

## Connection and Operation

### Names and Functions of Driver Parts

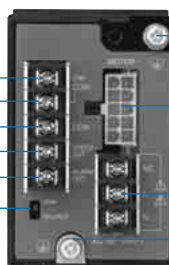
**Speed Potentiometer**  
Turning the potentiometer clockwise causes the speed to increase. Speed setting range is 100~2000 r/min. The factory setting is 0 r/min.

**RUN/STAND-BY Switch**



Front of Driver

**Input/Output Signal Connection Terminals**



Back of Driver

**Sink/Source-Input Select Switch**

	<b>SINK</b>	Set to the SINK side when the sink logic is to be used.
	<b>SOURCE</b>	Set to the SOURCE side when the source logic is to be used.

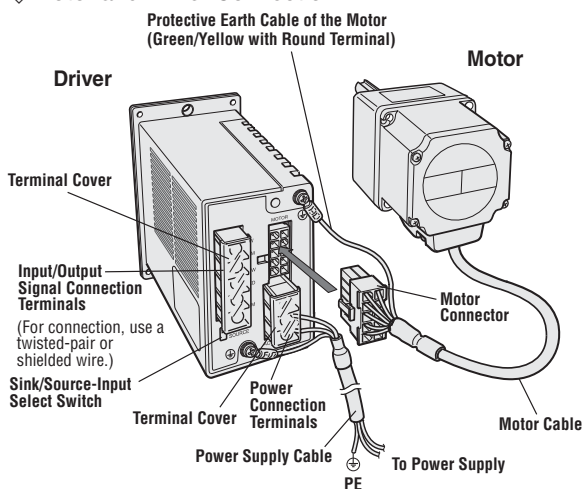
\*The factory setting is SINK side.

#### Notes:

- The RUN/STAND-BY switch is not a power ON/OFF switch.
- When you want to stop the motor for an extended period, turn off the driver power.

### Connection Diagrams

#### Motor and Driver Connection



#### Motor Connection

Insert the motor cable connector into the motor connector (MOTOR) on the driver. To extend the distance between the motor and driver, use an accessory extension cable. The connection can be extended to a maximum of 10.5 m (34.4 ft.).

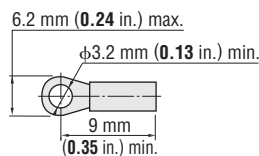
Connect the motor's protective earth cable (green/yellow) to the driver, as shown in the figure. If you are using an extension cable or the motor can be accessed directly by hands, connect the protective earth cable from the motor directly to ground. If the protective earth cable is not long enough, connect a lead wire of AWG18 (0.75 mm<sup>2</sup>) or thicker to the protective earth cable of the motor cable and connect it to ground over the shortest distance. The lead wire must be provided by the user. The accessory dedicated extension cable does not come with a protective earth cable. If you are using the accessory dedicated extension cable, provide grounding at a relay point or extend the cable to an appropriate grounding point.

#### Power Connection

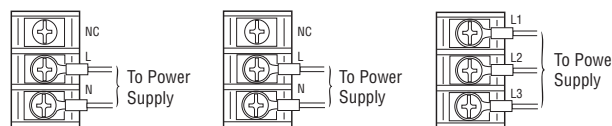
Connect the included power supply cable to the power connection terminals of the driver. Connect the red and black lead wires to the power connection terminals, and green/yellow lead wire to the protective earth terminal. When the included power supply cable is not used, use a cable of AWG22 (0.3 mm<sup>2</sup>) or thicker. For the protective earth cable, use a cable of AWG18 (0.75 mm<sup>2</sup>) or thicker.

#### Applicable Crimp Terminals

Round Terminal with Insulation (M3)



- Single-Phase 100~115 VAC
- Single-Phase 200~230 VAC
- Three-Phase 200~230 VAC



#### Operation

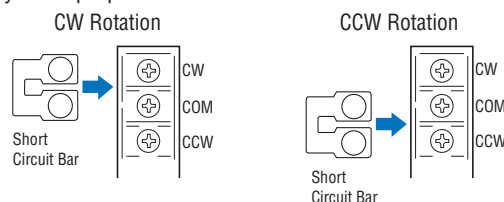
The direction of motor rotation is as viewed from the output shaft end of the motor. "CW" indicates clockwise direction, while "CCW" indicates counterclockwise direction.

#### Stand Alone Operation

When the RUN/STAND-BY switch is set to the "RUN" position, the motor will run. When it is set to the "STAND-BY" position, the motor will stop.



The direction of rotation depends on how the short circuit bar at the back of driver is connected. Connect the short circuit bar between the CW and COM or CCW and COM. Do not use the short circuit bar for any other purpose.



