of second motor poles | 2, 4, 6, 8, 10, 9999 | 9999 |
| 455 | Second motor excitation current | 0 to 500A, 9999/ 0 to 3600A, 9999 *2 | 9999 |
| 456 | Rated second motor voltage | 0 to 1000V | 400V |
| 457 | Rated second motor frequency | 10 to 120Hz | 50Hz |
| 458 | Second motor constant (R1) | 0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2 | 9999 |
| 459 | Second motor constant (R2) | 0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2 | 9999 |
| 460 | Second motor constant (L1) | 0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2 | 9999 |
| 461 | Second motor constant (L2) | 0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2 | 9999 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 462 | Second motor constant (X) | 0 to 500Ω (0 to 100%), 9999/ 0 to 100Ω (0 to 100%), 9999 *2 | 9999 |
| 463 | Second motor auto tuning setting/status | 0, 1, 101 | 0 |
| 464 *5 | Digital position control sudden stop deceleration time | 0 to 360.0s | 0 |
| 465 *5 | First position feed amount lower 4 digits | 0 to 9999 | 0 |
| 466 *5 | First position feed amount upper 4 digits | 0 to 9999 | 0 |
| 467 *5 | Second position feed amount lower 4 digits | 0 to 9999 | 0 |
| 468 *5 | Second position feed amount upper 4 digits | 0 to 9999 | 0 |
| 469 *5 | Third position feed amount lower 4 digits | 0 to 9999 | 0 |
| 470 *5 | Third position feed amount upper 4 digits | 0 to 9999 | 0 |
| 471 *5 | Fourth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 472 *5 | Fourth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 473 *5 | Fifth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 474 *5 | Fifth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 475 *5 | Sixth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 476 *5 | Sixth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 477 *5 | Seventh position feed amount lower 4 digits | 0 to 9999 | 0 |
| 478 *5 | Seventh position feed amount upper 4 digits | 0 to 9999 | 0 |
| 479 *5 | Eighth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 480 *5 | Eighth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 481 *5 | Ninth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 482 *5 | Ninth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 483 *5 | Tenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 484 *5 | Tenth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 485 *5 | Eleventh position feed amount lower 4 digits | 0 to 9999 | 0 |
| 486 *5 | Eleventh position feed amount upper 4 digits | 0 to 9999 | 0 |
| 487 *5 | Twelfth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 488 *5 | Twelfth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 489 *5 | Thirteenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 490 *5 | Thirteenth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 491 *5 | Fourteenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 492 *5 | Fourteenth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 493 *5 | Fifteenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 494 *5 | Fifteenth position feed amount upper 4 digits | 0 to 9999 | 0 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 495 | Remote output selection | 0, 1, 10, 11 | 0 |
| 496 | Remote output data 1 | 0 to 4095 | 0 |
| 497 | Remote output data 2 | 0 to 4095 | 0 |
| 498 | PLC function flash memory clear | 0 to 9999 | 0 |
| 503 | Maintenance timer | 0 (1 to 9998) | 0 |
| 504 | Maintenance timer alarm output set time | 0 to 9998, 9999 | 9999 |
| 505 | Speed setting reference | 1 to 120Hz | 50Hz |
| 506 | Parameter 1 for user | 0 to 65535 | 0 |
| 507 | Parameter 2 for user | 0 to 65535 | 0 |
| 508 | Parameter 3 for user | 0 to 65535 | 0 |
| 509 | Parameter 4 for user | 0 to 65535 | 0 |
| 510 | Parameter 5 for user | 0 to 65535 | 0 |
| 511 | Parameter 6 for user | 0 to 65535 | 0 |
| 512 | Parameter 7 for user | 0 to 65535 | 0 |
| 513 | Parameter 8 for user | 0 to 65535 | 0 |
| 514 | Parameter 9 for user | 0 to 65535 | 0 |
| 515 | Parameter 10 for user | 0 to 65535 | 0 |
| 516 | S-pattern time at a start of acceleration | 0.1 to 2.5s | 0.1s |
| 517 | S-pattern time at a completion of acceleration | 0.1 to 2.5s | 0.1s |
