



INVERTER

FR-A800

INSTALLATION GUIDELINE

FR-A820-00046(0.4K) to 04750(90K)

FR-A840-00023(0.4K) to 06830(280K)

FR-A842-07700(315K) to 12120(500K)

FR-A846-00023(0.4K) to 00470(18.5K)

Thank you for choosing this Mitsubishi Inverter.
 This Installation guideline and the enclosed CD-ROM give handling information and precautions for use of this product.
 Do not use this product until you have a full knowledge of the equipment, the safety information and the instructions.
 Please forward this Installation guideline and the CD ROM to the end user.

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| 11/2013 | pdp | 274662-A | First edition |
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| 08/2014 | akl | 274662-D | Additions: <ul style="list-style-type: none"> • FR-A842-07700(315K) to 12120 (500K) (Separated converter type) • FR-A846-00023(0.4K) to 00470(18.5K) (IP55 compatible model) |
| | | | |

 **For Maximum Safety**

- Mitsubishi transistorized 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.
- Please check upon receiving of the inverter whether this instruction manual corresponds to the delivered inverter. Compare the specifications on the capacity plate with the specifications given in this manual.

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.

Installation, operation, maintenance and inspection must be performed by qualified personnel. Here, qualified personnel means personnel who meets all the conditions below.

- A person who took a proper engineering training. Please note if you can take a proper engineering training at your local Mitsubishi Electric office. Such training may be available at your local Mitsubishi Electric office. Contact your local sales office for schedules and locations.
- A person who can access operating manuals for the protective devices (e.g. light curtain) connected to the safety control system.

A person who has read and familiarized himself/herself with the manuals.


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.

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 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. Earthing must conform to the requirements of national and local safety regulations and electrical codes (JIS, NEC section 250, IEC 536 class 1 and other applicable standards). A neutral-point earthed power supply for 400V class inverter in compliance with EN standard must be used.
- 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.
- If your application requires by installation standards an RCD (residual current device) as up stream protection please select according to DIN VDE 0100-530 as following:
 - Single phase inverter type A or B
 - Three phase inverter only type B(Additional instructions on the use of a residual current device are contained on *page 57*.)
- 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 or handle the cables with wet hands. You may get an electric shock.
- Standard models and IP55 compatible models only: When measuring the main circuit capacitor capacity, 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.
- A PM motor is a synchronous motor with high-performance magnets embedded in the rotor. Motor terminals holds high-voltage while the motor is running even after the inverter power is turned OFF. Before wiring or inspection, the motor must be confirmed to be stopped. In an application, such as fan and blower, where the motor is driven by the load, a low-voltage manual motor starter must be connected at the inverter's output side, and wiring and inspection must be performed while the motor starter is open. Otherwise you may get an electric shock.

Fire Prevention

CAUTION

- Mount the inverter to incombustible material. Install the inverter on a nonflammable wall without holes (so that nobody can touch the inverter heatsink on the rear side, 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, 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/+, N/-. This could cause a fire and destroy the inverter. The surface temperature of braking resistors can far exceed 100 °C for brief periods. Make sure that there is adequate protection against accidental contact and a safe distance is maintained to other units and system parts.
- Resistors cannot be used for FR-A842 (separated converter type) and FR-A846 (IP55 compatible models).
- Be sure to perform daily and periodic inspections as specified in the Instruction Manual. If a product is used without any inspection, a burst, breakage, or a fire may occur.

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.

Additional Instructions

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

Transportation and installation

⚠CAUTION

- Any person who is opening a package using a sharp object, such as a knife and cutter, must wear gloves to prevent injuries caused by the edge of the sharp object.
- When carrying products, use correct lifting gear to prevent injury.
- Do not stand or rest heavy objects on the product.
- Do not stack the inverter boxes higher than the number recommended.
- When carrying the inverter, do not hold it by the front cover or setting dial; it may fall off or fail.
- During installation, caution must be taken not to drop the inverter as doing so may cause injuries.
- 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 the product on a hot surface.
- Check the inverter mounting orientation is correct.
- The inverter must be installed on a strong surface securely with screws so that it will not drop.
- Do not install or operate the inverter if it is damaged or has parts missing. This can result in breakdowns.
- 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.

| Operating condition | FR-A820/A840/A842 | FR-A846 (IP55 compatible models) |
|-----------------------------|--|---|
| Surrounding air temperature | LD, ND (initial setting), HD ratings: -10°C to $+50^{\circ}\text{C}$ (non-freezing) SLD rating: -10°C to $+40^{\circ}\text{C}$ (non-freezing) | -10°C to $+40^{\circ}\text{C}$ (non-freezing) |
| Ambient humidity | With circuit board coating: 95% RH or less (non-condensing), Without circuit board coating: 90% RH or less (non-condensing) | 95% RH or less (non-condensing) |
| Storage temperature | -20°C to $+65^{\circ}\text{C}$ ^{*1} | |
| Atmosphere | Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt) | |
| Altitude | Maximum 1000m above sea level for standard operation. After that derate by 3% for every extra 500m up to 2500m (91%) | |
| Vibration | 5.9m/s^2 or less ^{*2} at 10 to 55Hz (directions of X, Y, Z axes) | |

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

^{*2} 2.9m/s^2 or less for the FR-A840-04320(160K) or higher

- If halogen-based materials (fluorine, chlorine, bromine, iodine, etc.) infiltrate into a Mitsubishi product, the product will be damaged. Halogen-based materials are often included in fumigant, which is used to sterilize or disinfect wooden packages. When packaging, prevent residual fumigant components from being infiltrated into Mitsubishi products, or use an alternative sterilization or disinfection method (heat disinfection, etc.) for packaging. Sterilization or disinfection of wooden package should also be performed before packaging the product.
- To prevent a failure, do not use the inverter with a part or material containing halogen flame retardant including bromine.

Wiring

⚠CAUTION

- Do not install assemblies or components (e. g. power factor correction capacitors) on the inverter output side, which are not approved from Mitsubishi. These devices on the inverter output side may be overheated or burn out.
- The direction of rotation of the motor corresponds to the direction of rotation commands (STF/STR) only if the phase sequence (U, V, W) is maintained.
- PM motor terminals (U, V, W) hold high-voltage while the PM motor is running even after the power is turned OFF. Before wiring, the PM motor must be confirmed to be stopped. Otherwise you may get an electric shock.
- Never connect an PM motor to the commercial power supply.
Applying the commercial power supply to input terminals (U,V, W) of a PM motor will burn the PM motor. The PM motor must be connected with the output terminals (U, V, W) of the inverter.


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.

Operation

WARNING

- When you have chosen the retry function, stay away from the equipment as it will restart suddenly after an alarm stop.
- Since pressing the  key may not stop output depending on the function setting status, 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.
- Do not use a PM motor for an application where the PM motor is driven by its load and runs at a speed higher than the maximum motor speed.
- Performing pre-excitation (LX signal and X13 signal) under torque control (Real sensorless vector control) may start the motor running at a low speed even when the start command (STF or STR) is not input. The motor may run also at a low speed when the speed limit value = 0 with a start command input. It must be confirmed that the motor running will not cause any safety problem before performing pre-excitation.
- The inverter can be started and stopped via the serial port communications link or the field bus. However, please note that depending on the settings of the communications parameters it may not be possible to stop the system via these connections if there is an error in the communications system or the data line. In configurations like this it is thus essential to install additional safety hardware that makes it possible to stop the system in an emergency (e.g. controller inhibit via control signal, external motor contactor etc). Clear and unambiguous warnings about this must be posted on site for the operating and service staff.
- Use this inverter only with three-phase induction motors or with a PM motor. Connection of any other electrical equipment to the inverter output may damage the inverter as well as the equipment.
- 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.
- Use a noise filter to reduce the effect of electromagnetic interference and follow the accepted EMC procedures for proper installation of frequency inverters. Otherwise nearby electronic equipment may be affected.
- Take appropriate measures regarding harmonics. Otherwise this can endanger compensation systems or overload generators.
- When driving a 400V 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.
- Use a motor designed for inverter operation. (The stress for motor windings is bigger than in line power supply).
- When parameter clear or all clear is performed, set again 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.
- The DC braking function of the frequency inverter is not designed to continuously hold a load. Use an electro-mechanical holding brake on the motor for this purpose.
- 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.
- Only one PM motor can be connected to an inverter.
- A PM motor must be used under PM sensorless vector control. Do not use a synchronous motor, induction motor, or synchronous induction motor.
- Do not connect a PM motor in the induction motor control settings (initial settings). Do not use an induction motor in the PM sensorless vector control settings. It will cause a failure.
- In the system with a PM motor, the inverter power must be turned ON before closing the contacts of the contactor at the output side.

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 primary 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 (i. e. the frequency inverter switches off with an error message), take the corresponding corrective action as described in the inverter manual, then reset the inverter, and resume operation.

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.

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. For more details on the PM motor, refer to the Instruction Manual of the PM motor.

For IP55 compatible models: Waterproof and dustproof performances

CAUTION

- The inverter is rated with an IPX5 ^{*1} waterproof rating and an IP5X ^{*2} dustproof rating when the operation panel (FR-DU08-01), the front cover, the wiring cover, and the cable glands are securely fixed with screws.
- The items enclosed with the inverter such as the Instruction Manual or CD are not rated with the IPX5 waterproof or IP5X dustproof ratings.
- Although the inverter is rated with the IPX5 waterproof and IP5X dustproof ratings, it is not intended for use in water. Also, the ratings do not guarantee protection of the inverter from needless submersion in water or being washed under strong running water such as a shower.
- Do not pour or apply the following liquids over the inverter: water containing soap, detergent, or bath additives; sea water; swimming pool water; warm water; boiling water; etc.
- The inverter is intended for indoor ^{*3} installation and not for outdoor installation. Avoid places where the inverter is subjected to direct sunlight, rain, sleet, snow, or freezing temperatures.
- If the operation panel (FR-DU08-01) is not installed, if the screws of the operation panel are not tightened, or if the operation panel is damaged or deformed, the IPX5 waterproof performance and the IP5X dustproof performance are impaired. If any abnormalities are found on the operation panel, ask for an inspection and repair.
- If the screws of the front cover or the wiring cover are not tightened, if any foreign matter (hair, sand grain, fiber, etc.) is stuck between the inverter and the gasket, if the gasket is damaged, or if the front cover or the wiring cover is damaged or deformed, the IPX5 waterproof performance and the IP5X dustproof performance are impaired. If any abnormalities are found on the front cover, wiring cover, or the gasket of the inverter, ask for an inspection and repair.
- Cable glands are important components to maintain the waterproof and dustproof performances. Be sure to use cable glands of the recommended size and shape or equivalent. The standard protective bushes cannot sufficiently maintain the IPX5 waterproof performance and the IP5X dustproof performance.
- If a cable gland is damaged or deformed, the IPX5 waterproof performance and the IP5X dustproof performance are impaired. If any abnormalities are found on the cable glands, ask the manufacturer of the cable glands for an inspection and repair.
- To maintain the waterproof and dustproof performances of the inverter, daily and periodic inspections are recommended regardless of the presence or absence of abnormalities.

^{*1} IPX5 refers to protection of the inverter functions against water jets from any direction when about 12.5-liter water (water here refers to fresh water at room temperature (5 to 35°C)) is injected from a nozzle with an inside diameter of 6.3 mm from the distance of about 3 m for at least 3 minutes.

^{*2} IP5X refers to protection of the inverter functions and maintenance of safety when the inverter is put into a stirring device containing dust of 75 µm or smaller in diameter, stirred for 8 hours, and then removed from the device.

^{*3} Indoor here refers to the environments that are not affected by climate conditions.

1 INSTALLATION AND INSTRUCTIONS

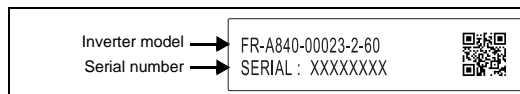
1.1 Inverter Type

FR - A8 4 0 - 00023 - 2 - 60

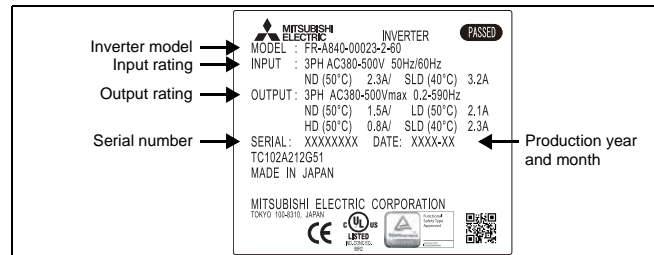
| Symbol | EMC Filter (IP55 compatible models only) |
|--------|--|
| C2 | Built-in C2 filter |
| C3 | Built-in C3 filter |

| Symbol | Voltage class | Symbol | Structure, functionality | Symbol | Description | Symbol | Type ^{*1} | Symbol | Circuit board coating (3C2) ^{*2} | Plated conductor |
|--------|---------------|--------|--------------------------|----------------|---------------------------------|--------|--------------------|---------|---|------------------|
| 2 | 200V class | 0 | Standard model | 00023 to 12120 | SLD rated inverter current [A] | -1 | FM | Without | Without | Without |
| 4 | 400V class | 2 | Separated converter type | 0.4 to 500K | ND rated inverter capacity [kW] | -2 | CA | -60 | With | Without |
| | | 6 | IP55 compatible model | | | | | -06 | With | With |

Capacity plate



Rating plate



^{*1} Specification differs by the type as follows

| Type | Monitor output | Initial setting | | | |
|---------------------------------|--|---------------------|---------------|-----------------|---|
| | | Built-in EMC filter | Control logic | Rated frequency | Pr. 19 "Base frequency voltage" |
| FM (terminal FM equipped model) | Terminal FM: pulse train output Terminal AM: analog voltage output (0 to ±10VDC) | OFF | Sink logic | 60Hz | 9999 (same as the power supply voltage) |
| CA (terminal CA equipped model) | Terminal CA: analog current output (0 to 20mADC) Terminal AM: analog voltage output (0 to ±10VDC) | ON | Source logic | 50Hz | 8888 (95% of the power supply voltage) |

^{*2} Standard models and separated converter types only.

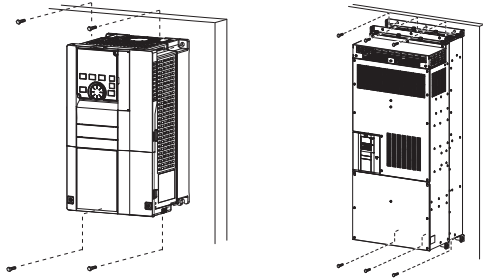
Notes

- The rating plate shows the rated inverter current in SLD operation (Super Light Duty). The overload current rating at SLD is 110 % of the rated current for 60 s and 120 % for 3 s at surrounding air temperature of max. 40 °C.
- The inverter model name used in this installation guide consists of the inverter model, e. g. FR-A840-00023-2-60 and the applicable motor capacity in brackets specified in [kW]. This approach helps for better understanding and for choosing the right motor. For further specification details like capacity, current or overload current rating refer to *chapter 8*.
- In this installation guideline the following common designations are used for the different types of inverter models:
 - FR-A8 0: Standard model
 - FR-A82: Separated converter type
 - FR-A86: IP55 compatible model
- For selecting the right frequency inverter you should know details of your application and especially the load characteristic.



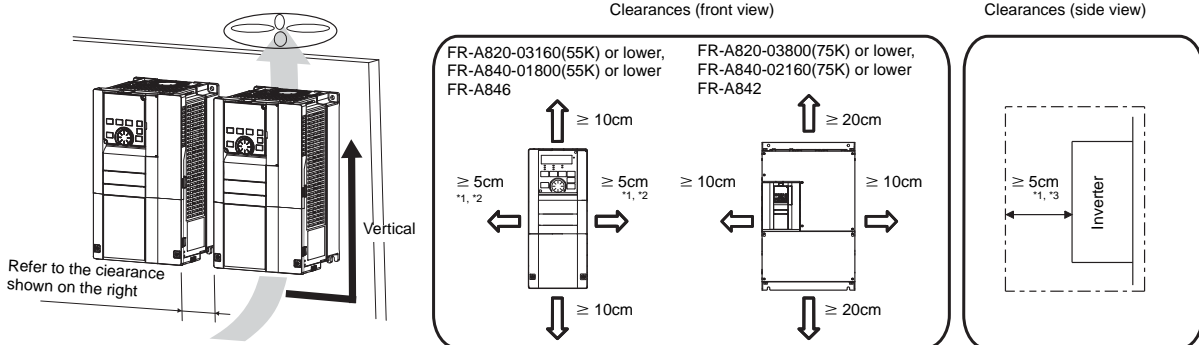
1.2 Installation of the inverter

- Install the inverter on a strong surface securely with bolts.



Fix six positions for the FR-A840-04320(160K) or higher and for the FR-A842 models (separated converter type).

- 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 nonflammable surface.
- When encasing multiple inverters, install them in parallel as a cooling measure.



^{*1} For the FR-A820-00250(3.7K) or lower, the FR-A840-00126(3.7K) or lower, and the FR-A846-00126(3.7K) or lower allow 1cm or more clearance.

^{*2} When using the FR-A820-01250(22K) or lower and FR-A840-00620(22K) or lower at the surrounding air temperature of 40°C or less (30°C or less for the SLD rated inverter), side-by-side installation (0cm clearance) is available.

^{*3} For replacing the cooling fan of the FR-A840-04320(160K) or higher, and of the FR-A842 models, 30cm of space is necessary in front of the inverter. Refer to the Instruction Manual for fan replacement.

1.3 Environment

Before installation, check that the environment meets following specifications:

| | | |
|--|--|--|
| Surrounding air temperature ^{*6} | LD, ND (initial setting), HD ratings: -10°C to +50°C (non-freezing) SLD rating: -10°C to +40°C (non-freezing) | Enclosure x = Measurement position |
| | IP55 compatible models: -10°C to +40°C (non-freezing) | |
| Ambient humidity | With circuit board coating, IP55 compatible models: 95% RH or less (non-condensing), Without circuit board coating: 90% RH or less (non-condensing) | |
| Storage temperature | -20°C to +65°C ^{*4} | |
| Atmosphere | Indoors (No corrosive and flammable gases, oil mist, dust and dirt) | |
| Altitude | Maximum 2,500 m above sea level ^{*5} | |
| Vibration | 5.9m/s ² or less ^{*7} at 10 to 55Hz (directions of X, Y, Z axes) | |

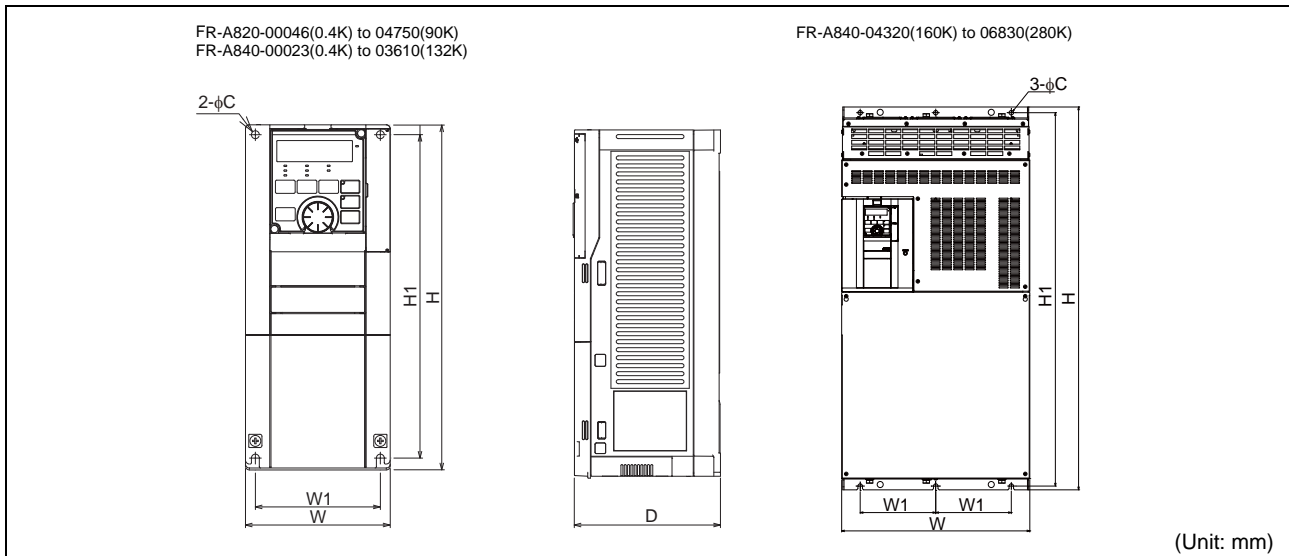
^{*4} Temperature applicable for a short time, e.g. in transit.

^{*5} For the installation at an altitude above 1,000m up to 2,500m, derate the rated current 3% per 500 m.

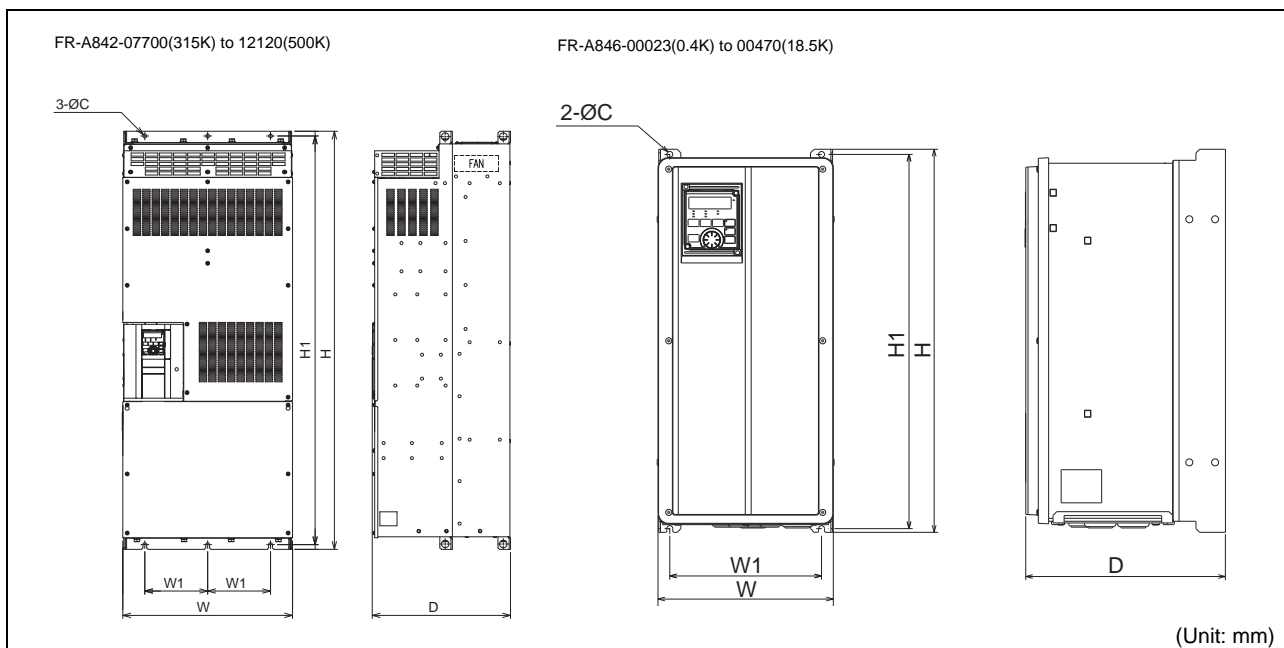
^{*6} Surrounding air temperature is a temperature measured at a measurement position in an enclosure. Ambient temperature is a temperature outside an enclosure.

