Brushless DC Motor Systems

AXH Series

The AXH Series combines a compact, brushless DC speed control motor and 24 VDC board-level driver. These systems provide space savings and high power output, and are easy to use.

Combination Type (Pre-assembled Gearmotors)
The combination type (pre-assembled gearmotors) come with the motor and its dedicated gearhead already assembled. This simplifies installation in equipment. Motors and gearheads are also available separately so they can be on hand to make changes or repairs. *Except for 15W type

Features

- Compact Board-Level Driver
  The size of the AXH driver has been reduced by approximately 60% when compared to conventional DC brushless drivers. (Driver for 15W-50W)

- Compact, High Power Motors
  The size of the AXH Motor has been reduced by approximately 55% when compared to conventional AC speed control motors [3.15 in. (80mm) size]. The motor has extremely high output power for its small size.

- Superior Speed Stability
  The fluctuation is only ±1% for load, voltage and temperature. These motors provide superior speed stability with minimal speed fluctuation.

- Constant Torque over a Wide Speed Range
  The speed can be set within the wide range of 100 r/min to 3000 r/min (30:1). The AXH Series maintains a constant torque from low speed to high speed.

- Gearheads Provide High Torque
  AXH geared type motors come pre-assembled with a gearhead. These gearheads provide torque up to 17.7 lb-in (2N·m) for the 15 W motors and up to 141 lb-in (16N·m) with the 50 W motors.

- Protective Functions
  The AXH Series is equipped with protective functions to handle overload, overvoltage, undervoltage, overspeed and out-of-phase power. When one of these protective functions detects an abnormality, a LED blinks and motor comes to a stop.

Safety Standards and CE Marking

<table>
<thead>
<tr>
<th>Standards</th>
<th>Certification Body</th>
<th>Standards File No.</th>
<th>CE Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>AXH015 type</td>
<td>UL1950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXH230 type</td>
<td>CSA C22.2 No.950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXH450 type</td>
<td>UL60950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXH5100 type</td>
<td>CSA C22.2 No.60950</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- When the system is approved under various safety standards, the model names on the motor and driver nameplates are the approved model names.
- List of Motor and Driver Combinations ➜ Page B-68
- Details of Safety Standards ➜ Page G-2
- The EMC value changes according to the wiring and layout. Therefore, the final EMC level must be checked with the motor/driver incorporated in the equipment.
The system configuration shown is an example. Other configurations are available.

**Product Number Code**

**AXH 4 50 K C -**

- **Series**
  - **AXH**: AXH Series

- **Output Power**
  - 15: 15W (1/50 HP)
  - 30: 30W (1/25 HP)
  - 50: 50W (1/15 HP)
  - 100: 100W (1/8 HP)

- **Gear Ratio or Shaft Type**
  - **Number**: Gear Ratio
  - **A**: Round Shaft Type

- **Power Supply Voltage**
  - **K**: 24 VDC

- **C**: Cable Type
  - **None**: Lead Wire Type

- **Motor Frame Size**
  - **0**: 1.65 in. sq (42 mm sq.)
  - **2**: 2.36 in. sq (60 mm sq.)
  - **4**: 3.15 in. sq (80 mm sq.)
  - **5**: 3.54 in. sq (90 mm sq.)

**Product Line**

- **Geared Type/Combination Type**

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Model</th>
<th>Gear Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/50 15W</td>
<td>AXH015K</td>
<td>5, 10, 15, 20, 30, 50, 100</td>
</tr>
<tr>
<td>1/25 30W</td>
<td>AXH230KC</td>
<td>5, 10, 15, 20, 30, 50, 100, 200</td>
</tr>
<tr>
<td>1/15 50W</td>
<td>AXH450KC</td>
<td>5, 10, 15, 20, 30, 50, 100, 200</td>
</tr>
<tr>
<td>1/8 100W</td>
<td>AXH5100KC</td>
<td>5, 10, 15, 20, 30, 50, 100, 200</td>
</tr>
</tbody>
</table>

- **AXH015K** are Geared Type and the others are combination type.
- Enter the gear ratio in the box (□) within the model name.