| 518 | S-pattern time at a start of deceleraiton | 0.1 to 2.5s | 0.1s |
| 519 | S-pattern time at a completion of deceleraiton | 0.1 to 2.5s | 0.1s |
| 539 | Modbus-RTU communication check time interval | 0 to 999.8s, 9999 | 9999 |
| 547 | USB communication station number | 0 to 31 | 0 |
| 548 | USB communication check time interval | 0 to 999.8s, 9999 | 9999 |
| 549 | Protocol selection | 0, 1 | 0 |
| 550 | NET mode operation command source selection | 0, 1, 9999 | 9999 |
| 551 | PU mode operation command source selection | 1, 2, 3 | 2 |
| 555 | Current average time | 0.1 to 1.0s | 1s |
| 556 | Data output mask time | 0.0 to 20.0s | 0s |
| 557 | Current average value monitor signal output reference current | 0 to 500/ 0 to 3600A *2 | Rated inverter current |
| 563 | Energization time carrying-over times | (0 to 65535) | 0 |
| 564 | Operating time carrying-over times | (0 to 65535) | 0 |
| 569 | Second motor speed control gain | 0 to 200%, 9999 | 9999 |
| 570 | Multiple rating setting | 0 to 3 | 2 |
| 571 | Holding time at a start | 0.0 to 10.0s, 9999 | 9999 |
| 573 | 4mA input check selection | 1, 9999 | 9999 |
| 574 | Second motor online auto tuning | 0, 1 | 0 |
| 575 | Output interruption detection time | 0 to 3600s, 9999 | 1s |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 576 | Output interruption detection level | 0 to 400Hz | 0Hz |
| 577 | Output interruption cancel level | 900 to 1100% | 1000% |
| 592 | Traverse function selection | 0, 1, 2 | 0 |
| 593 | Maximum amplitude amount | 0 to 25% | 10% |
| 594 | Amplitude compensation amount during deceleration | 0 to 50% | 10% |
| 595 | Amplitude compensation amount during deceleration | 0 to 50% | 10% |
| 596 | Amplitude acceleration time | 0.1 to 3600s | 5s |
| 597 | Amplitude deceleration time | 0.1 to 3600s | 5s |
| 611 | Acceleration time at a restart | 0 to 3600s, 9999 | 5/15s *2 |
| 665 | Regeneration avoidance frequency gain | 0 to 200% | 100 |
| 684 | Tuning data unit switchover | 0, 1 | 0 |
| 800 | Control method selection | 0 to 5, 9 to 12, 20 | 20 |
| 802 *5 | Pre-excitation selection | 0, 1 | 0 |
| 803 | Constant power range torque characteristic selection | 0, 1 | 0 |
| 804 | Torque command source selection | 0, 1, 3 to 6 | 0 |
| 805 | Torque command value (RAM) | 600 to 1400% | 1000% |
| 806 | Torque command value (RAM,EEPROM) | 600 to 1400% | 1000% |
| 807 | Speed limit selection | 0, 1, 2 | 0 |
| 808 | Forward rotation speed limit | 0 to 120Hz | 50Hz |
| 809 | Reverse rotation speed limit | 0 to 120Hz, 9999 | 9999 |
| 810 | Torque limit input method selection | 0, 1 | 0 |
| 811 | Set resolution switchover | 0, 1, 10, 11 | 0 |
| 812 | Torque limit level (regeneration) | 0 to 400%, 9999 | 9999 |
| 813 | Torque limit level (3rd quadrant) | 0 to 400%, 9999 | 9999 |
| 814 | Torque limit level (4th quadrant) | 0 to 400%, 9999 | 9999 |
| 815 | Torque limit level 2 | 0 to 400%, 9999 | 9999 |
| 816 | Torque limit level during acceleration | 0 to 400%, 9999 | 9999 |
| 817 | Torque limit level during deceleration | 0 to 400%, 9999 | 9999 |
| 818 | Easy gain tuning response level setting | 1 to 15 | 2 |
| 819 | Easy gain tuning selection | 0 to 2 | 0 |
| 820 | Speed control P gain 1 | 0 to 1000% | 60% |
| 821 | Speed control integral time 1 | 0 to 20s | 0.333s |
| 822 | Speed setting filter 1 | 0 to 5s, 9999 | 9999 |
| 823 *5 | Speed detection filter 1 | 0 to 0.1s | 0.001s |
| 824 | Torque control P gain 1 | 0 to 200% | 100% |
| 825 | Torque control integral time 1 | 0 to 500ms | 5ms |
| 826 | Torque setting filter 1 | 0 to 5s, 9999 | 9999 |
| 827 | Torque detection filter 1 | 0 to 0.1s | 0s |
| 828 | Model speed control gain | 0 to 1000% | 60% |
| 830 | Speed control P gain 2 | 0 to 1000%, 9999 | 9999 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 831 | Speed control integral time 2 | 0 to 20s, 9999 | 9999 |
| 832 | Speed setting filter 2 | 0 to 5s, 9999 | 9999 |
| 833 *5 | Speed detection filter 2 | 0 to 0.1s | 0.001s |
| 834 | Torque control P gain 2 | 0 to 200%, 9999 | 9999 |
| 835 | Torque control integral time 2 | 0 to 500ms, 9999 | 9999 |
| 836 | Torque setting filter 2 | 0 to 5s, 9999 | 9999 |
| 837 | Torque detection filter 2 | 0 to 0.1s, 9999 | 9999 |
