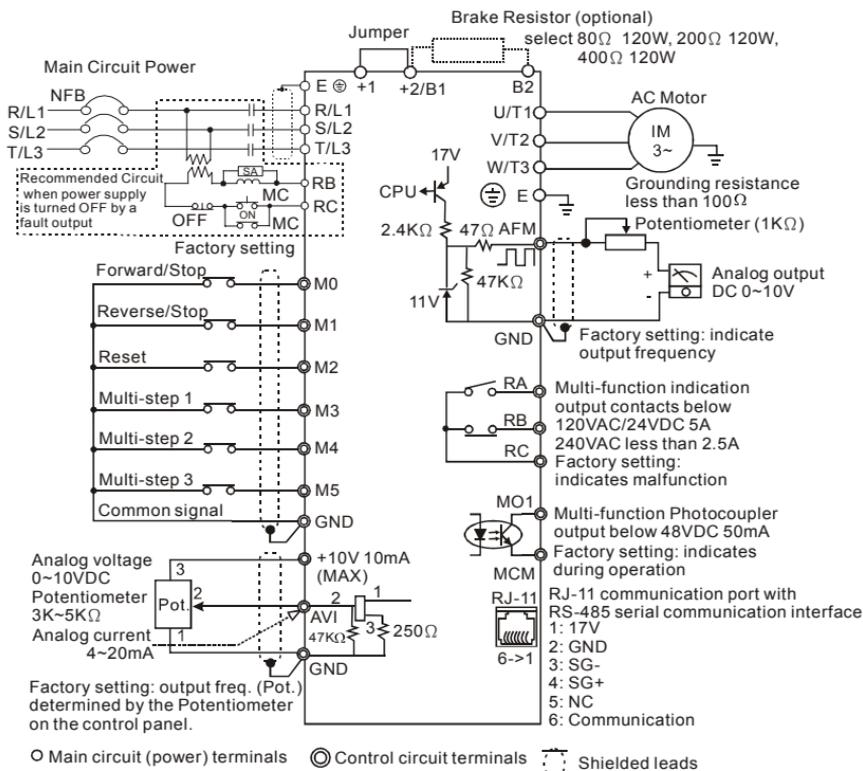


For VFDXXXSXXA/B/D/U

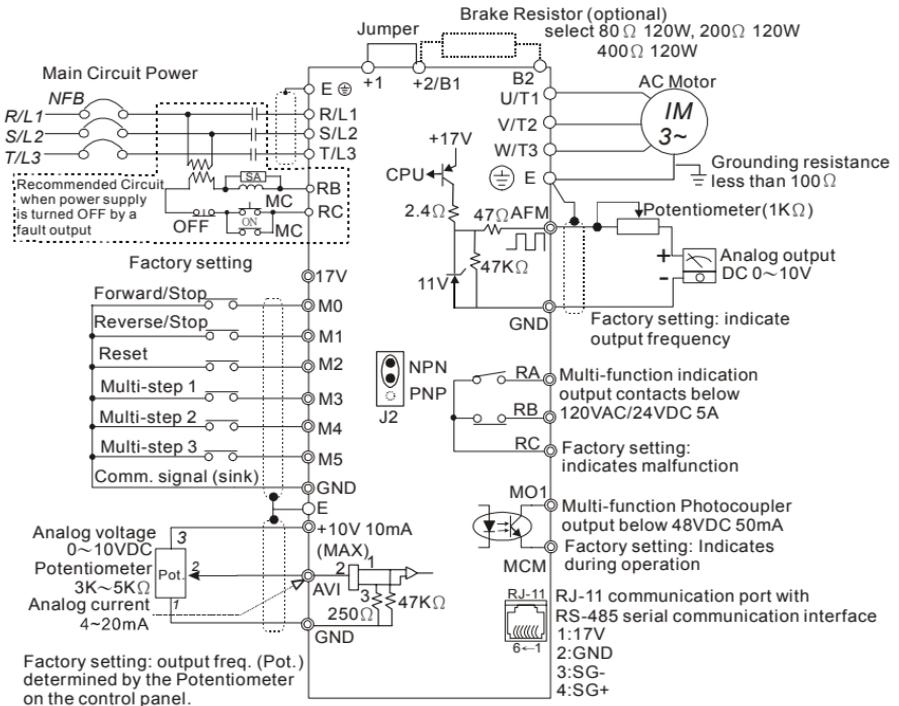


NOTE: Do not plug in a modem or telephone line to the RS-485 communication port, permanent damage may result. Pins 1&2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

*If it is single phase model, please select any of the two input power terminals in main circuit power.

For VFDXXXXXE

