2-Phase Stepping Motor and Driver Package

UMK Series
2-Phase Stepping Motor and Driver Package
UMK Series

The UMK Series provides high torque and low vibration.

Features

- High Torque
  Combines a high torque PK motor with a dedicated driver. Maximum holding torque is as follows:
  - UMK24: 22 oz-in (0.16 N·m) – 45 oz-in (0.32 N·m)
  - UMK24M: 22 oz-in (0.16 N·m) – 45 oz-in (0.32 N·m)
  - UMK26: 55 oz-in (0.39 N·m) – 191 oz-in (1.35 N·m)
  - UMK26M: 55 oz-in (0.39 N·m) – 191 oz-in (1.35 N·m)

- Low Vibration and Low Noise
  Raising the torque can increase vibration and audible noise. The UMK Series was designed to ensure low vibration and low noise. For a 2-phase stepping motor running at full step, rotation is achieved by continuous 1.8° steps. This is a type of motion that leads naturally to vibration. To lower vibration and noise, it is important to make rotation as smooth as possible.

- High-Resolution Type
  The UMK Series also includes high resolution models for which the basic step angle (1.8°/step) is cut in half to 0.9°/step (for full steps). The resolution is doubled from the 200 steps per rotation for the standard models to 400 steps per rotation. Consequently, the high-resolution model can be half-stepped to obtain 800 steps per rotation.
An example of a single-axis system configuration with an EMP400 series controller.

**System Configuration**

- **Mounting Brackets (Accessories)** (→Page C-291)
- **Flexible Couplings (Accessories)** (→Page C-284)
- **Clean Dampers (Accessories)** (→Page C-289)
- **I/O Cable with Terminal Block (Accessories)** (→Page C-264)
- **Programmable Controller** (Not supplied)

**Product Number Code**

**UMK 2 6 6 M A A**

- **UMK Series**
- 2-phase
- **U.S.A. Version**
- **Shaft Type**
  - **A**: Single Shaft
  - **B**: Double Shaft
- **Blank**: Standard Type
- **M**: High-Resolution Type
- **Motor Case Length**
  - **4**: 1.65 in. sq. (42 mm sq.)
  - **6**: 2.22 in. sq. (56.4 mm sq.)

**Product Line**

<table>
<thead>
<tr>
<th>Type</th>
<th>Power Supply Voltage</th>
<th>Maximum Holding Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1.65 inch (42 mm)</td>
</tr>
<tr>
<td>Standard Type</td>
<td>Single-Phase 100/115 VAC</td>
<td>22–45 oz-in (0.16–0.32 N·m)</td>
</tr>
<tr>
<td>High-Resolution Type</td>
<td>Single-Phase 100/115 VAC</td>
<td>22–45 oz-in (0.16–0.32 N·m)</td>
</tr>
</tbody>
</table>
Standard Type

Motor Frame Size: □ 1.65 in. (□ 42 mm), □ 2.22 in. (□ 56.4 mm)

### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Single Shaft</th>
<th>Double Shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UMK243AA</td>
<td>UMK244AA</td>
</tr>
<tr>
<td></td>
<td>UMK243BA</td>
<td>UMK244BA</td>
</tr>
<tr>
<td>Maximum Holding Torque (oz-in (N·m))</td>
<td>22 (0.16)</td>
<td>36 (0.26)</td>
</tr>
<tr>
<td>Rotor Inertia J (oz-in² (kg·m²))</td>
<td>0.191 (30×10⁻³)</td>
<td>0.3 (54×10⁻³)</td>
</tr>
<tr>
<td>Rated Current (A/phase)</td>
<td>0.95</td>
<td>1.2</td>
</tr>
<tr>
<td>Basic Step Angle</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Power Source</td>
<td>Single-Phase 115 VAC ±15% 60 Hz or Single-Phase 100 VAC ±15% 50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Excitation Mode</td>
<td>1 A</td>
<td>1.4 A</td>
</tr>
<tr>
<td>Weight (motor lb. (kg))</td>
<td>0.46 (0.21)</td>
<td>0.59 (0.27)</td>
</tr>
<tr>
<td>Dimension No. (motor)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Driver (lb. (kg))</td>
<td>1 (0.47)</td>
<td></td>
</tr>
</tbody>
</table>