#### Operation Using External Signals

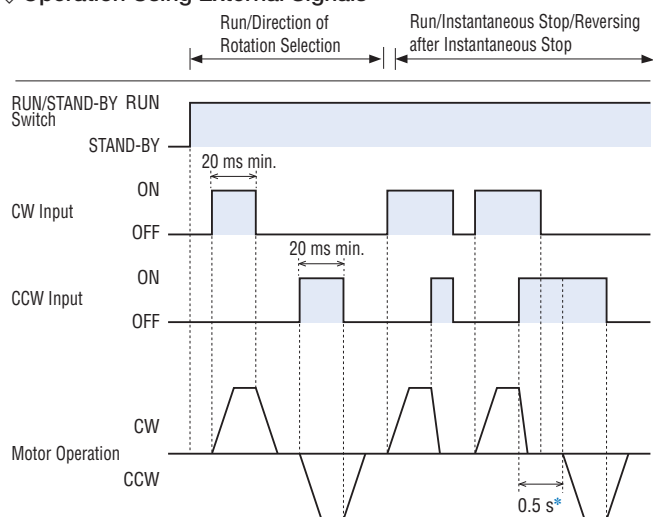
Set the RUN/STAND-BY switch to the "RUN" position.



- Refer to "Input circuit connection example" shown on the page B-101 for connection.

## ● Timing Chart

### ◇ Operation Using External Signals



\* Motor does not run for 0.5 sec after instantaneous stop, if a reversing run signal is input.

#### Note:

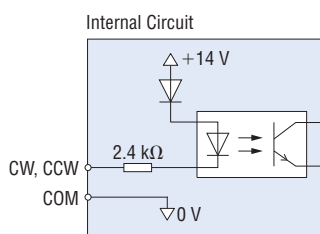
- The CW and CCW input signals must be ON for at least 20 msec.
- When both the CW and CCW inputs are turned on, the motor stops instantaneously.

## ● Input/Output Signal Circuits

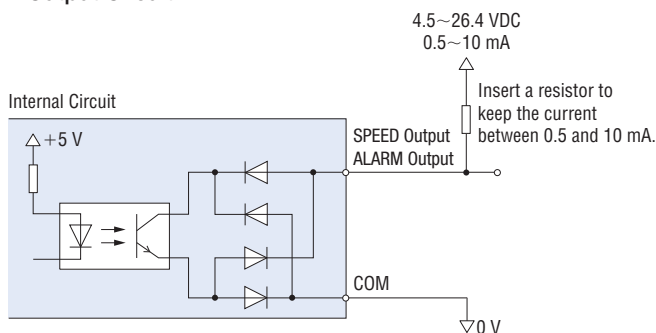
The factory setting is the sink logic. Select the sink logic or source logic according to the external control device you will be using.

### ◇ Sink Logic

#### ● Input Circuit

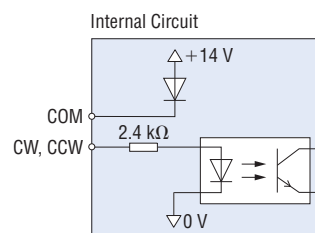


#### ● Output Circuit

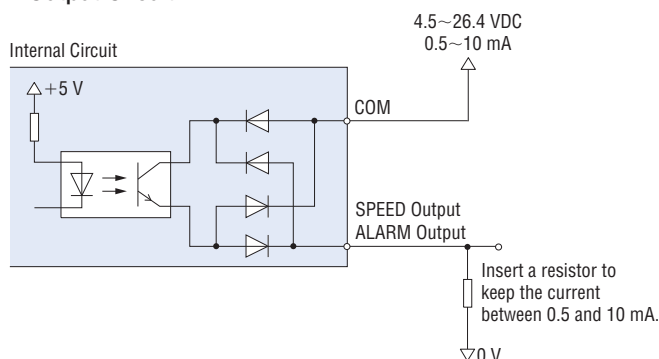


### ◇ Source Logic

#### ● Input Circuit

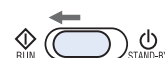


#### ● Output Circuit

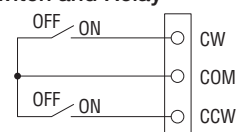


### ◇ Input Circuit Connection Example

Set the RUN/STAND-BY switch to the "RUN" position.

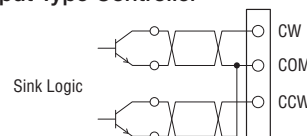


#### ● Small-Capacity Switch and Relay



- Use a small-capacity contact type relay capable of opening and closing 14 VDC, 10 mA.

