MITSUBISHI ELECTRIC

800 series

INVERTER
FR-A800 Plus
INSTALLATION GUIDELINE

Roll to Roll Function

FR-A820-00046(0.4K) to 04750(90K)(-E)-R2R
FR-A840-00023(0.4K) to 06830(280K)(-E)-R2R
FR-A842-07700(315K) to 12120(500K)(-E)-R2R

Thank you for choosing this Mitsubishi Electric 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.

CONTENTS

Version check

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Version B

Print date		Art. no.	Revision
05/2019	pdp	473174-A	First edition
08/2019	pdp	473174-B	Additions: Ethernet parameters added: Pr. 1073 to Pr. 1078, Pr. 1124 and Pr. 1125, Pr. 1431 to Pr. 1455 Changes: General corrections according “INSTRUCTION MANUAL (STARTUP) – B-0600605-D”

⚠ For Maximum Safety

- Mitsubishi Electric 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 Electric 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 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 or the wiring cover. Otherwise you may get an electric shock.
- Do not run the inverter with the front cover or the wiring cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Even if power is off, do not remove the front cover except for wiring or periodic inspection.You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, check to make sure that the operation panel LED 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 61140 class 1 and other applicable standards). A neutral-point earthed (grounded) power supply for 400 V 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.
- 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.
- 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.

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).
- 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 (+ and –) 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 will be extremely hot. Touching these devices may cause a burn.

Additional Instructions

The following instructions must be also followed. If the product is handled incorrectly, it may cause unexpected fault, an injury, or an electric shock.

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.
- The product must be transported in correct method that corresponds to the weight. Failure to do so may lead to injuries.
- 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
Surrounding air temperature	LD, SND, ND (initial setting), HD: −10 °C to +50 °C (non-freezing) SLD: −10 °C to +40 °C *2 (non-freezing)
Ambient humidity	With circuit board coating (conforming to IEC 60721-3-3 3C2/3S2): 95% RH or less (non-condensing), Without circuit board coating: 90% RH or less (non-condensing)
Storage temperature	−20 °C to +6 5°C *1
Atmosphere	Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
Altitude	Maximum 1000 m above sea level for standard operation. After that derate by 3% for every extra 500 m up to 2500 m (91%).
Vibration	5.9 m/s² or less *2 at 10 to 55 Hz (directions of X, Y, Z axes)

*1 Temperature applicable for a short time, e.g. in transit.
*2 2.9 m/s² or less for the FR-A840-04320(160K)-R2R or higher.

- If halogen-based materials (fluorine, chlorine, bromine, iodine, etc.) infiltrate into a Mitsubishi Electric 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 Electric products, or use an alternative sterilization or disinfection method (heat disinfection, etc.) for packaging. Sterilization of 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 a power factor correction capacitor or surge suppressor/capacitor type filter on the inverter output side, which are not approved from Mitsubishi Electric. 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.

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 STOP RESET 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 (STF/STR) signal is off before resetting the inverter alarm. A failure to do so may restart the motor suddenly.• 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.

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.

1 INSTALLATION AND INSTRUCTIONS

1.1 Inverter Type

Symbol	Voltage class
2	200 V class
4	400 V class

Symbol	Structure, functionality
0	Standard model
2	Separated converter type

Capacity [*1]	Description
00023 to 12120	Inverter SLD rated current [A]
0.4 to 500K	Inverter ND rated capacity [kW]

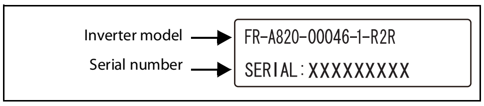
Symbol	Type [*2]	Communication type
-1	FM	RS-485
-2	CA	RS-485
-E1	FM	Ethernet [*5]
-E2	CA	Ethernet [*5]

Symbol	Circuit board coating [*3]	Plated conductor
Without	Without	Without
-60	With	Without
-06 [*4]	With	With

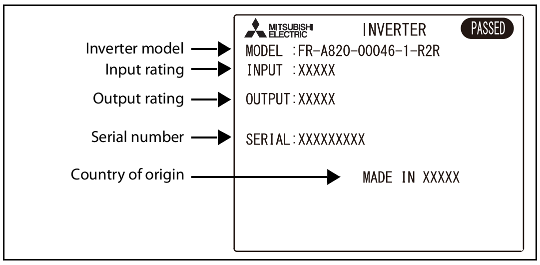
Symbol	Function
R2R	Roll to roll dedicated model

FR - A820 - 00046 -1 - ☐ R2R

Capacity plate



Rating plate



*1 Models can be alternatively indicated with the inverter rated current (SLD rating).
*2 Specification differs by the type. Major differences are shown in the table below:

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 ±10 V DC)	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA: analog current output (0 to 20 mA DC) Terminal AM: analog voltage output (0 to ±10 V DC)	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

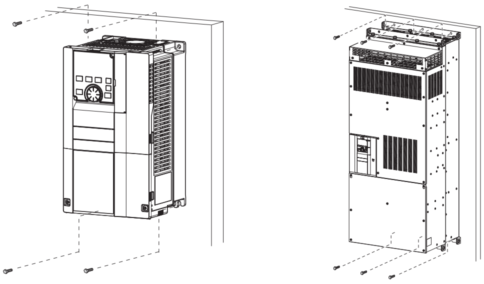
*3 Conforming to IEC60721-3-3 3C2/3S2.
*4 For the FR-A820-00340(5.5K)-R2R or higher, and the FR-A840-00170(5.5K)-R2R or higher
*5 Inverter equipped with a built-in Ethernet board (FR-A8ETH).

Notes

- The rating plate shows the inverter rated 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.
- In this Instruction Manual, the inverter model name consists of the applicable motor capacity and the rated current. (Example: FR-A842-07700(315K)-R2R)
  For further specification details like capacity, current or overload current rating refer to *chapter 7*.
- In this installation guideline the following common designations are used for the different types of inverter models:
  – FR-A8☐0: Standard model
  – FR-A8☐2: Separated converter type
- For selecting the right frequency inverter you should know details of your application and especially the load characteristic.
- For how to read the SERIAL number, refer to *page 59*.

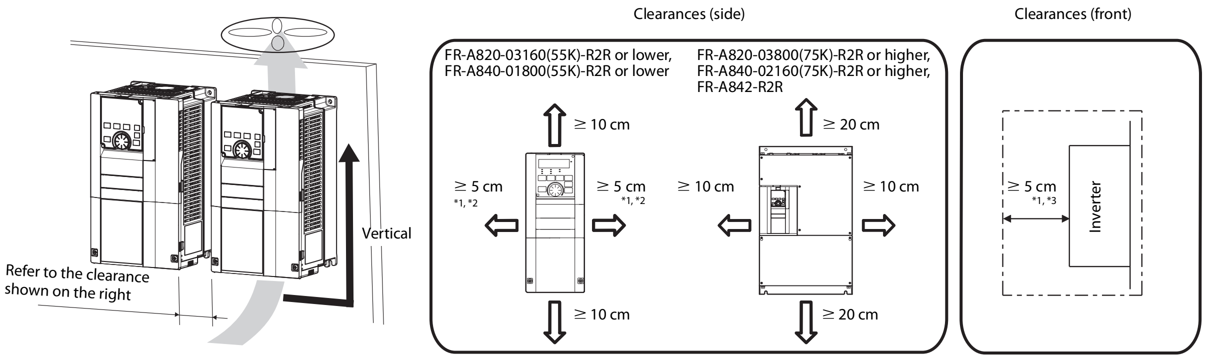
1.2 Installation of the inverter

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



Fix six positions for the FR-A840-04320(160K)-R2R or higher and for the FR-A842-R2R 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.
- For heat dissipation and maintenance, keep clearance between the inverter and the other devices or enclosure surface. The clearance below the inverter is required as a wiring space, and the clearance above the inverter is required as a heat dissipation space.



*1 For the FR-A820-00250(3.7K)-R2R or lower and FR-A840-00126(3.7K)-R2R or lower allow 1 cm or more clearance.

*2 When using the FR-A820-01250(22K)-R2R or lower and FR-A840-00620(22K)-R2R 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 (0 cm clearance) is available.

*3 For replacing the cooling fan of the FR-A840-04320(160K)-R2R or higher, and of the FR-A842-R2R models, 30 cm of space is necessary in front of the inverter. Refer to the "FR-A800 Instruction Manual (Detailed)" and "FR-A802-R2R Instruction Manual (Hardware)" for fan replacement.

1.2.1 Installation orientation of the inverter

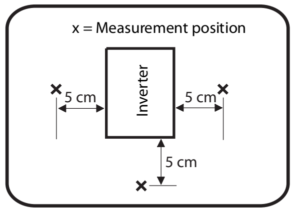
Install the inverter on a wall as specified. Do not mount it horizontally or in any other way.

1.2.2 Above the inverter

Heat is blown up from inside the inverter by the small fan built in the unit. Any equipment placed above the inverter should be heat resistant.

1.3 Environment

Before installation, check that the environment meets following specifications:

Surrounding air temperature *4, *5	LD, SND, ND (initial setting), HD: −10 °C to +50 °C (non-freezing) SLD: −10 °C to +40 °C (non-freezing) Enclosure 
Ambient humidity	With circuit board coating (conforming to IEC 60721-3-3 3C2/3S2): 95% RH or less (non-condensing), Without circuit board coating: 90% RH or less (non-condensing)
Storage temperature	−20 °C to +65 °C *1
Atmosphere	Indoors (No corrosive and flammable gases, oil mist, dust and dirt)
Altitude	Maximum 2,500 m above sea level *2
Vibration	5.9 m/s^2 or less *3 at 10 to 55 Hz (directions of X, Y, Z axes)

*1 Temperature applicable for a short time, e.g. in transit.
*2 For the installation at an altitude above 1,000 m up to 2,500 m, derate the rated current 3% per 500 m.
*3 2.9 m/s^2 or less for the FR-A840-04320(160K)-R2R or higher, and the FR-A842-R2R
*4 Surrounding Air Temperature is a temperature measured at a measurement position in an enclosure.
Ambient Temperature is a temperature outside an enclosure.
*5 For the amount of heat generated by the inverter unit, refer to the Instruction Manual (Detailed).

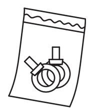
1.4 Accessory

- Fan cover fixing screws
  These screws are necessary for compliance with the EU Directives (refer to *page 55*).

Capacity	Screw size (mm)	Quantity
FR-A820-00105(1.5K)-R2R to FR-A820-00250(3.7K)-R2R FR-A840-00083(2.2K)-R2R, FR-A840-00126(3.7K)-R2R	M3 × 35	1
FR-A820-00340(5.5K)-R2R to FR-A820-00490(7.5K)-R2R FR-A840-00170(5.5K)-R2R to FR-A840-00250(7.5K)-R2R	M3 × 35	2
FR-A820-00630(11K)-R2R to FR-A820-01250(22K)-R2R FR-A840-00310(11K)-R2R, FR-A840-00620(22K)-R2R	M4 × 40	2

- Eyebolt for hanging the inverter

Capacity	Eyebolt size	Quantity
FR-A840-04320(160K)-R2R to FR-A840-06830(280K)-R2R	M12	2



- Earthing (grounding) cable (1): For connection with a communication option
- CD-ROM (1): Including the Instruction Manual (Detailed) and other documents

1.5 Installing a communication option (FR-A800-E-R2R)

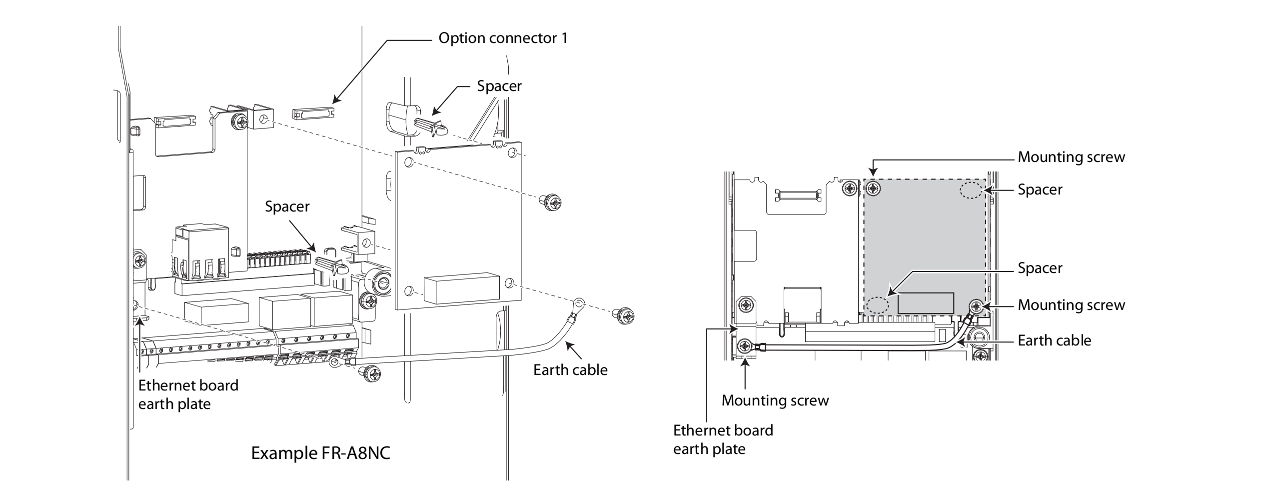
To use a communication option, the enclosed earthing (grounding) cable needs to be installed. Install the cable according to the following procedure:

① Insert spacers into the mounting holes that will not be tightened with the option mounting screws.

② Fit the connector of the communication option to the guide of the connector of the inverter, and insert the option as far as it goes. (Insert it to the inverter option connector 1.)

③ Remove the mounting screw (lower) of the Ethernet board earth plate. Fit the one terminal of the earthing (grounding) cable on the Ethernet board earth plate and fix it securely to the inverter with the mounting screw (tightening torque 0.33 Nm to 0.40 Nm).

④ Fix the left part of the communication option securely with the option mounting screw, and place another terminal of the earthing (grounding) cable on the right part of the option and fix the cable terminal and the option with the option mounting screw (tightening torque 0.33 Nm to 0.40 Nm).
If the screws are not tightened properly, the connector may not be inserted deep enough. Check the connector.



Notes

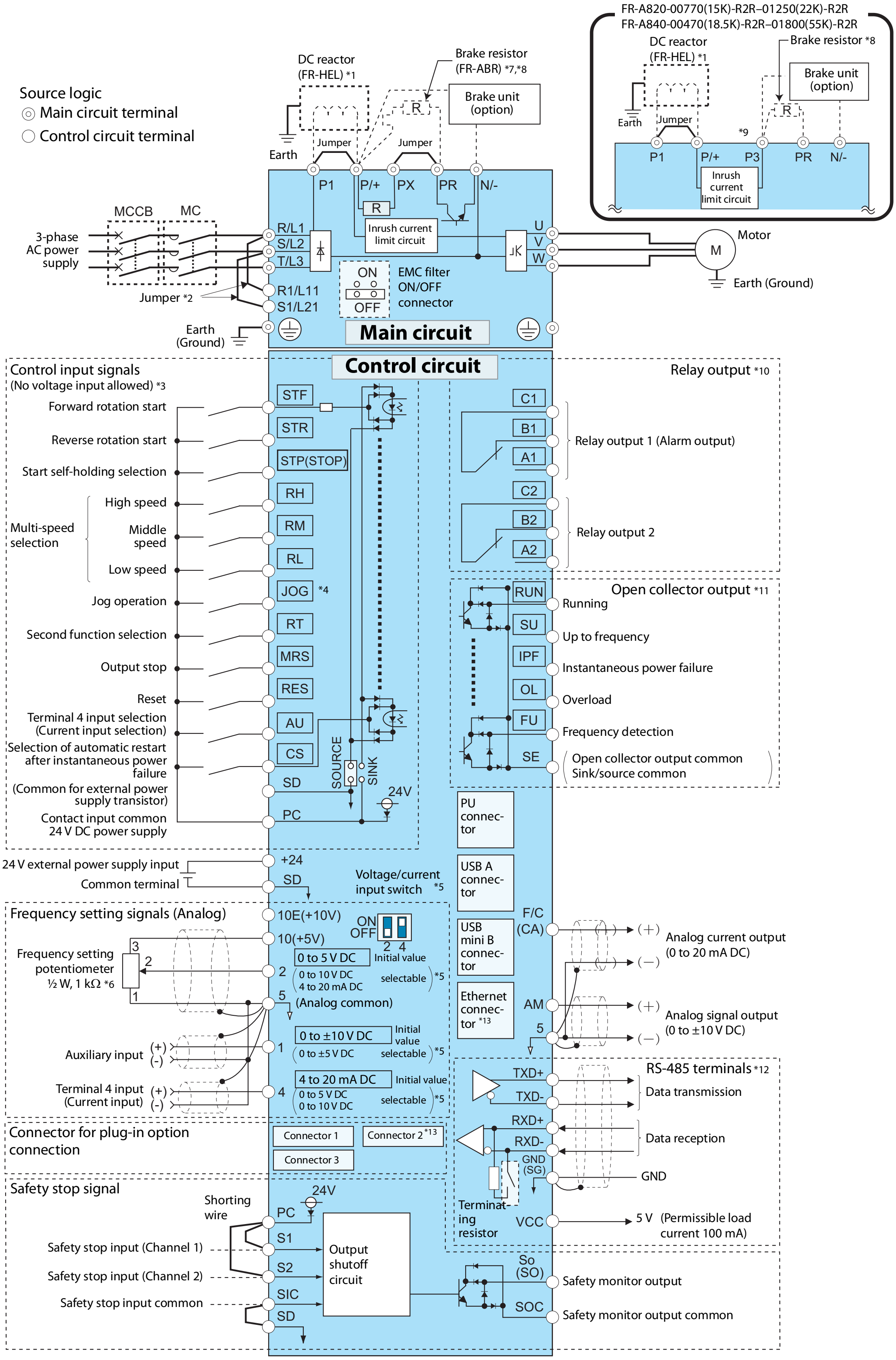
- The number and shape of the spacers used differ depending on the communication option type. Refer to the Instruction Manual of each communication option for details.
- The earth plate enclosed with a communication option is not used.

2 WIRING

2.1 Terminal connection diagrams

2.1.1 FR-A820/A840(-E)-R2R

- **CA type**



For footnotes *1 to *13 refer to next page.

*1 For the FR-A820-03800(75K)-R2R or higher, and the FR-A840-02160(75K)-R2R 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 48*, and select one suitable for the applicable motor capacity.) When a DC reactor is connected to the FR-A820-03160(55K)-R2R or lower or the FR-A840-01800(55K)-R2R 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 29*.)

*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, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to "FR-A800 Instruction Manual (Detailed)".)

*6 It is recommended to use 2 W, 1 kΩ when the frequency setting signal is changed frequently.

*7 If connecting a brake resistor, remove the jumper between PR and PX. (FR-A820-00490(7.5K)-R2R or lower, FR-A840-00250(7.5K)-R2R or lower).

*8 Connect a brake resistor across terminals P/+ (P3) and PR. The terminal PR is equipped in FR-A820-00046(0.4K)-R2R to 01250(22K)-R2R, FR-A840-00023(0.4K)-R2R to 01800(55K)-R2R. Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to "FR-A800 Instruction Manual (Detailed)".)

*9 Do not connect the DC power supply (under DC feeding mode) to terminal P3.

*10 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 29*.)

*11 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 29*.)