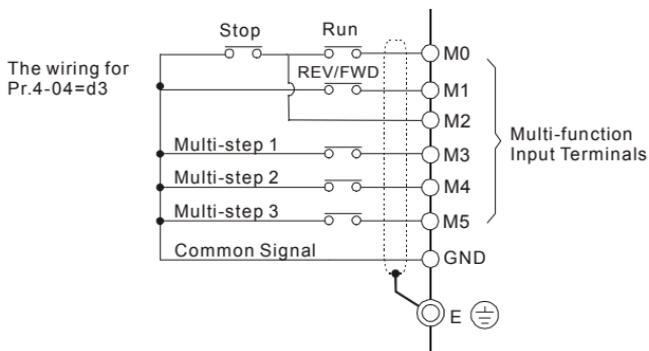
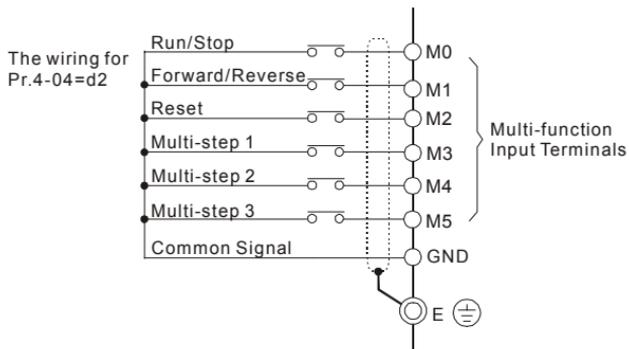
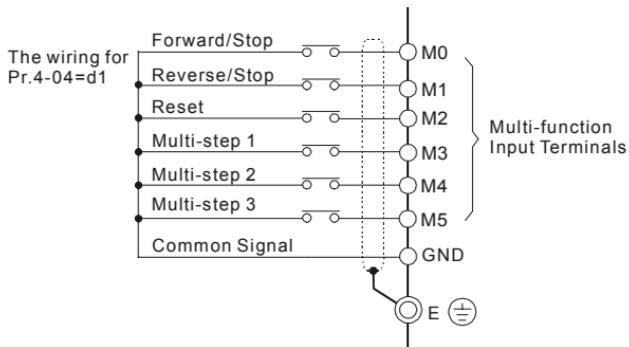
NPN (sink mode)



NOTE: Do not plug in a Modem or telephone line to the RS-485 communication port, permanent damage may result. Pins 1 & 2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

* If it is single phase model, please select any of the two input power terminals in main circuit power.

