

6. Wiring

- Wiring for **SUMITOMO standard 3-phase motor** is shown below. Refer to the respective instruction manual when using another manufacturer,s motor.

**DANGER**

- Do not handle the unit when cables are live. Be sure to turn off the power; otherwise, electric shock may result.
- Connect a power cable to the unit according to the connection diagram shown inside the terminal box or in the maintenance manual; otherwise, electric shock or fire may result.
- Do not forcibly curve, pull, or clamp the power cable and lead wires; otherwise, electric shock or fire may result.
- Correctly ground the grounding bolt; otherwise, electric shock may result.
- The lead-in condition of an **explosion-proof type motor** shall conform to the facility's electrical codes extension regulations, and explosion-proofing guide, as well as the maintenance manual; otherwise, explosion, electric shock, personal injury, fire or damage to the equipment may result.
- Do not wet by water for electrical parts like cable connector, rectifier or condenser, even for **water-proof type**.

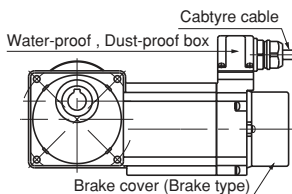
! CAUTION

- When wiring, follow the facility's electrical codes and extension regulations; otherwise, burning, electric shock, injury, or fire may result.
- The motor is not equipped with a protective device. However, it is compulsory to install an overload protector according to facility electrical codes. It is recommended to install other protective devices (earth leakage breaker, etc.), in addition to an overload protector, in order to prevent burning, electric shock, personal injury, and fire.
- Connecting method is shown below. Insulate the connecting point using insulating tape.



- Never touch the terminals when measuring insulation resistance; otherwise, electric shock may result.
- When measuring the insulation resistance of an **explosion-proof type motor**, confirm that there is no gas, steam, or other explosive substance in the vicinity, in order to prevent possible explosion or ignition.
- When using a **400V-class inverter** to drive the motor, mount a suppresser filter or reactor on the inverter side, or provide reinforced insulation on the motor side; otherwise, dielectric breakdown may cause fire or damage to the equipment.
- **For brakemotors**, install a rectifier in a place where the temperature is 60°C or below; if the ambient temperature exceeds 60°C, be sure to use a cover for protection.
- **For single-phase motors**, exercise care so as not to mistake the starting capacitor for the operation capacitor. The starting capacitor will be broken used for operation.
- **For single-phase motors**, exercise care so as not to damage the vinyl cover of the starting capacitor, otherwise electric shock may result.
- Do not open water-proof dust-proof box for **water-proof type**, otherwise electrical shock, fire or damage to the equipment, may result.

Fig.26



- **For brake motors**, do not electrify a brake coil continuously when a motor is stopping; otherwise, a brake coil may burn and fire may result.

- Long cables cause voltage to drop. Select cables with appropriate diameter so that the voltage drop will be less than 2%.
- **After wiring outdoor and explosion-proof type motors**, check that terminal box mounting bolts are not loose, and correctly attach the terminal box cover.

6-1) Attaching/Detaching The Terminal Box Cover (0.1-0.4kW 3-phase motor)

(1) Detaching

As shown in Fig. 27, hold both sides of the terminal box and pull it towards you. The cover will detach.

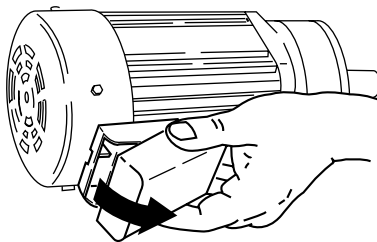


Fig.27

(2) Attaching

Press the terminal box cover to the terminal box case until it snaps into place.

6-2) Measuring Insulation Resistance

- When measuring the insulation resistance, disconnect the motor from the control panel. Check the motor separately.

Measure the insulation resistance before wiring. The insulation resistance (R) varies according to the motor output, voltage, type of insulation, coil temperature, humidity, dirt, period of operation, test electrification time, etc. Usually, the insulation resistance exceeds the values shown in Table 6.