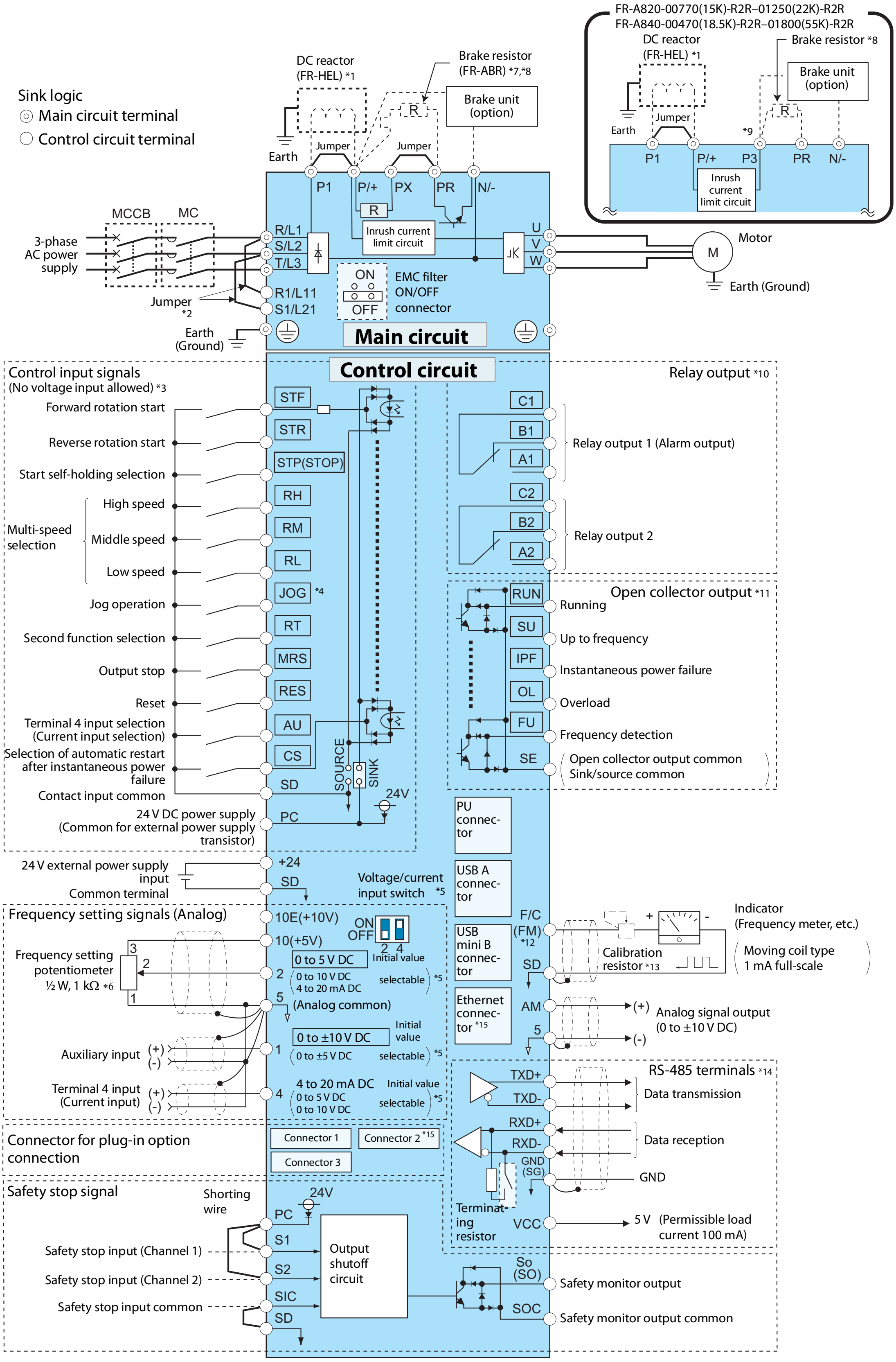
*12 Upon delivery the FR-A800-E-R2R inverter models are not equipped with the RS-485 terminal block.

*13 For FR-A800-E-R2R: The option connector 2 cannot be used because the Ethernet board is installed in the initial status. The Ethernet board must be removed to install a plug-in option to the option connector 2. (However, Ethernet communication is disabled in that case.)

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10 cm 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.

● FM type



For footnotes *1 to *15 refer to next page.

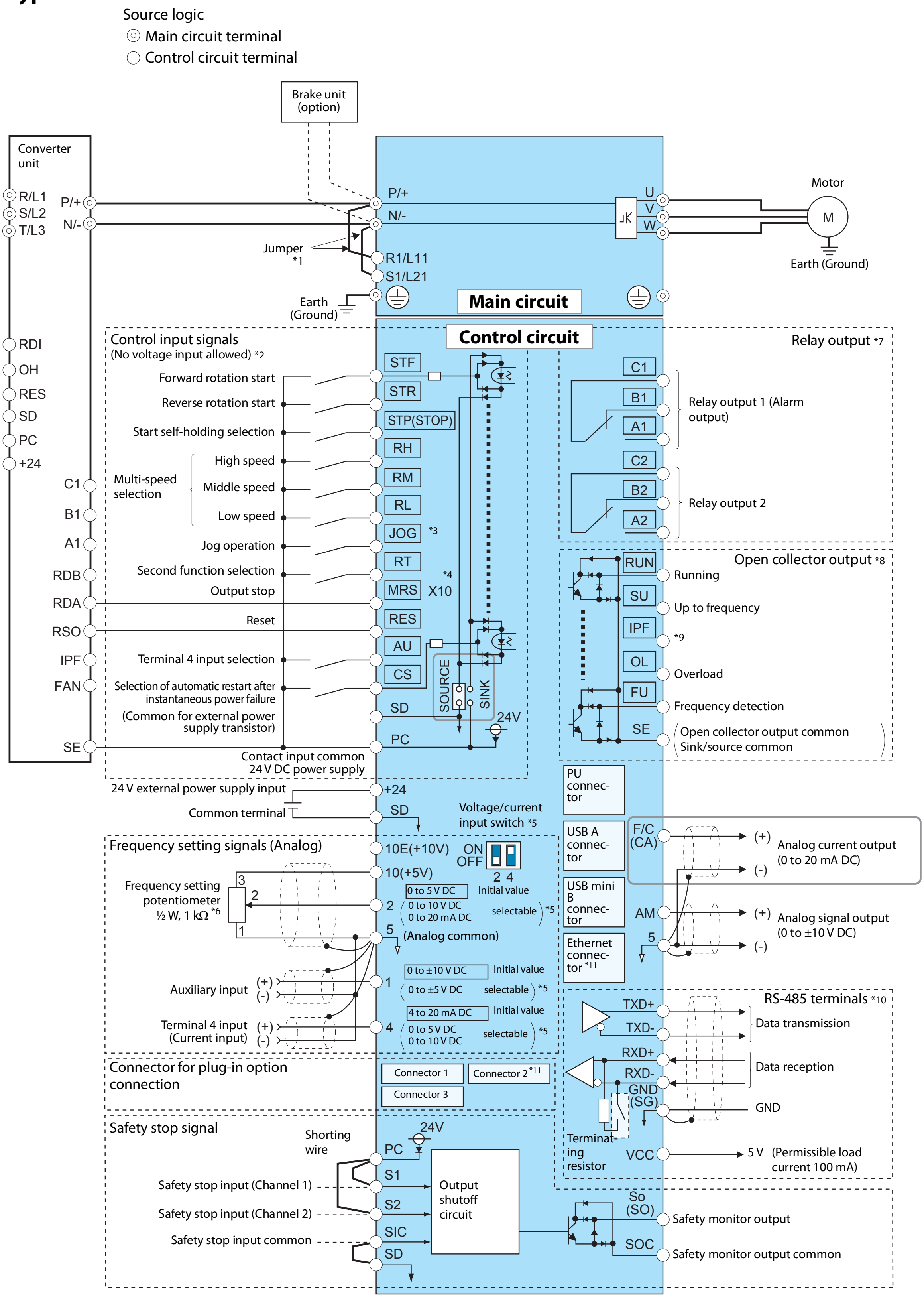
*1 For the FR-A820-03800(75K)-R2R or higher, and the FR-A840-02160(75K)-R2R or higher, or if using a motor with a capacity of 75 kW or higher, always connect a DC reactor (FR-HEL), which is available as an option.
(When selecting a DC reactor, refer to *page 48*, and select one suitable for the applicable motor capacity.) When a DC reactor is connected to the FR-A820-03160(55K)-R2R or lower or the FR-A840-01800(55K)-R2R 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 29*.)
*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, set the voltage/current input switch OFF. To input a current, set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. (Pr. 561) (Refer to "FR-A800 Instruction Manual (Detailed)".)
*6 It is recommended to use 2 W, 1 kΩ when the frequency setting signal is changed frequently.
*7 If connecting a brake resistor, remove the jumper between PR and PX. (FR-A820-00490(7.5K)-R2R or lower, FR-A840-00250(7.5K)-R2R or lower).
*8 Connect a brake resistor across terminals P/+ (P3) and PR. The terminal PR is equipped in FR-A820-00046(0.4K)-R2R to 01250(22K)-R2R, and FR-A840-00023(0.4K)-R2R to 01800(55K)-R2R. Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to "FR-A800 Instruction Manual (Detailed)".)
*9 Do not connect the DC power supply (under DC feeding mode) to terminal P3.
*10 The function of these terminals can be changed with the output terminal assignment (Pr. 195, Pr. 196). (Refer to *page 29*.)
*11 The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 29*.)
*12 The terminal F/C(FM) can be used to output pulse trains as open collector output by setting Pr. 291.
*13 Not required when calibrating the scale with the operation panel.
*14 Upon delivery the FR-A800-E-R2R inverter models are not equipped with the RS-485 terminal block.
*15 For FR-A800-E-R2R: The option connector 2 cannot be used because the Ethernet board is installed in the initial status. The Ethernet board must be removed to install a plug-in option to the option connector 2. (However, Ethernet communication is disabled in that case.)

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10 cm 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.

2.1.2 FR-A842(-E)-R2R

● CA type



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

Note

The FR-A842-R2R 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] The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 29*.)

[*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 "FR-A800 Instruction Manual (Detailed)".)

[*6] It is recommended to use 2 W, 1 kΩ 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 29*.)

[*8] The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 29*.)

[*9] No function is assigned in the initial setting. Use Pr.192 for function assignment.

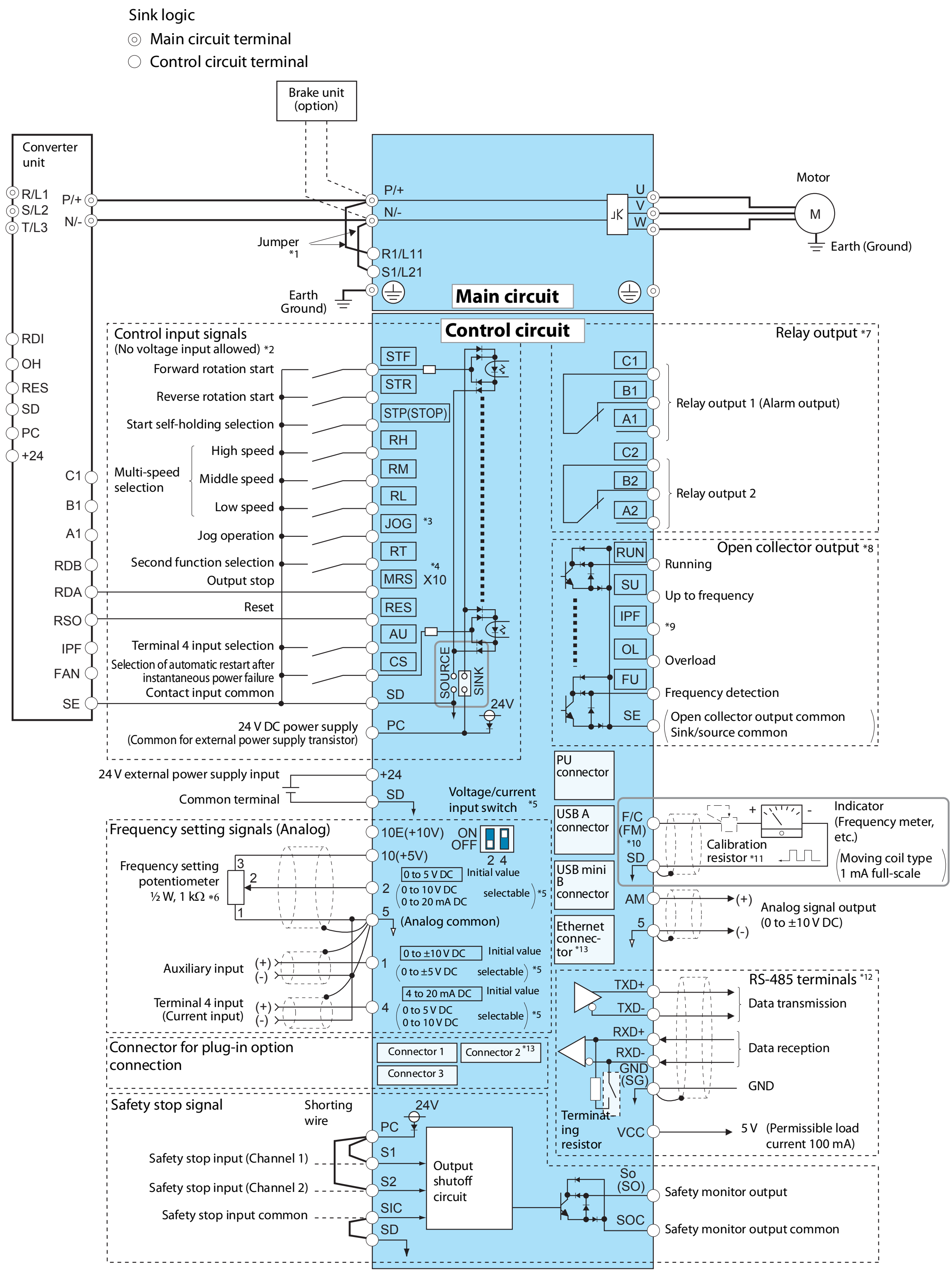
[*10] Upon delivery the FR-A800-E-R2R inverter models are not equipped with the RS-485 terminal block.

[*11] For FR-A800-E-R2R: The option connector 2 cannot be used because the Ethernet board is installed in the initial status. The Ethernet board must be removed to install a plug-in option to the option connector 2. (However, Ethernet communication is disabled in that case.)

CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10 cm 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.

● FM type



For footnotes *1 to *13 refer to next page.

Note

The FR-A842-R2R 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] The function of these terminals can be changed with the input terminal assignment (Pr. 178 to Pr. 189). (Refer to *page 29*.)

[*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 "FR-A800 Instruction Manual (Detailed)".)

[*6] It is recommended to use 2 W, 1 kΩ 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 29*.)

[*8] The function of these terminals can be changed with the output terminal assignment (Pr. 190 to Pr. 194). (Refer to *page 29*.)

[*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.

[*12] Upon delivery the FR-A800-E-R2R inverter models are not equipped with the RS-485 terminal block.

[*13] For FR-A800-E-R2R: The option connector 2 cannot be used because the Ethernet board is installed in the initial status. The Ethernet board must be removed to install a plug-in option to the option connector 2. (However, Ethernet communication is disabled in that case.)

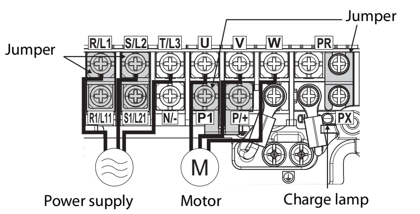
CAUTION

- To prevent a malfunction due to noise, keep the signal cables more than 10 cm 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.

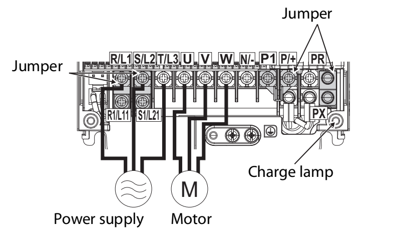
2.2 Main circuit terminal

2.2.1 Terminal layout and wiring

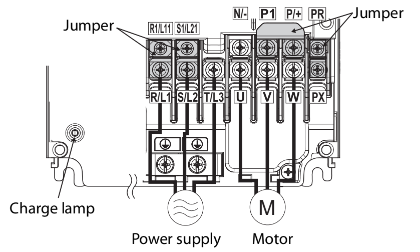
FR-A820-00046(0.4K)-R2R, 00077(0.75K)-R2R



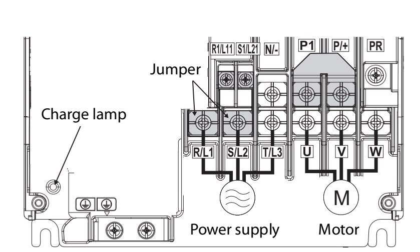
FR-A820-00105(1.5K)-R2R to 00250(3.7K)-R2R
FR-A840-00023(0.4K)-R2R to 00126(3.7K)-R2R



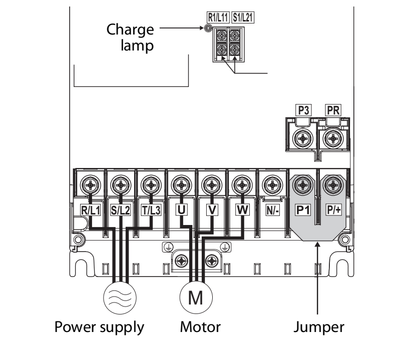
FR-A820-00340(5.5K)-R2R, 00490(7.5K)-R2R
FR-A840-00170(5.5K)-R2R, 00250(7.5K)-R2R



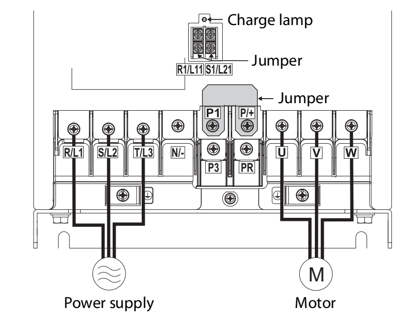
FR-A820-00630(11K)-R2R
FR-A840-00310(11K)-R2R, 00380(15K)-R2R



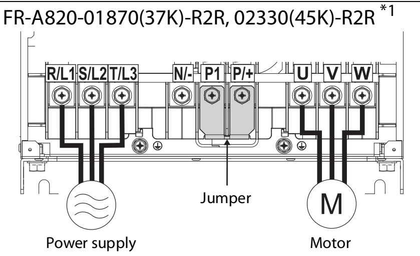
FR-A820-00770(15K)-R2R to 01250(22K)-R2R
FR-A840-00470(18.5K)-R2R, 00620(22K)-R2R



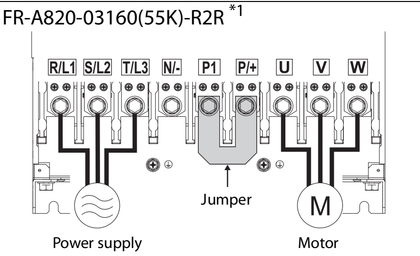
FR-A820-01540(30K)-R2R *2
FR-A840-00770(30K)-R2R



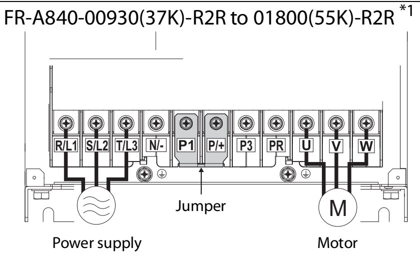
FR-A820-01870(37K)-R2R, 02330(45K)-R2R *1



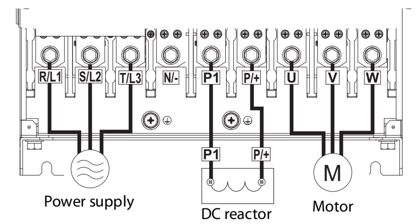
FR-A820-03160(55K)-R2R *1



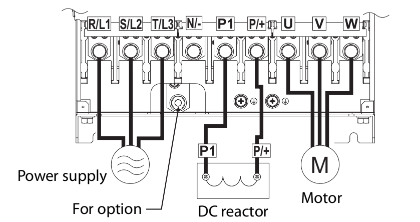
FR-A840-00930(37K)-R2R to 01800(55K)-R2R *1



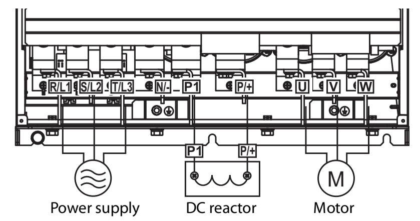
FR-A840-02160(75K)-R2R, 02600(90K)-R2R *1



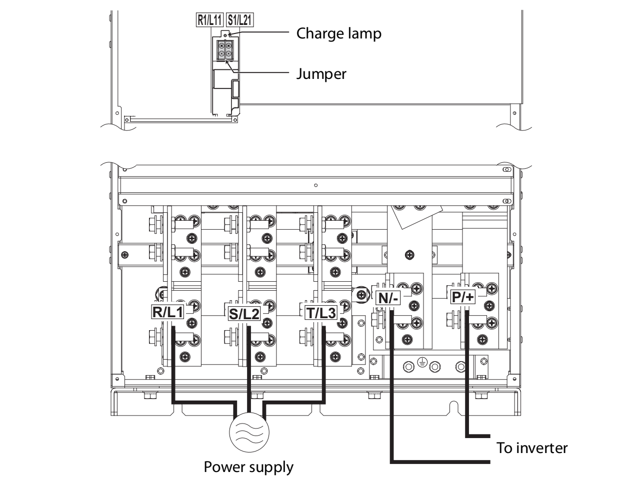
FR-A820-03800(75K)-R2R, 04750(90K)-R2R *1, *3
FR-A840-03250(110K)-R2R to 04810(185K)-R2R *1, *3



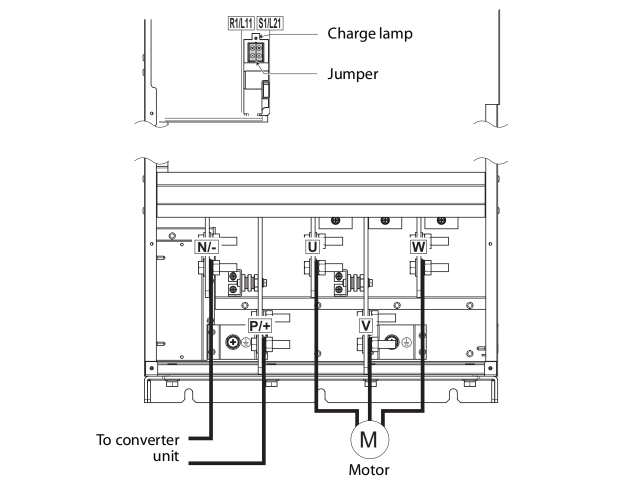
FR-A840-05470(220K) to 06830(280K)-R2R *1



FR-CC2-H315K to FR-CC2-H500K

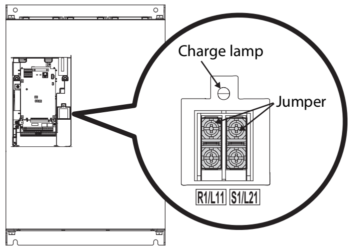


FR-A842-07700(315K)-R2R to FR-A842-12120(500K)-R2R



For footnotes *1 to *2 refer to next page.