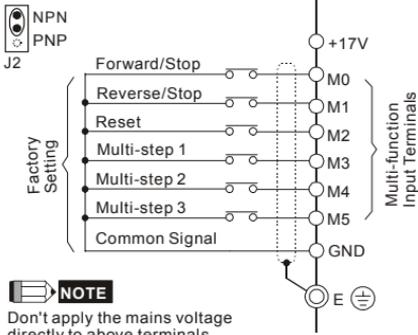
Two/Three wire control



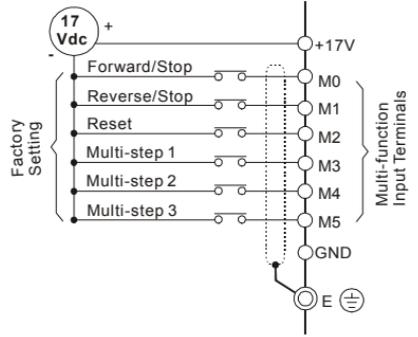
For VFDXXXXXE

NPN Mode

NPN mode without external power

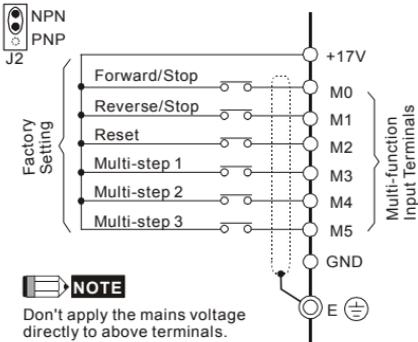


NPN mode with external power

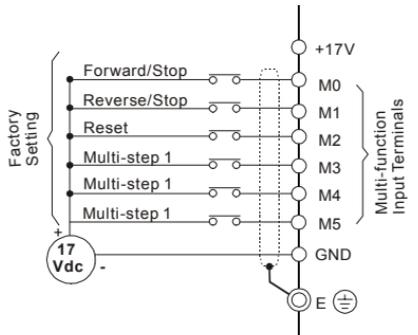


PNP Mode

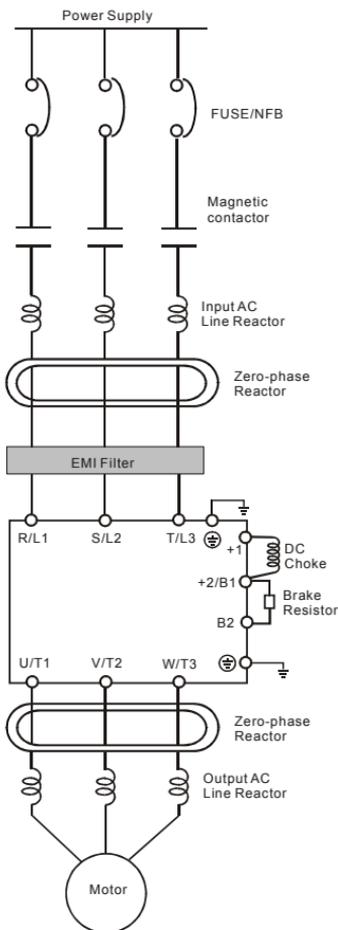
PNP mode without external power



PNP mode with external power



2.4.2 External Wiring



Items	Explanations
Power supply	Please follow the specific power supply requirements shown in Appendix A.
Fuse/NFB (Optional)	There may be an inrush current during power up. Please check the chart of Appendix B and select the correct fuse with rated current. Use of an NFB is optional.
Magnetic contactor (Optional)	Please do not use a Magnetic contactor as the I/O switch of the AC motor drive, as it will reduce the operating life cycle of the AC drive.
Input AC Line Reactor (Optional)	Used to improve the input power factor, to reduce harmonics and provide protection from AC line disturbances (surges, switching spikes, short interruptions, etc.). AC line reactor should be installed when the power supply capacity is 500kVA or more and or advanced capacity is activated. And the mains wiring distance should be $\leq 10\text{m}$. Refer to Appendix B for details.
Zero-phase Reactor (Ferrite Core Common Choke) (Optional)	Zero phase reactors are used to reduce radio noise especially when audio equipment is installed near the inverter. Effective for noise reduction on both the input and output sides. Attenuation quality is good for a wide range from AM band to 10MHz. Appendix B specifies the zero phase reactor. (RF220X00A)
EMI filter (Optional)	To reduce electromagnetic interference, please refer to Appendix B for more details.
Brake resistor (Optional)	Used to reduce the deceleration time of the motor. Please refer to the chart in Appendix B for specific brake resistors.
Output AC Line Reactor (Optional)	Motor surge voltage amplitude depends on motor cable length. For applications with long motor cable ($>20\text{m}$), it is necessary to install a reactor at the inverter output side.

