Driver Model: PMD03CA

To see specifications and pricing, use the Web Catalog search function.

A Full Range of Driver Functions

1. Signal Monitor Display

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>Green</td>
<td>Power input display</td>
</tr>
</tbody>
</table>

2. Current Adjustment Potentiometer

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUN</td>
<td>Motor run current potentiometer</td>
<td>Can adjust the motor running current</td>
</tr>
<tr>
<td>STOP</td>
<td>Motor stop current potentiometer</td>
<td>Can adjust the current at the motor standstill</td>
</tr>
</tbody>
</table>

3. Function Select Switches

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Switch Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>F/H</td>
<td>Step angle select switch</td>
<td>Switches the motor’s step angle. F: Full step, H: Half step</td>
</tr>
<tr>
<td>2P/1P</td>
<td>Pulse input mode switch</td>
<td>Switches between 1-pulse input and 2-pulse input</td>
</tr>
</tbody>
</table>

4. Input/Output Signal

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Input/Output</th>
<th>Pin No.</th>
<th>Terminal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN1</td>
<td>Input signal</td>
<td></td>
<td>1 - Pulse Signal (CW Pulse Signal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 - Rotation Direction Signal (CCW Pulse Signal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 - All Windings Off Signal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 - Step Angle Select Signal</td>
</tr>
<tr>
<td>CN4</td>
<td>Input signal</td>
<td></td>
<td>1 - Current Cutback Release Signal</td>
</tr>
<tr>
<td></td>
<td>Output signal</td>
<td></td>
<td>3 - Excitation Timing Signal</td>
</tr>
</tbody>
</table>

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**Connection Diagrams**

**Controller**

- **V_0** (+5 VDC to 24 VDC)
- **Twisted wire**
- **Pulse Signal**
- **Rotation Direction Signal**
- **All Windings Off Signal**
- **Step Angle Signal**
- **Excitation Timing Signal**

**Driver (Inner circuit)**

- **CN1**
- **CN2**
- **CN3**
- **CN4**

**Stepping motor**

- **Black**
- **Green**
- **Orange**
- **Red**
- **Blue**

**24/36 VDC ± 10%**

**GND**

**N.C**

**Power Supply**

Keep the input power voltage either 24 VDC ± 10% or 36 VDC ± 10%. Use a power supply that can supply sufficient input current.

**Notes**

- Keep the voltage V_0 between 5 VDC and 24 VDC. When they are equal to 5 VDC, the external resistance R_1 is not necessary. When they are above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA, and connect R_2 to keep the current below 10 mA.
- Use twisted-pair wire of 0.08 mm² or thicker and 6.6 feet (2 m) or less in length for the signal line.
- Suitable wire size for the CN1, CN2, CN3 and CN4 connector is between AWG 28 and 26. Use rated at AWG 26 (0.14 mm²) for the power line. When assembling the connectors, use the hand-operated crimp tool for contact 911790-1(AMP). The crimp tool is not provided with the package. They must be furnished separately.
- Signal lines should be kept at least 3.94 inch (10 cm) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
- If noise generated by the motor lead wire causes a problem, try shielding the motor lead wires with conductive tape or wire mesh.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.
Description of Input/Output Signals

Pulse Input and Rotation Direction Signals

1-Pulse Input Mode

Pulse Input Signal

"Pulse" signal is input to the PLS/CW. – terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step. The direction of rotation is determined by the rotation direction signal.

Rotation Direction Input Signal

The "Rotation Direction" signal is input to DIR./CCW. – terminal. A "photocoupler ON" signal input commands a clockwise direction rotation. A "photocoupler OFF" signal input commands a counterclockwise direction rotation.

2-Pulse Input Mode

CW Pulse Input Signal

"Pulse" signal is input to the CW/P. – terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in the clockwise direction.

CCW Pulse Input Signal

"Pulse" signal is input to the CCW/D. – terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in the counterclockwise direction.

All Windings Off Input Signal

When the "All Windings Off" (A.W.OFF) signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand. This signal is used when moving the motor by external force or to manual home position.

Timing Chart

Current Cutback

All Windings Off

1-pulse input mode

Pulse Signal

Photocoupler ON

OFF

Rotation Direction
Signal

ON

OFF

2-pulse input mode

CW Pulse Signal

ON

OFF

CCW Pulse Signal

ON

OFF

All Windings Off Signal

ON

OFF

5 µs min.

10 µs min.

Approx. 100 ms

Shaded area indicates the radiation of the photocoupler diode.

Note:

1. When the signal is in the ‘photocoupler ON’ state, the ‘Automatic Current Cutback’ function is deactivated. Always set it in the ‘photocoupler OFF’ state when the pulse signal is stopped.

2. Wait a period of time to allow the motor oscillations to end before inputting the ‘All Windings Off’ signal. This time varies with the load inertia, the load torque and the starting pulse rate. The signal input must be stopped before the motor stops.

3. Never input step pulse signal immediately after switching the ‘All Windings Off’ input signal to the ‘photocoupler OFF’ state, or the motor may lose synchronism. In general, a minimum interval of 100 ms is required.

4. The motor will not operate properly when inputting a pulse signal while either the CW or CCW pulse is in the ‘photocoupler ON’ state.

Note: 10 µs or more is the standard interval time for switching from CW to CCW. Note that the interval time greatly varies according the motor and load inertia.

How to Use Function Select Switches

Step Angle Select

When the step angle select switch is set to "F" position, the setting is for full step. When set to "H" position, the setting is for half step.

Note:

The step angle can be set with not only the step angle select switch but the step angle select signal input. But set the unused select to FULL STEP. When either of them is set to HALF STEP, the setting is for half step.

Pulse Input Mode

When the pulse input mode select switch is set to “2P” position, the 2-pulse input mode is set. When the pulse input mode select switch is set to “1P” position, the 1-pulse input mode is set.

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Web Catalog–Connection and Operation

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Adjusting the Motor Running Current
The rated output current is set at the factory. If it is necessary to change the current setting, follow the procedures described below.

Connecting an Ammeter
Connect a DC ammeter between the motor and pin 1 of CN3 connector as shown below.

- After connecting the DC ammeter to the motor, turn on the power. (The excitation status at this point is fixed: power on reset.)
- When the power is turned on, the motor enters a 4 phase excitation state, and + directional current flows through the blue motor lead wire. (Even if 4-5 phase excitation has been selected, the motor enters a 4 phase excitation state when the power is turned on. Adjust the current in this state.)
- The value measured by the ammeter represents the total current in two phases. The current for one phase is equivalent to half of the ammeter value. (When setting the current to 0.3 A/phase, adjust the current level until the ammeter reads 0.6 A.)

Notes:
- Never input pulse signals.
- Select “photocoupler OFF” for “all windings off” signal. (Select “photocoupler OFF” when the switch is open.)
- When the RUN current is adjusted, the current at motor standstill also changes.

Adjusting the Current at Motor Standstill
Set “current cutback release” signal to the “photocoupler ON” state when adjusting the current.

1) Adjust the current at motor standstill with the STOP potentiometer.
Adjusting range
PMD03CA: 0.07 A/phase to 0.28 A/phase
(2) At the time of shipping, the current at motor standstill is set for half of rated current.
The STOP potentiometer can be used to readjust the current at motor standstill to the current value required to produce enough holding torque.

\[
Holding\ torque\ [oz-in\ (N-m)] = \frac{Maximum\ holding\ torque\ [oz-in\ (N-m)] \times \text{Current at motor standstill [A]}}{Motor\ rated\ current\ [A]}
\]

Note:
- The motor RUN current should be less than the motor rated current.