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

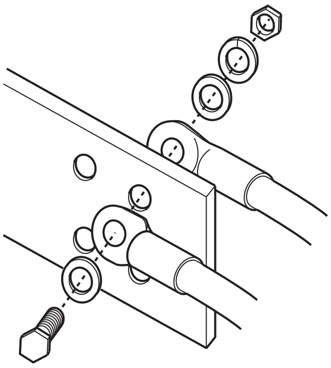


*2 The terminals P3 and PR of the FR-A820-01540(30K)-R2R are not equipped with screws. Do not connect anything to these.

*3 When an option other than the DC reactor must be connected to terminal P/+, use terminal P/+ (for option connection).

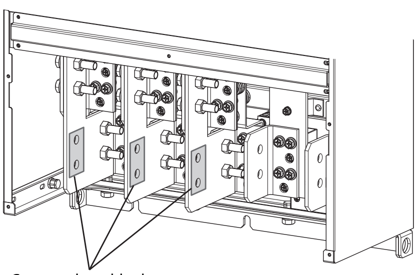
CAUTION

- 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)-R2R 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.

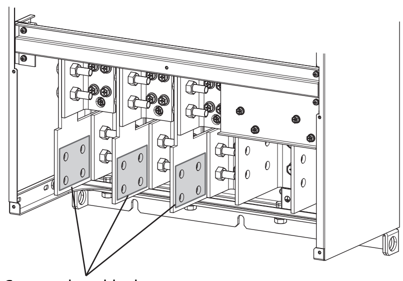


- When wiring the main circuit conductor (R/L1, S/L2, T/L3) of the converter unit (FR-CC2), use the bolts (nuts) for main circuit wiring, which are provided on the front side of the conductor.

FR-CC2-H315K, H355K



FR-CC2-H400K to H500K



2.3 Wiring fundamentals

2.3.1 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 a low speed.

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

200 V class, FR-A820 (220 V input power supply, ND rating, without a power factor improving AC or DC reactor)

Applicable inverter type FR-A820-□-R2R	Terminal screw size *4	Tightening torque [Nm]	Crimp terminal		Cable gauge								
					HIV, etc. [mm²] *1				AWG/MCM *2		PVC, etc. [mm²] *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable
00046(0.4K) to 00167(2.2K)	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
00250(3.7K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
00340(5.5K)	M5 (M4)	2.5	5.5-5	5.5-5	5.5	5.5	5.5	5.5	10	10	6	6	6
00490(7.5K)	M5 (M4)	2.5	14-5	8-5	14	8	14	5.5	6	8	16	10	16
00630(11K)	M5	2.5	14-5	14-5	14	14	14	8	6	6	16	16	16
00770(15K)	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
00930(18.5K)	M8 (M6)	7.8	38-8	22-8	38	22	38	14	2	4	35	25	25
01250(22K)	M8 (M6)	7.8	38-8	38-8	38	38	38	22	2	2	35	35	25
01540(30K)	M8 (M6)	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
01870(37K)	M10 (M8)	14.7	80-10	60-10	80	60	80	22	3/0	1/0	70	70	35
02330(45K)	M10 (M8)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
03160(55K)	M12 (M8)	24.5	100-12	100-12	100	100	100	38	4/0	4/0	95	95	50

200 V class, FR-A820 (220V input power supply, ND rating, with a power factor improving AC or DC reactor)

Applicable inverter type FR-A820-□-R2R	Terminal screw size *4	Tightening torque [Nm]	Crimp terminal		Cable gauge								
					HIV, etc. [mm²] *1				AWG/MCM *2		PVC, etc. [mm²] *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable
00046(0.4K) to 00167(2.2K)	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
00250(3.7K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
00340(5.5K)	M5 (M4)	2.5	5.5-5	5.5-5	5.5	5.5	5.5	5.5	10	10	6	6	6
00490(7.5K)	M5 (M4)	2.5	14-5	8-5	14	8	14	5.5	8	8	10	10	10
00630(11K)	M5	2.5	14-5	14-5	14	14	14	8	6	6	16	16	16
00770(15K)	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
00930(18.5K)	M8 (M6)	7.8	22-8	22-8	22	22	38	14	4	4	35	25	16
01250(22K)	M8 (M6)	7.8	38-8	38-8	38	38	38	22	2	2	35	35	25
01540(30K)	M8 (M6)	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
01870(37K)	M10 (M8)	14.7	60-10	60-10	60	60	80	22	1/0	1/0	70	70	35
02330(45K)	M10 (M8)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
03160(55K)	M12 (M8)	24.5	100-12	100-12	100	100	125	38	4/0	4/0	95	95	50
03800(75K)	M12 (M8)	24.5	150-12	150-12	125	125	150	38	250	250	120	120	—
04750(90K)	M12 (M8)	24.5	150-12	150-12	150	150	2x100	60	300	300	150	150	—

For footnotes *1 to *4 refer to *page 17*.

400 V class, FR-A840 (440 V input power supply, ND rating, without a power factor improving AC or DC reactor)

Applicable inverter type FR-A840-□-R2R	Terminal screw size *4	Tightening Torque [Nm]	Crimp terminal		Cable gauge								
					HIV, etc. [mm²] *1				AWG/MCM *2		PVC, etc. [mm²] *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable
00023(0.4K) to 00126(3.7K)	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
00170(5.5K)	M4	1.5	2-4	2-4	2	2	3.5	3.5	12	14	2.5	2.5	4
00250(7.5K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
00310(11K)	M5	2.5	5.5-5	5.5-5	5.5	5.5	5.5	5.5	10	10	6	6	10
00380(15K)	M5	2.5	8-5	5.5-5	8	5.5	8	5.5	8	10	10	6	10
00470(18.5K)	M6	4.4	14-6	8-6	14	8	14	8	6	8	16	10	16
00620(22K)	M6	4.4	14-6	14-6	14	14	22	14	6	6	16	16	16
00770(30K)	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
00930(37K)	M8	7.8	22-8	22-8	22	22	22	14	4	4	25	25	16
01160(45K)	M8	7.8	38-8	38-8	38	38	38	22	1	2	50	50	25
01800(55K)	M8	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25

400 V class, FR-A840 (440 V input power supply, ND rating, with a power factor improving AC or DC reactor)

Applicable inverter type FR-A840-□-R2R	Terminal screw size *4	Tightening Torque [Nm]	Crimp terminal		Cable gauge								
					HIV, etc. [mm²] *1				AWG/MCM *2		PVC, etc. [mm²] *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable
00023(0.4K) to 00126(3.7K)	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
00170(5.5K)	M4	1.5	2-4	2-4	2	2	3.5	3.5	12	14	2.5	2.5	4
00250(7.5K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
00310(11K)	M5	2.5	5.5-5	5.5-5	5.5	5.5	5.5	5.5	10	10	6	6	10
00380(15K)	M5	2.5	5.5-5	5.5-5	5.5	5.5	8	5.5	10	10	6	6	10
00470(18.5K)	M6	4.4	8-6	8-6	8	8	14	8	8	8	10	10	16
00620(22K)	M6	4.4	14-6	14-6	14	14	22	14	6	6	16	16	16
00770(30K)	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
00930(37K)	M8	7.8	22-8	22-8	22	22	22	14	4	4	25	25	16
01160(45K)	M8	7.8	38-8	38-8	38	38	38	22	2	2	50	50	25
01800(55K)	M8	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
02160(75K)	M10	14.7	60-10	60-10	60	60	60	22	1/0	1/0	50	50	25
02600(90K)	M10	14.7	60-10	60-10	60	60	80	22	3/0	3/0	50	50	25
03250(110K)	M10 (M12)	14.7	80-10	80-10	80	80	80	38	3/0	3/0	70	70	35
03610(132K)	M10 (M12)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
04320(160K)	M12 (M10)	24.5	150-12	150-12	125	125	150	38	250	250	120	120	70
04810(185K)	M12 (M10)	24.5	150-12	150-12	150	150	150	38	300	300	150	150	95
05470(220K)	M12 (M10)	46	100-12	100-12	2×100	2×100	2×100	60	2×4/0	2×4/0	2×95	2×95	95
06100(250K)	M12 (M10)	46	100-12	100-12	2×100	2×100	2×125	60	2×4/0	2×4/0	2×95	2×95	95
06830(280K)	M12 (M10)	46	150-12	150-12	2×125	2×125	2×125	60	2×250	2×250	2×120	2×120	120

For footnotes *1 to *4 refer to *page 17*.

*1 For the FR-A820-03160(55K)-R2R or lower and the FR-A840-01800(55K)-R2R or lower, it is the gauge of a cable (HIV cable (600 V class heat-resistant PVC insulated wire), etc.) with the continuous maximum permissible temperature of 75 °C. Assumes that the surrounding air temperature is 50 °C or less and the wiring distance is 20 m or less.
For the FR-A820-03800(75K)-R2R or higher and the FR-A840-02160(75K)-R2R or higher, it is the gauge of a cable with the continuous maximum permissible temperature of 90 °C or higher. Assumes that the surrounding air temperature is 50 °C or less and wiring is performed in an enclosure.

*2 For all the 200 V class capacities and the FR-A840-01160(45K)-R2R or lower, it is the gauge of a cable with continuous maximum permissible temperature of 75 °C (THHW cable). Assumes that the surrounding air temperature is 40 °C or less and the wiring distance is 20 m or less.
For the FR-A840-01800(55K)-R2R or higher, it is the gauge of a cable with continuous maximum permissible temperature of 90 °C (THHN cable). Assumes that the surrounding air temperature is 40 °C or less and wiring is performed in an enclosure,
(For the use in the United States or Canada, refer to "Instructions for UL and cUL" on *page 58*.)

*3 For the FR-A820-00770(15K)-R2R or lower and the FR-A840-01160(45K)-R2R or lower it is the gauge of a cable with continuous maximum permissible temperature of 70 °C (PVC cable). Assumes that the surrounding air temperature is 40 °C or less and the wiring distance is 20 m or less.
For the FR-A820-00930(18.5K)-R2R or higher and the FR-A840-01800(55K)-R2R or higher, it is the gauge of a cable with continuous maximum permissible temperature of 90 °C (XLPE cable). 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 (grounding).
The screw size for PR and PX terminals of FR-A820-00340(5.5K)-R2R and FR-A820-00490(7.5K)-R2R is indicated in brackets.
The screw size for P/+ terminal for connecting an option to FR-A840-03250(110K)-R2R or FR-A840-03610(132K)-R2R is indicated in brackets.
The screw size for earthing (grounding) of FR-A840-04320(160K)-R2R or higher is indicated in parenthesis.

400 V class, FR-A842 (440 V input power supply, ND rating)
(For the applicable cables of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.)

Applicable inverter type FR-A842-□-R2R	Terminal screw size *4	Tightening torque [Nm]	Crimp terminal	Cable gauge					
				HIV, etc. [mm²] *1			AWG/MCM *2	PVC, etc. [mm²] *3	
			U, V, W	U, V, W	P/+, N/−	Earthing (grounding) cable	U, V, W	U, V, W	Earthing (grounding) cable
07700(315K)	M12 (M10)	46	150-12	2×150	2×150	100	2×300	2×150	150
08660(355K)	M12 (M10)	46	C2-200	2×200	2×200	100	2×350	2×185	2×95
09620(400K)	M12 (M10)	46	C2-200	2×200	2×200	100	2×400	2×185	2×95
10940(450K)	M12 (M10)	46	C2-250	2×250	2×250	100	2×500	2×240	2×120
12120(500K)	M12 (M10)	46	C2-250	2×250	3×200	2×100	2×500	2×240	2×120

*1 The gauge of the cable with the continuous maximum permissible temperature of 90 °C or higher (LMFC cable (heat resistant flexible cross-linked polyethylene insulated cable), etc.). 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 the cable (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 the cable (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 (grounding).
The screw size for earthing (grounding) is indicated in brackets.

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

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

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

- The above shows a selection example for the ND rating. For selecting the SLD rating, LD rating, SND rating, or HD rating, refer to the "FR-A800 Instruction Manual (Detailed)". For selecting the ratings of FR-A842-R2R refer to the "FR-A802-R2R (Separated Converter Type) Instruction Manual (Hardware)".
- 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.

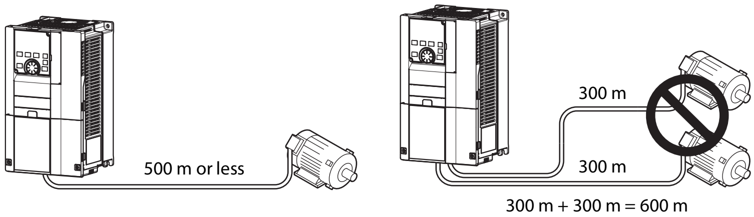
2.3.2 Total wiring length

◆ **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)-R2R, FR-A840-00023(0.4K)-R2R	FR-A820-00077(0.75K)-R2R, FR-A840-00038(0.75K)-R2R	FR-A820-00105(1.5K)-R2R or higher, FR-A840-00052(1.5K)-R2R or higher, FR-A842-07700(315K)-R2R to 12120(500K)-R2R
2 (2 kHz) or lower	300 m	500 m	500 m
3 (3 kHz) or higher	200 m	300 m	500 m

Total wiring length (FR-A820-00105(1.5K)-R2R or higher, FR-A840-00052(1.5K)-R2R or higher, and FR-A842-R2R)



When driving a 400 V 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 "400 V class inverter-driven insulation-enhanced motor" and set frequency in Pr. 72 "PWM frequency selection" according to wiring length.

	Wiring length		
	≤ 50 m	50 m–100 m	≥ 100 m
Pr. 72 setting	≤ 15 (14.5 kHz)	≤ 9 (9 kHz)	≤ 4 (4 kHz)
	FR-A842-R2R: ≤ 6 (6 kHz)		

– Connect the surge voltage suppression filter (FR-ASF-H, FR-BMF-H) to the output side of the FR-A840-01800(55K)-R2R or lower, and the sine wave filter (MT-BSL, MT-BSC) to the output side of the FR-A840-02160(75K)-R2R 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-R2R.

CAUTION

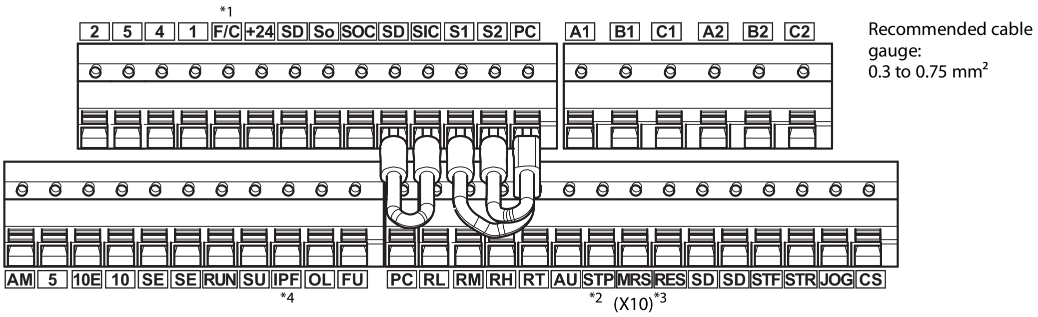
- Especially for long-distance wiring, the inverter may be affected by a charging current caused by stray capacitances of the wiring, leading to an activation of the overcurrent protection, malfunction of the fast-response current limit operation, or even to an inverter failure. It may also cause a malfunction or fault of the equipment connected ON the inverter output side. If the fast-response current limit function malfunctions, disable this function.
  (For Pr. 156 "Stall prevention operation selection", refer to the "FR-A800 Instruction Manual (Detailed)".)
- For details of Pr. 72 "PWM frequency selection", refer to the "FR-A800 Instruction Manual (Detailed)".
- 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 (Detailed)" to drive a 400 V class motor by an inverter.

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

- Terminal screw size: M4
- Cable size: 0.75 mm^2 to 2 mm^2
- Tightening torque: 1.5 Nm

2.4 Control circuit terminals

2.4.1 Terminal layout



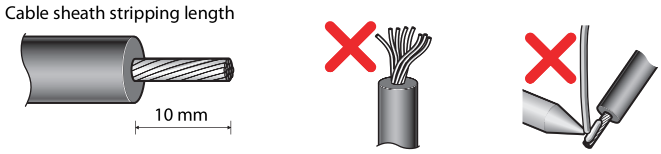
*1 The terminal functions as the terminal FM for the FM type inverter, and as the terminal CA for the CA type inverter.
*2 Represents the terminal STOP.
*3 The initial value is for the FR-A842-R2R is X10 (Inverter run enable).
*4 No function is assigned in the initial setting for the FR-A842-R2R.

2.4.2 Wiring method

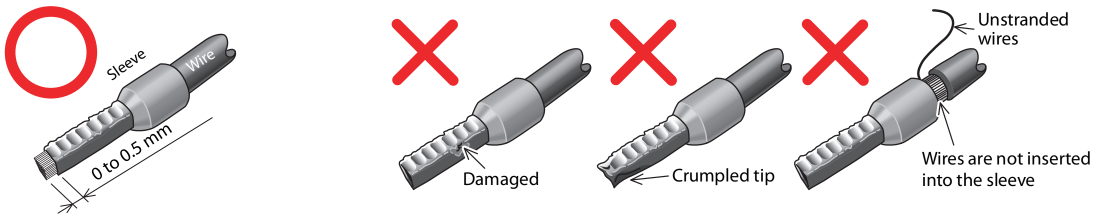
- Power supply connection

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.



(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.



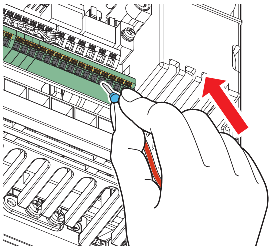
- Blade terminals commercially available (as of January 2017)

Cable gauge (mm²)	Ferrule terminal model			Manufacturer	Crimping tool name
	With insulation sleeve	Without insulation sleeve	For UL wire *5		
0.3	AI 0,34-10TQ	—	—	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 *6		
0.75 (for two wires)	AI-TWIN 2×0,75-10GY	—	—		

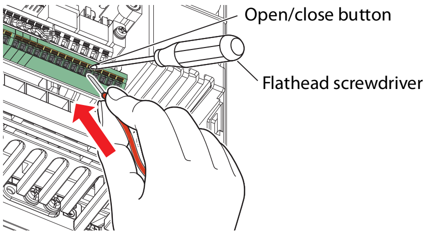
*5 A ferrule terminal with an insulation sleeve compatible with the MTW wire which has a thick wire insulation.
*6 Applicable for the terminals A1, B1, C1, A2, B2, and C2 only.

Cable gauge (mm²)	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

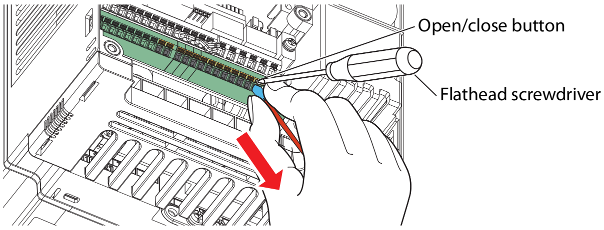
(3) Insert the wires into a socket.



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

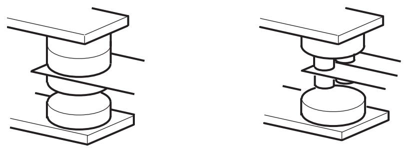
- When using stranded wires without a blade terminal, twist enough to avoid short circuit with a nearby terminals or wires.
- Pulling out the wire forcefully without pushing the open/close button all the way down may damage the terminal block.
- Use a small flathead screwdriver (tip thickness: 0.4 mm, 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 2016).

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.

2.4.3 Wiring precautions

- It is recommended to use the cables of 0.3 to 0.75 mm^2 gauge for connection to the control circuit terminals.
- The wiring length should be 30 m (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 (ground) the shield to the enclosure, etc.
- Always apply a voltage to the alarm output terminals (A1, B1, C1, A2, B2, C2) via a relay coil, lamp, etc.
- When using an external power supply for transistor output, note the following points to prevent a malfunction caused by undesirable current.
  Do not connect a terminal SD on the inverter and the 0 V terminal of the external power supply (when the sink logic is selected).
  Do not connect a terminal PC on the inverter and the +24 V terminal of the external power supply (when the source logic is selected).
  Do not install an external power source in parallel with the internal 24 V DC power source (connected to terminals PC and SD) to use them together.
  Refer to Chapter 2 of the Instruction Manual (Detailed) for the detail.
- Separate the wiring of the control circuit away from the wiring of the main circuit.

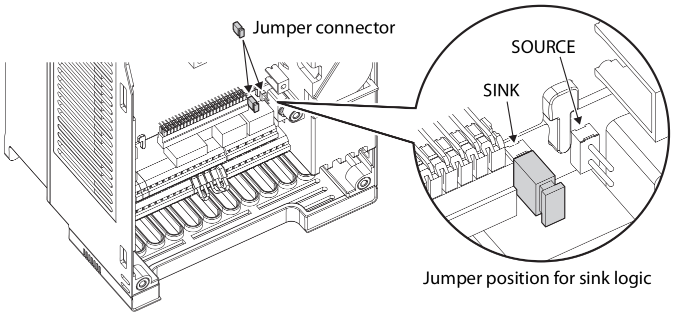
2.4.4 Control logic (sink/source) change

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.)