| 840 *5 | Torque bias selection | 0 to 3, 9999 | 9999 |
| 841 *5 | Torque bias 1 | 600 to 1400%, 9999 | 9999 |
| 842 *5 | Torque bias 2 | 600 to 1400%, 9999 | 9999 |
| 843 *5 | Torque bias 3 | 600 to 1400%, 9999 | 9999 |
| 844 *5 | Torque bias filter | 0 to 5s, 9999 | 9999 |
| 845 *5 | Torque bias operation time | 0 to 5s, 9999 | 9999 |
| 846 *5 | Torque bias balance compensation | 0 to 10V, 9999 | 9999 |
| 847 *5 | Fall-time torque bias terminal 1 bias | 0 to 400%, 9999 | 9999 |
| 848 *5 | Fall-time torque bias terminal 1 gain | 0 to 400%, 9999 | 9999 |
| 849 | Analog input offset adjustment | 0 to 200% | 100% |
| 850 | Brake operation selection | 0, 1 | 0 |
| 853 | Speed deviation time | 0 to 100s | 1s |
| 854 | Excitation ratio | 0 to 100% | 100% |
| 858 | Terminal 4 function assignment | 0, 1, 4, 9999 | 0 |
| 859 | Torque current | 0 to 500A, 9999/ 0 to 3600A, 9999 *2 | 9999 |
| 860 | Second motor torque current | 0 to 500A, 9999/ 0 to 3600A, 9999 *2 | 9999 |
| 862 | Notch filter time constant | 0 to 60 | 0 |
| 863 | Notch filter depth | 0, 1, 2, 3 | 0 |
| 864 | Torque detection | 0 to 400% | 150% |
| 865 | Low speed detection | 0 to 400Hz | 1.5Hz |
| 866 | Torque monitoring reference | 0 to 400% | 150% |
| 867 | AM output filter | 0 to 5s | 0.01s |
| 868 | Terminal 1 function assignment | 0 to 6, 9999 | 0 |
| 869 | Current output filter | 0 to 5s | 0.02s |
| 872 | Input phase failure protection selection | 0, 1 | 0 |
| 873 | Speed limit | 0 to 120Hz | 20Hz |
| 874 | OLT level setting | 0 to 200% | 150% |
| 875 | Fault definition | 0, 1 | 0 |
| 877 | Speed feed forward control/ model adaptive speed control selection | 0, 1, 2 | 0 |
| 878 | Speed feed forward filter | 0 to 1s | 0s |
| 879 | Speed feed forward torque limit | 0 to 400% | 150% |
| 880 | Load inertia ratio | 0 to 200 times | 7 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|------|---------------|---------------|
| 881 | Speed feed forward gain | 0 to 1000% | 0% |
| 882 | Regeneration avoidance operation selection | 0, 1, 2 | 0 |
| 883 | Regeneration avoidance operation level | 300 to 800V | 760/785VDC *2 |
| 884 | Regeneration avoidance at deceleration detection sensitivity | 0 to 5 | 0 |
| 886 | Regeneration avoidance voltage gain | 0 to 200% | 100% |
| 888 | Free parameter 1 | 0 to 9999 | 9999 |
| 889 | Free parameter 2 | 0 to 9999 | 9999 |
| 891 | Cumulative power monitor digit shifted times | 0 to 4, 9999 | 9999 |
| 892 | Load factor | 30 to 150% | 100% |
| 893 | Energy saving monitor reference (motor capacity) | 0.1 to 55/ 0 to 3600kW *2 | Inverter rated capacity |
| 894 | Control selection during commercial power-supply operation | 0, 1, 2, 3 | 0 |
| 895 | Power saving rate reference value | 0, 1, 9999 | 9999 |
| 896 | Power unit cost | 0 to 500, 9999 | 9999 |
| 897 | Power saving monitor average time | 0,1 to 1000h, 9999 | 9999 |
| 898 | Power saving cumulative monitor clear | 0, 1, 10, 9999 | 9999 |
| 899 | Operation time rate (estimated value) | 0 to 100%, 9999 | 9999 |
| C0 (900) | FM terminal calibration | — | — |
| C1 (901) | AM terminal calibration | — | — |
| C2 (902) | Terminal 2 frequency setting bias frequency | 0 to 400Hz | 0Hz |
| C3 (902) | Terminal 2 frequency setting bias | 0 to 300% | 0% |
| 125 (903) | Terminal 2 frequency setting gain frequency | 0 to 400Hz | 50Hz |
| C4 (903) | Terminal 2 frequency setting gain | 0 to 300% | 100% |
| C5 (904) | Terminal 4 frequency setting bias frequency | 0 to 400Hz | 0Hz |
| C6 (904) | Terminal 4 frequency setting bias | 0 to 300% | 20% |
| 126 (905) | Terminal 4 frequency setting gain frequency | 0 to 400Hz | 50Hz |
| C7 (905) | Terminal 4 frequency setting gain | 0 to 300% | 100% |
| C8 (930) | Current output bias signal | 0 to 100% | 0% |
| C9 (930) | Current output bias current | 0 to 100% | 0% |
| C10 (931) | Current output gain signal | 0 to 100% | 100% |
| C11 (931) | Current output gain current | 0 to 100% | 100% |
| C12 (917) | Terminal 1 bias frequency (speed) | 0 to 400Hz | 0Hz |
| C13 (917) | Terminal 1 bias (speed) | 0 to 300% | 0% |
| C14 (918) | Terminal 1 gain frequency (speed) | 0 to 400Hz | 50Hz |
| C15 (918) | Terminal 1 gain (speed) | 0 to 300% | 100% |