Table 6 Insulation resistance

Megohmmeter voltage	Insulation resistance (R)
500V	1M(Ω) or more

Reference: The following equations are shown in JEC-2100.

$$R (> \text{ or } =) \frac{\text{Rated voltage (V)}}{\text{Rated output (kW)+1000}} \quad (\text{M}\Omega)$$

$$R (> \text{ or } =) \frac{\text{Rated voltage (V) + Speed (rpm)/3}}{\text{Rated output (kW) + 2000}} + 0.5 \quad (\text{M}\Omega)$$

A drop in insulation resistance may be attributed to poor insulation. In that case, do not turn on the power. Contact our nearest agent, distributor, or sales office.

6–3) Protection Coordination

- (1) Use a molded case circuit breaker for protection against short circuit.
- (2) Use an overload protection device that protects the unit against asurge of electric current exceeding that shown on the rating plate.
- (3) For an **explosion-proof type motor** , use an overload protector that can protect the unit within the allowable binding hour by means of the locked rotor current shown on the rating plate.

6–4) Single-Phase Motor Condenser Specification

Table 7 15–90W Single-Phase Motor Condenser Specification

Motor voltage	Condenser Voltage Resistance	Motor type	Motor capacity (W)	Frame Size	Condenser capacity (μF)
100V	220V	Induction	15	01#, 03#	5
			25	01#, 03#	7
			40	05#, 07#	12
			40	17#	14
			60	17#	18
			90	15#, 17#	25
		Reversible	15	01#, 03#	6
			25	01#, 03#	10
			40	05#, 07#	14
			40	17#	16
			60	17#	22
			90	15#, 17#	32
200V	440V	Induction	40	17#	3.5
			60	17#	4.5
			90	15#, 17#	6.5
		Reversible	40	17#	4
			60	17#	5.5
			90	15#, 17#	8

Table 8 0.1–0.75kW Single-Phase Motor Condenser Specification

Motor voltage	Motor capacity (W)	For starting		For operation	
		Condenser capacity(μF)	Condenser Voltage Resistance (V)	Condenser capacity(μF)	Condenser Voltage Resistance (V)
100V/200V	0.1	60	125	10	230
	0.2	100	125	30	230
	0.4	200	125	40	230
	0.75	350	125	40	230



6-5) Three-Phase Motor-Single-Phase Motor (without brake) Connection

Fig. 28 shows the three-phase motor (without brake) connection and the standard specifications for terminal codes.

Fig. 28 Three-phase motor connection and terminal code.

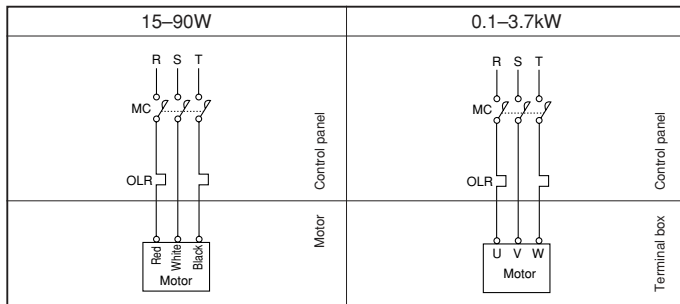
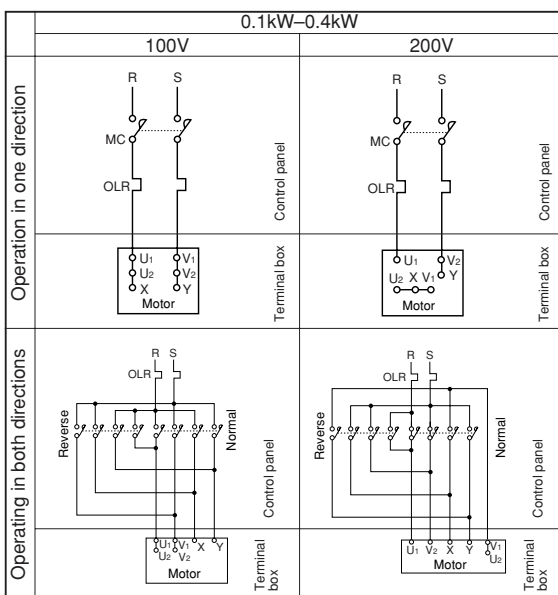
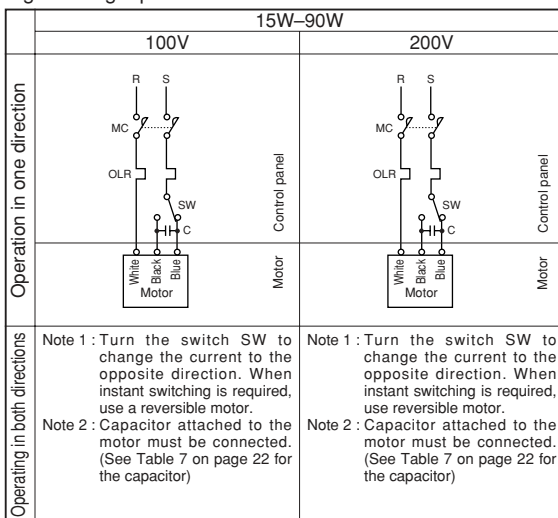




