Connection and Operation [30 W (1/25 HP), 60 W (1/12 HP), 120 W (1/6 HP)]

**Names and Functions of Driver Parts**

- **Display**
  
  Displays the monitor contents, alarm, etc.

- **Dial**
  
  Changes the speed and parameters. The value is set when the dial is pressed after changes are made.

- **Operating Switch**
  
  The motor is started by setting it to the "RUN" position. Setting it to the "STAND-BY" position stops the motor.

- **Rotation Direction Switch**
  
  Changes the rotation direction of the motor.

- **Sensor Connector (CN3)**
  
  Connects to the motor sensor connector (black).

- **I/O Signal Connector (CN4)**
  
  Connects with the I/O signals.

- **Motor Connector (CN2)**
  
  Connects to the motor’s motor connector (white).

- **Main Power Connector (CN1)**
  
  Connects to the main power supply.

- **Protective Earth Terminals (2 locations)**
  
  Ground either one of the protective earth terminals.

**When Front Panel is Removed**

- **MODE Key**
  
  Changes the operation mode.

- **FUNCTION Key**
  
  Changes the indication and functions for the operating mode.

- **Acceleration/Deceleration Time Potentiometer**
  
  Sets the acceleration time for starting the motor and deceleration time for motor standstill. Setting Range: 0.1 s—15.0 s

- **Mounting Holes (2 locations)**

**Main Power Connector (CN1)**

Connects to the main power supply. Please connect to the power supply according to the power supply voltage being used.

- **Single-Phase 100-120 VAC**

- **Single-Phase 200-240 VAC**

- **Three-Phase 200-240 VAC**

- **Applicable Lead Wire Size**
  
  AWG18—14 (0.75—2.0 mm²)

**Operation with the Driver Only**

- **Run/Stop**
  
  When the operating switch is set to the "RUN" position, the motor will start. When it is returned to the "STAND-BY" position, the motor decelerates to a stop.

- **Speed Setting Method**
  
  Set the motor speed by using the dial. Speed Setting Range: 50—4000 r/min

  Turning the dial slowly to the right increases the speed by 1 r/min increments, while turning it to the left reduces the speed by 1 r/min increments. Turning the dial quickly increases the speed variation. Pressing the dial sets the speed.

**Extended Functions**

These settings can be made with key operations after removing the front panel.

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring</td>
<td>4 data points, speed, acceleration time, deceleration time, reset</td>
</tr>
<tr>
<td>Parameters</td>
<td>Gear ratio, speed increasing ratio, initial panel display, initial operation prohibition alarm, initial operation prohibition alarm cancellation method selection, analog acceleration/deceleration, speed upper limit/lower limit setting function, simple holding selection, external operating signal input, input function selection, output function selection, overload alarm detection time except when shaft is locked, overload warning label, speed attainment band, parameter mode reset</td>
</tr>
</tbody>
</table>

**Applicable Lead Wire Size**

- AWG18—14 (0.75—2.0 mm²)
Operation by External Signals

- **Operating Method**
  - Using the built-in power supply in the driver, the motor is operated through signals from external sources (switches, relays, etc.). Connect Pins No. 5~8 of the I/O signal connector (CN4) as shown in the figure to the right.
  - When operating using external signals, change the parameter setting in the "External Operating Signal Input." Refer to the operating manual for details.
  - Multistep speed-change operation up to 4 steps can be performed.

