



INVERTER

FR-A700

INSTALLATION GUIDELINE

FR-A760-00017 to 00840-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

[1]	INSTALLATION OF THE INVERTER AND INSTRUCTIONS.....	1
[2]	OUTLINE DIMENSION DRAWING	2
[3]	WIRING	3
[4]	PRECAUTIONS FOR USE OF THE INVERTER.....	11
[5]	PARAMETER LIST.....	13
[6]	TROUBLESHOOTING.....	21

A700

This section is specifically about safety matters

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

WARNING Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

CAUTION Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

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

1. Electric Shock Prevention

WARNING

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

2. Fire Prevention CAUTION

- Install the inverter on an incombustible wall without holes, etc.
- Mounting it to or near combustible material can cause a fire.
- If the inverter has become faulty, switch off the inverter power. A continuous flow of large current could cause a fire.
- When using a brake resistor, make up a sequence that will turn off power when an alarm signal is output.
- Otherwise, the brake resistor may excessively overheat due to damage of the brake transistor and so, causing a fire.
- Do not connect a resistor directly to the DC terminals P+, N-. This could cause a fire.

3. Injury Prevention CAUTION

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

4. Additional Instructions

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

(1) Transportation and installation

CAUTION

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

Environmental	Ambient temperature	-10°C to +40°C (14°F to 104°F) (non-freezing) SLD of 00061 or less : -10°C to +30°C (14°F to 86°F) (non-freezing)
	Ambient humidity	90% RH or less (non-condensing)
	Storage temperature	-20°C to +65°C *1 (-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) (92%) 5.9ms ² or less

*1 Temperature applicable for a short time, e.g. in transit.

(2) Wiring

CAUTION

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


(3) Test operation and adjustment

CAUTION

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

(4) Operation

WARNING

- When you have chosen the retry function, stay away from the equipment as it will restart suddenly after an alarm stop.
- Since the  key is valid only when functions are set (refer to the *Instruction Manual (appended)*), provide a circuit and switch separately to make an emergency stop (power off, mechanical brake operation for emergency stop, etc.).
- Make sure that the start signal is off before resetting the inverter alarm. A failure to do so may restart the motor suddenly.
- The load used should be a three-phase induction motor only. Connection of any other electrical equipment to the inverter output may damage the inverter as well as equipment.
- Performing pre-excitation (LX signal and X13 signal) under torque control (real senseless vector control) may start the motor running at a low speed even when the start command (STF or STR) is not input. The motor may run also at a low speed when the speed limit value = 0 with a start command input. Perform pre-excitation after making sure that there will be no problem in safety if the motor runs.
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in manuals. Doing so may lead to fault or damage of the inverter.

CAUTION

- The electronic thermal relay function does not guarantee protection of the motor from overheating.
- Do not use a magnetic contactor on the inverter input for frequent starting/stopping of the inverter.
- Use a noise filter to reduce the effect of electromagnetic interference. Otherwise nearby electronic equipment may be affected.
- Take measures to suppress harmonics. Otherwise power supply harmonics from the inverter may heat/damage the power factor correction capacitor and generator.
- When a 575V class motor is inverter-driven, it should be insulation-enhanced or surge voltages suppressed. Surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When parameter clear or all clear is performed, reset the required parameters before starting operations. Each parameter returns to the initial value.
- The inverter can be easily set for high-speed operation. Before changing its setting, fully examine the performances of the motor and machine.
- In addition to the inverter's holding function, install a holding device to ensure safety.
- Before running an inverter which had been stored for a long period, always perform inspection and test operation.
- For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

(5) Emergency stop

CAUTION

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

(6) Maintenance, inspection and parts replacement

CAUTION

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

(7) Disposing of the inverter

CAUTION

- Treat as industrial waste.

General instructions

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

1 INSTALLATION OF THE INVERTER AND INSTRUCTIONS

• Inverter Type

FR - **A760** - **00061** - NA

Symbol	Voltage Class	Symbol	Type number
A760	Three-phase 600V class	600V class 00017 to 00840	Displays the rated current

Capacity plate

Capacity plate	FR-A760-00061-NA XXXXX
Inverter type	Serial number

Rating plate

Rating plate	MITSUBISHI INVERTER
Model	FR-A760-00061-NA
Inverter type	REV. : 000XX
Input rating	240 (40°C) XXX - 15 (40°C) XXX
Output rating	50 (40°C) XXX - 30 (40°C) XXX
Serial number	SERIAL : XXXXX
	PASSED

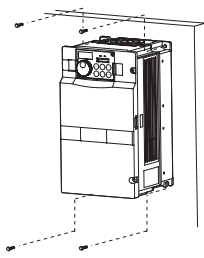
	Overload current rating	Ambient temperature
SLD	110% 60s, 120% 3s	40°C (104°F) 30°C (86°F)(00061 or less)
LD	120% 60s, 150% 3s	40°C (104°F)
ND	150% 60s, 200% 3s	40°C (104°F)
HD	200% 60s, 250% 3s	40°C (104°F)

• Installation of the inverter

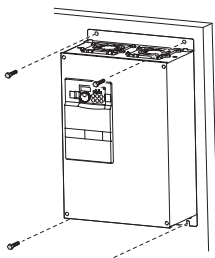
Note - Some inverter models may be installed outside an enclosure. See Appendix 1 for details.