- **Round Shaft Type**

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/50 15W</td>
<td>AXH015K-A</td>
</tr>
<tr>
<td>1/25 30W</td>
<td>AXH230KC-A</td>
</tr>
<tr>
<td>1/15 50W</td>
<td>AXH450KC-A</td>
</tr>
<tr>
<td>1/8 100W</td>
<td>AXH5100KC-A</td>
</tr>
</tbody>
</table>
## Specifications

### General Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Motor</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation Resistance</td>
<td>100 MΩ or more when 500 VDC megger is applied between the windings and the frame after continuous operation under normal ambient temperature and humidity.</td>
<td>100 MΩ or more when 500 VDC megger is applied between the power supply input and the frame after continuous operation under normal ambient temperature and humidity.</td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>Sufficient to withstand 0.5 kVAC at 50 Hz applied between the windings and the frame for 1 minute after continuous operation under normal ambient temperature and humidity.</td>
<td>Sufficient to withstand 0.5 kVAC at 50 Hz applied between the power supply input and the frame for 1 minute after continuous operation under normal ambient temperature and humidity.</td>
</tr>
<tr>
<td>Temperature Rise</td>
<td>90°F (50°C) or less measured by the thermocouple method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency under normal ambient temperature and humidity, with a connected gearhead or equivalent heat radiation plate. *</td>
<td>—</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>32°F–122°F (0°C–+50°C) (nonfreezing)</td>
<td></td>
</tr>
<tr>
<td>Ambient Humidity</td>
<td>85% maximum (noncondensing)</td>
<td></td>
</tr>
<tr>
<td>Atmosphere</td>
<td>No corrosive gases or dust</td>
<td></td>
</tr>
<tr>
<td>Degree of Protection</td>
<td>15W Type: IP 40 30W–100W Type: IP 65 (except for the mounting surface)</td>
<td>IP 00</td>
</tr>
</tbody>
</table>

* Size of heat radiation plate (Material: Aluminum)
  - AXH230KC-A: 4.53 in. × 4.53 in. (115 mm × 115 mm), 0.20 in. (5 mm) thick
  - AXH450KC-A: 5.31 in. × 5.31 in. (135 mm × 135 mm), 0.20 in. (5 mm) thick
  - AXH5100KC-A: 7.87 in. × 7.87 in. (200 mm × 200 mm), 0.20 in. (5 mm) thick

### Common Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Control Method</td>
<td>Any one of the following methods.</td>
</tr>
<tr>
<td></td>
<td>1. By built-in potentiometer</td>
</tr>
<tr>
<td></td>
<td>2. By external potentiometer</td>
</tr>
<tr>
<td></td>
<td>3. By DC voltage (0–5 VDC)</td>
</tr>
<tr>
<td>Input Signals</td>
<td>C-MOS negative logic</td>
</tr>
<tr>
<td></td>
<td>START/STOP input</td>
</tr>
<tr>
<td></td>
<td>Brake input</td>
</tr>
<tr>
<td></td>
<td>Direction of rotation input</td>
</tr>
<tr>
<td></td>
<td>Speed setting method</td>
</tr>
<tr>
<td></td>
<td>Alarm reset</td>
</tr>
<tr>
<td>Output Signals</td>
<td>Open collector output</td>
</tr>
<tr>
<td></td>
<td>External use conditions 26.4 VDC, 10 mA Max.</td>
</tr>
<tr>
<td></td>
<td>Speed Signal Output (SPEED OUT) 30 P/R, Alarm Signal Output (ALARM OUT)</td>
</tr>
<tr>
<td>Protection Functions #1</td>
<td>When the following are activated, the alarm signal will be output and the motor will come to a natural stop.</td>
</tr>
<tr>
<td></td>
<td>· Overload Protection: Activated when a load exceeding the rated torque is applied to the motor for approximately 5 seconds or more.</td>
</tr>
<tr>
<td></td>
<td>· Out-of-Phase Protection: Activated when the sensor wire inside the motor cable is disconnected.</td>
</tr>
<tr>
<td></td>
<td>· Overvoltage Protection: Activated when the voltage applied to the driver exceeds 24 VDC by approximately 15% or more.</td>
</tr>
<tr>
<td></td>
<td>· Undervoltage Protection: Activated when the voltage applied to the driver falls at least 25% below 24 VDC.</td>
</tr>
<tr>
<td></td>
<td>· Over Speed Protection: Activated when the motor rotates at an abnormal speed above 3500 r/min.</td>
</tr>
<tr>
<td>Motor Insulation Class #2</td>
<td>Class E [248°F (120°C)]</td>
</tr>
<tr>
<td>Rating</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

*1 With the AXH Series the motor speed cannot be controlled in applications where the motor shaft is turned by the load, as in lowering operations. Also, the motor will stop naturally if the load exceeds the permissible load inertia or the overvoltage protection function is activated during load lowering operations.

