MITSUBISHI ELECTRIC

700 series

# INVERTER
# FR-A700
# INSTALLATION GUIDELINE

## FR-A720-00030 to 03460-NA
## FR-A740-00015 to 09620-NA
## FR-A720-00030 to 00330-N4
## FR-A740-00015 to 00170-N4
## FR-A760-00017 to 06630-NA

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**



A 700

| 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** Incorrect handling may cause hazardous conditions, resulting in death or severe injury.

**⚠CAUTION** Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

The ⚠CAUTION level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal 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 wiring, inspection or switching EMC filter ON/OFF connector, power must be switched OFF. To confirm that, LED indication of the operation panel must be checked. (It must be OFF.) Any person who is involved in wiring, inspection or switching EMC filter ON/OFF connector shall 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 code (NEC section 250, IEC 536 class 1 and other applicable standards).
  A neutral-point earthed (grounded) power supply for 400V class inverter in compliance with EN standard must be used.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The inverter must be installed before wiring. Otherwise you may get an electric shock or be injured.
- Setting dial and key operations must be performed 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.
- When measuring the main circuit capacitor capacity (*Pr. 259 Main circuit capacitor life measuring* = "1"), the DC voltage is applied to the motor for 1s at powering off. Never touch the motor terminal, etc. right after powering off to prevent an electric shock.

### 2. Fire Prevention

**⚠CAUTION**

- Inverter must be installed on a nonflammable wall without holes (so that nobody touches the inverter heatsink on the rear side, etc.). Mounting it to or near flammable material can cause a fire.
- If the inverter has become faulty, the inverter power must be switched OFF. A continuous flow of large current could cause a fire.
- When using a brake resistor, a sequence that will turn OFF power when a fault signal is output must be configured.
  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/+ and N/-. Doing so could cause a fire.

### 3. Injury Prevention

**⚠CAUTION**

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- Polarity must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, do not touch the inverter since the inverter will be extremely hot. Doing so can cause burns.

### 4. Additional Instructions

Also the following points must be noted to prevent an accidental failure, injury, electric shock, etc.

**(1) Transportation and installation**

**⚠CAUTION**

- The product must be transported in correct method that corresponds to the weight. Failure to do so may lead to injuries.
- Do not stack the boxes containing inverters higher than the number recommended.
- The product must be installed to the position where withstands the weight of the product 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.
- The inverter mounting orientation must be correct.
- Foreign conductive bodies must be prevented to enter the inverter. That includes screws and metal fragments or other flammable substance such as oil.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- The inverter must be used under the following environment: Otherwise the inverter may be damaged.

| | | | |
|---|---|---|---|
| Environment | Surrounding air temperature *1 | LD, ND (initial setting), HD*3 | -10°C to +50°C (14°F to 122°F) (non-freezing) |
| | | SLD | -10°C to +40°C (14°F to 104°F) (non-freezing)*2 |
| | Ambient humidity | | 90% RH or less (non-condensing) |
| | Storage temperature | | -20°C to +65°C *2 (-4°F to 149°F) |
| | Atmosphere | | Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt) |
| | Altitude, vibration | | Maximum 1000m (3280.80feet) above sea level for standard operation. After that derate by 3% for every extra 500m (1640.40feet) up to 2500m (8202feet) (91%). 5.9m/s$^2$ or less at 10 to 55Hz (directions of X, Y, Z axes) *5 |

*1 For the FR-A760-00840 or less, the Surrounding air temperature is -10°C to +40°C (14°F to 104°F)
*2 For the FR-A760-00061 or less with SLD set, the temperature is -10°C to +30°C (14°F to 86°F)
*3 For the FR-A760-01040 or more with HD set, the temperature is -10°C to +40°C (14°F to 104°F)
*4 Temperature applicable for a short time, e.g. in transit.
*5 2.9m/s$^2$ or less for the FR-A740-03250 (FR-A760-02210) or more.

**(2) Wiring** ⚠CAUTION

- Do not install a power factor correction capacitor, surge suppressor or capacitor type filter on the inverter output side. These devices on the inverter output side may be overheated or burn out.
- The connection orientation of the output cables U, V, W to the motor affects the rotation direction of the motor.

**(3) Test operation and adjustment**

⚠CAUTION

- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

**(4) Operation** ⚠WARNING

- Any person must stay away from the equipment when the retry function is set as it will restart suddenly after trip.
- Since pressing STOP RESET key may not stop output depending on the function setting status, separate circuit and switch that make an emergency stop (power OFF, mechanical brake operation for emergency stop, etc.) must be provided.
- OFF status of the start signal must be confirmed before resetting the inverter fault. Resetting inverter alarm with the start signal ON restarts the motor suddenly.
- The inverter must be used for three-phase induction motors. Connection of any other electrical equipment to the inverter output may damage the 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 also run at a low speed when the speed limit value = 0 with a start command input. It must be confirmed that the motor running will not cause any safety problem before performing pre-excitation.
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in this manual. 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. It is recommended to install both an external thermal and PTC thermistor for overheat protection.
- Do not use a magnetic contactor on the inverter input for frequent starting/stopping of the inverter. Otherwise the life of the inverter decreases.
- The effect of electromagnetic interference must be reduced by using a noise filter or by other means. Otherwise nearby electronic equipment may be affected.
- Appropriate measures must be taken to suppress harmonics. Otherwise power supply harmonics from the inverter may heat/ damage the power factor correction capacitor and generator.
- When driving a 400V/600V class motor by the inverter, the motor must be an insulation-enhanced motor or measures must be taken to suppress surge voltage. Surge voltage attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations because all parameters return to the initial value.
- The inverter can be easily set for high-speed operation. Before changing its setting, the performances of the motor and machine must be fully examined.
- Stop status cannot be hold by the inverter's brake function. In addition to the inverter's brake function, a holding device must be installed to ensure safety.
- Before running an inverter which had been stored for a long period, inspection and test operation must be performed.
- For prevention of damage due to static electricity, nearby metal must be touched before touching this product to eliminate static electricity from your body.

**(5) Emergency stop** ⚠CAUTION

- A safety backup such as an emergency brake must be provided to prevent hazardous condition to the machine and equipment in case of inverter failure.
- When the breaker on the inverter input side trips, the wiring must be checked for fault (short circuit), and internal parts of the inverter for a damage, etc. The cause of the trip must be identified and removed before turning ON the power of the breaker.
- When any protective function is activated, appropriate corrective action must be taken, and the inverter must be reset before resuming operation.

**(6) Maintenance, inspection and parts replacement**

⚠CAUTION

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

**(7) Disposing of the inverter**

⚠CAUTION

- The inverter must be treated as industrial waste.

General instructions

Many of the diagrams and drawings in this Installation Guideline show the inverter without a cover or partially open for explanation. Never operate the inverter in this manner. The cover must be always reinstalled and the instruction in this Installation Guideline must be followed when operating the inverter.

# 1 INSTALLATION OF THE INVERTER AND INSTRUCTIONS

- **Inverter Model**

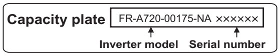
FR - A720 - 00175 - NA

| Symbol | Voltage Class |
|---|---|
| A720 | Three-phase 200V class |
| A740 | Three-phase 400V class |
| A760 | Three-phase 600V class |

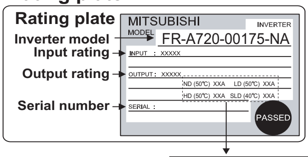
| Symbol | Type number |
|---|---|
| 200V class 00030 to 03460 | Displays the rated current |
| 400V class 00015 to 03250 | |
| 600V class 00017 to 04020 | |

| Symbol | Specifications |
|---|---|
| NA | U.S. Specifications |
| N4 | U.S. Specifications (UL Type 1) |

## Capacity plate




## Rating plate



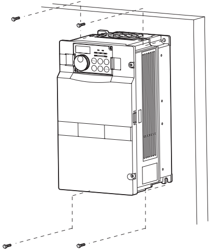

| | Overload current rating | Surrounding air temperature | |
|---|---|---|---|
| | | FR-A720/A740 | FR-A760 |
| SLD | 110% 60s, 120% 3s | 40°C (104°F) | 30°C (86°F) (00061 or less)<br>40°C (104°F) (00120 or more) |
| LD | 120% 60s, 150% 3s | 50°C (122°F) | 40°C (104°F) (00840 or less)<br>50°C (122°F) (01040 or more) |
| ND | 150% 60s, 200% 3s | 50°C (122°F) | 40°C (104°F) (00840 or less)<br>50°C (122°F) (01040 or more) |
| HD | 200% 60s, 250% 3s | 50°C (122°F) | 40°C (104°F) |

- **Installation of the inverter**

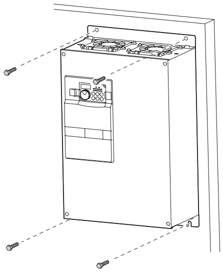
Note - Some inverter models may be installed outside an enclosure. See Appendix 2 for details.

Installation on the enclosure

**FR-A720-00900 or less**
**FR-A740-00440 or less**
**FR-A760-00330 or less**



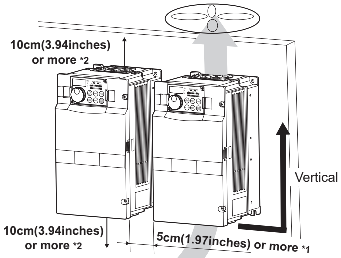
**FR-A720-01150 or more**
**FR-A740-00570 or more**
**FR-A760-00550 or more**



Fix six positions for the FR-A740-03250 to 06830 (FR-A760-02210 to 06630) and fix eight positions for the FR-A740-07700 to 09620.

**CAUTION**

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




***1 1cm or more for FR-A720-00175**
**(FR-A740-00090, FR-A760-00061) or less**
**10cm or more for FR-A720-02880**
**(FR-A740-01440, FR-A760-01040) or more**
***2 20cm or more for FR-A720-02880**
**(FR-A740-01440, FR-A760-01040) or more**

**REMARKS**

To use an enclosed brake resistor for the FR-A760-00061 or less, *refer to page 8*.

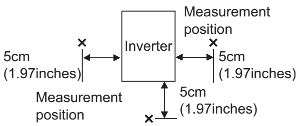
- **General Precaution**

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.

| | |
|---|---|
| **Surrounding air temperature** | **FR-A720/A740**<br>LD, ND (initial setting),HD:<br>-10°C to + 50°C (14°F to 122°F) (non-freezing)<br>SLD: -10°C to + 40°C (14°F to 104°F) (non-freezing)<br>**FR-A760**<br>LD, ND (initial setting):<br>-10°C to +40°C (14°F to 104°F) (non-freezing) (00840 or less)<br>-10°C to +50°C (14°F to 122°F) (non-freezing) (01040 or more)<br>HD:<br>-10°C to + 40°C (14°F to 104°F) (non-freezing)<br>SLD:<br>-10°C to +30°C (14°F to 86°F) (non-freezing) (00061 or less)<br>-10°C to +40°C (14°F to 104°F) (non-freezing) (00120 or more) |
| **Ambient humidity** | 90%RH or less (non-condensing) |
| **Storage temperature** | -20°C to +65°C (-4°F to 149°F) |
| **Ambience** | Indoors (No corrosive and flammable gases, oil mist, dust and dirt.) |
| **Altitude, vibration** | Maximum 1000m (3280.80feet) above sea level for standard operation. After that derate by 3% for every extra 500m (1640.40feet) up to 2500m (8202feet) (91%).<br>5.9m/s$^2$ or less at 10 to 55Hz (directions of X, Y, Z axes) *1 |




*1 2.9m/s$^2$ or less for the FR-A740-03250 (FR-A760-02210) or more

**CAUTION**

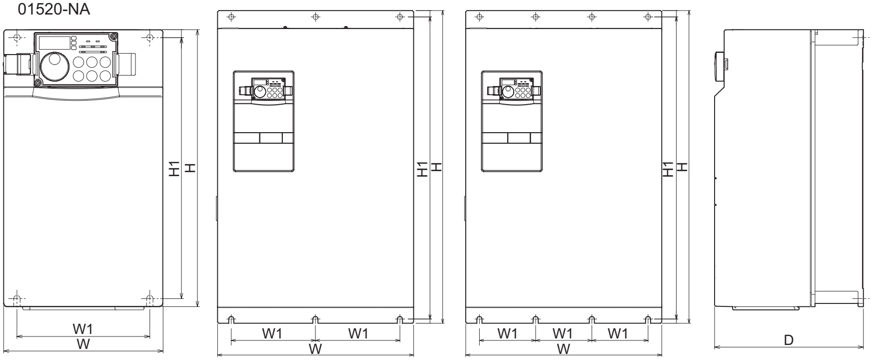
- Install the inverter on a strong surface securely and vertically with bolts.
- Leave enough clearances and take cooling measures.
- Avoid places where the inverter is subjected to direct sunlight, high temperature and high humidity.
- Install the inverter on a non-combustible wall surface.