CAUTION

- Make sure that the jumper connector is installed correctly.
- Never change the control logic while power is ON.

2.4.5 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. When the main circuit power supply is turned ON, the power supply source changes from the 24 V external power supply to the main circuit power supply.

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

◆ **Applied 24 V external power specification**

Item	Rated specification
Input voltage	23 to 25.5 V DC
Input current	≤ 1.4 A

2.5 Safety stop function

2.5.1 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 (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 (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 shorting wires, and then connect to the safety relay module as shown in the following connection diagram.

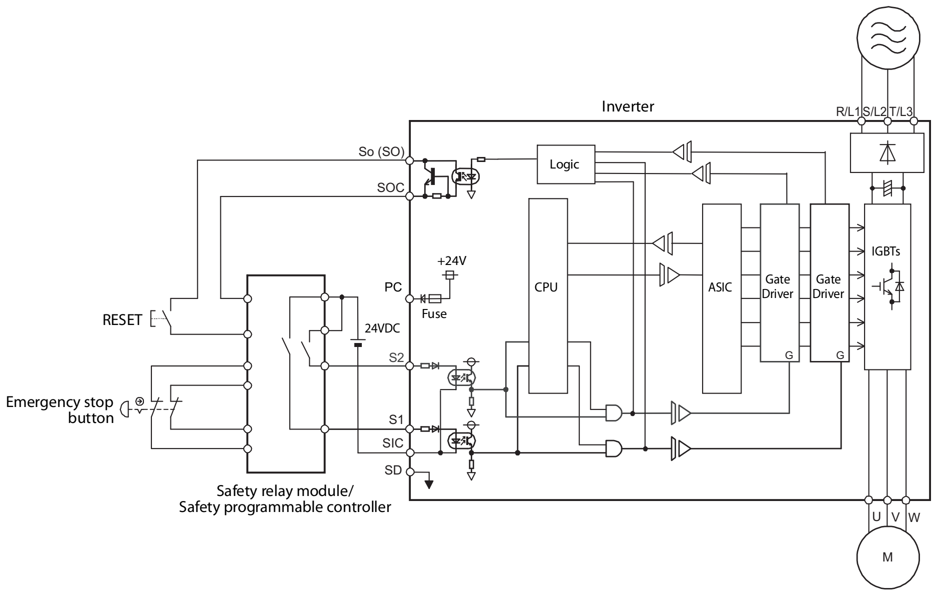
*2 At an internal safety circuit failure, the operation panel displays one of the faults shown on the next page.

CAUTION

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

2.5.2 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 (SO) and SOC. The reset button acts as the feedback input for the safety relay module or the safety programmable controller.



2.5.3 Safety stop function operation

Input power	Internal safety circuit status	Input terminal *1, *2		Output terminal	Output signal *8, *9, *10	Inverter operation enable signal	Operation panel indication	
		S1	S2	So (SO)	SAFE		E.SAF *6	SA *7
OFF	—	—	—	OFF	OFF	Output shutoff (Safe state)	Not displayed	Not displayed
ON	Normal	ON	ON	ON *3	OFF	**Drive enabled**	Not displayed	Not displayed
	Normal	ON	OFF	OFF *4	OFF *4	Output shutoff (Safe state)	Displayed	Displayed
	Normal	OFF	ON	OFF *4	OFF *4	Output shutoff (Safe state)	Displayed	Displayed
	Normal	OFF	OFF	ON *3	ON *3	Output shutoff (Safe state)	Not displayed	Displayed
	Fault	ON	ON	OFF	OFF	Output shutoff (Safe state)	Displayed	Not displayed *5
	Fault	ON	OFF	OFF	OFF	Output shutoff (Safe state)	Displayed	Displayed
	Fault	OFF	ON	OFF	OFF	Output shutoff (Safe state)	Displayed	Displayed
	Fault	OFF	OFF	OFF	OFF	Output shutoff (Safe state)	Displayed	Displayed

*1 ON: Transistor used for an open collector output is conducted.
OFF: Transistor used for an open collector output is not conducted.

*2 When not using the safety stop function, short across terminals S1 and PC, S2 and PC, and SIC and SD to use the inverter. (In the initial status, terminals S1 and PC, S2 and PC, and SIC and SD are respectively shorted with shorting wires.)

*3 If any of the protective functions shown in the following table is activated, the terminal So (SO) and the SAFE output signal turn OFF.

Error definition	Operation panel indication
Option fault	E.OPT
Communication option fault	E.OP1 to E.OP3
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 (FR-A800-E-R2R/FR-A802-E-R2R without RS-485 terminals)	E.CTE
24 VDC power fault	E.P24

Error definition	Operation panel indication
Safety circuit fault	E.SAF
Overspeed occurrence	E.OS
Speed deviation excess detection	E.OSD
Signal loss detection	E.ECT
Encoder phase fault	E.EP
CPU fault	E.CPU
	E.5 to E.7
Internal circuit fault	E.13

*4 If the internal safety circuit is operated normally, the terminal So (SO) and the SAFE output signal remain ON until "E.SAF" is displayed, and the terminal So (SO) and the SAFE output signal turn OFF when E.SAF is displayed.

*5 "SA" is displayed when the terminals S1 and S2 are identified as OFF due to the internal safety circuit failure.

*6 If another fault occurs at the same time as E.SAF, the other fault can be displayed.

*7 If another warning occurs at the same time as SA, the other warning can be displayed.

*8 The ON/OFF state of the output signal is the one for the positive logic. The ON and OFF are reversed for the negative logic.

*9 For the SAFE signal, refer to the following table and use any of Pr. 190 to Pr. 196 (output terminal function selection) to assign the function to the output terminal.

Output signal	Pr. 190 to Pr. 196 settings	
	Positive logic	Negative logic
SAFE	80	180

*10 The use of the SAFE signal has not been certified for compliance with safety standards.

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

3 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 Electric 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.

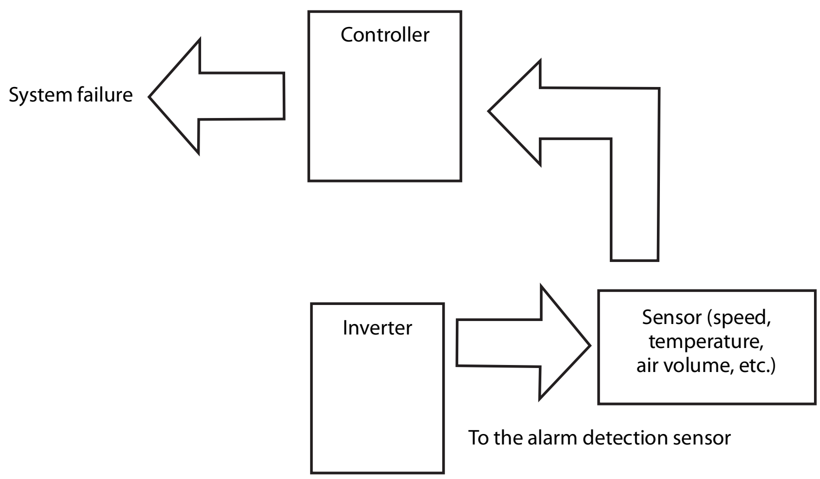
Interlock method	Check method	Used signals	Refer to
Inverter protective function operation	Operation check of an alarm contact Circuit error detection by negative logic	Fault output signal (ALM signal)	Refer to chapter "Parameter" of the "FR-A800 Instruction Manual (Detailed)" and "FR-A800-R2R Instruction Manual (Roll to Roll function)".
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, if the inverter CPU fails in a system interlocked with the inverter's fault, start, and RUN signals, no fault signal will be output and the RUN signal will be kept ON because the inverter CPU is down.
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.



4 PRECAUTIONS FOR USE OF THE INVERTER

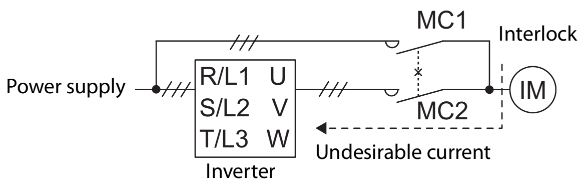
The FR-A800 series is a highly reliable product, but incorrect peripheral circuit making or operation/handling method may shorten the product life or damage the product.

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 gauge 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 15* 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 18*)
- 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 "FR-A800 Instruction Manual (Detailed)".)
- Electrical corrosion of the bearing
  When a motor is driven by the inverter, axial voltage is generated on the motor shaft, which may cause electrical corrosion of the bearing in rare cases depending on the wiring, load, operating conditions of the motor or specific inverter settings (high carrier frequency and EMC filter ON).
  Contact your sales representative to take appropriate countermeasures for the motor.
  The following shows examples of countermeasures for the inverter:
  - Decrease the carrier frequency.
  - Turn OFF the EMC filter.
  - Provide a common mode choke on the output side of the inverter.*1
    (This is effective regardless of the EMC filter ON/OFF connector setting.)

    *1 Recommended common mode choke: FT-3KM F series FINEMET® common mode choke cores manufactured by Hitachi Metals, Ltd. FINEMET is a registered trademark of Hitachi Metals, Ltd.
- Do not install a power factor correction capacitor, surge suppressor or capacitor type filter on the inverter output side.
  This will cause the inverter to trip or the capacitor and surge suppressor to be damaged. If any of the above devices is installed, immediately remove it.
- 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, then confirm that the voltage across the main circuit terminals P/+ and N/- of the inverter is low enough using a tester, etc. 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 input side MC must be avoided.
  Always use the start signal (ON/OFF of STF and STR signals) to start/stop the inverter. (Refer to *page 5*.)
- 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.

- FR-A800 models only:
  Across terminals P/+ and PR, connect only an external brake resistor.
  Do not connect a mechanical brake.
- FR-A842 models (Separated converter type) only:
  Correct connection of the converter unit and the inverter
  - Make sure that the terminal P/+ of the converter unit and the terminal P/+ of the inverter, and the terminal N/- of the converter unit and the terminal N- of the inverter are correctly connected.
    Connecting the opposite polarity of terminals N/- and P/+ will damage the inverter.
    Also, do not install an MCCB across the terminals P/+ and N/- (across terminals P and P/+ or across N and N/-).
  - Always connect the terminal RDA of the converter unit and the terminal MRS (X10) of the inverter, and the terminal SE of the converter unit and the terminal SD (terminal PC for source logic) of the inverter.
    Not connecting these terminals may damage the converter unit.
- When using the commercial power supply,, electrical and mechanical interlocks are provided between the electronic bypass contactors MC1 and MC2.
  When using a switching circuit as shown on the right, chattering due to misconfigured sequence or arc generated at switching may allow undesirable current to flow in and damage the inverter. Miswiring may also damage the inverter. (The commercial power supply operation is not available with vector control dedicated motors (SF-V5RU, SF-THY).)



  If switching to the commercial power supply operation while a failure such as an output short circuit has occurred between the magnetic contactor MC2 and the motor, the damage may further spread. If a failure has occurred between the MC2 and the motor, a protection circuit such as using the OH signal input must be provided.
- 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 does not require an encoder.)
- Inverter (converter unit) input side magnetic contactor (MC)
  On the inverter‘s (converter unit‘s) input side, connect an MC for the following purposes. (Refer to the "FR-A800 Instruction Manual (Detailed)" and "FR-A800-R2R - Instruction Manual (Roll to Roll function)".)
  - To disconnect the inverter (and the converter unit) from the power supply when a fault occurs or when the drive is not functioning (e.g. emergency stop operation).
  - 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 (and the converter unit) from the power supply to ensure safe maintenance and inspection work.

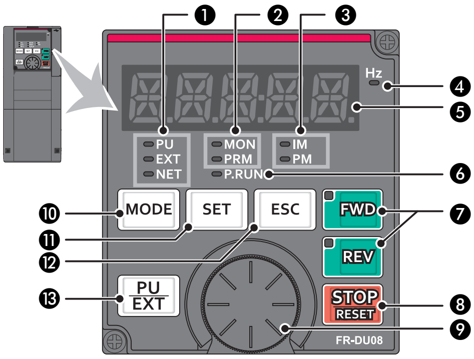
  If using an MC for emergency stop during operation, select an MC regarding the inverter input side current as JEM1038-AC-3 class rated current.
- Handling of inverter output side magnetic contactor
  Switch the magnetic contactor between the inverter and motor only when both the inverter and motor are 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.
- 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 current at locked condition, starting current, etc. Decreasing current may increase the life. However, decreasing current will result in insufficient torque and the inverter may not start. Adding a margin to the current can eliminate such a condition. For a general-purpose motor, use an inverter (and the converter unit) of a higher capacity (up to 2 ranks).
- Make sure that the specifications and rating match the system requirements.

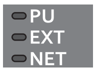
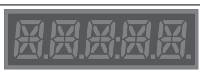
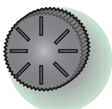
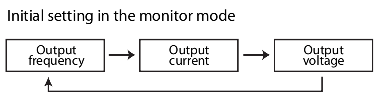
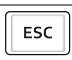
5 BASIC OPERATION

5.1 Operation panel (FR-DU08)

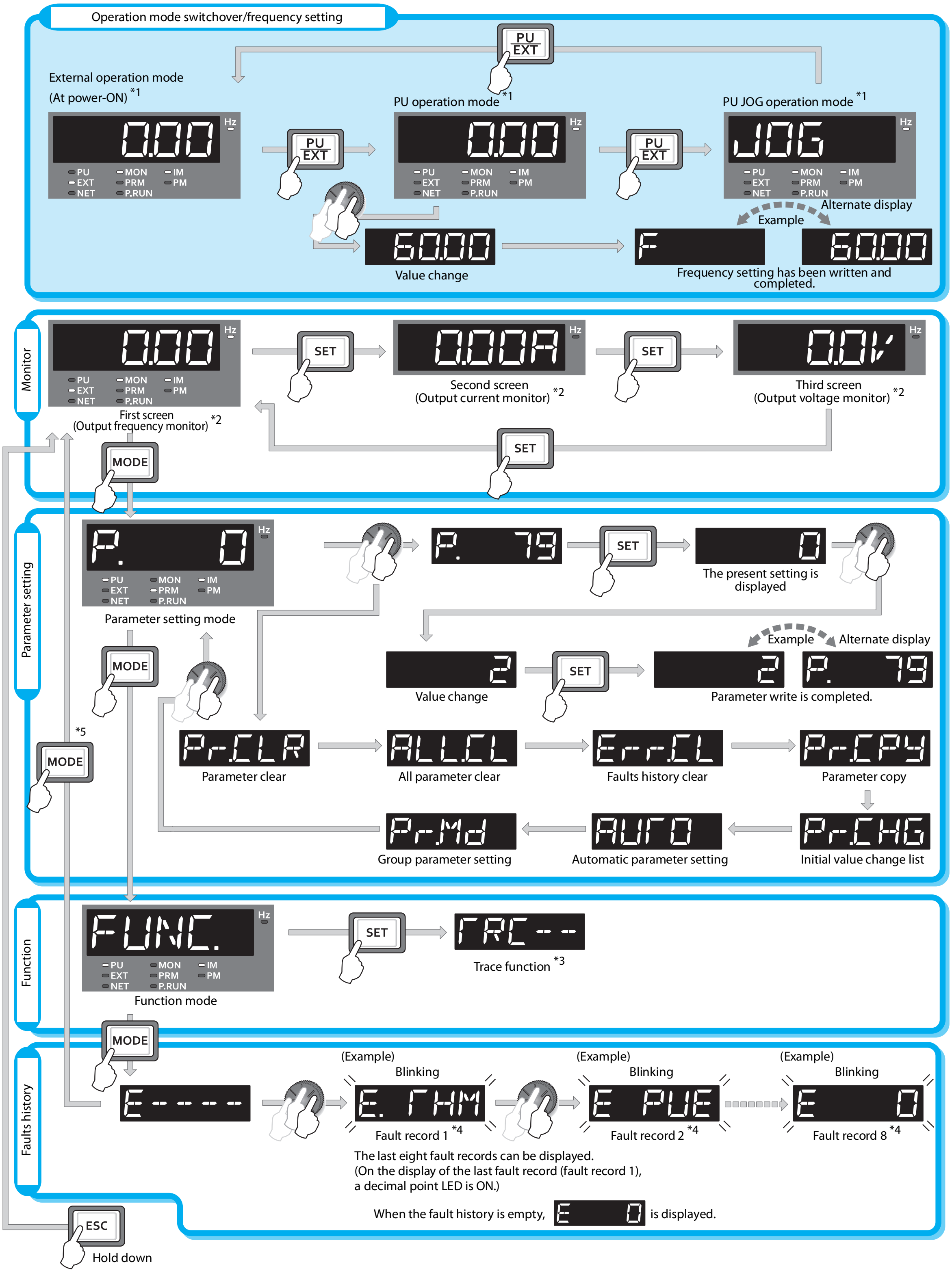
5.1.1 Components of the operation panel (FR-DU08)

To mount the operation panel (FR-DU08) on the enclosure surface, refer to the "FR-A800 Instruction Manual (Detailed)".



No.	Component	Name	Description
❶		Inverter operation mode LED indicator	PU: Lit to indicate the PU operation mode. EXT: 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: Lit to indicate the External/PU combined operation mode 1 or 2.
❷		Operation panel mode LED 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.
❸		Controlled motor type LED indicator	IM: Always lit while the inverter power is ON. The indicator flickers when the vector control test operation is selected. (The indicators may go OFF during an inverter reset or in some other cases.) PM: Not used.
❹		Frequency unit LED indicator	Lit to indicate the actual frequency. (Flickers when the set frequency is displayed in the monitor.)
❺		Monitor (5-digit LED)	Shows a numeric value (readout) of a monitor item such as the frequency, a parameter number, etc. (Using Pr. 52, Pr. 774 to Pr. 776, the monitored item can be changed.)
❻		PLC function LED indicator	Lit to indicate that the PLC function of the inverter is valid.
❼		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. Either LED flickers under the following conditions. • 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.
❽		STOP/RESET key	Stops the operation commands. Resets the inverter when the protection function is activated.
❾		Setting dial	The setting dial of the Mitsubishi Electric inverters. Turn the setting dial to change the setting of frequency or parameter etc. Press the setting dial to perform the following operations: • To display a set frequency on the LED display in the monitoring mode (the monitor item shown on the display can be changed using Pr. 992.) • To display the present setting during calibration • To display a fault history number on the LED display in the faults history mode.
❿		MODE key	Switches the operation panel to a different mode. Pressing the "MODE" and "PU/EXT keys simultaneously switches to the easy setting mode. Every key on the operation panel becomes inoperable by holding this key for 2 seconds. The key lock is invalid when Pr. 161 = "0 (initial setting)". (Refer to the FR-A800 Instruction Manual (Detailed).)
⓫		SET key	Confirms each setting. Switches the monitor screen in the monitor mode. (Using Pr. 52 and Pr. 774–Pr. 776, the monitored item on each screen can be changed.) 
⓬		ESC key	Goes back to the previous display. Holding this key for a longer time changes the mode back to the monitor mode.
⓭		PU/EXT key	Switches between the PU operation mode, the PU JOG operation mode and the External operation mode. Pressing the "MODE" and "PU/EXT" keys simultaneously switches to the easy setting mode. Also cancels the PU stop warning.

5.1.2 Basic operation



*1 For the details of operation modes, refer to the "FR-A800 Instruction Manual (Detailed)".

*2 Monitored items can be changed. (Refer to the "FR-A800 Instruction Manual (Detailed)".)

*3 For the details of the trace function, refer to the "FR-A800 Instruction Manual (Detailed)".

*4 For the details of faults history, refer to the "FR-A800 Instruction Manual (Detailed)".

*5 The USB memory mode will appear if a USB memory device is connected. Refer to the "FR-A800 Instruction Manual (Detailed)" for the USB memory mode.

5.2 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).

Remarks

- 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).
- The changing of the parameter settings may be restricted in some operating statuses. Use Pr. 77 Parameter write selection to change the setting of the restriction.
- Refer to "FR-A800 Instruction Manual (Detailed)" and "FR-A800-R2R Instruction Manual (Roll to roll function)" for instruction codes for communication and availability of Parameter clear, all clear, and Parameter copy.