Installation on the enclosure

FR-A760-00330 or less

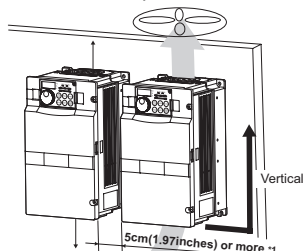


FR-A760-00550 or more



CAUTION

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



*1 1cm or more for FR-A760-00061 or less

REMARKS

To use an enclosed brake resistor for the FR-A760-00061 or less, refer to page 4.

• General Precaution

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

• Environment

Before installation, check that the environment meets following specifications.

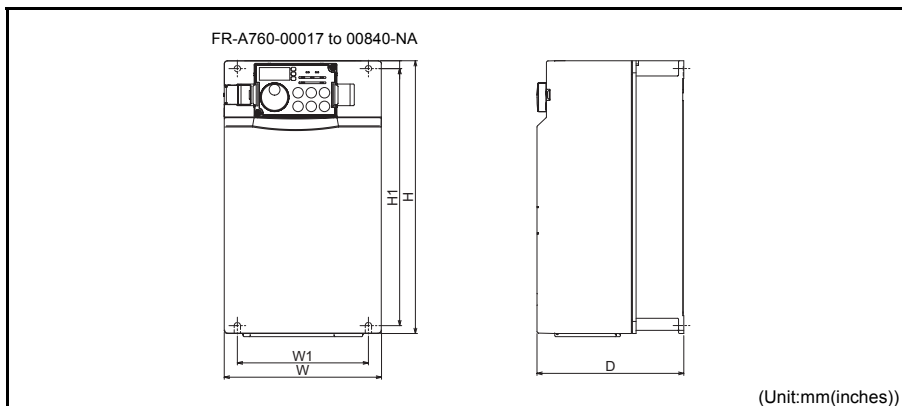
Ambient temperature	-10°C to +40°C (14°F to 104°F) (non-freezing) SLD of 00061 or less : -10°C to +30°C (14°F to 86°F) (non-freezing)	
Ambient humidity	90%RH or less (non-condensing)	
Storage temperature	-20°C to +65°C (-4°F to 149°F)	
Ambience	Indoors (No corrosive and flammable gases, oil mist, dust and dirt.)	
Altitude, vibration	Below 1000m, 5.9m/s ² or less	

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

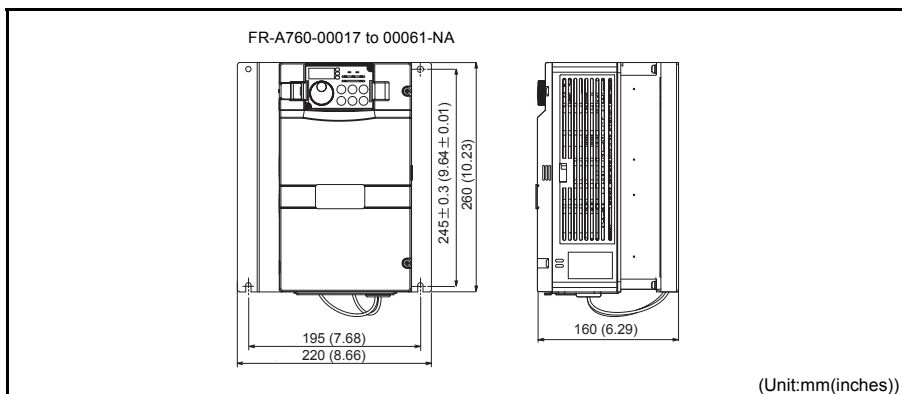
●When an enclosed brake resistor is not used