# 2 OUTLINE DIMENSION DRAWING

FR-A720-00030 to 03460-NA
FR-A740-00015 to 02600-NA
FR-A720-00030 to 00330-N4
FR-A740-00015 to 00170-N4
FR-A760-00017 to 01520-NA

FR-A740-03250 to 06830-NA
FR-A760-02020 to 04020-NA

FR-A740-07700 to 09620-NA
FR-A760-04960, 06630-NA




(Unit:mm(inches))

• 200V class

| Inverter Model | W | W1 | H | H1 | D |
|---|---|---|---|---|---|
| FR-A720-00030-NA | 110 (4.33) | 95 (3.74) | 260 (10.24) | 245 (9.65) | 110 (4.33) |
| FR-A720-00050-NA | | | | | 125 (4.92) |
| FR-A720-00080-NA | 150 (5.91) | 125 (4.92) | | | 140 (5.51) |
| FR-A720-00110-NA | | | | | |
| FR-A720-00175-NA | | | | | |
| FR-A720-00240-NA | 220 (8.66) | 195 (7.68) | | | 170 (6.69) |
| FR-A720-00330-NA | | | | | |
| FR-A720-00460-NA | | | 300 (11.81) | 285 (11.22) | 190 (7.48) |
| FR-A720-00610-NA | 250 (9.84) | 230 (9.06) | 400 (15.75) | 380 (14.96) | |
| FR-A720-00760-NA | | | | | |
| FR-A720-00900-NA | | | | | |
| FR-A720-01150-NA | 325 (12.8) | 270 (10.63) | 550 (21.65) | 530 (20.87) | 195 (7.68) |
| FR-A720-01450-NA | 435 (17.13) | 380 (14.96) | | 525 (20.67) | 250 (9.84) |
| FR-A720-01750-NA | | | | | |
| FR-A720-02150-NA | 465 (18.31) | 410 (16.14) | 700 (27.56) | 675 (26.57) | |
| FR-A720-02880-NA | | 400 (15.75) | 740 (29.13) | 715 (28.15) | 360 (14.17) |
| FR-A720-03460-NA | | | | | |
| FR-A720-00030-N4 | 110 (4.33) | 95 (3.74) | 260 (10.24) | 245 (9.65) | 122 (4.80) |
| FR-A720-00050-N4 | | | | | 137 (5.39) |
| FR-A720-00080-N4 | 150 (5.91) | 125 (4.92) | | | 152 (5.98) |
| FR-A720-00110-N4 | | | | | |
| FR-A720-00175-N4 | | | | | |
| FR-A720-00240-N4 | 220 (8.66) | 195 (7.68) | | | 182 (7.17) |
| FR-A720-00330-N4 | | | | | |

• 400V class

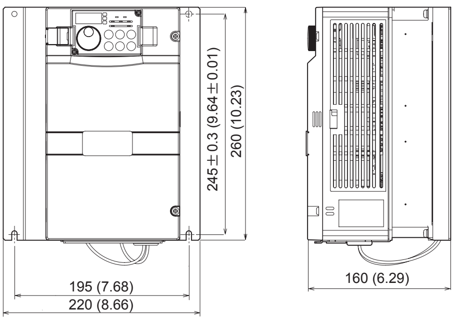
<table>
<tr><th>Inverter Model</th><th>W</th><th>W1</th><th>H</th><th>H1</th><th>D</th></tr>
<tr><td>FR-A740-00015-NA</td><td rowspan="5">150 (5.91)</td><td rowspan="5">125 (4.92)</td><td rowspan="7">260 (10.24)</td><td rowspan="7">245 (9.65)</td><td rowspan="5">140 (5.51)</td></tr>
<tr><td>FR-A740-00025-NA</td></tr>
<tr><td>FR-A740-00040-NA</td></tr>
<tr><td>FR-A740-00060-NA</td></tr>
<tr><td>FR-A740-00090-NA</td></tr>
<tr><td>FR-A740-00120-NA</td><td rowspan="4">220 (8.66)</td><td rowspan="4">195 (7.68)</td><td rowspan="2">170 (6.69)</td></tr>
<tr><td>FR-A740-00170-NA</td></tr>
<tr><td>FR-A740-00230-NA</td><td rowspan="2">300 (11.81)</td><td rowspan="2">285 (11.22)</td><td rowspan="2">190 (7.48)</td></tr>
<tr><td>FR-A740-00310-NA</td></tr>
<tr><td>FR-A740-00380-NA</td><td rowspan="2">250 (9.84)</td><td rowspan="2">230 (9.06)</td><td rowspan="2">400 (15.75)</td><td rowspan="2">380 (14.96)</td><td rowspan="2">190 (7.48)</td></tr>
<tr><td>FR-A740-00440-NA</td></tr>
<tr><td>FR-A740-00570-NA</td><td>325 (12.8)</td><td>270 (10.63)</td><td>550 (21.65)</td><td>530 (20.87)</td><td>195 (7.68)</td></tr>
<tr><td>FR-A740-00710-NA</td><td rowspan="3">435 (17.13)</td><td rowspan="3">380 (14.96)</td><td rowspan="3">550 (21.65)</td><td rowspan="3">525 (20.67)</td><td rowspan="3">250 (9.84)</td></tr>
<tr><td>FR-A740-00860-NA</td></tr>
<tr><td>FR-A740-01100-NA</td></tr>
<tr><td>FR-A740-01440-NA</td><td rowspan="4">465 (18.31)</td><td rowspan="4">400 (15.75)</td><td rowspan="2">620 (24.41)</td><td rowspan="2">595 (23.43)</td><td rowspan="2">300 (11.81)</td></tr>
<tr><td>FR-A740-01800-NA</td></tr>
<tr><td>FR-A740-02160-NA</td><td rowspan="2">740 (29.13)</td><td rowspan="2">715 (28.15)</td><td rowspan="2">360 (14.17)</td></tr>
<tr><td>FR-A740-02600-NA</td></tr>
<tr><td>FR-A740-03250-NA</td><td rowspan="2">498 (19.6)</td><td rowspan="2">200 (7.87)</td><td rowspan="5">1010 (39.76)</td><td rowspan="5">985 (38.78)</td><td rowspan="5">380 (14.96)</td></tr>
<tr><td>FR-A740-03610-NA</td></tr>
<tr><td>FR-A740-04320-NA</td><td rowspan="3">680 (26.77)</td><td rowspan="3">300 (11.81)</td></tr>
<tr><td>FR-A740-04810-NA</td></tr>
<tr><td>FR-A740-05470-NA</td></tr>
<tr><td>FR-A740-06100-NA</td><td rowspan="2">790 (31.1)</td><td rowspan="2">315 (12.4)</td><td rowspan="2">1330 (52.36)</td><td rowspan="2">1300 (51.18)</td><td rowspan="5">440 (17.32)</td></tr>
<tr><td>FR-A740-06830-NA</td></tr>
<tr><td>FR-A740-07700-NA</td><td rowspan="3">995 (39.17)</td><td rowspan="3">300 (11.81)</td><td rowspan="3">1580 (62.2)</td><td rowspan="3">1550 (61.02)</td></tr>
<tr><td>FR-A740-08660-NA</td></tr>
<tr><td>FR-A740-09620-NA</td></tr>
<tr><td>FR-A740-00015-N4</td><td rowspan="5">150 (5.91)</td><td rowspan="5">125 (4.92)</td><td rowspan="7">260 (10.24)</td><td rowspan="7">245 (9.65)</td><td rowspan="5">152 (5.98)</td></tr>
<tr><td>FR-A740-00025-N4</td></tr>
<tr><td>FR-A740-00040-N4</td></tr>
<tr><td>FR-A740-00060-N4</td></tr>
<tr><td>FR-A740-00090-N4</td></tr>
<tr><td>FR-A740-00120-N4</td><td rowspan="2">220 (8.66)</td><td rowspan="2">195 (7.68)</td><td rowspan="2">182 (7.17)</td></tr>
<tr><td>FR-A740-00170-N4</td></tr>
</table>

• 600V class

| Inverter Model | W | W1 | H | H1 | D |
|---|---|---|---|---|---|
| FR-A760-00017-NA | 150 (5.91) | 125 (4.92) | 260 (10.24) | 245 (9.65) | 140 (5.51) |
| FR-A760-00040-NA | | | | | |
| FR-A760-00061-NA | | | | | |
| FR-A760-00120-NA | 220 (8.66) | 195 (7.68) | | | 170 (6.69) |
| FR-A760-00220-NA | | | 300 (11.81) | 285 (11.22) | 190 (7.48) |
| FR-A760-00330-NA | 250 (9.84) | 230 (9.06) | 400 (15.75) | 380 (14.96) | 190 (7.48) |
| FR-A760-00550-NA | 435 (17.13) | 380 (14.96) | 550 (21.65) | 525 (20.67) | 250 (9.84) |
| FR-A760-00840-NA | | | | | |
| FR-A760-01040-NA | 465 (18.31) | 400 (15.75) | 620 (24.41) | 595 (23.43) | 300 (11.81) |
| FR-A760-01310-NA | | | | | |
| FR-A760-01520-NA | | | | | |
| FR-A760-02210-NA | 498 (19.6) | 200 (7.87) | 1010 (39.76) | 985 (38.78) | 380 (14.96) |
| FR-A760-02550-NA | | | | | |
| FR-A760-03040-NA | 680 (26.77) | 300 (11.81) | | | |
| FR-A760-04020-NA | 790 (31.1) | 315 (12.4) | 1330 (52.36) | 1300 (51.18) | 440 (17.32) |
| FR-A760-04960-NA | 995 (39.17) | 300 (11.81) | 1580 (62.20) | 1550 (61.02) | |
| FR-A760-06630-NA | | | | | |

## ●When an enclosed brake resistor is used (FR-A760 only)

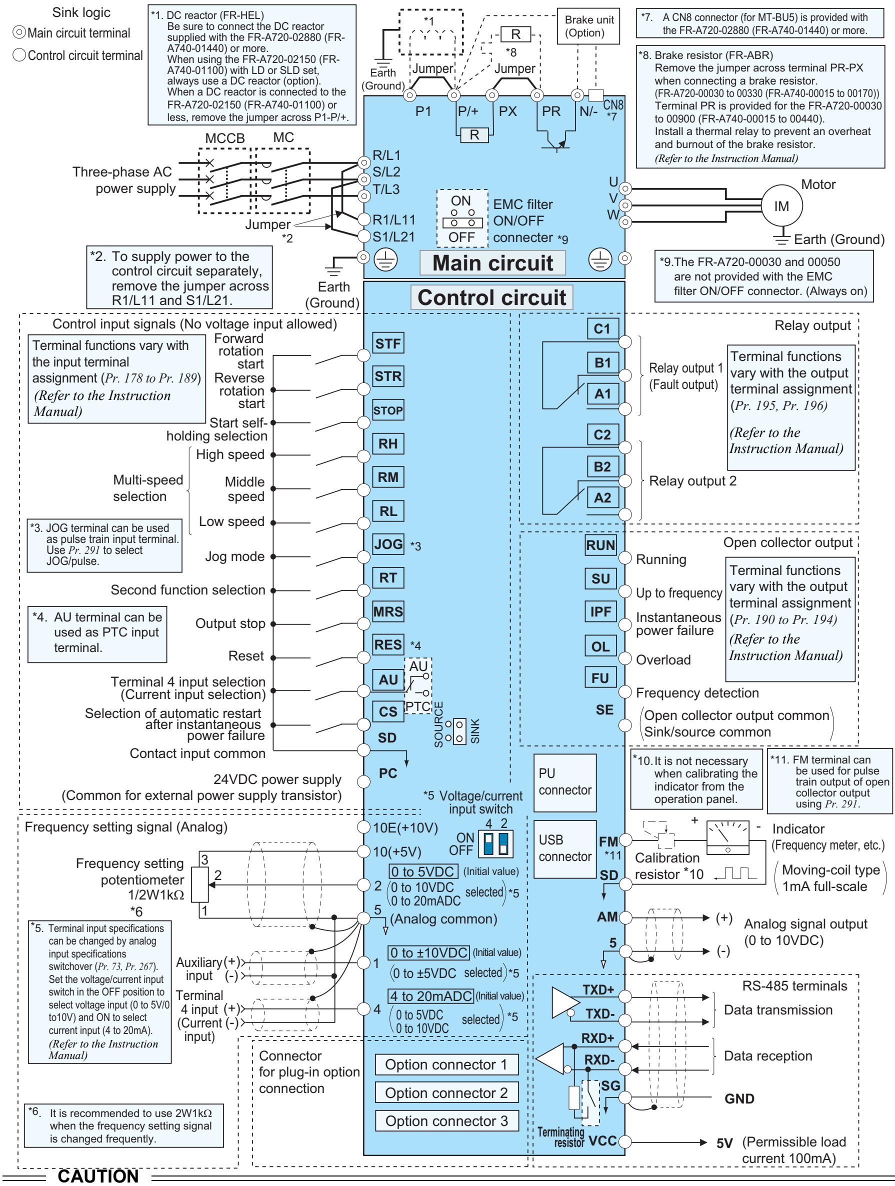
FR-A760-00017 to 00061-NA




(Unit:mm(inches))