| Parameter | Name | Setting Range | Initial Value |
|-----------|------|---------------|---------------|
| C16 (919) | Terminal 1 bias command (torque/magnetic flux) | 0 to 400% | 0% |
| C17 (919) | Terminal 1 bias (torque/ magnetic flux) | 0 to 300% | 0% |
| C18 (920) | Terminal 1 gain command (torque/magnetic flux) | 0 to 400% | 150% |
| C19 (920) | Terminal 1 gain (torque/ magnetic flux) | 0 to 300% | 100% |
| C38 (932) | Terminal 4 bias command (torque/magnetic flux) | 0 to 400% | 0% |
| C39 (932) | Terminal 4 bias (torque/ magnetic flux) | 0 to 300% | 20% |
| C40 (933) | Terminal 4 gain command (torque/magnetic flux) | 0 to 400% | 150% |
| C41 (933) | Terminal 4 gain (torque/ magnetic flux) | 0 to 300% | 100% |
| 989 | Parameter copy alarm release | 10/100 | 10/100 *2 |
| 990 | PU buzzer control | 0, 1 | 1 |
| 991 | PU contrast adjustment | 0 to 63 | 58 |
| Pr. CL | Parameter clear | 0, 1 | 0 |
| ALLC | All parameter clear | 0, 1 | 0 |
| Er.CL | Alarm history clear | 0, 1 | 0 |
| PCPY | Parameter copy | 0, 1, 2, 3 | 0 |

