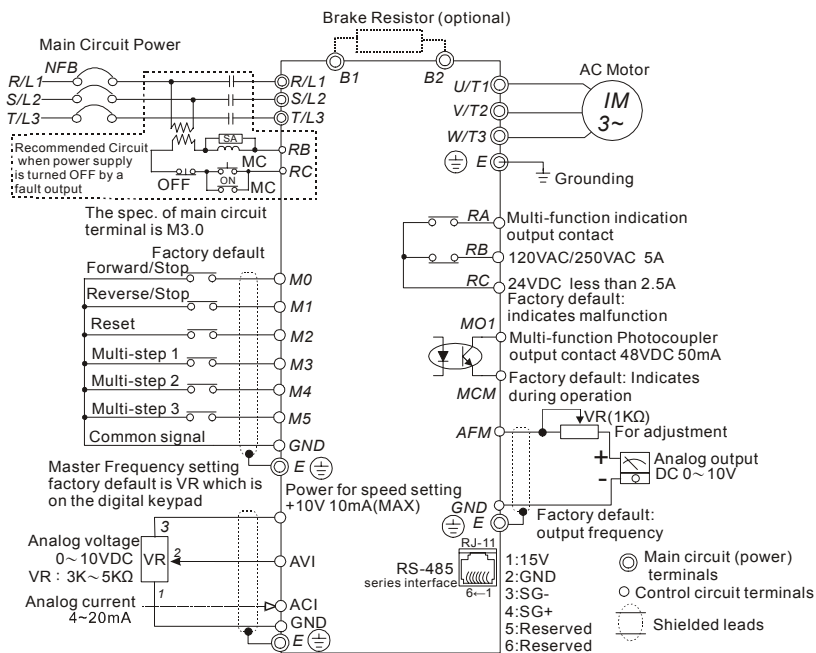


**DANGER!**

1. A charge may still remain in the DC bus capacitors with hazardous voltages even if the power has been turned off. To prevent personal injury, please ensure that the power is turned off and wait ten minutes for the capacitors to discharge to safe voltage levels before opening the AC motor drive.
2. Only qualified personnel familiar with AC motor drives is allowed to perform installation, wiring and commissioning.
3. Make sure that the power is off before doing any wiring to prevent electric shock.

2.1 Basic Wiring Diagram

Users must connect wires according to the following circuit diagram shown below.



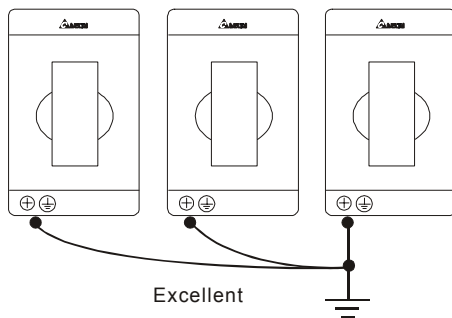
NOTE: Do not plug a Modem or telephone line to the RS-485 communication port, permanent damage may result. Terminal 1 & 2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

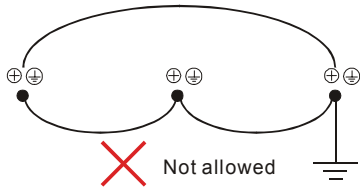
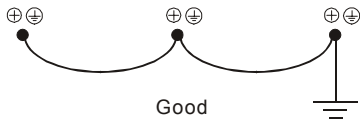
* If it is single phase model, please select any of the two input power terminals in main circuit power.

* Single phase model can be input 3-phase power.

