OPERATING MANUAL

Brake Pack
SB50W

Thank you for purchasing an Oriental Motor product.
This Operating Manual describes product handling procedures and safety precautions.
- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

Introduction

■ Before using the product

Only qualified personnel of electrical and mechanical engineering should work with the product.
Use the product correctly after thoroughly reading the section "Safety precautions." In addition, be sure to observe the contents described in warning, caution, and note in this manual.
The product described in this manual is designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose. Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.
This Operating Manual describes product handling methods and others for the brake pack only. For details about motors, refer to the operating manual of a motor used.

■ Overview of the product

The brake pack is a product that allows a programmable controller to perform clockwise/counterclockwise operation and instantaneous stop of a motor as well as release/actuation control of the electromagnetic brake. In addition, if the brake pack detects an "open" state of the thermal protector built in the motor, the ALARM output is turned "OFF" to prevent the motor from restarting when the thermal protector is automatically returned.

Safety precautions

The precautions described below are intended to ensure the safe and correct use of the product, and to prevent the user and other personnel from exposure to the risk of injury. Use the product only after carefully reading and fully understanding these instructions.

⚠WARNING	Handling the product without observing the instructions that accompany a "WARNING" symbol may result in serious injury or death.
⚠CAUTION	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
Note	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.

⚠WARNING

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in places subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock, or injury.
- Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock, or injury.
- Do not transport, install, connect or inspect the product while the power is supplied. Always turn off the power before carrying out these operations. Failure to do so may result in electric shock.
- Do not use the brake pack as a safety device. Doing so may result in fire, electric shock, injury, or damage to equipment.
- Do not use the brake mechanism of the electromagnetic brake motor for braking or as a safety brake. It is intended to hold the moving part and motor positions. Using it for braking or as a safety brake may result in injury or damage to equipment.
- If the ALARM output of the brake pack is turned "OFF," remove the cause before resetting the alarm. Continuing the operation without removing the cause of the problem may cause malfunction of the motor and/or the brake pack, leading to injury or damage to equipment.
- Install the brake pack in an enclosure. Failure to do so may result in electric shock or injury.
- Be sure to keep the input-power voltage of the brake pack within the specified range. Failure to do so may result in fire or electric shock.
- Connect the cables securely according to the wiring example. Failure to do so may result in fire or electric shock.
- Connect an earth leakage breaker to the power line of the brake pack to protect the primary circuit. Failure to do so may result in fire.
- Turn off the power to the brake pack in the event of a power failure. Otherwise, the motor having connected may suddenly start when the power is restored, causing injury or damage to equipment.
- Do not disassemble or modify the brake pack. Doing so may result in electric shock, injury, or damage to equipment. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.

⚠CAUTION

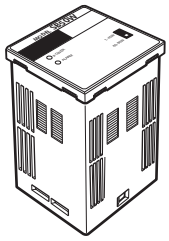
- Do not use the brake pack beyond its specifications. Doing so may result in electric shock, injury, or damage to equipment.
- Do not leave anything around the brake pack that would obstruct ventilation. Doing so may result in damage to equipment.
- Use the brake pack and a motor only in the specified combination. An incorrect combination may cause a fire.
- Before turning on the power supply, make sure to turn all control inputs of the brake pack "OFF." Otherwise, the motor may suddenly start when the power is turned on, leading to injury or damage to equipment.
- Provide an emergency-stop device or emergency-stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- Immediately when trouble has occurred, stop operation and turn off the power supply. Failure to do so may result in fire, electric shock, or injury.

Preparation

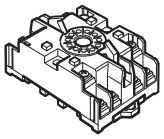
■ Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the Oriental Motor sales office from which you purchased the product.

Brake pack 1 unit

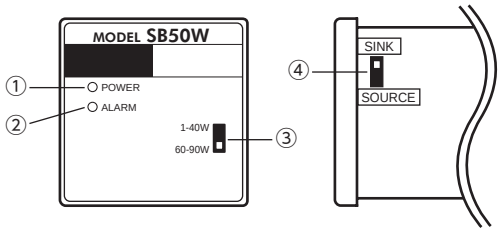


Flush mounting socket 1 piece



Instructions and Precautions for Safe Use 1 copy

■ Names and functions of parts



Number	Name	Factory setting	Description
①	POWER indicator (green)	–	Lit while 24 VDC is supplied.
②	ALARM indicator (red)	–	Lit while the ALARM output is "OFF."
③	Motor output selector switch	60 - 90 W	Switches the setting of this switch according to the motor output.
④	Sink/Source selector switch	SINK	Switches the control signal input/output mode between "sink logic" and "source logic." (p.3)

■ Applicable motors

World **K** Series, **FPW** Series, **K Ⅱ** Series,
K Series (motor output power 1 to 90 W, except for 2-pole type)

Note Three-phase motors cannot be used in combination.

Installation

This section explains the installation location and installation method for the brake pack.

■ Installation location

Install the product in a well-ventilated location that provides easy access for inspection.

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature: 0 to +40 °C (+32 to +104 °F) (non-freezing)
- Operating ambient humidity: 85% or less (non-condensing)
- Area free of explosive atmosphere, toxic gas (such as sulfuric gas), or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields, or vacuum
- Altitude: Up to 1000 m (3300 ft.) above sea level

■ Installation method

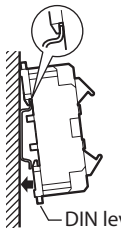
The brake pack is designed so that heat is dissipated via air convection. Install the brake pack to a metal plate offering excellent vibration resistance. Do not use the DIN rail when vibration is large. Fix the flash mounting socket with screws directly and install the brake pack.