Fig. 29 shows the **single-phase motor (without brake)** connection and the standard specifications for terminal codes.

Fig. 29 Single-phase motor connection and terminal code.



Note: When operating in the reversed direction, exchange X and Y in the above diagrams.

MC: Electromagnetic contactor
 OLR: Overload relay or thermal relay
 SW: Rotation shifting switch

These should be furnished by the customer

C: Condenser — Accessory

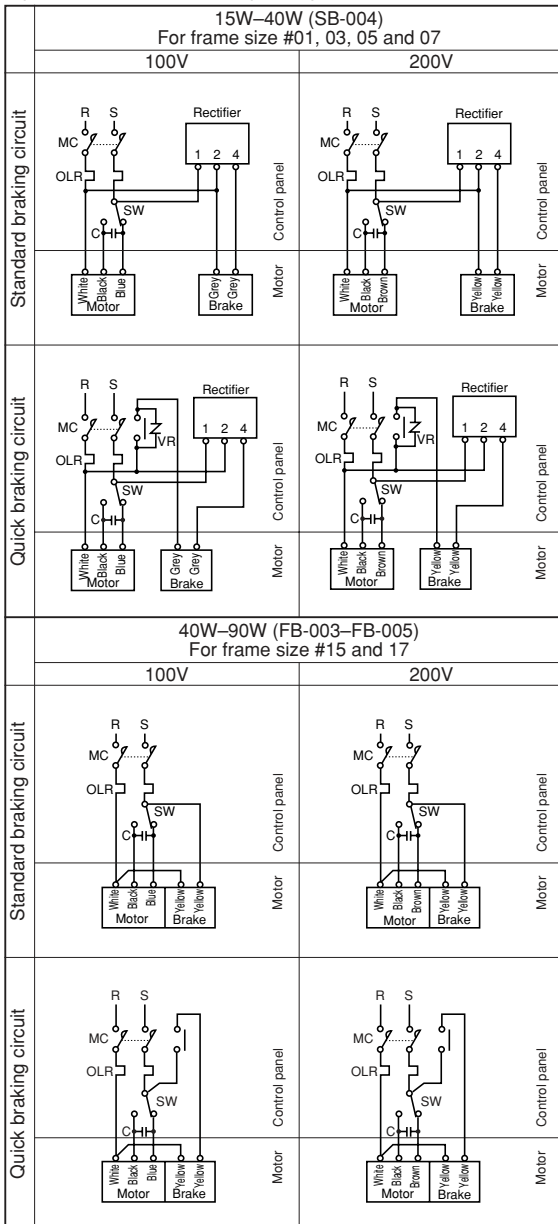
- For **15-90W single-phase motors**, connect the accessory capacitor. (See Table 7 on page 22 for the capacitor.)
- Do not open water-proof dust-proof box for **water-proof type**, other wise electrical shock, fire or damage to the equipment may result.
- Rectifier, Condenser are not water-proofed. for **water-proof type**.

6-6) Three-Phase Motor-Single-Phase Motor With Brake

Fig. 30 shows the **single-phase motor with brake** connection and the standard specifications for terminal code.