*1  Differ according to capacities. (00023, 00038/00052 to 00126/00170, 00250/00310 to 01800/02160 or more)
*2  Differ according to capacities. (01800 or less/02160 or more)
*3  Differ according to capacities. (00250 or less/00310 or more)
*4  Differ according to capacities. (00250 or less/00310 to 01800/02160 or more)
*5  Setting can be made only when the FR-A7AP is mounted.

# 6 TROUBLESHOOTING

When an alarm (major failures) occurs in the inverter, the protective function is activated bringing the inverter to an alarm stop and the PU display automatically changes to any of the following error (alarm) indications.

If your fault does not correspond to any of the following errors or if you have any other problem, please contact your sales representative.

- Retention of alarm output signal ......... When the magnetic contactor (MC) provided on the input side of the inverter is opened at the activation of the protective function, the inverter's control power will be lost and the alarm output will not be held.
- Alarm display ..................................... When the protective function is activated, the operation panel display automatically switches to the above indication.
- Resetting method................................ When the protective function is activated, the inverter output is kept stopped. Unless reset, therefore, the inverter cannot restart. *(Refer to page 18.)*
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.
  Not doing so may lead to the inverter fault and damage.

Inverter alarm displays are roughly divided as below.

(1) Error Message
    A message regarding operational fault and setting fault by the operation panel (FR-DU07) and parameter unit (FR-PU04 /FR-PU07) is displayed.
    The inverter does not shut off output.

(2) Warnings
    The inverter does not shut off output even when a warning is displayed. However, failure to take appropriate measures will lead to a major fault.

(3) Minor fault
    The inverter does not shut off output.You can also output a minor fault signal by making parameter setting.
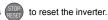
(4) Major fault
    When the protective function is activated, the inverter output is shut off and an alarm is output.

## 6.1 Reset method of protective function

(1) Resetting the inverter
The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter. Recover about 1s after reset is cancelled.

Operation 1: ..... Using the operation panel, press  to reset the inverter.

(Enabled only when the inverter protective function is activated (major fault) (*(Refer to the Instruction Manual (applied))* for major fault.))

Operation 2: ...... Switch power off once, then switch it on again.

Operation 3: ..... Turn on the reset signal (RES) for more than 0.1s. (If the RES signal is kept on, "Err." appears (flickers) to indicate that the inverter is in a reset status.)

