

OUTLINE

1.1 Pre-Operation Information

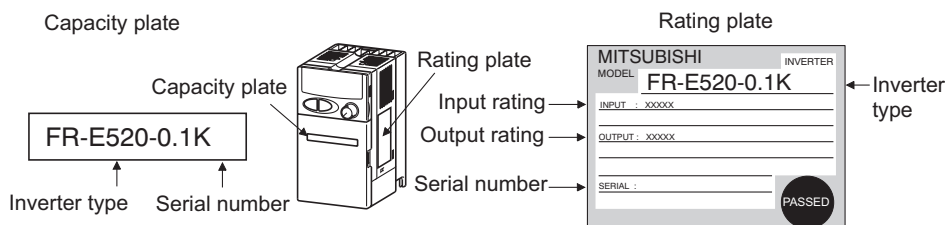
1.1.1 Precautions for operation

This manual is written for the FR-E500 series transistorized inverters. Incorrect handling may cause the inverter to operate incorrectly, causing its life to be reduced considerably, or at the worst, the inverter to be damaged. Handle the inverter properly in accordance with the information in each section as well as the precautions and instructions of this manual to use it correctly. For handling information on the parameter unit (FR-PU04), stand-alone options, etc., refer to the corresponding manuals.

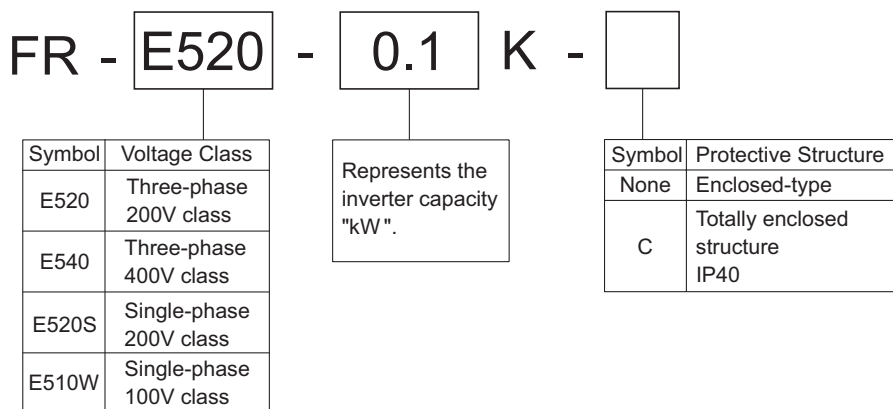
(1) Unpacking and product check

Unpack the inverter and check the capacity plate on the front cover and the rating plate on the inverter side face to ensure that the product agrees with your order and the inverter is intact.

1) Inverter type



● Inverter type



2) Accessory

Instruction manual

If you have found any discrepancy, damage, etc., please contact your sales representative.

SAFETY INSTRUCTIONS

1. Electric Shock Prevention



WARNING

- While power is on or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- 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 inverter power indicator lamp is off, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.
- This inverter must be earthed (grounded). Earthing (grounding) must conform to the requirements of national and local safety regulations and electrical codes. (NEC section 250, IEC 536 class 1 and other applicable standards)
- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the inverter before wiring. Otherwise, you may get an electric shock or be injured.
- Operate the switches and potentiometers with dry hands to prevent 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 change the cooling fan while power is on.
It is dangerous to change the cooling fan while power is on.

2. Fire Prevention

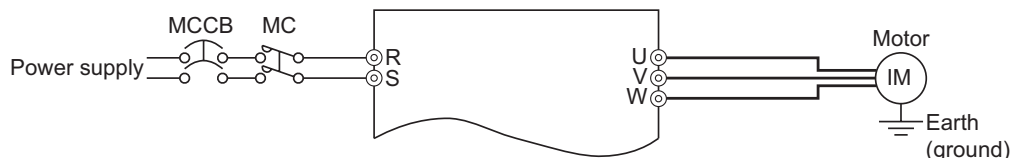


CAUTION

- Install the inverter on an incombustible wall without holes, etc. Installing the inverter directly on or near a combustible surface could lead to a fire.
- If the inverter has become faulty, switch off the inverter power. A continuous flow of large current could cause a fire.
- When a brake resistor is used, use an alarm signal to switch power off. Otherwise, the brake resistor may excessively overheat due to damage of the brake transistor and such, causing a fire.
- Do not connect the resistor directly to the DC terminals P(+) and N(-). This could cause a fire.