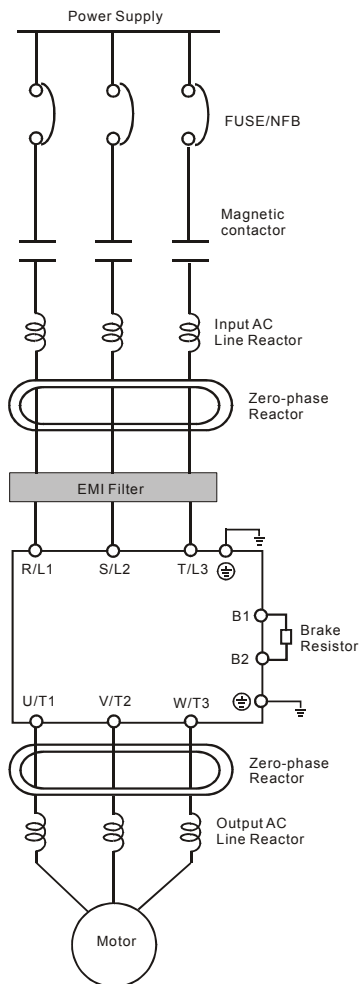
**CAUTION!**

1. The wiring of main circuit and control circuit should be separated to prevent erroneous actions.
2. Please use shield wire for the control wiring and not to expose the peeled-off net in front of the terminal.
3. Please use the shield wire or tube for the power wiring and ground the two ends of the shield wire or tube.
4. Damaged insulation of wiring may cause personal injury or damage to circuits/equipment if it comes in contact with high voltage.
5. The AC motor drive, motor and wiring may cause interference. To prevent the equipment damage, please take care of the erroneous actions of the surrounding sensors and the equipment.
6. When the AC drive output terminals U/T1, V/T2, and W/T3 are connected to the motor terminals U/T1, V/T2, and W/T3, respectively. To permanently reverse the direction of motor rotation, switch over any of the two motor leads.
7. 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.
8. The AC motor drive, electric welding machine and the greater horsepower motor should be grounded separately.
9. Use ground leads that comply with local regulations and keep them as short as possible.
10. No brake resistor is built in the VFD-M series, it can install brake resistor for those occasions that use higher load inertia or frequent start/stop. Refer to Appendix B for details.
11. Multiple VFD-M 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.**





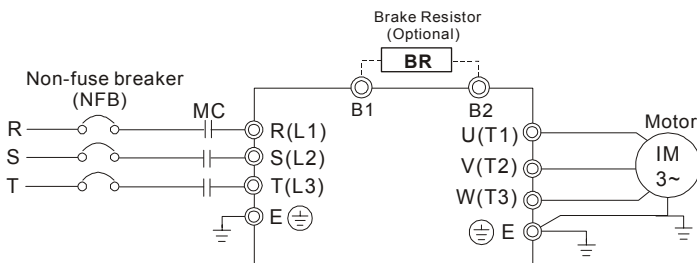
2.2 External Wiring




Items	Explanations
Power supply	Please follow the specific power supply requirement shown in APPENDIX A.
Fuse/NFB (Optional)	There may be inrush current during power up. Please check the chart of APPENDIX B and select the correct fuse with rated current. NFB is optional.
Magnetic contactor (Optional)	Please do not use a Magnetic contactor as the I/O switch of the AC drive, this 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. (Surge, switching spike, power flick, etc.) AC line reactor should be installed when the power supply capacity is $\geq 500\text{kVA}$ or phase lead reactor will be switched. And the wiring distance should not exceed 10m. Please refer to Appendix B for detail.
Zero-phase Reactor (Ferrite Core Common Choke) (Optional)	Zero phase reactors are used to reduce radio noise especially when audio equipment 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 zero phase reactors. (RF220X00A)
EMI filter (Optional)	To reduce electromagnetic interference. Please refer to Appendix B for detail.
Brake Resistor (Optional)	Used to reduce stopping time of the motor. Please refer to the chart on Appendix B for specific brake resistors.
Output AC Line Reactor (Optional)	Motor surge voltage amplitudes depending on motor cable length. For long motor cable applications ($>20\text{m}$), it is necessary to install on the inverter output side.

2.3 Main Circuit

2.3.1 Main Circuit Connection



Terminal Symbol	Explanation of Terminal Function
R/L1, S/L2, T/L3	AC line input terminals (three phase)
U/T1, V/T2, W/T3	Motor connections
B1 – B2	Connections for brake resistor (optional)
	Earth Ground



CAUTION!

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

- Connect these terminals (R/L1, S/L2, T/L3) 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.
- Please make sure to fasten the screw of the main circuit terminals to prevent sparks which is made by the loose screws due to vibration.

- Please use voltage and current within the regulation shown in Appendix A.
- When using a GFCI (Ground Fault Circuit Interrupter), select a current sensor with sensitivity of 200mA, and not less than 0.1-second detection time to avoid nuisance tripping.
- 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.