# 3 WIRING

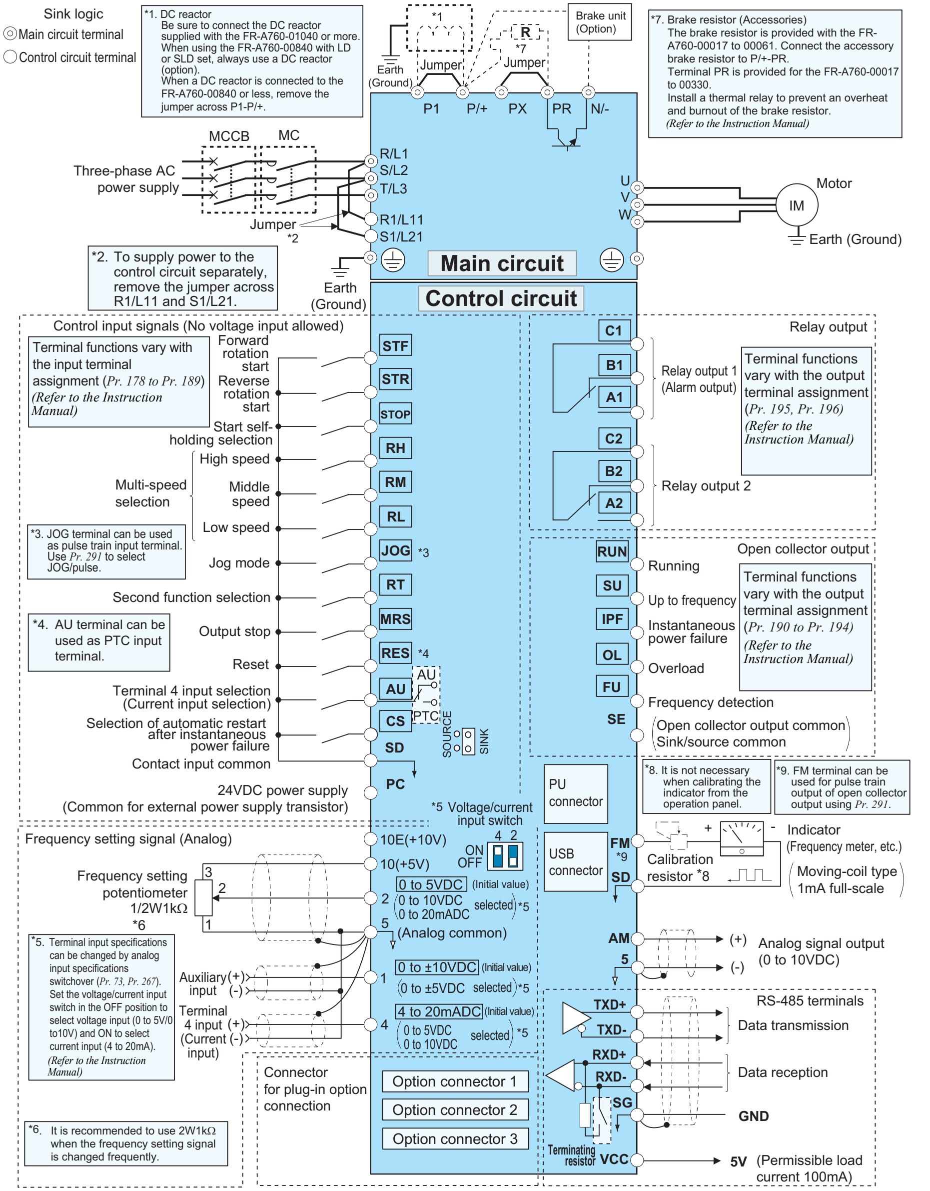
## 3.1 Terminal connection diagram (FR-A720/740)




**CAUTION**

- To prevent a malfunction due to noise, keep the signal cables more than 10cm (3.94inches) away from the power cables. Also separate the main circuit wire of the input side and the output side.
- 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.
- Set the voltage/current input switch correctly. Different setting may cause a fault, failure or malfunction.

## 3.2 Terminal connection diagram (FR-A760)




### CAUTION

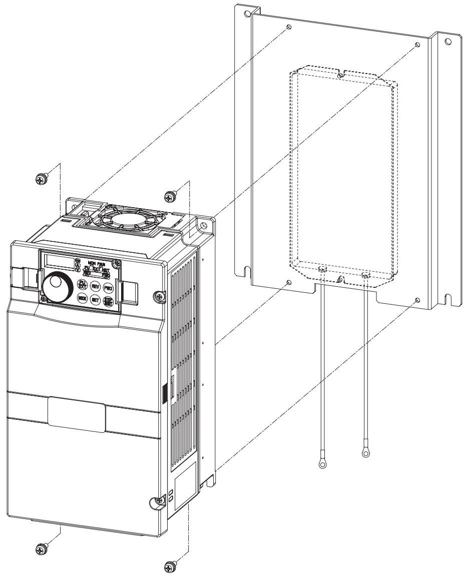
- To prevent a malfunction due to noise, keep the signal cables more than 10cm (3.94inches) away from the power cables. Also separate the main circuit wire of the input side and the output side.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure 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.
- Set the voltage/current input switch correctly. Different setting may cause a fault, failure or malfunction.

# 3.3 Connection of provided brake resistor (FR-A760 only)

Connecting the brake resistor enclosed with the unit to the FR-A760-00017 to 00061 will improve regeneration capability.

## (1) Installation procedure

Connect the brake resistor to the inverter with provided screws.



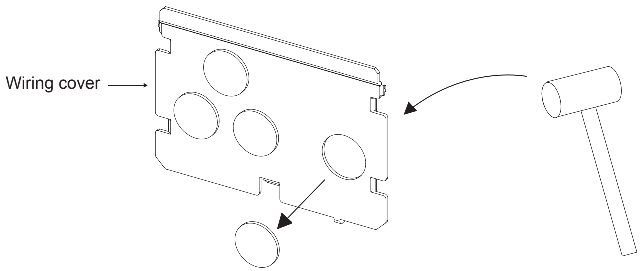
**REMARKS**

Connecting the brake resistor changes the protective structure to OPEN type (NEMA1).

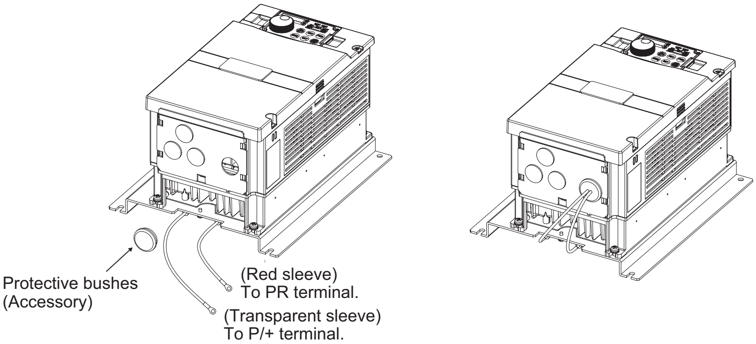
## (2) Connection

### Wiring cover and Handling (FR-A760-00061 or less)

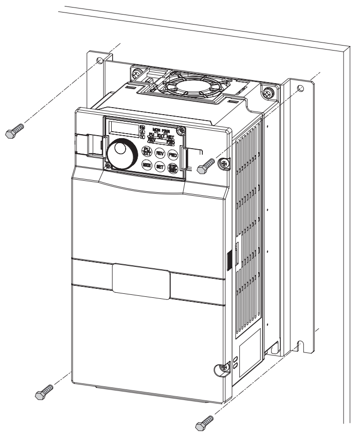
1) Remove the wiring cover of the inverter. Punch out a knockout by firmly tapping it with such as a hammer. Remove any sharp edges and burrs from knockout holes of the wiring cover.



2) Attach protective bushes provided to the wiring cover and cut with nippers or a cutter before running the cables. Connect the wire with red sleeve to PR terminal. Connect the wire with transparent sleeve to P/+.




### (3) Installation of the inverter



**CAUTION**

When handling the wiring cover, care must be taken not to cut fingers or hands with sharp edges and burrs.
Avoid wire offcuts and other foreign matter from entering the inverter.

## ⚠ WARNING

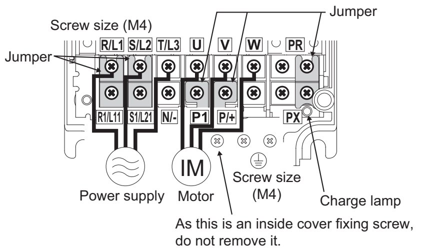
⚠ Do not wire without using protective bushes. Otherwise, the cable sheathes may be scratched by the wiring cover edges, resulting in a short circuit or ground fault.

# 3.4 Main circuit terminal

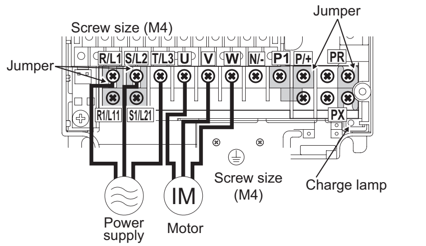
## (1) Terminal layout and wiring

### 200V class

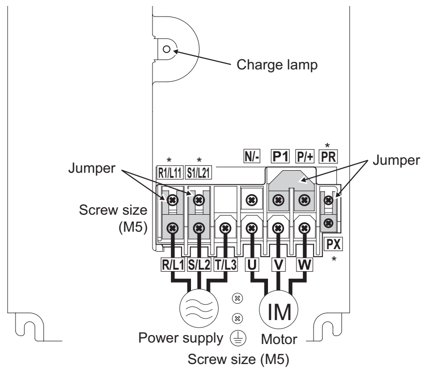
FR-A720-00030, 00050-NA/N4




FR-A720-00080, 00110, 00175-NA/N4

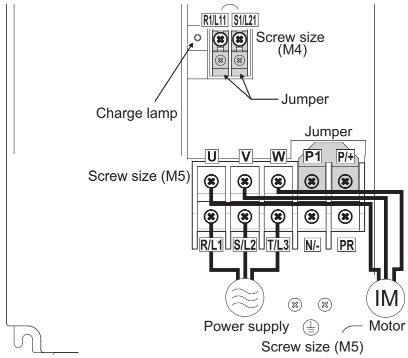



FR-A720-00240, 00330-NA/N4

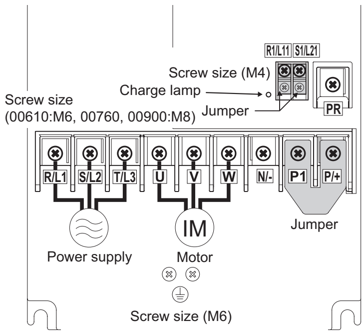



* Screw size of terminal R1/L11, S1/L21, PR, and PX is M4.

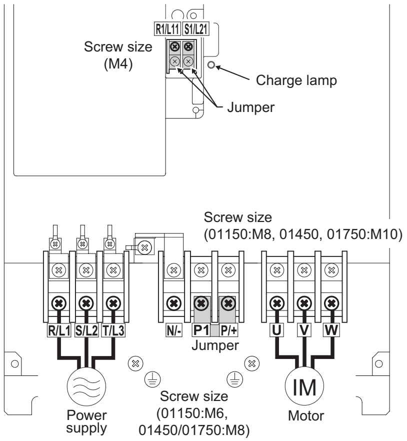
FR-A720-00460-NA



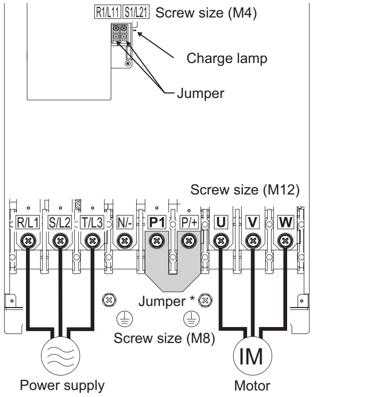

FR-A720-00610, 00760, 00900-NA




FR-A720-01150, 01450, 01750-NA

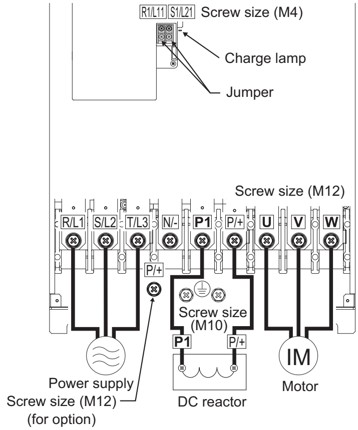


FR-A720-02150-NA



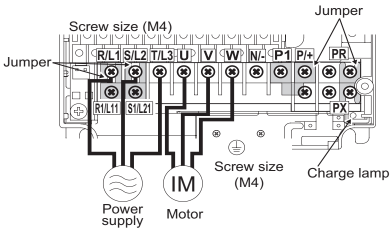

* When using the inverter with LD or SLD set, remove a jumper between P/+ and P1 and connect a DC reactor (FR-HEL-75K option).