●600V class

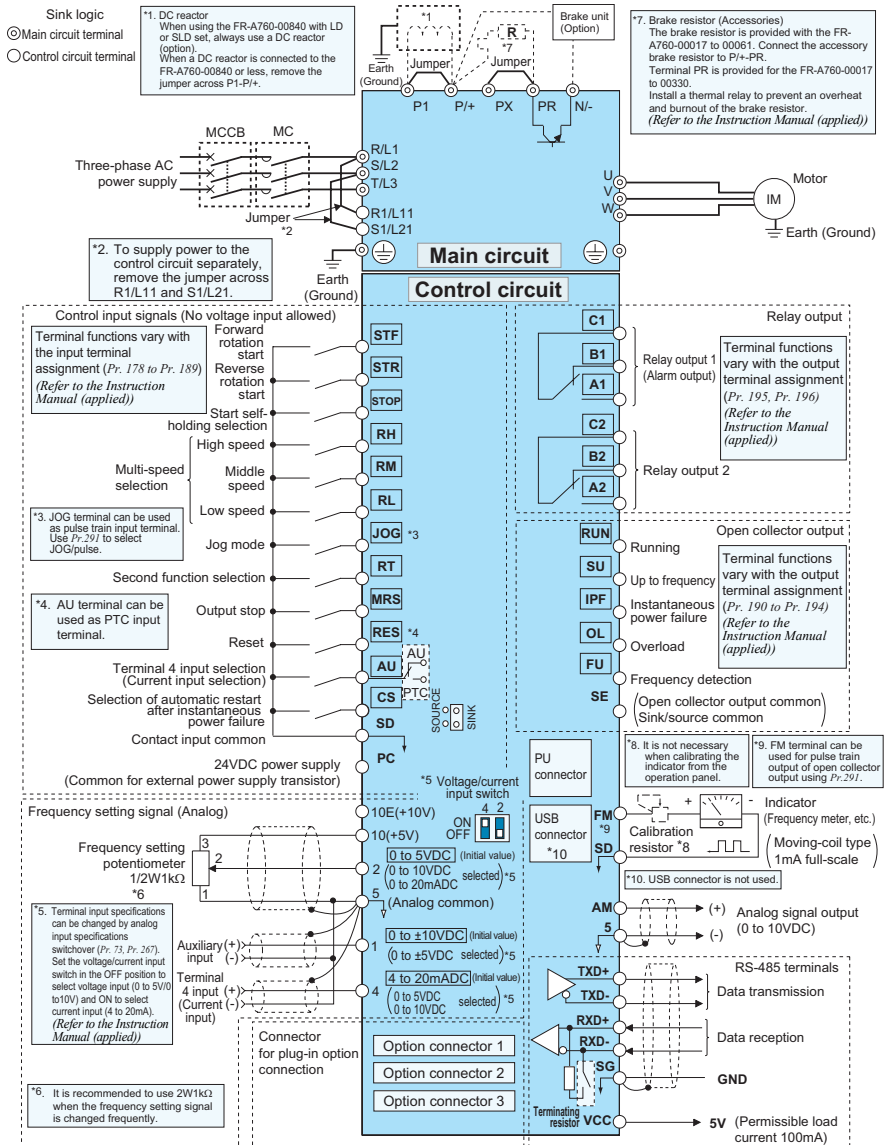
Inverter Type	W	W1	H	H1	D
FR-A760-00017-NA	150 (5.91)	125 (4.92)	260 (10.24)	245 (9.65)	140 (5.51)
FR-A760-00040-NA					170 (6.69)
FR-A760-00061-NA					190 (7.48)
FR-A760-00120-NA	220 (8.66)	195 (7.68)	300 (11.81)	285 (11.22)	190 (7.48)
FR-A760-00220-NA			400 (15.75)	380 (14.96)	190 (7.48)
FR-A760-00330-NA	250 (9.84)	230 (9.06)	550 (21.65)	525 (20.67)	250 (9.84)
FR-A760-00550-NA	435 (17.13)	380 (14.96)	550 (21.65)	525 (20.67)	250 (9.84)
FR-A760-00840-NA					

●When an enclosed brake resistor is used



3 WIRING

3.1 Terminal connection diagram



CAUTION

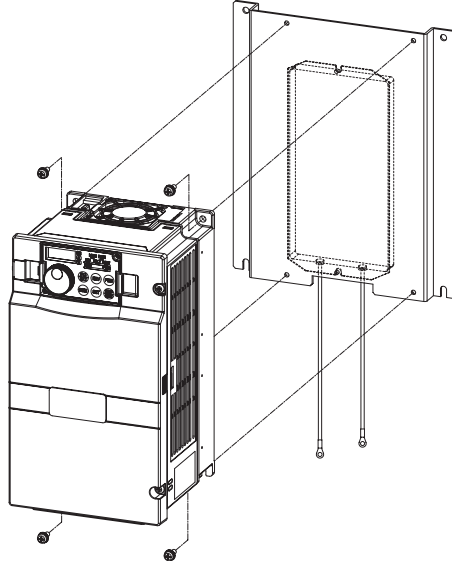
- To prevent a malfunction due to noise, keep the signal cables more than 10cm (3.94inches) away from the power cables.
- After wiring, wire offsets must not be left in the inverter.
- Wire offsets can cause an alarm, failure or malfunction. Always keep the inverter clean.
- When drilling mounting holes 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 Connection of provided brake resistor

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.



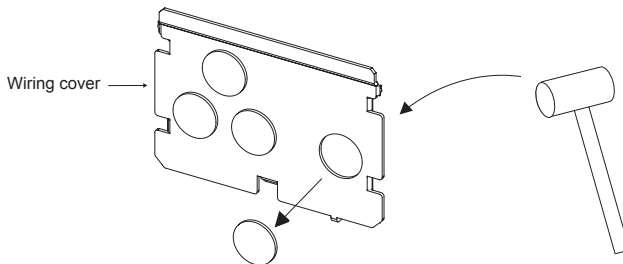
REMARKS

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

(2) Connection

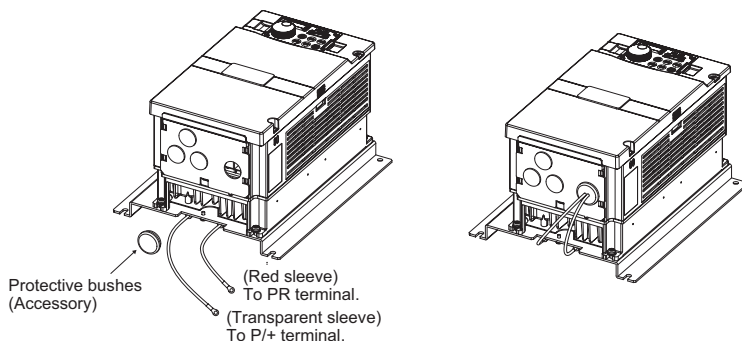
Wiring cover and Handling (FR-A760-00061 or less)

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.

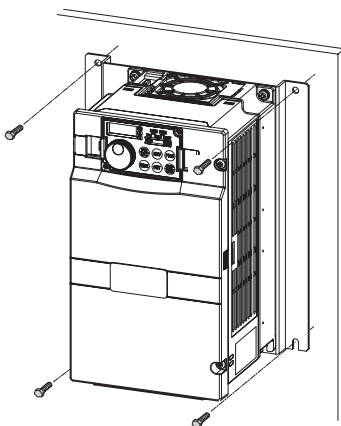




- 2) Attach protective bushes provided to the wiring cover and cut with nippers or a cutter before running the cables. Connect the wire with red sleeve to PR terminal. Connect the wire with transparent sleeve to P/+ terminal.



