MITSUBISHI ELECTRIC

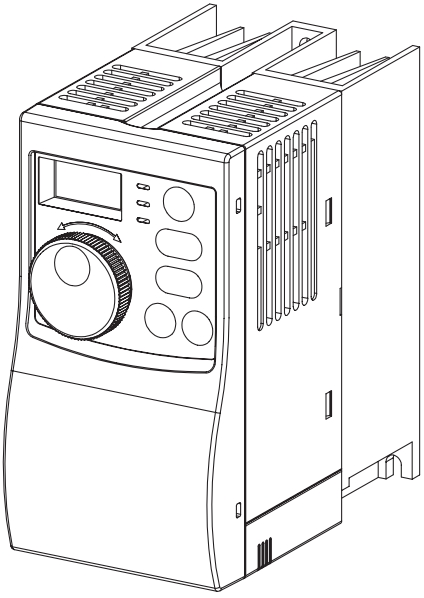
# TRANSISTORIZED INVERTER

FR-S500

## INSTRUCTION MANUAL (Detailed)

### SIMPLE INVERTER

# FR-S520E-0.1K to 3.7K (-C)
# FR-S540E-0.4K to 3.7K
# FR-S520SE-0.1K to 1.5K
# FR-S510WE-0.1K to 0.75K



## 1.2.3 Wiring instructions

1) Use crimping terminals with insulation sleeve to wire the power supply and motor.

2) Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Never perform such wiring.

3) After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean.
When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

4) Use cables of the recommended size to make a voltage drop 2% maximum.
If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency.

5) For long distance wiring, the fast-response current limit function may be reduced or the devices connected to the secondary side may malfunction or become faulty under the influence of a charging current due to the stray capacity of wiring.
Therefore, note the maximum overall wiring length.

6) Electromagnetic wave interference
The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. In this case, install a FR-BIF(-H) optional capacitor type filter (for use on the input side only) or FR-BSF01 or FR-BLF common mode filter to minimize interference.

7) Do not install a power capacitor, surge suppressor or capacitor type filter (FR-BIF(-H) 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 connected, remove them. (When using the FR-BIF(-H) capacitor type filter with a single-phase power supply, connect it to the input side of the inverter after isolating the T phase securely.)

8) Before starting wiring or other work after the inverter is operated, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.

## *1.2.4 Selection of peripheral devices*

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

1) Three-phase 200V power input

| Motor Output (kW) | Applied Inverter Type | Moulded Case Circuit Breaker (MCCB *1, 4) or Earth Leakage Circuit Breaker (ELB) (Refer to page 12) (*2, 4) | Magnetic Contactor (MC) (Refer to page 16) | AC Reactor FR-HAL-□□K FR-BAL-□□K (Refer to page 17) | DC Reactor FR-HEL-□□K FR-BEL-□□K (Refer to page 17) |
|---|---|---|---|---|---|
| **0.1** | **FR-S520E-0.1K(-C)** | 30AF/5A | S-N10 | 0.4 (*3) | 0.4 (*3) |
| **0.2** | **FR-S520E-0.2K(-C)** | 30AF/5A | S-N10 | 0.4 (*3) | 0.4 (*3) |
| **0.4** | **FR-S520E-0.4K(-C)** | 30AF/5A | S-N10 | 0.4 | 0.4 |
| **0.75** | **FR-S520E-0.75K(-C)** | 30AF/10A | S-N10 | 0.75 | 0.75 |
| **1.5** | **FR-S520E-1.5K(-C)** | 30AF/15A | S-N10 | 1.5 | 1.5 |
| **2.2** | **FR-S520E-2.2K(-C)** | 30AF/20A | S-N10 | 2.2 | 2.2 |
| **3.7** | **FR-S520E-3.7K(-C)** | 30AF/30A | S-N20, S-N21 | 3.7 | 3.7 |

2) Three-phase 400V power input

| Motor Output (kW) | Applied Inverter Type | Moulded Case Circuit Breaker (MCCB *1, 4) or Earth Leakage Circuit Breaker (ELB) (Refer to page 12) (*2, 4) | Magnetic Contactor (MC) (Refer to page 16) | AC Reactor FR-HAL-□□K FR-BAL-□□K (Refer to page 17) | DC Reactor FR-HEL-□□K FR-BEL-□□K (Refer to page 17) |
|---|---|---|---|---|---|
| **0.4** | **FR-S540E-0.4K** | 30AF/5A | S-N10 | H0.4 | H0.4 |
| **0.75** | **FR-S540E-0.75K** | 30AF/5A | S-N10 | H0.75 | H0.75 |
| **1.5** | **FR-S540E-1.5K** | 30AF/10A | S-N10 | H1.5 | H1.5 |
| **2.2** | **FR-S540E-2.2K** | 30AF/15A | S-N10 | H2.2 | H2.2 |
| **3.7** | **FR-S540E-3.7K** | 30AF/20A | S-N20, S-N21 | H3.7 | H3.7 |