FR-A720-02880, 03460-NA

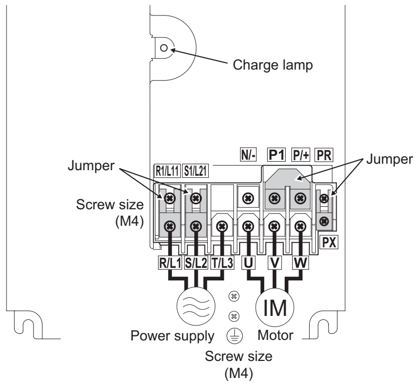



## 400V class

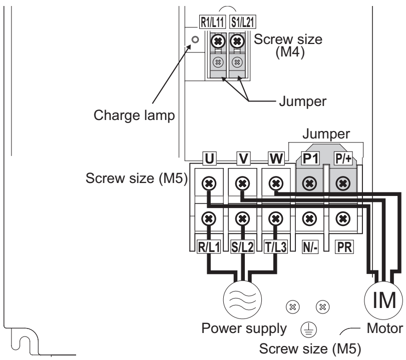
FR-A740-00015 to 00090-NA/N4



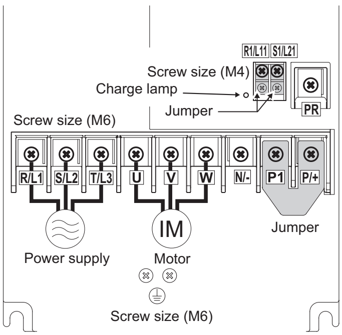

FR-A740-00120, 00170-NA/N4



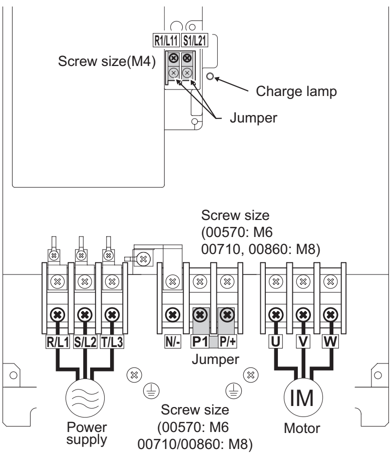

FR-A740-00230, 00310-NA



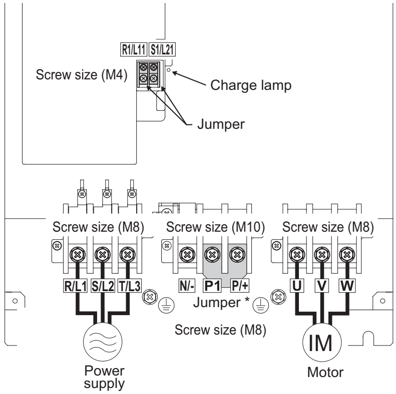

FR-A740-00380, 00440-NA



FR-A740-00570, 00710, 00860-NA

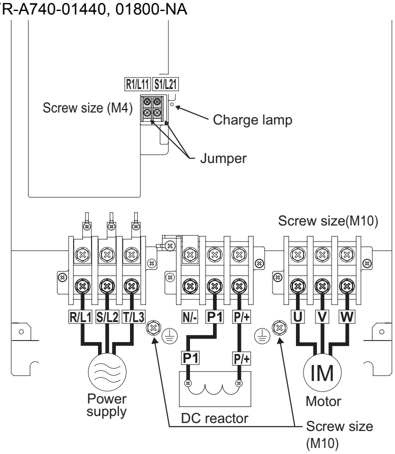



FR-A740-01100-NA

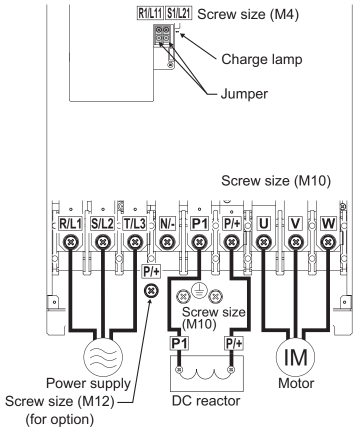



* When using the inverter with LD or SLD set, remove a jumper between P/+ and P1 and connect a DC reactor (FR-HEL-H 90K option).

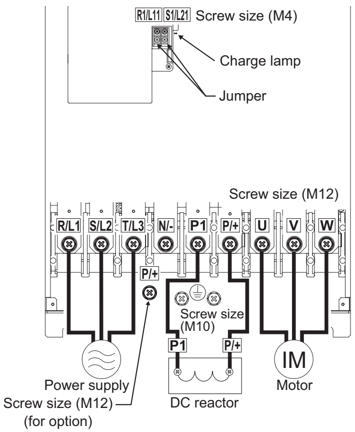
FR-A740-01440, 01800-NA



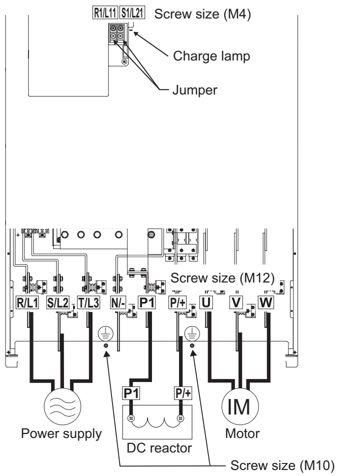

FR-A740-02160, 02600-NA



FR-A740-03250, 03610-NA

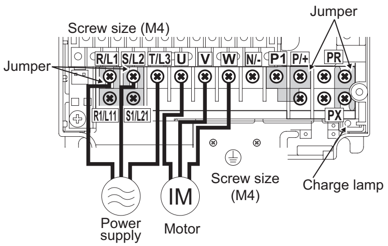



FR-A740-04320 to 09620-NA

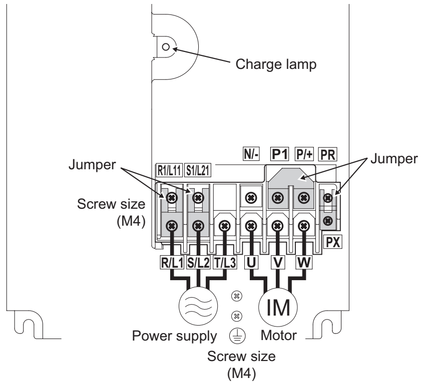



## 600V class

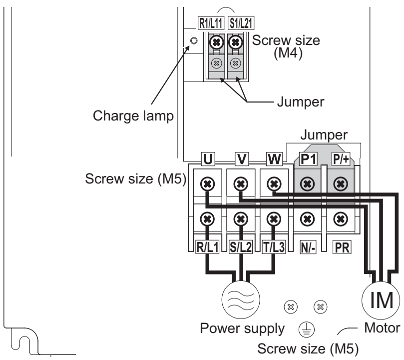
FR-A760-00017 to 00061-NA



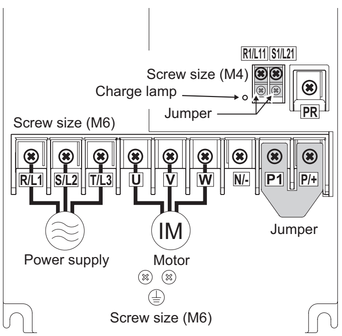

FR-A760-00120-NA



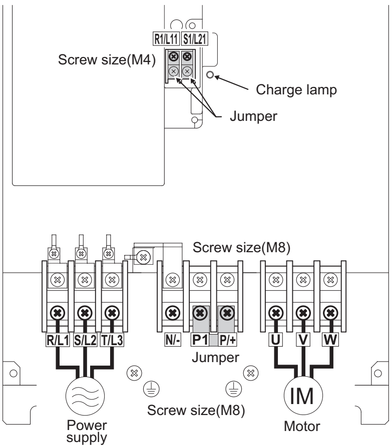

FR-A760-00220-NA



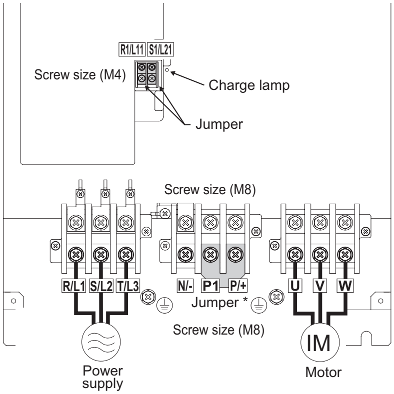

FR-A760-00330-NA



FR-A760-00550-NA

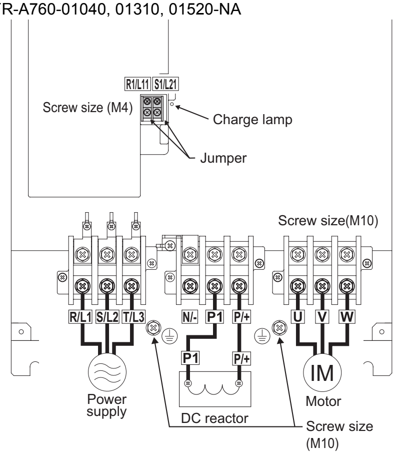



FR-A760-00840-NA

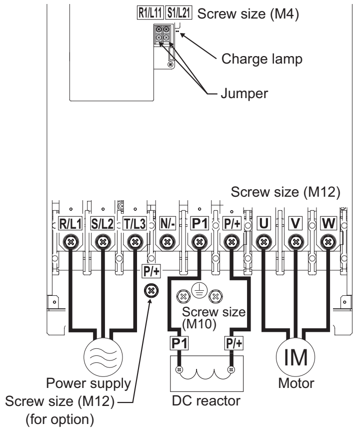



* When using the inverter with LD or SLD set, remove a jumper between P/+ and P1 and connect a DC reactor.

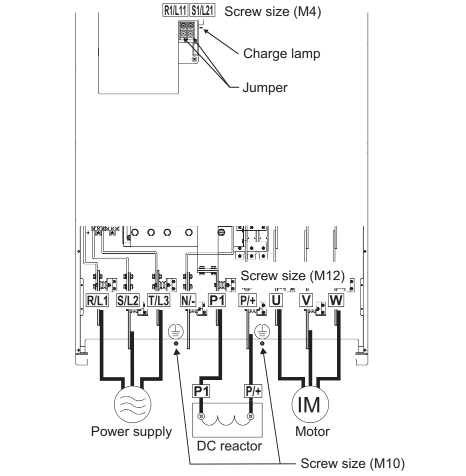
FR-A760-01040, 01310, 01520-NA




FR-A760-02210, 02550-NA

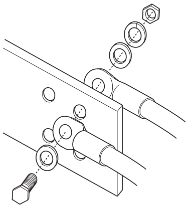


FR-A760-03040 to 06630-NA




## CAUTION

- The power supply cables must be connected to R/L1, S/L2, T/L3. (Phase sequence needs not to be matched.) Never connect the power cable to the U, V, W of the inverter. Doing so will damage the inverter.
- 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 FR-A740-04320 (FR-A760-03040) 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) Applicable 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 (65.62feet).