INSTALLATION AND WIRING

- Single-phase 200V power input
- Single-phase 100V power input



Note: 1. To ensure safety, connect the power input to the inverter via a magnetic contactor and earth (ground) leakage circuit breaker or moulded case circuit breaker, and use the magnetic contactor to switch power on-off.
2. The output is three-phase 200V.

(1) Description of the main circuit terminals

Symbol	Terminal Name	Description
R, S, T (L ₁ , L ₂ , L ₃) (Note)	AC power input	Connect to the commercial power supply. Keep these terminals open when using the high power factor converter (FR-HC) or power regeneration common converter (FR-CV).
U, V, W	Inverter output	Connect a three-phase squirrel-cage motor.
P (+), PR	Brake resistor connection	Connect the optional brake resistor across terminals P-PR (+ - PR) (not for 0.1K and 0.2K).
P (+), N (-)	Brake unit connection	Connect the optional brake unit, high power factor converter (FR-HC), and power regeneration common converter (FR-CV).
P (+), P1	Power factor improving DC reactor connection	Disconnect the jumper from terminals P-P1 (+ - P1) and connect the optional power factor improving DC reactor. (can not be connected to the single phase 100V power input specification inverter)
	Earth (Ground)	For earthing (grounding) the inverter chassis. Must be earthed (grounded).

Note: R, S (L₁, L₂) terminals for single-phase power input.

INSTALLATION AND WIRING

- 6) Connect only the recommended optional brake resistor between the terminals P-PR (+ - PR). Keep terminals P-PR (+ - PR) of 0.1K or 0.2K open. These terminals must not be shorted.
0.1K and 0.2K do not accept the brake resistor. Keep terminals P-PR (+ - PR) open. Also, never short these terminals.
- 7) 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, install the FR-BIF optional capacitor type filter (for use in the input side only) or FR-BSF01 or FR-BLF common mode filter to minimize interference.
- 8) Do not install a power capacitor, surge suppressor or capacitor type filter (FR-BIF option) on the output side of the inverter.
This will cause the inverter to trip or the capacitor and surge suppressor to be damaged. If any of the above devices are installed, immediately remove them. (When using the FR-BIF capacitor type filter with a single-phase power supply, connect it to the input side of the inverter after isolating the T phase securely.)
- 9) When rewiring after operation, make sure that the POWER lamp has gone off, and when more than 10 minutes has elapsed after power-off, check with a meter etc. that the voltage is zero. After that, start rewiring work. For some time after power-off, there is a dangerous voltage in the capacitor.

Notes on Earthing (Grounding)

- Leakage currents flow in the inverter. To prevent an electric shock, the inverter and motor must be earthed (grounded). Earthing (grounding) must conform to the requirements of national and local safety regulations and electrical codes. (NEC section 250, IEC 536 class 1 and other applicable standards)
- Use the dedicated earth (ground) terminal to earth (ground) the inverter. (Do not use the screw in the case, chassis, etc.) For the earth (ground) connection, avoid direct contact between aluminium and copper. Tin-plated cable lugs can be used if the plating does not contain zinc. When tightening the screws, take care not to damage the thread in the aluminium frame.
- Use the thickest possible earth (ground) cable. Use the cable whose size is equal to or greater than that indicated below, and minimize the cable length. The earthing (grounding) point should be as near as possible to the inverter.

(Unit: mm²)

Motor Capacity	Earth (ground) Cable Gauge		
	100V class	200V class	400V class
2.2kW or less	2 (2.5)	2 (2.5)	2 (2.5)
3.7kW	—	3.5 (4)	2 (4)
5.5kW, 7.5kW	—	5.5 (6)	3.5 (4)

For use as a product compliant with the Low Voltage Directive, use PVC cable whose size is indicated within parentheses.

- Earth (ground) the motor on the inverter side using one wire of the 4-core cable.

INSTALLATION AND WIRING

2.3.6 Peripheral devices

(1) Selection of peripheral devices

Check the inverter type of the inverter to be used with the inverter you purchased. Appropriate peripheral devices must be selected according to the capacity. Refer to the following list and prepare appropriate peripheral devices:

	Inverter Type	Motor Output (kW)	Power Supply Capacity (kVA)	Moulded Case Circuit Breaker (MCCB) or Earth (Ground) Leakage Circuit Breaker (NV) (Note 6)		Magnetic Contactor (MC)		
				Standard	With power factor improving reactor	A	B	C
Three-phase 200V	FR-E520-0.1K	0.1	0.4	30AF 5A	30AF 5A	S-N11	S-N18	S-N20
	FR-E520-0.2K	0.2	0.8	30AF 5A	30AF 5A	S-N18	S-N20	S-N20
	FR-E520-0.4K	0.4	1.5	30AF 5A	30AF 5A	S-N18	S-N21	S-N21
	FR-E520-0.75K	0.75	2.5	30AF 10A	30AF 10A	S-N18	S-N21	S-N21
	FR-E520-1.5K	1.5	4.5	30AF 15A	30AF 15A	S-N21	S-N25	S-N50
	FR-E520-2.2K	2.2	5.5	30AF 20A	30AF 15A	S-N10		
	FR-E520-3.7K	3.7	9	30AF 30A	30AF 30A	S-N20, S-N21		
	FR-E520-5.5K	5.5	12	50AF 50A	50AF 40A	S-N25		
	FR-E520-7.5K	7.5	17	100AF 60A	50AF 50A	S-N35		
Three-phase 400V	FR-E540-0.4K	0.4	1.5	30AF 5A	30AF 5A	S-N10		
	FR-E540-0.75K	0.75	2.5	30AF 5A	30AF 5A	S-N10		
	FR-E540-1.5K	1.5	4.5	30AF 10A	30AF 10A	S-N10		
	FR-E540-2.2K	2.2	5.5	30AF 15A	30AF 10A	S-N10		
	FR-E540-3.7K	3.7	9	30AF 20A	30AF 15A	S-N20, S-N21		
	FR-E540-5.5K	5.5	12	30AF 30A	30AF 20A	S-N20, S-N21		
	FR-E540-7.5K	7.5	17	30AF 30A	30AF 30A	S-N20, S-N21		
Single-phase 200V	FR-E520S-0.1K	0.1	0.4	30AF 5A	30AF 5A	S-N18	S-N20	S-N20
	FR-E520S-0.2K	0.2	0.8	30AF 10A	30AF 10A	S-N18	S-N21	S-N21
	FR-E520S-0.4K	0.4	1.5	30AF 10A	30AF 10A	S-N21	S-N25	S-N50
	FR-E520S-0.75K	0.75	2.5	30AF 15A	30AF 15A	S-N21	S-N25	S-N50
Single-phase 100V	FR-E510W-0.1K	0.1	0.5	30AF 10A	30AF 10A	S-N18	S-N21	S-N21
	FR-E510W-0.2K	0.2	0.9	30AF 15A	30AF 15A	S-N21	S-N25	S-N25
	FR-E510W-0.4K	0.4	1.5	30AF 20A	30AF 20A	S-N21	S-N25	S-N50
	FR-E510W-0.75K	0.75	2.5	30AF 30A	30AF 30A	S-N21	S-N25	S-N50

SPECIFICATIONS

7.1 Standard Specifications

7.1.1 Model specifications

(1) Three-phase 200V power supply

Type FR-E520- ☐ K(C) (Note 8)	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5
Applicable motor capacity (kW) (Note 1)	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5
Output	Rated capacity (kVA) (Note 2)	0.3	0.6	1.2	2.0	3.2	4.4	7.0	13.1
	Rated current (A) (Note 6)	0.8 (0.8)	1.5 (1.4)	3 (2.5)	5 (4.1)	8 (7)	11 (10)	17.5 (16.5)	24 (23)
	Overload capacity (Note 3)	150% 60s 200% 0.5s (inverse-time characteristics)							
	Voltage (Note 4)	Three phase, 200V to 240V							
Power supply	Rated input AC (DC) voltage, frequency	Three phase, 200V to 240V 50Hz/60Hz (280VDC, Note 7)							
	Permissible AC (DC) voltage fluctuation	170 to 264V 50Hz/60Hz (252 to 310VDC, Note 7)							
	Permissible frequency fluctuation	±5%							
	Power supply system capacity (kVA)(Note 5)	0.4	0.8	1.5	2.5	4.5	5.5	9	12
Protective structure (JEM1030)	Enclosed type (IP20), IP40 for totally enclosed structure series								
Cooling system	Self-cooling				Forced air cooling				
Approximate weight (kg)	0.6	0.6	0.8	1.0	1.7	1.7	2.2	4.4	4.9