^{*7} 2.9m/s² or less for the FR-A840-04320(160K) or higher

2 OUTLINE DRAWING



| | Inverter Type | W | W1 | H | H1 | D | C | | |
|---------------------|----------------------|-----|------|------|-----|-----|---|-----|-----|
| 200V class | FR-A820-00046(0.4K) | 110 | 95 | 260 | 245 | 110 | 6 | | |
| | FR-A820-00077(0.75K) | | | | | 125 | | | |
| | FR-A820-00105(1.5K) | 150 | 125 | | | 300 | | 285 | 140 |
| | FR-A820-00167(2.2K) | | | | | | | | |
| | FR-A820-00250(3.7K) | | | | | | | | |
| | FR-A820-00340(5.5K) | 220 | 195 | | | 550 | | 530 | 190 |
| | FR-A820-00490(7.5K) | | | | | | | | |
| | FR-A820-00630(11K) | 250 | 230 | 700 | 675 | 250 | | | |
| | FR-A820-00770(15K) | | | | | | | | |
| | FR-A820-00930(18.5K) | | | | | | | | |
| | FR-A820-01250(22K) | | | | | | | | |
| | FR-A820-01540(30K) | 325 | 270 | 740 | 715 | 360 | | | |
| | FR-A820-01870(37K) | | | | | | | | |
| | FR-A820-02330(45K) | 435 | 380 | 1010 | 985 | 380 | | | |
| FR-A820-03160(55K) | | | | | | | | | |
| FR-A820-03800(75K) | | | | | | | | | |
| FR-A820-04750(90K) | 465 | 400 | 1010 | 984 | 380 | | | | |
| 400V class | FR-A840-00023(0.4K) | 150 | 125 | 260 | 245 | 140 | 6 | | |
| | FR-A840-00038(0.75K) | | | | | | | | |
| | FR-A840-00052(1.5K) | | | | | | | | |
| | FR-A840-00083(2.2K) | | | | | | | | |
| | FR-A840-00126(3.7K) | | | | | | | | |
| | FR-A840-00170(5.5K) | 220 | 195 | 300 | 285 | 170 | | | |
| | FR-A840-00250(7.5K) | | | | | | | | |
| | FR-A840-00310(11K) | | | | | | | | |
| | FR-A840-00380(15K) | 250 | 230 | 400 | 380 | 190 | | | |
| | FR-A840-00470(18.5K) | | | | | | | | |
| | FR-A840-00620(22K) | | | | | | | | |
| | FR-A840-00770(30K) | | | | | | | | |
| | FR-A840-00930(37K) | 325 | 270 | 550 | 530 | 195 | | | |
| | FR-A840-01160(45K) | | | | | | | | |
| | FR-A840-01800(55K) | 435 | 380 | 740 | 715 | 360 | | | |
| | FR-A840-02160(75K) | | | | | | | | |
| | FR-A840-02600(90K) | | | | | | | | |
| | FR-A840-03250(110K) | 465 | 400 | 1010 | 985 | 380 | | | |
| | FR-A840-03610(132K) | | | | | | | | |
| | FR-A840-04320(160K) | 498 | 200 | 1010 | 985 | 380 | | | |
| FR-A840-04810(185K) | | | | | | | | | |
| FR-A840-05470(220K) | 680 | 300 | 1010 | 984 | 380 | | | | |
| FR-A840-06100(250K) | | | | | | | | | |
| FR-A840-06830(280K) | | | | | | | | | |
| | | | | | | | | | |



| | Inverter Type | W | W1 | H | H1 | D | C |
|-------------------------------------|------------------------------------|-----|-----|-------|------|-----|----|
| 400V class | FR-A842-07700(315K) | 540 | 200 | 1330 | 1300 | 440 | 12 |
| | FR-A842-08660(355K) | | | | | | |
| | FR-A842-09620(400K) | 680 | 240 | 1580 | 1550 | | |
| | FR-A842-10940(450K) | | | | | | |
| | FR-A842-12120(500K) | | | | | | |
| | FR-A846-00023(0.4K) to 00170(5.5K) | 238 | 201 | 520 | 508 | 271 | 8 |
| FR-A846-00250(7.5K) to 00470(18.5K) | 650 | | | 632.5 | 285 | 10 | |

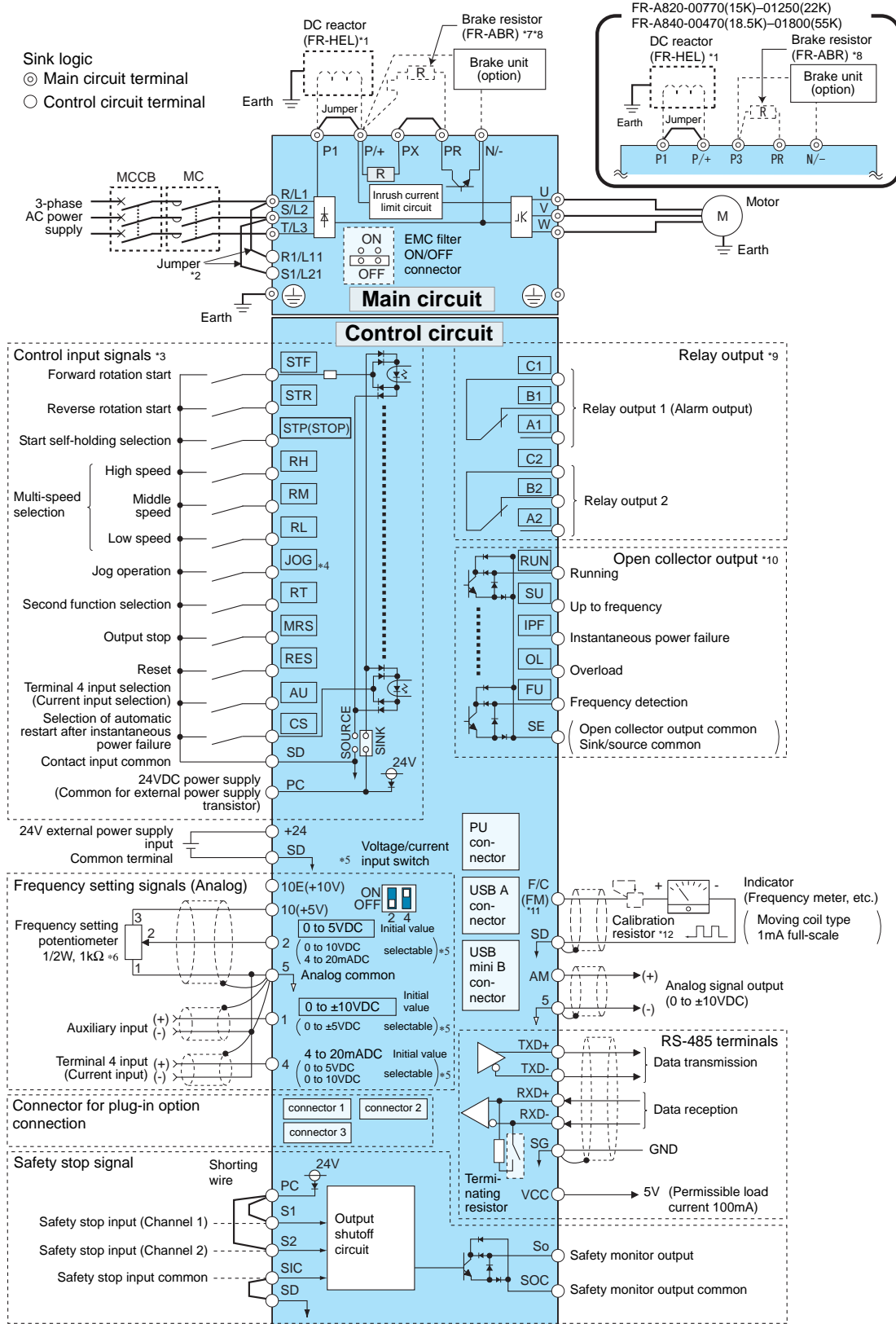
For dimensions of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.

3 WIRING

3.1 Terminal connection diagrams

3.1.1 FR-A820/A840

● FM type



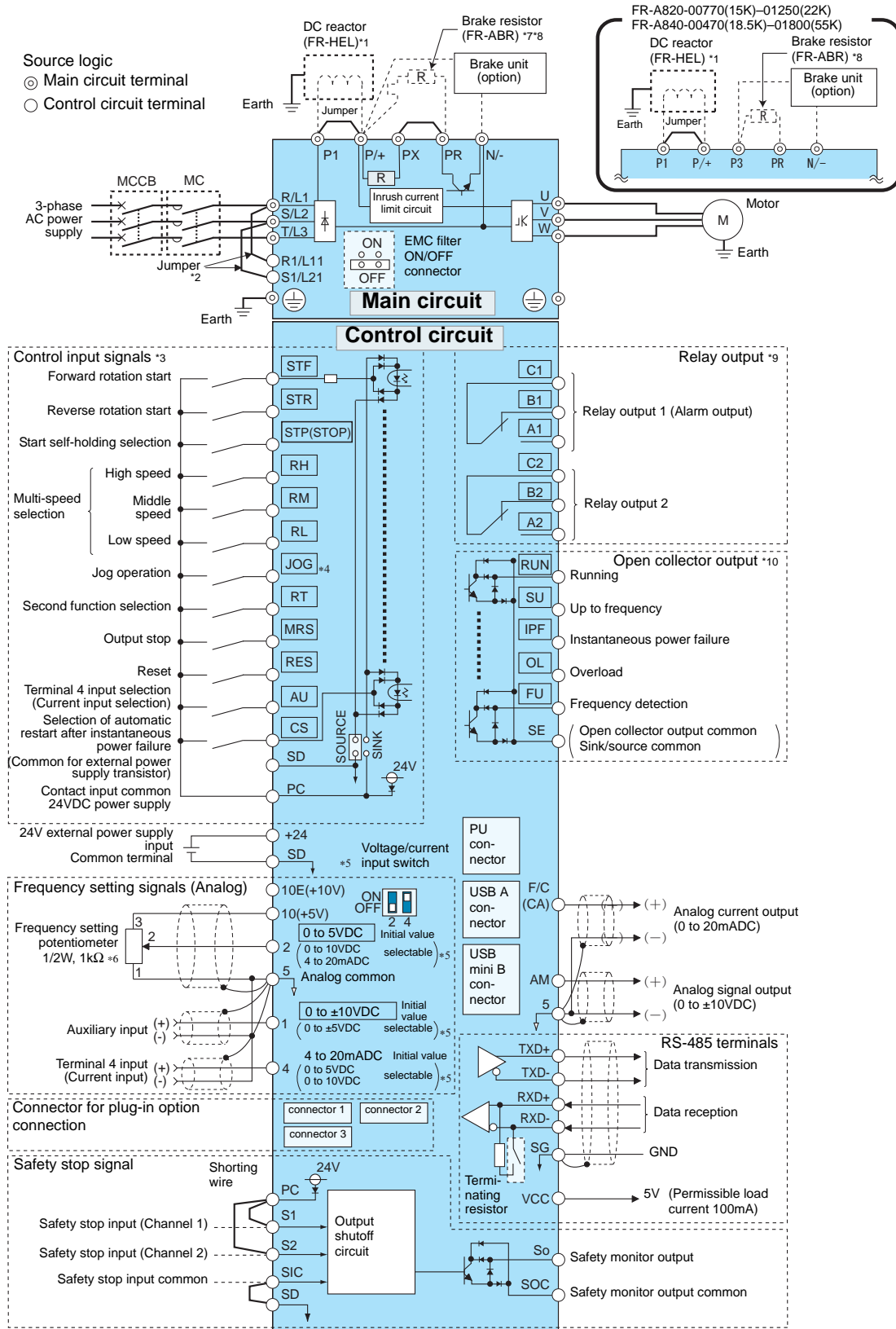
For footnotes *1 to *12 refer to next page.



- *1 For the FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher, or if using a motor with a capacity of 75 kW or higher, always connect a DC reactor (FR-HEL), which is available as an option.
(When selecting a DC reactor, refer to *page 53*, and select one suitable for the applicable motor capacity.) When a DC reactor is connected to the FR-A820-03160(55K) or lower or the FR-A840-01800(55K) or lower, if a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.
- *2 When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
- *3 No input voltage is allowed for these terminals. The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 33*.)
- *4 Terminal JOG is also used as the pulse train input terminal. Use Pr. 291 to choose JOG or pulse.
- *5 Terminal input specifications can be changed by analog input specification switchover (Pr. 73, Pr. 267). To input a voltage (0 to 5 V/0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to the FR-A800 Instruction Manual.)
- *6 It is recommended to use 2W, 1k Ω when the frequency setting signal is changed frequently.
- *7 If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)).
- *8 The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), and FR-A840-00023(0.4K) to 00620(22K). Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual.)
- *9 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 33*.)
- *10 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 33*.)
- *11 The terminal F/C(FM) can be used to output pulse trains as open collector output by setting Pr. 291.
- *12 Not required when calibrating the scale with the operation panel.

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
 - Set the voltage/current input switch in the correct position. An incorrect setting may cause a fault, failure or malfunction.
-

● CA type


For footnotes *1 to *10 refer to next page.



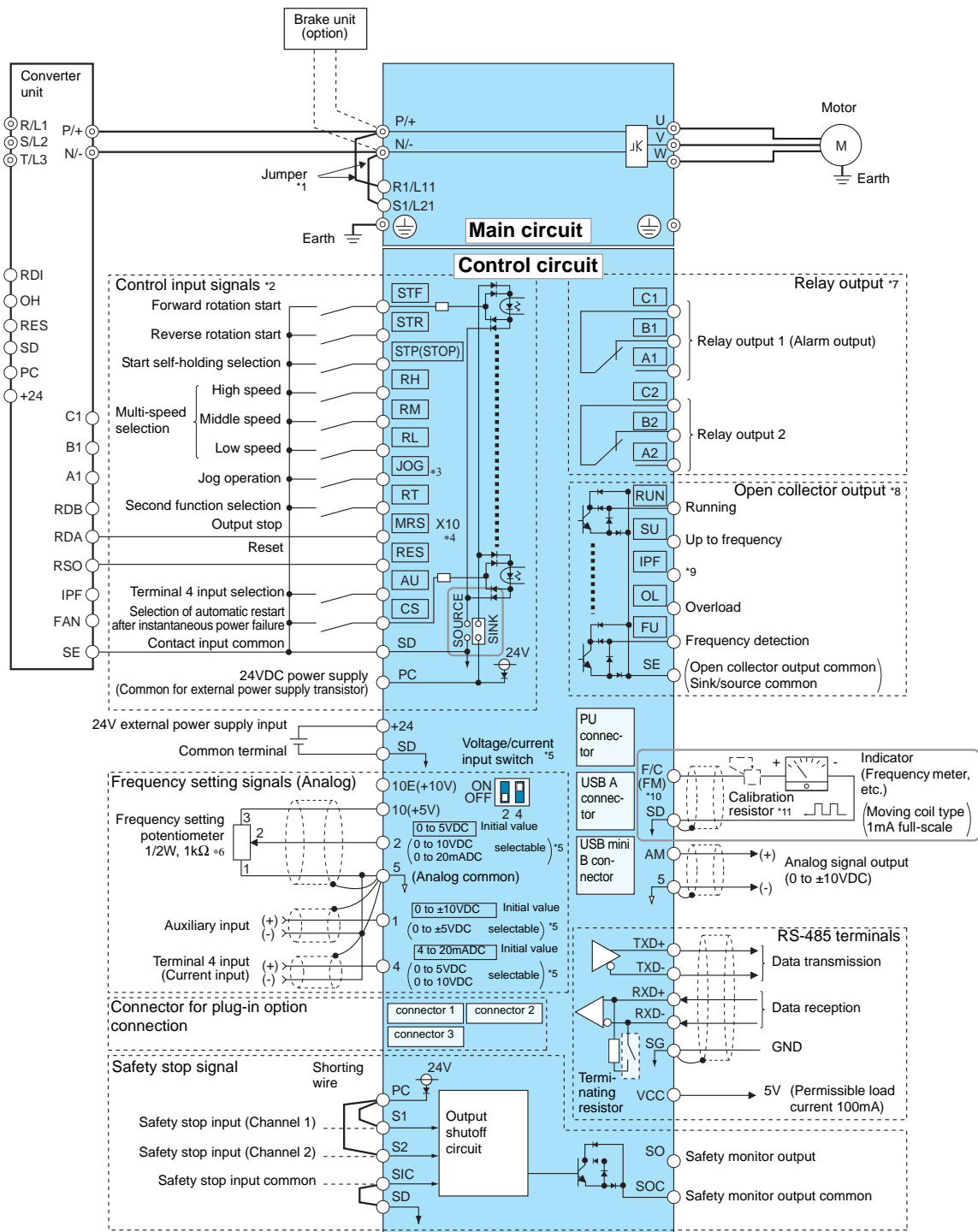
- *1 For the FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher, or if using a motor with a capacity of 75 kW or higher, always connect a DC reactor (FR-HEL), which is available as an option.
(When selecting a DC reactor, refer to *page 53*, and select one suitable for the applicable motor capacity.) When a DC reactor is connected to the FR-A820-03160(55K) or lower or the FR-A840-01800(55K) or lower, if a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.
- *2 When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
- *3 The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 33*.)
- *4 Terminal JOG is also used as the pulse train input terminal. Use Pr. 291 to choose JOG or pulse.
- *5 Terminal input specifications can be changed by analog input specification switchover (Pr. 73, Pr. 267). To input a voltage (0 to 5 V/0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to the FR-A800 Instruction Manual.)
- *6 It is recommended to use 2W, 1k Ω when the frequency setting signal is changed frequently.
- *7 If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)).
- *8 The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), FR-A840-00023(0.4K) to 00620(22K). Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual.)
- *9 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 33*.)
- *10 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 33*.)

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
 - Set the voltage/current input switch in the correct position. An incorrect setting may cause a fault, failure or malfunction.
-

3.1.2 FR-A842
● FM type

- Sink logic
- ⊙ Main circuit terminal
- Control circuit terminal



For footnotes *1 to *11 refer to next page.

Note

The FR-A842 models must be operated with a converter unit (FR-CC2), which has to be operated separately. For more details about the installation of the converter unit please refer to the corresponding FR-CC2 Instruction Manual.

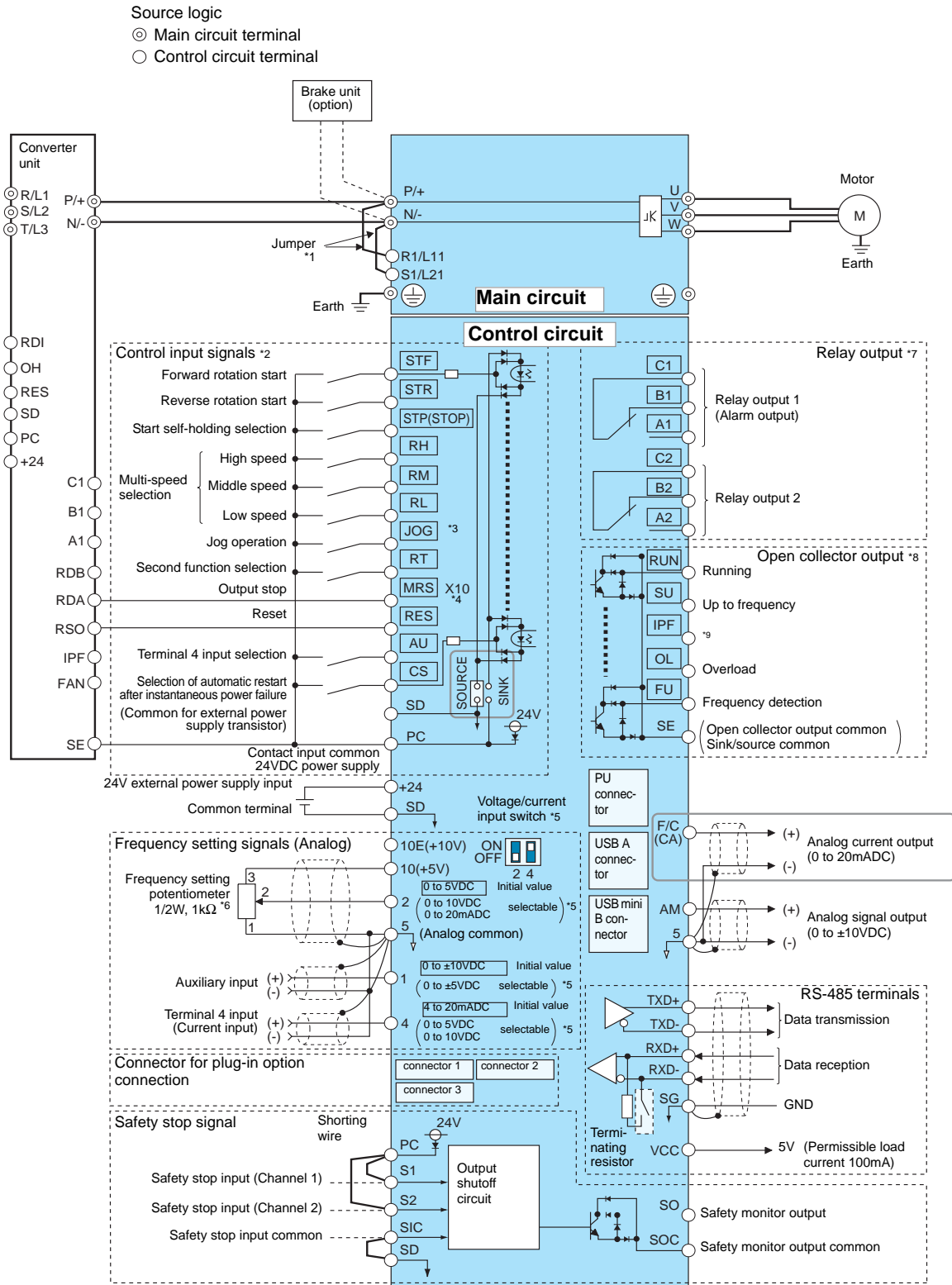


- *1 The terminals R1/L11 and S1/L21 are connected to the terminals P/+ and N/- with a jumper respectively. When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
- *2 No input voltage is allowed for these terminals. The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 33*.)
- *3 Terminal JOG is also used as the pulse train input terminal. Use Pr. 291 to choose JOG or pulse.
- *4 The X10 signal (NC contact input specification) is assigned to the terminal MRS in the initial setting. Set Pr. 599 = "0" to change the input specification of the X10 signal to NO contact.
- *5 Terminal input specifications can be changed by analog input specification switchover (Pr. 73, Pr. 267). To input a voltage (0 to 5 V/0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to the FR-A800 Instruction Manual.)
- *6 It is recommended to use 2W, 1k Ω when the frequency setting signal is changed frequently.
- *7 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 33*.)
- *8 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 33*.)
- *9 No function is assigned in the initial setting. Use Pr.192 for function assignment.
- *10 The terminal F/C (FM) can be used to output pulse trains as open collector output by setting Pr. 291.
- *11 Not required when calibrating the scale with the operation panel.

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
 - Set the voltage/current input switch in the correct position. An incorrect setting may cause a fault, failure or malfunction.
-

● CA type



For footnotes *1 to *9 refer to next page.

Note

The FR-A842 models must be operated with a converter unit (FR-CC2), which has to be operated separately. For more details about the installation of the converter unit please refer to the corresponding FR-CC2 Instruction Manual.



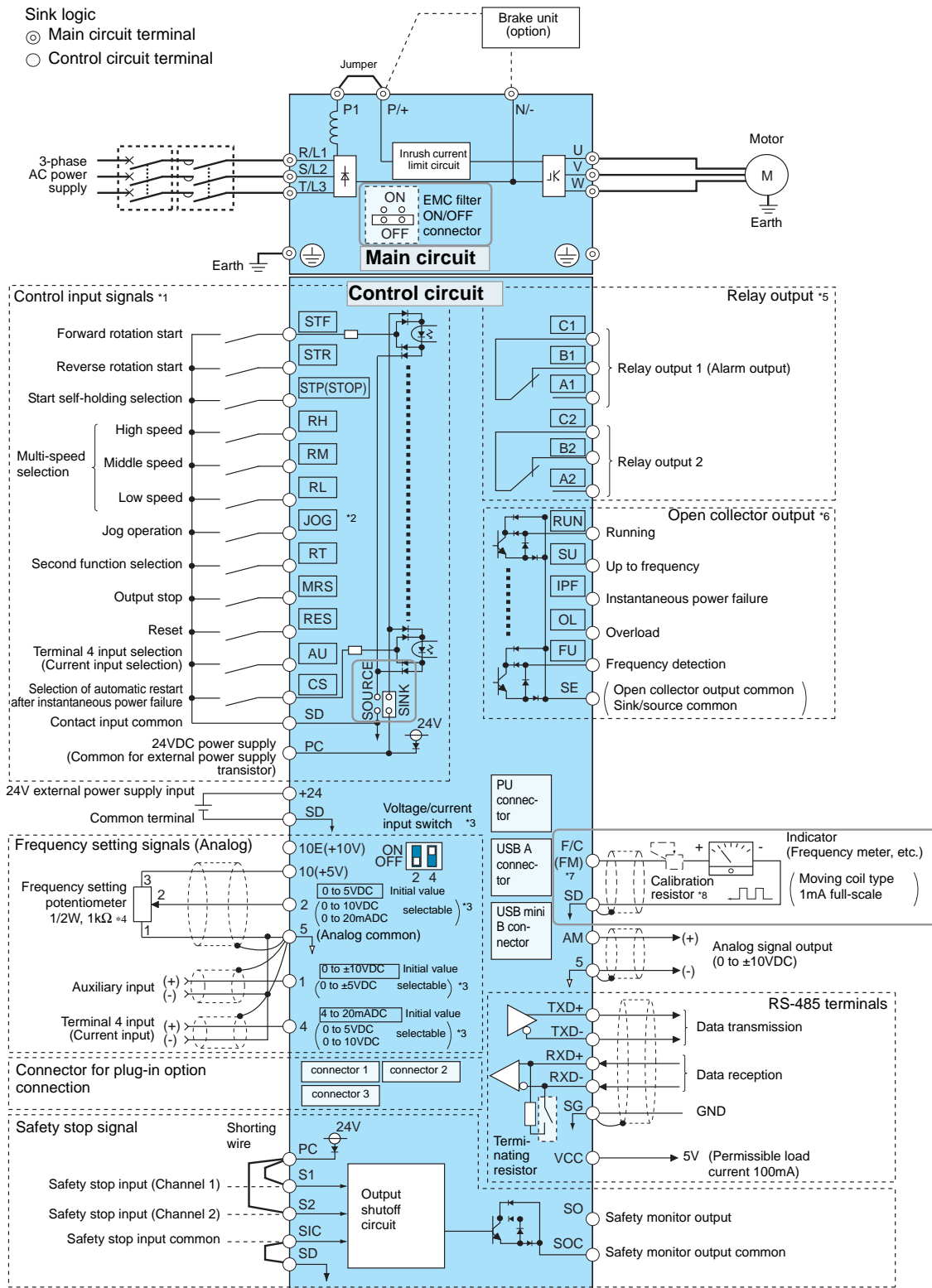
- *1 The terminals R1/L11 and S1/L21 are connected to the terminals P/+ and N/- with a jumper respectively. When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.
- *2 No input voltage is allowed for these terminals. The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 33*.)
- *3 Terminal JOG is also used as the pulse train input terminal. Use Pr. 291 to choose JOG or pulse.
- *4 The X10 signal (NC contact input specification) is assigned to the terminal MRS in the initial setting. Set Pr. 599 = "0" to change the input specification of the X10 signal to NO contact.
- *5 Terminal input specifications can be changed by analog input specification switchover (Pr. 73, Pr. 267). To input a voltage (0 to 5 V/0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to the FR-A800 Instruction Manual.)
- *6 It is recommended to use 2W, 1k Ω when the frequency setting signal is changed frequently.
- *7 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 33*.)
- *8 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 33*.)
- *9 No function is assigned in the initial setting. Use Pr.192 for function assignment.

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
 - Set the voltage/current input switch in the correct position. An incorrect setting may cause a fault, failure or malfunction.
-

3.1.3 FR-A846

● FM type



For footnotes *1 to *8 refer to next page.

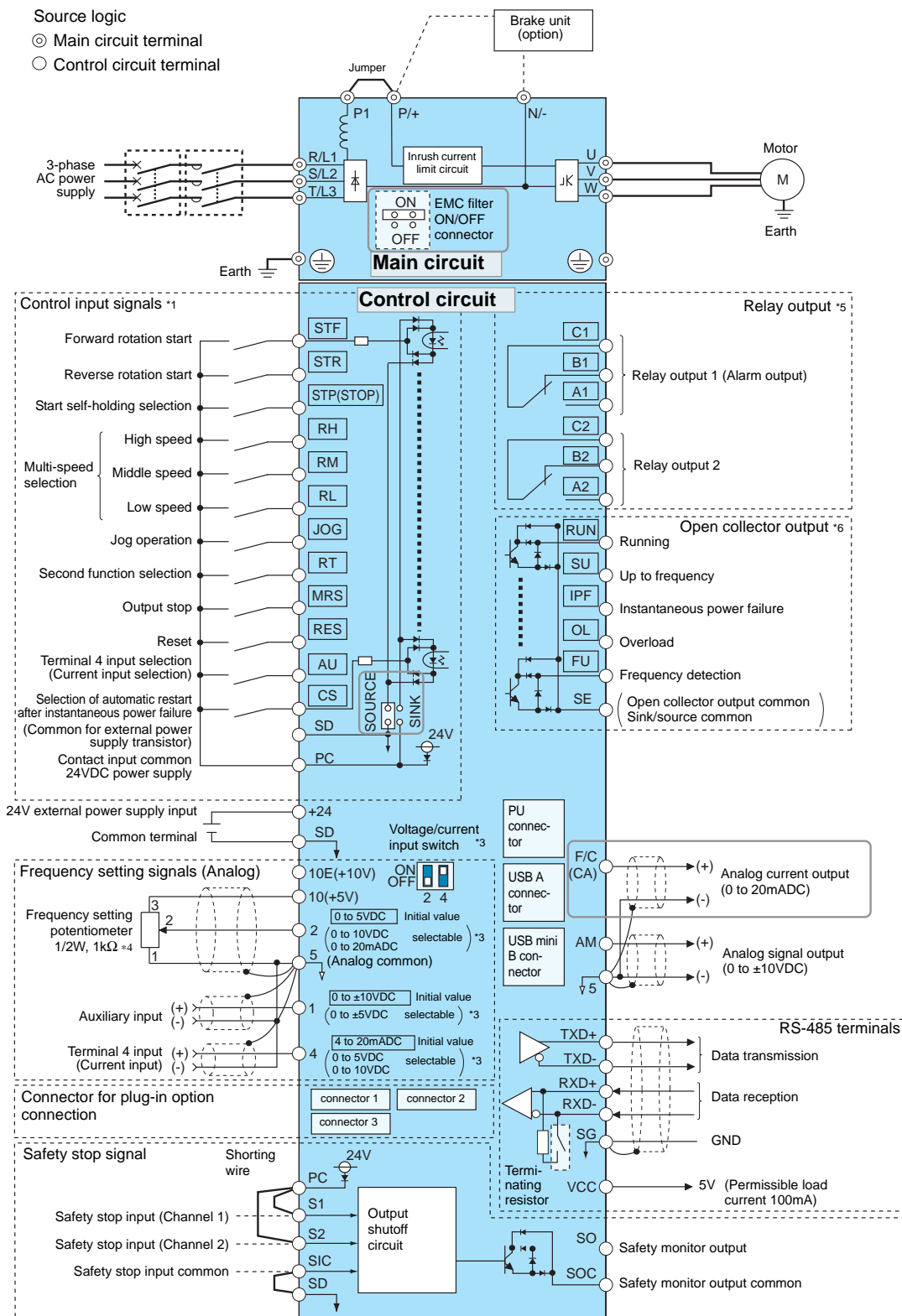


- *1 No input voltage is allowed for these terminals. The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 33*.)
- *2 Terminal JOG is also used as the pulse train input terminal. Use Pr. 291 to choose JOG or pulse.
- *3 Terminal input specifications can be changed by analog input specification switchover (Pr. 73, Pr. 267). To input a voltage (0 to 5 V/0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to the FR-A800 Instruction Manual.)
- *4 It is recommended to use 2W, 1k Ω when the frequency setting signal is changed frequently.
- *5 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 33*.)
- *6 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 33*.)
- *7 The terminal F/C (FM) can be used to output pulse trains as open collector output by setting Pr. 291.
- *8 Not required when calibrating the scale with the operation panel.