### How to Read Speed-Torque Characteristics

**UMK243BA**

Power Input: 115 VAC Current: 0.95 A/Phase (2 phases ON)

With Damper: D4CL-5.0F $J_L = 0.186$ oz-in² (34 × 10⁻⁵ kg·m²)

**UMK264BA**

Power Input: 115 VAC Current: 2 A/Phase (2 phases ON)

With Damper: D6CL-6.3F $J_L = 0.77$ oz-in² (140 × 10⁻⁵ kg·m²)

**UMK245BA**

Power Input: 115 VAC Current: 1.3 A/Phase (2 phases ON)

With Damper: D4CL-5.0F $J_L = 0.186$ oz-in² (34 × 10⁻⁵ kg·m²)

**UMK265BA**

Power Input: 115 VAC Current: 2 A/Phase (2 phases ON)

With Damper: D6CL-6.3F $J_L = 0.77$ oz-in² (140 × 10⁻⁵ kg·m²)

Note:
The pulse input circuit responds up to approximately 20 kHz with a pulse duty of 50%
**High-Resolution Type**  
Motor Frame Size: □ 1.65 in. (□ 42 mm), □ 2.22 in. □ 56.4 mm

### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Single Shaft</th>
<th>UMK243MAA</th>
<th>UMK244MAA</th>
<th>UMK245MAA</th>
<th>UMK246MAA</th>
<th>UMK264MAA</th>
<th>UMK266MAA</th>
<th>UMK268MAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Torque</td>
<td>oz-in (N·m)</td>
<td>22 (0.16)</td>
<td>24 (0.26)</td>
<td>36 (0.26)</td>
<td>45 (0.32)</td>
<td>55 (0.39)</td>
<td>127 (0.9)</td>
<td>191 (1.35)</td>
</tr>
<tr>
<td>Rotor Inertia J</td>
<td>oz·in² (kg·m²)</td>
<td>0.191 (35×10⁻⁵)</td>
<td>0.3 (34×10⁻⁵)</td>
<td>0.37 (68×10⁻⁵)</td>
<td>0.66 (120×10⁻⁵)</td>
<td>1.64 (300×10⁻⁵)</td>
<td>2.6 (480×10⁻⁵)</td>
<td></td>
</tr>
<tr>
<td>Rated Current</td>
<td>A/phase</td>
<td>0.95</td>
<td>1.2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Basic Step Angle</td>
<td>°/step</td>
<td>0.°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How to Read Specifications Table** — Page C-9

### Speed — Torque Characteristics

**UMK243MAA**  
Power Input: 115 VAC  
Current: 0.95 A/Phase (2 Phases ON)  
With Damper D4CL-5.0F: JL = 0.186 oz-in² (34×10⁻⁵ kg·m²)

**UMK264MAA**  
Power Input: 115 VAC  
Current: 2 A/Phase (2 Phases ON)  
With Damper D6CL-6.3F: JL = 0.77 oz-in² (140×10⁻⁵ kg·m²)

**UMK244MAA**  
Power Input: 115 VAC  
Current: 1.2 A/Phase (2 Phases ON)  
With Damper D4CL-5.0F: JL = 0.186 oz-in² (34×10⁻⁵ kg·m²)

**UMK266MAA**  
Power Input: 115 VAC  
Current: 2 A/Phase (2 Phases ON)  
With Damper D6CL-6.3F: JL = 0.77 oz-in² (140×10⁻⁵ kg·m²)

**UMK245MAA**  
Power Input: 115 VAC  
Current: 1.2 A/Phase (2 Phases ON)  
With Damper D4CL-5.0F: JL = 0.186 oz-in² (34×10⁻⁵ kg·m²)

**UMK268MAA**  
Power Input: 115 VAC  
Current: 2 A/Phase (2 Phases ON)  
With Damper D6CL-6.3F: JL = 0.77 oz-in² (140×10⁻⁵ kg·m²)

**Note:**  
The pulse input circuit responds up to approximately 20 kHz with a pulse duty of 50%
### Common Specifications