Note
- Provide clearances of at least 25 mm (0.98 in.) and 50 mm (1.97 in.) in the horizontal and vertical directions, respectively, between the brake pack and enclosure or other equipment within the enclosure.
- Do not install any equipment that generates a large amount of heat or noise near the brake pack.
- Reconsider the ventilation condition if the ambient temperature of the brake pack exceeds 40 °C (104 °F).

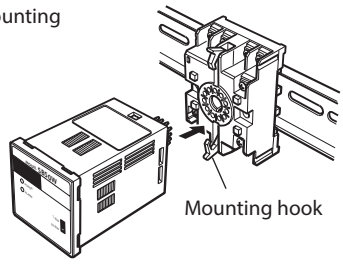
● Installing to DIN rail

Use a DIN rail of 35 mm (1.38 in.) wide to install the flush mounting socket.

1. Engage the hook on the back of the flush mounting socket over the DIN rail, and push until the DIN lever locks in place.



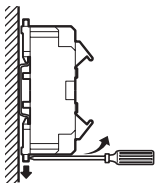
2. Insert the brake pack into the flush mounting socket.



Note Use the mounting hook of the flush mounting socket to secure the brake pack.

● Removing from DIN rail

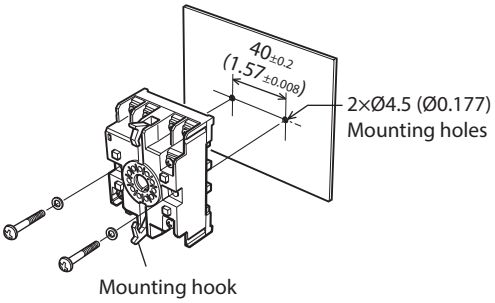
Pull the DIN lever down with a screwdriver, and lift the bottom of the flush mounting socket to remove it from the rail.



● Installing with screws

Secure the flush mounting socket with two screws (M4 or M3, not included) through the two mounting holes provided. Leave no gap between the flush mounting socket and the metal plate.
Insert the brake pack into the flush mounting socket.

[Unit: mm (in.)]



Note Use the mounting hook of the flush mounting socket to secure the brake pack.

Setting

■ Switching motor output power

Use the motor output selector switch on the brake pack to set according to the output power of the motor connected.
Set the switch to "1 - 40 W" when the brake pack is connected to a 1 to 40 W motor.
Set the switch to "60 - 90 W" when the brake pack is connected to a 60 W or 90 W motor.
It is set to "60 - 90 W" at the time of shipment.

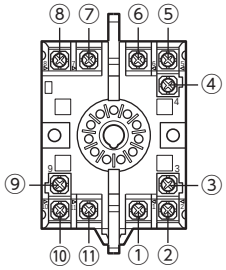
Note Always set the motor output power to the brake pack before operating the motor. Switching it during operation will not enable the new setting of the motor output power.

Connection

This section explains methods and examples of connecting the brake pack to a power supply, a motor, an external control device and others, as well as I/O signals.

■ Terminal assignments of flush mounting socket

The terminal assignments of the flush mounting socket are shown in the figure.
The terminals of the socket are marked with terminal numbers.



Terminal No.	Signal name	Description
①	Motor/capacitor	Used to connect the motor and capacitor.
②	AC power Input (L)	Single-phase 100 - 115 VAC or single-phase 200 - 230 VAC
③	NC	Not used. Do not connect anything.
④ *1	Brake release input *2	The motor does not stop instantaneously but coasts to a stop.
	ALARM-RESET input	Used to reset the ALARM output.
⑤	CCW operation input *3	The motor rotates in the CCW direction while this signal is being "ON."
⑥	DC power Input	+24 VDC input
⑦	GND	GND
⑧	CW operation input	The motor rotates in the CW direction while this signal is being "ON."
⑨	ALARM output *4	When the built-in thermal protector of the motor is in an "open" state, this signal is turned "OFF."
⑩	Electromagnetic brake *5	Used to connect the electromagnetic brake.
⑪	Motor/capacitor	Used to connect the motor and capacitor.

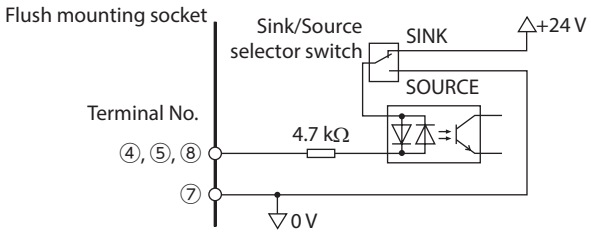
*1 It functions as the brake release input during normal operation, and as the ALARM-RESET input when the ALARM output is in an "OFF" state. (Refer to "Alarm reset" on page 7.)
*2 When an electromagnetic brake motor is used, the electromagnetic brake is released.
*3 It cannot be used for an induction motor with four lead wires.
*4 Refer to "Alarm" on Page 7 for details.
*5 Electromagnetic brake motor only

■ I/O signals

The input/output circuits are initially set to sink logic.
Switch the circuit mode between "sink logic" and "source logic" according to the external control device used (Refer to "Switching between sink logic and source logic").

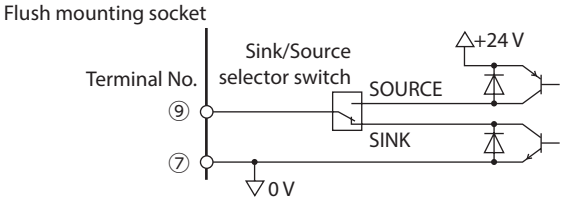
● Input circuit (internal circuit)

The input signal voltage is 24 VDC.
Input signals are provided as photocoupler inputs. The signal state represents a state of "ON: Carrying current" or "OFF: Not carrying current" for the internal photocoupler rather than the voltage level of the signal.