## 200V class (when input power supply is 220V)

| Applicable Inverter Model | Terminal Screw Size *4 | Tightening Torque N·m | Crimping Terminal | | Cable Sizes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HIV, etc. ($mm^2$) *1 | | | | AWG/MCM *2 | | PVC, etc. ($mm^2$) *3 | | |
| | | | R/L1, S/L2, T/L3 | U, V, W | 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-A720-00030 to 00110-NA/N4 | M4 | 1.5 | 2-4 | 2-4 | 2 | 2 | 2 | 2 | 14 | 14 | 2.5 | 2.5 | 2.5 |
| FR-A720-00175-NA/N4 | M4 | 1.5 | 5.5-4 | 5.5-4 | 3.5 | 3.5 | 3.5 | 3.5 | 12 | 12 | 4 | 4 | 4 |
| FR-A720-00240-NA/N4 | M5(M4) | 2.5 | 5.5-5 | 5.5-5 | 5.5 | 5.5 | 5.5 | 5.5 | 10 | 10 | 6 | 6 | 6 |
| FR-A720-00330-NA/N4 | M5(M4) | 2.5 | 14-5 | 8-5 | 14 | 8 | 14 | 5.5 | 6 | 8 | 16 | 10 | 16 |
| FR-A720-00460-NA | M5 | 2.5 | 14-5 | 14-5 | 14 | 14 | 14 | 14 | 6 | 6 | 16 | 16 | 16 |
| FR-A720-00610-NA | M6 | 4.4 | 22-6 | 22-6 | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A720-00760-NA | M8(M6) | 7.8 | 38-8 | 38-8 | 38 | 38 | 38 | 22 | 2 | 2 | 35 | 35 | 25 |
| FR-A720-00900-NA | M8(M6) | 7.8 | 38-8 | 38-8 | 38 | 38 | 38 | 22 | 2 | 2 | 35 | 35 | 25 |
| FR-A720-01150-NA | M8(M6) | 7.8 | 60-8 | 60-8 | 60 | 60 | 60 | 22 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A720-01450-NA | M10(M8) | 14.7 | 80-10 | 80-10 | 80 | 80 | 80 | 22 | 3/0 | 3/0 | 70 | 70 | 35 |
| FR-A720-01750-NA | M10(M8) | 14.7 | 100-10 | 100-10 | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A720-02150-NA | M12(M8) | 24.5 | 100-12 | 100-12 | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A720-02880-NA | M12(M10) | 24.5 | 150-12 | 150-12 | 125 | 125 | 125 | 38 | 250 | 250 | — | — | — |
| FR-A720-03460-NA | M12(M10) | 24.5 | 150-12 | 150-12 | 150 | 150 | 150 | 38 | 300 | 300 | — | — | — |

*1 For the 02150 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 (167°F). Assumes that the surrounding air temperature is 50°C (122°F) or less and the wiring distance is 20m (65.62feet) or less.
For the 02880 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 (194°F). Assumes that the surrounding air temperature is 50°C (122°F) or less and wiring is performed in an enclosure.

*2 The recommended cable size is that of the cable (THHW cable) with continuous maximum permissible temperature of 75°C (167°F). Assumes that the surrounding air temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
(Selection example for use mainly in the United States.)

*3 For the 00610 or less, the recommended cable size is that of the cable (PVC cable) with continuous maximum permissible temperature of 70°C (158°F). Assumes that the surrounding air temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
For the 00760 or more, the recommended cable size is that of the cable (XLPE cable) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the surrounding air temperature is 40°C (104°F) 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 00240 and 00330, screw size of terminal R1/L11, S1/L21, PR, and PX is indicated in ( )
A screw for earthing (grounding) of the 00760 or more is indicated in ( ).

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

| Applicable Inverter Model | Terminal Screw Size *4 | Tightening Torque N·m | Crimping Terminal | | Cable Sizes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HIV, etc. (mm²) *1 | | | | AWG/MCM *2 | | PVC, etc. (mm²) *3 | | |
| | | | R/L1, S/L2, T/L3 | U, V, W | 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-A740-00015 to 00090-NA/N4 | M4 | 1.5 | 2-4 | 2-4 | 2 | 2 | 2 | 2 | 14 | 14 | 2.5 | 2.5 | 2.5 |
| FR-A740-00120-NA/N4 | M4 | 1.5 | 2-4 | 2-4 | 2 | 2 | 3.5 | 3.5 | 12 | 14 | 2.5 | 2.5 | 4 |
| FR-A740-00170-NA/N4 | M4 | 1.5 | 5.5-4 | 5.5-4 | 3.5 | 3.5 | 3.5 | 3.5 | 12 | 12 | 4 | 4 | 4 |
| FR-A740-00230-NA | M5 | 2.5 | 5.5-5 | 5.5-5 | 5.5 | 5.5 | 5.5 | 8 | 10 | 10 | 6 | 6 | 10 |
| FR-A740-00310-NA | M5 | 2.5 | 8-5 | 8-5 | 8 | 8 | 8 | 8 | 8 | 8 | 10 | 10 | 10 |
| FR-A740-00380-NA | M6 | 4.4 | 14-6 | 8-6 | 14 | 8 | 14 | 14 | 6 | 8 | 16 | 10 | 16 |
| FR-A740-00440-NA | M6 | 4.4 | 14-6 | 14-6 | 14 | 14 | 22 | 14 | 6 | 6 | 16 | 16 | 16 |
| FR-A740-00570-NA | M6 | 4.4 | 22-6 | 22-6 | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A740-00710-NA | M8 | 7.8 | 22-8 | 22-8 | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A740-00860-NA | M8 | 7.8 | 38-8 | 38-8 | 38 | 38 | 38 | 22 | 1 | 2 | 50 | 50 | 25 |
| FR-A740-01100-NA | M8 | 7.8 | 60-8 | 60-8 | 60 | 60 | 60 | 22 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A740-01440-NA | M10 | 14.7 | 60-10 | 60-10 | 60 | 60 | 60 | 38 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A740-01800-NA | M10 | 14.7 | 60-10 | 60-10 | 60 | 60 | 80 | 38 | 3/0 | 3/0 | 50 | 50 | 25 |
| FR-A740-02160-NA | M10(M12) | 14.7 | 80-10 | 80-10 | 80 | 80 | 80 | 38 | 3/0 | 3/0 | 70 | 70 | 35 |
| FR-A740-02600-NA | M10(M12) | 14.7 | 100-10 | 100-10 | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A740-03250-NA | M12(M10) | 24.5 | 150-12 | 150-12 | 125 | 150 | 150 | 38 | 250 | 250 | 120 | 120 | 70 |
| FR-A740-03610-NA | M12(M10) | 24.5 | 150-12 | 150-12 | 150 | 150 | 150 | 38 | 300 | 300 | 150 | 150 | 95 |
| FR-A740-04320-NA | 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-A740-04810-NA | 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-A740-05470-NA | 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-A740-06100-NA | 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-A740-06830-NA | 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-A740-07700-NA | 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-A740-08660-NA | 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-A740-09620-NA | M12(M10) | 24.5 | C2-200 | C2-250 | 3×200 | 2×250 | 3×200 | 2×100 | 2×500 | 2×500 | 2×240 | 2×240 | 2×120 |

*1 For the 01100 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 (167°F). Assumes that the surrounding air temperature is 50°C (122°F) or less and the wiring distance is 20m (65.62feet) or less.
For the 01440 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 (194°F). Assumes that the surrounding air temperature is 50°C (122°F) or less and wiring is performed in an enclosure.

*2 For the 00860 or less, the recommended cable size is that of the cable (THHW cable) with continuous maximum permissible temperature of 75°C (167°F). Assumes that the surrounding air temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
For the 01100 or more, the recommended cable size is that of the cable (THHN cable) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the surrounding air temperature is 40°C (104°F) or less and wiring is performed in an enclosure.
(Selection example for use mainly in the United States.)

*3 For the 00860 or less, the recommended cable size is that of the cable (PVC cable) with continuous maximum permissible temperature of 70°C (158°F). Assumes that the surrounding air temperature is 40°C (104°F) or less and the wiring distance is 20m (65.62feet) or less.
For the 01100 or more, the recommended cable size is that of the cable (XLPE cable) with continuous maximum permissible temperature of 90°C (194°F). Assumes that the surrounding air temperature is 40°C (104°F) 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).
A screw for P/+ terminal for option connection of the 02160 and 02600 is indicated in ( ).
A screw for earthing (grounding) of the 03250 or more is indicated in ( ).

## 600V class (when input power supply is 575V)

| Applicable Inverter Model | Terminal Screw Size *2 | Tightening Torque N·m | Crimping Terminal | | | | Cable Sizes *1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | HIV, etc. ($mm^2$) | | | | AWG | | | |
| | | | R/L1, S/L2, T/L3 | U, V, W | P/+, P1 | Earth (Ground) Cable | R/L1, S/L2, T/L3 | U, V, W | P/+, P1 | Earth (Ground) Cable | R/L1, S/L2, T/L3 | U, V, W | P/+, P1 | Earth (Ground) Cable |
| FR-A760-00017-NA | M4 | 1.5 | 2-4 | 2-4 | 2-4 | 2-4 | 2 | 2 | 2 | 2 | 14 | 14 | 14 | 14 |
| FR-A760-00040-NA | M4 | 1.5 | 2-4 | 2-4 | 2-4 | 2-4 | 2 | 2 | 2 | 2 | 14 | 14 | 14 | 14 |
| FR-A760-00061-NA | M4 | 1.5 | 2-4 | 2-4 | 2-4 | 2-4 | 2 | 2 | 2 | 2 | 14 | 14 | 14 | 14 |
| FR-A760-00120-NA | M4 | 1.5 | 3.5-4 | 2-4 | 3.5-4 | 3.5-4 | 3.5 | 2 | 3.5 | 3.5 | 12 | 14 | 10 | 12 |
| FR-A760-00220-NA | M5 | 2.5 | 5.5-5 | 5.5-5 | 8-5 | 5.5-4 | 5.5 | 5.5 | 8 | 5.5 | 10 | 10 | 8 | 10 |
| FR-A760-00330-NA | M6 | 4.4 | 14-6 | 14-6 | 14-6 | 14-6 | 14 | 14 | 14 | 14 | 6 | 6 | 4 | 6 |
| FR-A760-00550-NA | M8 | 7.8 | 22-8 | 22-8 | 22-8 | 22-8 | 22 | 22 | 22 | 22 | 4 | 4 | 2 | 4 |
| FR-A760-00840-NA | M8 | 7.8 | 38-8 | 38-8 | 38-8 | 22-8 | 38 | 38 | 38 | 22 | 2 | 2 | 1/0 | 4 |
| FR-A760-01040-NA | M10 | 14.7 | 60-10 | 60-10 | 60-10 | 38-10 | 60 | 60 | 60 | 38 | 2 | 2 | 1/0 | 1 |
| FR-A760-01310-NA | M10 | 14.7 | 60-10 | 60-10 | 60-10 | 38-10 | 60 | 60 | 60 | 38 | 1/0 | 1/0 | 2/0 | 1 |
| FR-A760-01520-NA | M10 | 14.7 | 60-10 | 60-10 | 60-10 | 38-10 | 60 | 60 | 60 | 38 | 2/0 | 2/0 | 3/0 | 1 |
| FR-A760-02210-NA | M12(M10) | 24.5 | 80-12 | 80-12 | 80-12 | 38-10 | 80 | 80 | 80 | 38 | 4/0 | 250 | 300 | 1 |
| FR-A760-02550-NA | M12(M10) | 24.5 | 100-12 | 100-12 | 125-12 | 38-10 | 100 | 100 | 125 | 38 | 250 | 300 | 2×2/0 | 1 |
| FR-A760-03040-NA | M12(M10) | 24.5 | 125-12 | 125-12 | 150-12 | 60-10 | 125 | 125 | 150 | 60 | 2×2/0 | 2×3/0 | 2×4/0 | 1/0 |
| FR-A760-04020-NA | M12(M10) | 24.5 | 2×80-12 | 2×80-12 | 2×100-12 | 100-10 | 2×80 | 2×80 | 2×100 | 100 | 2×4/0 | 2×250 | 2×300 | 4/0 |
| FR-A760-04960-NA | M12(M10) | 24.5 | 2×125-12 | 2×125-12 | 2×150-12 | 100-10 | 2×125 | 2×125 | 2×150 | 100 | 2×300 | 2×300 | 2×350 | 300 |
| FR-A760-06630-NA | M12(M10) | 24.5 | 2×200-12 | 2×200-12 | 2×250-12 | 100-10 | 2×200 | 2×200 | 2×250 | 100 | 2×400 | 2×400 | 2×500 | 300 |

*1 The cables used should be 75°C (167°F) copper cables.
*2 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, a screw for earthing (grounding), and P/+ for option connection. A screw for earthing (grounding) of the 02210 or more is indicated in ( ).

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

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

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.

**CAUTION**

- 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 (FR-A720/A740)

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 (328.08feet) maximum for vector control.)

| *Pr. 72 PWM frequency selection* setting (carrier frequency) | FR-A720-00030 FR-A740-00015 | FR-A720-00050 FR-A740-00025 | FR-A720-00080 or more FR-A740-00040 or more |
|---|---|---|---|
| 2 (2kHz) or less | 300m (984.25 feet) | 500m (1640.42 feet) | 500m (1640.42 feet) |
| 3 to 15 (3kHz to 14.5kHz) | 200m (656.19 feet) | 300m (984.25 feet) | 500m (1640.42 feet) |

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" and set frequency in *Pr. 72 PWM frequency selection* according to wiring length

| | Wiring Length | | |
|---|---|---|---|
| | 50m (164.04feet) or less | 50m (164.04feet) to 100m (328.08feet) | exceeding 100m (328.08feet) |
| **Carrier frequency** | 14.5kHz or less | 9kHz or less | 4kHz or less |

2) Connect the surge voltage suppression filter (FR-ASF-H) to the FR-A720-02150 (FR-A740-01100) or less and the sine wave filter (MT-BSL/BSC) to the FR-A720-02880 (FR-A740-01440) or more on the inverter output side.

**CAUTION**

· 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.*)

· For details of *Pr. 72 PWM frequency selection , refer to* *Instruction Manual*. (When using an option sine wave filter (MT-BSL/BSC) for the FR-A720-02880(FR-A740-01440) 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) Total wiring length (FR-A760)

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 (328.08feet) maximum for vector control.)