*2 Motor insulation is recognized as class A [221°F (105°C)] by UL and CSA standards.

## Features

- Specifications B-60
- System Configuration B-59
- Characteristics B-62
### Permissible Overhung Load and Permissible Thrust Load

#### Geared Type/Combination Type

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>Permissible Overhung Load</th>
<th>Permissible Thrust Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.39 in. (10 mm) from shaft end</td>
<td>0.79 in. (20 mm) from shaft end</td>
</tr>
<tr>
<td>AXH015K-A</td>
<td>5 — 100</td>
<td>11.2</td>
<td>50</td>
</tr>
<tr>
<td>AXH230KC-A</td>
<td>10 — 20</td>
<td>33</td>
<td>150</td>
</tr>
<tr>
<td>AXH450KC-A</td>
<td>10 — 20</td>
<td>45</td>
<td>200</td>
</tr>
<tr>
<td>AXH5100KC-A</td>
<td>10 — 20</td>
<td>112</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>30 — 200</td>
<td>112</td>
<td>500</td>
</tr>
</tbody>
</table>

- Enter the gear ratio in the box (□) within the model name.
- A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- Values inside parentheses ( ) are for the AXH015K-A model.

#### Round Shaft Type

<table>
<thead>
<tr>
<th>Model</th>
<th>Permissible Overhang Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.39 in. (10mm) from shaft end</td>
</tr>
<tr>
<td></td>
<td>lb.</td>
</tr>
<tr>
<td>AXH015K-A</td>
<td>11.2</td>
</tr>
<tr>
<td>AXH230KC-A</td>
<td>15.7</td>
</tr>
<tr>
<td>AXH450KC-A</td>
<td>27</td>
</tr>
<tr>
<td>AXH5100KC-A</td>
<td>36</td>
</tr>
</tbody>
</table>

- Permissible Thrust Load: Avoid thrust loads as much as possible. If thrust load is unavoidable, keep it to no more than half the motor weight.

### Permissible Load Inertia J for Geared Type/Combination Type

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>50</th>
<th>100</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>AXH015K-A</td>
<td>2.2</td>
<td>9.3</td>
<td>21</td>
<td>38</td>
<td>86</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>1.7</td>
<td>3.9</td>
<td>7.0</td>
<td>15.7</td>
<td>43.7</td>
<td>43.7</td>
<td>43.7</td>
<td>—</td>
</tr>
<tr>
<td>AXH230KC-A</td>
<td>8.5</td>
<td>34</td>
<td>77</td>
<td>136</td>
<td>310</td>
<td>850</td>
<td>850</td>
<td>850</td>
<td>850</td>
</tr>
<tr>
<td></td>
<td>1.55</td>
<td>6.2</td>
<td>14.0</td>
<td>24.8</td>
<td>55.8</td>
<td>155</td>
<td>155</td>
<td>155</td>
<td>155</td>
</tr>
<tr>
<td>AXH450KC-A</td>
<td>30</td>
<td>120</td>
<td>270</td>
<td>480</td>
<td>1080</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td>22</td>
<td>49.5</td>
<td>88</td>
<td>198</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
</tr>
<tr>
<td>AXH5100KC-A</td>
<td>137</td>
<td>547</td>
<td>1230</td>
<td>2188</td>
<td>4923</td>
<td>13675</td>
<td>13675</td>
<td>13675</td>
<td>13675</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>100</td>
<td>225</td>
<td>400</td>
<td>900</td>
<td>2500</td>
<td>2500</td>
<td>2500</td>
<td>2500</td>
</tr>
</tbody>
</table>

- Enter the gear ratio in the box (□) within the model name.
### Dimensions
Scale 1/4, Unit = inch (mm)
Mounting screws are included with the combination type. Dimensions for screws → Page B-133
Enter the gear ratio in the box (□) within the model name.