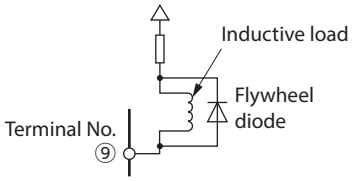


● Output circuit (internal circuit)

Output signals are provided as open-collector outputs. The signal state represents a state of "ON: Carrying current" or "OFF: Not carrying current" for the internal photocoupler rather than the voltage level of the signal.
Use a power supply of 26.4 VDC or less, and ensure that the output current does not exceed 10 mA.



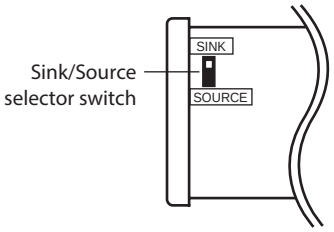
Note When connecting a relay (inductive load), etc., to detect alarm outputs, provide a fly-back voltage control measure based on diode, etc., for the inductive load.
Or use a relay with built-in flywheel diode.



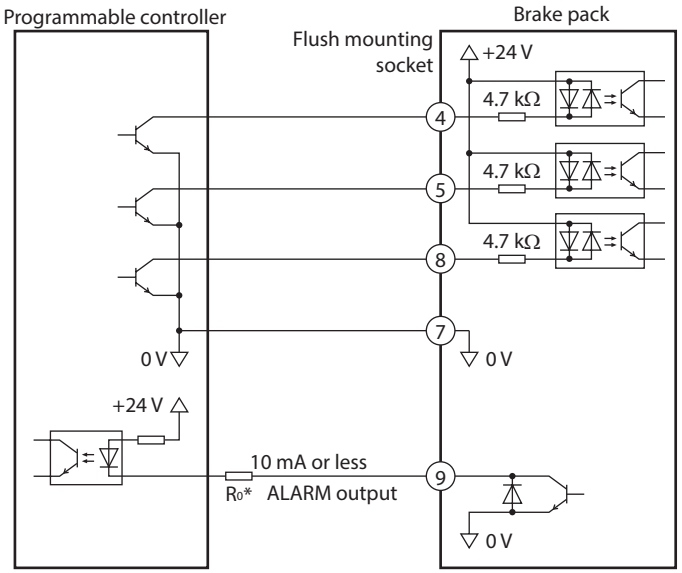
■ Switching between sink logic and source logic

Use the sink/source selector switch on the side of the brake pack to switch the input/output circuit mode between "sink logic" and "source logic."
In the sink logic input circuit, a signal will be turned ON when the current flows out of the input terminal.
In the source logic input circuit, a signal will be turned ON when the current flows into the input terminal.
The factory setting is sink logic. Set an appropriate mode based on the output circuit of the external control device used.

Figure viewed from the side of brake pack

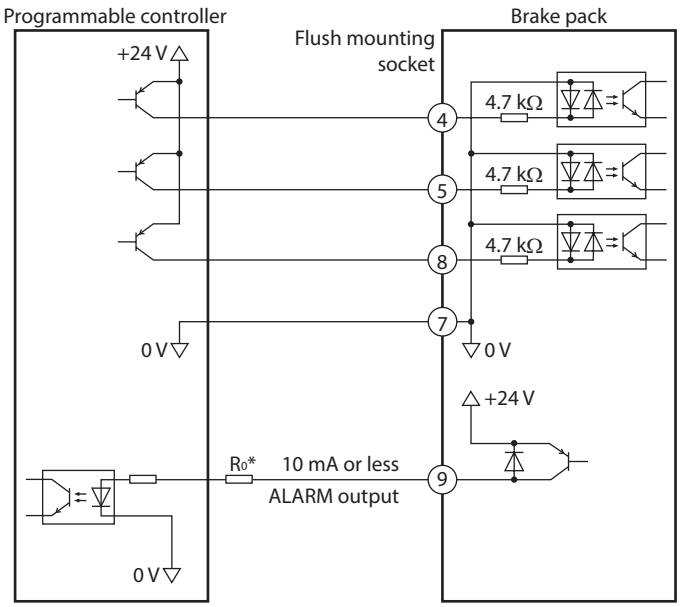


● Connection example of sink logic



* Recommended resistance value when the current-limiting resistor R_0 is connected 2.7 kΩ to 4.7 kΩ (1 W)

● Connection example of source logic



* Recommended resistance value when the current-limiting resistor R_0 is connected 2.7 kΩ to 4.7 kΩ (1 W)

Note

For output signals, be sure to connect a current-limiting resistor R_0 so that the current does not exceed 10 mA.

- When using a programmable controller, check the resistance value inside the controller and connect a current-limiting resistor R_0 as necessary.

■ Connecting the earth leakage breaker

Connect an earth leakage breaker to the power line of the brake pack to protect the primary circuit. (⇒ Refer to p.8)
Recommended device: Mitsubishi Electric Corporation NV series

■ Connection example

The figures show connection examples of sink logic.
Refer to p.6 for a connection example of source logic.
The rotation direction represents that of the motor output shaft when viewed from the output shaft side. "CW" indicates clockwise and "CCW" counterclockwise.
The rotation direction of the gearhead output shaft varies from that of the motor output shaft depending on the gear ratio of the gearhead.