· **When fast response current limit is enabled, the wiring length should be within the value in the table below (****Pr. 156*** **= 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30).**

**· ND/HD Rated**

| ***Pr. 72 PWM frequency selection*** **setting (carrier frequency)** | **FR-A760-00017** | **FR-A760-00040** | **FR-A760-00061** | **FR-A760-00120 or more** |
|---|---|---|---|---|
| 2 (2kHz) or less | 100m (328.08feet) | 300m (984.25feet) | 300m (984.25feet) | 500m (1640.42feet) |
| 3 to 15 (3kHz to 14.5kHz) | 100m (328.08feet) | 200m (656.16feet) | 300m (984.25feet) | 500m (1640.42feet) |

**· LD/SLD Rated**

<table>
<tr><th>Pr. 72 PWM frequency selection setting (carrier frequency)</th><th>FR-A760-00017</th><th>FR-A760-00040</th><th>FR-A760-00061</th><th colspan="2">FR-A760-00120</th><th>FR-A760-00220 or more</th></tr>
<tr><td>2 (2kHz) or less</td><td>100m (328.08feet)</td><td>200m (656.16feet)</td><td>300m (984.25feet)</td><td colspan="2">500m (1640.42feet)</td><td>500m (1640.42feet)</td></tr>
<tr><td rowspan="2">3 to 15 (3kHz to 14.5kHz)</td><td rowspan="2">100m (328.08feet)</td><td rowspan="2">100m (328.08feet)</td><td rowspan="2">200m (656.16feet)</td><td>ND, HD</td><td>500m (1640.42feet)</td><td rowspan="2">500m (1640.42feet)</td></tr>
<tr><td>LD, SLD</td><td>400m (1312.33feet)</td></tr>
</table>

· **When fast response current limit is disabled, the wiring length should be within the value in the table below (****Pr. 156*** **= 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29).**

| **FR-A760-00017** | **FR-A760-00040** | **FR-A760-00061** | **FR-A760-00120 or more** |
|---|---|---|---|
| 100m (328.08feet) | 300m (984.25feet) | 500m (1640.42feet) | 500m (1640.42feet) |

**CAUTION**

- 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.*)
- For details of *Pr. 72 PWM frequency selection , refer to* *Instruction Manual.*

### (5) 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

# 3.5 Control circuit terminals

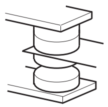
## (1) Terminal layout

Terminal screw size: M3.5
Tightening torque: 1.2N·m

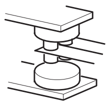
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | B1 | C1 | A2 | B2 | C2 | 10E | 10 | 2 | 5 | 4 | | |
| RL | RM | RH | RT | AU | STOP | MRS | RES | SD | FM | AM | 1 | |
| SE | RUN | SU | IPF | OL | FU | SD | SD | STF | STR | JOG | CS | PC |

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

1) Terminals 5, SD and SE are common to the I/O signals and isolated from each other. Do not earth (ground). Avoid connecting the terminal SD 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 fault 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 (98.43feet) 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 16* for the recommended cable sizes.

(5) The overall wiring length should be 500m (1640.4 feet) maximum.
(The wiring length should be 100m (328.1 feet) maximum for vector control.)
Especially for long distance wiring, the fast response current limit function may decrease or the equipment connected to the secondary 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 19.)*

(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. In this case, set the EMC filter valid to minimize interference. (Only the FR-A720/A740 are provided with an EMC filter.)

(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.

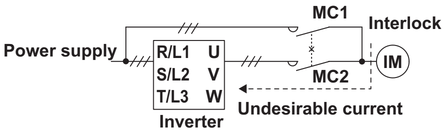
(9) A short circuit or earth (ground) fault on the inverter output side may damage the inverter modules.
· Fully check the insulation resistance of the circuit prior to inverter operation since repeated short circuits caused by peripheral circuit inadequacy or an earth (ground) fault caused by wiring inadequacy or reduced motor insulation resistance may damage the inverter modules.
· Fully check the to-earth (ground) insulation and phase to 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.
Application of permissible voltage to the inverter I/O signal circuit and incorrect polarity may damage the I/O terminal. 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 bypass operation.
When the wiring is incorrect and if there is a bypass operation circuit as shown right, the inverter will be damaged when the power supply is connected to the inverter U, V, W terminals, 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.

(18) When the motor signal is unstable, due to change in the frequency setting signal caused by noises from the inverter, take the following measures to change the motor speed by the analog signal.
- Do not run the signal cables and power cables (inverter I/O cables) in parallel with each other and do not bundle them.
- Run signal cables as far away as possible from power cables (inverter I/O cables).
- Use shield cables as signal cables.
- Install a ferrite core on the signal cable (Example: ZCAT3035-1330 TDK).

# 5 FAILSAFE OF THE SYSTEM WHICH USES THE INVERTER

When a fault occurs, the inverter trips to output a fault signal. However, a fault output signal may not be output at an inverter fault occurrence when the detection circuit or output circuit fails, etc. Although Mitsubishi assures best quality products, provide an interlock which uses inverter status output signals to prevent accidents such as damage to machine when the inverter fails for some reason and at the same time consider the system configuration where failsafe from outside the inverter, without using the inverter, is enabled even if the inverter fails.

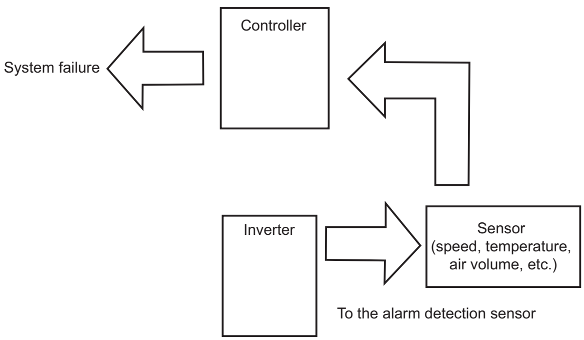
(1) Interlock method which uses the inverter status output signals
By combining the inverter status output signals to provide an interlock as shown below, an inverter alarm can be detected.

| No | Interlock Method | Check Method | Used Signals | Refer to Page |
|---|---|---|---|---|
| 1) | Inverter protective function operation | Operation check of an alarm contact<br>Circuit error detection by negative logic | Fault output signal (ALM signal) | *Refer to the chapter 4 of the Instruction Manual.* |
| 2) | Inverter running status | Operation ready signal check | Operation ready signal (RY signal) | *Refer to the chapter 4 of the Instruction Manual.* |
| 3) | Inverter running status | Logic check of the start signal and running signal | Start signal (STF signal, STR signal)<br>Running signal (RUN signal) | *Refer to the chapter 4 of the Instruction Manual.* |
| 4) | Inverter running status | Logic check of the start signal and output current | Start signal (STF signal, STR signal)<br>Output current detection signal (Y12 signal) | *Refer to the chapter 4 of the Instruction Manual.* |

(2) Backup method outside the inverter
Even if the interlock is provided by the inverter status signal, enough failsafe is not ensured depending on the failure status of the inverter itself. For example, when the inverter CPU fails, even if the interlock is provided using the inverter fault output signal, start signal and RUN signal output, there is a case where a fault output signal is not output and RUN signal is kept output even if an inverter fault occurs.
Provide a speed detector to detect the motor speed and current detector to detect the motor current and consider the backup system such as checking up as below according to the level of importance of the system.

1) Start signal and actual operation check
Check the motor running and motor current while the start signal is input to the inverter by comparing the start signal to the inverter and detected speed of the speed detector or detected current of the current detector. Note that the motor current runs as the motor is running for the period until the motor stops since the inverter starts decelerating even if the start signal turns off. For the logic check, configure a sequence considering the inverter deceleration time. In addition, it is recommended to check the three-phase current when using the current detector.

2) Command speed and actual operation check
Check if there is no gap between the actual speed and commanded speed by comparing the inverter speed command and detected speed of the speed detector.



# 6 PARAMETER LIST

## 6.1 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% | 6/5/4/3/ 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 | 60Hz |
| ◎ 4 | Multi-speed setting (high speed) | 0 to 400Hz | 60Hz |
| ◎ 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 | Rated inverter 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% *4 |
| 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 | 9999 |
| 20 | Acceleration/deceleration reference frequency | 1 to 400Hz | 60Hz |
| 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 | FM 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 | 60Hz |
| 56 | Current monitoring reference | 0 to 500/0 to 3600A *2 | Rated inverter 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 | 60Hz |
| 67 | Number of retries at fault 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 to 8, 13 to 18, 30, 33, 34 *5 | 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 | Fault 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 | Rated motor voltage | 0 to 1000V | 200/400/ 575V *6 |
| 84 | Rated motor frequency | 10 to 120Hz | 60Hz |
| 89 | Speed control gain (Advanced 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 |
| 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 | Third stall prevention operation frequency | 0 to 400Hz | 0 |
| 116 | Third output frequency detection | 0 to 400Hz | 60Hz |
| 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 to 10, 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 selection | 0, 1, 2 | 1 |
| ◎ 125 | Terminal 2 frequency setting gain frequency | 0 to 400Hz | 60Hz |
| ◎ 126 | Terminal 4 frequency setting gain frequency | 0 to 400Hz | 60Hz |