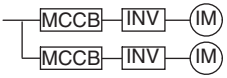
3) Single-phase 200V power input

| Motor Output (kW) | Applied Inverter Type | Moulded Case Circuit Breaker (MCCB *1, 4) or Earth Leakage Circuit Breaker (ELB) (Refer to page 12) (*2, 4) | Magnetic Contactor (MC) (Refer to page 16) | AC Reactor (*3) FR-HAL-□□K FR-BAL-□□K (Refer to page 17) | DC Reactor (*3) FR-HEL-□□K FR-BEL-□□K (Refer to page 17) |
|---|---|---|---|---|---|
| **0.1** | **FR-S520SE-0.1K** | 30AF/5A | S-N10 | 0.4 | 0.4 |
| **0.2** | **FR-S520SE-0.2K** | 30AF/10A | S-N10 | 0.4 | 0.4 |
| **0.4** | **FR-S520SE-0.4K** | 30AF/10A | S-N20, S-N21 | 0.75 | 0.75 |
| **0.75** | **FR-S520SE-0.75K** | 30AF/15A | S-N20, S-N21 | 1.5 | 1.5 |
| **1.5** | **FR-S520SE-1.5K** | 30AF/20A | S-N20, S-N21 | 2.2 | 2.2 |

4) Single-phase 100V power input

| Motor Output (kW) | Applied Inverter Type | Moulded Case Circuit Breaker (MCCB *1, 4) or Earth Leakage Circuit Breaker (ELB) (Refer to page 12) (*2, 4) | Magnetic Contactor (MC) (Refer to page 16) | AC Reactor (*3) FR-HAL-□□K FR-BAL-□□K (Refer to page 17) | DC Reactor (*5) FR-HEL-□□K FR-BEL-□□K (Refer to page 17) |
|---|---|---|---|---|---|
| **0.1** | **FR-S510WE-0.1K** | 30AF/10A | S-N10 | 0.75 | — |
| **0.2** | **FR-S510WE-0.2K** | 30AF/15A | S-N10 | 1.5 | — |
| **0.4** | **FR-S510WE-0.4K** | 30AF/20A | S-N20, S-N21 | 2.2 | — |
| **0.75** | **FR-S510WE-0.75K** | 30AF/30A | S-N20, S-N21 | 3.7 | — |

*1. • Select the MCCB according to the power supply capacity.
• Install one MCCB per inverter.




*2. For installations in the United States or Canada, the circuit breaker must be inverse time or instantaneous trip type.
*3. The power factor may be slightly lower.
*4. 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.
*5. The single-phase 100V power input model is not compatible with the DC reactor.

| Function | Parameter Number | Name | Instruction Code | | Computer Link Data Setting Increments * | Link Parameter Extension Setting (Instruction Code 7F/FF) |
|---|---|---|---|---|---|---|
| | | | Read | Write | | |
| Additional function | H6 (162) | Automatic restart after instantaneous power failure selection | 3E | BE | 1 | 1 |
| | H7 (559) | Second electronic thermal O/L relay | 3B | BB | 0.01A | 5 |
| Brake function | b1 (560) | Regenerative function selection | 3C | BC | 1 | 5 |
| | b2 (561) | Special regenerative brake duty | 3D | BD | 0.1% | 5 |
| Calibration parameters | C1 (900) | FM terminal calibration | 5C | DC | — | 1 |
| | C2(902) | Frequency setting voltage bias frequency | 5E | DE | 0.01Hz | 1 (6C/EC=0) |
| | C3(902) | Frequency setting voltage bias | 5E | DE | 0.1% | 1 (6C/EC=1) |
| | C4(903) | Frequency setting voltage gain | 5F | DF | 0.1% | 1 (6C/EC=1) |
| | C5(904) | Frequency setting current bias frequency | 60 | E0 | 0.01Hz | 1 (6C/EC=0) |
| | C6(904) | Frequency setting current bias | 60 | E0 | 0.1% | 1 (6C/EC=1) |
| | C7(905) | Frequency setting current gain | 61 | E1 | 0.1% | 1 (6C/EC=1) |
| | C8(269) | Parameter for manufacturer setting. | | | | |
| Clear parameters | CLr | Parameter clear | — | FC | 1 | — |
| | ECL | Alarm history clear | — | F4 | 1 | — |