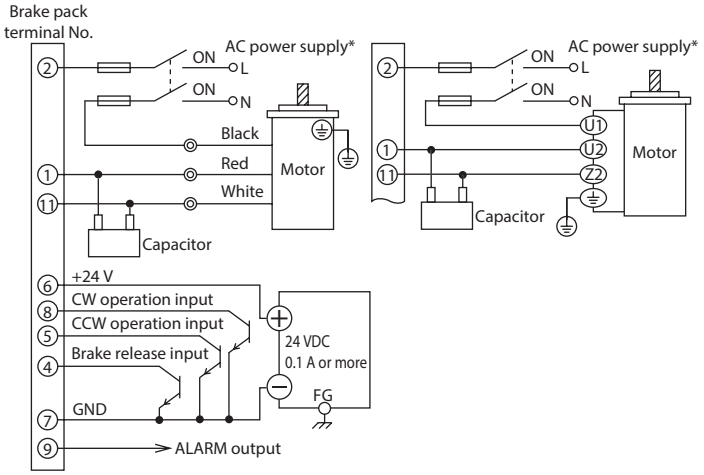
Note

- The input signal voltage is 24 VDC±10% and 0.1 A or more.
- Separate a power supply for the brake pack from that of the noise source (welding machine, electric discharge machine, etc.).
- Wire the motor cable and the I/O signal cable as short as possible.
- Wire the I/O signal cable by providing a clearance at least 300 mm (11.8 in.) away from cables carrying a large amount of current. Also, wire by crossing it with the power supply cable and motor cable at a right angle, not parallel to them.
- Use a cable of AWG 18 (0.75 mm^2) or thicker for the motor cable and the power supply cable.
- Be sure to connect the GND terminal to the GND (negative side) of the external control device. Operation cannot be executed if not connected.

Contact capacity of switch (SW1)

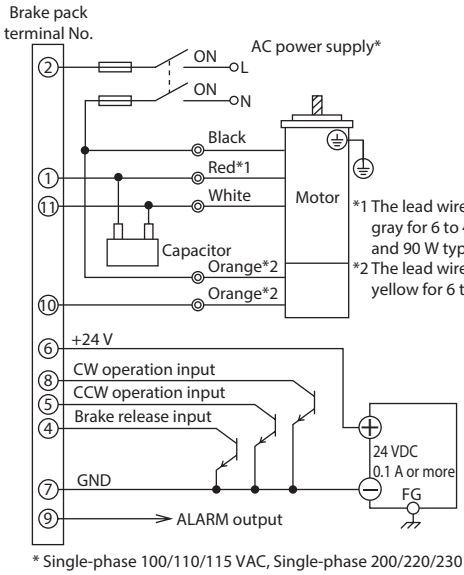
Single-phase 100–115 VAC: 125 VAC, 5 A or more (inductive load)
Single-phase 200–230 VAV: 250 VAC, 5 A or more (inductive load)

● World K Series, KⅡ Series Induction motor / Reversible motor



* Single-phase 100/110/115 VAC, Single-phase 200/220/230 VAC

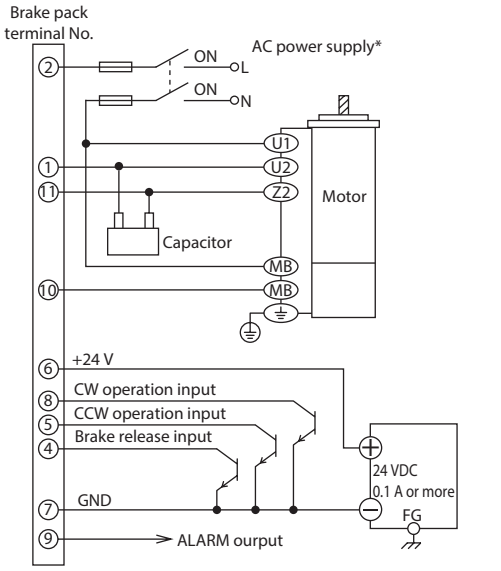
● Electromagnetic brake motor



*1 The lead wire color of the **K** Series motors is gray for 6 to 40 W types and yellow for 60 W and 90 W types.
*2 The lead wire color of the **K** Series motors is yellow for 6 to 40 W types.

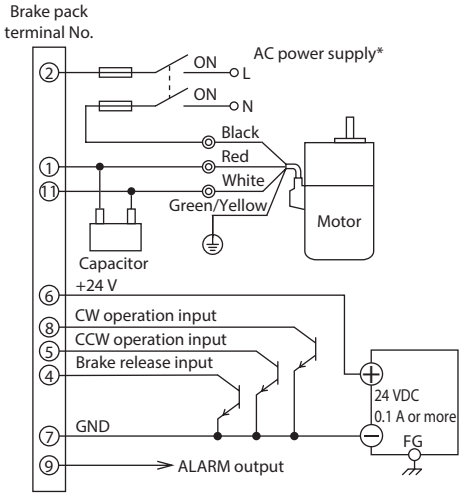
* Single-phase 100/110/115 VAC, Single-phase 200/220/230 VAC