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
 - Set the voltage/current input switch in the correct position. An incorrect setting may cause a fault, failure or malfunction.
-

● CA type



For footnotes *1 to *6 refer to next page.



- *1 No input voltage is allowed for these terminals. The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 33*.)
- *2 Terminal JOG is also used as the pulse train input terminal. Use Pr. 291 to choose JOG or pulse.
- *3 Terminal input specifications can be changed by analog input specification switchover (Pr. 73, Pr. 267). To input a voltage (0 to 5 V/0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to the FR-A800 Instruction Manual.)
- *4 It is recommended to use 2W, 1k Ω when the frequency setting signal is changed frequently.
- *5 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 33*.)
- *6 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 33*.)

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
 - Set the voltage/current input switch in the correct position. An incorrect setting may cause a fault, failure or malfunction.
-
-

3.2 Main circuit terminal

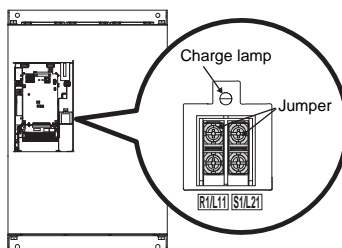
3.2.1 Terminal layout and wiring

| | | |
|--|--|--|
| <p>FR-A820-00046(0.4K), 00077(0.75K)</p> <p>Power supply Motor Charge lamp</p> | <p>FR-A820-00105(1.5K) to 00250(3.7K) FR-A840-00023(0.4K) to 00126(3.7K)</p> <p>Power supply Motor Charge lamp</p> | <p>FR-A820-00340(5.5K), 00490(7.5K) FR-A840-00170(5.5K), 00250(7.5K)</p> <p>Charge lamp Power supply Motor</p> |
| <p>FR-A820-00630(11K) FR-A840-00310(11K), 00380(15K)</p> <p>Charge lamp Power supply Motor</p> | <p>FR-A820-00770(15K) to 01250(22K) FR-A840-00470(18.5K), 00620(22K)</p> <p>Power supply Motor Charge lamp Jumper</p> | <p>FR-A820-01540(30K) *2 FR-A840-00770(30K)</p> <p>Power supply Motor Charge lamp Jumper</p> |
| <p>FR-A820-01870(37K), 02330(45K) *1</p> <p>Power supply Motor Jumper</p> | <p>FR-A820-03160(55K) *1</p> <p>Power supply Motor Jumper</p> | <p>FR-A840-00930(37K) to 01800(55K) *1</p> <p>Power supply Motor Jumper</p> |
| <p>FR-A840-02160(75K), 02600(90K) *1</p> <p>Power supply DC reactor Motor</p> | <p>FR-A820-03800(75K), 04750(90K) *1 FR-A840-03250(110K) to 04810(185K) *1</p> <p>Power supply For option DC reactor Motor</p> | <p>FR-A840-05470(220K) to 06830(280K) *1</p> <p>Power supply DC reactor Motor</p> |
| <p>FR-A842-07700(315K) to 12120(500K) *3</p> <p>To converter unit Motor</p> | <p>FR-A846-00023(0.4K) to 00170(5.5K)</p> <p>Power supply Motor Charge lamp Jumper</p> | <p>FR-A846-00250(7.5K) to 00470(18.5K)</p> <p>Power supply Motor Charge lamp Jumper</p> |

For footnotes *1 to *3 refer to next page.



*1 The following diagram shows the positions of R1/L11, S1/L21, and the charge lamp.

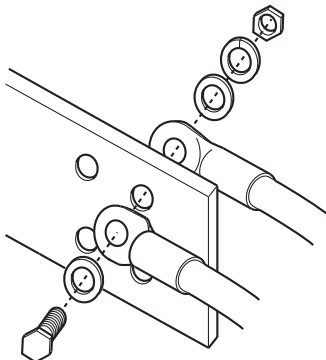


*2 The terminals P3 and PR of the FR-A820-01540(30K) are not equipped with screws. Do not connect anything to these.

*3 For terminal layout and wiring of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.

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 clockwise direction when viewed from the motor shaft. (The phase sequence must be matched.)
- The charge lamp will turn ON when the power is supplied to the main circuit.
- When wiring the inverter main circuit conductor of the FR-A840-05470(220K) or higher, 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). For wiring, use bolts (nuts) provided with the inverter.



- For wiring the main circuit conductor of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.

3.3 Wiring fundamentals

3.3.1 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 tables indicate a selection example for the wiring length of 20m.

200V class, FR-A820 (when input power supply is 220V based on the rated current for 150% overload for 1 minute)

| Applicable Inverter Type | Terminal Screw Size *4 | Tightening Torque [Nm] | Crimping Terminal | |
|------------------------------------|------------------------|------------------------|-------------------|---------|
| | | | R/L1, S/L2, T/L3 | U, V, W |
| FR-A820-00046(0.4K) to 00167(2.2K) | M4 | 1.5 | 2-4 | 2-4 |
| FR-A820-00250(3.7K) | M4 | 1.5 | 5.5-4 | 5.5-4 |
| FR-A820-00340(5.5K) | M5 (M4) | 2.5 | 5.5-5 | 5.5-5 |
| FR-A820-00490(7.5K) | M5 (M4) | 2.5 | 14-5 | 8-5 |
| FR-A820-00630(11K) | M5 | 2.5 | 14-5 | 14-5 |
| FR-A820-00770(15K) | M6 | 4.4 | 22-6 | 22-6 |
| FR-A820-00930(18.5K) | M8 (M6) | 7.8 | 38-8 | 38-8 |
| FR-A820-01250(22K) | M8 (M6) | 7.8 | 38-8 | 38-8 |
| FR-A820-01540(30K) | M8 (M6) | 7.8 | 60-8 | 60-8 |
| FR-A820-01870(37K) | M10 (M8) | 14.7 | 80-10 | 80-10 |
| FR-A820-02330(45K) | M10 (M8) | 14.7 | 100-10 | 100-10 |
| FR-A820-03160(55K) | M12 (M8) | 24.5 | 100-12 | 100-12 |
| FR-A820-03800(75K) | M12 (M8) | 24.5 | 150-12 | 150-12 |
| FR-A820-04750(90K) | M12 (M8) | 24.5 | 150-12 | 150-12 |

| Applicable Inverter Type | Cable Sizes | | | | | | | | |
|------------------------------------|---------------------------------|---------|---------|-------------------|------------------|---------|---------------------------------|---------|-------------------|
| | HIV, etc. [mm ²] *1 | | | | AWG/MCM *2 | | PVC, etc. [mm ²] *3 | | |
| | R/L1, S/L2, T/L3 | U, V, W | P/+, P1 | Earth Cable Gauge | R/L1, S/L2, T/L3 | U, V, W | R/L1, S/L2, T/L3 | U, V, W | Earth Cable Gauge |
| FR-A820-00046(0.4K) to 00167(2.2K) | 2 | 2 | 2 | 2 | 14 | 14 | 2.5 | 2.5 | 2.5 |
| FR-A820-00250(3.7K) | 3.5 | 3.5 | 3.5 | 3.5 | 12 | 12 | 4 | 4 | 4 |
| FR-A820-00340(5.5K) | 5.5 | 5.5 | 5.5 | 5.5 | 10 | 10 | 6 | 6 | 6 |
| FR-A820-00490(7.5K) | 14 | 8 | 14 | 5.5 | 6 | 8 | 16 | 10 | 16 |
| FR-A820-00630(11K) | 14 | 14 | 14 | 8 | 6 | 6 | 16 | 16 | 16 |
| FR-A820-00770(15K) | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A820-00930(18.5K) | 38 | 38 | 38 | 14 | 2 | 2 | 35 | 35 | 25 |
| FR-A820-01250(22K) | 38 | 38 | 38 | 22 | 2 | 2 | 35 | 35 | 25 |
| FR-A820-01540(30K) | 60 | 60 | 60 | 22 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A820-01870(37K) | 80 | 80 | 80 | 22 | 3/0 | 3/0 | 70 | 70 | 35 |
| FR-A820-02330(45K) | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A820-03160(55K) | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A820-03800(75K) | 125 | 125 | 125 | 38 | 250 | 250 | — | — | — |
| FR-A820-04750(90K) | 150 | 150 | 150 | 38 | 300 | 300 | — | — | — |

*1 For the FR-A820-03160(55K) or lower the recommended cable size is that of the HIV cable (600V class 2 vinyl-insulated cable) with continuous maximum permissible temperature of 75°C. Assumes that the surrounding air temperature is 50°C or less and the wiring distance is 20m or less.

For the FR-A820-03800(75K) or higher the recommended cable size is that of the LMFC cable (heat resistant flexible cross-linked polyethylene insulated cable) with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 50°C or less and wiring is performed in an enclosure.

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

*3 For the FR-A820-00770(15K) or lower the recommended cable size is that of the PVC cable with continuous maximum permissible temperature of 70°C. Assumes that the surrounding air temperature is 40°C or less and the wiring distance is 20m or less.

For the FR-A820-00930(18.5K) or higher the recommended cable size is that of XLPE cable with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 40°C or less and wiring is performed in an enclosure. (Selection example for use mainly in Europe.)

*4 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, PR, PX, P/+, N/–, P1, P3, and a screw for earthing. The screw size for PR and PX terminals of FR-A820-00340(5.5K) and FR-A820-00490(7.5K) is indicated in brackets. The screw size for earthing of FR-A820-00930(18.5K) or higher is indicated in brackets.



400V class, FR-A840/A846 (when input power supply is 440V based on the rated current for 150% overload for 1 minute)

| Applicable Inverter Type | Terminal Screw Size *4 | Tightening Torque [Nm] | Crimping Terminal | |
|------------------------------------|------------------------|------------------------|-------------------|---------|
| | | | R/L1, S/L2, T/L3 | U, V, W |
| FR-A840-00023(0.4K) to 00126(3.7K) | M4 | 1.5 | 2-4 | 2-4 |
| FR-A840-00170(5.5K) | M4 | 1.5 | 2-4 | 2-4 |
| FR-A840-00250(7.5K) | M4 | 1.5 | 5.5-4 | 5.5-4 |
| FR-A840-00310(11K) | M5 | 2.5 | 5.5-5 | 5.5-5 |
| FR-A840-00380(15K) | M5 | 2.5 | 8-5 | 8-5 |
| FR-A840-00470(18.5K) | M6 | 4.4 | 14-6 | 8-6 |
| FR-A840-00620(22K) | M6 | 4.4 | 14-6 | 14-6 |
| FR-A840-00770(30K) | M6 | 4.4 | 22-6 | 22-6 |
| FR-A840-00930(37K) | M8 | 7.8 | 22-8 | 22-8 |
| FR-A840-01160(45K) | M8 | 7.8 | 38-8 | 38-8 |
| FR-A840-01800(55K) | M8 | 7.8 | 60-8 | 60-8 |
| FR-A840-02160(75K) | M10 | 14.7 | 60-10 | 60-10 |
| FR-A840-02600(90K) | M10 | 14.7 | 60-10 | 60-10 |
| FR-A840-03250(110K) | M10 (M12) | 14.7 | 80-10 | 80-10 |
| FR-A840-03610(132K) | M10 (M12) | 14.7 | 100-10 | 100-10 |
| FR-A840-04320(160K) | M12 (M10) | 24.5 | 150-12 | 150-12 |
| FR-A840-04810(185K) | M12 (M10) | 24.5 | 150-12 | 150-12 |
| FR-A840-05470(220K) | M12 (M10) | 46 | 100-12 | 100-12 |
| FR-A840-06100(250K) | M12 (M10) | 46 | 100-12 | 100-12 |
| FR-A840-06830(280K) | M12 (M10) | 46 | 150-12 | 150-12 |
| FR-A846-00023(0.4K) to 00126(5.5K) | M4 | 1.5 | 2-4 | 2-4 |
| FR-A846-00170(5.5K) | M4 | 1.5 | 2-4 | 2-4 |
| FR-A846-00250(7.5K) | M6 | 4.4 | 5.5-6 | 5.5-6 |
| FR-A846-00310(11K) | M6 | 4.4 | 5.5-6 | 5.5-6 |
| FR-A846-00380(15K) | M6 | 4.4 | 8-6 | 8-6 |
| FR-A846-00470(18.5K) | M6 | 4.4 | 14-6 | 8-6 |

| Applicable Inverter Type | Cable Sizes | | | | | | | | |
|------------------------------------|---------------------------------|---------|---------|-------------------|------------------|---------|---------------------------------|---------|-------------------|
| | HIV, etc. [mm ²] *1 | | | | AWG/MCM *2 | | PVC, etc. [mm ²] *3 | | |
| | R/L1, S/L2, T/L3 | U, V, W | P/+, P1 | Earth Cable Gauge | R/L1, S/L2, T/L3 | U, V, W | R/L1, S/L2, T/L3 | U, V, W | Earth Cable Gauge |
| FR-A840-00023(0.4K) to 00126(3.7K) | 2 | 2 | 2 | 2 | 14 | 14 | 2.5 | 2.5 | 2.5 |
| FR-A840-00170(5.5K) | 2 | 2 | 3.5 | 3.5 | 12 | 14 | 2.5 | 2.5 | 4 |
| FR-A840-00250(7.5K) | 3.5 | 3.5 | 3.5 | 3.5 | 12 | 12 | 4 | 4 | 4 |
| FR-A840-00310(11K) | 5.5 | 5.5 | 5.5 | 5.5 | 10 | 10 | 6 | 6 | 10 |
| FR-A840-00380(15K) | 8 | 8 | 8 | 5.5 | 8 | 8 | 10 | 10 | 10 |
| FR-A840-00470(18.5K) | 14 | 8 | 14 | 8 | 6 | 8 | 16 | 10 | 16 |
| FR-A840-00620(22K) | 14 | 14 | 22 | 14 | 6 | 6 | 16 | 16 | 16 |
| FR-A840-00770(30K) | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A840-00930(37K) | 22 | 22 | 22 | 14 | 4 | 4 | 25 | 25 | 16 |
| FR-A840-01160(45K) | 38 | 38 | 38 | 22 | 1 | 2 | 50 | 50 | 25 |
| FR-A840-01800(55K) | 60 | 60 | 60 | 22 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A840-02160(75K) | 60 | 60 | 60 | 22 | 1/0 | 1/0 | 50 | 50 | 25 |
| FR-A840-02600(90K) | 60 | 60 | 80 | 22 | 3/0 | 3/0 | 50 | 50 | 25 |
| FR-A840-03250(110K) | 80 | 80 | 80 | 22 | 3/0 | 3/0 | 70 | 70 | 35 |
| FR-A840-03610(132K) | 100 | 100 | 100 | 38 | 4/0 | 4/0 | 95 | 95 | 50 |
| FR-A840-04320(160K) | 125 | 150 | 150 | 38 | 250 | 250 | 120 | 120 | 70 |
| FR-A840-04810(185K) | 150 | 150 | 150 | 38 | 300 | 300 | 150 | 150 | 95 |
| FR-A840-05470(220K) | 2x100 | 2x100 | 2x100 | 60 | 2x4/0 | 2x4/0 | 2x95 | 2x95 | 95 |
| FR-A840-06100(250K) | 2x100 | 2x100 | 2x125 | 60 | 2x4/0 | 2x4/0 | 2x95 | 2x95 | 95 |
| FR-A840-06830(280K) | 2x125 | 2x125 | 2x125 | 60 | 2x250 | 2x250 | 2x120 | 2x120 | 120 |
| FR-A846-00023(0.4K) to 00126(5.5K) | 2 | 2 | 2 | 2 | 14 | 14 | 2.5 | 2.5 | 2.5 |
| FR-A846-00170(5.5K) | 2 | 2 | 3.5 | 3.5 | 12 | 14 | 2.5 | 2.5 | 4 |
| FR-A846-00250(7.5K) | 3.5 | 3.5 | 3.5 | 3.5 | 12 | 12 | 4 | 4 | 4 |
| FR-A846-00310(11K) | 5.5 | 5.5 | 5.5 | 5.5 | 10 | 10 | 6 | 6 | 10 |
| FR-A846-00380(15K) | 8 | 8 | 8 | 5.5 | 8 | 8 | 10 | 10 | 10 |
| FR-A846-00470(18.5K) | 14 | 8 | 14 | 8 | 6 | 8 | 16 | 10 | 16 |

For footnotes *1 to *4 refer to next page.

- *1 For the FR-A840-01800(55K) or lower and the FR-A846 (IP55 compatible) models, the recommended cable size is that of the HIV cable (600V class 2 vinyl-insulated cable) with continuous maximum permissible temperature of 75°C. Assumes that the surrounding air temperature is 50°C or less and the wiring distance is 20m or less.
For the FR-A840-02160(75K) or higher, the recommended cable size is that of the LMFC cable (heat resistant flexible cross-linked polyethylene insulated cable) with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 50°C or less and wiring is performed in an enclosure.
- *2 For the FR-A840-01160(45K) or lower and the FR-A846 (IP55 compatible) models, the recommended cable size is that of the THHW cable with continuous maximum permissible temperature of 75°C. Assumes that the surrounding air temperature is 40°C or less and the wiring distance is 20m or less.
For the FR-A840-01800(55K) or higher, the recommended cable size is that of THHN cable with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 40°C or less and wiring is performed in an enclosure.
(Selection example for use mainly in the United States.)
- *3 For the FR-A840-01160(45K) or lower and the FR-A846 (IP55 compatible) models, the recommended cable size is that of the PVC cable with continuous maximum permissible temperature of 70°C. Assumes that the surrounding air temperature is 40°C or less and the wiring distance is 20m or less.
For the FR-A840-01800(55K) or higher, the recommended cable size is that of XLPE cable with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 40°C or less and wiring is performed in an enclosure. (Selection example for use mainly in Europe.)
- *4 The terminal screw size for the FR-A840 models indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, PR, PX, P/+, N/–, P1, P3, and a screw for earthing.
The terminal screw size for the FR-A846 (IP55 compatible) models indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, P/+, N/–, P1 and a screw for earthing.
The screw size for P/+ terminal for connecting an option to FR-A840-03250(110K) or FR-A840-03610(132K) is indicated in brackets.
The screw size for earthing (grounding) of FR-A840-04320(160K) or higher is indicated in brackets.

400V class, FR-A842 (when input power supply is 440V based on the rated current for 150% overload for 1 minute)

(For the applicable cables of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.)

| Applicable Inverter Type FR-A842-□ | Terminal Screw Size *4 | Tightening Torque [Nm] | Crimping Terminal | Cable Sizes | | | | | |
|---------------------------------------|------------------------|------------------------|-------------------|---------------------------------|---------|----------|-------------------|---------------------------------|---------|
| | | | | HIV, etc. [mm ²] *1 | | | AWG/MCM *2 | PVC, etc. [mm ²] *3 | |
| | | | | U, V, W | U, V, W | P/+, N/– | Earth Cable Gauge | U, V, W | U, V, W |
| 07700(315K) | M12 (M10) | 46 | 150-12 | 2x150 | 2x150 | 100 | 2x300 | 2x150 | 150 |
| 08660(355K) | M12 (M10) | 46 | C2-200 | 2x200 | 2x200 | 100 | 2x350 | 2x185 | 2x95 |
| 09620(400K) | M12 (M10) | 46 | C2-200 | 2x200 | 2x200 | 100 | 2x400 | 2x185 | 2x95 |
| 10940(450K) | M12 (M10) | 46 | C2-250 | 2x250 | 2x250 | 100 | 2x500 | 2x240 | 2x120 |
| 12120(500K) | M12 (M10) | 46 | C2-250 | 2x250 | 3x200 | 2x100 | 2x500 | 2x240 | 2x120 |

- *1 The recommended cable size is that of the LMFC cable (heat resistant flexible cross-linked polyethylene insulated cable) with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 40°C or less and wiring is performed in an enclosure.
- *2 The recommended cable size is that of THHN cable with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 40°C or less and wiring is performed in an enclosure.
(Selection example for use mainly in the United States.)
- *3 The recommended cable size is that of XLPE cable with continuous maximum permissible temperature of 90°C. Assumes that the surrounding air temperature is 40°C or less and wiring is performed in an enclosure. (Selection example for use mainly in Europe.)
- *4 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, P/+, N/– and a screw for earthing.
The screw size for earthing (grounding) is indicated in brackets

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

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

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 tightened too loosely can cause a short circuit or malfunction.
A screw that has been tightened 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.



3.3.2 Total wiring length

◆ With general-purpose motor

Connect one or more general-purpose motors within the total wiring length shown in the following table. (The wiring length should be 100 m or less under vector control.)

| Pr. 72 setting (carrier frequency) | FR-A820-00046(0.4K), FR-A840-00023(0.4K), FR-A846-00023(0.4K) | FR-A820-00077(0.75K), FR-A840-00038(0.75K), FR-A846-00038(0.75K) | FR-A820-00105(1.5K) or higher FR-A840-00052(1.5K) or higher, FR-A842-07700(315K) to 12120(500K) FR-A846-00052(1.5K) or higher |
|---------------------------------------|---|--|---|
| 2 (2kHz) or lower | 300m | 500m | 500m |
| 3 (3kHz) or higher | 200m | 300m | 500m |

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. In this case, take one of the following measure.

- 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 | 50m–100m | ≥ 100m |
| Pr. 72 setting | ≤ 15 (14.5kHz) | ≤ 9 (9kHz) | ≤ 4 (4kHz) |
| | IP55 compatible models: ≤ 6 (6kHz) | | |

- Connect the surge voltage suppression filter (FR-ASF-H, FR-BMF-H) to the output side of the FR-A840-01800(55K) or lower and the sine wave filter (MT-BSL, MT-BSC) to the output side of the FR-A840-02160(75K) or higher.
- If the motor capacity is 280 kW or lower, connect the sine wave filter (MT-BSL/MT-BSC) to the output side of the FR-A842.

◆ With PM motor

Use the wiring length of 100 m or shorter when connecting a PM motor.

Use one PM motor for one inverter. Multiple PM motors cannot be connected to an inverter.

When the wiring length exceeds 50 m for a 400V class motor driven by an inverter under PM sensorless vector control, set "9" (6 kHz) or less in Pr. 72 "PWM frequency selection".

CAUTION

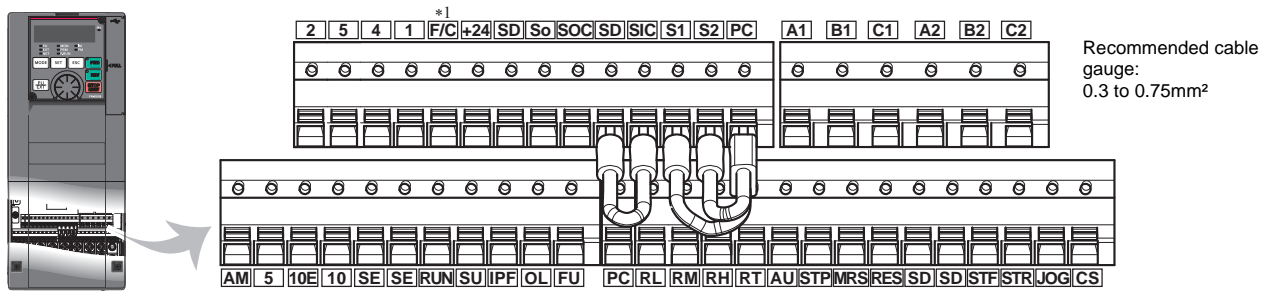
- Especially for long-distance wiring, the inverter may be affected by a charging current caused by stray capacitances of the wiring, leading to an activation of the overcurrent protection, malfunction of the fast-response current limit operation, or even to an inverter failure. If the fast-response current limit function malfunctions, disable this function. (For Pr. 156 "Stall prevention operation selection", refer to the Instruction Manual.)
- For details of Pr. 72 "PWM frequency selection", refer to the Instruction Manual.
- The optional surge voltage suppression filter FR-ASF-H and FR-BMF-H can be used under V/F control and Advanced magnetic flux vector control. The sine wave filter MT-BSL and MT-BSC can be used under V/F control. Do not use the filters under different control methods. (For details, refer to the Instruction Manual of the option.)
- Refer to the FR-A800 Instruction Manual to drive a 400V class motor by an inverter.
- The carrier frequency is limited during PM sensorless vector control. (Refer to the FR-A800 Instruction Manual.)

3.3.3 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: 1.5Nm

3.4 Control circuit terminals

3.4.1 Terminal layout



*1 The terminal functions as the terminal FM for the FM type, and as the terminal CA for the CA type.

3.4.2 Wiring method

• Power supply connection

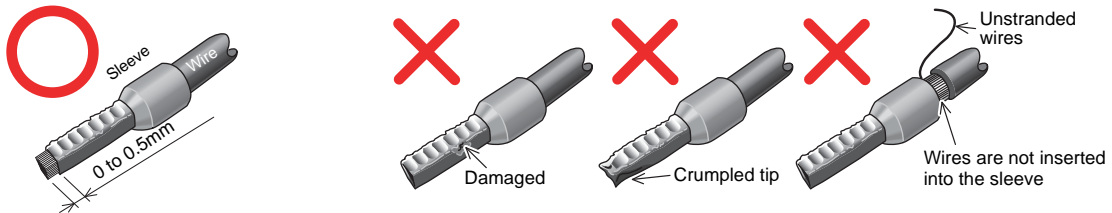
For the control circuit wiring, strip off the sheath of a cable, and use it with a blade terminal. For a single wire, strip off the sheath of the wire and apply directly. Insert the blade terminal or the single wire into a socket of the terminal.