(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



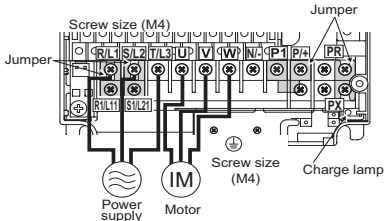
Do not wire without using protective bushes. Otherwise, the cable sheaths may be scratched by the wiring cover edges, resulting in a short circuit or ground fault.

3.3 Main circuit terminal

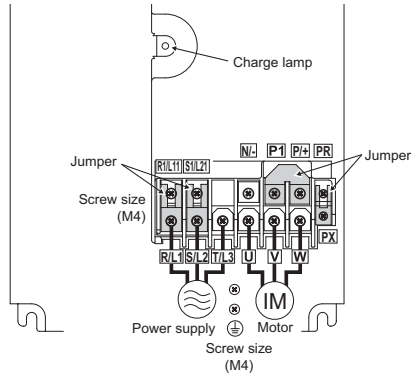
(1) Terminal layout and wiring

600V class

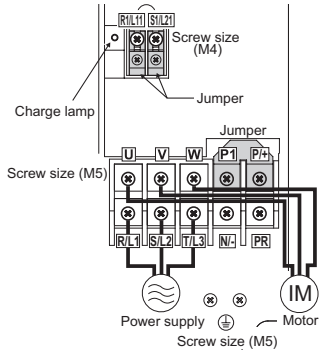
FR-A760-00017 to 00061-NA



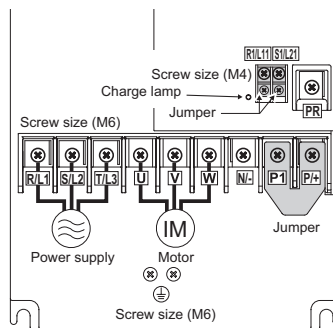
FR-A760-00120-NA



FR-A760-00220-NA

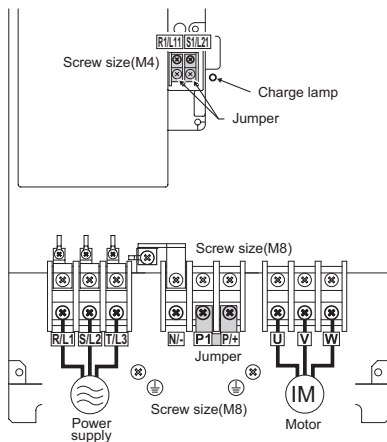


FR-A760-00330-NA

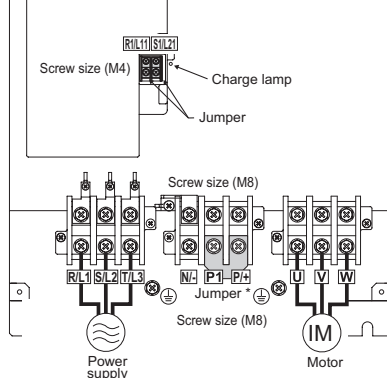




FR-A760-00550-NA



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.

CAUTION

- The power supply cables must be connected to R/L1, S/L2, T/L3. Never connect the power cable to the U, V, W of the inverter. Doing so will damage the inverter. (Phase sequence needs not to be matched.)
- Connect the motor to U, V, W. At this time, turning on the forward rotation switch (signal) rotates the motor in the counterclockwise direction when viewed from the motor shaft.

(2) Applied cable size

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

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

The following table indicates a selection example for the wiring length of 20m (65.62feet).

600V class

Applicable Inverter Type	Terminal Screw Size *2	Tightening Torque N·m	Crimping Terminal			Cable Sizes *1					
			R/L1, S/L2, T/L3 P/+, P1	U, V, W	Earth (Ground) Cable	mm ²			AWG		
						R/L1, S/L2, T/L3, P/+, P1	U, V, W	Earth (Ground) Cable	R/L1, S/L2, T/L3, P/+, P1	U, V, W	Earth (Ground) Cable
FR-A760-00017-NA	M4	1.5	2-4	2-4	2-4	2	2	2	14	14	14
FR-A760-00040-NA	M4	1.5	2-4	2-4	2-4	2	2	2	14	14	14
FR-A760-00061-NA	M4	1.5	2-4	2-4	2-4	2	2	2	14	14	14
FR-A760-00120-NA	M4	1.5	3.5-4	2-4	3.5-4	3.5	2	3.5	12	14	12
FR-A760-00220-NA	M5	2.5	5.5-5	5.5-5	5.5-4	5.5	5.5	5.5	10	10	10
FR-A760-00330-NA	M6	4.4	14-6	14-6	14-6	14	14	14	6	6	6
FR-A760-00550-NA	M8	7.8	22-8	22-8	22-8	22	22	22	4	4	4
FR-A760-00840-NA	M8	7.8	38-8	38-8	22-8	38	38	22	2	2	4

*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.