Output terminals for main circuit (U, V, W)

- When it needs to install the filter at the output side of terminals U/T1, V/T2, W/T3 on the AC motor drive. Please use inductance filter. Do not use phase-compensation capacitors or L-C (Inductance-Capacitance) or R-C (Resistance-Capacitance), unless approved by Delta.
- DO NOT connect phase-compensation capacitors or surge absorbers at the output terminals of AC motor drives.
- Use well-insulated motor, suitable for inverter operation.

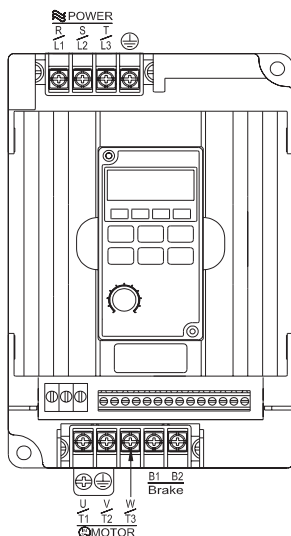
Terminals [B1, B2] for connecting external brake unit

Brake Resistor(optional)
Refer to Appendix B for the use of
special brake resistor



- Connect a brake resistor or brake unit in applications with frequent deceleration ramps, short deceleration time, too low braking torque or requiring increased braking torque.
- The AC motor drive has a built-in brake chopper, you can connect the external brake resistor to the terminals [B1, B2] when needed.
- When not used, please leave the terminals [B1, B2] open.

2.3.2 Main Circuit Terminals

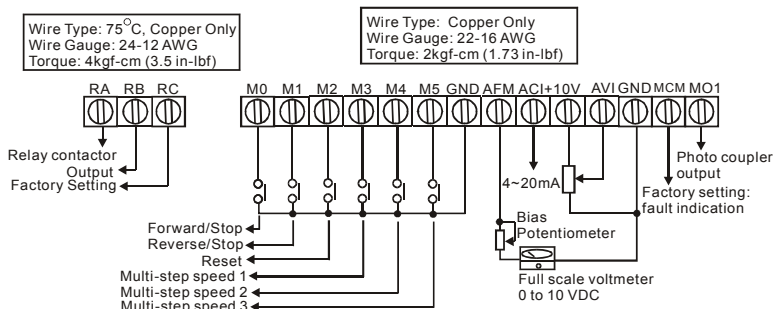


Wire Type: 75 °C Copper Only

Model Name	Max. Current (input / output)	Wire Gauge AWG (mm ²)	Torque kgf-cm (in-lbf)
VFD002M11A	6A/1.6A	12-14	14 (12)
VFD004M11A	9A/2.5A	(3.3-2.1)	
VFD007M11A	16A/4.2A	12 (3.3)	
VFD004M21A/21B	6.3A/2.5A	12-14 (3.3-2.1)	
VFD004M23A	3.2A/2.5A		
VFD007M21A/21B	11.5A/5.0A		
VFD007M23A	6.3A/5.0A	12 (3.3)	
VFD015M21A/21B	15.7A/7.0A		
VFD015M23A	9.0A/7.0A	12-14 (3.3-2.1)	15 (13)
VFD022M21A	27A/10A	8 (8.4)	
VFD022M23B	15A/10A	8-12 (8.4-3.3)	
VFD037M23A	19.6A/17A	8-10 (8.4-5.3)	
VFD055M23A	28A/25A	8 (8.4)	
VFD007M43B	4.2A/3.0A	12-14 (3.3-2.1)	14 (12)
VFD007M53A	2.4A/1.7A	12-14 (3.3-2.1)	
VFD015M43B	5.7A/4.0A	12-14 (3.3-2.1)	
VFD015M53A	4.2A/3.0A	12-14 (3.3-2.1)	
VFD022M43B	6.0A/5.0A	12-14 (3.3-2.1)	
VFD022M53A	5.9A/4.2A	12-14 (3.3-2.1)	
VFD037M43A	8.5A/8.2A	8-14 (8.4-2.1)	
VFD037M53A	7.0A/6.6A	8-14 (8.4-2.1)	
VFD055M43A	14A/13A	8-12 (8.4-3.3)	
VFD055M53A	10.5A/9.9A	8-12 (8.4-3.3)	
VFD075M43A	23A/18A	8-10 (8.4-5.3)	
VFD075M53A	12.9A/12.2A	8-12 (8.4-3.3)	