- (1) Strip off the sheath for the below length. If the length of the sheath peeled is too long, a short circuit may occur with neighbouring wires. If the length is too short, wires might come off. Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.

Cable sheath stripping length



- (2) Insert wires into a blade terminal, then crimp the terminal. Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve. Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate, or the face is damaged.



• Blade terminals commercially available (as of February 2012)

| Cable gauge (mm ²) | Blade terminal model | | | Manufacturer | Crimping tool name |
|--------------------------------|------------------------|---------------------------|--------------------|---------------------------|--------------------|
| | With insulation sleeve | Without insulation sleeve | For UL wire *2 | | |
| 0.3 | AI 0,5-10WH | — | — | Phoenix Contact Co., Ltd. | CRIMPFOX 6 |
| 0.5 | AI 0,5-10WH | — | AI 0,5-10WH-GB | | |
| 0.75 | AI 0,75-10GY | A 0,75-10 | AI 0,75-10GY-GB | | |
| 1 | AI 1-10RD | A 1-10 | AI 1-10RD/1000GB | | |
| 1.25, 1.5 | AI 1,5-10BK | A 1,5-10 | AI 1,5-10BK/1000GB | | |
| 0.75 (for two wires) | AI-TWIN 2x0,75-10GY | — | — | | |

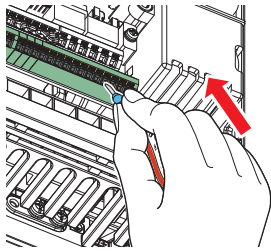
*2 A blade terminal with an insulation sleeve compatible with the MTW wire which has a thick wire insulation.

*3 Applicable for the terminals A1, B1, C1, A2, B2, and C2 only.

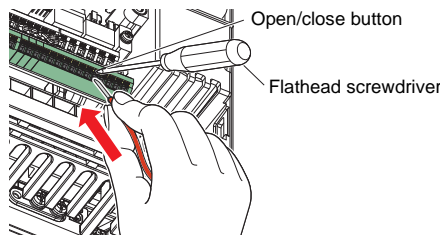
| Cable gauge (mm ²) | Blade terminal product number | Insulation product number | Manufacturer | Crimping tool product number |
|--------------------------------|-------------------------------|---------------------------|------------------|------------------------------|
| 0.3 to 0.75 | BT 0.75-11 | VC 0.75 | NICHIFU Co.,Ltd. | NH 69 |



(3) Insert the wires into a socket.

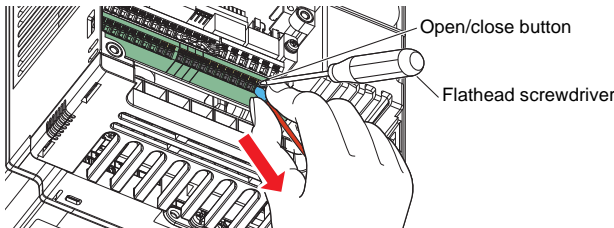


When using a single wire or stranded wires without a blade terminal, push the open/close button all the way down with a flathead screwdriver, and insert the wire.



• Wire removal

Pull the wire while pushing the open/close button all the way down firmly with a flathead screwdriver.



CAUTION

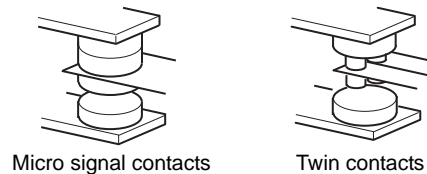
- When using stranded wires without a blade terminal, twist enough to avoid short circuit with a nearby terminals or wires.
- During wiring, pulling out the wire forcefully without pushing the open/close button all the way down may damage the terminal block.
- Use a small flathead screwdriver (tip thickness: 0.4 mm, tip width: 2.5 mm). If a flathead screwdriver with a narrow tip is used, terminal block may be damaged. Commercially available products (as of February 2012).

| Name | Model | Manufacturer |
|--------|------------------|---------------------------|
| Driver | SZF 0- 0,4 x 2,5 | Phoenix Contact Co., Ltd. |

- Place the flathead screwdriver vertical to the open/close button. In case the blade tip slips, it may cause an inverter damage or injury.

3.4.3 Wiring precautions

- It is recommended to use the cables of 0.75mm² gauge for connection to the control circuit terminals.
- The wiring length should be 30m (200 m for the terminal FM) maximum.
- 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.
- To suppress EMI, use shielded or twisted cables for the control circuit terminals and run them away from the main and power circuits (including the 200 V relay sequence circuit). For the cables connected to the control circuit terminals, connect their shields to the common terminal of the connected control circuit terminal. When connecting an external power supply to the terminal PC, however, connect the shield of the power supply cable to the negative side of the external power supply. Do not directly earth the shield to the enclosure, etc.
- Do not apply a voltage to the contact input terminals (e.g. STF) of the control circuit.
- Always apply a voltage to the alarm output terminals (A1, B1, C1, A2, B2, C2) via a relay coil, lamp, etc.



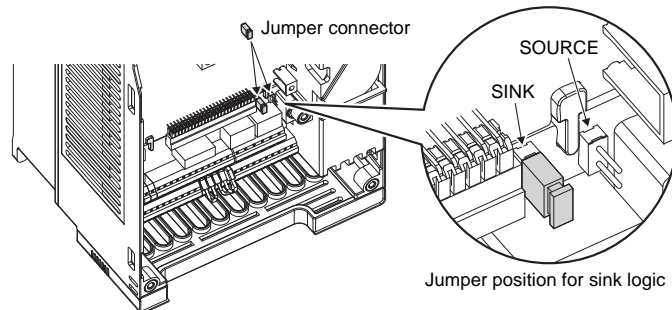
3.4.4 Control logic (sink/source) change

Change the control logic of input signals as necessary.

To change the control logic, change the jumper connector position on the control circuit board. Connect the jumper connector to the connector pin of the desired control logic.

- The control logic of input signals is initially set to the sink logic (SINK) for the FM type.
- The control logic of input signals is initially set to the source logic (SOURCE) for the CA type.

(The output signals may be used in either the sink or source logic independently of the jumper connector position.)



3.4.5 When supplying 24 V external power to the control circuit

Connect the 24 V external power supply across terminals +24 and SD. The 24 V external power supply enables I/O terminal ON/OFF operation, operation panel displays, control functions, and communication during communication operation even during power-OFF of inverter's main circuit power supply.

During the 24 V external power supply operation, "EV" flickers on the operation panel.

◆ Applied 24 V external power specification

| Item | Rated specification |
|---------------|---------------------|
| Input voltage | 23 to 25.5VDC |
| Input current | ≤ 1.4A |



3.5 Safety stop function

3.5.1 Function description

The terminals related to the safety stop function are shown below.

| Terminal symbol | Terminal function description | | | |
|-----------------|---|-----------|--|---|
| S1 *1 | For input of the safety stop | Channel 1 | Between S1 and SIC | Open: In safety stop mode Short: Other than the safety stop mode |
| S2 *1 | | Channel 2 | Between S2 and SIC | |
| SIC *1 | Common terminal for terminals S1 and S2 | | | |
| SO | Outputs when an alarm or failure is detected. The signal is output when no internal safety circuit failure *2 exists. | | OFF: Internal safety circuit failure *2 ON: No internal safety circuit failure *2 | |
| SOC | Terminal SO (open collector output) common | | | |

*1 In the initial status, terminals S1 and PC, S2 and PC, and SIC and SD are respectively shorted with shorting wires. To use the safety stop function, remove all the shortening wires, and then connect to the safety relay module as shown in the following connection diagram.

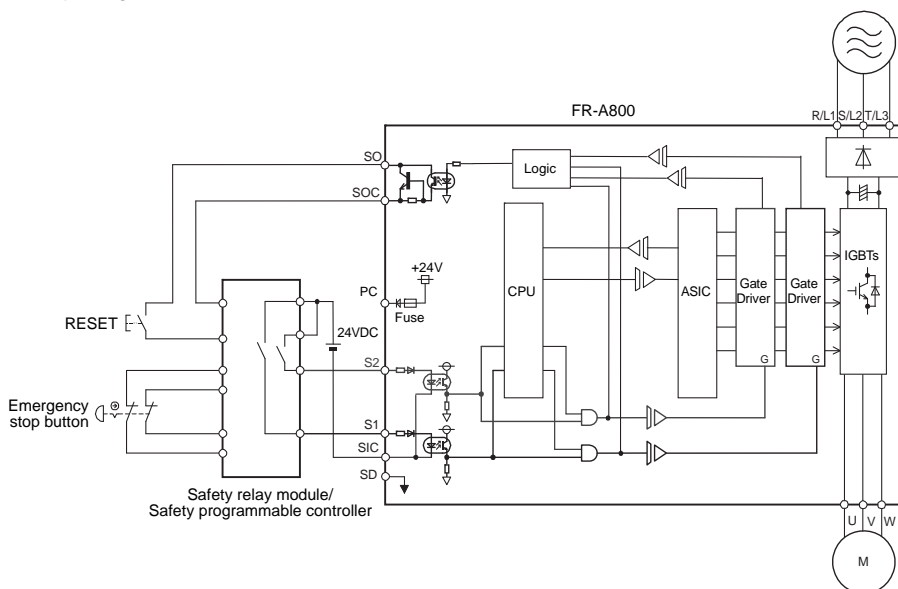
*2 At an internal safety circuit failure, the operation panel displays one of the faults shown on the next page.

CAUTION

Use the terminal SO to output a fault and to prevent restarting of the inverter. The signal cannot be used as safety stop input signal to other devices.

3.5.2 Connection diagram

To prevent automatic restart after a fault occurrence, connect the reset button of a safety relay module or a safety programmable controller across the terminals SO and SOC. The reset button acts as the feedback input for the safety relay module or the safety programmable controller.



3.5.3 Safety stop function operation

| Input power | Input signal | | Internal safety circuit failure ^{*1} | Output signal | Inverter operation enable signal |
|-------------|--------------|-------------------|---|-----------------------------|----------------------------------|
| | S1-SIC | S2-SIC | | SO ^{*3} | |
| OFF | — | — | — | OFF | Output shutoff (Safe state) |
| ON | Short | Short | No failure | ON | Drive enabled |
| | | | Failure | OFF | Output shutoff (Safe state) |
| | Open | Open | No failure ^{*2} | ON | Output shutoff (Safe state) |
| | | | Failure | OFF | Output shutoff (Safe state) |
| | Short | Open | N/A ^{*4} | OFF | Output shutoff (Safe state) |
| Open | Short | N/A ^{*4} | OFF | Output shutoff (Safe state) | |

^{*1} At an internal safety circuit failure, the operation panel displays one of the faults shown below.

^{*2} SA is displayed on the operation panel when both of the S1 and S2 signals are in the open status and no internal safety circuit failure exists.

^{*3} ON: Transistor used for an open collector output is conducted.
OFF: Transistor used for an open collector output is not conducted.

^{*4} N/A denotes a condition where circuit fault does not apply.

3.5.4 Internal safety circuit failure

At an internal safety circuit failure, the terminal SO turns OFF.

The following faults can cause the internal safety circuit failure (terminal SO = OFF).

| Error Definition | Operation panel indication |
|---|----------------------------|
| Option fault | E.OPT |
| Communication option fault | E.OP1 |
| Parameter storage device fault | E.PE |
| Retry count excess | E.RET |
| Parameter storage device fault | E.PE2 |
| Operation panel power supply short circuit/RS-485 terminal power supply short circuit | E.CTE |
| 24 VDC power fault | E.P24 |
| Safety circuit fault | E.SAF |
| Overspeed occurrence | E.OS |
| Speed deviation excess detection | E.OSD |

| Error Definition | Operation panel indication |
|--------------------------|----------------------------|
| Signal loss detection | E.ECT |
| Excessive position fault | E.OD |
| Brake sequence fault | E.MB1 to E.MB7 |
| Encoder phase fault | E.EP |
| CPU fault | E.CPU |
| | E.5 |
| | E.6 |
| | E.7 |
| Internal circuit fault | E.13 |

For more details, refer to the Safety stop function instruction manual (BCN-A23228-001).
(Find a PDF copy of this manual in the enclosed CD-ROM.)

4 FAILSAFE OF THE SYSTEM WHICH USES THE INVERTER

When a fault is detected by the protective function, the protective function activates and output a fault signal (ALM). 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.

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.

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.

| Interlock Method | Check Method | Used Signals | Refer to |
|--|--|---|--|
| Inverter protective function operation | Operation check of an alarm contact Circuit error detection by negative logic | Fault output signal (ALM signal) | Refer to chapter "Parameter" of the Instruction Manual |
| Inverter operating status | Operation ready signal check | Operation ready signal (RY signal) | |
| Inverter running status | Logic check of the start signal and running signal | Start signal (STF signal, STR signal) Running signal (RUN signal) | |
| | Logic check of the start signal and output current | Start signal (STF signal, STR signal) Output current detection signal (Y12 signal) | |

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.

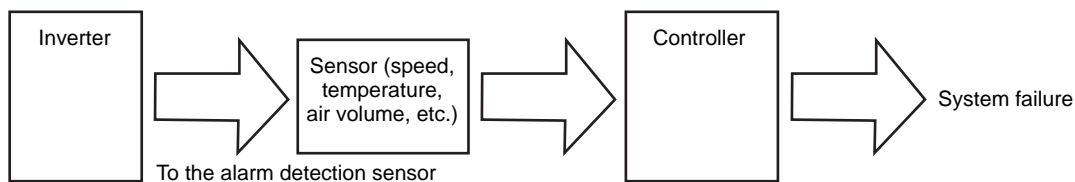
Provide a speed detector to detect the motor speed and current detector to detect the motor current and consider the backup system such as checking up as below according to the level of importance of the system.

- 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 current is flowing through the motor while the motor coasts to stop, even after the inverter's start signal is turned 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.

- 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.

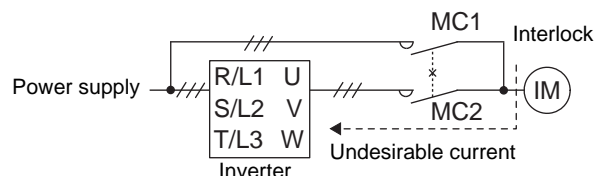


5 PRECAUTIONS FOR USE OF THE INVERTER

The FR-A800 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:

- Use crimping terminals with insulation sleeve to wire the power supply and motor.
- Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Never perform such wiring.
- 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 a control box etc., take care not to allow chips and other foreign matter to enter the inverter.
- Use cables of the appropriate size to make a voltage drop of 2% maximum.
If the wiring distance is long between the inverter and motor, a voltage drop in the main circuit will cause the motor torque to decrease especially at the output of a low frequency.
Refer to *page 19* for the recommended cable size.
- The overall wiring length should be within the prescribed length.
Especially for long distance wiring, the fast-response current limit function may be reduced or the equipment connected to the inverter output side may malfunction or become faulty under the influence of a charging current due to the stray capacity of the wiring. Therefore, note the overall wiring length. (Refer to *page 22*)
- 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, activate the EMC filter (turn ON the EMC filter ON/OFF connector) to minimize interference. (Refer to the Instruction Manual.)
- Do not install a power factor correction capacitor, varistor or arrester on the inverter output side.
This will cause the inverter to trip or the capacitor, varistor, or arrester to be damaged. If any of the above devices is installed, immediately remove it.
- 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.
- If "EV" is displayed on the operation panel, turn OFF the 24 V external power supply before performing wiring.
- A short circuit or earth 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 fault caused by wiring inadequacy or reduced motor insulation resistance may damage the inverter modules.
 - Fully check the to-earth 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.
- Do not use the inverter input side magnetic contactor (MC) to start/stop the inverter.
Since repeated inrush currents at power ON will shorten the life of the converter circuit (switching life is about 1,000,000 times), frequent starts and stops of the MC must be avoided.
Always use the start signal (ON/OFF of STF and STR signals) to start/stop the inverter.
- Standard models only: Across terminals P/+ and PR, connect only an external brake resistor.
Do not connect a mechanical brake.
- 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 and 5.
- Provide electrical and mechanical interlocks for MC1 and MC2 which are used for commercial power supply-inverter switch-over.
When the wiring is incorrect or if there is a commercial power supply-inverter switch-over circuit as shown on the right, the inverter will be damaged by leakage current from the power supply due to arcs generated at the time of switch-over or chattering caused by a sequence error.
(The commercial power supply operation is not available with vector control dedicated motors (SF-V5RU, SF-THY) nor with PM motors.)
- If the machine must not be restarted when power is restored after a power failure, provide a magnetic contactor (MC) 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.





- Vector control is available with an encoder-equipped motor. And such an encoder must be directly connected to a motor shaft without any backlash. (Real sensorless vector control, PM sensorless control do not require an encoder.)
- Inverter input side magnetic contactor (MC)

On the inverter input side, connect an MC for the following purposes. (Refer to the Instruction Manual.)

 - To release the inverter from the power supply when a fault occurs or when the drive is not functioning (e.g. emergency stop operation). For example (does not apply for FR-A842), MC avoids overheat or burnout of the brake resistor when heat capacity of the resistor is insufficient or brake regenerative transistor is damaged with short while connecting an optional brake resistor.
 - To prevent any accident due to an automatic restart at restoration of power after an inverter stop made by a power failure
 - To separate the inverter from the power supply to ensure safe maintenance and inspection work.

If using an MC for emergency stop during operation, select an MC regarding the inverter input side current as JEM1038-AC-3 class rated current.
- Handling of inverter output side magnetic contactor

Switch the magnetic contactor between the inverter and motor only when both the inverter and motor are at a stop. When the magnetic contactor is turned ON while the inverter is operating, overcurrent protection of the inverter and such will activate. When MC is provided for switching to the commercial power supply, for example, switch it ON/OFF after the inverter and motor have stopped.

A PM motor is a synchronous motor with high-performance magnets embedded inside. High-voltage is generated at the motor terminals while the motor is running even after the inverter power is turned OFF. Before wiring or inspection, confirm that the motor is stopped. In an application, such as fan and blower, where the motor is driven by the load, a low-voltage manual contactor must be connected at the inverter's output side, and wiring and inspection must be performed while the contactor is open. Otherwise you may get an electric shock.
- Countermeasures against inverter-generated EMI

When the motor speed is unstable, due to change in the frequency setting signal caused by electromagnetic noises from the inverter, take the following measures when applying the motor speed by the analog signal:

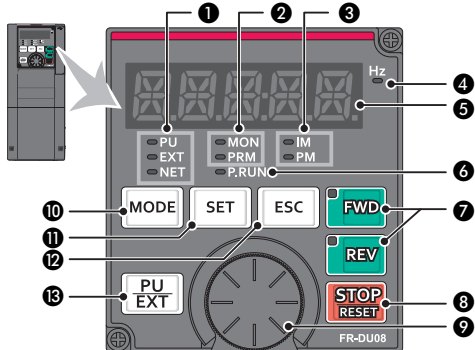
 - Do not run the signal cables and power cables (inverter I/O cables) in parallel with each other and do not bundle them.
 - Run signal cables as far away as possible from power cables (inverter I/O cables).
 - Use shielded cables as signal cables.
 - Install a ferrite core on the signal cable (Example: ZCAT3035-1330 TDK).
- Instructions for overload operation

When performing operation of frequent start/stop of the inverter, increase/decrease in the temperature of the transistor element of the inverter may 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 bound current, starting current, etc. Decreasing current may increase the life. However, decreasing current will result in insufficient torque and the inverter may not start. Adding a margin to the current can eliminate such a condition. For a general-purpose motor, use an inverter of a higher capacity (up to 2 ranks). For a PM motor, use an inverter and a PM motor of higher capacities (up to 2 ranks).
- Make sure that the specifications and rating match the system requirements.
- FR-A842 models only: Connect the converter unit and the inverter correctly. For details refer to the FR-CC2 Instruction Manual.

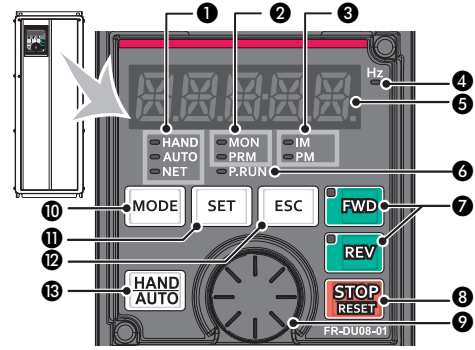
6 DRIVE THE MOTOR

6.1 Operation panel (FR-DU08, FR-DU08-01)

6.1.1 Components of the operation panel (FR-DU08, FR-DU08-01)



FR-DU08 (for FR-A800/A802 series)

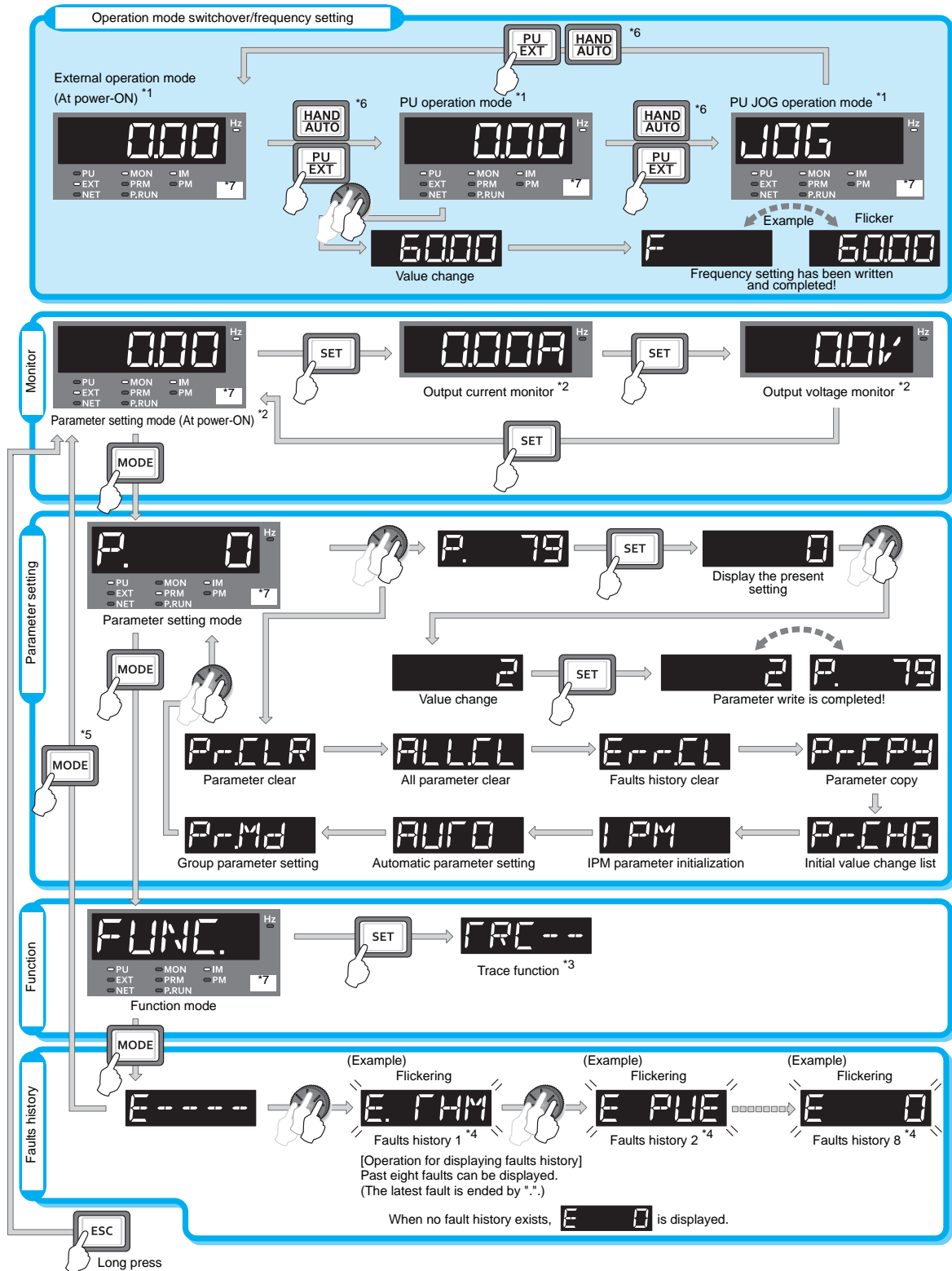


FR-DU08-01 (IP55 compatible model for FR-A806 series)

| No. | Component | Name | Description |
|-----|-----------|---------------------------------------|--|
| ① | | Operation mode indicator (FR-DU08) | PU (HAND for FR-DU08-01): Lit to indicate the PU operation mode. EXT (AUTO for FR-DU08-01): Lit to indicate the External operation mode. (Lit at power-ON in the initial setting.) NET: Lit to indicate the Network operation mode. PU and EXT (HAND and AUTO for FR-DU08-01): Lit to indicate the External/PU combined operation mode 1 or 2. |
| | | Operation mode indicator (FR-DU08-01) | |
| ② | | Operation panel status indicator | MON: Lit to indicate the monitoring mode. Quickly flickers twice intermittently while the protective function is activated. Slowly flickers in the display-OFF mode. PRM: Lit to indicate the parameter setting mode. |
| ③ | | Control motor indicator | IM: Lit to indicate the induction motor control. PM: Lit to indicate the PM sensorless vector control. The indicator flickers when test operation is selected. |
| ④ | | Frequency unit indicator | Lit to indicate frequency. (Flickers when the set frequency is displayed in the monitor.) |
| ⑤ | | Monitor (5-digit LED) | Shows the frequency, parameter number, etc. (Using Pr. 52, Pr. 774 to Pr. 776, the monitored item can be changed.) |
| ⑥ | | PLC function indicator | Lit to indicate that the sequence program can be executed. |
| ⑦ | | FWD key, REV key | FWD key: Starts forward rotation. The LED is lit during forward operation. REV key: Starts reverse rotation. The LED is lit during reverse operation. The LED flickers under the following conditions. <ul style="list-style-type: none"> When the frequency command is not given even if the forward/reverse command is given. When the frequency command is the starting frequency or lower. When the MRS signal is being input. |
| | | | |
| ⑧ | | STOP/RESET key | Stops the operation commands. Resets the inverter when the protection function is activated. |
| ⑨ | | Setting dial | The setting dial of the Mitsubishi inverters. The setting dial is used to change the frequency and parameter settings. Press the setting dial to perform the following operations: <ul style="list-style-type: none"> To display a set frequency in the monitoring mode (the setting can be changed using Pr. 992.) To display the present setting during calibration To display a fault history number in the faults history mode |
| ⑩ | | MODE key | Switches to different modes. Pressing the "MODE" and "PU/EXT (HAND/AUTO for FR-DU08-01)" keys simultaneously switches to the easy setting mode. Holding this key for 2 seconds locks the operation. The key lock is invalid when Pr. 161 = "0 (initial setting)". (Refer to the FR-A800 Instruction Manual.) |
| ⑪ | | SET key | Enters each setting. If pressed during operation, the monitored item changes. (Using Pr. 52 and Pr. 774–Pr. 776, the monitored item can be changed.) <div style="text-align: center;"> </div> |
| ⑫ | | ESC key | Goes back to the previous display. Holding this key for a longer time changes the mode back to the monitor mode. |
| ⑬ | | PU/EXT key (FR-DU08) | Switches between the PU operation mode, the PU JOG operation mode and the External operation mode. Pressing the "MODE" and "PU/EXT (HAND/AUTO for FR-DU08-01)" keys simultaneously switches to the easy setting mode. Cancels the PU stop also. |
| | | HAND/AUTO key (FR-DU08-01) | |



6.1.2 Basic operation (factory setting)



^{*1} For the details of operation modes, refer to the Instruction Manual.