Parameter	Name	Setting range	Initial value
0	**Torque boost** Simple	0 to 30%	6/4/3/2/1% *1
1	**Maximum frequency** Simple	0 to 120 Hz	120 Hz *2 60 Hz *3
2	**Minimum frequency** Simple	0 to 120 Hz	0 Hz
3	**Base frequency** Simple	0 to 590 Hz	60/50 Hz *10
4	**Multi-speed setting (high speed)** Simple	0 to 590 Hz	60/50 Hz *10
5	**Multi-speed setting (middle speed)** Simple	0 to 590 Hz	30 Hz
6	**Multi-speed setting (low speed)** Simple	0 to 590 Hz	10 Hz
7	**Acceleration time** Simple	0 to 3600 s	5 s *4 15 s *5
8	**Deceleration time** Simple	0 to 3600 s	5 s *4 15 s *5
9	**Electronic thermal O/L relay** Simple	0 to 500 A *2 0 to 3600 A *3	Inverter rated current
10	**DC injection brake operation frequency**	0 to 120 Hz, 9999	3 Hz
11	**DC injection brake operation time**	0 to 10 s, 8888	0.5 s
12	**DC injection brake operation voltage**	0 to 30%	4/2/1% *6
13	**Starting frequency**	0 to 60 Hz	0.5 Hz
14	**Load pattern selection**	0 to 5, 12 to 15	0
15	**Jog frequency**	0 to 590 Hz	5 Hz
16	**Jog acceleration/ deceleration time**	0 to 3600 s	0.5 s

Parameter	Name	Setting range	Initial value
17	**MRS input selection**	0, 2, 4	0
18	**High speed maximum frequency**	0 to 590 Hz	120 Hz *2 60 Hz *3
19	**Base frequency voltage**	0 to 1000 V, 8888, 9999	9999/ 8888 *10
20	**Acceleration/ deceleration reference frequency**	1 to 590 Hz	60/50 Hz *10
21	**Acceleration/ deceleration time increments**	0, 1	0
22	**Stall prevention operation level (Torque limit level)**	0 to 400%	150%
23	**Stall prevention operation level compensation factor at double speed**	0 to 200%, 9999	9999
24 to 27	**Multi-speed setting (4 speed to 7 speed)**	0 to 590 Hz, 9999	9999
28	**Multi-speed input compensation selection**	0, 1	0
29	**Acceleration/ deceleration pattern selection**	0 to 6	0
30	**Regenerative function selection**	0 to 2, 10, 11, 20, 21, 100 to 102, 110, 111, 120, 121 *14 2, 10, 11, 102, 110, 111 *15	0 *14 10 *15
31	**Frequency jump 1A**	0 to 590 Hz, 9999	9999
32	**Frequency jump 1B**	0 to 590 Hz, 9999	9999
33	**Frequency jump 2A**	0 to 590 Hz, 9999	9999
34	**Frequency jump 2B**	0 to 590 Hz, 9999	9999

*1 Differs according to capacities.
- 6%: FR-A820-00046(0.4K)-R2R to 00077(0.75K)-R2R and FR-A840-00023(0.4K)-R2R to 00038(0.75K)-R2R
- 4%: FR-A820-00105(1.5K)-R2R to 00250(3.7K)-R2R and FR-A840-00052(1.5K)-R2R to 00126(3.7K)-R2R
- 3%: FR-A820-00340(5.5K)-R2R, 00490(7.5K)-R2R and FR-A840-00170(5.5K)-R2R, 00250(7.5K)-R2R
- 2%: FR-A820-00630(11K)-R2R to 03160(55K)-R2R and FR-A840-00310(11K)-R2R to 01800(55K)-R2R
- 1%: FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower
*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher
*4 The initial value for FR-A820-00490(7.5K)-R2R or lower and FR-A840-00250(7.5K)-R2R or lower
*5 The initial value for FR-A820-00630(11K)-R2R or higher and FR-A840-00310(11K)-R2R or higher
*6 Differs according to capacities.
- 4%: FR-A820-00490(7.5K)-R2R or lower and FR-A840-00250(7.5K)-R2R or lower
- 2%: FR-A820-00630(11K)-R2R to 03160(55K)-R2R and FR-A840-00310(11K)-R2R to 01800(55K)-R2R
- 1%: FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

*10 Differs according to types. (FM type/CA type)
*14 The setting range or initial value is for standard models.
*15 The setting range or initial value is for separated converter types.

Parameter	Name	Setting range	Initial value
35	**Frequency jump 3A**	0 to 590 Hz, 9999	9999
36	**Frequency jump 3B**	0 to 590 Hz, 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 590 Hz	6 Hz
43	**Output frequency detection for reverse rotation**	0 to 590 Hz, 9999	9999
44	**Second acceleration/ deceleration time**	0 to 3600 s	5 s
45	**Second deceleration time**	0 to 3600 s, 9999	9999
46	**Second torque boost**	0 to 30%, 9999	9999
47	**Second V/F (base frequency)**	0 to 590 Hz, 9999	9999
48	**Second stall prevention operation level**	0 to 400%	150%
49	**Second stall prevention operation frequency**	0 to 590 Hz, 9999	0 Hz
50	**Second output frequency detection**	0 to 590 Hz	30 Hz
51	**Second electronic thermal O/L relay**	0 to 500 A, 9999 *2 0 to 3600 A, 9999 *3	9999
52	**Operation panel main monitor selection**	0, 5 to 14, 17 to 20, 22 to 36, 38, 40 to 46, 50 to 57, 61to 64, 67, 71 to 74, 81 to 93, 97, 98, 100	0
54	**FM/CA terminal function selection** *10	1 to 3, 5 to 14, 17, 18, 19, 21, 22, 24, 26 to 28, 30, 32 to 34, 36, 46, 50, 61, 62, 70, 81, 82, 87 to 90, 92, 93, 97, 98	1
55	**Frequency monitoring reference**	0 to 590 Hz	60/50 Hz *10
56	**Current monitoring reference**	0 to 500 A *2 0 to 3600 A *3	Inverter rated current
57	**Restart coasting time**	0, 0.1 to 30 s, 9999	9999
58	**Restart cushion time**	0 to 60 s	1 s
60	**Energy saving control selection**	0, 4, 9	0
65	**Retry selection**	0 to 5	0
66	**Stall prevention operation reduction starting frequency**	0 to 590 Hz	60/50 Hz *10
67	**Number of retries at fault occurrence**	0 to 10, 101 to 110	0
68	**Retry waiting time**	0.1 to 600 s	1 s
69	**Retry count display erase**	0	0

Parameter	Name	Setting range	Initial value
70 *14	**Special regenerative brake duty**	0 to 100%	0%
71	**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	0
72	**PWM frequency selection**	0 to 15 *2 0 to 6, 25 *3	2
73	**Analog input selection**	0 to 7, 10 to 17	1
74	**Input filter time constant**	0 to 8	1
75	**Reset selection/ disconnected PU detection/PU stop selection**	0 to 3, 14 to 17, 1000 to 1003, 1014 to 1017. *2 0 to 3, 14 to 17, 100 to 103, 114 to 117, 1000 to 1003, 1014 to 1017, 1100 to 1103, 1114 to 1117 *3	14
	Reset selection	0 to 3	0
	Disconnected PU detection	0, 1	
	PU stop selection		1
	Reset limit	0 *2 0, 1 *3	0
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** Simple	0 to 4, 6, 7	0
80	**Motor capacity**	0.4 to 55 kW, 9999 *2 0 to 3600 kW, 9999 *3	9999
81	**Number of motor poles**	2, 4, 6, 8, 10, 12, 9999	9999
82	**Motor excitation current**	0 to 500 A, 9999 *2 0 to 3600 A, 9999 *3	9999
83	**Rated motor voltage**	0 to 1000 V	200 V *7 400 V *8
84	**Rated motor frequency**	10 to 400 Hz, 9999	9999
85	**Excitation current break point**	0 to 400 Hz, 9999	9999
86	**Excitation current low speed scaling factor**	0 to 300%, 9999	9999
89	**Speed control gain (Advanced magnetic flux vector)**	0 to 200%, 9999	9999

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower
*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher
*7 The value for the 200 V class.
*8 The value for the 400 V class.
*10 Differs according to types. (FM type/CA type)
*14 The setting range or initial value is for standard models.

Parameter	Name	Setting range	Initial value
90	Motor constant (R1)	0 to 50 Ω, 9999 *2	9999
		0 to 400 mΩ, 9999 *3	
91	Motor constant (R2)	0 to 50 Ω, 9999 *2	9999
		0 to 400 mΩ, 9999 *3	
92	Motor constant (L1)	0 to 6000 mH, 9999 *2	9999
		0 to 400 mH, 9999 *3	
93	Motor constant (L2)	0 to 6000 mH, 9999 *2	9999
		0 to 400 mH, 9999 *3	
94	Motor constant (X)	0 to 100%, 9999	9999
95	Online auto tuning selection	0 to 2	0
96	Auto tuning setting/ status	0, 1, 11, 101	0
100	Second acceleration time for line speed command	0 to 3600 s	15 s
101	Second deceleration time for line speed command	0 to 3600 s	15 s
102	Third acceleration time for line speed command	0 to 3600 s	15 s
103	Third deceleration time for line speed command	0 to 3600 s	15 s
110	Third acceleration/ deceleration time	0 to 3600 s, 9999	9999
111	Third deceleration time	0 to 3600 s, 9999	9999
112	Third torque boost	0 to 30%, 9999	9999
113	Third V/F (base frequency)	0 to 590 Hz, 9999	9999
114	Third stall prevention operation level	0 to 400%	150%
115	Third stall prevention operation frequency	0 to 590 Hz	0 Hz
116	Third output frequency detection	0 to 590 Hz	60/50 Hz *10
117	PU communication station number	0 to 31	0
118	PU communication speed	48, 96, 192, 384, 576, 768, 1152	192
119	PU communication stop bit length / data length	0, 1, 10, 11	1
	PU communication data length	0, 1	0
	PU communication stop bit length	0, 1	1
120	PU communication parity check	0 to 2	2
121	Number of PU communication retries	0 to 10, 9999	1
122	PU communication check time interval	0, 0.1 to 999.8 s, 9999	9999

Parameter	Name	Setting range	Initial value
123	PU communication waiting time setting	0 to 150 ms, 9999	9999
124	PU communication CR/ LF selection	0 to 2	1
125	Terminal 2 frequency setting gain frequency Simple	0 to 590 Hz	60/50 Hz *10
126	Terminal 4 frequency setting gain frequency Simple	0 to 590 Hz	60/50 Hz *10
127	PID control automatic switchover frequency	0 to 590 Hz, 9999	9999
128	PID action selection	0, 40, 41	0
129	PID proportional band	0.1 to 1000%, 9999	100%
130	PID integral time	0.1 to 3600 s, 9999	1 s
131	PID upper limit	400 to 600%, 9999	9999
132	PID lower limit	400 to 600%, 9999	9999
133	PID action set point	400 to 600%	500%
134	PID differential time	0.01 to 10.00 s, 9999	9999
135	Integral clamp (positive polarity)	0 to 100%, 9999	9999
136	Integral clamp (negative polarity)	0 to 100%, 9999	9999
137	PID upper/lower limit hysteresis width	0 to 100%, 9999	9999
140	Backlash acceleration stopping frequency	0 to 590 Hz	1 Hz
141	Backlash acceleration stopping time	0 to 360 s	0.5 s
142	Backlash deceleration stopping frequency	0 to 590 Hz	1 Hz
143	Backlash deceleration stopping time	0 to 360 s	0.5 s
144	Speed setting switchover	0, 2, 4, 6, 8, 10, 12, 102, 104, 106, 108, 110, 112	4
145	PU display language selection	0 to 7	—
147	Acceleration/ deceleration time switching frequency	0 to 590 Hz, 9999	9999
148	Stall prevention level at 0V input	0 to 400%	150%
149	Stall prevention level at 10 V input	0 to 400%	200%
150	Output current detection level	0 to 400%	150%
151	Output current detection signal delay time	0 to 10 s	0 s
152	Zero current detection level	0 to 400%	5%
153	Zero current detection time	0 to 10 s	0.5 s
154	Voltage reduction selection during stall prevention operation	0, 1, 10, 11	1

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower

*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

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

Parameter	Name	Setting range	Initial value
155	RT signal function validity condition selection	0, 10	0
156	Stall prevention operation selection	0 to 31, 100, 101	0
157	OL signal output timer	0 to 25 s, 9999	0 s
158	AM terminal function selection	1 to 3, 5 to 14, 17, 18, 19, 21, 22, 24, 26 to 28, 30, 32 to 34, 36, 46, 50, 52 to 54, 61, 62, 67, 70, 81 to 84, 87 to 93, 97, 98	1
159 [*16]	DA1 output sign selection	0 to 2	0
160	User group read selection *Simple*	0, 1, 9999	0
161	Frequency setting/key lock operation selection	0, 1, 10, 11	0
162	Automatic restart after instantaneous power failure selection	0 to 3, 10 to 13	0
163	First cushion time for restart	0 to 20 s	0 s
164	First cushion voltage for restart	0 to 100%	0%
165	Stall prevention operation level for restart	0 to 400%	150%
166	Output current detection signal retention time	0 to 10 s, 9999	0.1 s
167	Output current detection operation selection	0, 1, 10, 11	0
168	Parameter for manufacturer setting. Do not set.		
169			
170	Watt-hour meter clear	0, 10, 9999	9999
171	Operation hour meter clear	0, 9999	9999
172	User group registered display/batch clear	9999, (0 to 16)	0
173	User group registration	0 to 1999, 9999	9999
174	User group clear	0 to 1999, 9999	9999
178	STF terminal function selection	0 to 13, 16 to 18, 20, 23 to 28, 32, 42 to 44, 46 to 48, 50 to 53, 60, 62, 64 to 67, 70 to 72, 74, 81, 92, 93, 100 to 109, 111 to 117, 120 to 126, 9999	60
179	STR terminal function selection	0 to 13, 16 to 18, 20, 23 to 28, 32, 42 to 44, 46 to 48, 50 to 53, 61, 62, 64 to 67, 70 to 72, 74, 81, 92, 93, 100 to 109, 111 to 117, 120 to 126, 9999	61

Parameter	Name	Setting range	Initial value
180	RL terminal function selection	0 to 13, 16 to 18, 20, 23 to 28, 32, 42 to 44, 46 to 48, 50 to 53, 62, 64 to 67, 70 to 72, 74, 81, 92, 93, 100 to 109, 111 to 117, 120 to 126, 9999	0
181	RM terminal function selection		1
182	RH terminal function selection		2
183	RT terminal function selection		3
184	AU terminal function selection		4
185	JOG terminal function selection		5
186	CS terminal function selection		6
187	MRS terminal function selection		24 [*14] 10 [*15]
188	STOP terminal function selection		25
189	RES terminal function selection		62
190	RUN terminal function selection	0 to 8, 10 to 16, 25, 26, 30 to 35, 39 to 48, 55, 64, 67, 68, 79, 80, 85, 90 to 99, 100 to 108, 110 to 116, 125, 126, 130 to 135, 139 to 148, 155, 164, 167, 168, 179, 180, 185, 190 to 199, 206 to 208, 211 to 213, 231 to 239, 242, 306 to 308, 311 to 313, 331 to 339, 342, 9999 [*18]	0
191	SU terminal function selection		1
192	IPF terminal function selection		2 [*14] 9999 [*15]
193	OL terminal function selection		3
194	FU terminal function selection		4
195	ABC1 terminal function selection	0 to 8, 10 to 16, 25, 26, 30 to 35, 39 to 48, 55, 64, 67, 68, 79, 80, 85, 90, 91, 94 to 99, 100 to 108, 110 to 116, 125, 126, 130 to 135, 139 to 148, 155, 164, 167, 168, 179, 180, 185, 190, 191, 194 to 199, 206 to 208, 211 to 213, 231 to 239, 242, 306 to 308, 311 to 313, 331 to 339, 342, 9999 [*18]	99
196	ABC2 terminal function selection		9999
232 to 239	Multi-speed setting (speeds 8 to 15)	0 to 590 Hz, 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%

[*14] The setting range or initial value is for standard models.

[*15] The setting range or initial value is for separated converter types.

[*16] The setting is available only when the FR-A8AZ is installed.

[*18] The setting values "242" and "342" are available for the Ethernet models only.

Parameter	Name	Setting range	Initial value
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 10 s	0.5 s
247	Constant-power range slip compensation selection	0, 9999	9999
249	Earth (ground) fault detection at start	0, 1	0
250	Stop selection	0 to 100 s, 1000 to 1100 s, 8888, 9999	9999
251	Output phase loss protection selection	0, 1	1
252	Override bias	0 to 1000%	50%
253	Override gain	0 to 1000%	150%
255	Life alarm status display	(0 to 15)	0
256 *14	Inrush current limit circuit life display	(0 to 100%)	100%
257	Control circuit capacitor life display	(0 to 100%)	100%
258 *14	Main circuit capacitor life display	(0 to 100%)	100%
259 *14	Main circuit capacitor life measuring	0, 1	0
260	PWM frequency automatic switchover	0, 1	1
261	Power failure stop selection	0 to 2, 11, 12, 21, 22	0
262	Subtracted frequency at deceleration start	0 to 20 Hz	3 Hz
263	Subtraction starting frequency	0 to 590 Hz, 9999	60/50 Hz *10
264	Power-failure deceleration time 1	0 to 3600 s	5 s
265	Power-failure deceleration time 2	0 to 3600 s, 9999	9999
266	Power failure deceleration time switchover frequency	0 to 590 Hz	60/50 Hz *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 set.		
270	Acceleration/ deceleration time during stall condition	0 to 3600 s	15 s
271	Second acceleration time for inertia compensation	0 to 3600 s	15 s
272	Second deceleration time for inertia compensation	0 to 3600 s	15 s

Parameter	Name	Setting range	Initial value
276	Line speed monitoring reference	0 to 6553.4 m/ min *11	1000 m/min *11
278	Actual line speed voltage/current gain	0 to 100%, 9999	9999
279	Actual line speed gain	0 to 6553.4 m/ min *11, 9999	9999
280	Actual line speed voltage/current bias	0 to 100%, 9999	9999
281	Actual line speed bias	0 to 6553.4 m/ min *11, 9999	9999
282	Actual line speed pulse input bias	0 to 500, 9999	9999
283	Actual line speed pulse input gain	0 to 500, 9999	9999
284	Actual line speed input filter time constant	0 to 5 s	0.02 s
285	Overspeed detection frequency (Excessive speed deviation detection frequency)	0 to 30 Hz, 9999	9999
286	Droop gain	0 to 100%	0%
287	Droop filter time constant	0 to 1 s	0.3 s
288	Droop function activation selection	0 to 2, 10, 11, 20 to 22	0
289	Inverter output terminal filter	5 to 50 ms, 9999	9999
290	Monitor negative output selection	0 to 7	0
291	Pulse train I/O selection	0, 1, 10, 11, 20, 21, 100 (FM type) 0, 1 (CA type)	0
294	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	0
313	DO0 output selection	0 to 8, 10 to 16, 25, 26, 30 to 35, 39 to 48, 55, 64, 68, 79, 80, 85 to 99, 100 to 108, 110 to 116, 125, 126, 130 to 135, 139 to 148, 155, 164, 168, 179, 180, 185 to 199, 206 to 208, 211 to 213, 231 to 239, 242, 306 to 308, 311 to 313, 331 to 339, 342, 9999 *18	9999
314	DO1 output selection		9999
315	DO2 output selection		9999
316	DO3 output selection		9999
317	DO4 output selection		9999
318	DO5 output selection		9999
319	DO6 output selection		9999

*10 Differs according to types. (FM type/CA type)
*11 The increment varies depending on the Pr. 358 setting.
*14 The setting range or initial value is for standard models.
*18 The setting values "242" and "342" are available for the Ethernet models only.

Parameter	Name	Setting range	Initial value
320	RA1 output selection	0 to 8, 10 to 16, 25, 26, 30 to 35, 39 to 48, 55, 64, 68, 79, 80, 85 to 91, 94 to 99, 206 to 208, 211 to 213, 231 to 239, 242, 9999 *18	9999
321	RA2 output selection		9999
322	RA3 output selection		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
	RS-485 communication data length	0, 1	0
	RS-485 communication stop bit length	0, 1	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 999.8 s, 9999	0 s
337	RS-485 communication waiting time setting	0 to 150 ms, 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
343	Communication error count	—	0
349 *19	Communication reset selection	0, 1	0
350	Line speed command voltage/current bias	0 to 100%	0%
351	Line speed command bias	0 to 6553.4 m/min *11	0 m/min *11
352	Line speed command voltage/current gain	0 to 100%	50%
353	Line speed command gain	0 to 6553.4 m/min. *11, 9999	1000 m/min *11
354	Line speed command pulse input bias	0 to 500	0
355	Line speed command pulse input gain	0 to 500	100

Parameter	Name	Setting range	Initial value
356	Line speed command digital input bias	0 to 65535	0
357	Line speed command digital input gain	0 to 65535	65535
358	Line speed unit	0 to 3	0
359 *9	Encoder rotation direction	0, 1, 100, 101	1
360	Line speed command value	0 to 6553.4 m/min *11	0 m/min *11
361	Line speed command input selection	0 to 8, 9999	9999
362	Actual line speed input selection	0 to 7, 9999	0
363	Dancer / tension sensor feedback input selection	3 to 6, 9999	9999
364	Dancer tension setting input selection	3 to 6, 9999	9999
365	Tension command value (RAM)	0 to 100 N *13	0 N
366	Tension command value (RAM, EEPROM)	0 to 100 N *13	0 N
367 *9	Speed feedback range	0 to 590 Hz, 9999	9999
368 *9	Feedback gain	0 to 100	1
369 *9	Number of encoder pulses	0 to 4096	1024
374	Overspeed detection level	0 to 590 Hz, 9999	9999
376 *9	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 590 Hz	0
386	Frequency for maximum input pulse	0 to 590 Hz	60/50 Hz *10
393	Line speed command acceleration/deceleration reference	0 to 6553.4 m/min *11	1000 m/min *11
394	First acceleration time for line speed command	0 to 3600 s	15 s
395	First deceleration time for line speed command	0 to 3600 s	15 s
414	PLC function operation selection	0 to 2, 11, 12	0

*9 The setting is available only when a plug-in option that supports Vector control is installed. For details of the Vector control compatible options supporting the parameter, refer to the "FR-A800 Instruction Manual (Detailed)" or the Instruction Manual of the Vector control compatible option.