#### Motor/Gearhead
**AXH015K-□/AXH015K-A**
(Geared Type)
- Geared motor: AXHM015K-
- Weight: 1.1 lb. (0.5 kg)
- Connector Housing: 171822
  - 8(AMP)
  - M4 P0.7 0.31 (8) Deep
  - 0.12 (3)
  - 0.63 (16)
  - □ 1.65 (42)

#### Round Shaft Type
**AXH015K-A**
- Motor: AXHM015K-A
- Weight: 0.55 lb. (0.25 kg)
- Connector Housing: 171822 – 8(AMP)
  - 0.16 (4)
  - 1.69 (43)
  - □ 1.65 (42)

**AXH230KC-□/AXH230KC-A**
Motor/Gearhead
**AXH230KC-□/AXH230KC-A**
(Geared Type)
- Weight: 0.55 lb. (0.25 kg)
- Connector Housing: 171822
  - 8(AMP)
  - M4 P0.7 0.31 (8) Deep
  - 0.12 (3)
  - 0.63 (16)
  - □ 1.65 (42)

#### AXH450KC-□/AXH450KC-A**
**AXH450KC-□/AXH450KC-A**
(Geared Type)
- Weight: 0.96 lb. (0.44 kg)
- Connector Housing: 171822
  - 8(AMP)
  - M4 P0.7 0.31 (8) Deep
  - 0.12 (3)
  - 0.63 (16)
  - □ 1.65 (42)

#### AXH5100KC-□/AXH5100KC-A**
**AXH5100KC-□/AXH5100KC-A**
(Geared Type)
- Weight: 1.1 lb. (0.5 kg)
- Connector Housing: 171822
  - 8(AMP)
  - M4 P0.7 0.31 (8) Deep
  - 0.12 (3)
  - 0.63 (16)
  - □ 1.65 (42)
### Motor/Gearhead

**AXH230KC-□** (Combination Type)
- **Motor:** AXH230KC-GFH
- **Gearhead:** GFH2G□
- **Weight (including gearhead):** 2.2 lb. (1.0 kg)

**AXH230KC-A**
- **Motor:** AXHM230KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**AXH230KC-□**
- **Motor:** AXH230KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**AXHM230KC-A**
- **Motor:** AXHM230KC-A
- **Weight:** 1.76 lb. (0.8 kg)

### Motor/Gearhead

**AXH450KC-□** (Combination Type)
- **Motor:** AXH450KC-GFH
- **Gearhead:** GFH4G□
- **Weight (including gearhead):** 4.0 lb. (1.8 kg)

**AXH450KC-A**
- **Motor:** AXHM450KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**AXH450KC-□**
- **Motor:** AXH450KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**AXHM450KC-A**
- **Motor:** AXHM450KC-A
- **Weight:** 1.76 lb. (0.8 kg)

### Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead.)

### Lead Wire Types are also available. Contact your Oriental Motor Representative for more information.

---

**DHF230KC-B**
- **Motor:** DHF230KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHF230KC-A**
- **Motor:** DHF230KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**DHF230KC-□**
- **Motor:** DHF230KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**DHXM230KC-A**
- **Motor:** DHXM230KC-A
- **Weight:** 1.76 lb. (0.8 kg)

---

**DHF450KC-B**
- **Motor:** DHF450KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHF450KC-A**
- **Motor:** DHF450KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**DHF450KC-B**
- **Motor:** DHF450KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHXM450KC-A**
- **Motor:** DHXM450KC-A
- **Weight:** 1.76 lb. (0.8 kg)

---

**DHF500KC-B**
- **Motor:** DHF500KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHF500KC-A**
- **Motor:** DHF500KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**DHF500KC-B**
- **Motor:** DHF500KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHXM500KC-A**
- **Motor:** DHXM500KC-A
- **Weight:** 1.76 lb. (0.8 kg)

---

**DHF750KC-B**
- **Motor:** DHF750KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHF750KC-A**
- **Motor:** DHF750KC-A
- **Weight:** 1.76 lb. (0.8 kg)

**DHF750KC-B**
- **Motor:** DHF750KC-B
- **Weight:** 2.2 lb. (1.0 kg)

**DHXM750KC-A**
- **Motor:** DHXM750KC-A
- **Weight:** 1.76 lb. (0.8 kg)
Motor/Gearhead
AXH5100KC-□ (Combination Type)
Motor: AXHM5100KC-GFH
Gearhead: GFH5G
Weight (including gearhead): 6.4 lb. (2.9 kg)