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

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

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

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

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

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

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

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

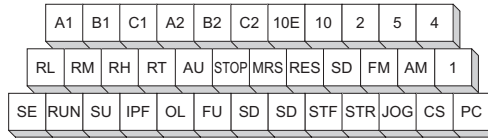
- Terminal screw size: M4
- Cable size: 0.75mm² to 2mm²
- Tightening torque: 1.5N·m

3.4 Control circuit terminals

(1) Terminal layout

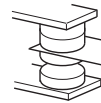
Terminal screw size: M3.5

Tightening torque: 1.2N·m

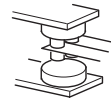


(2) Instructions for wiring of the control circuit terminal

- 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.
- 3) Use two or more parallel micro-signal contacts or twin contacts to prevent a contact faults when using contact inputs since the control circuit input signals are micro-currents.



Micro signal contacts



Twin contacts

- 4) Do not apply a voltage to the contact input terminals (e.g. STF) of the control circuit.
- 5) Always apply a voltage to the alarm output terminals (A, B, C) via a relay coil, lamp, etc.
- 6) It is recommended to use the cables of 0.75mm^2 gauge for connection to the control circuit terminals.
If the cable gauge used is 1.25mm^2 or more, the front cover may be lifted when there are many cables running or the cables are run improperly, resulting in an operation panel contact fault.
- 7) The wiring length should be 30m (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.

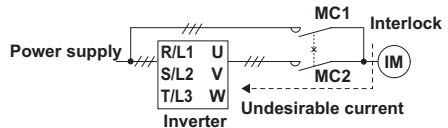
Before starting operation, always recheck the following items.

- (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 8* 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 9.*)
- (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.
- (7) Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the inverter output side.
This will cause the inverter to trip or the capacitor, and surge suppressor to be damaged. If any of the above devices is installed, immediately remove it.
- (8) Before starting wiring or other work after the inverter is operated, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.
- (9) A short circuit or earth (ground) fault on the inverter output side may damage the inverter modules.
 - Fully check the insulation resistance of the circuit prior to inverter operation since repeated short circuits caused by peripheral circuit inadequacy or an earth (ground) fault caused by wiring inadequacy or reduced motor insulation resistance may damage the inverter modules.
 - Fully check the to-earth (ground) insulation and inter-phase insulation of the inverter output side before power-on.
Especially for an old motor or use in hostile atmosphere, securely check the motor insulation resistance etc.
- (10) Do not use the inverter input side magnetic contactor to start/stop the inverter.
Always use the start signal (ON/OFF of STF and STR signals) to start/stop the inverter.
- (11) Across P/+ and PR terminals, connect only an external regenerative brake discharge resistor.
Do not connect a mechanical brake.
- (12) Do not apply a voltage higher than the permissible voltage to the inverter I/O signal circuits.
Contact to the inverter I/O signal circuits or opposite polarity may damage the I/O devices. Especially check the wiring to prevent the speed setting potentiometer from being connected incorrectly to short terminals 10E-5.



- (13) Provide electrical and mechanical interlocks for MC1 and MC2 which are used for bypass operation.

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



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

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

- (15) Instructions for overload operation

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

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

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

5 PARAMETER LIST

5.1 Parameter list

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

REMARKS

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

Parameter	Name	Setting Range	Initial Value
⊗ 0	Torque boost	0 to 30%	5/3/2/1% 1
⊗ 1	Maximum frequency	0 to 120Hz	120Hz
⊗ 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 500A	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%	1%
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	120Hz
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	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 500A	Rated inverter current
57	Restart coasting time	0, 0.1 to 5s, 9999	9999
58	Restart cushion time	0 to 60s	1s
59	Remote function selection	0, 1, 2, 3	0
60	Energy saving control selection	0, 4	0



Parameter	Name	Setting Range	Initial Value
61	Reference current	0 to 500A, 9999	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 alarm occurrence	0 to 10, 101 to 110	0
68	Retry waiting time	0 to 10s	1s
69	Retry count display erase	0	0
70	Special regenerative brake duty	0 to 30%	0%
71	Applied motor	0 to 8, 13 to 18, 30, 33, 34	0
72	PWM frequency selection	0 to 15	2
73	Analog input selection	0 to 7, 10 to 17	1
74	Input filter time constant	0 to 8	1
75	Reset selection/ disconnected PU detection/ PU stop selection	0 to 3, 14 to 17, 100 to 103, 114 to 117	14
76	Alarm code output selection	0, 1, 2	0
77	Parameter write selection	0, 1, 2	0
78	Reverse rotation prevention selection	0, 1, 2	0
⊗ 79	Operation mode selection	0, 1, 2, 3, 4, 6, 7	0
80	Motor capacity	0.4 to 55kW, 9999	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	9999
83	Motor rated voltage	0 to 1000V	575V
84	Rated motor frequency	10 to 120Hz	60Hz
89	Speed control gain (magnetic flux vector)	0 to 200%, 9999	9999
90	Motor constant (R1)	0 to 50Ω, 9999	9999
91	Motor constant (R2)	0 to 50Ω, 9999	9999
92	Motor constant (L1)	0 to 50Ω (0 to 1000mH), 9999	9999
93	Motor constant (L2)	0 to 50Ω (0 to 1000mH), 9999	9999
94	Motor constant (X)	0 to 500Ω (0 to 100%), 9999	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

Parameter	Name	Setting Range	Initial Value
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
127	PID control automatic switchover frequency	0 to 400Hz, 9999	9999
128	PID action selection	10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101	10
129	PID proportional band	0.1 to 1000%, 9999	100%
130	PID integral time	0.1 to 3600s, 9999	1s
131	PID upper limit	0 to 100%, 9999	9999
132	PID lower limit	0 to 100%, 9999	9999
133	PID action set point	0 to 100%, 9999	9999
134	PID differential time	0.01 to 10.00s, 9999	9999
135	Electronic bypass sequence selection	0, 1	0
136	MC switchover interlock time	0 to 100s	1s
137	Start waiting time	0 to 100s	0.5s
138	Bypass selection at an alarm	0, 1	0