Terminal box type



* Single-phase 100/110/115 VAC, Single-phase 200/220/230 VAC

● FPW Series Induction motor

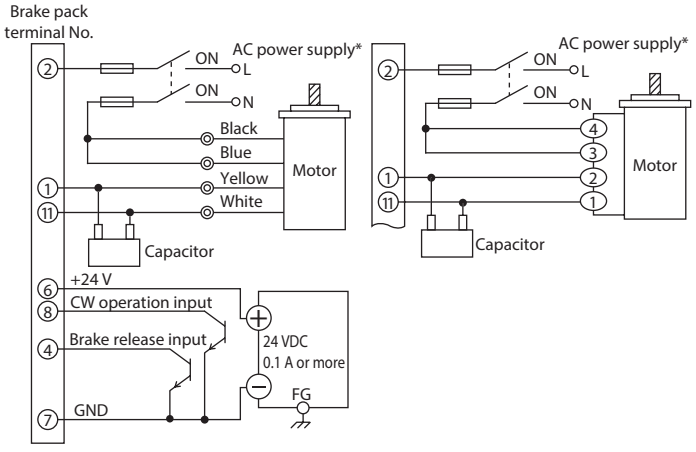


* Single-phase 100/110/115, Single-phase 200/220/230 VAC

● K Series Induction motor

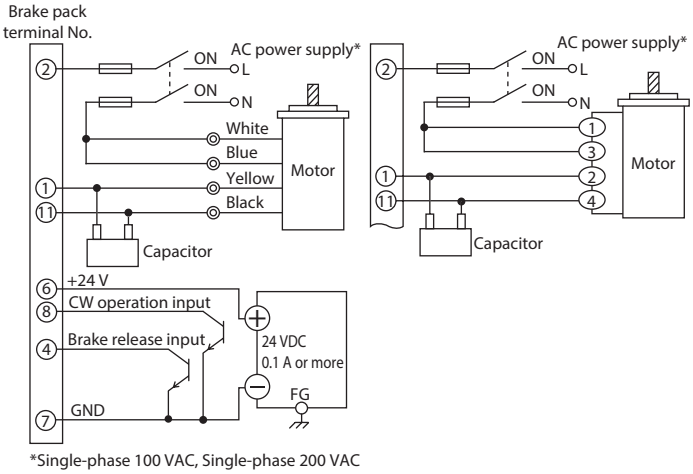
The CCW operation input cannot be used.
The terminal box type motor of 5 W is the same connection as the **K** Series reversible motor.

Clockwise operation



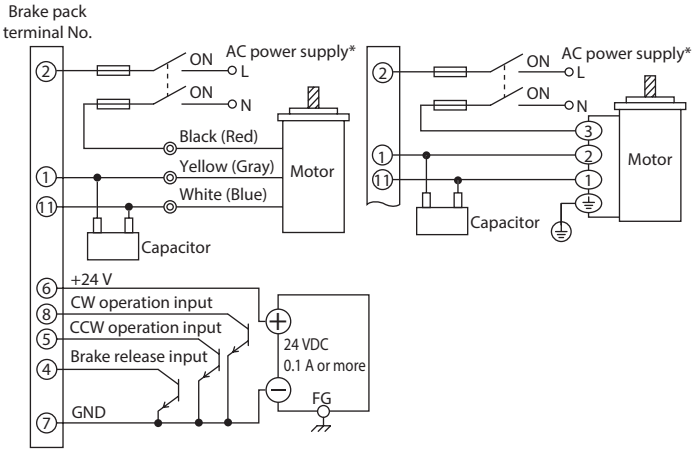
*Single-phase 100 VAC, Single-phase 200 VAC

Counterclockwise operation



*Single-phase 100 VAC, Single-phase 200 VAC

● K Series Reversible motor



*Single-phase 100 VAC, Single-phase 200 VAC

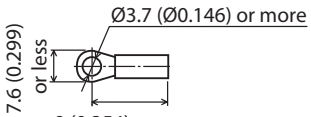
Colors in parentheses ( ) indicate those of the lead wires of the 1 W type reversible motor (single-phase 100/110/115 VAC).

Applicable crimp terminal

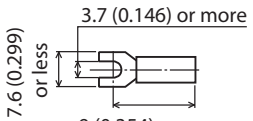
Use the crimp terminal with insulation shown in the figure for connection.

[Unit: mm (in.)]

Ring type terminal with insulation



U type terminal with insulation



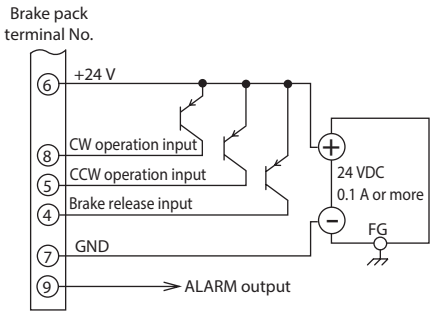
Capacity of protection devices (such as circuit protectors)

When a motor is stopped instantaneously, a large half-wave rectification current flows through the motor for 0.2 to 0.4 seconds. When connecting a protection device such as a circuit protector to the motor, refer to the table below for the braking current and select its current capacity.

Motor output power	Braking current [A] (Peak value)	
	100/110/115 VAC	200/220/230 VAC
1 W	1.0	0.3*
6 W	1.6	1.0
15 W	5.3	2.5
25 W	9.7	4.4
40 W	16	8.2
60 W	23	12
90 W	34	17

* The power supply voltage of the 1 W type is 200 VAC.

● Connection example of source logic



Connections to the AC power supply and the motor are the same as those of sink logic.

Operation

■ Induction motor, reversible motor

Start/instantaneous stop

- Turn the brake release input "OFF."
- Turning the CW operation input "ON" rotates the motor in the CW direction, while turning it "OFF" stops the motor instantaneously.
- Turning the CCW operation input "ON" rotates the motor in the CCW direction, while turning it "OFF" stops the motor instantaneously. This function is not applicable to an induction motor with four lead wires.

Start/stop

- Turn the brake release input "ON."
- Turning the CW operation input "ON" rotates the motor in the CW direction, while turning it "OFF" stops the motor.
- Turning the CCW operation input "ON" rotates the motor in the CCW direction, while turning it "OFF" stops the motor. This function is not applicable to an induction motor with four lead wires.
- The stopping time varies depending on the load inertia and friction load.

Note

- When starting/stopping (instantaneous stop) an induction motor with four lead wires in the CCW direction, change the connection of the motor lead wires.
- When switching the rotation direction of an induction motor, be sure to stop the motor before doing so.
- When the CW operation input and the CCW operation input are turned "ON" simultaneously, the CW operation input is prioritized.