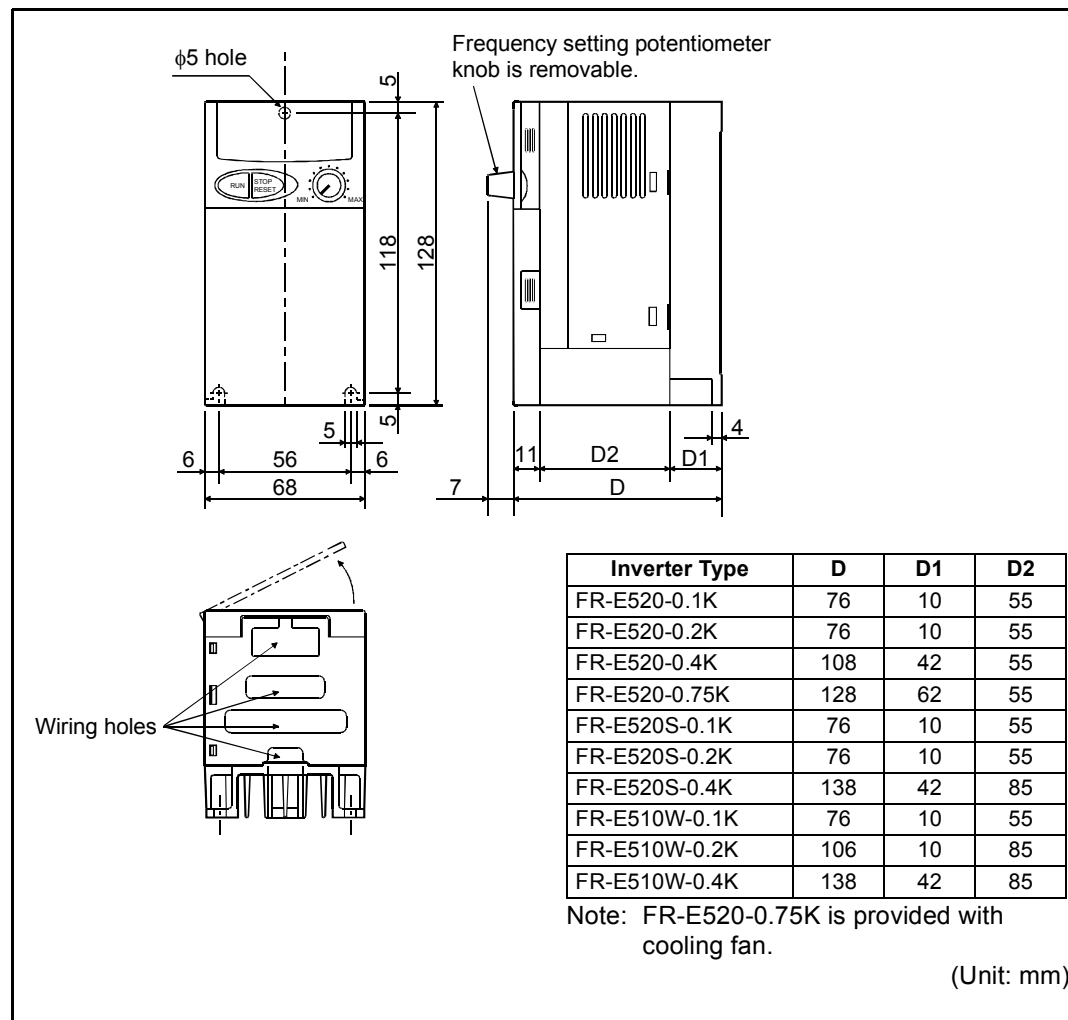
- Note: 1. The applicable motor capacity indicated is the maximum capacity applicable when a Mitsubishi 4-pole standard motor is used.
2. The rated output capacity indicated assumes that the output voltage is 230V.
3. The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
4. The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the pulse voltage value of the inverter output side voltage remains unchanged at about $\sqrt{2}$ that of the power supply.
5. The power supply capacity changes with the values of the power supply side inverter impedances (including those of the input reactor and cables).
6. The rated output current in the parentheses applies when low acoustic noise operation is to be performed at the ambient temperature higher than 40°C(30°C for the totally enclosed structure) with the Pr. 72 (PWM frequency selection) value set to 2kHz or higher.
7. When using a DC power supply
- (1) The guideline for the power supply voltage fluctuation range is 280VDC ±10%, and usually use the power supply at or below 300VDC.
 - (2) When DC power is switched on, a larger inrush current flows than in AC power. The number of power-on times should be minimized.
 - (3) 300VDC must be reserved to make the torque characteristic equal to when AC power supply is used.
8. The type code of the dirt-protection structure series ends with C.

SPECIFICATIONS

7.1.3 Outline dimension drawings

(1) 200V class, 100V class

- FR-E520-0.1K, 0.2K, 0.4K, 0.75K
- FR-E520S-0.1K, 0.2K, 0.4K
- FR-E510W-0.1K, 0.2K, 0.4K





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PRODUCT: FR-E520-0.1K / FREQROL-E500 0.1 kW Three-Phase 200 V Inverter

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