2.4.3 Main Terminals Connections

Terminal Symbol	Explanation of Terminal Function
R/L1, S/L2, T/L3	AC line input terminals (3-phase)
L/L1, N/L2	AC line input terminals (1-phase)
U/T1, V/T2, W/T3	AC drive output terminals for connecting 3-phase induction motor
+1, +2/B1	Connections for DC choke. Please remove the jumper prior to installation.
+2/B1, B2	Connections for brake resistor (optional)
	Earth connection, please comply with local regulations.

Mains power terminals (R/L1, S/L2, T/L3 and L/L1, N/L2)

- Connect these terminals via a non-fuse breaker or earth leakage breaker to 3-phase AC power (some models to 1-phase AC power) for circuit protection. It is unnecessary to consider phase-sequence.
- It is recommended to add a magnetic contactor (MC) in the power input wiring to cut off power quickly and reduce malfunction when activating the protection function of AC motor drives. Both ends of the MC should have an R-C surge absorber.
- Do NOT run/stop AC motor drives by turning the power ON/OFF. Run/stop AC motor drives by RUN/STOP command via control terminals or keypad. If you still need to run/stop AC drives by turning power ON/OFF, it is recommended to do so only ONCE per hour.
- Do NOT connect 3-phase models to a 1-phase power source, or else phase loss may occur.

Control circuit terminals (U/T1, V/T2, W/T3)

- When the AC drive output terminals U/T1, V/T2, and W/T3 are connected to the motor terminals U, V, and W, respectively, the motor will rotate counterclockwise (as viewed on the shaft end of the motor) when a forward operation command is received. To permanently reverse the direction of motor rotation, switch over any of the two motor leads.

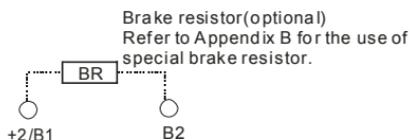


- DO NOT connect phase-compensation capacitors or surge absorbers at the output terminals of AC motor drives.
- With long motor cables, high capacitive switching current peaks can cause over-current, high leakage current or lower current readout accuracy. To prevent this, the motor cable should be less than 20m for 3.7kW models and below. And the cable should be less than 50m for 5.5kW models and above. For longer motor cables use an AC output reactor.
- Use a well-insulated motor, suitable for inverter operation.

Terminals [+2/B1, +1] for connecting DC reactor

- This is the connector for the DC reactor to improve the power factor. Please remove the short jumper when connecting DC reactor.

Terminals [+2/B1, B2] for connecting brake resistor



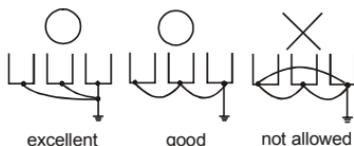
- Connect a brake resistor in applications with frequent deceleration ramps, short deceleration time, too low brake torque or requiring increased brake torque.



Short-circuiting [+2/B1, B2] can damage the AC motor drive.

Grounding terminals (⊕)