■ Electromagnetic brake motor

Start/instantaneous stop, electromagnetic brake holding

- Turn the brake release input "OFF."
- Turning the CW operation input "ON" "releases" the electromagnetic brake and rotates the motor in the CW direction. Turning it "OFF" stops the motor instantaneously. When the motor stops, the electromagnetic brake simultaneously "actuates" to hold the motor shaft (load).
- Turning the CCW operation input "ON" "releases" the electromagnetic brake and rotates the motor in the CCW direction. Turning it "OFF" stops the motor instantaneously. When the motor stops, the electromagnetic brake simultaneously "actuates" to hold the motor shaft (load).

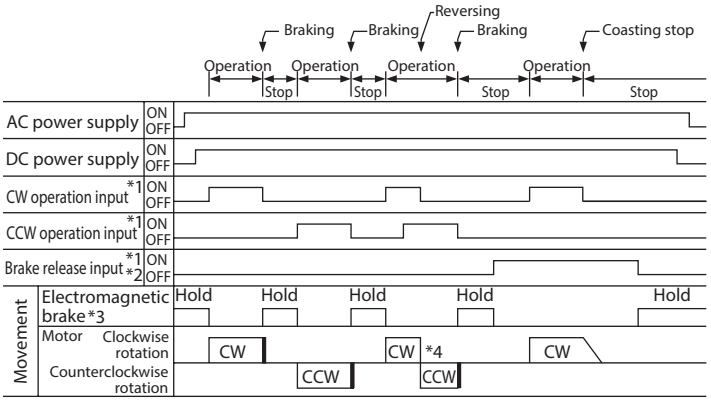
Start/stop, electromagnetic brake releasing

- Turn the brake release input "ON."
- Turning the CW operation input "ON" rotates the motor in the CW direction, while turning it "OFF" stops the motor.
- Turning the CCW operation input "ON" rotates the motor in the CCW direction, while turning it "OFF" stops the motor.
- Turning the brake release input "ON" makes the electromagnetic brake be in a state of "releasing." To move a load of the electromagnetic brake motor manually, turn the brake release input "ON."

Note

When the CW operation input and the CCW operation input are turned "ON" simultaneously, the CW operation input is prioritized.

■ Timing chart



*1 Do not turn the CW operation input, the CCW operation input, or the brake release input ON before turning on the AC power supply. The motor cannot be operated if any of the input signals is turned ON before the AC power supply is turned on. The ALARM indicator is lit and the ALARM output is turned "OFF."

*2 The brake release input functions as the ALARM-RESET input when the ALARM output is in an "OFF" state.

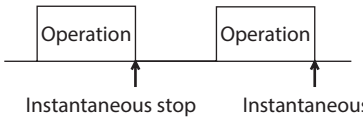
*3 Electromagnetic brake motor only

*4 Operation of instantaneous switching the rotation direction cannot be performed with induction motors.

■ Operating cycle

If operation and instantaneous stop are repeatedly performed in a short cycle time, the motor temperature rise will be large and the operating time is limited. Observe the operating cycle given in the table below for operation.

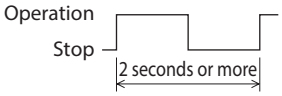
Motor operation



Conditions of use

[1 W to 25 W motors]

- Operating cycle: 2 seconds or more
- Operating duty: 50% or less

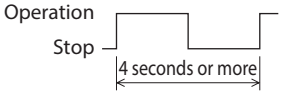


Example

Use	Operation/Stop	Operating duty
Possible	1 second / 1 second	50 %
Possible	0.5 seconds / 1.5 second	25 %
Not possible	1.2 seconds / 0.8 seconds	60 %

[40 W to 90 W motors]

- Operating cycle: 4 seconds or more
- Operating duty: 50% or less



Example

Use	Operation/Stop	Operating duty
Possible	2 seconds / 2 seconds	50 %
Possible	1.2 seconds / 2.8 seconds	30 %
Not possible	3 seconds / 1 second	75 %

$$\text{Operating duty} = \frac{\text{Operating time}}{\text{Operating time + Stop time}} \times 100\ [\%]$$

Note

Make sure that the motor case temperature does not exceed 90 °C (194 °F) during operation of the motor. Operating in a state where the case temperature exceeds 90 °C (194 °F) may significantly deteriorate the windings and ball bearings of the motor and shorten the motor's life span.

Alarm

The **SB50W** brake pack is equipped with the function for detecting an open state of the thermal protector, and it generates an alarm when the motor is abnormally heated.
If an alarm is generated, the ALARM output will be in an "OFF" state and the ALARM indicator will be lit (red). At the same time, the power supplying to the motor will be stopped. When an electromagnetic brake motor is used, the electromagnetic brake actuates to hold the motor shaft (load).
When the DC power supply is turned on, the ALARM indicator is lit momentarily but it is not abnormal.

■ Cause of alarm

If an alarm is generated, check the following and take an appropriate remedial action.

Cause	Remedial action
The motor is abnormally heated and the thermal protector built in the motor is actuated. (Except for 6 W motors)	Reduce a load. Or reconsider the operating cycle and the operating ambient temperature. Check that the motor case temperature is 90 °C (194 °F) or lower before resetting the alarm.
Connection error or disconnection of cable (power supply cable, motor cable)	Check the connection.

If the causes of the alarm above are not applied, check the following.
The **SB50W** brake pack monitors the current flowing through the motor in order to detect the operation of the thermal protector.
Accordingly, an alarm will also be generated in the following cases.

Cause	Remedial action
Before turning on the AC power supply, the DC power supply was turned on to turn the operation input (CW operation input, CCW operation input, brake release input) "ON."	Turn on the AC power supply before turning the operation input "ON."
Only the AC power supply was turned off after the operation input (CW operation input, CCW operation input, brake release input) were turned "ON" even once.	Turn off the DC power supply before turning off the AC power supply.