^{*2} Monitored items can be changed. (Refer to the Instruction Manual.)

^{*3} For the details of the trace function, refer to the Instruction Manual.

^{*4} For the details of faults history, refer to the Instruction Manual.

^{*5} The USB memory mode will appear if a USB memory device is connected. Refer to the Instruction Manual for the USB memory mode.

^{*6} HAND/AUTO key only when using FR-DU08-01.

^{*7} Drawing features display of FR-DU08. LED displays of FR-DU08-01 for PU and EXT are different (HAND, AUTO), see previous page.

6.2 Parameter list

For simple variable-speed operation of the inverter, the initial values 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 performed from the operation panel (FR-DU08, resp. FR-DU08-01 for IP55 compatible models).

Remark

- **Simple** indicates simple mode parameters. Use Pr. 160 "User group read selection" to switch between the simple mode and extended mode. (Initially set to the extended mode.)

| Parameter | Name | Setting Range | Initial Value | Parameter | Name | Setting Range | Initial Value |
|-----------|---|------------------------------|------------------------------|-------------|---|--|---------------------|
| 0 | Torque boost Simple | 0 to 30% | 6/4/3/2/ 1% *1 | 18 | High speed maximum frequency | 120 to 590Hz | 120Hz *2 60Hz *3 |
| 1 | Maximum frequency Simple | 0 to 120Hz | 120Hz *2 60Hz *3 | 19 | Base frequency voltage | 0 to 1000V, 8888, 9999 | 9999/ 8888 *10 |
| 2 | Minimum frequency Simple | 0 to 120Hz | 0Hz | 20 | Acceleration/ deceleration reference frequency | 1 to 590Hz | 60/50Hz *10 |
| 3 | Base frequency Simple | 0 to 590Hz | 60/50Hz *10 | 21 | Acceleration/ deceleration time increments | 0, 1 | 0 |
| 4 | Multi-speed setting (high speed) Simple | 0 to 590Hz | 60/50Hz *10 | 22 | Stall prevention operation level (Torque limit level) | 0 to 400% | 150% |
| 5 | Multi-speed setting (middle speed) Simple | 0 to 590Hz | 30Hz | 23 | Stall prevention operation level compensation factor at double speed | 0 to 200%, 9999 | 9999 |
| 6 | Multi-speed setting (low speed) Simple | 0 to 590Hz | 10Hz | 24 to 27 | Multi-speed setting (4 speed to 7 speed) | 0 to 590Hz, 9999 | 9999 |
| 7 | Acceleration time Simple | 0 to 3600s | 5s *4 15s *5 | 28 | Multi-speed input compensation selection | 0, 1 | 0 |
| 8 | Deceleration time Simple | 0 to 3600s | 5s *4 15s *5 | 29 | Acceleration/ deceleration pattern selection | 0 to 6 | 0 |
| 9 | Electronic thermal O/L relay Simple | 0 to 500 *2 0 to 3600A *3 | Rated inverter current | 30 | Regenerative function selection | 0 to 2, 10, 11, 20, 21, 100 to 102, 110, 111, 120, 121/ 2, 10, 11, 102, 110, 111/ 0, 2, 10, 20, 100, 102, 110, 120 *15 | 0/10/0 *15 |
| 10 | DC injection brake operation frequency | 0 to 120Hz, 9999 | 3Hz | 31 | Frequency jump 1A | 0 to 590Hz, 9999 | 9999 |
| 11 | DC injection brake operation time | 0 to 10s, 8888 | 0.5s | 32 | Frequency jump 1B | 0 to 590Hz, 9999 | 9999 |
| 12 | DC injection brake operation voltage | 0 to 30% | 4/2/1% *6 | 33 | Frequency jump 2A | 0 to 590Hz, 9999 | 9999 |
| 13 | Starting frequency | 0 to 60Hz | 0.5Hz | 34 | Frequency jump 2B | 0 to 590Hz, 9999 | 9999 |
| 14 | Load pattern selection | 0 to 5 | 0 | 35 | Frequency jump 3A | 0 to 590Hz, 9999 | 9999 |
| 15 | Jog frequency | 0 to 590Hz | 5Hz | | | | |
| 16 | Jog acceleration/ deceleration time | 0 to 3600s | 0.5s | | | | |
| 17 | MRS input selection | 0, 2, 4 | 0 | | | | |

*1 Differs according to capacities.

- 6%: FR-A820-00046(0.4K) to 00077(0.75K) and FR-A840-00023(0.4K) to 00038(0.75K)
- 4%: FR-A820-00105(1.5K) to 00250(3.7K) and FR-A840-00052(1.5K) to 00126(3.7K)
- 3%: FR-A820-00340(5.5K) to 00490(7.5K) and FR-A840-00170(5.5K) to 00250(7.5K)
- 2%: FR-A820-00630(11K) to 03160(55K) and FR-A840-00310(11K) to 01800(55K)
- 1%: FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*2 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

*3 For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*4 For FR-A820-00490(7.5K) or lower and FR-A840-00250(7.5K) or lower

*5 For FR-A820-00630(11K) or higher and FR-A840-00310(11K) or higher

*6 Differs according to capacities.

- 4%: FR-A820-00490(7.5K) or lower and FR-A840-00250(7.5K) or lower
- 2%: FR-A820-00630(11K) to 03160(55K) and FR-A840-00310(11K) to 01800(55K)
- 1%: FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*10 Differs according to types. (FM type/CA type)

*15 Differs according to model types (standard model, separated converter type, IP55 compatible model).



| Parameter | Name | Setting Range | Initial Value |
|-----------|---|---|------------------------|
| 36 | Frequency jump 3B | 0 to 590Hz, 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 590Hz | 6Hz |
| 43 | Output frequency detection for reverse rotation | 0 to 590Hz, 9999 | 9999 |
| 44 | Second acceleration/ deceleration time | 0 to 3600s | 5s |
| 45 | Second deceleration time | 0 to 3600s, 9999 | 9999 |
| 46 | Second torque boost | 0 to 30%, 9999 | 9999 |
| 47 | Second V/F (base frequency) | 0 to 590Hz, 9999 | 9999 |
| 48 | Second stall prevention operation level | 0 to 400% | 150% |
| 49 | Second stall prevention operation frequency | 0 to 590Hz, 9999 | 0Hz |
| 50 | Second output frequency detection | 0 to 590Hz | 30Hz |
| 51 | Second electronic thermal O/L relay | 0 to 500A, 9999 *2 | 9999 |
| | | 0 to 3600A, 9999 *3 | |
| 52 | Operation panel main monitor selection | 0, 5 to 14, 17 to 20, 22 to 35, 38, 40 to 45, 50 to 57, 61, 62, 64, 67, 87 to 98, 100 | 0 |
| 54 | FM/CA terminal function selection *10 | 1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52, 53, 61, 62, 67, 70, 87 to 90, 92, 93, 95, 97, 98 | 1 |
| 55 | Frequency monitoring reference | 0 to 590Hz | 60/50Hz *10 |
| 56 | Current monitoring reference | 0 to 500A *2 | Rated inverter current |
| | | 0 to 3600A *3 | |
| 57 | Restart coasting time | 0, 0.1 to 30s, 9999 | 9999 |
| 58 | Restart cushion time | 0 to 60s | 1s |
| 59 | Remote function selection | 0 to 3, 11 to 13 | 0 |
| 60 | Energy saving control selection | 0, 4, 9 | 0 |
| 61 | Reference current | 0 to 500A, 9999 *2 | 9999 |
| | | 0 to 3600A, 9999 *3 | |
| 62 | Reference value at acceleration | 0 to 400%, 9999 | 9999 |
| 63 | Reference value at deceleration | 0 to 400%, 9999 | 9999 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|--|---|---------------|
| 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 590Hz | 60/50Hz *10 |
| 67 | Number of retries at fault occurrence | 0 to 10, 101 to 110 | 0 |
| 68 | Retry waiting time | 0.1 to 600s | 1s |
| 69 | Retry count display erase | 0 | 0 |
| 70 *16 | Special regenerative brake duty | 0 to 100% | 0% |
| 71 | Applied motor | 0 to 6, 13 to 16, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54, 70, 73, 74, 330, 333, 334, 8090, 8093, 8094, 9090, 9093, 9094 | 0 |
| | | 0 to 15 *2 0 to 6, 25 *3 | |
| 72 | PWM frequency selection | 0 to 7, 10 to 17 | 2 |
| 73 | Analog input selection | 0 to 8 | 1 |
| 74 | Input filter time constant | 0 to 2 | 1 |
| 75 | Reset selection/ disconnected PU detection/PU stop selection | 0 to 3, 14 to 17 *2 | 14 |
| | | 0 to 3, 14 to 17, 100 to 103, 114 to 117 *3 | |
| 76 | Fault code output selection | 0 to 2 | 0 |
| 77 | Parameter write selection | 0 to 2 | 0 |
| 78 | Reverse rotation prevention selection | 0 to 2 | 0 |
| 79 | Operation mode selection <i>Simple</i> | 0 to 4, 6, 7 | 0 |
| 80 | Motor capacity | 0.4 to 55kW, 9999 *2 | 9999 |
| | | 0 to 3600kW, 9999 *3 | |
| 81 | Number of motor poles | 2, 4, 6, 8, 10, 12, 9999 | 9999 |
| 82 | Motor excitation current | 0 to 500A, 9999 *2 | 9999 |
| | | 0 to 3600A, 9999 *3 | |
| 83 | Rated motor voltage | 0 to 1000V | 200/400V *7 |
| 84 | Rated motor frequency | 10 to 400Hz, 9999 | 9999 |

*2 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

*3 For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

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

*10 Differs according to types. (FM type/CA type)

*16 Setting available for standard models only.

| Parameter | Name | Setting Range | Initial Value | Parameter | Name | Setting Range | Initial Value |
|-----------|--|---|------------------------|-----------|---|---|------------------------|
| 89 | Speed control gain (Advanced magnetic flux vector) | 0 to 200%, 9999 | 9999 | 118 | PU communication speed | 48, 96, 192, 384, 576, 768, 1152 | 192 |
| 90 | Motor constant (R1) | 0 to 50Ω, 9999 ^{*2} 0 to 400mΩ, 9999 ^{*3} | 9999 | 119 | PU communication stop bit length / data length | 0, 1, 10, 11 | 1 |
| 91 | Motor constant (R2) | to 50Ω, 9999 ^{*2} 0 to 400mΩ, 9999 ^{*3} | 9999 | 120 | PU communication parity check | 0 to 2 | 2 |
| 92 | Motor constant (L1)/ d-shaft inductance (Ld) | 0 to 6000mH, 9999 ^{*2} 0 to 400mH, 9999 ^{*3} | 9999 | 121 | Number of PU communication retries | 0 to 10, 9999 | 1 |
| 93 | Motor constant (L2)/ q-shaft inductance (Lq) | 0 to 6000mH, 9999 ^{*2} 0 to 400mH, 9999 ^{*3} | 9999 | 122 | PU communication check time interval | 0, 0.1 to 999.8s, 9999 | 9999 |
| 94 | Motor constant (X) | 0 to 100%, 9999 | 9999 | 123 | PU communication waiting time setting | 0 to 150ms, 9999 | 9999 |
| 95 | Online auto tuning selection | 0 to 2 | 0 | 124 | PU communication CR/LF selection | 0 to 2 | 1 |
| 96 | Auto tuning setting/status | 0, 1, 11, 101 | 0 | 125 | Terminal 2 frequency setting gain frequency Simple | 0 to 590Hz | 60/50Hz ^{*10} |
| 100 | V/F1 (first frequency) | 0 to 590Hz, 9999 | 9999 | 126 | Terminal 4 frequency setting gain frequency Simple | 0 to 590Hz | 60/50Hz ^{*10} |
| 101 | V/F1 (first frequency voltage) | 0 to 1000V | 0V | 127 | PID control automatic switchover frequency | 0 to 590Hz, 9999 | 9999 |
| 102 | V/F2 (second frequency) | 0 to 590Hz, 9999 | 9999 | 128 | PID action selection | 0, 10, 11, 20, 21, 40 to 43, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 1000, 1001, 1010, 1011, 2000, 2001, 2010, 2011 | 0 |
| 103 | V/F2 (second frequency voltage) | 0 to 1000V | 0V | 129 | PID proportional band | 0.1 to 1000%, 9999 | 100% |
| 104 | V/F3 (third frequency) | 0 to 590Hz, 9999 | 9999 | 130 | PID integral time | 0.1 to 3600s, 9999 | 1s |
| 105 | V/F3 (third frequency voltage) | 0 to 1000V | 0V | 131 | PID upper limit | 0 to 100%, 9999 | 9999 |
| 106 | V/F4 (fourth frequency) | 0 to 590Hz, 9999 | 9999 | 132 | PID lower limit | 0 to 100%, 9999 | 9999 |
| 107 | V/F4 (fourth frequency voltage) | 0 to 1000V | 0V | 133 | PID action set point | 0 to 100%, 9999 | 9999 |
| 108 | V/F5 (fifth frequency) | 0 to 590Hz, 9999 | 9999 | 134 | PID differential time | 0.01 to 10.00s, 9999 | 9999 |
| 109 | V/F5 (fifth frequency voltage) | 0 to 1000V | 0V | 135 | Electronic bypass sequence selection | 0, 1 | 0 |
| 110 | Third acceleration/ deceleration time | 0 to 3600s, 9999 | 9999 | 136 | MC switchover interlock time | 0 to 100s | 1s |
| 111 | Third deceleration time | 0 to 3600s, 9999 | 9999 | 137 | Start waiting time | 0 to 100s | 0.5s |
| 112 | Third torque boost | 0 to 30%, 9999 | 9999 | 138 | Bypass selection at a fault | 0, 1 | 0 |
| 113 | Third V/F (base frequency) | 0 to 590Hz, 9999 | 9999 | 139 | Automatic switchover frequency between inverter and commercial power-supply operation | 0 to 60Hz, 9999 | 9999 |
| 114 | Third stall prevention operation level | 0 to 400% | 150% | 140 | Backlash acceleration stopping frequency | 0 to 590Hz | 1Hz |
| 115 | Third stall prevention operation frequency | 0 to 590Hz | 0Hz | | | | |
| 116 | Third output frequency detection | 0 to 590Hz | 60/50Hz ^{*10} | | | | |
| 117 | PU communication station number | 0 to 31 | 0 | | | | |

^{*2} For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

^{*3} For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

^{*10} Differs according to types. (FM type/CA type)



| Parameter | Name | Setting Range | Initial Value | Parameter | Name | Setting Range | Initial Value | |
|-----------|---|---|---------------|-----------|--|---|---|---|
| 141 | Backlash acceleration stopping time | 0 to 360s | 0.5s | 165 | Stall prevention operation level for restart | 0 to 400% | 150% | |
| 142 | Backlash deceleration stopping frequency | 0 to 590Hz | 1Hz | 166 | Output current detection signal retention time | 0 to 10s, 9999 | 0.1s | |
| 143 | Backlash deceleration stopping time | 0 to 360s | 0.5s | 167 | Output current detection operation selection | 0, 1, 10, 11 | 0 | |
| 144 | Speed setting switchover | 0, 2, 4, 6, 8, 10, 102, 104, 106, 108, 110, 112 | 4 | 168 | Parameter for manufacturer setting. Do not make setting. | | | |
| 145 | PU display language selection | 0 to 7 | 1 | 169 | | | | |
| 147 | Acceleration/ deceleration time switching frequency | 0 to 590Hz, 9999 | 9999 | 170 | Watt-hour meter clear | 0, 10, 9999 | 9999 | |
| 148 | Stall prevention level at 0V input | 0 to 400% | 150% | 171 | Operation hour meter clear | 0, 9999 | 9999 | |
| 149 | Stall prevention level at 10V input | 0 to 400% | 200% | 172 | User group registered display/ batch clear | 9999, (0 to 16) | 0 | |
| 150 | Output current detection level | 0 to 400% | 150% | 173 | User group registration | 0 to 1999, 9999 | 9999 | |
| 151 | Output current detection signal delay time | 0 to 10s | 0s | 174 | User group clear | 0 to 1999, 9999 | 9999 | |
| 152 | Zero current detection level | 0 to 400% | 5% | 178 | STF terminal function selection | 0 to 20, 22 to 28, 37, 42 to 47, 50, 51, 60 to 62, 64 to 74, 76 to 80, 87, 92, 93, 9999 *12 | 60 | |
| 153 | Zero current detection time | 0 to 10s | 0.5s | 179 | STR terminal function selection | | 61 | |
| 154 | Voltage reduction selection during stall prevention operation | 0, 1, 10, 11 | 1 | 180 | RL terminal function selection | | 0 | |
| 155 | RT signal function validity condition selection | 0, 10 | 0 | 181 | RM terminal function selection | | 1 | |
| 156 | Stall prevention operation selection | 0 to 31, 100, 101 | 0 | 182 | RH terminal function selection | | 2 | |
| 157 | OL signal output timer | 0 to 25s, 9999 | 0s | 183 | RT terminal function selection | | 3 | |
| 158 | AM terminal function selection | 1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52 to 54, 61, 62, 67, 70, 87 to 90, 91 to 98 | 1 | 184 | AU terminal function selection | | 4 | |
| 159 | Automatic switch-over frequency range from bypass to inverter operation | 0 to 10Hz, 9999 | 9999 | 185 | JOG terminal function selection | | 5 | |
| 160 | User group read selection <i>Simple</i> | 0, 1, 9999 | 0 | 186 | CS terminal function selection | | 6 | |
| 161 | Frequency setting/ key lock operation selection | 0, 1, 10, 11 | 0 | 187 | MRS terminal function selection | | 24/10/24 *15 | |
| 162 | Automatic restart after instantaneous power failure selection | 0 to 3, 10 to 13 | 0 | 188 | STOP terminal function selection | | 25 | |
| 163 | First cushion time for restart | 0 to 20s | 0s | 189 | RES terminal function selection | | 62 | |
| 164 | First cushion voltage for restart | 0 to 100% | 0% | 190 | RUN terminal function selection | | 0 to 8, 10 to 20, 22, 25 to 28, 30 to 36, 38 to 54, 56, 57, 60, 61, 63, 64, 68, 70, 79, 84, 85, 90 to 99, 100 to 108, 110 to 116, 120, 122, 125 to 128, 130 to 136, 138 to 154, 156, 157, 160, 161, 163, 164, 168, 170, 179, 184, 185, 190 to 199, 200 to 208, 300 to 308, 9999 *13 | 0 |
| | | | | 191 | SU terminal function selection | | 1 | |
| | | | | 192 | IPF terminal function selection | | 2/9999/2 *15 | |
| | | | | 193 | OL terminal function selection | 3 | | |
| | | | | 194 | FU terminal function selection | 4 | | |
| | | | | 195 | ABC1 terminal function selection | 99 | | |
| | | | | 196 | ABC2 terminal function selection | 9999 | | |

*12 The setting value "60" is only available for Pr. 178, and "61" is only for Pr. 179.

*13 The setting values "92, 93, 192, 193" are only available for Pr. 190 to Pr. 194.

*15 Differs according to model types (standard model, separated converter type, IP55 compatible model).

| Parameter | Name | Setting Range | Initial Value |
|------------|---|--------------------------------------|---------------|
| 232 to 239 | Multi-speed setting (speeds 8 to 15) | 0 to 590Hz, 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, 101 to 105 | 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 |
| 248 | Self power management selection | 0 to 2 | 0 |
| 249 | Earth fault detection at start | 0, 1 | 0 |
| 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% |
| 254 | Main circuit power OFF waiting time | 0 to 3600s, 9999 | 600s |
| 255 | Life alarm display | (0 to 15) | 0 |
| 256 *17 | Inrush current limit circuit life display | (0 to 100%) | 100% |
| 257 | Control circuit capacitor life display | (0 to 100%) | 100% |
| 258 *17 | Main circuit capacitor life display | (0 to 100%) | 100% |
| 259 *17 | Main circuit capacitor life measuring | 0, 1 | 0 |
| 260 | PWM frequency automatic switchover | 0, 1 | 1 |
| 261 *17 | Power failure stop selection | 0 to 2, 21, 22 | 0 |
| 262 *17 | Subtracted frequency at deceleration start | 0 to 20Hz | 3Hz |
| 263 *17 | Subtraction starting frequency | 0 to 590Hz, 9999 | 60/50Hz *10 |
| 264 *17 | Power-failure deceleration time 1 | 0 to 3600s | 5s |

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|------------------------------------|---------------|
| 265 *17 | Power-failure deceleration time 2 | 0 to 3600s, 9999 | 9999 |
| 266 *17 | Power failure deceleration time switchover frequency | 0 to 590Hz | 60/50Hz *10 |
| 267 | Terminal 4 input selection | 0 to 2 | 0 |
| 268 | Monitor decimal digits selection | 0, 1, 9999 | 9999 |
| 269 | Parameter for manufacturer setting. Do not make setting. | | |
| 270 | Stop-on contact/load torque high-speed frequency control selection | 0 to 3, 11, 13 | 0 |
| 271 | High-speed setting maximum current | 0 to 400% | 50% |
| 272 | Middle-speed setting minimum current | 0 to 400% | 100% |
| 273 | Current averaging range | 0 to 590Hz, 9999 | 9999 |
| 274 | Current averaging filter time constant | 1 to 4000 | 16 |
| 275 | Stop-on contact excitation current low-speed multiplying factor | 50 to 300%, 9999 | 9999 |
| 276 | PWM carrier frequency at stop-on contact | 0 to 9, 9999 *2 0 to 4, 9999 *3 | 9999 |
| 278 | Brake opening frequency | 0 to 30Hz | 3Hz |
| 279 | Brake opening current | 0 to 400% | 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 *17 | 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 to 2, 10, 11 | 0 |
| 289 | Inverter output terminal filter | 5 to 50ms, 9999 | 9999 |
| 290 | Monitor negative output selection | 0 to 7 | 0 |

*2 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

*3 For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*10 Differs according to types. (FM type/CA type)

*17 Setting available for standard models and IP55 compatible models.



| Parameter | Name | Setting Range | Initial Value |
|-----------|--|--|---------------|
| 291 | Pulse train I/O selection | 0, 1, 10, 11, 20, 21, 100 (FM type) | 0 |
| | | 0,1 (CA type) | |
| 292 | Automatic acceleration/ deceleration | 0, 1, 3, 5 to 8, 11 | 0 |
| 293 | Acceleration/ deceleration separate selection | 0 to 2 | 0 |
| 294 *17 | UV avoidance voltage gain | 0 to 200% | 100% |
| 295 | Frequency change increment amount setting | 0, 0.01, 0.10, 1.00, 10.00 | 0 |
| 296 | Password lock level | 0 to 6, 99, 100 to 106, 199, 9999 | 9999 |
| 297 | Password lock/ unlock | (0 to 5), 1000 to 9998, 9999 | 9999 |
| 298 | Frequency search gain | 0 to 32767, 9999 | 9999 |
| 299 | Rotation direction detection selection at restarting | 0, 1, 9999 | 9999 |
| 331 | RS-485 communication station | 0 to 31 (0 to 247) | 0 |
| 332 | RS-485 communication speed | 3, 6, 12, 24, 48, 96, 192, 384, 576, 768, 1152 | 96 |
| 333 | RS-485 communication stop bit length/data length | 0, 1, 10, 11 | 1 |
| 334 | RS-485 communication parity check selection | 0 to 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 to 2 | 0 |
| 340 | Communication startup mode selection | 0 to 2, 10, 12 | 0 |
| 341 | RS-485 communication CR/LF selection | 0 to 2 | 1 |
| 342 | Communication EEPROM write selection | 0, 1 | 0 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|------------------|---------------|
| 343 | Communication error count | — | 0 |
| 350 *8 | Stop position command selection | 0, 1, 9999 | 9999 |
| 351 *8 | Orientation speed | 0 to 30Hz | 2Hz |
| 352 *8 | Creep speed | 0 to 10Hz | 0.5Hz |
| 353 *8 | Creep switchover position | 0 to 16383 | 511 |
| 354 *8 | Position loop switchover position | 0 to 8191 | 96 |
| 355 *8 | DC injection brake start position | 0 to 255 | 5 |
| 356 *8 | Internal stop position command | 0 to 16383 | 0 |
| 357 *8 | Orientation in-position zone | 0 to 255 | 5 |
| 358 *8 | Servo torque selection | 0 to 13 | 1 |
| 359 *8 | Encoder rotation direction | 0, 1, 100, 101 | 1 |
| 360 *8 | 16-bit data selection | 0 to 127 | 0 |
| 361 *8 | Position shift | 0 to 16383 | 0 |
| 362 *8 | Orientation position loop gain | 0.1 to 100 | 1 |
| 363 *8 | Completion signal output delay time | 0 to 5s | 0.5s |
| 364 *8 | Encoder stop check time | 0 to 5s | 0.5s |
| 365 *8 | Orientation limit | 0 to 60s, 9999 | 9999 |
| 366 *8 | Recheck time | 0 to 5s, 9999 | 9999 |
| 367 *8 | Speed feedback range | 0 to 590Hz, 9999 | 9999 |
| 368 *8 | Feedback gain | 0 to 100 | 1 |
| 369 *8 | Number of encoder pulses | 0 to 4096 | 1024 |
| 374 | Overspeed detection level | 0 to 590Hz, 9999 | 9999 |
| 376 *8 | 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 590Hz | 0 |
| 386 | Frequency for maximum input pulse | 0 to 590Hz | 60/50Hz *10 |

*8 The setting is available only when the FR-A8AP is mounted.