- A401AU (GFH5G5 ~ 20)
- A401BU (GFH5G30 ~ 100)
- A401CU (GFH5G200)

**Speed Control Systems**

Motor/Gearhead
AXH5100KC-A
Motor: AXHM5100KC-A
Weight: 3.1 lb. (1.4 kg)

- A402U

---

**Round Shaft Type**
AXH5100KC-A
Motor: AXHM5100KC-A
Weight: 3.1 lb. (1.4 kg)

- A402U
Introduction

Before Using a Speed Control System

AXH015K-\( ^\ast \) AXHM015K
1/50 HP 15 W

AXH230KC-\( ^\ast \) AXHM230KC-GFH
1/25 HP 30 W

AXH450KC-\( ^\ast \) AXHM450KC-GFH
1/15 HP 50 W

AXH5100KC-\( ^\ast \) AXHM5100KC-GFH
1/8 HP 100 W

AXH015K-A AXHM015K-A AXHD15K
1/50 HP 15 W

AXH230KC-A AXHM230KC-A AXHD30K
1/25 HP 30 W

AXH450KC-A AXHM450KC-A AXHD50K
1/15 HP 50 W

AXH5100KC-A AXHM5100KC-A AXHD100K
1/8 HP 100 W

\( ^\ast \) Geared Motor Model

Enter the gear ratio in the box \((\Box)\) with in the model name.

List of Motor and Driver Combinations

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Model</th>
<th>Motor Model</th>
<th>Gearhead Model</th>
<th>Driver Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/50 HP 15 W</td>
<td>AXH015K-( ^\ast )</td>
<td>AXHM015K-( ^\ast )</td>
<td>AXHD15K</td>
<td>AXHD15K</td>
</tr>
<tr>
<td>1/25 HP 30 W</td>
<td>AXH230KC-( ^\ast )</td>
<td>AXHM230KC-GFH</td>
<td>GFH2G</td>
<td>AXHD30K</td>
</tr>
<tr>
<td>1/15 HP 50 W</td>
<td>AXH450KC-( ^\ast )</td>
<td>AXHM450KC-GFH</td>
<td>GFH4G</td>
<td>AXHD50K</td>
</tr>
<tr>
<td>1/8 HP 100 W</td>
<td>AXH5100KC-( ^\ast )</td>
<td>AXHM5100KC-GFH</td>
<td>GFH5G</td>
<td>AXHD100K</td>
</tr>
<tr>
<td>1/50 HP 15 W</td>
<td>AXH015K-A</td>
<td>AXHM015K-A</td>
<td>AXHD15K</td>
<td></td>
</tr>
<tr>
<td>1/25 HP 30 W</td>
<td>AXH230KC-A</td>
<td>AXHM230KC-A</td>
<td>AXHD30K</td>
<td></td>
</tr>
<tr>
<td>1/15 HP 50 W</td>
<td>AXH450KC-A</td>
<td>AXHM450KC-A</td>
<td>AXHD50K</td>
<td></td>
</tr>
<tr>
<td>1/8 HP 100 W</td>
<td>AXH5100KC-A</td>
<td>AXHM5100KC-A</td>
<td>AXHD100K</td>
<td></td>
</tr>
</tbody>
</table>

\( ^\ast \) Geared Motor Model

Enter the gear ratio in the box \((\Box)\) with in the model name.

Round Shaft Type

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Model</th>
<th>Motor Model</th>
<th>Driver Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/50 HP 15 W</td>
<td>AXH015K-A</td>
<td>AXHM015K-A</td>
<td>AXHD15K</td>
</tr>
<tr>
<td>1/25 HP 30 W</td>
<td>AXH230KC-A</td>
<td>AXHM230KC-A</td>
<td>AXHD30K</td>
</tr>
<tr>
<td>1/15 HP 50 W</td>
<td>AXH450KC-A</td>
<td>AXHM450KC-A</td>
<td>AXHD50K</td>
</tr>
<tr>
<td>1/8 HP 100 W</td>
<td>AXH5100KC-A</td>
<td>AXHM5100KC-A</td>
<td>AXHD100K</td>
</tr>
</tbody>
</table>
### Connection and Operation