*18*

## 6.2 List of alarm display

| Operation Panel Indication | | Name |
|---|---|---|
| E - - - | E - - - | Alarm history |
| HOLd | HOLD | Operation panel lock |
| Er1 to Er4 | Er1 to 4 | Parameter write error |
| rE1 to rE4 | rE1 to 4 | Copy operation error |
| Err. | Err. | Error |
| OL | OL | Stall prevention (overcurrent) |
| oL | oL | Stall prevention (overvoltage) |
| rb | RB | Regenerative brake prealarm |
| TH | TH | Electronic thermal relay function prealarm |
| PS | PS | PU stop |
| MT | MT | Maintenance signal output |
| CP | CP | Parameter copy |
| SL | SL | Speed limit indication (Output during speed limit) |
| Fn | FN | Fan fault |
| E.OC1 | E.OC1 | Overcurrent shut-off during acceleration |
| E.OC2 | E.OC2 | Overcurrent shut-off during constant speed |
| E.OC3 | E.OC3 | Overcurrent shut-off during deceleration or stop |
| E.OV1 | E.OV1 | Regenerative overvoltage shut-off during acceleration |
| E.OV2 | E.OV2 | Regenerative overvoltage shut-off during constant speed |
| E.OV3 | E.OV3 | Regenerative overvoltage shut-off during deceleration or stop |
| E.THT | E.THT | Inverter overload shut-off (electronic thermal relay function) |
| E.THM | E.THM | Motor overload shut-off (electronic thermal relay function) |
| E.FIn | E.FIN | Fin overheat |
| E.IPF | E.IPF | Instantaneous power failure |
| E. bE | E.BE | Brake transistor alarm detection |
| E.UVT | E.UVT | Undervoltage |
| E.ILF* | E.ILF* | Input phase failure |
| E.OLT | E.OLT | Stall prevention |

The left side rows are grouped as: Error message (E---, HOLD, Er1-4, rE1-4, Err.), Warnings (OL, oL, RB, TH, PS, MT, CP, SL), Minor fault (FN), Major fault (E.OC1 onward).

| Operation Panel Indication | | Name |
|---|---|---|
| E. GF | E.GF | Output side earth (ground) fault overcurrent |
| E. LF | E.LF | Output phase failure |
| E.OHT | E.OHT | External thermal relay operation |
| E.PTC | E.PTC* | PTC thermistor operation |
| E.OPT | E.OPT | Option alarm |
| E.OP3 | E.OP3 | Communication option alarm |
| E. 1 to E. 3 | E. 1 to E. 3 | Option alarm |
| E. PE | E.PE | Parameter storage device alarm |
| E.PUE | E.PUE | PU disconnection |
| E.rET | E.RET | Retry count excess |
| E.PE2 | E.PE2* | Parameter storage device alarm |
| E. 6/ E. 7/ E.CPU | E. 6 / E. 7 / E.CPU | CPU error |
| E.CTE | E.CTE | Operation panel power supply short circuit, RS-485 terminal power supply short circuit |
| E.P24 | E.P24 | 24VDC power output short circuit |
| E.CdO | E.CDO* | Output current detection value exceeded |
| E.IOH | E.IOH* | Inrush current limit circuit alarm |
| E.SEr | E.SER* | Communication error (inverter) |
| E.AIE | E.AIE* | Analog input error |
| E. OS | E.OS | Overspeed occurence |
| E.OSd | E.OSD | Speed deviation excess detection |
| E.ECT | E.OSD | Open cable detection |
| E. Od | E.OD | Excessive position error |
| E.Mb1 to E.Mb7 | E.MB1 to E.MB7 | Brake sequence error |
| E.EP | E.EP | Encoder phase error |
| E. bE | E.BE | Brake transistor alarm detection |
| E.USb | E.USB* | USB communication error |
| E. 11 | E.11 | Opposite rotation deceleration error |
| E. 13 | E.13 | Internal circuit error |

The right side rows are all grouped as: Major fault.

\* If an error occurs when using the FR-PU04, "Fault 14" is displayed on the FR-PU04.

# Appendix 1   Instructions for Compliance with the European Directives

## (1)   EMC Directive

We have self-confirmed our inverters as products compliant to the EMC Directive (second environment of conforming standard EN61800-3) and place the CE mark on the inverters.

Note: First  environment
  Environment including residential buildings. Includes buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.
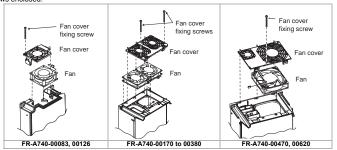  Second environment
  Environment including all buildings except buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.