■ Alarm reset

When resetting an alarm, turn the operation input (CW operation input, CCW operation input, brake release input) "OFF" and check that the motor is stopped.
Before resetting an alarm by one of the following methods, be sure to remove the cause of the alarm.

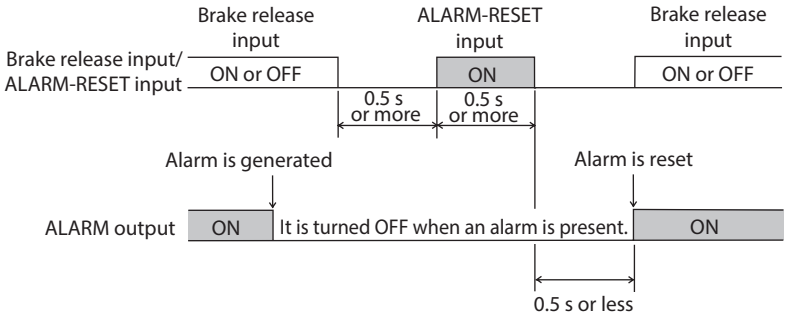
- Turn the ALARM-RESET input "ON."
- Turn on the AC and DC power supplies again.

Note

Before resetting an alarm, be sure to turn the operation input (CW operation input, CCW operation input, brake release input) "OFF."
An alarm cannot be reset if the ALARM-RESET input is turned "ON" while the operation input is "ON."
Also, if the DC power supply is turned on while the operation input is "ON," the motor may start suddenly, causing injury or damage to equipment.

● Reset using the ALARM-RESET input

When the ALARM output is in an "OFF" state, the brake release input functions as the ALARM-RESET input.
Check that all input signals are in an "OFF" state and the AC power supply is "ON," and then turn the ALARM-RESET input "ON" for at least 0.5 seconds.
To restart the operation, turn the ALARM-RESET input "OFF" and wait for at least 0.5 seconds.



Troubleshooting and remedial actions

In motor operation, the motor or the brake pack may not operate properly due to an error in the signal input method or connection.
When the motor operation cannot be performed properly, refer to the contents provided in this section and take an appropriate remedial action. If the problem persists, contact your nearest Oriental Motor sales office.

The motor does not rotate. The motor rotation speed is too low.

- **The ALARM indicator is lit.**

Refer to "Alarm" on Page 7.

- **The ALARM indicator is not lit.**

Cause	Remedial action
Connecting the capacitor is wrong.	Connect the capacitor properly.
The CW operation input or the CCW operation input is not turned "ON."	Check the signal input status of the CW and CCW operation inputs or the connection.
Connection error or disconnection of cable (power supply cable, motor cable)	Check the connection.
The connection of the electromagnetic brake is wrong. (When an electromagnetic brake motor is used)	Connect the electromagnetic brake properly.
The sink/source selector switch is not set properly.	Set the sink/source selector switch properly according to the external control device used. (p.3)

The motor rotates in the opposite direction to the specified one.

Cause	Remedial action
The CW operation input or the CCW operation input is wrongly input or a connection error is occurred.	Check the signal input status of the CW and CCW operation inputs or the connection. The motor rotates in the CW direction when the CW operation input is turned "ON." It rotates in the CCW direction when the CCW operation input is turned "ON."
The output shaft of the gearhead rotates in the direction opposite to that of the motor depending on the gear ratio of the gearhead.	With a gearhead having a gear ratio to rotate the output shaft in the opposite direction to the motor, reverse the operation for the CW and CCW operation inputs.

The motor doesn't stop instantaneously. The electromagnetic brake does not hold.

Cause	Remedial action
The brake release input is being "ON."	Turn the brake release input "OFF."

An alarm is not reset even if the AC power supply is turned off.

Cause	Remedial action
The DC power is not turned off and/or all input signals are not turned OFF.	To reset an alarm, turn off the AC and DC power supplies and turn all input signals "OFF" before turning on the power supplies again.

Inspection and maintenance

■ Inspection

It is recommended that periodic inspections would be conducted for the items listed below after each operation of the motor. When an abnormality is generated, discontinue any use and contact your nearest Oriental Motor sales office.

Note The brake pack uses semiconductor components. Handle it with care. Static electricity may damage the brake pack.

● Inspection item

- Check if a damage or stress is applied on the cable.
- Check if the openings in the brake pack are clogged.
- Check if a mounting screw of the brake pack is loose.

■ Warranty

Check on the Oriental Motor Website for the product warranty.

■ Disposal

Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

Regulations and standards

■ UL Standards, CSA Standards

This product is recognized by UL under the UL and CSA Standards.

■ CE Marking

This product is affixed with the mark under the following directive.

● Low Voltage Directive

Installation conditions

Protection class	N/A, built-in appliance
Overvoltage category	Ⅱ
Pollution degree	2
Degree of protection	IP10 (after connecting to the plug socket)

- This product cannot be used in IT power distribution systems.

Since the brake pack is not equipped with a ground fault protection circuit, consider the following.

- Earth leakage breaker: Conforming to EN or IEC Standards
  Conditional short-circuit current rating Icc: 5 kA
  Rated sensitivity current: 30 mA or less

● EMC Directive

Refer to "Conformity to the EMC" for details about conformity.

Note This product does not conform to safety standards when used in combination with **K** Series motors.

■ RoHS Directive

This product does not contain the substances exceeding the restriction values.

■ Conformity to the EMC

Effective measures must be taken against EMI that the motor and brake pack may give to adjacent control-system equipment, as well as EMS of the motor and brake pack themselves, in order to prevent a serious functional impediment in the machinery. The use of the following installation and wiring methods will enable the motor and brake pack to be compliant with EMC. Oriental Motor conducts EMC testing on its motors and brake pack in accordance with "Example of installation and wiring of motor and brake pack." The user is responsible for ensuring the machine's compliance with EMC, based on the installation and wiring explained below.