- **I/O Signal Connector (CN4)**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Terminal Name</th>
<th>Function*</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>C0</td>
<td>IN-COM0</td>
<td>Input Signal Common (External power supply)</td>
</tr>
<tr>
<td>8</td>
<td>X0</td>
<td>[FWD]</td>
<td>The motor rotates in the forward direction when &quot;ON.&quot;</td>
</tr>
<tr>
<td>7</td>
<td>X1</td>
<td>[REV]</td>
<td>The motor rotates in the reverse direction when &quot;ON.&quot;</td>
</tr>
<tr>
<td>6</td>
<td>X2</td>
<td>[M0]</td>
<td>Selects the operating data.</td>
</tr>
<tr>
<td>5</td>
<td>C1</td>
<td>IN-COM1</td>
<td>Input Signal Common (Internal power supply: 0 V)</td>
</tr>
<tr>
<td>4</td>
<td>Y0+</td>
<td>[SPEED-OUT]</td>
<td>30 pulses are output when the motor output shaft makes one rotation.</td>
</tr>
<tr>
<td>3</td>
<td>Y0−</td>
<td>[ALARM-OUT1]</td>
<td>Turns OFF when an alarm is activated. (Normally closed)</td>
</tr>
<tr>
<td>2</td>
<td>Y1+</td>
<td>[ALARM-OUT1]</td>
<td>Turns OFF when an alarm is activated. (Normally closed)</td>
</tr>
<tr>
<td>1</td>
<td>Y1−</td>
<td>[ALARM-OUT1]</td>
<td>Turns OFF when an alarm is activated. (Normally closed)</td>
</tr>
</tbody>
</table>

*The text inside the [ ] represents the factory default function assignment.

The following signals can be assigned as necessary to 3 input signal terminals (X0 ~ X2) and 2 output signal terminals (Y0, Y1).

- 3 of the 7 input signals (FWD, REV, M0, M1, ALARM-RESET, EXT-ERROR, H-FREE)
- 2 of the 6 output signals (ALARM-OUT1, SPEED-OUT, ALARM-OUT2, MOVE, VA, WNG)

- **Applicable Lead Wire Size**
  AWG 26 ~ 20 (0.14 ~ 0.5 mm²)

Connection Example Using Switches and Relays

- The figure shows a connection example when operating a motor with a contact alarm switch such as switches and relays. (Single-phase 100-120 VAC)

Timing Chart

- This is when the "External Operating Signal Input" parameter setting is "ON" and the rotation direction switch is set to "FWD."
- Switching the FWD input to ON will cause the motor to turn clockwise as viewed from the motor shaft side, while switching the REV input to ON will cause the motor to turn counterclockwise. Turning it OFF decelerates the motor to a stop.
- If the FWD input and REV input are turned ON simultaneously, the motor will stop instantaneously.
- With the combination type, the rotation direction varies according to the gear ratio of the gearhead.

Features X-XX / System Configuration X-XX / Product Line X-XX / Specifications X-XX / Characteristics X-XX
Dimensions X-XX / Connection and Operation X-XX / Motor and Driver Combinations X-XX
I/O Signal and Programmable Controller Connection Examples

This is a connection example for operating a motor using a transistor output type programmable controller.

**Sink Logic**
*Programmable Controller*

\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]

\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]

**Source Logic**
*Programmable Controller*

\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]
\[\text{CN4} \]

#Recommended Resistance Value
- 24 VDC: 680 Ω ~ 2.7 kΩ (2 W)
- 5 VDC: 150 Ω ~ 560 Ω (0.5 W)

**Note**
Maintain the current value of Y0 and Y1 at 100 mA or less. If this current value is exceeded, connect the limiting resistor R.

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

If an external control device with a built-in clamp diode is connected and the external control device is turned off when the driver power is on, current may flow in and rotate the motor. Because the current capacity of the driver and external control device is different, the motor may also run when their power supplies are turned ON or OFF simultaneously. To turn the power off, turn off the driver and then the external control device. To turn the power on, turn on the external control device and then the driver.

**When Multistep Speed-Change Operation is Used**
Multistep speed-change operation is possible by switching the M0 and M1 inputs ON / OFF.

**Operating Condition Example**

<table>
<thead>
<tr>
<th>Operating Data No.</th>
<th>M0</th>
<th>M1</th>
<th>Speed [r/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>OFF</td>
<td>OFF</td>
<td>3000</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
<td>OFF</td>
<td>1000</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
<td>ON</td>
<td>2000</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
<td>ON</td>
<td>500</td>
</tr>
</tbody>
</table>