#### Connection Diagrams

**15 W, 30 W, 50 W**

#### 100 W

**Motor**

- **SPEED Output**
- **Start/Stop Input**
- **Rotation Direction**
- **Alarm Reset Input**
- **External DC Power Supply**
- **Speed Potentiometer Selection Input**
- **Brake Input**

**Driver**

- **Power supply connection**
- **Alarm Output**
- **Speed Output**
- **Start/Stop Input**
- **Rotation Direction**
- **Alarm Reset Input**
- **External DC Power Supply**
- **Speed Potentiometer Selection Input**
- **Brake Input**

---

- **When the motor cable needs to be extended, use an optional extension cable [sold separately, 4.9 ft. (1.5 m)].**

- **Extension Cable → Page B-69**

---

#### Timing Chart

- **Max. 10 ms**

- **2-speed switching/stop**
- **Run/Brake**
- **Rotation direction switching**

- **CW (Clockwise)**
- **CCW (Counterclockwise)**

---

- **Run/stop, instantaneous stopping and rotation direction switching operations can all be controlled with the START/STOP, RUN/BRAKE and CW/CCW signals.**

- **If both the START/STOP signal and the RUN/BRAKE signal are set to ON (L level), the motor rotates. At this time, if the CW/CCW signal is set to ON (L level), then the motor rotates clockwise as seen from the motor shaft side; if the CW/CCW signal is set to OFF (H level), the motor rotates in the counterclockwise direction.**

- **If the RUN/BRAKE signal is set to OFF (H level) while the START/STOP signal is ON (L level), the motor stops instantaneously. If the START/STOP signal is set to OFF (H level) while the RUN/BRAKE signal is set to ON (L level), the motor stops naturally.**

- **Wait for 10 ms before switching the other input signals.**

- **Do not switch different input signals simultaneously.**

---

**Features B-66**

**System Configuration B-69**

**Specifications B-80**

**Characteristics B-62**
### Introduction

Before using a speed control system

#### Example of Input Circuit Connection

- **Control by Small Capacity Relay, Switch, or Similar Device**
  - Switch capacity: 24 VDC 10 mA

#### Example of Output Circuit Connection

- **Output Signal Connections**
  - **SPEED Output**
    - The system outputs pulse signals (with a width of 0.3 ms) at a rate of 30 pulses per rotation of the motor output shaft, synchronized with the motor drive. You can measure the SPEED output frequency and calculate the motor speed.
    
    \[
    \text{Motor speed (r/min)} = \frac{\text{Speed output frequency (Hz)}}{30} \times 60 \text{[r/min]}
    \]

    - **SPEED output frequency (Hz) = \frac{1}{T}**

  - **ALARM Output**
    - The ALARM output is normally at the ON (L level) and switches to the OFF (H level) when there is an alarm.

    - **ALARM-RESET**
      - When the motor is stopped, setting this signal to the ON (L level), then returning it to the OFF (H level) resets the alarm. Please return either the START/STOP input or the RUN/BRAKE input to the OFF (H level) before inputting the ALARM-RESET. The ALARM-RESET is not accepted if both these signals are at the ON (L level).

    - **Notes**:
      - Output signal is open collector output, so an external power supply (Vcc) is required.
      - Use a power supply of no more than 26.4 VDC and connect a limit resistance (R) so that the output current does not exceed 10 mA. When using neither the speed output function nor the alarm output function, this connection is not required.
**Speed Setting Method**

**Speed Control by Internal Potentiometer**
When INT.VR/EXT. input is set to the ON (L level), the speed can be set with the internal speed potentiometer. There is no need for this connection when the internal potentiometer is not used.

**Speed Control by External Potentiometer**
When separating the motor speed setting from the driver, connect the optional external potentiometer as follows.

External speed potentiometer **PAVR-20KZ** (Sold separately)

**Speed Control by External DC Voltage**
When setting the motor speed with an external DC voltage, do so in the following manner.

**Accessories** (Sold Separately)

**Extension Cable**
The maximum extended length is 6.6 ft. (2 m).

**For 15 W, 30 W, 50 W**
Two types of cables are available. Covered lead wire type and ribbon cable type.

- **CC02AXH [4.9 ft. (1.5 m)]**
- **FC02HBL [4.9 ft. (1.5 m)]**

**For 100 W**
- **CC02AXH2 [4.9 ft. (1.5 m)]**