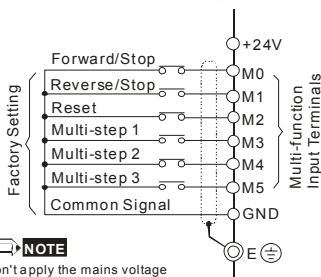
Note: It needs to use the Recognized Ring Terminal to conduct a proper wiring.

2.4 Control Terminal Wiring (Factory Settings)

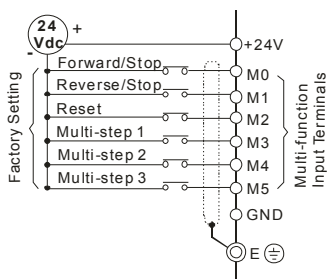


NPN Mode

NPN mode without external power

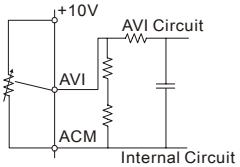
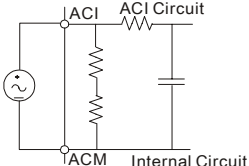
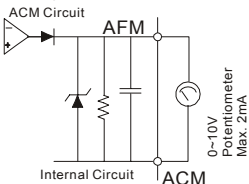


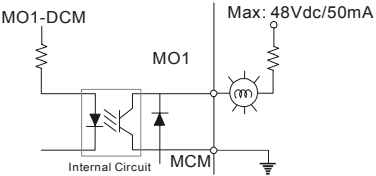
NPN mode with external power



Terminal symbols and functions

Terminal Symbol	Terminal Function	Factory Settings (NPN mode)
RA	Multi-Function Relay Output (N.O.) a	RA-RC Resistive Load 5A(N.O.)/3A(N.C.) 277Vac; 5A(N.O.)/3A(N.C.) 30Vdc Refer to P45 for programming.
RB	Multi-Function Relay Output (N.C.) b	RB-RC Resistive Load 5A(N.O.)/3A(N.C.) 277Vac; 5A(N.O.)/3A(N.C.) 30Vdc

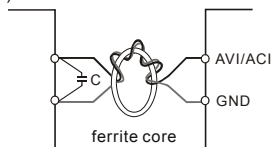
Terminal Symbol	Terminal Function	Factory Settings (NPN mode)
RC	Multi-function Relay Common	5A(N.O.)/3A(N.C.) 277Vac; 5A(N.O.)/3A(N.C.) 30Vdc
M0	Multi-function auxiliary input	M0~M5-GND Refer to P38~P42 for programming the multi-function inputs. ON: the activation current is 10 mA. OFF: leakage current 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	
GND	Common Signal	
+10V	+10 Vdc Output	+10V-GND It can supply +10 VDC power.
AVI	Analog Voltage Input 	Impedance: 20k Ω Resolution: 10 bits Range: 0~10Vdc = 0~Max.Output Frequency
ACI	Analog Current Input 	Impedance: 250 Ω Resolution: 10 bits Range: 4~20mA = 0~Max.Output Frequency
AFM	Analog Output Meter 	0 to 10V, 2mA Impedance: 100k Ω Output Current: 2mA max Resolution: 8 bits Range: 0 ~ 10Vdc

Terminal Symbol	Terminal Function	Factory Settings (NPN mode)
MO1	Multi-function Output Terminal (Photocoupler)	<p>Maximum: 48Vdc, 50mA Refer to P45 for programming.</p> 
MCM	Multi-function Output Common (Photocoupler)	Common for Multi-function Outputs

Note: Use twisted-shielded, twisted-pair or shielded-lead wires for the control signal wiring. It is recommended to run all signal wiring in a separate steel conduit. The shield wire should only be connected at the drive. Do not connect shield wire on both ends.

Analog inputs (AVI, ACI)

- 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)

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

Digital outputs (MO1)

- 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 away 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.

DANGER!

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