Parameter	Name	Setting Range	Initial Value
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
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

Parameter	Name	Setting Range	Initial Value
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
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,	0
191	SU terminal function selection	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	1
192	IPF terminal function selection	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	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	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	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



Parameter	Name	Setting Range	Initial Value
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 failure protection selection	0, 1	1
252	Override bias	0 to 200%	50%
253	Override gain	0 to 200%	150%
255	Life alarm status display	(0 to 15)	0
256	Inrush current limit circuit life display	(0 to 100%)	100%
257	Control circuit capacitor life display	(0 to 100%)	100%
258	Main circuit capacitor life display	(0 to 100%)	100%
259	Main circuit capacitor life measuring	0, 1	0
260	PWM frequency automatic switchover	0, 1	1
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

Parameter	Name	Setting Range	Initial Value
276	PWM carrier frequency at stop-on contact	0 to 9, 9999	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
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 *3	Stop position command selection	0, 1, 9999	9999
351 *3	Orientation speed	0 to 30Hz	2Hz
352 *3	Creep speed	0 to 10Hz	0.5Hz
353 *3	Creep switchover position	0 to 16383	511
354 *3	Position loop switchover position	0 to 8191	96
355 *3	DC injection brake start position	0 to 255	5
356 *3	Internal stop position command	0 to 16383	0
357 *3	Orientation in-position zone	0 to 255	5
358 *3	Servo torque selection	0 to 13	1



Parameter	Name	Setting Range	Initial Value
359 *3	Encoder rotation direction	0, 1	1
360 *3	16 bit data selection	0 to 127	0
361 *3	Position shift	0 to 16383	0
362 *3	Orientation position loop gain	0.1 to 100	1
363 *3	Completion signal output delay time	0 to 5s	0.5s
364 *3	Encoder stop check time	0 to 5s	0.5s
365 *3	Orientation limit	0 to 60s, 9999	9999
366 *3	Recheck time	0 to 5s, 9999	9999
367 *3	Speed feedback range	0 to 400Hz, 9999	9999
368 *3	Feedback gain	0 to 100	1
369 *3	Number of encoder pulses	0 to 4096	1024
374	Overspeed detection level	0 to 400Hz	140Hz
376 *3	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 *3	Orientation selection	0, 1, 2	0
396 *3	Orientation speed gain (P term)	0 to 1000	60
397 *3	Orientation speed integral time	0 to 20s	0.333s
398 *3	Orientation speed gain (D term)	0 to 100	1
399 *3	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 *3	Position command source selection	0, 2	0
420 *3	Command pulse scaling factor numerator	0 to 32767	1
421 *3	Command pulse scaling factor denominator	0 to 32767	1
422 *3	Position loop gain	0 to 150sec ⁻¹	25sec ⁻¹
423 *3	Position feed forward gain	0 to 100%	0
424 *3	Position command acceleration/deceleration time constant	0 to 50s	0s
425 *3	Position feed forward command filter	0 to 5s	0s
426 *3	In-position width	0 to 32767/pulse	100
427 *3	Excessive level error	0 to 400K, 9999	40K
428 *3	Command pulse selection	0 to 5	0
429 *3	Clear signal selection	0, 1	1
430 *3	Pulse monitor selection	0 to 5, 9999	9999

Parameter	Name	Setting Range	Initial Value
450	Second applied motor	0 to 8, 13 to 18, 30, 33, 34, 9999	9999
451	Second motor control method selection	10, 11, 12, 20, 9999	9999
453	Second motor capacity	0.4 to 55kW, 9999	9999
454	Number of second motor poles	2, 4, 6, 8, 10, 9999	9999
455	Second motor excitation current	0 to 500A, 9999	9999
456	Rated second motor voltage	0 to 1000V	575V
457	Rated second motor frequency	10 to 120Hz	60Hz
458	Second motor constant (R1)	0 to 50Ω, 9999	9999
459	Second motor constant (R2)	0 to 50Ω, 9999	9999
460	Second motor constant (L1)	0 to 50Ω (0 to 1000mH), 9999	9999
461	Second motor constant (L2)	0 to 50Ω (0 to 1000mH), 9999	9999
462	Second motor constant (X)	0 to 500Ω (0 to 100%), 9999	9999
463	Second motor auto tuning setting/status	0, 1, 101	0
464 *3	Digital position control sudden stop deceleration time	0 to 360.0s	0
465 *3	First position feed amount lower 4 digits	0 to 9999	0
466 *3	First position feed amount upper 4 digits	0 to 9999	0
467 *3	Second position feed amount lower 4 digits	0 to 9999	0
468 *3	Second position feed amount upper 4 digits	0 to 9999	0
469 *3	Third position feed amount lower 4 digits	0 to 9999	0
470 *3	Third position feed amount upper 4 digits	0 to 9999	0
471 *3	Fourth position feed amount lower 4 digits	0 to 9999	0
472 *3	Fourth position feed amount upper 4 digits	0 to 9999	0
473 *3	Fifth position feed amount lower 4 digits	0 to 9999	0
474 *3	Fifth position feed amount upper 4 digits	0 to 9999	0
475 *3	Sixth position feed amount lower 4 digits	0 to 9999	0
476 *3	Sixth position feed amount upper 4 digits	0 to 9999	0
477 *3	Seventh position feed amount lower 4 digits	0 to 9999	0
478 *3	Seventh position feed amount upper 4 digits	0 to 9999	0
479 *3	Eighth position feed amount lower 4 digits	0 to 9999	0
480 *3	Eighth position feed amount upper 4 digits	0 to 9999	0
481 *3	Ninth position feed amount lower 4 digits	0 to 9999	0
482 *3	Ninth position feed amount upper 4 digits	0 to 9999	0
483 *3	Tenth position feed amount lower 4 digits	0 to 9999	0