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

*11 The increment varies depending on the Pr. 358 setting.

*13 The setting varies with the Pr. 1401 setting.

*18 The setting values "242" and "342" are available for the Ethernet models only.

*19 Available for the Ethernet models only,

Parameter	Name	Setting range	Initial value
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
422	**Position control gain**	0 to 150 s^{-1}	25 s^{-1}
423	**Dancer / tension sensor feedback detection level**	0 to 100%	10%
424	**Dancer / tension sensor feedback input offset**	400 to 600%	500%
425	**Break detection waiting time**	0 to 100 s, 9999	9999
426	**Dancer tension setting bias**	0 to 200%	0%
427	**Dancer tension setting gain**	0 to 200%	100%
428	**Command pulse selection**	0 to 5	0
430	**Dancer tension setting**	1 to 100, 9999	100
432 *9	**Pulse train torque command bias**	0 to 400%	0%
433 *9	**Pulse train torque command gain**	0 to 400%	150%
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, 9999	9999
451	**Second motor control method selection**	10 to 12, 20, 110 to 112, 9999	9999
453	**Second motor capacity**	0.4 to 55 kW, 9999 *2 0 to 3600 kW, 9999 *3	9999
454	**Number of second motor poles**	2, 4, 6, 8, 10, 12, 9999	9999
455	**Second motor excitation current**	0 to 500 A, 9999 *2 0 to 3600 A, 9999 *3	9999
456	**Rated second motor voltage**	0 to 1000 V	200 V *7 400 V *8
457	**Rated second motor frequency**	10 to 400 Hz, 9999	9999
458	**Second motor constant (R1)**	0 to 50 Ω, 9999 *2 0 to 400 mΩ, 9999 *3	9999
459	**Second motor constant (R2)**	0 to 50 Ω, 9999 *2 0 to 400 mΩ, 9999 *3	9999
460	**Second motor constant(L1)**	0 to 6000 mH, 9999 *2 0 to 400 mH, 9999 *3	9999
461	**Second motor constant (L2)**	0 to 6000 mH, 9999 *2 0 to 400 mH, 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	**PID proportional band for values below set point**	0.1 to 1000%, 9999	9999
465	**PID integral time for values below set point**	0.1 to 3600 s, 9999	9999
466	**PID differential time for values below set point**	0.01 to 10 s, 9999	9999
467	**Second PID proportional band**	0.1 to 1000%, 9999	9999
468	**Second PID integral time**	0.1 to 3600 s, 9999	9999
469	**Second PID differential time**	0.01 to 10 s, 9999	9999
470	**Second PID proportional band for values below set point**	0.1 to 1000%, 9999	9999
471	**Second PID integral time for values below set point**	0.1 to 3600 s, 9999	9999
472	**Second PID differential time for values below set point**	0.01 to 10 s, 9999	9999
473	**Third PID proportional band**	0.1 to 1000%, 9999	9999
474	**Third PID integral time**	0.1 to 3600 s, 9999	9999
475	**Third PID differential time**	0.01 to 10 s, 9999	9999
476	**Third PID proportional band for values below set point**	0.1 to 1000%, 9999	9999
477	**Third PID integral time for values below set point**	0.1 to 3600 s, 9999	9999
478	**Third PID differential time for values below set point**	0.01 to 10 s, 9999	9999
479	**Fourth PID proportional band**	0.1 to 1000%, 9999	9999
480	**Fourth PID integral time**	0.1 to 3600 s, 9999	9999
481	**Fourth PID differential time**	0.01 to 10 s, 9999	9999
482	**Fourth PID proportional band for values below set point**	0.1 to 1000%, 9999	9999
483	**Fourth PID integral time for values below set point**	0.1 to 3600 s, 9999	9999

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower

*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

*7 The value for the 200 V class.

*8 The value for the 400 V class.

*9 The setting is available only when a plug-in option that supports Vector control is installed. For details of the Vector control compatible options supporting the parameter, refer to the "FR-A800 Instruction Manual (Detailed)" or the Instruction Manual of the Vector control compatible option.

Parameter	Name	Setting range	Initial value
484	Fourth PID differential time for values below set point	0.01 to 10 s, 9999	9999
485	Integral control activation	0 to 3	0
486	Deviation A	400.1 to 600%	600%
487	Deviation B	400 to 599.9%	400%
488	Deviation C1	400.1 to 599.9%, 9999	9999
489	Deviation C2	400.1 to 599.9%, 9999	9999
490	PID gain A	0.1 to 1000%, 9999	9999
491	PID gain B	0.1 to 1000%, 9999	9999
492	PID gain C1	0.1 to 1000%, 9999	9999
493	PID gain C2	0.1 to 1000%, 9999	9999
494	PID gain D	0.1 to 1000%, 9999	9999
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, 9696 (0 to 9999)	0
502	Stop mode selection at communication error	0 to 2, 11, 12	0
503	Maintenance timer 1	0 (1 to 9998)	0
504	Maintenance timer 1 warning output set time	0 to 9998, 9999	9999
505	Speed setting reference	1 to 590 Hz	60/50 Hz [*10]
516	S-pattern time at a start of acceleration	0.1 to 2.5 s	0.1 s
517	S-pattern time at a completion of acceleration	0.1 to 2.5 s	0.1 s
518	S-pattern time at a start of deceleration	0.1 to 2.5 s	0.1 s
519	S-pattern time at a completion of deceleration	0.1 to 2.5 s	0.1 s
539	Modbus-RTU communication check time interval	0 to 999.8 s, 9999	9999
541 [*19]	Frequency command sign selection	0, 1	0
544 [*19]	CC-Link extended setting	0, 1, 12, 14, 18, 24, 28, 100, 112, 114, 118, 128	0
547	USB communication station number	0 to 31	0
548	USB communication check time interval	0 to 999.8 s, 9999	9999

Parameter	Name	Setting range	Initial value
549	Protocol selection	0, 1	0
550	NET mode operation command source selection	0, 1, 5, 9999 [*20]	9999
551	PU mode operation command source selection	1 to 3, 5, 9999 [*20]	9999
552	Frequency jump range	0 to 30 Hz, 9999	9999
553	PID deviation limit	0.0 to 100.0%, 9999	9999
554	PID signal operation selection	0 to 3	0
555	Current average time	0.1 to 1.0 s	1 s
556	Data output mask time	0 to 20 s	0 s
557	Current average value monitor signal output reference current	0 to 500 A [*2]	Inverter rated current
		0 to 3600 A [*3]	
560	Second frequency search gain	0 to 32767, 9999	9999
561	PTC thermistor protection level	0.5 to 30 kΩ, 9999	9999
563	Energization time carrying-over times	(0 to 65535)	0
564	Operating time carrying-over times	(0 to 65535)	0
565	Second motor excitation current break point	0 to 400 Hz, 9999	9999
566	Second motor excitation current low-speed scaling factor	0 to 300%	9999
569	Second motor speed control gain	0 to 200%, 9999	9999
570	Multiple rating setting	0 to 3, 12	2
571	Holding time at a start	0.0 to 10.0 s, 9999	9999
573	4 mA input check selection	1 to 3, 9999	9999
574	Second motor online auto tuning	0, 1	0
598	Undervoltage level	175 to 215 V, 9999 [*7]	9999
		350 to 430 V, 9999 [*8]	
599	X10 terminal input selection	0, 1	0 [*14]
			1 [*15]
600	First free thermal reduction frequency 1	0 to 590 Hz, 9999	9999
601	First free thermal reduction ratio 1	1 to 100%	100%
602	First free thermal reduction frequency 2	0 to 590 Hz, 9999	9999
603	First free thermal reduction ratio 2	1 to 100%	100%
604	First free thermal reduction frequency 3	0 to 590 Hz, 9999	9999

[*2] The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower
[*3] The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher
[*7] The value for the 200 V class.
[*8] The value for the 400 V class.
[*10] Differs according to types. (FM type/CA type)
[*14] The initial value is for standard models.
[*15] The initial value is for separated converter types.
[*19] Available for the Ethernet models only,
[*20] The setting value "5" is available for the Ethernet models only

Parameter	Name	Setting range	Initial value
606	Power failure stop external signal input selection	0, 1	1
607	Motor permissible load level	110 to 250%	150%
608	Second motor permissible load level	110 to 250%, 9999	9999
611	Acceleration time at a restart	0 to 3600 s, 9999	9999
617	Reverse rotation excitation current low-speed scaling factor	0 to 300%, 9999	9999
620	Line speed bias for reel change	0 to 2000 m/min *11	1000 m/min *11
621	Allowable deviation from target line speed	0 to 6553.4 m/min *11	0 m/min *11
622	Line speed command for starting	0 to 6553.4 m/min *11	0 m/min *11
635	Line speed command added compensation value voltage/current bias	0 to 100%, 9999	9999
636	Line speed command added compensation value bias	0 to 6553.4 m/min *11, 9999	9999
637	Line speed command added compensation value voltage/current gain	0 to 100%, 9999	9999
638	Line speed command added compensation value gain	0 to 6553.4 m/min *11, 9999	9999
639	Speed control proportional term applied diameter 1	1 to 99%, 9999	9999
640	Speed control proportional term applied diameter 2	1 to 99%, 9999	9999
641	Speed control proportional gain 1	0 to 1000%, 9999	9999
642	Speed control proportional gain 2	0 to 1000%, 9999	9999
643	Speed control proportional gain 3	0 to 1000%, 9999	9999
644	Speed control proportional gain 4	0 to 1000%, 9999	9999
645	Winding diameter storage selection	0, 1	0
646	Stored winding diameter	1 to 6553 mm	1 mm
647	Operation time with stored winding diameter	0 to 100 s	0 s
648	Target winding diameter	1 to 6553 mm	1 mm
650	Terminal 4 input compensation selection	0, 1	0
653	Speed smoothing control	0 to 200%	0%
654	Speed smoothing cutoff frequency	0 to 120 Hz	20 Hz
655	Analog remote output selection	0, 1, 10, 11	0

*11 The increment varies depending on the Pr. 358 setting.

Parameter	Name	Setting range	Initial value
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%
663	Control circuit temperature signal output level	0 to 100 °C	0 °C
665	Regeneration avoidance frequency gain	0 to 200%	100%
668	Power failure stop frequency gain	0 to 200%	100%
673	SF-PR slip amount adjustment operation selection	2, 4, 6, 9999	9999
674	SF-PR slip amount adjustment gain	0 to 500%	100%
675	User parameter auto storage function selection	1, 9999	9999
679	Second droop gain	0 to 100%, 9999	9999
680	Second droop filter time constant	0 to 1 s, 9999	9999
681	Second droop function activation selection	0 to 2, 10, 11, 20 to 22, 9999	9999
682	Second droop break point gain	0.1 to 100%, 9999	9999
683	Second droop break point torque	0.1 to 100%, 9999	9999
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 3600 s, 9999	1 s
692	Second free thermal reduction frequency 1	0 to 590 Hz, 9999	9999
693	Second free thermal reduction ratio 1	1 to 100%	100%
694	Second free thermal reduction frequency 2	0 to 590 Hz, 9999	9999
695	Second free thermal reduction ratio 2	1 to 100%	100%
696	Second free thermal reduction frequency 3	0 to 590 Hz, 9999	9999
699	Input terminal filter	5 to 50 ms, 9999	9999
707	Motor inertia (integer)	10 to 999, 9999	9999
724	Motor inertia (exponent)	0 to 7, 9999	9999
744	Second motor inertia (integer)	10 to 999, 9999	9999
745	Second motor inertia (exponent)	0 to 7, 9999	9999

Parameter	Name	Setting range	Initial value
753	Empty reel inertia (integer)	10 to 999, 9999	9999
754	Empty reel inertia (exponent)	0 to 7, 101 to 104, 9999	9999
755 *9	Cumulative pulse clear signal selection	0 to 3	0
756 *9	Cumulative pulse division scaling factor	1 to 16384	1
757 *9	Control terminal option - Cumulative pulse division scaling factor	1 to 16384	1
758 *9	Cumulative pulse storage	0 to 3	0
774	Operation panel monitor selection 1	1 to 3, 5 to 14, 17 to 20, 22 to 36, 38, 40 to 46, 50 to 57, 61 to 64, 67, 71 to 74, 81 to 93, 97, 98, 100, 9999	9999
775	Operation panel monitor selection 2		9999
776	Operation panel monitor selection 3		9999
778	4 mA input check filter	0 to 10 s	0 s
799	Pulse increment setting for output power	0.1, 1, 10, 100, 1000 kWh	1 kWh
800	Control method selection	0 to 2, 9 to 12, 20, 100 to 102, 109 to 112	20
801	Output limit level	0 to 400%, 9999	9999
802	Pre-excitation selection	0, 1	0
803	Constant output range torque characteristic selection	0 to 2, 10, 11	0
804	Tension / Torque command source selection	0 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 400 Hz	60/50 Hz *10
809	Reverse rotation speed limit/reverse-side speed limit	0 to 400 Hz, 9999	9999
810	Torque limit input method selection	0 to 2	0
811	Set resolution switchover	0, 1, 10, 11	0
812	Torque limit level (regeneration)	0 to 400%, 9999	9999
813	Torque limit level (3rd quadrant)	0 to 400%, 9999	9999
814	Torque limit level (4th quadrant)	0 to 400%, 9999	9999
815	Torque limit level 2	0 to 400%, 9999	9999
816	Torque limit level during acceleration	0 to 400%, 9999	9999
817	Torque limit level during deceleration	0 to 400%, 9999	9999
818	Easy gain tuning response level setting	1 to 15	2
819	Easy gain tuning selection	0 to 2	0
820	Speed control P gain 1	0 to 1000%	60%
821	Speed control integral time 1	0 to 20 s	0.333 s
822	Speed setting filter 1	0 to 5 s, 9999	9999
823 *9	Speed detection filter 1	0 to 0.1 s	0.001 s
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 500 ms	5 ms
826	Torque setting filter 1	0 to 5 s, 9999	9999
827	Torque detection filter 1	0 to 0.1 s	0 s
828	Model speed control gain	0 to 1000%	60%
829	Taper ratio setting input filter time constant	0 to 5 s	0.02 s
830	Speed control P gain 2	0 to 1000%, 9999	9999
831	Speed control integral time 2	0 to 20 s, 9999	9999
832	Speed setting filter 2	0 to 5 s, 9999	9999
833 *9	Speed detection filter 2	0 to 0.1 s, 9999	9999
834	Torque control P gain 2	0 to 500%, 9999	9999
835	Torque control integral time 2	0 to 500 ms, 9999	9999
836	Torque setting filter 2	0 to 5 s, 9999	9999
837	Torque detection filter 2	0 to 0.1 s, 9999	9999
840	Torque bias selection	0 to 3, 24, 25, 9999	9999
841	Torque bias 1	600 to 1400%, 9999	9999
842	Torque bias 2	600 to 1400%, 9999	9999
843	Torque bias 3	600 to 1400%, 9999	9999
844	Torque bias filter	0 to 5 s, 9999	9999
845	Torque bias operation time	0 to 5 s, 9999	9999
846	Torque bias balance compensation	0 to 10 V, 9999	9999
847	Fall-time torque bias terminal 1 bias	0 to 400%, 9999	9999
848	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
851 *9	Control terminal option-Number of encoder pulses	0 to 4096	2048

*9 The setting is available only when a plug-in option that supports Vector control is installed. For details of the Vector control compatible options supporting the parameter, refer to the "FR-A800 Instruction Manual (Detailed)" or the Instruction Manual of the Vector control compatible option.

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

Parameter	Name	Setting range	Initial value
852 *9	**Control terminal option-Encoder rotation direction**	0, 1, 100, 101	1
853 *9	**Speed deviation time**	0 to 100 s	1 s
854	**Excitation ratio**	0 to 100%	100%
855 *9	**Control terminal option - Signal loss detection enable/ disable selection**	0, 1	0
858	**Terminal 4 function assignment**	0, 1, 4, 9999	0
859	**Torque current/Rated PM motor current**	0 to 500 A, 9999 *2 0 to 3600 A, 9999 *3	9999
860	**Second motor torque current/Rated PM motor current**	0 to 500 A, 9999 *2 0 to 3600 A, 9999 *3	9999
862 *9	**Encoder option selection**	0, 1	0
863 *9	**Control terminal option-Encoder pulse division ratio**	1 to 32767	1
864	**Torque detection**	0 to 400%	150%
865	**Low speed detection**	0 to 590 Hz	1.5 Hz
866	**Torque monitoring reference**	0 to 400%	150%
867	**AM output filter**	0 to 5 s	0.01 s
868	**Terminal 1 function assignment**	0 to 6, 9999	0
869	**Current output filter**	0 to 5 s	—/0.02 s *10
870	**Speed detection hysteresis**	0 to 5 Hz	0 Hz
872 *14	**Input phase loss protection selection**	0, 1	0
873 *9	**Speed limit**	0 to 400 Hz	20 Hz
874	**OLT level setting**	0 to 400%	150%
875	**Fault definition**	0, 1	0
876 *9	**Thermal protector input**	0, 1	1
877	**Speed feed forward control/model adaptive speed control selection**	0 to 2	0
878	**Speed feed forward filter**	0 to 1 s	0 s
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%

Parameter	Name	Setting range	Initial value
882	**Regeneration avoidance operation selection**	0 to 2	0
883	**Regeneration avoidance operation level**	300 to 1000 V	380 V DC *7 760 V DC *8
884	**Regeneration avoidance at deceleration detection sensitivity**	0 to 5	0
885	**Regeneration avoidance compensation frequency limit value**	0 to 590 Hz, 9999	6 Hz
886	**Regeneration avoidance voltage gain**	0 to 200%	100%
888	**Free parameter 1**	0 to 9999	9999
889	**Free parameter 2**	0 to 9999	9999
891	**Cumulative power monitor digit shifted times**	0 to 4, 9999	9999
892	**Load factor**	30 to 150%	100%
893	**Energy saving monitor reference (motor capacity)**	0.1 to 55 kW *2 0 to 3600 kW *3	Inverter rated capacity
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 1000 h, 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) *17	**FM/CA terminal calibration**	—	—
C1 (901) *17	**AM terminal calibration**	—	—
C2 (902) *17	**Terminal 2 frequency setting bias frequency**	0 to 590 Hz	0 Hz
C3 (902) *17	**Terminal 2 frequency setting bias**	0 to 300%	0%

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower

*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

*7 The value for the 200 V class.

*8 The value for the 400 V class.

*9 The setting is available only when a plug-in option that supports Vector control is installed. For details of the Vector control compatible options supporting the parameter, refer to the "FR-A800 Instruction Manual (Detailed)" or the Instruction Manual of the Vector control compatible option.

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

*14 The initial value is for standard models.

*17 The parameter number in parentheses is that used (displayed) on the LCD operation panel and the parameter unit.

Parameter	Name	Setting range	Initial value
125 (903) *17	**Terminal 2 frequency setting gain frequency**	0 to 590 Hz	60/50 Hz *10
C4 (903) *17	**Terminal 2 frequency setting gain**	0 to 300%	100%
C5 (904) *17	**Terminal 4 frequency setting bias frequency**	0 to 590 Hz	0 Hz
C6 (904) *17	**Terminal 4 frequency setting bias**	0 to 300%	20%
126 (905) *17	**Terminal 4 frequency setting gain frequency**	0 to 590 Hz	60/50 Hz *10
C7 (905) *17	**Terminal 4 frequency setting gain**	0 to 300%	100%
C12 (917) *17	**Terminal 1 bias frequency (speed)**	0 to 590 Hz	0 Hz
C13 (917) *17	**Terminal 1 bias (speed)**	0 to 300%	0%
C14 (918) *17	**Terminal 1 gain frequency (speed)**	0 to 590 Hz	60/50 Hz *10
C15 (918) *17	**Terminal 1 gain (speed)**	0 to 300%	100%
C16 (919) *17	**Terminal 1 bias command (torque/ magnetic flux)**	0 to 400%	0%
C17 (919) *17	**Terminal 1 bias (torque/ magnetic flux)**	0 to 300%	0%
C18 (920) *17	**Terminal 1 gain command (torque/ magnetic flux)**	0 to 400%	150%
C19 (920) *17	**Terminal 1 gain (torque/magnetic flux)**	0 to 300%	100%
C8 (930) *17	**Current output bias signal**	0 to 100%	—/0% *10
C9 (930) *17	**Current output bias current**	0 to 100%	—/0% *10

Parameter	Name	Setting range	Initial value
C10 (931) *17	**Current output gain signal**	0 to 100%	—/100% *10
C11 (931) *17	**Current output gain current**	0 to 100%	—/100% *10
C38 (932)	**Terminal 4 bias command (torque/ magnetic flux)**	0 to 400%	0%
C39 (932)	**Terminal 4 bias (torque/magnetic flux)**	0 to 300%	20%
C40 (933)	**Terminal 4 gain command (torque/ magnetic flux)**	0 to 400%	150%
C41 (933)	**Terminal 4 gain (torque/magnetic flux)**	0 to 300%	100%
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 36, 38, 40 to 46, 50 to 57, 61 to 64, 67, 71 to 74, 81 to 93, 97, 98, 100	0
994	**Droop break point gain**	0.1 to 100%, 9999	9999
995	**Droop break point torque**	0.1 to 100%	100%
997	**Fault initiation**	0 to 255, 9999	9999
999	**Automatic parameter setting** Simple	1, 2, 10 to 13, 20, 21, 9999	9999
1000	**Direct setting selection**	0 to 2	0
1003	**Notch filter frequency**	0, 8 to 1250 Hz	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

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower

*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

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

*17 The parameter number in parentheses is that used (displayed) on the LCD operation panel and the parameter unit.