*10 Differs according to types. (FM type/CA type)

*17 Setting available for standard models and IP55 compatible models.

| Parameter | Name | Setting Range | Initial Value |
|-------------------|--|--|-------------------|
| 393 ^{*8} | Orientation selection | 0 to 2 | 0 |
| 396 ^{*8} | Orientation speed gain (P term) | 0 to 1000 | 60 |
| 397 ^{*8} | Orientation speed integral time | 0 to 20s | 0.333s |
| 398 ^{*8} | Orientation speed gain (D term) | 0 to 100 | 1 |
| 399 ^{*8} | Orientation deceleration ratio | 0 to 1000 | 20 |
| 414 | PLC function operation selection | 0 to 2 | 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 | Position command source selection | 0, 2 | 0 |
| 420 | Command pulse scaling factor numerator (electronic gear numerator) | 1 to 32767 | 1 |
| 421 | Command pulse multiplication denominator (electronic gear denominator) | 1 to 32767 | 1 |
| 422 | Position control gain | 0 to 150s ⁻¹ | 25s ⁻¹ |
| 423 | Position feed forward gain | 0 to 100% | 0% |
| 424 | Position command acceleration/deceleration time constant | 0 to 50s | 0s |
| 425 | Position feed forward command filter | 0 to 5s | 0s |
| 426 | In-position width | 0 to 32767 pulse | 100 pulse |
| 427 | Excessive level error | 0 to 400K pulse, 9999 | 40K pulse |
| 428 | Command pulse selection | 0 to 5 | 0 |
| 429 | Clear signal selection | 0, 1 | 1 |
| 430 | Pulse monitor selection | 0 to 5, 100 to 105, 1000 to 1005, 1100 to 1105, 8888, 9999 | 9999 |
| 446 | Model position control gain | 0 to 150s ⁻¹ | 25s ⁻¹ |

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|---|------------------------|
| 450 | Second applied motor | 0, 1, 3 to 6, 13 to 16, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54, 70, 73, 74, 330, 333, 334, 8090, 8093, 8094, 9090, 9093, 9094, 9999 | 9999 |
| 451 | Second motor control method selection | 10 to 14, 20, 110 to 114, 9999 | 9999 |
| 453 | Second motor capacity | 0.4 to 55kW, 9999 ^{*2} 0 to 3600kW, 9999 ^{*3} | 9999 |
| 454 | Number of second motor poles | 2, 4, 6, 8, 10, 12, 9999 | 9999 |
| 455 | Second motor excitation current | 0 to 500A, 9999 ^{*2} 0 to 3600A, 9999 ^{*3} | 9999 |
| 456 | Rated second motor voltage | 0 to 1000V | 200/400V ^{*7} |
| 457 | Rated second motor frequency | 10 to 400Hz, 9999 | 9999 |
| 458 | Second motor constant (R1) | 0 to 50Ω, 9999 ^{*2} 0 to 400mΩ, 9999 ^{*3} | 9999 |
| 459 | Second motor constant (R2) | 0 to 50Ω, 9999 ^{*2} 0 to 400mΩ, 9999 ^{*3} | 9999 |
| 460 | Second motor constant(L1)/Second motor d-shaft inductance (Ld) | 0 to 6000mH, 9999 ^{*2} 0 to 400mH, 9999 ^{*3} | 9999 |
| 461 | Second motor constant (L2)/Second motor q-shaft inductance (Lq) | 0 to 6000mH, 9999 ^{*2} 0 to 400mH, 9999 ^{*3} | 9999 |
| 462 | Second motor constant (X) | 0 to 100%, 9999 | 9999 |
| 463 | Second motor auto tuning setting/status | 0, 1, 11, 101 | 0 |
| 464 | Digital position control sudden stop deceleration time | 0 to 360s | 0 |
| 465 | First target position lower 4 digits | 0 to 9999 | 0 |
| 466 | First target position upper 4 digits | | 0 |
| 467 | Second target position lower 4 digits | | 0 |

^{*2} For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

^{*3} For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

^{*7} Differs according to the voltage class. (200V class/400V class)

^{*8} The setting is available only when the FR-A8AP is mounted.

^{*10} Differs according to types. (FM type/CA type)



| Parameter | Name | Setting Range | Initial Value |
|-----------|---|---------------|---------------|
| 468 | Second target position upper 4 digits | 0 to 9999 | 0 |
| 469 | Third target position lower 4 digits | | 0 |
| 470 | Third target position upper 4 digits | | 0 |
| 471 | Fourth target position lower 4 digits | | 0 |
| 472 | Fourth target position upper 4 digits | | 0 |
| 473 | Fifth target position lower 4 digits | | 0 |
| 474 | Fifth target position upper 4 digits | | 0 |
| 475 | Sixth target position lower 4 digits | | 0 |
| 476 | Sixth target position upper 4 digits | | 0 |
| 477 | Seventh target position lower 4 digits | | 0 |
| 478 | Seventh target position upper 4 digits | | 0 |
| 479 | Eighth target position lower 4 digits | | 0 |
| 480 | Eighth target position upper 4 digits | | 0 |
| 481 | Ninth target position lower 4 digits | | 0 |
| 482 | Ninth target position upper 4 digits | | 0 |
| 483 | Tenth target position lower 4 digits | | 0 |
| 484 | Tenth target position upper 4 digits | | 0 |
| 485 | Eleventh target position lower 4 digits | 0 | |
| 486 | Eleventh target position upper 4 digits | 0 | |
| 487 | Twelfth target position lower 4 digits | 0 | |

| Parameter | Name | Setting Range | Initial Value | |
|-----------|--|-------------------|---------------|---|
| 488 | Twelfth target position upper 4 digits | 0 to 9999 | 0 | |
| 489 | Thirteenth target position lower 4 digits | | 0 | |
| 490 | Thirteenth target position upper 4 digits | | 0 | |
| 491 | Fourteenth target position lower 4 digits | | 0 | |
| 492 | Fourteenth target position upper 4 digits | | 0 | |
| 493 | Fifteenth target position lower 4 digits | | 0 | |
| 494 | Fifteenth target position upper 4 digits | | 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 | |
| 502 | Stop mode selection at communication error | 0 to 3 | 0 | |
| 503 | Maintenance timer 1 | 0 (1 to 9998) | 0 | |
| 504 | Maintenance timer 1 alarm output set time | 0 to 9998, 9999 | 9999 | |
| 505 | Speed setting reference | 1 to 590Hz | 60/50Hz *10 | |
| 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 | |
| 522 | Output stop frequency | 0 to 590Hz, 9999 | 9999 | |
| 539 | Modbus-RTU communication check time interval | 0 to 999.8s, 9999 | 9999 | |
| 547 | USB communication station number | 0 to 31 | 0 | |

*10 Differs according to types. (FM type/CA type)

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|---|------------------------|
| 548 | USB communication check time interval | 0 to 999.8s, 9999 | 9999 |
| 549 | Protocol selection | 0, 1 | 0 |
| 550 | NET mode operation command source selection | 0, 1, 9999 | 9999 |
| 551 | PU mode operation command source selection | 1 to 3, 9999 | 9999 |
| 552 | Frequency jump range | 0 to 30Hz, 9999 | 9999 |
| 553 | PID deviation limit | 0 to 100%, 9999 | 9999 |
| 554 | PID signal operation selection | 0 to 3, 10 to 13 | 0 |
| 555 | Current average time | 0.1 to 1.0s | 1s |
| 556 | Data output mask time | 0 to 20s | 0s |
| 557 | Current average value monitor signal output reference current | 0 to 500A ^{*2} 0 to 3600A ^{*3} | Rated inverter current |
| 560 | Second frequency search gain | 0 to 32767, 9999 | 9999 |
| 561 | PTC thermistor protection level | 0.5 to 30k Ω , 9999 | 9999 |
| 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/ 0 to 3/ 1, 2 ^{*15} | 2 |
| 571 | Holding time at a start | 0 to 10s, 9999 | 9999 |
| 573 | 4mA input check selection | 1 to 4, 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 590Hz | 0Hz |
| 577 | Output interruption release level | 900 to 1100% | 1000% |
| 592 | Traverse function selection | 0 to 2 | 0 |
| 593 | Maximum amplitude amount | 0 to 25% | 10% |
| 594 | Amplitude compensation amount during deceleration | 0 to 50% | 10% |

| Parameter | Name | Setting Range | Initial Value |
|--------------------|---|-------------------|----------------------|
| 595 | Amplitude compensation amount during acceleration | 0 to 50% | 10% |
| 596 | Amplitude acceleration time | 0.1 to 3600s | 5s |
| 597 | Amplitude deceleration time | 0.1 to 3600s | 5s |
| 598 ^{*14} | Undervoltage level | 350 to 430V, 9999 | 9999 |
| 599 | X10 terminal input selection | 0, 1 | 0/1/0 ^{*15} |
| 600 | First free thermal reduction frequency 1 | 0 to 590Hz, 9999 | 9999 |
| 601 | First free thermal reduction ratio 1 | 1 to 100% | 100% |
| 602 | First free thermal reduction frequency 2 | 0 to 590Hz, 9999 | 9999 |
| 603 | First free thermal reduction ratio 2 | 1 to 100% | 100% |
| 604 | First free thermal reduction frequency 3 | 0 to 590Hz, 9999 | 9999 |
| 607 | Motor permissible load level | 110 to 250% | 150% |
| 608 | Second motor permissible load level | 110 to 250%, 9999 | 9999 |
| 609 | PID set point/ deviation input selection | 1 to 5 | 2 |
| 610 | PID measured value input selection | 1 to 5 | 3 |
| 611 | Acceleration time at a restart | 0 to 3600s, 9999 | 9999 |
| 639 | Brake opening current selection | 0, 1 | 0 |
| 640 | Brake operation frequency selection | 0, 1 | 0 |
| 641 | Second brake sequence operation selection | 0, 7, 8, 9999 | 0 |
| 642 | Second brake opening frequency | 0 to 30Hz | 3Hz |
| 643 | Second brake opening current | 0 to 400% | 130% |
| 644 | Second brake opening current detection time | 0 to 2s | 0.3s |
| 645 | Second brake operation time at start | 0 to 5s | 0.3s |
| 646 | Second brake operation frequency | 0 to 30Hz | 6Hz |

^{*2} For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

^{*3} For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

^{*14} The setting is available only with the 400V class.

^{*15} Differs according to model types (standard model, separated converter type, IP55 compatible model).



| Parameter | Name | Setting Range | Initial Value |
|--------------------|--|------------------|---------------|
| 647 | Second brake operation time at stop | 0 to 5s | 0.3s |
| 648 | Second deceleration detection function selection | 0, 1 | 0 |
| 650 | Second brake opening current selection | 0, 1 | 0 |
| 651 | Second brake operation frequency selection | 0, 1 | 0 |
| 653 | Speed smoothing control | 0 to 200% | 0% |
| 654 | Speed smoothing cutoff frequency | 0 to 120Hz | 20Hz |
| 655 | Analog remote output selection | 0, 1, 10, 11 | 0 |
| 656 | Analog remote output 1 | 800 to 1200% | 1000% |
| 657 | Analog remote output 2 | 800 to 1200% | 1000% |
| 658 | Analog remote output 3 | 800 to 1200% | 1000% |
| 659 | Analog remote output 4 | 800 to 1200% | 1000% |
| 660 | Increased magnetic excitation deceleration operation selection | 0, 1 | 0 |
| 661 | Magnetic excitation increase rate | 0 to 40%, 9999 | 9999 |
| 662 | Increased magnetic excitation current level | 0 to 300% | 100% |
| 665 | Regeneration avoidance frequency gain | 0 to 200% | 100% |
| 668 ^{*17} | Power failure stop frequency gain | 0 to 200% | 100% |
| 684 | Tuning data unit switchover | 0, 1 | 0 |
| 686 | Maintenance timer 2 | 0 (1 to 9998) | 0 |
| 687 | Maintenance timer 2 warning output set time | 0 to 9998, 9999 | 9999 |
| 688 | Maintenance timer 3 | 0 (1 to 9998) | 0 |
| 689 | Maintenance timer 3 warning output set time | 0 to 9998, 9999 | 9999 |
| 690 | Deceleration check time | 0 to 3600s, 9999 | 1s |
| 692 | Second free thermal reduction frequency 1 | 0 to 590Hz, 9999 | 9999 |
| 693 | Second free thermal reduction ratio 1 | 1 to 100% | 100% |

| Parameter | Name | Setting Range | Initial Value |
|-----------|--|-------------------------------------|---------------|
| 694 | Second free thermal reduction frequency 2 | 0 to 590Hz, 9999 | 9999 |
| 695 | Second free thermal reduction ratio 2 | 1 to 100% | 100% |
| 696 | Second free thermal reduction frequency 3 | 0 to 590Hz, 9999 | 9999 |
| 699 | Input terminal filter | 5 to 50ms, 9999 | 9999 |
| 702 | Maximum motor frequency | 0 to 400Hz, 9999 | 9999 |
| 706 | Induced voltage constant (phi f) | 0 to 5000mV/(rad/s), 9999 | 9999 |
| 707 | Motor inertia (integer) | 10 to 999, 9999 | 9999 |
| 711 | Motor Ld decay ratio | 0 to 100%, 9999 | 9999 |
| 712 | Motor Lq decay ratio | 0 to 100%, 9999 | 9999 |
| 717 | Starting resistance tuning compensation | 0 to 200%, 9999 | 9999 |
| 721 | Starting magnetic pole position detection pulse width | 0 to 6000μs, 10000 to 16000μs, 9999 | 9999 |
| 724 | Motor inertia (exponent) | 0 to 7, 9999 | 9999 |
| 725 | Motor protection current level | 100 to 500%, 9999 | 9999 |
| 738 | Second motor induced voltage constant (phi f) | 0 to 5000mV/(rad/s), 9999 | 9999 |
| 739 | Second motor Ld decay ratio | 0 to 100%, 9999 | 9999 |
| 740 | Second motor Lq decay ratio | 0 to 100%, 9999 | 9999 |
| 741 | Second starting resistance tuning compensation | 0 to 200%, 9999 | 9999 |
| 742 | Second motor magnetic pole position detection pulse width | 0 to 6000μs, 10000 to 16000μs, 9999 | 9999 |
| 743 | Second motor maximum frequency | 0 to 400Hz, 9999 | 9999 |
| 744 | Second motor inertia (integer) | 10 to 999, 9999 | 9999 |
| 745 | Second motor inertia (exponent) | 0 to 7, 9999 | 9999 |
| 746 | Second motor protection current level | 100 to 500%, 9999 | 9999 |
| 747 | Second motor low-speed range torque characteristic selection | 0, 9999 | 9999 |

^{*17} Setting available for standard models and IP55 compatible models.

| Parameter | Name | Setting Range | Initial Value |
|-----------|--|---|---------------|
| 753 | Second PID action selection | 0, 10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 1000, 1001, 1010, 1011, 2000, 2001, 2010, 2011 | 0 |
| 754 | Second PID control automatic switch-over frequency | 0 to 590Hz, 9999 | 9999 |
| 755 | Second PID action set point | 0 to 100%, 9999 | 9999 |
| 756 | Second PID proportional band | 0.1 to 1000%, 9999 | 100 % |
| 757 | Second PID integral time | 0.1 to 3600s, 9999 | 1 s |
| 758 | Second PID differential time | 0.01 to 10.00s, 9999 | 9999 |
| 759 | PID unit selection | 0 to 43, 9999 | 9999 |
| 760 | Pre-charge fault selection | 0, 1 | 0 |
| 761 | Pre-charge ending level | 0 to 100%, 9999 | 9999 |
| 762 | Pre-charge ending time | 0 to 3600s, 9999 | 9999 |
| 763 | Pre-charge upper detection level | 0 to 100%, 9999 | 9999 |
| 764 | Pre-charge time limit | 0 to 3600s, 9999 | 9999 |
| 765 | Second pre-charge fault selection | 0, 1 | 0 % |
| 766 | Second pre-charge ending level | 0 to 100%, 9999 | 9999 |
| 767 | Second pre-charge ending time | 0 to 3600s, 9999 | 9999 |
| 768 | Second pre-charge upper detection level | 0 to 100%, 9999 | 9999 |
| 769 | Second pre-charge time limit | 0 to 3600s, 9999 | 9999 |
| 774 | Operation panel monitor selection 1 | 1 to 3, 5 to 14, 17 to 20, 22 to 35, 38, 40 to 45, 50 to 57, 61, 62, 64, 67, 87 to 98, 100, 9999 | 9999 |
| 775 | Operation panel monitor selection 2 | | 9999 |
| 776 | Operation panel monitor selection 3 | | 9999 |
| 777 | 4mA input fault operation frequency | 0 to 590Hz, 9999 | 9999 |
| 778 | 4mA input check filter | 0 to 10s | 0 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|---|-------------------------|
| 779 | Operation frequency during communication error | 0 to 590Hz, 9999 | 9999 |
| 788 | Low speed range torque characteristic selection | 0, 9999 | 9999 |
| 791 | Acceleration time in low-speed range | 0 to 3600s, 9999 | 9999 |
| 792 | Deceleration time in low-speed range | 0 to 3600s, 9999 | 9999 |
| 799 | Pulse increment setting for output power | 0.1, 1, 10, 100, 1000kWh | 1kWh |
| 800 | Control method selection | 0 to 6, 9 to 14, 20, 100 to 106, 109 to 114 | 20 |
| 802 | Pre-excitation selection | 0, 1 | 0 |
| 803 | Constant output range torque characteristic selection | 0, 1, 10, 11 | 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 to 2 | 0 |
| 808 | Forward rotation speed limit/speed limit | 0 to 400Hz | 60/50Hz * ¹⁰ |
| 809 | Reverse rotation speed limit/reverse-side speed limit | 0 to 400Hz, 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 |

*¹⁰ Differs according to types. (FM type/CA type)



| Parameter | Name | Setting Range | Initial Value |
|-------------------|---|----------------------|---------------|
| 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 ^{*8} | Speed detection filter 1 | 0 to 0.1s | 0.001s |
| 824 | Torque control P gain 1 (current loop proportional gain) | 0 to 500% | 100% |
| 825 | Torque control integral time 1 (current loop integral time) | 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 ^{*8} | Speed detection filter 2 | 0 to 0.1s, 9999 | 9999 |
| 834 | Torque control P gain 2 | 0 to 500%, 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 ^{*8} | Torque bias selection | 0 to 3, 24, 25, 9999 | 9999 |
| 841 ^{*8} | Torque bias 1 | 600 to 1400%, 9999 | 9999 |
| 842 ^{*8} | Torque bias 2 | 600 to 1400%, 9999 | 9999 |
| 843 ^{*8} | Torque bias 3 | 600 to 1400%, 9999 | 9999 |

| Parameter | Name | Setting Range | Initial Value |
|--------------------|---|---|---------------|
| 844 ^{*8} | Torque bias filter | 0 to 5s, 9999 | 9999 |
| 845 ^{*8} | Torque bias operation time | 0 to 5s, 9999 | 9999 |
| 846 ^{*8} | Torque bias balance compensation | 0 to 10V, 9999 | 9999 |
| 847 ^{*8} | Fall-time torque bias terminal 1 bias | 0 to 400%, 9999 | 9999 |
| 848 ^{*8} | 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 to 2 | 0 |
| 853 ^{*8} | 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/Rated PM motor current | 0 to 500A, 9999 ^{*2} 0 to 3600A, 9999 ^{*3} | 9999 |
| 860 | Second motor torque current/Rated PM motor current | 0 to 500A, 9999 ^{*2} 0 to 3600A, 9999 ^{*3} | 9999 |
| 864 | Torque detection | 0 to 400% | 150% |
| 865 | Low speed detection | 0 to 590Hz | 1.5Hz |
| 866 | Torque monitoring reference | 0 to 400% | 150% |
| 867 | AM output filter | 0 to 5s | 0.01s |
| 868 | Terminal 1 function assignment | 0 to 6, 9999 | 0 |
| 869 ^{*11} | Current output filter | 0 to 5s | 0.02s |
| 870 | Speed detection hysteresis | 0 to 5Hz | 0Hz |
| 872 ^{*17} | Input phase loss protection selection | 0, 1 | 0 |
| 873 ^{*8} | Speed limit | 0 to 400Hz | 20Hz |
| 874 | OLT level setting | 0 to 400% | 150% |
| 875 | Fault definition | 0, 1 | 0 |
| 877 | Speed feed forward control/model adaptive speed control selection | 0 to 2 | 0 |

^{*2} For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

^{*3} For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

^{*7} Differs according to the voltage class. (200V class/400V class)

^{*8} The setting is available only when the FR-A8AP is mounted.

^{*11} The setting is available only with the CA type.

^{*17} Setting available for standard models and IP55 compatible models.

| 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 times |
| 881 | Speed feed forward gain | 0 to 1000% | 0% |
| 882 | Regeneration avoidance operation selection | 0 to 2 | 0 |
| 883 | Regeneration avoidance operation level | 300 to 800V | 380V DC/ 760V DC *7 |
| 884 | Regeneration avoidance at deceleration detection sensitivity | 0 to 5 | 0 |
| 885 | Regeneration avoidance compensation frequency limit value | 0 to 590Hz, 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 *2 | Rated inverter capacity |
| | | 0 to 3600kW *3 | |
| 894 | Control selection during commercial power-supply operation | 0 to 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) *9 | FM/CA terminal calibration *10 | — | — |
| C1 (901) *9 | AM terminal calibration | — | — |
| C2 (902) *9 | Terminal 2 frequency setting bias frequency | 0 to 590Hz | 0Hz |

| Parameter | Name | Setting Range | Initial Value |
|-----------------|--|---------------|---------------|
| C3 (902) *9 | Terminal 2 frequency setting bias | 0 to 300% | 0% |
| 125 (903) *9 | Terminal 2 frequency setting gain frequency | 0 to 590Hz | 60/50Hz *10 |
| C4 (903) *9 | Terminal 2 frequency setting gain | 0 to 300% | 100% |
| C5 (904) *9 | Terminal 4 frequency setting bias frequency | 0 to 590Hz | 0Hz |
| C6 (904) *9 | Terminal 4 frequency setting bias | 0 to 300% | 20% |
| 126 (905) *9 | Terminal 4 frequency setting gain frequency | 0 to 590Hz | 60/50Hz *10 |
| C7 (905) *9 | Terminal 4 frequency setting gain | 0 to 300% | 100% |
| C12 (917) *9 | Terminal 1 bias frequency (speed) | 0 to 590Hz | 0Hz |
| C13 (917) *9 | Terminal 1 bias (speed) | 0 to 300% | 0% |
| C14 (918) *9 | Terminal 1 gain frequency (speed) | 0 to 590Hz | 60/50Hz *10 |
| C15 (918) *9 | Terminal 1 gain (speed) | 0 to 300% | 100% |
| C16 (919) *9 | Terminal 1 bias command (torque/magnetic flux) | 0 to 400% | 0% |
| C17 (919) *9 | 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) *9 | Terminal 1 gain (torque/magnetic flux) | 0 to 300% | 100% |
| C8 (930) *9,*11 | Current output bias signal | 0 to 100% | 0% |

*2 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

*3 For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*9 The parameter number in parentheses is the one for use with the parameter unit (FR-PU07).

*10 Differs according to types. (FM type/CA type)

*11 The setting is available only with the CA type.



| Parameter | Name | Setting Range | Initial Value |
|--------------------------------------|---|--|---------------|
| C9 (930) *9,*11 | Current output bias current | 0 to 100% | 0% |
| C10 (931) *9,*11 | Current output gain signal | 0 to 100% | 100% |
| C11 (931) *9,*11 | Current output gain current | 0 to 100% | 100% |
| C38 (932) *9 | Terminal 4 bias command (torque/magnetic flux) | 0 to 400% | 0% |
| C39 (932) *9 | Terminal 4 bias (torque/magnetic flux) | 0 to 300% | 20% |
| C40 (933) *9 | Terminal 4 gain command (torque/magnetic flux) | 0 to 400% | 150% |
| C41 (933) *9 | Terminal 4 gain (torque/magnetic flux) | 0 to 300% | 100% |
| C42 (934) *9 | PID display bias coefficient | 0 to 500.00, 9999 | 9999 |
| C43 (934) *9 | PID display bias analog value | 0 to 300.0% | 20% |
| C44 (935) *9 | PID display gain coefficient | 0 to 500.00, 9999 | 9999 |
| C45 (935) *9 | PID display gain analog value | 0 to 300.0% | 100% |
| 977 | Input voltage mode selection | 0, 1 | 0 |
| 989 | Parameter copy alarm release | 10 *2 | 10 *2 |
| | | 100 *3 | 100 *3 |
| 990 | PU buzzer control | 0, 1 | 1 |
| 991 | PU contrast adjustment | 0 to 63 | 58 |
| 992 | Operation panel setting dial push monitor selection | 0 to 3, 5 to 14, 17 to 20, 22 to 35, 38, 40 to 45, 50 to 57, 61, 62, 64, 67, 87 to 97, 100 | 0 |
| 994 | Droop break point gain | 0.1 to 100%, 9999 | 9999 |
| 995 | Droop break point torque | 0.1 to 100% | 100% |

| Parameter | Name | Setting Range | Initial Value |
|-------------|---|---|---------------|
| 997 | Fault initiation | 0 to 255, 9999 | 9999 |
| 998 | PM parameter initialization <i>Simple</i> | 0, 3003, 3103, 8009, 8109, 9009, 9109 | 0 |
| 999 | Automatic parameter setting <i>Simple</i> | 1, 2, 10 to 13, 20, 21, 9999 | 9999 |
| 1002 | Lq tuning target current adjustment coefficient | 50 to 150%, 9999 | 9999 |
| 1003 | Notch filter frequency | 0, 8 to 1250Hz | 0 |
| 1004 | Notch filter depth | 0 to 3 | 0 |
| 1005 | Notch filter width | 0 to 3 | 0 |
| 1006 | Clock (year) | 2000 to 2099 | 2000 |
| 1007 | Clock (month, day) | 101 to 131, 201 to 229, 301 to 331, 401 to 430, 501 to 531, 601 to 630, 701 to 731, 801 to 831, 901 to 930, 1001 to 1031, 1101 to 1130, 1201 to 1231 | 101 |
| | | 0 to 59, 100 to 159, 200 to 259, 300 to 359, 400 to 459, 500 to 559, 600 to 659, 700 to 759, 800 to 859, 900 to 959, 1000 to 1059, 1100 to 1159, 1200 to 1259, 1300 to 1359, 1400 to 1459, 1500 to 1559, 1600 to 1659, 1700 to 1759, 1800 to 1859, 1900 to 1959, 2000 to 2059, 2100 to 2159, 2200 to 2259, 2300 to 2359 | 0 |
| 1008 | Clock (hour, minute) | 0 to 59, 100 to 159, 200 to 259, 300 to 359, 400 to 459, 500 to 559, 600 to 659, 700 to 759, 800 to 859, 900 to 959, 1000 to 1059, 1100 to 1159, 1200 to 1259, 1300 to 1359, 1400 to 1459, 1500 to 1559, 1600 to 1659, 1700 to 1759, 1800 to 1859, 1900 to 1959, 2000 to 2059, 2100 to 2159, 2200 to 2259, 2300 to 2359 | 0 |
| 1020 | Trace operation selection | 0 to 4 | 0 |
| 1021 | Trace mode selection | 0 to 2 | 0 |
| 1022 | Sampling cycle | 0 to 9 | 2 |
| 1023 | Number of analog channels | 1 to 8 | 4 |
| 1024 | Sampling auto start | 0, 1 | 0 |
| 1025 | Trigger mode selection | 0 to 4 | 0 |
| 1026 | Number of sampling before trigger | 0 to 100% | 90% |

*2 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

*3 For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*9 The parameter number in parentheses is the one for use with the parameter unit (FR-PU07).

*11 The setting is available only with the CA type.