| 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 a fault | 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, 70 | 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 | | | |
| 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, 42 to 44, 50, 60, 62, 64 to 71, 74, 9999 | 60 |
| 179 | STR terminal function selection | 0 to 20, 22 to 28, 42 to 44, 50, 61, 62, 64 to 71, 74, 9999 | 61 |
| 180 | RL terminal function selection | 0 to 20, 22 to 28, 42 to 44, 50, 62, 64 to 71, 74, 9999 | 0 |
| 181 | RM terminal function selection | | 1 |
| 182 | RH terminal function selection | | 2 |
| 183 | RT terminal function selection | | 3 |
| 184 | AU terminal function selection | 0 to 20, 22 to 28, 42 to 44, 50, 62 to 71, 74, 9999 | 4 |
| 185 | JOG terminal function selection | 0 to 20, 22 to 28, 42 to 44, 50, 62, 64 to 71, 74, 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 range slip compensation selection | 0, 9999 | 9999 |
| 250 | Stop selection | 0 to 100s,1000 to 1100s 8888, 9999 | 9999 |
| 251 | Output phase loss 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 | 60Hz |
| 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 | 60Hz |
| 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 *7 | Stop position command selection | 0, 1, 9999 | 9999 |
| 351 *7 | Orientation speed | 0 to 30Hz | 2Hz |
| 352 *7 | Creep speed | 0 to 10Hz | 0.5Hz |
| 353 *7 | Creep switchover position | 0 to 16383 | 511 |
| 354 *7 | Position loop switchover position | 0 to 8191 | 96 |
| 355 *7 | DC injection brake start position | 0 to 255 | 5 |
| 356 *7 | Internal stop position command | 0 to 16383 | 0 |
| 357 *7 | Orientation in-position zone | 0 to 255 | 5 |
| 358 *7 | Servo torque selection | 0 to 13 | 1 |
| 359 *7 | Encoder rotation direction | 0, 1 | 1 |
| 360 *7 | 16 bit data selection | 0 to 127 | 0 |
| 361 *7 | Position shift | 0 to 16383 | 0 |
| 362 *7 | Orientation position loop gain | 0.1 to 100 | 1 |
| 363 *7 | Completion signal output delay time | 0 to 5s | 0.5s |
| 364 *7 | Encoder stop check time | 0 to 5s | 0.5s |
| 365 *7 | Orientation limit | 0 to 60s, 9999 | 9999 |
| 366 *7 | Recheck time | 0 to 5s, 9999 | 9999 |
| 367 *7 | Speed feedback range | 0 to 400Hz, 9999 | 9999 |
| 368 *7 | Feedback gain | 0 to 100 | 1 |
| 369 *7 | Number of encoder pulses | 0 to 4096 | 1024 |
| 374 | Overspeed detection level | 0 to 400Hz | 140Hz |
| 376 *7 | 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 | 60Hz |
| 393 *7 | Orientation selection | 0, 1, 2 | 0 |
| 396 *7 | Orientation speed gain (P term) | 0 to 1000 | 60 |
| 397 *7 | Orientation speed integral time | 0 to 20s | 0.333s |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 398 *7 | Orientation speed gain (D term) | 0 to 100 | 1 |
| 399 *7 | 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 *7 | Position command source selection | 0, 2 | 0 |
| 420 *7 | Command pulse scaling factor numerator | 0 to 32767 | 1 |
| 421 *7 | Command pulse scaling factor denominator | 0 to 32767 | 1 |
| 422 *7 | Position loop gain | 0 to 150$sec^{-1}$ | 25$sec^{-1}$ |
| 423 *7 | Position feed forward gain | 0 to 100% | 0 |
| 424 *7 | Position command acceleration/deceleration time constant | 0 to 50s | 0s |
| 425 *7 | Position feed forward command filter | 0 to 5s | 0s |
| 426 *7 | In-position width | 0 to 32767pulse | 100 |
| 427 *7 | Excessive level error | 0 to 400K, 9999 | 40K |
| 428 *7 | Command pulse selection | 0 to 5 | 0 |
| 429 *7 | Clear signal selection | 0, 1 | 1 |
| 430 *7 | 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, 9999/0 to 8, 13 to 18, 30, 33, 34, 9999 *5 | 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 | 200/400/ 575V *6 |
| 457 | Rated second motor frequency | 10 to 120Hz | 60Hz |
| 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 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 461 | Second motor constant (L2) | 0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2 | 9999 |
| 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 *7 | Digital position control sudden stop deceleration time | 0 to 360.0s | 0 |
| 465 *7 | First position feed amount lower 4 digits | 0 to 9999 | 0 |
| 466 *7 | First position feed amount upper 4 digits | 0 to 9999 | 0 |
| 467 *7 | Second position feed amount lower 4 digits | 0 to 9999 | 0 |
| 468 *7 | Second position feed amount upper 4 digits | 0 to 9999 | 0 |
| 469 *7 | Third position feed amount lower 4 digits | 0 to 9999 | 0 |
| 470 *7 | Third position feed amount upper 4 digits | 0 to 9999 | 0 |
| 471 *7 | Fourth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 472 *7 | Fourth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 473 *7 | Fifth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 474 *7 | Fifth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 475 *7 | Sixth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 476 *7 | Sixth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 477 *7 | Seventh position feed amount lower 4 digits | 0 to 9999 | 0 |
| 478 *7 | Seventh position feed amount upper 4 digits | 0 to 9999 | 0 |
| 479 *7 | Eighth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 480 *7 | Eighth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 481 *7 | Ninth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 482 *7 | Ninth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 483 *7 | Tenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 484 *7 | Tenth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 485 *7 | Eleventh position feed amount lower 4 digits | 0 to 9999 | 0 |
| 486 *7 | Eleventh position feed amount upper 4 digits | 0 to 9999 | 0 |
| 487 *7 | Twelfth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 488 *7 | Twelfth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 489 *7 | Thirteenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 490 *7 | Thirteenth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 491 *7 | Fourteenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 492 *7 | Fourteenth position feed amount upper 4 digits | 0 to 9999 | 0 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 493 *7 | Fifteenth position feed amount lower 4 digits | 0 to 9999 | 0 |
| 494 *7 | Fifteenth position feed amount upper 4 digits | 0 to 9999 | 0 |
| 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 | 60Hz |
| 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 deceleration | 0.1 to 2.5s | 0.1s |
| 519 | S-pattern time at a completion of deceleration | 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 | 1 |
| 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 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 574 | Second motor online auto tuning | 0, 1 | 0 |
| 575 | Output interruption detection time | 0 to 3600s, 9999 | 1s |
| 576 | Output interruption detection level | 0 to 400Hz | 0Hz |
| 577 | Output interruption cancel level | 900 to 1100% | 1000% |
| 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 *7 | 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 | 60Hz |
| 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 *7 | 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 |
| 831 | Speed control integral time 2 | 0 to 20s, 9999 | 9999 |
| 832 | Speed setting filter 2 | 0 to 5s, 9999 | 9999 |
| 833 *7 | Speed detection filter 2 | 0 to 0.1s, 9999 | 9999 |
| 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 *7 | Torque bias selection | 0 to 3, 9999 | 9999 |
| 841 *7 | Torque bias 1 | 600 to 1400%, 9999 | 9999 |
| 842 *7 | Torque bias 2 | 600 to 1400%, 9999 | 9999 |
| 843 *7 | Torque bias 3 | 600 to 1400%, 9999 | 9999 |
| 844 *7 | Torque bias filter | 0 to 5s, 9999 | 9999 |
| 845 *7 | Torque bias operation time | 0 to 5s, 9999 | 9999 |
| 846 *7 | Torque bias balance compensation | 0 to 10V, 9999 | 9999 |
| 847 *7 | Fall-time torque bias terminal 1 bias | 0 to 400%, 9999 | 9999 |
| 848 *7 | 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 |
| 872 | Input phase loss 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 |
| 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/ 300 to 1000V *5 | 380/ 760/ 940VDC *6 |

| Parameter | Name | Setting Range | Initial Value |
|---|---|---|---|
| 884 | Regeneration avoidance at deceleration detection sensitivity | 0 to 5 | 0 |
| 885 | Regeneration avoidance compensation frequency limit value | 0 to 10Hz, 9999 | 6Hz |
| 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 | 60Hz |
| 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 | 60Hz |
| C7 (905) | Terminal 4 frequency setting gain | 0 to 300% | 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 | 60Hz |
| C15 (918) | Terminal 1 gain (speed) | 0 to 300% | 100% |
| 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 | Faults history clear | 0, 1 | 0 |
| PCPY | Parameter copy | 0, 1, 2, 3 | 0 |

*1 Differ according to capacities.
6%: FR-A720-00030, 00050 (FR-A740-00015, 00025)
5%: FR-A760-00017
4%: FR-A720-00080 to 00175 (FR-A740-00040 to 00090)
3%: FR-A720-00240, 00330(FR-A740-00120, 00170)(FR-A760-00040)
2%: FR-A720-00460 to 02150(FR-A740-00230 to 01100)
(FR-A760-00061, 00120)
1%: FR-A720-02880(FR-A740-01440)(FR-A760-00220) or more

*2 Differ according to capacities. (FR-A720-02150(FR-A740-01100, FR-A760-00840) or less/FR-A720-02880(FR-A740-01440, FR-A760-01040) or more)

*3 Differ according to capacities. (FR-A720-00330(FR-A740-00170, FR-A760-00120) or less/FR-A720-00460(FR-A740-00230, FR-A760-00220) or more)

*4 Differ according to capacities.
4%: FR-A720-00330 (FR-A740-00170) or less
2%: FR-A720-00460 to 02150 (FR-A740-00230 to 01100)
1%: FR-A720-02880 (FR-A740-01440) or more, FR-A760

*5 Differs according to the voltage class. (200V class, 400V class/600V class)

*6 Differs according to the voltage class. (200V class/400V class/600V class)

*7 Setting can be made only when the FR-A7AP is mounted.

# 7 TROUBLESHOOTING

When a fault occurs in the inverter, the inverter trips stop and the PU display automatically changes to any of the following fault or alarm indications.
If the fault does not correspond to any of the following faults 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 33.)*
- 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 trip.

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

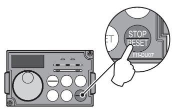
(3) Alarm
The inverter does not trip. You can also output a minor fault signal by making parameter setting.

(4) Fault
When a fault occurs, the inverter trips and a fault signal is output.

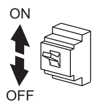
## 7.1 Reset method of protective function

(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.
Inverter recovers about 1s after the reset is released.

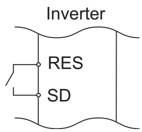
Operation 1: ..... Using the operation panel, press STOP RESET to reset the inverter.
(This may only be performed when a fault occurs. (*(Refer to the Instruction Manual)* for major fault.)




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.)



## 7.2 List of fault or alarm display

| | Operation Panel Indication | | Name |
|---|---|---|---|
| Error message | E - - - | E - - - | Faults history |
| Error message | HOLd | HOLD | Operation panel lock |
| Error message | Er1 to Er4 | Er1 to 4 | Parameter write error |
| Error message | rE1 to rE4 | rE1 to 4 | Copy operation error |
| Error message | Err. | Err. | Error |
| Warnings | OL | OL | Stall prevention (overcurrent) |
| Warnings | oL | oL | Stall prevention (overvoltage) |
| Warnings | rb | RB | Regenerative brake prealarm |
| Warnings | TH | TH | Electronic thermal relay function prealarm |
| Warnings | PS | PS | PU stop |
| Warnings | MT | MT | Maintenance signal output |
| Warnings | CP | CP | Parameter copy |
| Warnings | SL | SL | Speed limit indication (Output during speed limit) |
| Minor fault | Fn | FN | Fan alarm |
| Major fault | E.OC1 | E.OC1 | Overcurrent trip during acceleration |
| Major fault | E.OC2 | E.OC2 | Overcurrent trip during constant speed |
| Major fault | E.OC3 | E.OC3 | Overcurrent trip during deceleration or stop |
| Major fault | E.Ou1 | E.OV1 | Regenerative overvoltage trip during acceleration |
| Major fault | E.Ou2 | E.OV2 | Regenerative overvoltage trip during constant speed |
| Major fault | E.Ou3 | E.OV3 | Regenerative overvoltage trip during deceleration or stop |
| Major fault | E.THT | E.THT | Inverter overload trip (electronic thermal relay function) |
| Major fault | E.THM | E.THM | Motor overload trip (electronic thermal relay function) |
| Major fault | E.FIn | E.FIN | Fin overheat |
| Major fault | E.IPF | E.IPF | Instantaneous power failure |
| Major fault | E. bE | E.BE | Brake transistor alarm detection |
| Major fault | E.UuT | E.UVT | Undervoltage |
| Major fault | E.ILF | E.ILF* | Input phase loss |
| Major fault | E.OLT | E.OLT | Stall prevention |

| | Operation Panel Indication | | Name |
|---|---|---|---|
| Major fault | E. GF | E.GF | Output side earth (ground) fault overcurrent |
| Major fault | E. LF | E.LF | Output phase loss |
| Major fault | E.OHT | E.OHT | External thermal relay operation |
| Major fault | E.PTC | E.PTC* | PTC thermistor operation |
| Major fault | E.OPT | E.OPT | Option fault |
| Major fault | E.OP3 | E.OP3 | Communication option fault |
| Major fault | E. 1 to E. 3 | E. 1 to E. 3 | Option fault |
| Major fault | E. PE | E.PE | Parameter storage device fault |
| Major fault | E.PUE | E.PUE | PU disconnection |
| Major fault | E.rET | E.RET | Retry count excess |
| Major fault | E.PE2 | E.PE2* | Parameter storage device fault |
| Major fault | E. 6/ E. 7/ E.CPU | E. 6 / E. 7 / E.CPU | CPU fault |
| Major fault | E.CTE | E.CTE | Operation panel power supply short circuit, RS-485 terminal power supply short circuit |
| Major fault | E.P24 | E.P24 | 24VDC power output short circuit |
| Major fault | E.CdO | E.CDO* | Output current detection value exceeded |
| Major fault | E.IOH | E.IOH* | Inrush current limit circuit fault |
| Major fault | E.SEr | E.SER* | Communication fault (inverter) |
| Major fault | E.AIE | E.AIE* | Analog input fault |
| Major fault | E. OS | E.OS | Overspeed occurrence |
| Major fault | E.OSd | E.OSD | Speed deviation excess detection |
| Major fault | E.ECT | E.ECT | Signal loss detection |
| Major fault | E. Od | E.OD | Excessive position error |
| Major fault | E.Mb1 to E.Mb7 | E.MB1 to E.MB7 | Brake sequence fault |
| Major fault | E.EP | E.EP | Encoder phase error |
| Major fault | E. bE | E.BE | Brake transistor alarm detection |
| Major fault | E.USb | E.USB* | USB communication fault |
| Major fault | E. 11 | E.11 | Opposite rotation deceleration fault |
| Major fault | E. 13 | E.13 | Internal circuit 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 EU Directives (FR-A720/A740 only)

The EU Directives are issued to standardize different national regulations of the EU Member States and to facilitate free movement of the equipment, whose safety is ensured, in the EU territory.
Since 1996, compliance with the EMC Directive that is one of the EU Directives has been legally required. Since 1997, compliance with the Low Voltage Directive, another EU Directive, has been also legally required. When a manufacturer confirms its equipment to be compliant with the EMC Directive and the Low Voltage Directive, the manufacturer must declare the conformity and affix the CE marking.

## ● The authorized representative in the EU

The authorized representative in the EU is shown below.
Name: Mitsubishi Electric Europe BV
Address: Gothaer strase 8, 40880 Ratingen, Germany

● Note

We declare that this inverter conforms with the EMC Directive in industrial environments and affix the CE marking on the inverter. When using the inverter in a residential area, take appropriate measures and ensure the conformity of the inverter used in the residential area.

## (1) EMC Directive

We declare that this inverter conforms with the EMC Directive and affix the CE marking on the inverter.

- EMC Directive: 2004/108/EC
- Standard(s): EN61800-3:2004 (Second environment / PDS Category "C3")

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.

● Note

Set the EMC filter valid and 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. (The EMC filter is invalid when shipped from the factory. (The FR-A720-00030 and 00050 are always valid.))
* 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 (16.4 feet) maximum.
* Confirm that the inverter conforms 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 affix the CE marking on the inverters.

- 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.)