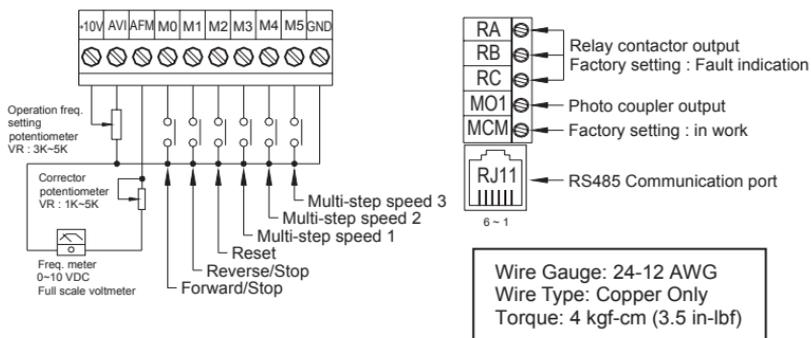
- Make sure that the leads are connected correctly and the AC drive is properly grounded. (Ground resistance should not exceed $0.1\ \Omega$.)
- Use ground leads that comply with local regulations and keep them as short as possible.
- Multiple VFD-S units can be installed in one location. All the units should be grounded directly to a common ground terminal, as shown in the figure below. **Ensure there are no ground loops.**



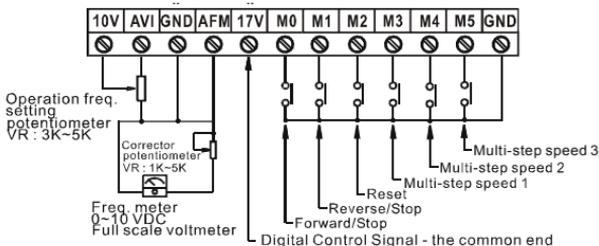
2.4.4 Control Terminals

Control Terminal Wiring (Factory Setting)

A. XXXSXXA/B/D/U

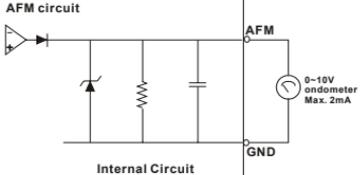
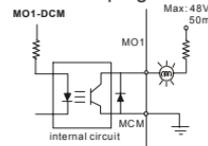
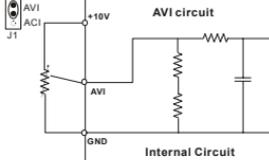
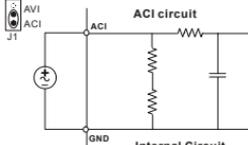


B. XXXSXXE



Terminal symbols and functions

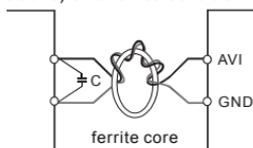
Terminal Symbol	Terminal Function	Factory Settings (NPN mode) ON: Connect to GND
M0	Multi-function auxiliary input	Refer to Pr.4-04 to Pr.4-08 for programming the Multi-function Inputs. ON: the activation current is 16mA. OFF: leakage current tolerance is 10 μ A.
M1	Multi-function input 1	
M2	Multi-function input 2	
M3	Multi-function input 3	
M4	Multi-function input 4	
M5	Multi-function Input 5	
+17V	DC Voltage Source	+17VDC, 20mA used for PNP mode.
GND	Digital Signal Common	Common for digital inputs and used for NPN mode.

Terminal Symbol	Terminal Function	Factory Settings (NPN mode) ON: Connect to GND
AFM	Analog output meter	<p>The voltage output type for this analog signal is PWM, so this analog voltage is only suitable to connect an external movable coil meter, not suitable to connect a digital meter or for A/D signal conversion.</p> <p>AFM circuit</p>  <p>Internal Circuit</p>
RA	Multi-function Relay output (N.O.) a	<p>Resistive Load: 5A(N.O.)/3A(N.C.) 240VAC 5A(N.O.)/3A(N.C.) 24VDC Inductive Load: 1.5A(N.O.)/0.5A(N.C.) 240VAC 1.5A(N.O.)/0.5A(N.C.) 24VDC Refer to Pr.3-06 for programming</p>
RB	Multi-function Relay output (N.C.) b	
RC	Multi-function Relay common	
MO1	Multi-function Output 1 (Photocoupler)	<p>Maximum 48VDC, 50mA Refer to Pr.3-01 for programming</p>  <p>internal circuit</p>
MCM	Multi-function output common	Max. 48Vdc 50mA
+10V	Potentiometer power supply	+10VDC 10mA (variable resistor: 3~5kohm)
AVI	Analog voltage Input (AVI/ACI)	<p>0~+10V/4~20mA corresponds to 0~max. operation frequency (Pr.01-00)</p> <p>PID feedback signal AVI input impedance: 47kohm ACI input impedance: 250kohm</p> <p>AVI circuit</p>  <p>Internal Circuit</p> <p>ACI circuit</p>  <p>Internal Circuit</p>