1) Notes
  Install the inverter and perform wiring according to the following instructions.
* The inverter is equipped with a built-in EMC filter. Set the EMC filter valid (initial setting).
* Connect the inverter to an earthed power supply.
* Install a motor and a control cable written in the EMC Installation Manual (BCN-A21041-204) according to the instruction.
* The cable length between the inverter and the motor is 5 m maximum.
* Confirm that the inverter complies with the EMC Directive as the industrial drives application for final installation.

## (2)   Low Voltage Directive

We have self-confirmed our inverters as products compliant to the Low Voltage Directive (Conforming standard EN 50178) and place the CE mark on the inverters.

1) Outline of instructions
* Do not use an earth leakage current breaker as an electric shock protector without connecting the equipment to the earth. Connect the equipment to the earth securely.
* Wire the earth terminal independently. (Do not connect two or more cables to one terminal.)
* Use the cable sizes on *page 6* under the following conditions.
  · Ambient temperature: 40°C maximum
  If conditions are different from above, select appropriate wire according to EN60204 Appendix C TABLE 5.
* Use a tinned (plating should not include zinc) crimping terminal to connect the earth (ground) cable. When tightening the screw, be careful not to damage the threads.
  For use as a product compliant with the Low Voltage  Directive, use PVC cable whose size is indicated on *page 6*.
* Use the moulded case circuit breaker and magnetic contactor which conform to the EN or IEC Standard.
* When using an earth leakage current breaker, use a residual current operated protective device (RCD) of type B (breaker which can detect both AC and DC). If not, provide double or reinforced insulation between the inverter and other equipment, or put a transformer between the main power supply and inverter.
* Use the inverter under the conditions of overvoltage category II (usable regardless of the earth (ground) condition of the power supply), overvoltage category III (usable with the earthed-neutral system power supply, 400V class only) and pollution degree 2 or lower specified in IEC664.
  · To use the inverter of 00930 or more (IP00) under the conditions of pollution degree 2, install it in the enclosure of IP 2X or higher.
  · To use the inverter under the conditions of pollution degree 3, install it in the enclosure of IP54 or higher.
  · To use the inverter of 00770 or less (IP20) outside of an enclosure in the environment of pollution degree 2, fix a fan cover with fan cover fixing screws enclosed.



| FR-A740-00083, 00126 | FR-A740-00170 to 00380 | FR-A740-00470, 00620 |

* On the input and output of the inverter, use cables of the type and size set forth in EN60204 Appendix C.
* The operating capacity of the relay outputs (terminal symbols A1, B1, C1, A2, B2, C2) should be 30VDC, 0.3A. (Relay outputs are basically isolated from the inverter internal circuit.)
* Control circuit terminals on *page 3* are safely isolated from the main circuit.
* Environment

| | During Operation | In Storage | During Transportation |
|---|---|---|---|
| Ambient temperature | LD, ND (initial setting), HD: -10°C to +50°C SLD: -10°C to +40°C | -20°C to +65°C | -20°C to +65°C |
| Ambient humidity | 90% RH or less | 90% RH or less | 90% RH or less |
| Maximum altitude | 1000m | 1000m | 10000m |

Details are given in the technical information "Low Voltage Directive Conformance Guide" (BCN-A21041-203). Please contact your sales representative.

# Appendix 2   Instructions for UL and cUL Compliance

(Conforming standard UL 508C, CSA C22.2 No.14)

## (1)   Installation

This inverter is a UL-listed as a product for use in an enclosure.

Design an enclosure so that the inverter ambient temperature, humidity and atmosphere satisfy the specifications. *(Refer to page 1.)*

**Wiring protection**

For installation in the United States, branch circuit protection must be provided in accordance with the National Electrical Code and any applicable provincial codes.