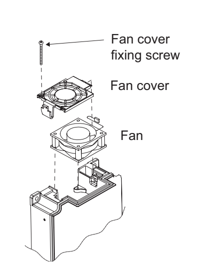
* Use the cable sizes on *page 16* under the following conditions.
  · Surrounding air temperature: 40°C (104°F) maximum
  If conditions are different from above, select appropriate wire according to EN60204 Appendix C TABLE 5.

* 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 16*.

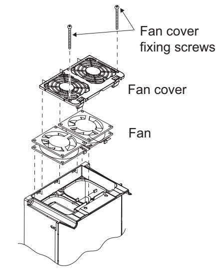
* Use the moulded case circuit breaker and magnetic contactor which conform to the EN or IEC Standard.

* 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.

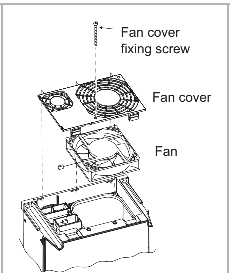
* Use the inverter under the conditions of overvoltage category II (usable regardless of the earth (ground) condition of the power supply), overvoltage category III (usable with the earthed-neutral system power supply, 400V class only) and pollution degree 2 or lower specified in IEC664.
  · To use the inverter of FR-A720-01150 (FR-A740-00570) 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 FR-A720-00900 (FR-A740-00440) 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-A720-00080 to 00175**
**FR-A740-00060, 00090**



**FR-A720-00240 to 00460**
**FR-A740-00120 to 00310**



**FR-A720-00610 to 00900**
**FR-A740-00380, 00440**

* 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 6* are safely isolated from the main circuit.

* Environment

| | During Operation | In Storage | During Transportation |
|---|---|---|---|
| Surrounding air temperature | LD, ND (initial setting), HD: -10°C to +50°C (14°F to 122°F) SLD: -10°C to +40°C (14°F to 104°F) | -20°C to +65°C (-4°F to +149°F) | -20°C to +65°C (-4°F to +149°F) |
| Ambient humidity | 90% RH or less | 90% RH or less | 90% RH or less |
| Maximum altitude | 1000m (3280.80feet) | 1000m (3280.80feet) | 10000m (32808feet) |

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 / cUL Listed open type device for use inside an enclosure or enclosed Type 1 device with a suitably rated enclosure.
For open type, design an enclosure so that the inverter surrounding air temperature, humidity and atmosphere satisfy the specifications. *(Refer to page 2.)*
The following UL / cUL Listed FR-A700 Series Inverters employ a UL Type 1 Enclosure - Suitable for Installation in a Compartment Handling Conditioned Air (Plenum):

Models FR-A720-00030, -00050, -00080, -00110, -00175, -00240, -00330, followed by -N4 suffix.
Models FR-A720-00460, -00610, -00760, -00900(*1), followed by -NA suffix.
Models FR-A740-00015, -00025, -00040, -00060, -00090, -00120, -00170, followed by -N4 suffix.
Models FR-A740-00230, -00310, -00380, -00440, followed by -NA suffix.
Models FR-A760-00220, -00330, followed by -NA suffix.
(*1) - Denotes suitable for Normal Duty and Heavy Duty Current Ratings only.

### 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 and cUL listed Class RK5, Class T or Class L type fuse or UL489 molded case circuit breaker (MCCB) that is suitable for branch circuit protection in accordance with the table below.
Note, the Class L fuses can be used if the applicable current rating is larger than 600A.

| FR-A720-□□□□□-NA/N4 | | 00030 | 00050 | 00080 | 00110 | 00175 | 00240 | 00330 | 00460 | 00610 | 00760 | 00900 | 01150 | 01450 | 01750 | 02150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated fuse voltage(V) | | 240V or more | | | | | | | | | | | | | | |
| Fuse Maximum allowable rating (A) | Without power factor improving reactor | 15 | 20 | 30 | 40 | 60 | 80 | 150 | 175 | 200 | 225 | 300 | 350 | 400 | 500 | 500 |
| | With power factor improving reactor | 15 | 20 | 20 | 30 | 50 | 70 | 125 | 150 | 200 | 200 | 250 | 300 | 350 | 400 | 500 |
| Molded case circuit breaker (MCCB) Maximum allowable rating (A)* | | 15 | 15 | 25 | 40 | 60 | 80 | 110 | 150 | 175 | 225 | 300 | 350 | 450 | 500 | 700 |

| FR-A720-□□□□□-NA | | 02880 | 03460 |
|---|---|---|---|
| Rated fuse voltage(V) | | 240V or more | |
| Fuse Maximum allowable rating (A) | Without power factor improving reactor | — | — |
| | With power factor improving reactor | 600 | 700 |
| Molded case circuit breaker (MCCB) Maximum allowable rating (A)* | | 900 | 1000 |

| FR-A740-□□□□□-NA/N4 | | 00015 | 00025 | 00040 | 00060 | 00090 | 00120 | 00170 | 00230 | 00310 | 00380 | 00440 | 00570 | 00710 | 00860 | 01100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated fuse voltage(V) | | 480V or more | | | | | | | | | | | | | | |
| Fuse Maximum allowable rating (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 |
| Molded case circuit breaker (MCCB) Maximum allowable rating (A)* | | 15 | 15 | 15 | 20 | 30 | 40 | 60 | 70 | 90 | 100 | 150 | 175 | 225 | 250 | 450 |

| FR-A740-□□□□□-NA | | 01440 | 01800 | 02160 | 02600 | 03250 | 03610 | 04320 | 04810 | 05470 | 06100 | 06830 | 07700 | 08660 | 09620 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated fuse voltage(V) | | 500V or more | | | | | | | | | | | | | |
| Fuse Maximum allowable rating (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 |
| Molded case circuit breaker (MCCB) Maximum allowable rating (A)* | | 500 | 600 | 800 | 900 | 1000 | 1200 | 1200 | 1200 | 1600 | 1600 | 2000 | 2000 | 2500 | 3000 |

* Maximum allowable rating by US National Electrical Code at SLD rating.
Exact size must be chosen for each installation.

Provide the appropriate UL and cUL listed Class T or Class L type fuse that is suitable for branch circuit protection in accordance with the table below.
Note, the Class L fuses can be used if the applicable current rating is larger than 600A.

| FR-A760-□□□□□ | | 00017 | 00040 | 00061 | 00120 | 00220 | 00330 | 00550 | 00840 | 01040 | 01310 | 01520 | 02210 | 02550 | 03040 | 04020 | 04960 | 06630 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated fuse voltage(V) | | 575V or more | | | | | | | | | | | | | | | | |
| Fuse Maximum allowable rating (A) | Without power factor improving reactor | 10 | 20 | 30 | 40 | 80 | 125 | 125 | 175 | — | — | — | — | — | — | — | — | — |
| | With power factor improving reactor | 6 | 10 | 15 | 25 | 40 | 60 | 100 | 150 | 200 | 250 | 300 | 400 | 450 | 600 | 700 | 800 | 1000 |

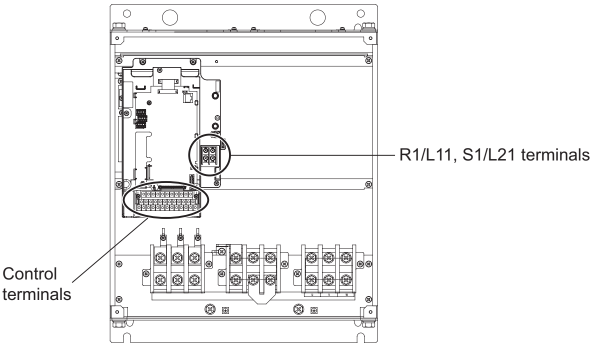
## (2) Wiring of the power supply and motor

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(167°F)) and round ring crimping terminals. Crimp the crimping terminals with the crimping tool recommended by the terminal maker.

## (3) Instruction for UL and cUL for FR-A760-01040 or larger models.

- The R1/L11, S1/L21 terminals are only used for factory wiring.
  Do not remove the jumper to R1/L11 and S1/L21 terminals.
  Do not connect wires to R1/L11 and S1/L21 terminals.

- Only bare ended, solid copper wire, size 16-18 AWG may be employed on all control terminals.



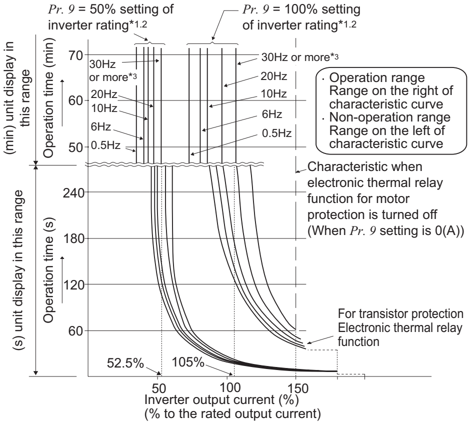

## (4) Short circuit ratings

- 200V class
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 264V Maximum.
- 400V class
  Model 01100 or less
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 528V Maximum.
  Model 01440 or more
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 550V Maximum.
- 600V class
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 660V Maximum.

## (5) Motor overload protection (FR-A720/740)

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**

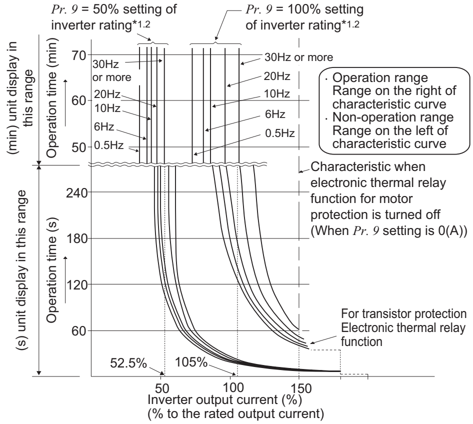
- Protective function by electronic thermal relay function is reset by inverter power reset and reset signal input. Avoid unnecessary reset and power-off.
- When multiple motors are operated by a single inverter, protection cannot be provided by the electronic thermal relay function. Install an external 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.
- Electronic thermal relay may not function when 5% or less of inverter rated current is set to electronic thermal relay setting.

## (6) Motor overload protection (FR-A760)

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)

*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.

**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.
- Electronic thermal relay may not function when 5% or less of inverter rated current is set to electronic thermal relay setting.

REVISIONS

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

| Print Date | *Manual Number | Revision |
|---|---|---|
| Sep. 2005 | IB-0600254ENG-A | First edition |
| Oct. 2006 | IB-0600254ENG-B | Additions<br>FR-A720-00030 to 00330-N4<br>FR-A740-00015 to 00170-N4 |
| Feb. 2007 | IB-0600254ENG-C | Additions<br>Breaker selection when using the inverter as UL or cUL listed product<br>FR-A760-00017 to 00840-NA |
| Apr. 2007 | IB-0600254ENG-D | Additions<br>FR-A760-01040 to 04020-NA |
| Sep. 2007 | IB-0600254ENG-E | Additions<br>• Failsafe<br>• Instruction for UL and cUL for FR-A760-01040 or larger models. |
| Jul. 2008 | IB-0600254ENG-F | Additions<br>• FR-A760-04960, 06630-NA |
| Jul. 2009 | IB-0600254ENG-G | Partial modification<br>• Appendix1 Instructions for Compliance with the EU Directives |
| | | |

**⚠ 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.

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## ■ When playing this CD-ROM on Windows OS

♦ Operating environment

- The following system is required to read instruction manuals contained in this CD-ROM.

| Item | Specifications |
|---|---|
| OS | Microsoft Windows 95 OSR 2.0, Windows 98 Second Edition, Windows Millennium Edition,<br>Windows NT 4.0 with Service Pack 6, Windows 2000 with Service Pack 2,<br>Windows XP Professional or Home Edition, Windows XP Tablet PC Edition |
| CPU | Intel Pentium processor |
| Memory | 64MB of RAM |
| Hard disk | 24MB of available hard-disk space |
| CD-ROM drive | Double speed or more (more than quadruple speed is recommended) |
| Monitor | 800x600 dot or more |
| Application | Acrobat Reader 4.05 or more |

♦ Operating method of this CD-ROM

How to read instruction manuals
Step 1. Start Windows and place this CD-ROM in the CD-ROM drive.
Step 2. "FR-A700 series documentation" PDF automatically opens.
Step 3. Click a manual you want to read in the "INSTRUCTION MANUAL" list.
Step 4. PDF manual you clicked opens.

* Manual opening of this CD-ROM
Step 1. Start Windows and place this CD-ROM in the CD-ROM drive.
Step 2. Select a CD-ROM drive (example: D drive) of "My computer" and click the right mouse button. Then, click "open" in the context menu.
Step 3. Open "INDEX.PDF" in the opened folder.
Step 4. "FR-A700 series documentation" PDF opens. Operates according to the steps from "Step 3" of "How to read instruction manuals"

- PDF data of the instruction manual are stored in "MANUAL" folder on this CD-ROM.