Parameter	Name	Setting Range	Initial Value
484 *3	Tenth position feed amount upper 4 digits	0 to 9999	0
485 *3	Eleventh position feed amount lower 4 digits	0 to 9999	0
486 *3	Eleventh position feed amount upper 4 digits	0 to 9999	0
487 *3	Twelfth position feed amount lower 4 digits	0 to 9999	0
488 *3	Twelfth position feed amount upper 4 digits	0 to 9999	0
489 *3	Thirteenth position feed amount lower 4 digits	0 to 9999	0
490 *3	Thirteenth position feed amount upper 4 digits	0 to 9999	0
491 *3	Fourteenth position feed amount lower 4 digits	0 to 9999	0
492 *3	Fourteenth position feed amount upper 4 digits	0 to 9999	0
493 *3	Fifteenth position feed amount lower 4 digits	0 to 9999	0
494 *3	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	Parameter for manufacturer setting. Do not set.		
548			
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

Parameter	Name	Setting Range	Initial Value
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 500A	Rated inverter current
563	Energization time carrying-over times	(0 to 65535)	0
564	Operating time carrying-over times	(0 to 65535)	0
569	Second motor speed control gain	0 to 200%, 9999	9999
570	Multiple rating setting	0 to 3	2
571	Holding time at a start	0.0 to 10.0s, 9999	9999
573	4mA input check selection	1, 9999	9999
574	Second motor online auto tuning	0, 1	0
575	Output interruption detection time	0 to 3600s, 9999	1s
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	5s
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 *3	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



Parameter	Name	Setting Range	Initial Value
822	Speed setting filter 1	0 to 5s, 9999	9999
823 *3	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 *3	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 *3	Torque bias selection	0 to 3, 9999	9999
841 *3	Torque bias 1	600 to 1400%, 9999	9999
842 *3	Torque bias 2	600 to 1400%, 9999	9999
843 *3	Torque bias 3	600 to 1400%, 9999	9999
844 *3	Torque bias filter	0 to 5s, 9999	9999
845 *3	Torque bias operation time	0 to 5s, 9999	9999
846 *3	Torque bias balance compensation	0 to 10V, 9999	9999
847 *3	Fall-time torque bias terminal 1 bias	0 to 400%, 9999	9999
848 *3	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	9999
860	Second motor torque current	0 to 500A, 9999	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 failure protection selection	0, 1	0
873	Speed limit	0 to 120Hz	20Hz
874	OLT level setting	0 to 200%	150%
875	Fault definition	0, 1	0
877	Speed feed forward control/ model adaptive speed control selection	0, 1, 2	0

Parameter	Name	Setting Range	Initial Value
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 1000V	940VDC
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 55kW	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



Parameter	Name	Setting Range	Initial Value
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
990	PU buzzer control	0, 1	1
991	PU contrast adjustment	0 to 63	58
Pr. CL	Parameter clear	0, 1	0
ALLC	All parameter clear	0, 1	0
Er.CL	Alarm history clear	0, 1	0
PCPY	Parameter copy	0, 1, 2, 3	0

*1 Differ according to capacities.

5%: FR-A760-00017

3%: FR-A760-00040

2%: FR-A760-00061, 00120

1%: FR-A760-00220 or more

*2 Differ according to capacities. (FR-A760-00120 or less/FR-FR-A760-00220 or more)

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

6 TROUBLESHOOTING

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

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

- Retention of alarm output signal..... When the magnetic contactor (MC) provided on the input side of the inverter is opened at the activation of the protective function, the inverter's control power will be lost and the alarm output will not be held.
- Alarm display..... When the protective function is activated, the operation panel display automatically switches to the above indication.
- Resetting method When the protective function is activated, the inverter output is kept stopped. Unless reset, therefore, the inverter cannot restart. *(Refer to page 21.)*
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.
Not doing so may lead to the inverter fault and damage.

Inverter alarm displays are roughly divided as below.

(1) Error Message

A message regarding operational fault and setting fault by the operation panel (FR-DU07) and parameter unit (FR-PU04 /FR-PU07) is displayed.

The inverter does not shut off output.

(2) Warnings

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

(3) Minor fault

The inverter does not shut off output. You can also output a minor fault signal by making parameter setting.

(4) Major fault


When the protective function is activated, the inverter output is shut off and an alarm is output.

6.1 Reset method of protective function

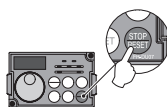
(1) Resetting the inverter

The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter.

Recover about 1s after reset is cancelled.

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

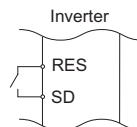
(Enabled only when the inverter protective function is activated (major fault) *((Refer to the Instruction Manual (applied))* for major fault.))