(1) Single-phase motor with FB-brake

Fig.30-a Connections when operating in one direction



Note 1: A rectifier is supplied separately for motors of 15-40W for frame size #01, 03, 05 and 07.

Note 2: A rectifier is built in the brake of motors of 40-90W for frame size #15 and 17. (FB-003-005)

Note 3: Turn the switch SW to change the current of 15-90W motors to the opposite direction. When instant switching is required, use a reversible motor.

MC: Electromagnetic contactor, OLR: Overload relay (thermal relay), SW: switch, VR: varistor and C: capacitor are not supplied by Sumitomo.

Note 4: Condenser
Please connect the condenser attached with product.

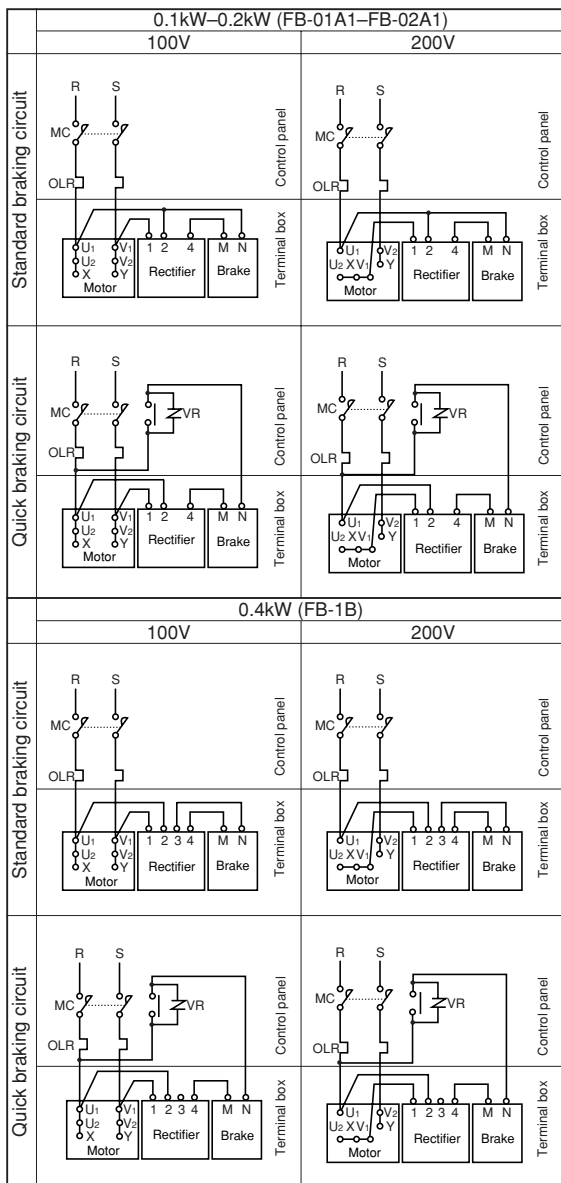
Capacity of varistor (VR)

Input power	AC100V, 200V
Rated voltage of varistor	AC260V-300V
Voltage of varistor	430V-470V
Rated capacity of motor	0.2Watt or more

Varistor is optionally available at Sumitomo.

- When greater stopping accuracy is desired for lifter units, etc., use the quick braking circuit.

- For the contact capacity of the emergency braking circuit, we recommend the DC braking capacity (for DC coil load) that is more than five times the braking current.



Note: When reverse 0.1-0.4kW motor, change X to Y (or Y to X) after the motor has stopped.

MC: Electromagnetic contactor, OLR: Overload relay (thermal relay), VR: varistor are not supplied by Sumitomo.