Parameter	Name	Setting range	Initial value
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
1015	Integral stop selection at limited manipulated amount	0, 1	0
1016	PTC thermistor protection detection time	0 to 60 s	0 s
1018	Monitor with sign selection	0, 9999	9999
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%
1027	Analog source selection (1ch)	1 to 3, 5 to 14, 17 to 20, 22 to 24, 26 to 36, 40 to 42, 46, 52 to 54, 61 to 64, 67, 71 to 74, 81 to 93, 97, 98, 201 to 213, 230 to 232, 235 to 238	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	1
1036	Analog trigger operation selection	0, 1	0
1037	Analog trigger level	600 to 1400	1000

Parameter	Name	Setting range	Initial value
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 60 min	0 min
1049	USB host reset	0, 1	0
1072	Tension reverse selection	0, 1	0
1073 *19	Ethernet communication network number	1 to 239	1
1074 *19	Ethernet communication station number	1 to 120	1
1075 *19	Link speed and duplex mode selection	0 to 4	0
1076 *19	Ethernet function selection 1	502, 5000 to 5002, 5006 to 5008, 5010 to 5013, 9999, 45237, 61450	5001
1077 *19	Ethernet function selection 2		45237
1078 *19	Ethernet function selection 3		9999
1103	Deceleration time at emergency stop	0 to 3600 s	5 s
1106	Torque monitor filter	0 to 5 s, 9999	9999
1107	Running speed monitor filter	0 to 5 s, 9999	9999
1108	Excitation current monitor filter	0 to 5 s, 9999	9999
1113	Speed limit method selection	0 to 2, 10	0
1114	Torque command reverse selection	0, 1	0
1115	Speed control integral term clear time	0 to 9998 ms	0 s
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

*19 Available for the Ethernet models only,

Parameter	Name	Setting range	Initial value
1121	Per-unit speed control reference frequency	0 to 400 Hz	120 Hz *2 60 Hz *3
1124*19	Station number in inverter-to-inverter link	0 to 5, 9999	9999
1125*19	Number of inverters in inverter-to-inverter link system	2 to 6	2
1136	Tension sensor feedback voltage/ current bias	0 to 100%	0%
1137	Tension sensor feedback bias	0 to 100 N *13	0 N
1138	Tension sensor feedback voltage/ current gain	0 to 100%	100%
1139	Tension sensor feedback gain	0 to 100 N *13	100 N *13
1150 to 1199	User parameters 1 to 50	0 to 65535	0
1211	Tension PI gain tuning timeout time	1 to 9999 s	50 s
1215	Limit cycle output upper limit	0 to 100%	0%
1217	Limit cycle hysteresis	0.1 to 10%	1%
1219	Tension PI gain tuning start/status	1, 8 (0, 2, 3, 9, 12, 13, 90 to 96)	0
1222	Target amplitude	0 to 100%, 9999	9999
1223	Manipulated amount for operation	0 to 10%	1%
1226	Tension PI gain tuning response level setting	1 to 7	2
1227	Dancer / tension sensor feedback input filter time constant	0 to 5 s	0 s
1230	Winding/unwinding selection	0, 1	0
1231	Material thickness d1	0 to 20 mm, 9999	9999
1232	Material thickness d2	0 to 20 mm	1 mm
1233	Material thickness d3	0 to 20 mm	1 mm
1234	Material thickness d4	0 to 20 mm	1 mm
1235	Maximum winding diameter 1	1 to 6553 mm	2 mm
1236	Minimum winding diameter 1	1 to 6553 mm	1 mm
1237	Maximum winding diameter 2	1 to 6553 mm	2 mm
1238	Minimum winding diameter 2	1 to 6553 mm	1 mm
1239	Maximum winding diameter 3	1 to 6553 mm	2 mm
1240	Minimum winding diameter 3	1 to 6553 mm	1 mm
1241	Maximum winding diameter 4	1 to 6553 mm	2 mm

Parameter	Name	Setting range	Initial value
1242	Minimum winding diameter 4	1 to 6553 mm	1 mm
1243	Gear ratio numerator (follower side)	1 to 65534	1
1244	Gear ratio denomina- tor (driver side)	1 to 65534	1
1245	Sampling time for winding diameter calculation	0.01 to 1 s, 9999	9999
1246	Line speed at winding diameter calculated value activation	0 to 6553.4 m/ min *11	1 m/min *11
1247	Winding diameter change increment amount limit	0 to 9.998 mm, 9999	9999
1248	Winding diameter change limit disable time	0 to 100 s	0 s
1249	Number of averaging for winding diameter calculation	0 to 10	4
1250	Winding diameter compensation speed filtering waiting time	0 to 100 s	0 s
1251	Winding diameter compensation speed filter time constant	0 to 100 s	0 s
1252	Dancer lower limit position	400 to 600%	400%
1253	Initial winding diameter calculation deadband	0 to 50%	1%
1254	Initial winding diameter calculation deadband 2	0 to 50%, 9999	9999
1255	Accumulated amount	1 to 5000 mm, 8888, 9999	9999
1256	Speed control P gain at start	0 to 1000%	60%
1257	Speed control integral time at start	0 to 20 s	2 s
1258	Integral term limit at start	0 to 100%	2.5%
1259	PID term limit at start	0 to 100%	2.5%
1262	Winding length increment	0 to 5	3
1263	Stored winding length (lower 4 digits)	0 to 9999 (m *12)	0 (m *12)
1264	Winding length detection (lower 4 digits)	0 to 9999 (m *12)	1000 (m *12)
1265	Line multi-speed setting (high-speed)	0 to 6553.4 m/ min *11	0 m/min *11
1266	Line multi-speed setting (middle-speed)	0 to 6553.4 m/ min *11	0 m/min *11
1267	Line multi-speed setting (low-speed)	0 to 6553.4 m/ min *11	0 m/min *11
1268	Line multi-speed setting (speed 4)	0 to 6553.4 m/ min *11	0 m/min *11

*2 The setting range or initial value for FR-A820-03160(55K)-R2R or lower and FR-A840-01800(55K)-R2R or lower

*3 The setting range or initial value for FR-A820-03800(75K)-R2R or higher and FR-A840-02160(75K)-R2R or higher

*11 The increment varies depending on the Pr. 358 setting.

*12 The increment varies depending on the Pr. 1262 setting.

*13 The setting varies with the Pr. 1401 setting.

*19 Available for the Ethernet models only,

Parameter	Name	Setting range	Initial value
1269	Line multi-speed setting (speed 5)	0 to 6553.4 m/min *11	0 m/min *11
1270	Line multi-speed setting (speed 6)	0 to 6553.4 m/min *11	0 m/min *11
1271	Line multi-speed setting (speed 7)	0 to 6553.4 m/min *11	0 m/min *11
1272	Line multi-speed setting (speed 8)	0 to 6553.4 m/min *11	0 m/min *11
1273	Line multi-speed setting (speed 9)	0 to 6553.4 m/min *11	0 m/min *11
1274	Line multi-speed setting (speed 10)	0 to 6553.4 m/min *11	0 m/min *11
1275	Line multi-speed setting (speed 11)	0 to 6553.4 m/min *11	0 m/min *11
1276	Line multi-speed setting (speed 12)	0 to 6553.4 m/min *11	0 m/min *11
1277	Line multi-speed setting (speed 13)	0 to 6553.4 m/min *11	0 m/min *11
1278	Line multi-speed setting (speed 14)	0 to 6553.4 m/min *11	0 m/min *11
1279	Line multi-speed setting (speed 15)	0 to 6553.4 m/min *11	0 m/min *11
1280	Winding diameter monitoring reference	1 to 6553 mm	1000 mm
1281	Commanded tension monitoring reference	0 to 100 N *13	100 N *13
1282	Tension command cushion time	0 to 360 s	0 s
1283	Cushion time reference tension	0.01 to 100 N *13	100 N *13
1284	Taper mode selection	0 to 4	0
1285	Taper setting analog input selection	3 to 6, 9999	9999
1286	Winding diameter at taper start	0 to 6553 mm, 9999	9999
1287	Taper ratio setting	0 to 100%, 9999	0%
1288	Data table winding diameter 1	0 to 6553 mm, 9999	9999
1289	Data table taper ratio 1	0 to 100%	0%
1290	Data table winding diameter 2	0 to 6553 mm, 9999	9999
1291	Data table taper ratio 2	0 to 100%	0%
1292	Data table winding diameter 3	0 to 6553 mm, 9999	9999
1293	Data table taper ratio 3	0 to 100%	0%
1294	Data table winding diameter 4	0 to 6553 mm, 9999	9999
1295	Data table taper ratio 4	0 to 100%	0%
1296	Data table winding diameter 5	0 to 6553 mm, 9999	9999
1297	Data table taper ratio 5	0 to 100%	0%
1298	Stored winding length (upper 4 digits)	0 to 9999 (m *12)	0 (m *12)
1299	Stored winding length increment	0 to 2	0
1300 to 1343	Communication option parameters. For details, refer to the Instruction Manual of the option.		
1346	Winding length detection (upper 4 digits)	0 to 9999 (m *12)	0 (m *12)
1348	P/PI control switchover frequency	0 to 400 Hz	0 Hz
1349	Emergency stop operation selection	0, 1, 10, 11	0
1350 to 1359	Communication option parameters. For details, refer to the Instruction Manual of the option.		
1401	Tension command increment	0 to 2	0
1402	Tension command input voltage bias	0 to 100%	0%
1403	Tension command bias	0 to 100 N *13	0 N
1404	Tension command input voltage gain	0 to 100%	100%
1405	Tension command gain	0 to 100 N *13	100 N *13
1406	Commanded tension reduction scaling factor during stall condition	0 to 200%	20%
1407	Speed limit during stall condition	0 to 60 Hz	1 Hz
1409	Tension command cushion time during stall condition	0 to 360 s, 9999	9999
1410	Motor inertia	0 to 500 $kg{\cdot}m^2$, 9999	0 $kg{\cdot}m^2$
1411	Empty reel inertia	0 to 500 $kg{\cdot}m^2$, 9999	0 $kg{\cdot}m^2$
1412	Roll width	0 to 5000 mm	0 mm
1413	Material specific gravity	0 to 20 g/cm^3	0 g/cm^3
1414	First acceleration time for inertia compensation	0 to 3600 s	15 s
1415	First deceleration time for inertia compensation	0 to 3600 s	15 s
1418	Inertia compensation cushion time	0 to 360 s	0 s
1419	Mechanical loss setting frequency bias	900 to 1100%	1000%
1420	Mechanical loss setting frequency 1	0 to 400 Hz, 9999	9999
1421	Mechanical loss 1	900 to 1100%	1000%
1422	Mechanical loss setting frequency 2	0 to 400 Hz, 9999	9999
1423	Mechanical loss 2	900 to 1100%	1000%
1424	Mechanical loss setting frequency 3	0 to 400 Hz, 9999	9999
1425	Mechanical loss 3	900 to 1100%	1000%
1426	Mechanical loss setting frequency 4	0 to 400 Hz, 9999	9999
1427	Mechanical loss 4	900 to 1100%	1000%
1428	Mechanical loss setting frequency 5	0 to 400 Hz, 9999	9999
1429	Mechanical loss 5	900 to 1100%	1000%

*11 The increment varies depending on the Pr. 358 setting.
*12 The increment varies depending on the Pr. 1262 setting.
*13 The setting varies with the Pr. 1401 setting.

Parameter	Name	Setting range	Initial value
1431 *19	**Ethernet signal loss detection function selection**	0 to 3	0
1432 *19	**Ethernet communication check time interval**	0 to 999.8 s, 9999	9999
1434 *19	**Ethernet IP address 1**	0 to 255	192
1435 *19	**Ethernet IP address 2**	0 to 255	168
1436 *19	**Ethernet IP address 3**	0 to 255	50
1437 *19	**Ethernet IP address 4**	0 to 255	1
1438 *19	**Subnet mask 1**	0 to 255	255
1439 *19	**Subnet mask 2**	0 to 255	255
1440 *19	**Subnet mask 3**	0 to 255	255
1441 *19	**Subnet mask 4**	0 to 255	0
1442 *19	**Ethernet IP filter address 1**	0 to 255	0
1443 *19	**Ethernet IP filter address 2**	0 to 255	0
1444 *19	**Ethernet IP filter address 3**	0 to 255	0
1445 *19	**Ethernet IP filter address 4**	0 to 255	0
1446 *19	**Ethernet IP filter address 2 range specification**	0 to 255, 9999	9999
1447 *19	**Ethernet IP filter address 3 range specification**	0 to 255, 9999	9999
1448 *19	**Ethernet IP filter address 4 range specification**	0 to 255, 9999	9999
1449 *19	**Ethernet command source selection IP address 1**	0 to 255	0
1450 *19	**Ethernet command source selection IP address 2**	0 to 255	0
1451 *19	**Ethernet command source selection IP address 3**	0 to 255	0
1452 *19	**Ethernet command source selection IP address 4**	0 to 255	0
1453 *19	**Ethernet command source selection IP address 3 range specification**	0 to 255, 9999	9999

Parameter	Name	Setting range	Initial value
1454 *19	**Ethernet command source selection IP address 4 range specification**	0 to 255, 9999	9999
1455 *19	**Keepalive time**	1 to 7200 s	3600 s
1480	**Load characteristics measurement mode**	0, 1, (2 to 5, 81 to 85)	0
1481	**Load characteristics load reference 1**	0 to 400%, 8888. 9999	9999
1482	**Load characteristics load reference 2**	0 to 400%, 8888. 9999	9999
1483	**Load characteristics load reference 3**	0 to 400%, 8888. 9999	9999
1484	**Load characteristics load reference 4**	0 to 400%, 8888. 9999	9999
1485	**Load characteristics load reference 5**	0 to 400%, 8888. 9999	9999
1486	**Load characteristics maximum frequency**	0 to 590 Hz	60/50 Hz *10
1487	**Load characteristics minimum frequency**	0 to 590 Hz	6 Hz
1488	**Upper limit warning detection width**	0 to 400%, 9999	20%
1489	**Lower limit warning detection width**	0 to 400%, 9999	20%
1490	**Upper limit fault detection width**	0 to 400%, 9999	9999
1491	**Lower limit fault detection width**	0 to 400%, 9999	9999
1492	**Load status detection signal delay time / load reference measurement waiting time**	0 to 60 s	1 s
1499	**Parameter for manufacturer setting. Do not set.**		
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**	—	—
AUTO	**Automatic parameter setting**	—	—
Pr.Md	**Group parameter setting**	(0,) 1, 2	0

*10 Differs according to types. (FM type/CA type)
*19 Available for the Ethernet models only,

6 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 46*.
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 method ....When a protective function of the inverter is activated, the inverter output is kept stopped. Unless reset, the inverter cannot restart. (Refer to *page 46*.)
- When any fault occurs, 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-LU08) 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 (LF) by making parameter setting.
- Fault
  When the protective function is activated, the inverter output is shut off and a fault signal (ALM) is output.
- Other message
  A message regarding the operational status of the inverter is displayed. The inverter does not trip.

NOTES

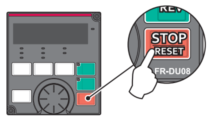
- For the details of fault displays and other malfunctions, also refer to the "FR-A800 Instruction Manual (Detailed)" and "FR-A802-R2R Instruction Manual (Hardware)".
- Past eight faults can be displayed on the operation panel. (Faults history). (Refer to *page 28*.)
- Upon delivery the FR-A800-E-R2R inverter models are not equipped with the RS-485 terminal block.

6.1 Reset method of protective function

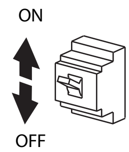
The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter.
Inverter recovers about 1s after reset is cancelled.

Three different methods can be used to reset an inverter.

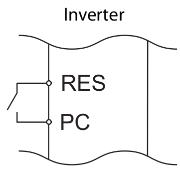
- Using the operation panel, press the STOP/RESET key to reset the inverter.
  (This may only be performed when a fault occurs.)



- 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.

6.2 List of alarm display

	Operation panel indication		Name	Data code
Error message	HOLd	HOLD	Operation panel lock	—
Error message	LOCd	LOCD	Password locked	—
Error message	Er1 to Er4, Er8	Er1 to Er4 Er8	Parameter write error	—
Error message	rE1 to rE4, rE6 to rE8	rE1 to rE4 rE6 to rE8	Copy operation error	—
Error message	Err.	Err.	Error	—
Warning	OL	OL	Stall prevention (overcurrent)	—
Warning	oL	oL	Stall prevention (overvoltage)	—
Warning	Rb	RB *1	Regenerative brake pre-alarm	—
Warning	TH	TH	Electronic thermal relay function pre-alarm	—
Warning	PS	PS	PU Stop	—
Warning	MT1 to MT3	MT1 to MT3	Maintenance signal output (Maintenance timer 1 to 3)	—

	Operation panel indication		Name	Data code
Warning	CP	CP	Parameter copy	—
Warning	SL	SL	Speed limit indication	—
Warning	SA	SA	Safety stop	—
Warning	UF	UF	USB host error	—
Warning	LdF	LDF *1	Load fault warning	—
Warning	EHR	EHR *2	Ethernet communication fault	—
Alarm	FN	FN	Fan alarm	—
Fault	E. OC1	E.OC1	Overcurrent trip during acceleration	16 (H10)
Fault	E. OC2	E.OC2	Overcurrent trip during constant speed	17 (H11)
Fault	E. OC3	E.OC3	Overcurrent trip during deceleration or stop	18 (H12)
Fault	E. OV1	E.OV1	Regenerative overvoltage trip during acceleration	32 (H20)
Fault	E. OV2	E.OV2	Regenerative overvoltage trip during constant speed	33 (H21)
Fault	E. OV3	E.OV3	Regenerative overvoltage trip during deceleration or stop	34 (H22)
Fault	E. THT	E.THT	Inverter overload trip (electronic thermal relay function)	48 (H30)

*1 Not available for FR-A842-R2R (Separated converter type)
*2 Available for FR-A800-E-R2R only

	Operation panel indication		Name	Data code
Fault	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. LUP	E.LUP *1	Upper limit fault detection	98 (H62)
	E. LdN	E.LDN *1	Lower limit fault detection	99 (H63)
	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. OP2	E.OP2		162 (HA2)
	E. OP3	E.OP3		163 (HA3)
	E. 16 to E. 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 (FR-A800-E without RS-485 terminals)	193 (HC1)
	E. P24	E.P24	24V DC power fault	194 (HC2)

	Operation panel indication		Name	Data code
Fault	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 *3	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. EP	E.EP	Encoder phase fault	220 (HDC)
	E. LCI	E.LCI	4 mA input fault	228 (HE4)
	E. PId	E.PID	PID signal fault	230 (HE6)
	E. EHR	E.EHR *2	Ethernet communication fault	231 (HE7)
	E. 1 to E. 3	E. 1 to E. 3	Option fault	241–243 (HF1–HF3)
	E. 5 to E. 7	E. 5 to E. 7	CPU fault	245–247 (HF5–HF7)
	E. 11	E.11	Opposite rotation deceleration fault	251 (HFB)
	E. THS	E.THS	Overload trip	252 (HFC)
	E. 13	E.13	Internal circuit fault	253 (HFD)
	E. EPS	E.EPS	Encoder pulse number setting error	255 (HFF)
Others	E - - - -	E - - - -	Faults history	—
	EV	EV	24 V external power supply operation	—
	E. 0	E.0	No fault records	—

If faults other than the above appear, contact your sales representative.