Control signal wiring size: 18 AWG (0.75 mm²) with shielded wire.

Analog input terminals (AVI, GND)

- Analog input signals are easily affected by external noise. Use shielded wiring and keep it as short as possible (<20m) with proper grounding. If the noise is inductive, connecting the shield to terminal GND can bring improvement.
- If the analog input signals are affected by noise from the AC motor drive, please connect a capacitor (0.1 μ F and above) and ferrite core as indicated in the following diagrams:



wind each wires 3 times or more around the core

Digital inputs (M0-M5, GND)

- When using contacts or switches to control the digital inputs, please use high quality components to avoid contact bounce.

Digital outputs (MO1, MCM)

- Make sure to connect the digital outputs to the right polarity, see wiring diagrams.
- When connecting a relay to the digital outputs, connect a surge absorber or fly-back diode across the coil and check the polarity.

General

- Keep control wiring as far as possible from the power wiring and in separate conduits to avoid interference. If necessary let them cross only at 90° angle.
- The AC motor drive control wiring should be properly installed and not touch any live power wiring or terminals.

NOTE

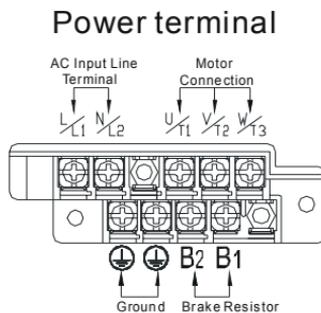
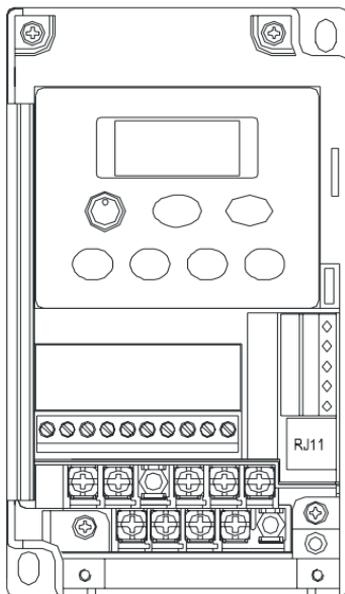
- If a filter is required for reducing EMI (Electro Magnetic Interference), install it as close as possible to AC drive. EMI can also be reduced by lowering the Carrier Frequency.
- When using a general GFCI (Ground Fault Circuit Interrupter), select a current sensor with sensitivity of 200mA or above, and not less than 0.1-second detection time to avoid nuisance tripping. For the specific GFCI of the AC motor drive, please select a current sensor with sensitivity of 30mA or above.

**DANGER!**

Damaged insulation of wiring may cause personal injury or damage to circuits/equipment if it comes in contact with high voltage.