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|---|---------------|
| 1027 | Analog source selection (1ch) | 1 to 3, 5 to 14, 17 to 20, 22 to 24, 32 to 35, 40 to 42, 52 to 54, 61, 62, 64, 67, 87 to 98, 201 to 213, 222 to 227, 230 to 238, 240 to 247, 251 to 254 | 201 |
| 1028 | Analog source selection (2ch) | | 202 |
| 1029 | Analog source selection (3ch) | | 203 |
| 1030 | Analog source selection (4ch) | | 204 |
| 1031 | Analog source selection (5ch) | | 205 |
| 1032 | Analog source selection (6ch) | | 206 |
| 1033 | Analog source selection (7ch) | | 207 |
| 1034 | Analog source selection (8ch) | | 208 |
| 1035 | Analog trigger channel | | 1 to 8 |
| 1036 | Analog trigger operation selection | 0, 1 | 0 |
| 1037 | Analog trigger level | 600 to 1400 | 1000 |
| 1038 | Digital source selection (1ch) | 1 to 255 | 1 |
| 1039 | Digital source selection (2ch) | | 2 |
| 1040 | Digital source selection (3ch) | | 3 |
| 1041 | Digital source selection (4ch) | | 4 |
| 1042 | Digital source selection (5ch) | | 5 |
| 1043 | Digital source selection (6ch) | | 6 |
| 1044 | Digital source selection (7ch) | | 7 |
| 1045 | Digital source selection (8ch) | | 8 |
| 1046 | Digital trigger channel | 1 to 8 | 1 |
| 1047 | Digital trigger operation selection | 0, 1 | 0 |
| 1048 | Display-off waiting time | 0 to 60min | 0min |
| 1049 | USB host reset | 0, 1 | 0 |
| 1072 | DC brake judgment time for swinging suppression control operation | 0 to 10s | 3s |

| Parameter | Name | Setting Range | Initial Value |
|-----------|---|-------------------|---|
| 1073 | Swinging suppression control operation selection | 0, 1 | 0 |
| 1074 | Swinging suppression frequency | 0.05 to 3Hz, 9999 | 1Hz |
| 1075 | Swinging suppression depth | 0 to 3 | 0 |
| 1076 | Swinging suppression width | 0 to 3 | 0 |
| 1077 | Rope length | 0.1 to 50m | 1m |
| 1078 | Trolley weight | 1 to 50000kg | 1kg |
| 1079 | Load weight | 1 to 50000kg | 1kg |
| 1103 | Deceleration time at emergency stop | 0 to 3600s | 5s |
| 1106 | Torque monitor filter | 0 to 5s, 9999 | 9999 |
| 1107 | Running speed monitor filter | 0 to 5s, 9999 | 9999 |
| 1108 | Excitation current monitor filter | 0 to 5s, 9999 | 9999 |
| 1113 | Speed limit method selection | 0 to 2, 10, 9999 | 9999 |
| 1114 | Torque command reverse selection | 0, 1 | 1 |
| 1115 | Speed control integral term clear time | 0 to 9998ms | 0s |
| 1116 | Constant output range speed control P gain compensation | 0 to 100% | 0% |
| 1117 | Speed control P gain 1 (per-unit system) | 0 to 300, 9999 | 9999 |
| 1118 | Speed control P gain 2 (per-unit system) | 0 to 300, 9999 | 9999 |
| 1119 | Model speed control gain (per-unit system) | 0 to 300, 9999 | 9999 |
| 1121 | Per-unit speed control reference frequency | 0 to 400 Hz | 120Hz ^{*2} 60Hz ^{*3} |
| 1134 | PID upper limit manipulated value | 0 to 100% | 100% |
| 1135 | PID lower limit manipulated value | 0 to 100% | 100% |
| 1136 | Second PID display bias coefficient | 0 to 500, 9999 | 9999 |
| 1137 | Second PID display bias analog value | 0 to 300% | 20% |
| 1138 | Second PID display gain coefficient | 0 to 500, 9999 | 9999 |
| 1139 | Second PID display gain analog value | 0 to 300% | 100% |

^{*2} For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

^{*3} For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher



| Parameter | Name | Setting Range | Initial Value |
|--------------|--|----------------------------------|---------------|
| 1140 | Second PID set point/deviation input selection | 1 to 5 | 2 |
| 1141 | Second PID measured value input selection | 1 to 5 | 3 |
| 1142 | Second PID unit selection | 0 to 43, 9999 | 9999 |
| 1143 | Second PID upper limit | 0 to 100%, 9999 | 9999 |
| 1144 | Second PID lower limit | 0 to 100%, 9999 | 9999 |
| 1145 | Second PID deviation limit | 0.0 to 100.0%, 9999 | 9999 |
| 1146 | Second PID signal operation selection | 0 to 3, 10 to 13 | 0 |
| 1147 | Second output interruption detection time | 0 to 3600s, 9999 | 1s |
| 1148 | Second output interruption detection level | 0 to 590Hz | 0Hz |
| 1149 | Second output interruption cancel level | 900 to 1100% | 1000% |
| 1150 to 1199 | PLC function user parameters 1 to 50 | 0 to 65535 | 0 |
| 1220 | Target position/speed selection | 0 to 2 | 0 |
| 1221 | Start command edge detection selection | 0, 1 | 0 |
| 1222 | First positioning acceleration time | 0.01 to 360s | 5s |
| 1223 | First positioning deceleration time | 0.01 to 360s | 5s |
| 1224 | First positioning dwell time | 0 to 20000ms | 0ms |
| 1225 | First positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1226 | Second positioning acceleration time | 0.01 to 360s | 5s |
| 1227 | Second positioning deceleration time | 0.01 to 360s | 5s |
| 1228 | Second positioning dwell time | 0 to 20000ms | 0ms |
| 1229 | Second positioning sub-function | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1230 | Third positioning acceleration time | 0.01 to 360s | 5s |
| 1231 | Third positioning deceleration time | 0.01 to 360s | 5s |
| 1232 | Third positioning dwell time | 0 to 20000ms | 0ms |
| 1233 | Third positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|---------------------------------------|----------------------------------|---------------|
| 1234 | Fourth positioning acceleration time | 0.01 to 360s | 5s |
| 1235 | Fourth positioning deceleration time | 0.01 to 360s | 5s |
| 1236 | Fourth positioning dwell time | 0 to 20000ms | 0ms |
| 1237 | Fourth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1238 | Fifth positioning acceleration time | 0.01 to 360s | 5s |
| 1239 | Fifth positioning deceleration time | 0.01 to 360s | 5s |
| 1240 | Fifth positioning dwell time | 0 to 20000ms | 0ms |
| 1241 | Fifth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1242 | Sixth positioning acceleration time | 0.01 to 360s | 5s |
| 1243 | Sixth positioning deceleration time | 0.01 to 360s | 5s |
| 1244 | Sixth positioning dwell time | 0 to 20000ms | 0ms |
| 1245 | Sixth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1246 | Seventh positioning acceleration time | 0.01 to 360s | 5s |
| 1247 | Seventh positioning deceleration time | 0.01 to 360s | 5s |
| 1248 | Seventh positioning dwell time | 0 to 20000ms | 0ms |
| 1249 | Seventh positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1250 | Eighth positioning acceleration time | 0.01 to 360s | 5s |
| 1251 | Eighth positioning deceleration time | 0.01 to 360s | 5s |
| 1252 | Eighth positioning dwell time | 0 to 20000ms | 0ms |
| 1253 | Eighth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1254 | Ninth positioning acceleration time | 0.01 to 360s | 5s |
| 1255 | Ninth positioning deceleration time | 0.01 to 360s | 5s |
| 1256 | Ninth positioning dwell time | 0 to 20000ms | 0ms |
| 1257 | Ninth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |

| Parameter | Name | Setting Range | Initial Value |
|-----------|--|----------------------------------|---------------|
| 1258 | Tenth positioning acceleration time | 0.01 to 360s | 5s |
| 1259 | Tenth positioning deceleration time | 0.01 to 360s | 5s |
| 1260 | Tenth positioning dwell time | 0 to 20000ms | 0ms |
| 1261 | Tenth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1262 | Eleventh positioning acceleration time | 0.01 to 360s | 5s |
| 1263 | Eleventh positioning deceleration time | 0.01 to 360s | 5s |
| 1264 | Eleventh positioning dwell time | 0 to 20000ms | 0ms |
| 1265 | Eleventh positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1266 | Twelfth positioning acceleration time | 0.01 to 360s | 5s |
| 1267 | Twelfth positioning deceleration time | 0.01 to 360s | 5s |
| 1268 | Twelfth positioning dwell time | 0 to 20000ms | 0ms |
| 1269 | Twelfth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1270 | Thirteenth positioning acceleration time | 0.01 to 360s | 5s |
| 1271 | Thirteenth positioning deceleration time | 0.01 to 360s | 5s |
| 1272 | Thirteenth positioning dwell time | 0 to 20000ms | 0ms |
| 1273 | Thirteenth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1274 | Fourteenth positioning acceleration time | 0.01 to 360s | 5s |
| 1275 | Fourteenth positioning deceleration time | 0.01 to 360s | 5s |
| 1276 | Fourteenth positioning dwell time | 0 to 20000ms | 0ms |
| 1277 | Fourteenth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1278 | Fifteenth positioning acceleration time | 0.01 to 360s | 5s |
| 1279 | Fifteenth positioning deceleration time | 0.01 to 360s | 5s |
| 1280 | Fifteenth positioning dwell time | 0 to 20000ms | 0ms |

| Parameter | Name | Setting Range | Initial Value |
|--------------|---|----------------------------------|---------------|
| 1281 | Fifteenth positioning subfunction | 0, 1, 10, 11, 100, 101, 110, 111 | 10 |
| 1282 | Home position return method selection | 0 to 6 | 4 |
| 1283 | Home position return speed | 0 to 30Hz | 2Hz |
| 1284 | Home position return creep speed | 0 to 10Hz | 0.5Hz |
| 1285 | Home position shift amount lower 4 digits | 0 to 9999 | 0 |
| 1286 | Home position shift amount upper 4 digits | 0 to 9999 | 0 |
| 1287 | Travel distance after proximity dog ON lower 4 digits | 0 to 9999 | 2048 |
| 1288 | Travel distance after proximity dog ON upper 4 digits | 0 to 9999 | 0 |
| 1289 | Home position return stopper torque | 0 to 200% | 40% |
| 1290 | Home position return stopper waiting time | 0 to 10s | 0.5s |
| 1292 | Position control terminal input selection | 0, 1 | 0 |
| 1293 | Roll feeding mode selection | 0, 1 | 0 |
| 1294 | Position detection lower 4 digits | 0 to 9999 | 0 |
| 1295 | Position detection upper 4 digits | 0 to 9999 | 0 |
| 1296 | Position detection selection | 0 to 2 | 0 |
| 1297 | Position detection hysteresis width | 0 to 32767 | 0 |
| 1300 to 1343 | Communication option parameters | | |
| 1350 to 1359 | | | |
| Pr.CLR | Parameter clear | (0,) 1 | 0 |
| ALL.CL | All parameter clear | (0,) 1 | 0 |
| Err.CL | Fault history clear | (0,) 1 | 0 |
| Pr.CPY | Parameter copy | (0,) 1 to 3 | 0 |
| Pr.CHG | Initial value change list | — | — |
| IPM | IPM initialization | 0, 3003 | 0 |
| AUTO | Automatic parameter setting | — | — |
| Pr.Md | Group parameter setting | (0,) 1, 2 | 0 |

7 TROUBLESHOOTING

When a fault occurs in the inverter, the protective function activates, and the PU display automatically changes to one of the fault or alarm indications listed on *page 51*.

If the 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 fault or alarm indication.
- Resetting methodWhen a protective function of the inverter is activated, the inverter output is kept stopped. Unless reset, the inverter cannot restart. (Refer to *page 51*.)
- When the protective functions were activated, take an appropriate corrective action, then reset the inverter, and resume the operation. Not doing so may lead to an inverter fault and damage.

Inverter fault or alarm indications are roughly divided as below:

- Error Message
A message regarding operational fault and setting fault by the operation panel (FR-DU08, FR-DU08-01) and parameter unit (FR-PU07) is displayed. The inverter does not shut off output.
- Warning
The inverter does not shut off output even when a warning is displayed. However, failure to take appropriate measures will lead to a fault.
- Alarm
The inverter does not shut off output. You can also output an alarm signal by making parameter setting.
- Fault
When the protective function is activated, the inverter output is shut off and a fault signal is output.

NOTES

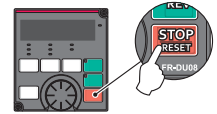
- For the details of fault displays and other malfunctions, also refer to the FR-A800 Instruction Manual.
- Past eight faults can be displayed using the setting dial. (Refer to *page 32*.)

7.1 Reset method of protective function

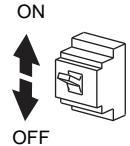
The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter. Inverter recovers about 1s after reset is cancelled.

Three different methods can be used to reset an inverter.

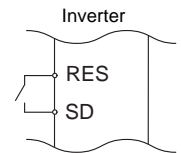
- Using the operation panel, press the STOP/RESET key to reset the inverter. (This may only be performed when a fault occurs.)



- Switch OFF the power once, then switch it ON again after the indicator of the operation panel turns OFF.



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



CAUTION

OFF status of the start signal must be confirmed before resetting the inverter fault. Resetting inverter fault with the start signal ON restarts the motor suddenly. This may cause injury.

7.2 List of alarm display

| Operation Panel Indication | | Name | Data code | |
|----------------------------|--------------------------|--------------------------|---|----------|
| Error message | E----- | E----- | Faults history | — |
| | HOLD | HOLD | Operation panel lock | — |
| | LOCd | LOCd | Password locked | — |
| | Er1 to Er4 Er8 | Er1 to Er4 Er8 | Parameter write error | — |
| | rE1 to rE4 rE6 to rE8 | rE1 to rE4 rE6 to rE8 | Copy operation error | — |
| Err. | Err. | Error | — | |
| Warning | OL | OL | Stall prevention (overcurrent) | — |
| | oL | oL | Stall prevention (overvoltage) | — |
| | Rb | RB *1 *2 | Regenerative brake pre-alarm | — |
| | TH | TH | Electronic thermal relay function pre-alarm | — |
| | PS | PS | PU Stop | — |
| | MF1 to MF3 | MT1 to MT3 | Maintenance signal output | — |
| Operation Panel Indication | | Name | Data code | |
| Warning | CP | CP *2 | Parameter copy | — |
| | SL | SL | Speed limit indication | — |
| | SA | SA | Safety stop | — |
| Alarm | UF | UF | USB host error | — |
| | EV | EV | 24 V external power supply operation | — |
| | HP1 | HP1 | Home position return setting error | — |
| | HP2 | HP2 | Home position return uncompleted | — |
| | HP3 | HP3 | Home position return parameter setting error | — |
| | FN FN2 | FN FN2 *3 | Fan alarm Internal fan alarm | — |
| Fault | E. OC1 | E.OC1 | Overcurrent trip during acceleration | 16 (H10) |
| | E. OC2 | E.OC2 | Overcurrent trip during constant speed | 17 (H11) |
| | E. OC3 | E.OC3 | Overcurrent trip during deceleration or stop | 18 (H12) |
| | E. OV1 | E.OV1 | Regenerative overvoltage trip during acceleration | 32 (H20) |
| | E. OV2 | E.OV2 | Regenerative overvoltage trip during constant speed | 33 (H21) |
| | E. OV3 | E.OV3 | Regenerative overvoltage trip during deceleration or stop | 34 (H22) |

For footnotes *1 to *3 refer to next page.



| Operation Panel Indication | | Name | Data code |
|----------------------------|---------------------|---|-------------------|
| E. THF | E.THT | Inverter overload trip (electronic thermal relay function) | 48 (H30) |
| E. THM | E.THM | Motor overload trip (electronic thermal relay function) | 49 (H31) |
| E. FIN | E.FIN | Heatsink overheat | 64 (H40) |
| E. IPF | E.IPF ^{*1} | Instantaneous power failure | 80 (H50) |
| E. UVT | E.UVT ^{*1} | Undervoltage | 81 (H51) |
| E. ILF | E.ILF ^{*1} | Input phase loss | 82 (H52) |
| E. OLT | E.OLT | Stall prevention stop | 96 (H60) |
| E. SOT | E.SOT | Loss of synchronism detection | 97 (H61) |
| E. BE | E.BE ^{*1} | Brake transistor alarm detection | 112 (H70) |
| E. GF | E.GF | Output side earth fault overcurrent | 128 (H80) |
| E. LF | E.LF | Output phase loss | 129 (H81) |
| E. OHT | E.OHT | External thermal relay operation | 144 (H90) |
| E. PTC | E.PTC | PTC thermistor operation | 145 (H91) |
| E. OPT | E.OPT | Option fault | 160 (HA0) |
| E. OP1 | E.OP1 | Communication option fault | 161 (HA1) |
| E. 16 to 20 | E.16 to E.20 | User definition error by the PLC function | 164–168 (HA4–HA8) |
| E. PE | E.PE | Parameter storage device fault | 176 (HB0) |
| E. PUE | E.PUE | PU disconnection | 177 (HB1) |
| E. RET | E.RET | Retry count excess | 178 (HB2) |
| E. PE2 | E.PE2 | Parameter storage device fault | 179 (HB3) |
| E. CPU | E.CPU | CPU fault | 192 (HC0) |
| E. CTE | E.CTE | Operation panel power supply short circuit/RS-485 terminal power supply short circuit | 193 (HC1) |
| E. P24 | E.P24 | 24V DC power fault | 194 (HC2) |

Fault

| Operation Panel Indication | | Name | Data code |
|----------------------------|---------------------|--------------------------------------|-------------------|
| E. CDO | E.CDO | Abnormal output current detection | 196 (HC4) |
| E. IOH | E.IOH ^{*1} | Inrush current limit circuit fault | 197 (HC5) |
| E. SER | E.SER | Communication fault (inverter) | 198 (HC6) |
| E. AIE | E.AIE | Analog input fault | 199 (HC7) |
| E. USB | E.USB | USB communication fault | 200 (HC8) |
| E. SAF | E.SAF | Safety circuit fault | 201 (HC9) |
| E. PBT | E.PBT | Internal circuit fault | 202 (HCA) |
| E. OS | E.OS | Overspeed occurrence | 208 (HD0) |
| E. OSD | E.OSD | Speed deviation excess detection | 209 (HD1) |
| E. ECT | E.ECT | Signal loss detection | 210 (HD2) |
| E. OD | E.OD | Excessive position fault | 211 (HD3) |
| E. MB1 to MB7 | E.MB1 to E.MB7 | Brake sequence fault | 213–219 (HD5–HDB) |
| E. EP | E.EP | Encoder phase fault | 220 (HDC) |
| E. IAH | E.IAH ^{*1} | Abnormal internal temperature | 225 (HE1) |
| E. LCI | E.LCI | 4mA input fault | 228 (HE4) |
| E. PCH | E.PCH | Pre-charge fault | 229 (HE5) |
| E. PID | E.PID | PID signal fault | 230 (HE6) |
| E. 1 to 3 | E. 1 to E. 3 | Option fault | 241–243 (HF1–HF3) |
| E. 5 to 7 | E. 5 to E. 7 | CPU fault | 245–247 (HF5–HF7) |
| E. 11 | E.11 | Opposite rotation deceleration fault | 251 (HFB) |
| E. 13 | E.13 | Internal circuit fault | 253 (HFD) |

Fault

*1 Not available for FR-A842 (Separated converter type)

*2 Not available for FR-A846 (IP55 compatible models)

*3 Available for FR-A846 (IP55 compatible models) only

8 SPECIFICATIONS

8.1 Rating

8.1.1 FR-A820 (200V class)

| Model FR-A820-□ | | 00046 (0.4K) | 00077 (0.75K) | 00105 (1.5K) | 00167 (2.2K) | 00250 (3.7K) | 00340 (5.5K) | 00490 (7.5K) | 00630 (11K) | 00770 (15K) | 00930 (18.5K) | 01250 (22K) | 01540 (30K) | 01870 (37K) | 02330 (45K) | 03160 (55K) | 03800 (75K) | 04750 (90K) | | | |
|--|------------------------------------|---|------------------|-----------------|-----------------|--------------------------------|--------------------|-----------------|----------------|--------------------------------|------------------|----------------|----------------|-----------------------|----------------|----------------|----------------|-----------------------|--|--|--|
| Applicable motor capacity [kW] ^{*1} | SLD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 110 | 132 | | | |
| | LD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | | | |
| | ND (initial setting) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | | | |
| | HD | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | | | |
| Rated capacity [kVA] ^{*2} | SLD | 1.8 | 2.9 | 4 | 6.4 | 10 | 13 | 19 | 24 | 29 | 35 | 48 | 59 | 71 | 89 | 120 | 145 | 181 | | | |
| | LD | 1.6 | 2.7 | 3.7 | 5.8 | 8.8 | 12 | 17 | 22 | 27 | 32 | 43 | 53 | 65 | 81 | 110 | 132 | 165 | | | |
| | ND (initial setting) | 1.1 | 1.9 | 3 | 4.2 | 6.7 | 9.1 | 13 | 18 | 23 | 29 | 34 | 44 | 55 | 67 | 82 | 110 | 132 | | | |
| | HD | 0.6 | 1.1 | 1.9 | 3 | 4.2 | 6.7 | 9.1 | 13 | 18 | 23 | 29 | 34 | 44 | 55 | 67 | 82 | 110 | | | |
| Rated current [A] | SLD | 4.6 | 7.7 | 10.5 | 16.7 | 25 | 34 | 49 | 63 | 77 | 93 | 125 | 154 | 187 | 233 | 316 | 380 | 475 | | | |
| | LD | 4.2 | 7 | 9.6 | 15.2 | 23 | 31 | 45 | 58 | 70.5 | 85 | 114 | 140 | 170 | 212 | 288 | 346 | 432 | | | |
| | ND (initial setting) | 3 | 5 | 8 | 11 | 17.5 | 24 | 33 | 46 | 61 | 76 | 90 | 115 | 145 | 175 | 215 | 288 | 346 | | | |
| | HD | 1.5 | 3 | 5 | 8 | 11 | 17.5 | 24 | 33 | 46 | 61 | 76 | 90 | 115 | 145 | 175 | 215 | 288 | | | |
| Overload current rating ^{*3} | SLD | 110% of rated motor capacity for 60s, 120% of rated motor capacity for 3s (max. surrounding air temperature 40°C) | | | | | | | | | | | | | | | | | | | |
| | LD | 120% of rated motor capacity for 60s, 150% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | | | | | | | | | | | | | | | | |
| | ND (initial setting) | 150% of rated motor capacity for 60s, 200% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | | | | | | | | | | | | | | | | |
| | HD | 200% of rated motor capacity for 60s, 250% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | | | | | | | | | | | | | | | | |
| Rated voltage ^{*4} | Three-phase 200 to 240V | | | | | | | | | | | | | | | | | | | | |
| Regenerative braking | Brake transistor | Built-in | | | | | | | | | | | | FR-BU2 (Option) | | | | | | | |
| | Maximum brake torque ^{*6} | 150% torque/3%ED ^{*5} | | | | 100% torque/3%ED ^{*5} | | | | 100% torque/2%ED ^{*5} | | | | 20% torque/continuous | | | | 10% torque/continuous | | | |
| | FR-ABR (when the option is used) | 150% torque/10%ED | | | | 100% torque/10%ED | | | | 100% torque/6%ED | | | | — | | | | — | | | |
| Rated input AC voltage/frequency | Three-phase 200 to 240V 50Hz/60Hz | | | | | | | | | | | | | | | | | | | | |
| Permissible AC voltage fluctuation | 170 to 264V 50Hz/60Hz | | | | | | | | | | | | | | | | | | | | |
| Permissible frequency fluctuation | ±5% | | | | | | | | | | | | | | | | | | | | |
| Rated input current [A] ^{*7} | SLD | 5.3 | 8.9 | 13.2 | 19.7 | 31.3 | 45.1 | 62.8 | 80.6 | 96.7 | 115 | 151 | 185 | 221 | 269 | 316 | 380 | 475 | | | |
| | LD | 5 | 8.3 | 12.2 | 18.3 | 28.5 | 41.6 | 58.2 | 74.8 | 90.9 | 106 | 139 | 178 | 207 | 255 | 288 | 346 | 432 | | | |
| | ND (initial setting) | 3.9 | 6.3 | 10.6 | 14.1 | 22.6 | 33.4 | 44.2 | 60.9 | 80 | 96.3 | 113 | 150 | 181 | 216 | 266 | 288 | 346 | | | |
| | HD | 2.3 | 3.9 | 6.3 | 10.6 | 14.1 | 22.6 | 33.4 | 44.2 | 60.9 | 80 | 96.3 | 113 | 150 | 181 | 216 | 215 | 288 | | | |
| Power supply capacity [kVA] ^{*8} | SLD | 2 | 3.4 | 5 | 7.5 | 12 | 17 | 24 | 31 | 37 | 44 | 58 | 70 | 84 | 103 | 120 | 145 | 181 | | | |
| | LD | 1.9 | 3.2 | 4.7 | 7 | 11 | 16 | 22 | 29 | 35 | 41 | 53 | 68 | 79 | 97 | 110 | 132 | 165 | | | |
| | ND (initial setting) | 1.5 | 2.4 | 4 | 5.4 | 8.6 | 13 | 17 | 23 | 30 | 37 | 43 | 57 | 69 | 82 | 101 | 110 | 132 | | | |
| | HD | 0.9 | 1.5 | 2.4 | 4 | 5.4 | 8.6 | 13 | 17 | 23 | 30 | 37 | 43 | 57 | 69 | 82 | 82 | 110 | | | |
| Protective structure ^{*9} | IP20 | | | | | | | | | | | | IP00 | | | | | | | | |
| Cooling system | Self-cooling | | | | | | Forced air cooling | | | | | | | | | | | | | | |
| Weight [kg] | 2.0 | 2.2 | 3.3 | 3.3 | 3.3 | 6.7 | 6.7 | 8.3 | 15 | 15 | 15 | 22 | 42 | 42 | 54 | 74 | 74 | | | | |

^{*1} The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

^{*2} The rated output capacity indicated assumes that the output voltage is 220V.

^{*3} The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

^{*4} The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.

^{*5} Value by the built-in brake resistor

^{*6} Value for the ND rating

^{*7} The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

^{*8} The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).