*1 Not available for FR-A842-R2R (Separated converter type)

*2 Available for FR-A800-E-R2R only

*3 Not available for FR-A800-E-R2R

7 SPECIFICATIONS

7.1 Rating

7.1.1 FR-A820 (200 V class)

Model FR-A820-□-R2R			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	90/110	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
		SND *2	0.75	1.5	2.2	3.7	5.5	7.5	7.5	15	18.5	22	22	30	45	45	55	90	90
		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 *3	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity [kVA] *4	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
		SND *2	1.6	2.7	3.7	5.8	8.8	12	14	22	27	32	39	48	65	72	99	132	148
		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
		SND *2	4.2	7	9.6	15.2	23	31	36	58	70.5	85	102	126	170	190	259	346	388
		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 *5	SLD	110% of rated motor capacity for 60 s, 120% of rated motor capacity for 3 s (max. surrounding air temperature 40 °C)																
		LD	120% of rated motor capacity for 60 s, 150% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)																
		SND *2	150% of rated motor capacity for 60 s (max. surrounding air temperature 50 °C)																
		ND (initial setting)	150% of rated motor capacity for 60 s, 200% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)																
		HD	200% of rated motor capacity for 60 s, 250% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)																
	Rated voltage *6		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in											FR-BU2 (Option)					
		Maximum brake torque *8	150% torque/3%ED *7			100% torque/ 3%ED *7		100% torque/ 2%ED *7		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				—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current [A] *9	Without DC reactor: 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
		Without DC reactor: 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
		Without DC reactor: SND *2	5	8.3	12.2	18.3	28.5	41.6	49	74.8	90.9	106	130	166	207	233	304	346	388
		Without DC reactor: 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
		Without DC reactor: 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
		With DC reactor: SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		With DC reactor: LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		With DC reactor: SND *2	4.2	7	9.6	15.2	23	31	36	58	70.5	85	102	126	170	190	259	346	388
		With DC reactor: ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		With DC reactor: HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Power supply capacity [kVA] *10	Without DC reactor: SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		Without DC reactor: LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		Without DC reactor: SND *2	1.9	3.2	4.7	7	11	16	19	29	35	41	50	63	79	89	116	132	148
		Without DC reactor: ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		Without DC reactor: HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
		With DC reactor: SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		With DC reactor: LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		With DC reactor: SND *2	1.6	2.7	3.7	5.8	8.8	12	14	22	27	32	39	48	65	72	99	132	148
		With DC reactor: 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
		With DC reactor: HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
Protective structure (IEC 60529) *11			Enclosed type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass [kg]			2.0	2.2	3.4	34	3.4	6.7	6.7	8.3	15.5	15.5	15.5	22	42	42	54	74	74

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

*2 For the SND rating, the carrier frequency is always 2 kHz.

*3 The 0.2 kW motor capacity is applicable under V/F control only.

*4 The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.

*5 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.

*6 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 √2.

*7 Value for the built-in brake resistor

*8 Value for the ND rating

*9 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.

*10 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).

*11 FR-DU08: IP40 (except for the PU connector section)

7.1.2 FR-A840 (400 V class)

Model FR-A840-□-R2R			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	75/90	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
		SND *2	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	55	90	90	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*3	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
Output	Rated capacity [kVA] *4	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
		SND *2	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	98	137	148	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
		SND *2	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	129	180	194	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
	Overload current rating *5	SLD	110% of rated motor capacity for 60 s, 120% of rated motor capacity for 3 s (max. surrounding air temperature 40 °C)																							
		LD	120% of rated motor capacity for 60 s, 150% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)																							
		SND *2	150% of rated motor capacity for 60 s (max. surrounding air temperature 50 °C)																							
		ND (initial setting)	150% of rated motor capacity for 60 s, 200% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)																							
		HD	200% of rated motor capacity for 60 s, 250% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)																							
	Rated voltage *6		Three-phase 380 to 500 V																							
	Regenerative braking	Brake transistor	Built-in															FR-BU2 (Option)								
		Maximum brake torque *8	100% torque/2%ED *7							20% torque/continuous								10% torque/continuous								
		FR-ABR (when the option is used)	100% torque/10%ED							100% torque/6%ED				— *13				—	—	—	—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V 50 Hz/60 Hz *12																							
	Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current [A] *9	Without DC reactor: 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
		Without DC reactor: 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
		Without DC reactor: SND *2	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	154	180	194	260	325	361	432	481	547	610
		Without DC reactor: 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
		Without DC reactor: 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
		With DC reactor: 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
		With DC reactor: 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
		With DC reactor: SND *2	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	129	180	194	260	325	361	432	481	547	610
		With DC reactor: 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
		With DC reactor: 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
	Power supply capacity [kVA] *10	Without DC reactor: 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
		Without DC reactor: 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
		Without DC reactor: SND *2	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	117	137	148	198	248	275	329	367	417	465
		Without DC reactor: 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
		Without DC reactor: 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
		With DC reactor: 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
		With DC reactor: 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
		With DC reactor: SND *2	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	98	137	148	198	248	275	329	367	417	465
		With DC reactor: 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
		With DC reactor: 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
Protective structure (IEC 60529) *11			Enclose type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass [kg]			3.0	3.0	3.0	3.4	3.4	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 Electric 4-pole standard motor.

*2 For the SND rating, the carrier frequency is always 2 kHz.

*3 The 0.2 kW motor capacity is applicable under V/F control only.

*4 The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.

*5 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.

*6 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 $\sqrt{2}$.

*7 Value for the built-in brake resistor

*8 Value for the ND rating

*9 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.

*10 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).

*11 FR-DU08: IP40 (except for the PU connector section)

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

*13 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.

7.1.3 FR-A842 (400 V class)

Model FR-A842-□-R2R			07700 (315K)	08660 (355K)	09620 (400K)	10940 (450K)	12120 (500K)
Applicable motor capacity [kW] *1		SLD	400	450	500	560	630
		LD	355	400	450	500	560
		SND *2	355	400	450	500	560
		ND (initial setting)	315	355	400	450	500
		HD	280	315	355	400	450
Output	Rated capacity [kVA] *3	SLD	587	660	733	834	924
		LD	521	587	660	733	834
		SND *2	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
		SND *2	683	770	866	962	1094
		ND (initial setting)	610	683	770	866	962
		HD	547	610	683	770	866
	Overload current rating *4	SLD	110% of rated motor capacity for 60 s, 120% of rated motor capacity for 3 s (max. surrounding air temperature 40 °C)				
		LD	120% of rated motor capacity for 60 s, 150% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)				
		SND *2	150% of rated motor capacity for 60 s (max. surrounding air temperature 50 °C)				
		ND (initial setting)	150% of rated motor capacity for 60 s, 200% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)				
		HD	200% of rated motor capacity for 60 s, 250% of rated motor capacity for 3 s (max. surrounding air temperature 50 °C)				
	Rated voltage *5		Three-phase 380 to 500 V				
	Regenerative braking torque *5 (when the converter unit FR-CC2 is used)	Maximum brake torque	10% torque/continuous				
Input power	Control power supply auxiliary input		Single-phase 380 to 500 V 50 Hz/60 Hz *8				
	DC power supply voltage		430 to 780 V DC				
	Permissible control power supply auxiliary input fluctuation		Frequency ±5%, voltage ±10%				
Protective structure (IEC 60529) *7			Open type (IP00)				
Cooling system			Forced air cooling				
Approx. mass [kg]			163	163	243	243	243

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

*2 For the SND rating, the carrier frequency is always 2 kHz.

*3 The rated output capacity indicated assumes that the output voltage is 440 V.

*4 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.

*5 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 $\sqrt{2}$.

*6 Value for the ND rating

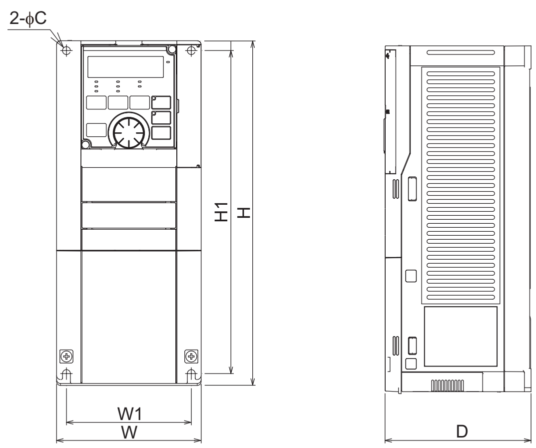
*7 FR-DU08: IP40 (except for the PU connector section)

*8 For the power voltage exceeding 480 V, set Pr. 977 "Input voltage mode selection". (For details, refer to "FR-A802-R2R Instruction Manual (Hardware)".)

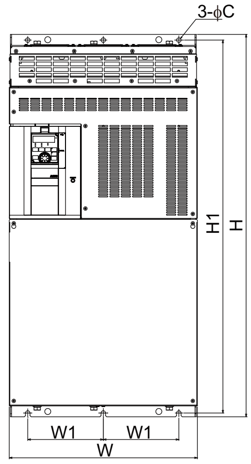
For ratings of the converter unit (FR-CC2) refer to the FR-CC2 Instruction Manual.

7.2 Outline dimensions

FR-A820-00046(0.4K)-R2R to 04750(90K)-R2R
FR-A840-00023(0.4K)-R2R to 03610(132K)-R2R



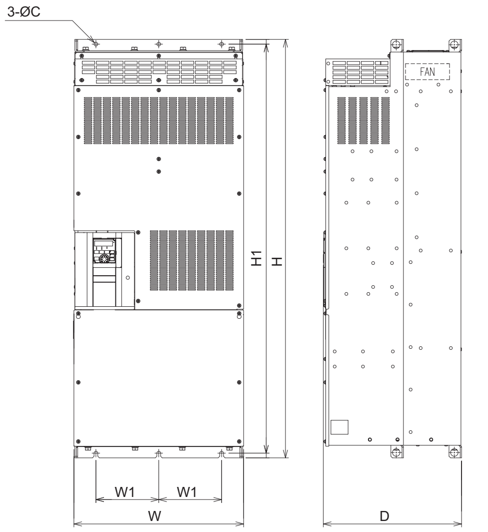
FR-A840-04320(160K)-R2R to 06830(280K)-R2R



(Unit: mm)

	Inverter type	W	W1	H	H1	D	C
200 V class	FR-A820-00046(0.4K)-R2R	110	95	260	245	110	6
	FR-A820-00077(0.75K)-R2R					125	
	FR-A820-00105(1.5K)-R2R	150	125			140	
	FR-A820-00167(2.2K)-R2R						
	FR-A820-00250(3.7K)-R2R						
	FR-A820-00340(5.5K)-R2R	220	195			170	
	FR-A820-00490(7.5K)-R2R						
	FR-A820-00630(11K)-R2R			300	285	190	
	FR-A820-00770(15K)-R2R	250	230	400	380		10
	FR-A820-00930(18.5K)-R2R						
	FR-A820-01250(22K)-R2R						
	FR-A820-01540(30K)-R2R	325	270	550	530	195	
	FR-A820-01870(37K)-R2R	435	380		525	250	12
	FR-A820-02330(45K)-R2R						
	FR-A820-03160(55K)-R2R	465	410	700	675		
	FR-A820-03800(75K)-R2R		400	740	715	360	
	FR-A820-04750(90K)-R2R						
400 V class	FR-A840-00023(0.4K)-R2R	150	125	260	245	140	6
	FR-A840-00038(0.75K)-R2R						
	FR-A840-00052(1.5K)-R2R						
	FR-A840-00083(2.2K)-R2R						
	FR-A840-00126(3.7K)-R2R						
	FR-A840-00170(5.5K)-R2R	220	195			170	
	FR-A840-00250(7.5K)-R2R						
	FR-A840-00310(11K)-R2R			300	285	190	
	FR-A840-00380(15K)-R2R						
	FR-A840-00470(18.5K)-R2R	250	230	400	380		10
	FR-A840-00620(22K)-R2R						
	FR-A840-00770(30K)-R2R	325	270	550	530	195	
	FR-A840-00930(37K)-R2R	435	380		525	250	12
	FR-A840-01160(45K)-R2R						
	FR-A840-01800(55K)-R2R						
	FR-A840-02160(75K)-R2R	465	400	620	595	300	
	FR-A840-02600(90K)-R2R						
	FR-A840-03250(110K)-R2R			740	715	360	
	FR-A840-03610(132K)-R2R						
	FR-A840-04320(160K)-R2R	498	200	1010	985	380	
	FR-A840-04810(185K)-R2R						
	FR-A840-05470(220K)-R2R	680	300		984		
	FR-A840-06100(250K)-R2R						
	FR-A840-06830(280K)-R2R						

FR-A842-07700(315K)-R2R to 12120(500K)-R2R



(Unit: mm)

	Inverter type	W	W1	H	H1	D	C
400 V class	FR-A842-07700(315K)-R2R	540	200	1330	1300	440	12
	FR-A842-08660(355K)-R2R						
	FR-A842-09620(400K)-R2R	680	240	1580	1550		
	FR-A842-10940(450K)-R2R						
	FR-A842-12120(500K)-R2R						

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

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
  The authorized representative in the EU is shown below:
  Name: Mitsubishi Electric Europe B.V.
  Address: Mitsubishi-Electric-Platz 1, 40882 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: 2014/30/EU
- Standard(s): EN61800-3:2004+A1:2012 (Second environment / PDS Category "C3")
- This inverter is not intended to be used on a low-voltage public network which supplies domestic premises. When using the inverter in a residential area, take appropriate measures and ensure the conformity of the inverter used in the residential area.
- 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 wiring according to the following instructions:

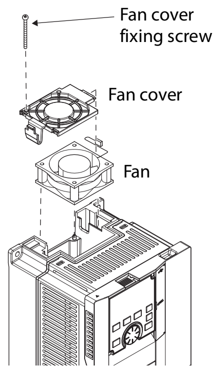
- The inverter (resp. the converter unit for separated converter types) is equipped with an EMC filter with a class C3. Set the EMC filter valid. (For details, refer to "FR-A800 Instruction Manual (Detailed)" and "FR-A802-R2R Instruction Manual (Hardware)".)
- Connect the inverter (and the converter unit) to an earthed power supply.
- To make full use of the built-in EMC filter, motor cable lengths should not exceed 20 m.
- Install a motor and a control cable according to the EMC Installation Guidelines (BCN-A21041-204) and Technical News (MF-S-112, 113) according to the instruction.
- Confirm that the inverter (and the converter unit) conforms with the EMC Directive as the industrial drives application for final installation.

A.1.2 Low Voltage Directive

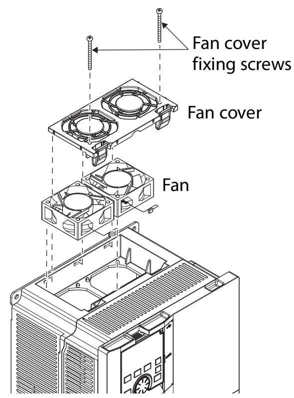
We have self-confirmed our inverters as products compliant to the Low Voltage Directive (conforming standard EN 61800-5-1) and place the CE mark on the inverters.

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 15* under the following conditions.
  - Surrounding air temperature: 40 °C maximum
    If conditions are different from above, select appropriate wire according to EN60204.
- 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 15*.
- 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, 400 V class only) and pollution degree 2 or lower specified in IEC60664. 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)-R2R or higher, the FR-A840-00770(30K)-R2R or higher (IP00) and the FR-A842-R2R models under the conditions of pollution degree 2, install it in the enclosure of IP2X or higher.
  - To use the inverter under the conditions of pollution degree 3, install it in the enclosure of IP54 or higher.
  - To use the inverter FR-A820-01250(22K)-R2R or less and FR-A840-00620(22K)-R2R or less (IP20) outside of an enclosure in the environment of pollution degree 2, fix a fan cover with fan cover fixing screws enclosed.



FR-A820-00105(1.5K)-R2R to 00250(3.7K)-R2R
FR-A840-00083(2.2K)-R2R, 00126(3.7K)-R2R



FR-A820-00340(5.5K)-R2R to 00250(22K)-R2R
FR-A840-00170(5.5K)-R2R to 00620(22K)-R2R

- On the input and output of the inverter (and the converter unit), use cables of the type and size set forth in EN 60204.
- The operating capacity of the relay outputs (terminal symbols A1, B1, C1, A2, B2, C2) should be 30 V DC, 0.3 A. (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 (for details, refer to *page 3*)

	During operation	In storage	During transportation
Surrounding air temperature	LD, SND, ND (initial setting), HD: −10 to +50 °C SLD: −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	2500 m [*1]	2500 m	10000 m

[*1] For the installation at an altitude above 1000 m, consider a 3% reduction in the rated current per 500 m increase in altitude.

Wiring protection

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

For the FR-A820 series, Class T, Class J, or Class CC fuse, or UL 489 Molded Case Circuit Breaker (MCCB) must be provided.

FR-A820-□-R2R		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]		240 V or more											
Fuse maximum allowable rating [A]	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 *2		15	15	25	40	60	80	110	150	190	225	300	350

FR-A820-□-R2R		01870 (37K)	02330 (45K)	03160 (55K)	03800 (75K)	04750 (90K)
Rated fuse voltage [V]		240 V or more				
Fuse maximum allowable rating [A]	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 *2		450	500	700	900	1000

FR-A840-□-R2R		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]		500 V or more											
Fuse maximum allowable rating [A]	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 *2		15	15	15	20	30	40	60	70	90	100	150	175

FR-A840-□-R2R		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]		500 V or more											
Fuse maximum allowable rating [A]	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 *2		225	250	450	450	500	—	—	—	—	—	—	—

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

*2 Select an appropriate molded case circuit breaker with a rating that is suitable for the size of the cable.

For wiring protection of the converter unit (FR-CC2) refer to "FR-A802-R2R Instruction Manual (Hardware)".

A.1.3 Short circuit ratings

- 200 V class
  Suitable for use in a circuit capable of delivering not more than 100 kA rms symmetrical amperes, 240 V maximum.
- 400 V class
  Suitable for use in a circuit capable of delivering not more than 100 kA rms symmetrical amperes, 500 V 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.274-13)

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 3*.)

Wiring protection (FR-A820/A840 inverters)

For installation in the United States, Class T, Class J, Class CC, or Class L fuse, UL 489 Molded Case Circuit Breaker (MCCB), or Type E combination motor controller must be provided, in accordance with the National Electrical Code and any applicable provincial codes (refer to the tables on *page 57* and below).

For installation in Canada, Class T, Class J, Class CC, or Class L fuse, UL 489 Molded Case Circuit Breaker (MCCB) or Type E combination motor controller must be provided in accordance with the Canada Electrical Code and any applicable provincial codes (refer to the tables on *page 57* and below).

For the FR-A820 series, Class T, Class J, or Class CC fuse, UL 489 Molded Case Circuit Breaker (MCCB), or Type E combination motor controller must be provided (refer to the tables on *page 57* and below).

FR-A820-□-R2R		00046 (0.4K)	00077 (0.75K)	00105 (1.5K)	00167 (2.2K)	00250 (3.7K)	00340 (5.5K) or higher
Type E combination motor controller *1	Maximum current rating [A]	8	13	18	25	32	—
	Maximum SCCR [kA] *2	50	50	50	25	25	—

FR-A840-□-R2R		00023 (0.4K)	00038 (0.75K)	00052 (1.5K)	00083 (2.2K)	00126 (3.7K)	00170 (5.5K)	00250 (7.5K)	00310 (11K) or higher
Type E combination motor controller *1	Maximum current rating [A]	4	6.3	8	13	18	25	32	—
	Maximum SCCR [kA] *2	50	50	50	50	50	25	25	—

*1 For UL/cUL certification, use the following product:

Model	Manufacturer	Rated voltage, V AC
MMP-T32	Mitsubishi Electric Corp.	480Y/277

*2 Suitable for use in a circuit capable of delivering not more than 50 or 25 kA rms symmetrical amperes, 480Y/277 volts maximum when protected by the type E combination motor controllers indicated in the above table.

Wiring protection (FR-A842 inverters)

For wiring protection of the converter unit (FR-CC2) refer to "FR-A802-R2R Instruction Manual (Hardware)".

A.2.3 Wiring of the power supply and motor

Refer to the National Electrical Code (Article 310) regarding the allowable current of the cable. Select the cable size for 125% of the rated current according to the National Electrical Code (Article 430).

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.

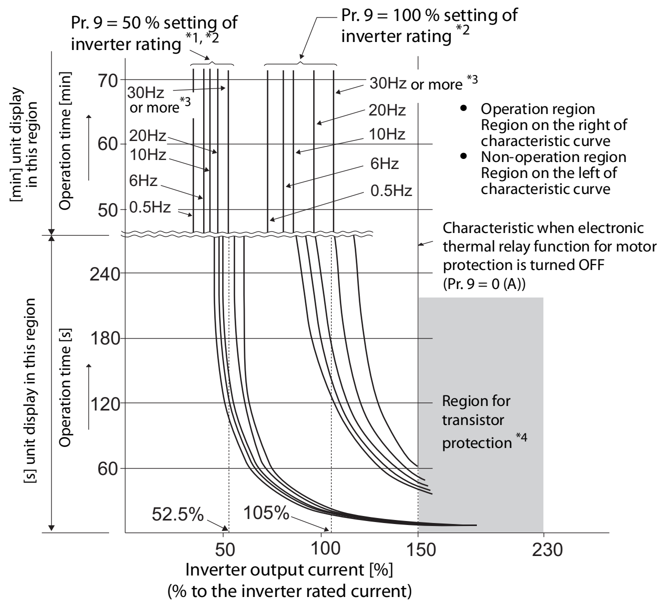
A.2.4 Short circuit ratings

- 200 V class
  Suitable for use in a circuit capable of delivering not more than 100 kA rms symmetrical amperes, 240 V maximum.
- 400 V class
  Suitable for use in a circuit capable of delivering not more than 100 kA rms symmetrical amperes, 500 V 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 Electric 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 Electric constant-torque motor, this characteristic curve applies to operation at 6 Hz or higher.

*4 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 "FR-A800 Instruction Manual (Detailed)").
- 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.
- Motor over temperature sensing is not provided by the drive.

A.3 SERIAL number check

The SERIAL number can be checked on the inverter rating plate or package. (Refer to *page 1*.)

Rating plate example

□	○	○	○○○○○○
Symbol	Year	Month	Control number

SERIAL

The SERIAL consists of one symbol, two characters indicating production year and month, and six characters indicating control number. The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

A.4 Instructions for EAC

The product certified in compliance with the Eurasian Conformity has the EAC marking.

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