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



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



6.2 List of alarm display

Operation Panel Indication		Name
Error message	<i>E---</i>	E --- Alarm history
	<i>HOLD</i>	HOLD Operation panel lock
	<i>Er1</i> to <i>Er4</i>	Er1 to 4 Parameter write error
	<i>rE1</i> to <i>rE4</i>	rE1 to 4 Copy operation error
	<i>Err.</i>	Err. Error
Warnings	<i>OL</i>	OL Stall prevention (overcurrent)
	<i>oL</i>	oL Stall prevention (overvoltage)
	<i>rb</i>	RB Regenerative brake prealarm
	<i>TH</i>	TH Electronic thermal relay function prealarm
	<i>PS</i>	PS PU stop
	<i>MT</i>	MT Maintenance signal output
	<i>CP</i>	CP Parameter copy
Minor fault	<i>SL</i>	SL Speed limit indication (Output during speed limit)
	<i>Fn</i>	FN Fan fault
Major fault	<i>EOC1</i>	E.OC1 Overcurrent shut-off during acceleration
	<i>EOC2</i>	E.OC2 Overcurrent shut-off during constant speed
	<i>EOC3</i>	E.OC3 Overcurrent shut-off during deceleration or stop
	<i>EOV1</i>	E.OV1 Regenerative overvoltage shut-off during acceleration
	<i>EOV2</i>	E.OV2 Regenerative overvoltage shut-off during constant speed
	<i>EOV3</i>	E.OV3 Regenerative overvoltage shut-off during deceleration or stop
	<i>ETH</i>	E.THT Inverter overload shut-off (electronic thermal relay function)
	<i>ETHM</i>	E.THM Motor overload shut-off (electronic thermal relay function)
	<i>EFIN</i>	E.FIN Fin overheat
	<i>EIPF</i>	E.IPF Instantaneous power failure
	<i>E.BE</i>	E.BE Brake transistor alarm detection
	<i>EUVT</i>	E.UVT Undervoltage
	<i>EILF*</i>	E.ILF* Input phase failure
	<i>EOLT</i>	E.OLT Stall prevention

Operation Panel Indication		Name
<i>E.GF</i>	E.GF	Output side earth (ground) fault overcurrent
<i>E.LF</i>	E.LF	Output phase failure
<i>EOHT</i>	E.OHT	External thermal relay operation
<i>EPTC</i>	E.PTC*	PTC thermistor operation
<i>EOPT</i>	E.OPT	Option alarm
<i>EOP3</i>	E.OP3	Communication option alarm
<i>E. 1</i> to <i>E. 3</i>	E. 1 to E. 3	Option alarm
<i>E. PE</i>	E.PE	Parameter storage device alarm
<i>EPUE</i>	E.PUE	PU disconnection
<i>ERET</i>	E.RET	Retry count excess
<i>EPE2</i>	E.PE2*	Parameter storage device alarm
<i>E. 6 / E. 7 / E.CPU</i>	E. 6 / E. 7 / E.CPU	CPU error
<i>E.CTE</i>	E.CTE	Operation panel power supply short circuit, RS-485 terminal power supply short circuit
<i>EP24</i>	E.P24	24VDC power output short circuit
<i>E.CDO</i>	E.CDO*	Output current detection value exceeded
<i>EIOH</i>	E.IOH*	Inrush current limit circuit alarm
<i>ESER</i>	E.SER*	Communication error (inverter)
<i>EAIE</i>	E.AIE*	Analog input error
<i>E.OS</i>	E.OS	Overspeed occurrence
<i>E.OSd</i>	E.OSD	Speed deviation excess detection
<i>E.ECT</i>	E.ECT	Signal loss detection
<i>E. Od</i>	E.OD	Excessive position error
<i>EMB1</i> to <i>EMB7</i>	E.MB1 to E.MB7	Brake sequence error
<i>EEP</i>	E.EP	Encoder phase error
<i>E. bE</i>	E.BE	Brake transistor alarm detection
<i>E. 11</i>	E.11	Opposite rotation deceleration error
<i>E. 13</i>	E.13	Internal circuit error

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

Appendix 1 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 ambient temperature, humidity and atmosphere satisfy the specifications. *(Refer to page 1.)*

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-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 T type fuse that is suitable for branch circuit protection in accordance with the table below.

FR-A760-□□□□□		00017	00040	00061	00120	00220	00330	00550	00840
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

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

(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) Short circuit ratings

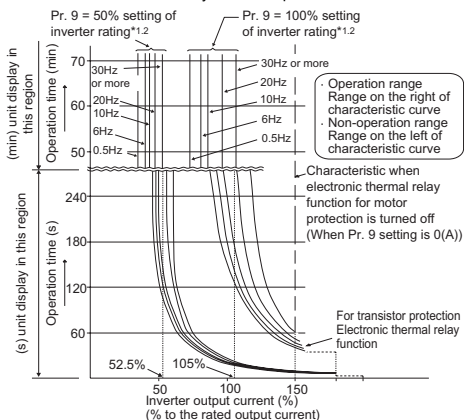
- 600V class
Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 660V Maximum.

(4) Motor overload protection

This inverter is certified as a motor overload protection device by UL.

When using the electronic thermal relay function as motor overload protection, set the rated motor current to Pr. 9 Electronic thermal O/L relay.

Electronic thermal relay function operation characteristic



This function detects the overload (overheat) of the motor, stops the operation of the inverter's output transistor, and stops the output. (The operation characteristic is shown on the left)

- *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.

MEMO

REVISIONS

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

Print Date	Manual Number	Revision
Dec., 2006	IB-0600312ENG-A	First edition

 For Maximum Safety

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