^{*9} FR-DU08: IP40 (except for the PU connector section)



8.1.2 FR-A840 (400V class)

| Model FR-A840-□ | | 00023 (0.4K) | 00038 (0.75K) | 00052 (1.5K) | 00083 (2.2K) | 00126 (3.7K) | 00170 (5.5K) | 00250 (7.5K) | 00310 (11K) | 00380 (15K) | 00470 (18.5K) | 00620 (22K) | 00770 (30K) | 00930 (37K) | 01160 (45K) | 01800 (55K) | 02160 (75K) | 02600 (90K) | 03250 (110K) | 03610 (132K) | 04320 (160K) | 04810 (185K) | 05470 (220K) | 06100 (250K) | 06830 (280K) | |
|---|------------------------------------|---|------------------|-----------------|-----------------|-----------------|-----------------|--------------------|----------------|----------------|------------------|-----------------------|----------------|----------------|----------------|----------------|-----------------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--|
| Applicable motor capacity [kW] ^{*1} | SLD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | 355 | |
| | LD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | 315 | |
| | ND (initial setting) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | 280 | |
| | HD | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 185 | 220 | 250 | |
| Rated capacity [kVA] ^{*2} | SLD | 1.8 | 2.9 | 4 | 6.3 | 10 | 13 | 19 | 24 | 29 | 36 | 47 | 59 | 71 | 88 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | 521 | |
| | LD | 1.6 | 2.7 | 3.7 | 5.8 | 8.8 | 12 | 18 | 22 | 27 | 33 | 43 | 53 | 65 | 81 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | |
| | ND (initial setting) | 1.1 | 1.9 | 3 | 4.6 | 6.9 | 9.1 | 13 | 18 | 24 | 29 | 34 | 43 | 54 | 66 | 84 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | |
| | HD | 0.6 | 1.1 | 1.9 | 3 | 4.6 | 6.9 | 9.1 | 13 | 18 | 24 | 29 | 34 | 43 | 54 | 66 | 84 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | |
| Rated current [A] | SLD | 2.3 | 3.8 | 5.2 | 8.3 | 12.6 | 17 | 25 | 31 | 38 | 47 | 62 | 77 | 93 | 116 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | 683 | |
| | LD | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 | 57 | 70 | 85 | 106 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | |
| | ND (initial setting) | 1.5 | 2.5 | 4 | 6 | 9 | 12 | 17 | 23 | 31 | 38 | 44 | 57 | 71 | 86 | 110 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | |
| | HD | 0.8 | 1.5 | 2.5 | 4 | 6 | 9 | 12 | 17 | 23 | 31 | 38 | 44 | 57 | 71 | 86 | 110 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | |
| Output Overload current rating ^{*3} | SLD | 110% of rated motor capacity for 60s, 120% of rated motor capacity for 3s (max. surrounding air temperature 40°C) | | | | | | | | | | | | | | | | | | | | | | | | |
| | LD | 120% of rated motor capacity for 60s, 150% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | | | | | | | | | | | | | | | | | | | | | |
| | ND (initial setting) | 150% of rated motor capacity for 60s, 200% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | | | | | | | | | | | | | | | | | | | | | |
| | HD | 200% of rated motor capacity for 60s, 250% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated voltage ^{*4} | | Three-phase 380 to 500V | | | | | | | | | | | | | | | | | | | | | | | | |
| Regenerative braking | Brake transistor | Built-in | | | | | | | | | | | | | | | FR-BU2 (Option) | | | | | | | | | |
| | Maximum brake torque ^{*6} | 100% torque/2%ED ^{*5} | | | | | | | | | | 20% torque/continuous | | | | | 10% torque/continuous | | | | | | | | | |
| | FR-ABR (when the option is used) | 100% torque/10%ED | | | | | | | | | | 100% torque/6%ED | | | | | — ^{*11} | | | | | | | | | |
| Rated input AC voltage/frequency | | Three-phase 380 to 500V 50Hz/60Hz ^{*10} | | | | | | | | | | | | | | | | | | | | | | | | |
| Permissible AC voltage fluctuation | | 323 to 550V 50Hz/60Hz | | | | | | | | | | | | | | | | | | | | | | | | |
| Permissible frequency fluctuation | | ±5% | | | | | | | | | | | | | | | | | | | | | | | | |
| Power supply Rated input current [A] ^{*7} | SLD | 3.2 | 5.4 | 7.8 | 10.9 | 16.4 | 22.5 | 31.7 | 40.3 | 48.2 | 58.4 | 76.8 | 97.6 | 115 | 141 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | 683 | |
| | LD | 3 | 4.9 | 7.3 | 10.1 | 15.1 | 22.3 | 31 | 38.2 | 44.9 | 53.9 | 75.1 | 89.7 | 106 | 130 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | 610 | |
| | ND (initial setting) | 2.3 | 3.7 | 6.2 | 8.3 | 12.3 | 17.4 | 22.5 | 31 | 40.3 | 48.2 | 56.5 | 75.1 | 91 | 108 | 134 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | 547 | |
| | HD | 1.4 | 2.3 | 3.7 | 6.2 | 8.3 | 12.3 | 17.4 | 22.5 | 31 | 40.3 | 48.2 | 56.5 | 75.1 | 91 | 108 | 110 | 144 | 180 | 216 | 260 | 325 | 361 | 432 | 481 | |
| Power supply capacity [kVA] ^{*8} | SLD | 2.5 | 4.1 | 5.9 | 8.3 | 12 | 17 | 24 | 31 | 37 | 44 | 59 | 74 | 88 | 107 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | 521 | |
| | LD | 2.3 | 3.7 | 5.5 | 7.7 | 12 | 17 | 24 | 29 | 34 | 41 | 57 | 68 | 81 | 99 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | 465 | |
| | ND (initial setting) | 1.7 | 2.8 | 4.7 | 6.3 | 9.4 | 13 | 17 | 24 | 31 | 37 | 43 | 57 | 69 | 83 | 102 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | 417 | |
| | HD | 1.1 | 1.7 | 2.8 | 4.7 | 6.3 | 9.4 | 13 | 17 | 24 | 31 | 37 | 43 | 57 | 69 | 83 | 84 | 110 | 137 | 165 | 198 | 248 | 275 | 329 | 367 | |
| Protective structure ^{*9} | | IP20 | | | | | | | | | | | | IP00 | | | | | | | | | | | | |
| Cooling system | | Self-cooling | | | | | | Forced air cooling | | | | | | | | | | | | | | | | | | |
| Weight [kg] | | 2.8 | 2.8 | 2.8 | 3.3 | 3.3 | 6.7 | 6.7 | 8.3 | 8.3 | 15 | 15 | 23 | 41 | 41 | 43 | 52 | 55 | 71 | 78 | 117 | 117 | 166 | 166 | 166 | |

^{*1} The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
^{*2} The rated output capacity indicated assumes that the output voltage is 440V.
^{*3} The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
^{*4} The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
^{*5} Value by the built-in brake resistor
^{*6} Value for the ND rating
^{*7} The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
^{*8} The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
^{*9} FR-DU08: IP40 (except for the PU connector section)
^{*10} For the power voltage exceeding 480V, set Pr. 977 "Input voltage mode selection". (For details, refer to the Instruction Manual.)
^{*11} The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

8.1.3 FR-A842 (400V class)

| Model FR-A842-□ | | 07700 (315K) | 08660 (355K) | 09620 (400K) | 10940 (450K) | 12120 (500K) |
|---|----------------------|---|-----------------|-----------------|-----------------|-----------------|
| Applicable motor capacity [kW] ^{*1} | SLD | 400 | 450 | 500 | — | — |
| | LD | 355 | 400 | 450 | 500 | — |
| | ND (initial setting) | 315 | 355 | 400 | 450 | 500 |
| | HD | 280 | 315 | 355 | 400 | 450 |
| Rated capacity [kVA] ^{*2} | SLD | 587 | 660 | 733 | 834 | 924 |
| | LD | 521 | 587 | 660 | 733 | 834 |
| | ND (initial setting) | 465 | 521 | 587 | 660 | 733 |
| | HD | 417 | 465 | 521 | 587 | 660 |
| Rated current [A] | SLD | 770 | 866 | 962 | 1094 | 1212 |
| | LD | 683 | 770 | 866 | 962 | 1094 |
| | ND (initial setting) | 610 | 683 | 770 | 866 | 962 |
| | HD | 547 | 610 | 683 | 770 | 866 |
| Overload current rating ^{*3} | SLD | 110% of rated motor capacity for 60s, 120% of rated motor capacity for 3s (max. surrounding air temperature 40°C) | | | | |
| | LD | 120% of rated motor capacity for 60s, 150% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | |
| | ND (initial setting) | 150% of rated motor capacity for 60s, 200% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | |
| | HD | 200% of rated motor capacity for 60s, 250% of rated motor capacity for 3s (max. surrounding air temperature 50°C) | | | | |
| Rated voltage ^{*4} | | Three-phase 380 to 500V | | | | |
| Regenerative braking torque ^{*5} (when the converter unit FR-CC2 is used) | Maximum brake torque | 10% torque/continuous | | | | |
| Control power supply auxiliary input | | Single-phase 380 to 500V 50Hz/60Hz ^{*7} | | | | |
| DC power supply voltage | | 430 to 780VDC | | | | |
| Permissible control power supply auxiliary input fluctuation | | Frequency ±5%, voltage ±10% | | | | |
| Protective structure (IEC 60529) ^{*6} | | IP00 | | | | |
| Cooling system | | Forced air cooling | | | | |
| Weight [kg] | | 163 | 163 | 243 | 243 | 243 |

^{*1} The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

^{*2} The rated output capacity indicated assumes that the output voltage is 440V.

^{*3} The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

^{*4} The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.

^{*5} Value for the ND rating

^{*6} FR-DU08: IP40 (except for the PU connector section)

^{*7} For the power voltage exceeding 480V, set Pr. 977 "Input voltage mode selection". (For details, refer to the FR-A800 Instruction Manual.)

For ratings of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.

8.1.4 FR-A846 (400V class)

| Model FR-A846-□ | | 00023 (0.4K) | 00038 (0.75K) | 00052 (1.5K) | 00083 (2.2K) | 00126 (3.7K) | 00170 (5.5K) | 00250 (7.5K) | 00310 (11K) | 00380 (15K) | 00470 (18.5K) | | |
|--|------------------------------------|---|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|-----------------------------------|------------------|--|--|
| Applicable motor capacity [kW] ^{*1} | LD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | | |
| | ND (initial setting) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | | |
| Rated capacity [kVA] ^{*2} | LD | 1.6 | 2.7 | 3.7 | 5.8 | 8.8 | 12 | 18 | 22 | 27 | 33 | | |
| | ND (initial setting) | 1.1 | 1.9 | 3 | 4.6 | 6.9 | 9.1 | 13 | 18 | 24 | 29 | | |
| Rated current [A] | LD | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 | | |
| | ND (initial setting) | 1.5 | 2.5 | 4 | 6 | 9 | 12 | 17 | 23 | 31 | 38 | | |
| Overload current rating ^{*3} | LD | 120% of rated motor capacity for 60s, 150% of rated motor capacity for 3s (max. surrounding air temperature 40°C) | | | | | | | | | | | |
| | ND (initial setting) | 150% of rated motor capacity for 60s, 200% of rated motor capacity for 3s (max. surrounding air temperature 40°C) | | | | | | | | | | | |
| Rated voltage ^{*4} | | Three-phase 380 to 500V | | | | | | | | | | | |
| Regenerative braking | Maximum brake torque ^{*5} | 10% torque/continuous | | | | | | | | | | | |
| Rated input AC voltage/frequency | | Three-phase 380 to 500V 50Hz/60Hz ^{*8} | | | | | | | | | | | |
| Permissible AC voltage fluctuation | | 323 to 550V 50Hz/60Hz | | | | | | | | | | | |
| Permissible frequency fluctuation | | ±5% | | | | | | | | | | | |
| Rated input current [A] ^{*6} | LD | 2.1 | 3.5 | 4.8 | 7.6 | 11.5 | 16 | 23 | 29 | 35 | 43 | | |
| | ND (initial setting) | 1.5 | 2.5 | 4 | 6 | 9 | 12 | 17 | 23 | 31 | 38 | | |
| Power supply capacity [kVA] ^{*7} | LD | 1.6 | 2.7 | 3.7 | 5.8 | 9 | 12 | 18 | 22 | 27 | 33 | | |
| | ND (initial setting) | 1.1 | 1.9 | 3 | 4.6 | 6.9 | 9 | 13 | 18 | 24 | 29 | | |
| Protective structure ^{*9} | IEC 60529 | Dust- and water-proof type (IP55) ^{*10} | | | | | | | | | | | |
| | UL50 | UL Type12 ^{*9} | | | | | | | | | | | |
| Cooling system | | Self-cooling + internal fan | | | | | | | | Forced air cooling + internal fan | | | |
| Weight [kg] | | 15 | 15 | 15 | 15 | 16 | 17 | 26 | 26 | 27 | 27 | | |

^{*1} The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.

^{*2} The rated output capacity indicated assumes that the output voltage is 440V.

^{*3} The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

^{*4} The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.

^{*5} Value for the ND rating

^{*6} The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

^{*7} The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).

^{*8} For the power voltage exceeding 480V, set Pr. 977 "Input voltage mode selection". (For details, refer to the Instruction Manual.)

^{*9} UL Type 12 Enclosure-Suitable for Installation in a Compartment Handling Conditioned Air (Plenum)

^{*10} For compliance with IP55, remove the protective bushes and install the recommended cable glands.

A APPENDIX

A.1 Instructions for Compliance with the EU Directives

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
Name: Mitsubishi Electric Europe B.V.
Address: Gothaer Straße 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.

A.1.1 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")
Standards for IP55 compatible models: EN61800-3:2004 (First environment / PDS Category "C2", Second environment / PDS Category "C3". The applicable standard depends on the built-in EMC filter.)
- This inverter is not intended to be used on a low-voltage public network which supplies domestic premises.
- Radio frequency interference is expected if used on such a network.
- The installer shall provide a guide for installation and use, including recommended mitigation devices.

NOTES

- 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.

NOTES

Set the EMC filter valid and install the inverter and perform EMC wiring according to the following instructions:

- The inverter (resp. the converter unit for separated converter types) is equipped with a built-in EMC filter. Set the EMC filter valid. (For details, refer to the FR-A800 and FR-CC2 Instruction Manuals.)
- Connect the inverter (and the converter unit) to an earthed power supply.
- Install a motor and a control cable according to the EMC Installation Guidelines (BCN-A21041-204).
- The cable length between the inverter and the motor is 5 m maximum.
- Confirm that the inverter (and the converter unit) conforms with the EMC Directive as the industrial drives application for final installation.
- For IP55 compatible models:
If the inverter with a built-in Class C2 EMC filter has an input current of 16 A or less, limits for harmonic current emissions of EN/IEC61000-3-2 shall apply.
However, if the inverter is the professional equipment with a total rated power of 1 kW or higher, limits for harmonic current emissions of EN/IEC61000-3-2 shall not apply. If the equipment input current is more than 16 A and does not exceed 75 A, the equipment complies with EN/IEC61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to the value provided in the table below at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to the value mentioned in the table below.

| Inverter model | Standard | S_{sc} | R_{sce} |
|----------------------|------------------|----------|-----------|
| FR-A846-00023(0.4K) | EN/IEC61000-3-2 | — | — |
| FR-A846-00250(7.5K) | EN/IEC61000-3-12 | 2261 kVA | ≥ 120 |
| FR-A846-00310(11K) | | 3059 kVA | |
| FR-A846-00380(15K) | | 4124 kVA | |
| FR-A846-00470(18.5K) | | 5055 kVA | |

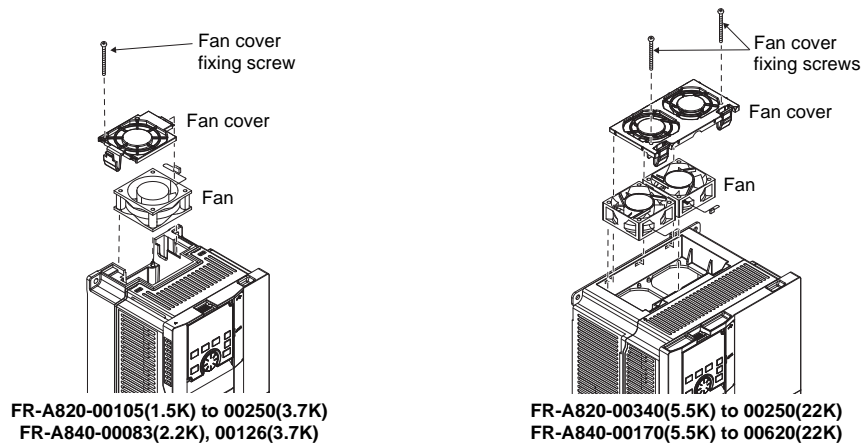
A.1.2 Low Voltage Directive

We have self-confirmed our inverters as products compliant to the Low Voltage Directive (conforming standard EN 61800-5-1) and place the CE mark 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 19* under the following conditions.
 - Surrounding air temperature: 40°C maximum
 - If conditions are different from above, select appropriate wire according to EN60204 Appendix C TABLE 5.
- Use a tinned (plating should not include zinc) crimping terminal to connect the earth 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 19*.
- Use the moulded case circuit breaker and magnetic contactor which conform to the EN or IEC Standard.
- This product can cause a DC current in the protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.
- Use the inverter under the conditions of overvoltage category II (usable regardless of the earth 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. An insulating transformer needs to be installed in the input side of the FR-A820 series inverters.
 - To use the inverter FR-A820-01540(30K) or higher, the FR-A840-00770(30K) or higher (IP00) and the FR-A842 models 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 (standard models and separated converter types only).
 - To use the inverter FR-A820-01250(22K) or less and FR-A840-00620(22K) or less (IP20) outside of an enclosure in the environment of pollution degree 2, fix a fan cover with fan cover fixing screws enclosed.



- On the input and output of the inverter (and the converter unit), 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 (and the converter unit).)
- Control circuit terminals on *page 5* are safely isolated from the main circuit.
- Environment

| | During Operation | In Storage | During Transportation |
|-----------------------------|--|----------------|-----------------------|
| Surrounding air temperature | LD, ND (initial setting), HD ratings: -10 to +50°C SLD rating: -10 to +40°C IP55 compatible models: -10 to +40°C | -20 to +65°C | -20 to +65°C |
| Ambient humidity | 95% RH or less | 95% RH or less | 95% RH or less |
| Maximum altitude | 2500m | 2500m | 10000m |

- For IP55 compatible models: Install the inverter at a place where ultraviolet radiation is not applied directly.



Wiring protection

For installation Class T, Class J, or Class CC fuse or UL 489 Molded Case Circuit Breaker (MCCB) according to the local directives must be provided.

| FR-A820-□ | | 00046 (0.4K) | 00077 (0.75K) | 00105 (1.5K) | 00167 (2.2K) | 00250 (3.7K) | 00340 (5.5K) | 00490 (7.5K) | 00630 (11K) | 00770 (15K) | 00930 (18.5K) | 01250 (22K) | 01540 (30K) |
|---|--|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|------------------|----------------|----------------|
| Rated fuse voltage [V] | | 240V or more | | | | | | | | | | | |
| Fuse Maximum allowable rating [A] *1 | Without power factor improving reactor | 15 | 20 | 30 | 40 | 60 | 80 | 150 | 175 | 200 | 225 | 300 | 350 |
| | With power factor improving reactor | 15 | 20 | 20 | 30 | 50 | 70 | 125 | 150 | 200 | 200 | 250 | 300 |
| Molded case circuit breaker (MCCB) Maximum allowable rating [A] *1 | | 15 | 15 | 25 | 40 | 60 | 80 | 110 | 150 | 190 | 225 | 300 | 350 |

| FR-A820-□ | | 01870 (37K) | 02330 (45K) | 03160 (55K) | 03800 (75K) | 04750 (90K) |
|---|--|----------------|----------------|----------------|----------------|----------------|
| Rated fuse voltage [V] | | 240V or more | | | | |
| Fuse Maximum allowable rating [A] *1 | Without power factor improving reactor | 400 | 500 | 500 | — | — |
| | With power factor improving reactor | 350 | 400 | 500 | 600 | 700 |
| Molded case circuit breaker (MCCB) Maximum allowable rating [A] *1 | | 450 | 500 | 700 | 900 | 1000 |

| FR-A840-□ | | 00023 (0.4K) | 00038 (0.75K) | 00052 (1.5K) | 00083 (2.2K) | 00126 (3.7K) | 00170 (5.5K) | 00250 (7.5K) | 00310 (11K) | 00380 (15K) | 00470 (18.5K) | 00620 (22K) | 00770 (30K) |
|---|--|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|------------------|----------------|----------------|
| Rated fuse voltage [V] | | 500V or more | | | | | | | | | | | |
| Fuse Maximum allowable rating [A] *1 | Without power factor improving reactor | 6 | 10 | 15 | 20 | 30 | 40 | 70 | 80 | 90 | 110 | 150 | 175 |
| | With power factor improving reactor | 6 | 10 | 10 | 15 | 25 | 35 | 60 | 70 | 90 | 100 | 125 | 150 |
| Molded case circuit breaker (MCCB) Maximum allowable rating [A] *1 | | 15 | 15 | 15 | 20 | 30 | 40 | 60 | 70 | 90 | 100 | 150 | 175 |

| FR-A840-□ | | 00930 (37K) | 01160 (45K) | 01800 (55K) | 02160 (75K) | 02600 (90K) | 03250 (110K) | 03610 (132K) | 04320 (160K) | 04810 (185K) | 05470 (220K) | 06100 (250K) | 06830 (280K) |
|---|--|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Rated fuse voltage [V] | | 500V or more | | | | | | | | | | | |
| Fuse Maximum allowable rating [A] *1 | Without power factor improving reactor | 200 | 250 | 300 | — | — | — | — | — | — | — | — | — |
| | With power factor improving reactor | 175 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| Molded case circuit breaker (MCCB) Maximum allowable rating [A] *1 | | 225 | 250 | 450 | 450 | 500 | 600 | 800 | 900 | 1000 | 1200 | 1200 | 1200 |

| FR-A846-□ | | 00023 (0.4K) | 00038 (0.75K) | 00052 (1.5K) | 00083 (2.2K) | 00126 (3.7K) | 00170 (5.5K) | 00250 (7.5K) | 00310 (11K) | 00380 (15K) | 00470 (18.5K) | |
|---|--|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|------------------|--|
| Rated fuse voltage [V] | | 500V or more | | | | | | | | | | |
| Fuse Maximum allowable rating [A] *1 | | 6 | 10 | 10 | 15 | 25 | 35 | 60 | 70 | 90 | 100 | |
| Molded case circuit breaker (MCCB) Maximum allowable rating [A] *1 | | 15 | 15 | 15 | 20 | 30 | 40 | 60 | 70 | 90 | 100 | |

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

For wiring protection of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual-

A.1.3 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
Suitable for use in a circuit capable of delivering not more than 100kA rms symmetrical amperes, 550V or 600V maximum.

A.1.4 Machinery directive

The frequency inverter itself is not a machine in the spirit of the EU machinery directive. The start up of the frequency inverter in a machine is prohibited so long until it has been confirmed that the entire machine complies with the provisions of Directive 98/37/EC (from 29.12.2009 Machinery Directive 2006/42/EC).

A.2 Instructions for UL and cUL

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

A.2.1 General precautions

⚠ WARNING

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.

A.2.2 Installation

FR-A820/A840/A842 inverters

These types of inverter have been approved as products for use in enclosure and approval tests were conducted under the following conditions.

Design an enclosure so that the inverter surrounding air temperature, humidity and atmosphere satisfy the specifications. (Refer to *page 2*.)

FR-A846 inverters (IP55 compatible model)

These types of inverter have been approved as products for a UL type12 enclosure that is suitable for Installation in a Compartment Handling Conditioned Air (Plenum).

Install the inverter so that the inverter surrounding air temperature, humidity and atmosphere satisfy the specifications. (Refer to *page 2*.)

The drive must be installed in clean air according to enclosure classification.

Cooling air must be clean, free from corrosive materials and electrically conductive dust regarding the UL Type 12 enclosure.

This enclosure provides protection from airborne dust and light sprays or splashing water from all directions.

Wiring protection

For installation in the United States, Class T, Class J, or Class CC fuse or UL 489 Molded Case Circuit Breaker (MCCB) must be provided in accordance with the National Electrical Code and any applicable provincial codes (refer to the tables on *page 58*).

For installation in Canada, Class T, Class J, or Class CC fuse or UL 489 Molded Case Circuit Breaker (MCCB) must be provided in accordance with the Canada Electrical Code and any applicable provincial codes (refer to the tables on *page 58*).

A.2.3 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 wires (rated at 75°C) and round crimping terminals. Crimp the crimping terminals with the crimping tool recommended by the terminal maker.

A.2.4 Short circuit ratings

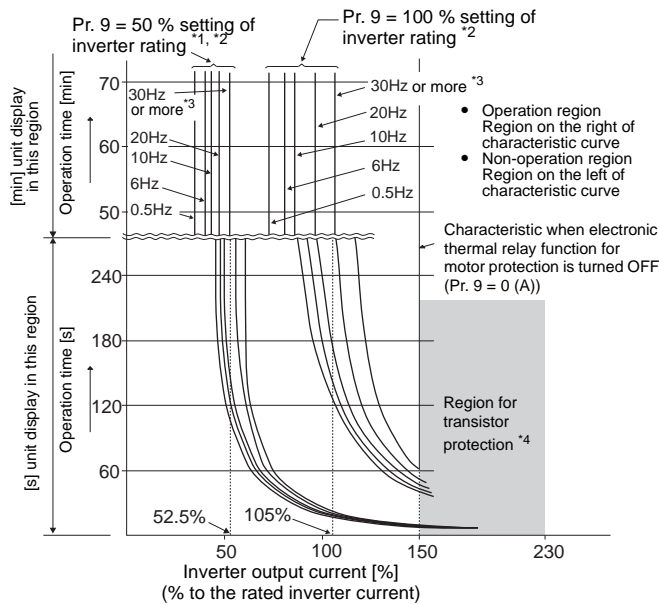
- 200V class
Suitable for use in a circuit capable of delivering not more than 100kA rms symmetrical amperes, 264V maximum.
- 400V class
Suitable for use in a circuit capable of delivering not more than 100kA rms symmetrical amperes, 550V or 600V maximum.



A.2.5 Motor overload protection

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 set one of "1", "13" to "16", "50", "53", "54" in Pr. 71. For FR-A842 models set one of "1", "13" to "16" in Pr. 71. This provides a 100 % continuous torque characteristic in the low-speed range. Set the rated current of the motor in Pr. 9.

¹ When 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 6 Hz or higher.

⁴ For FR-A842 models: Transistor protection is activated depending on the temperature of the heatsink. The protection may be activated even with less than 150% depending on the operating conditions.

CAUTION

- The internal accumulated heat value of the electronic thermal relay function is reset by inverter power reset and reset signal input. Avoid unnecessary reset and power-OFF.
- When using multiple motors with one inverter, or using a multi-pole motor or a specialized motor, provide an external thermal relay (OCR) between the inverter and motor. And for the setting of the thermal relay, add the line-to line leakage current to the current value on the motor rating plate (details in the Instruction Manual).
For low-speed operation where the cooling capability of the motor reduces, it is recommended to use a thermal protector or thermistor-incorporated 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 an external thermal relay.
- Set Pr. 9 = "0" for vector-control-dedicated motors (SF-V5RU) because they are equipped with thermal protectors.
- Electronic thermal relay may not operate when 5% or less of rated inverter current is set to electronic thermal relay setting.
- Motor over temperature sensing is not provided by the drive.

| HEADQUARTERS | | EUROPEAN REPRESENTATIVES | | EUROPEAN REPRESENTATIVES | | EURASIAN REPRESENTATIVES | |
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| Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061 Phone: +1 (847) 478-2100 Fax: +1 (847) 478-0328 | USA | MELTRADE Kft. Fertő utca 14. HU-1107 Budapest Phone: +36 (0)1 / 431-9726 Fax: +36 (0)1 / 431-9727 | HUNGARY | OOO "CSC-AUTOMATION" 4-B, M. Raskovoyi St. UA-02660 Kiev Phone: +380 (0)44 / 494 33 44 Fax: +380 (0)44 / 494-33-66 | UKRAINE | | |
| | | Beijer Electronics SIA Ritausmas iela 23 LV-1058 Riga Phone: +371 (0)6 / 784 2280 Fax: +371 (0)6 / 784 2281 | LATVIA | | | | |