⚠CAUTION This equipment is not intended for use in residential environments nor for use on a low-voltage public network supplied in residential premises, and it may not provide adequate protection to radio reception interference in such environments.

● Connecting a mains filter

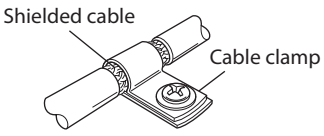
- Install a mains filter in the power source line in order to prevent the noise generated in the brake pack from propagating outside via the AC input line. For a mains filter, use the products as shown in the table below, or an equivalent.

Soshin Electric Co., Ltd.	HF2010A-UPF, NF2010A-UP
Schaffner EMC	FN2070-10-06

- Install the mains filter as close to the brake pack as possible, and use cable clamps and others to secure the input and output cables firmly to the surface of the enclosure.
- Connect the ground terminal of the mains filter to the grounding point, using as thick and short a wire as possible.
- Do not place the AC input cable (AWG18: 0.75 mm^2 or more) parallel with the mains-filter output cable (AWG18: 0.75 mm^2or more). Parallel placement will reduce mains-filter effectiveness if the enclosure's internal noise is directly coupled to the power supply cable by means of stray capacitance.

● Wiring the signal cable

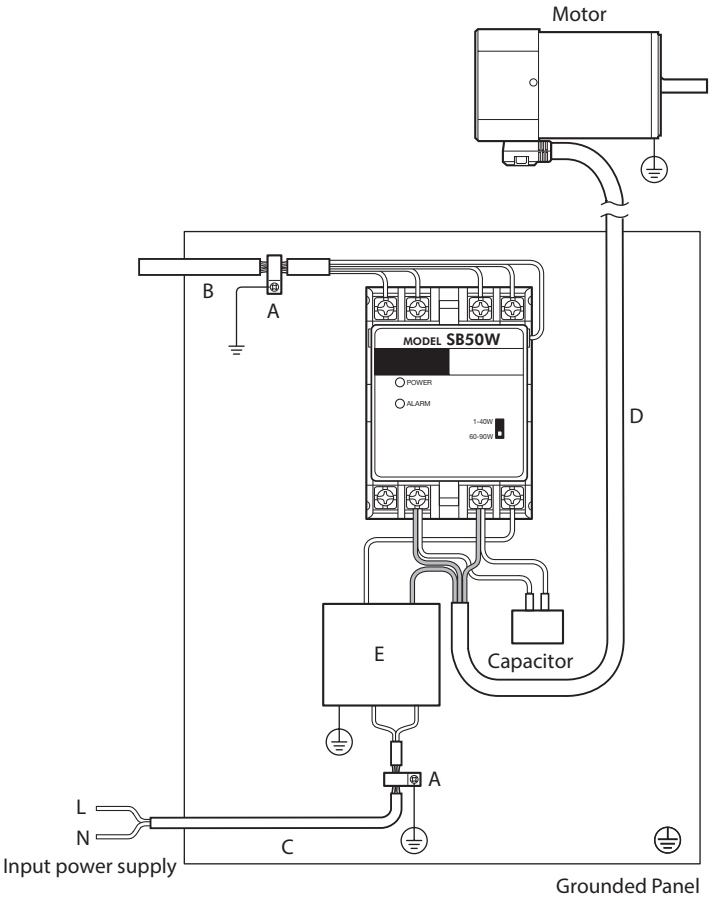
- For the signal cable of the brake pack, use a shielded cable of AWG28 (0.08 mm^2) or more in diameter, and keep it as short as possible.
- To ground a shielded cable, use a metal cable clamp or similar device that will maintain contact with the entire circumference of the shielded cable.
- Attach a cable clamp as close to the end of the cable as possible, and connect it to an appropriate grounding point as shown in the figure.



● Notes about installation and wiring

- Connect the motor/brake pack and other peripheral control device directly to the grounding point so that a potential difference does not occur between grounds.
- When relays or electromagnetic switches are used together with the product, use mains filters or CR circuits to suppress surges generated by them.
- Keep cables as short as possible without coiling and bundling extra lengths.
- Separate the power source cables such as the motor cable and the power supply cable from the signal cables, and wire them as far apart as possible [example: 100 to 200 mm (3.94 to 7.87 in.)]. If a power source cable must cross over a signal cable, wire them at right angles. Keep an appropriate distance between the AC input cable and output cable of the mains filter.

● Example of installation and wiring of motor and brake pack



A: Cable clamp
B: Signal cable [2 m (6.6 ft.)]
C: Power supply cable
D: Motor cable [10 m (32.8 ft.)]
E: Mains filter

■ Precautions about static electricity

Static electricity may cause the brake pack to malfunction or suffer damage. Be careful of handling the brake pack while the power is supplied.

Note Do not approach or touch the brake pack while the power is supplied.

Specifications

■ Specifications

Check on the Oriental Motor Website for the product specifications.

■ General specifications

Operating environment	Ambient temperature	0 to +40 °C [+32 to +104 °F] (non-freezing)
	Ambient humidity	85% or less (non-condensing)
	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environments.
	Vibration	Not subject to continuous vibrations or excessive impact. In conformance with JIS C 60068-2-6 "Sine-wave vibration test method" Frequency range: 10 to 55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times
Storage environment Shipping environment	Ambient temperature	−25 to +70 °C [−13 to +158 °F] (non-freezing)
	Ambient humidity	85% or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment.
Degree of protection		IP10 (after connecting to the plug socket)

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• Please contact your nearest Oriental Motor office for further information.

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