#### ● Transistor Output Type Controller



### Rotation Direction of Motor

- CW (clockwise) directional operation  
When CW input is turned on, the motor runs in a clockwise direction. When CW input is turned off, the motor stops.
  - CCW (counterclockwise) directional operation  
When CCW input is turned on, the motor runs in a counterclockwise direction. When CCW input is turned off, the motor stops.
- When both the CW and CCW inputs are turned on simultaneously, the motor stops instantly. Instantaneous reversing operation is not possible.

#### Note:

- When in the source logic, do not connect the CW input and CCW input to transistor output type controller.

### ◇ When an External Control Device with a Built-In Clamp Diode is Used

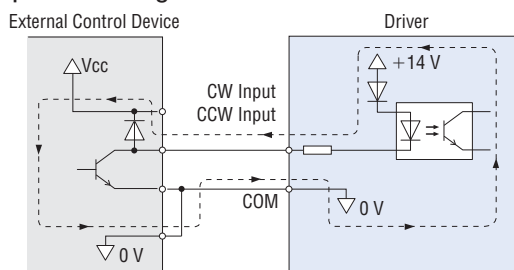
When you want to use an external control device with a built-in clamp diode, pay attention to the sequence of turning on or off the power.

Power ON: External control device ON → Driver ON

Power OFF: Driver OFF → External control device OFF

If the driver power is turned on first when connected as shown below, or the external control device power is turned off with the driver power turned on, current will be applied, as indicated by the arrows in the diagram. This may cause the motor to run. When the power is turned on or off simultaneously, the motor may run temporarily due to differences in power capacity. The external control device power must be turned on first, and driver power must be turned off first.

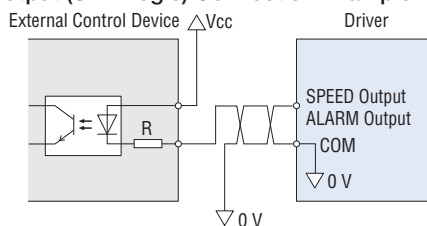
#### ● Example of Sink Logic



### ◇ Output Circuit Connection Example

The signal output is open-collector output. Use the power supply of 4.5 to 26.4 VDC to connect the limit resistor (R) to keep output current between 0.5 mA and 10 mA.

#### ● Signal Output (Sink Logic) Connection Example



#### Note:

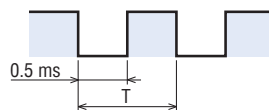
- The ON voltage of the output circuit is approximately 1.5 VDC. Remember this specification when driving other element using the output circuit.

### ◇ SPEED Output

The speed output signal is synchronized with the motor speed. The system outputs pulses (with a width of approximately 0.5 ms) at a rate of 30 pulses per rotation of the motor output shaft. You can measure the speed output frequency and calculate motor speed.

$$\text{Motor speed (r/min)} = \frac{\text{SPEED output frequency [Hz]}}{30} \times 60$$

$$\text{SPEED output frequency (Hz)} = \frac{1}{T}$$



- To display or monitor the speed of the motor output shaft or the reduced speed of the gearhead output shaft, use an accessory **SDM496** motor speed indicator (the **SDM496** can be used only when the sink logic is selected).  
Motor speed indicator → Page A-298

#### Notes:

- When you want to extend the input/output signal cable, the length must not exceed 2 m (6.6 ft.). The cable should be as short as possible in order to minimize noise.
- The input/output signal cable should be kept away from power supply cables or motor cables.

### ◇ ALARM Output

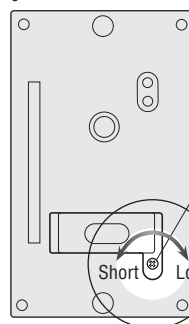
In the following conditions, the driver's protective function will actuate. The ALARM output will turn OFF and the motor will stop. In this case, the protective function that actuated can be checked based on whether the LED is blinking or illuminating steadily.

- The LED will blink upon actuation of the following protective function:  
Overload protective function
- The LED will illuminate steadily upon actuation of the following protective functions:  
Overvoltage protective function, motor sensor error, undervoltage protective function, overspeed protective function

### ● Setting the Acceleration/Deceleration Time

The motor starts over the specified acceleration time and stops over the specified deceleration time. This acceleration/deceleration time can be set within the range from 0.5 to 10 sec (2000 r/min without load). The time can be set using the acceleration/deceleration potentiometer. Remove the front panel of the driver to access the potentiometer.

- The figure shows the driver with the front panel removed.



#### Acceleration/Deceleration Time Potentiometer

Time is increased by turning the switch clockwise. Use an insulated Phillips Screwdriver for this operation. The shortest time is selected at the time of shipment.