2.4.5 Main Circuit Terminals

VFD002S11A/11B, VFD004S11A/11B



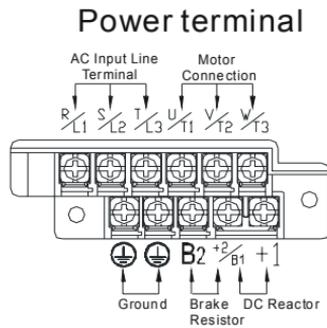
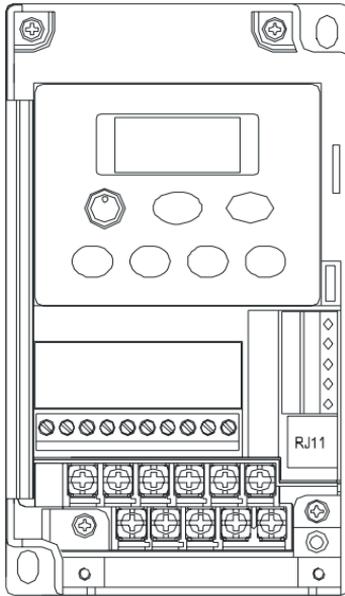
Power Terminal:

Torque: 12 kgf-cm (10 lbf-in)

Wire Gauge: 14-20 AWG (2.1-0.5mm²)

Wire Type: Copper only, 75°C

VFD002S21B/23A, VFD004S21B/23A/43A/43B/43E, VFD007S21B/23A/43A/43B/43E,
VFD015S23D

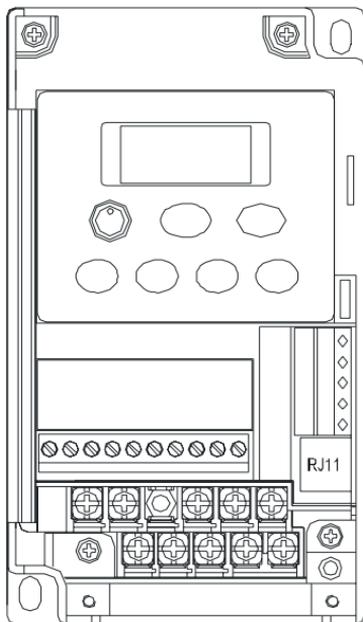


Power Terminal:

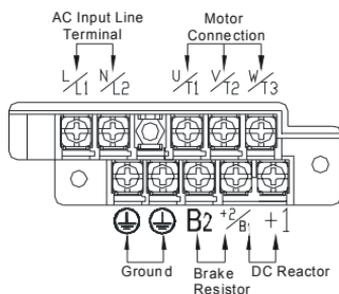
Torque: 12 kgf-cm (10 lbf-in)

Wire Gauge: 14-20 AWG (2.1-0.5mm²)

Wire Type: Copper only, 75°C



Power terminal



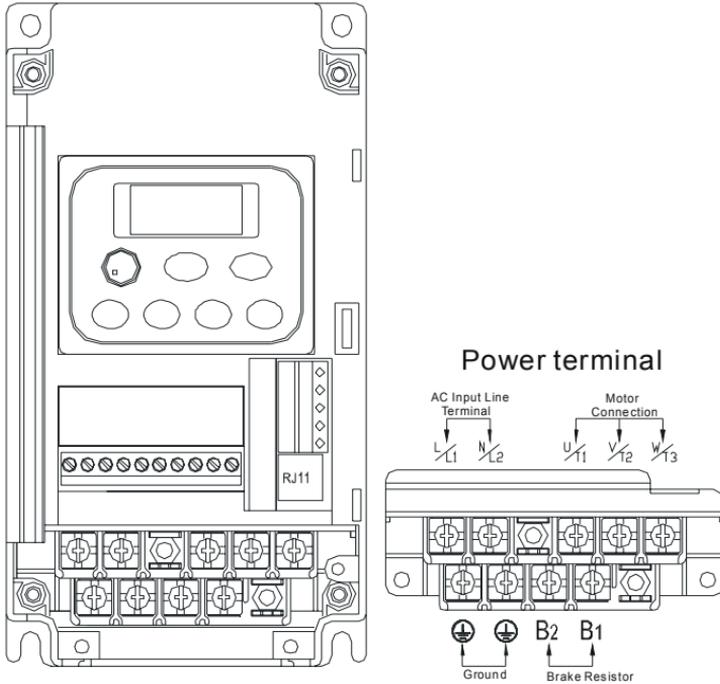
Power Terminal:

Torque: 12 kgf-cm (10 lbf-in)

Wire Gauge: 14-20 AWG (2.1-0.5mm²)

Wire Type: Copper only, 75°C

VFD007S11A/B



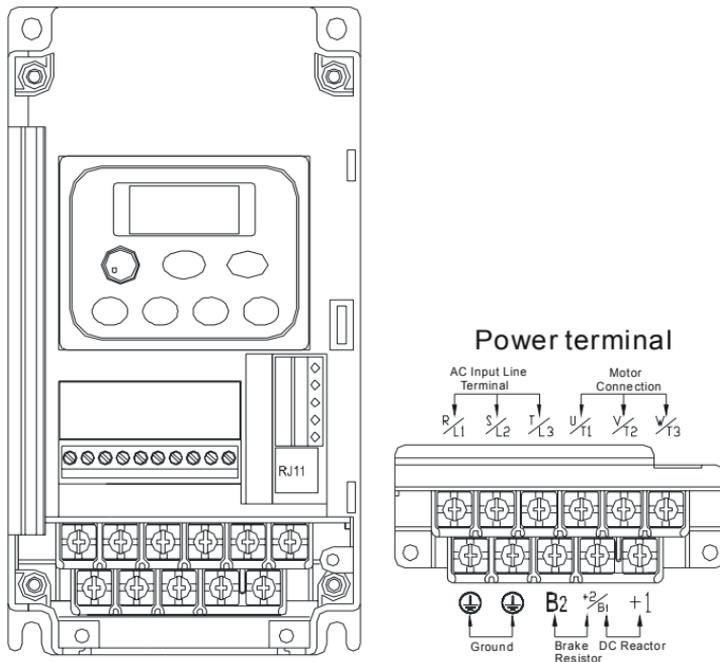
Power Terminal:

Torque: 20 kgf-cm (17.4 lbf-in)

Wire Gauge: 10-18 AWG (5.3-0.8mm²)

Wire Type: stranded copper only, 75°C

VFD015S21U/43D/43E/43U, VFD022S21U/23D/43D/43E/43U



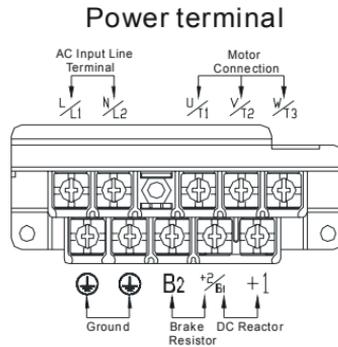
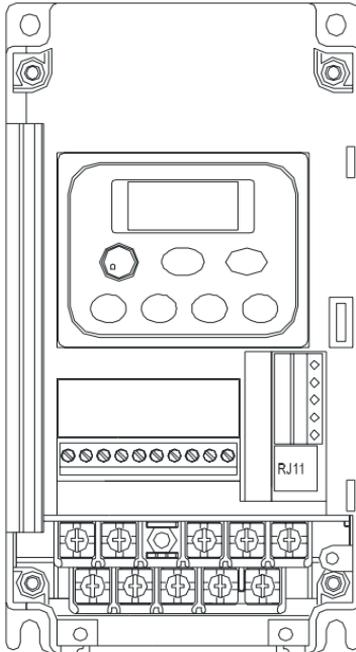
Power Terminal:

Torque: 20 kgf-cm (17.4 lbf-in)

Wire Gauge: 10-18 AWG (5.3-0.8mm²)

Wire Type: stranded copper only, 75°C

VFD015S21D/E, VFD022S21D/E



Power Terminal:

Torque: 20 kgf-cm (17.4 lbf-in)

Wire Gauge: 10-18 AWG (5.3-0.8mm²)

Wire Type: stranded copper only, 75°C