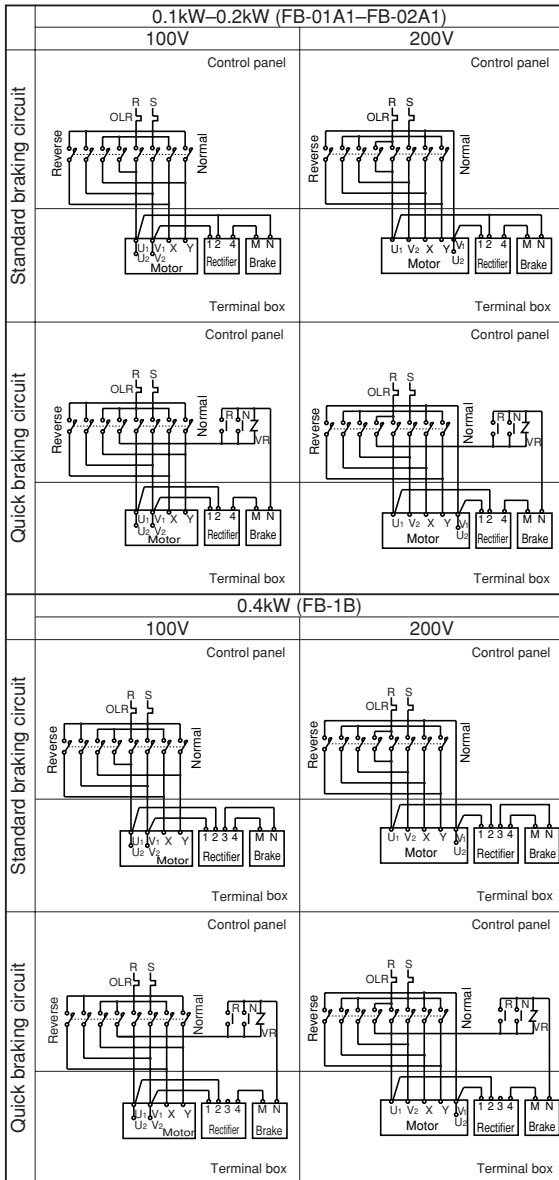
Capacity of varistor (VR)

Input power	AC100V, 200V
Rated voltage of varistor	AC260V-300V
Voltage of varistor	430V-470V
Rated capacity of varistor	FB-01A1, 02A1 0.2Watt or more
	FB-1B 0.4Watt or more

Varistor is optionally available at Sumitomo.

- When greater stopping accuracy is desired for lifter units, etc., use the quick braking circuit.
- For the contact capacity of the emergency braking circuit, we recommend the DC braking capacity (for DC coil load) that is more than five times the braking current.

Fig.30–b Connections when operating in both directions (0.1–0.75kW single-phase motor)



● Reversible electromagnetic contactor and OLR: Overload relay are not supplied by Sumitomo. VR: varistor is optionally available at Sumitomo.

Fig.31 Shows the **Three-phase motor with brake** connection and the standard specifications for terminal code.

(2) Three-phase motor with FB brake

Fig.31-a Connections when operating in one direction

	15W-60W(SB-004) for Frame size #01, 03, 05 and 07	40W-90W (FB-003-FB-005) for Frame size #15, 17
Standard braking circuit		
Quick braking circuit		
Standard braking circuit	<p>90W×4P Frame size 36#, 361# 0.1kW×4P-0.4kW×4P [FB-01A1-FB-05A1]</p>	<p>0.75kW×4P-5.5kW×4P [FB-1B-FB-8B]</p>
Quick braking circuit		

Note 1: A rectifier is supplied separately for 15-40W motors for frame size #01, 03, 05 and 07.

Note 2: A rectifier is built in the brake of 40-90W motors for frame size #15 and 17. (FB-003-005)

MC: Electromagnetic contactor and OLR: Overload relay are not supplied by Sumitomo. VR: varistor is optionally available at Sumitomo.

Capacity of varistor (VR)

a	Brake input power	AC200V-230V	AC380V-460V
	Rated voltage of varistor	AC260V-300V	AC510V
	Varistor voltage	430V-470V	820V
Rated capacity of varistor	SB-004, FB-01A1, 02A1, 05A1	0.2Watt or more	0.4Watt or more
	FB-1B	0.4Watt or more	0.6Watt or more
	FB-2B, 3B, 5B, 8B	0.6Watt or more	1.5Watt or more

Varistor is optionally available at Sumitomo.