For installation in Canada, branch circuit protection must be provided in accordance with the Canadian Electrical Code and any applicable provincial codes.

Provide the appropriate UL Listed Class RK5 or Class T fuses that are suitable for branch circuit protection in accordance with the table below.

| FR-A740-□□□□□-EC | | 00023 | 00038 | 00052 | 00083 | 00126 | 00170 | 00250 | 00310 | 00380 | 00470 | 00620 | 00770 | 00930 | 01160 | 01800 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated voltage(V) | | 480V or more | | | | | | | | | | | | | | |
| Rated current (A) | Without power factor improving reactor | 6 | 10 | 15 | 20 | 30 | 40 | 70 | 80 | 90 | 110 | 150 | 175 | 200 | 250 | 300 |
| | With power factor improving reactor | 6 | 10 | 10 | 15 | 25 | 35 | 60 | 70 | 90 | 100 | 125 | 150 | 175 | 200 | 250 |

| FR-A740-□□□□□-EC | | 02160 | 02600 | 03250 | 03610 | 04320 | 04810 | 05470 | 06100 | 06830 | 07700 | 08660 | 09620 | 10940 | 12120 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated voltage(V) | | 500V or more | | | | | | | | | | | | | |
| Rated current (A) | Without power factor improving reactor | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| | With power factor improving reactor | 300 | 350 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1350 | 1500 | 1800 |

## (2)   Wiring of the power supply and motor

For wiring the input (R/L1, S/L2, T/L3) and output (U, V, W) terminals of the inverter, use the UL Listed copper, stranded wires (rated at 75°C) and round ring crimping terminals. Crimp the crimping terminals with the crimping tool recommended by the terminal maker.
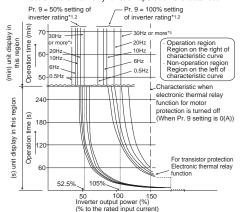
### (3) Short circuit ratings

- Model 01800 or less
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 528V Maximum.
- Model 02160 or more
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 550V Maximum.

### (4) Motor overload protection

This inverter is certified as a motor overload protection device by UL.
When using the electronic thermal relay function as motor overload protection, set the rated motor current to *Pr. 9 Electronic thermal O/L relay*.

Electronic thermal relay function operation characteristic



This function detects the overload (overheat) of the motor, stops the operation of the inverter's output transistor, and stops the output.
(The operation characteristic is shown on the left)
 When using the Mitsubishi constant-torque motor
 1) Set "1" or any of "13" to "18", "50", "53", "54" in *Pr. 71*.
    (This provides a 100% continuous torque characteristic in the low-speed range.)
 2) Set the rated current of the motor in *Pr. 9*.

*1 When a value 50% of the inverter rated output current (current value) is set in *Pr. 9*
*2 The % value denotes the percentage to the inverter rated output current. It is not the percentage to the motor rated current.
*3 When you set the electronic thermal relay function dedicated to the Mitsubishi constant-torque motor, this characteristic curve applies to operation at 6Hz or higher.

═══ **CAUTION** ═══

- Protective function by electronic thermal relay function is reset by inverter power reset and reset signal input. Avoid unnecessary reset and power-off.
- When multiple motors are operated by a single inverter, protection cannot be provided by the electronic thermal relay function. Install an external thermal relay to each motor.
- When the difference between the inverter and motor capacities is large and the setting is small, the protective characteristics of the electronic thermal relay function will be deteriorated. In this case, use an external thermal relay.
- A special motor cannot be protected by the electronic thermal relay function. Use the external thermal relay.

REVISIONS

*The manual number is given on the bottom left of the back cover.

| Print Date | *Manual Number | Revision |
|---|---|---|
| Nov., 2005 | IB-0600256ENG-A | First edition |

⚠ **For Maximum Safety**
- Mitsubishi inverters are not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to prevent serious accidents when it is used in facilities where breakdowns of the product are likely to cause a serious accident.
- Please do not use this product for loads other than three-phase induction motors.