- When greater stopping accuracy is desired for lifter units, etc., use the quick braking circuit.
- For the contact capacity of the emergency braking circuit, we recommend the DC braking capacity (for DC coil load) that is more than five times the braking current.

Fig.31-b Connections when operating in both directions

15W-60W(SB-004) for Frame size #01, 03, 05 and 07		40W-90W(FB-003-FB-005) for Frame size #15, 17	
Standard braking circuit			
Quick braking circuit			
90W×4P Frame size 36#, 361# 0.1kW×4P-0.4kW×4P (FB-01A1-FB-05A1)		0.75kW×4P-5.5kW×4P (FB-1B-FB-8B)	
Standard braking circuit			
Quick braking circuit			

● Electromagnetic contactor and OLR:
Overload relay are not supplied by
Sumitomo.
VR: varistor is optionally available at Sumitomo.

Fig.32 Shows the **inverter motor** connection and the standard specifications for terminal code.

Fig.32 Connections when operating a brake motor by an inverter

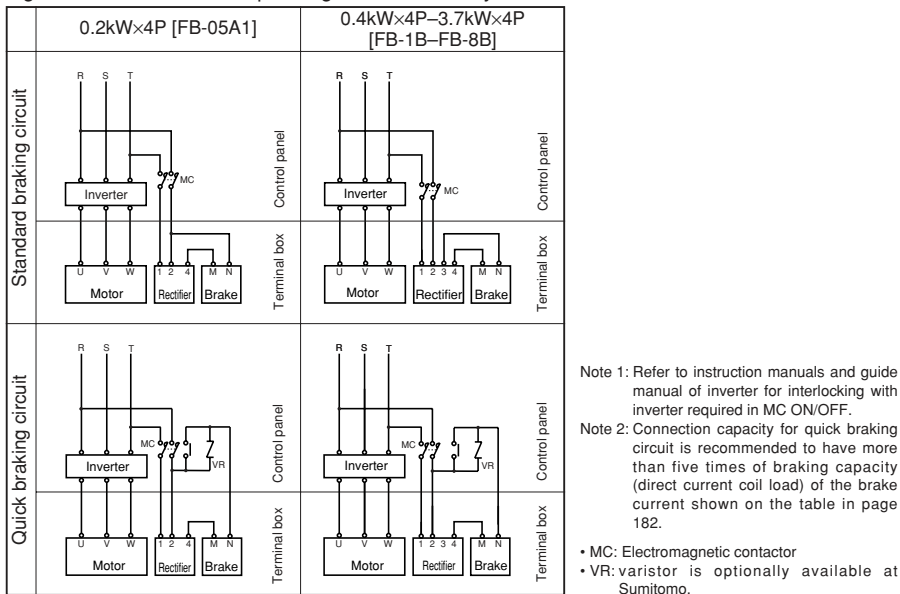


Table 9 Varistor (VR) Capacity

Motor power		AC200V~230V	AC380V~460V
Rated voltage of varistor		AC260V~AC300V	AC510V
Varistor voltage		430V~470V	820V
Rated power of varistor	Brake type		
	SB-004, FB-01A1, 02A1, 05A1, 01A, 02A, 05A	0.2Watt or more	0.4Watt or more
	FB-1B	0.4Watt or more	0.6Watt or more
	FB-2B, 3B, 5B, 8B	0.6Watt or more	1.5Watt or more

- The brake delay time of the normal braking action is different from that of the fast braking action. Table 1 on page 5 shows the delay time. Use a circuit that meets your requirements.
- DC braking capacity (for DC coil loading) exceeding 5 times the braking current shown on the name plate is recommended for the fast braking action.

- Use fast braking action for lifting devices or for better stopping accuracy.
- Use fast braking action when a leading capacitor is used.

- **For 15~90W single-phase**, connect the accessory capacitor, (see Table 7 on page 22 for the capacitor.)

- Pay attention to the following items **when driving an inverter**.

- For the inverter-driven motor with a brake, use the primary-side power supply for braking as shown in Fig.35, and synchronize the braking operation with the ON/OFF operation of the unit.
- For the inverter-driven motor with a brake, interlocking with the inverter is necessary to engage/release the MC. Refer to the inverter maintenance manual or guide.