#### Driver Specifications

<table>
<thead>
<tr>
<th>Input Signal Circuit</th>
<th>Photocoupler input, Input resistance 220 Ω, Input current 10~20 mA maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal voltage Photocoupler ON: +4.5~+5 V, Photocoupler OFF: 0~+1 V (voltate between terminals)</td>
</tr>
</tbody>
</table>

- **Pulse Signal**  
  (CW Pulse Signal)
  - Step command pulse signal (CW direction command pulse signal at 2-pulse input mode)
  - Pulse width: 5 μs minimum, Pulse rise/fall: 2 μs maximum  
    Pulse duty: Max 50%
  - Motor moves when the photocoupler state changes from ON to OFF.
  - Maximum input frequency: 20 kHz (when the pulse duty is 50%)
  - Negative logic pulse input.

- **Rotation Direction Signal**  
  (CCW Pulse Signal)
  - Rotation direction pulse signal, Photocoupler ON: CW, Photocoupler OFF: CCW
  - CCW direction command pulse signal at 2-pulse input mode.
  - Pulse width: 5 μs minimum, Pulse rise/fall: 2 μs maximum, Pulse duty: Max. 50%. Motor moves when the photocoupler state changes from ON to OFF.
  - Maximum input frequency: 20 kHz (when the pulse duty is 50%)
  - Negative logic pulse input.

- **All Windings Off Signal**
  - When in the 'photocoupler ON' state, the current to the motor is cut off and the motor shaft can be rotated manually.
  - When in the 'photocoupler OFF' state, the current is supplied to the motor.

#### Output Signal Circuit

- **Excitation Timing Signal**
  - The signal is output every time the excitation sequence returns to the initial stage '0'. (Photocoupler: ON)
  - Full step: signal output every 4 pulses, Half step: signal output every 8 pulses

- **Overheat Signal**
  - The signal is output when the internal temperature of the driver rises above approximately 194°F (90°C).
  - (Photocoupler: ON or OFF, automatic return available)
  - The motor current is shut off automatically if the automatic current off function is ON.
  - The output logic of the photocoupler is based on the setting of the overheat output logic switch

#### Functions
- Automatic current cutback, All windings off, Pulse mode input switch, Step angle switch, Overheat output logic switch

#### Indicator (LED)
- Power source input, CW/PLS input, CCW/DIR input, All windings off input, Excitation timing output, Overheat output

#### Driver Cooling Method
- Natural ventilation

### General Specifications

#### Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Motor</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation Class</td>
<td>Class B [266°F (130°C)]</td>
<td>100 MΩ minimum under normal temperature and humidity, when measured by a 500 VDC meger between the motor coils and the motor casing.</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>100 MΩ minimum under normal temperature and humidity, when measured by a 500 VDC</td>
<td>100 MΩ minimum under normal temperature and humidity, when measured by a 500 VDC</td>
</tr>
<tr>
<td>Insulation Strength</td>
<td>Sufficient to withstand 1.0 kV (0.5 kV for <strong>UMK24</strong> and <strong>UMK24-3M</strong> type), 60 Hz applied between the motor coils and casing for one minute, under normal temperature and humidity.</td>
<td>Sufficient to withstand the following for one minute, under normal temperature and humidity</td>
</tr>
<tr>
<td>Operating Environment</td>
<td><strong>Ambient Temperature</strong> 14°F<del>122°F (-10°C</del>+50°C) (nonfreezing)</td>
<td><strong>Ambient Temperature</strong> 32°F<del>104°F (0°C</del>+40°C) (nonfreezing)</td>
</tr>
<tr>
<td></td>
<td><strong>Ambient Humidity</strong> 85% or less (non-condensing)</td>
<td><strong>Ambient Humidity</strong> 85% or less (non-condensing)</td>
</tr>
<tr>
<td></td>
<td><strong>Atmosphere</strong> No corrosive gases, dust, water or oil.</td>
<td><strong>Atmosphere</strong> No corrosive gases, dust, water or oil.</td>
</tr>
</tbody>
</table>

#### Temperature Rise
- Temperature rise of the coil measured by the Change Resistance Method is 144°F (80°C) or less. (at standstill, two phases energized)

#### Static Angle Error
- ±3 arc minutes (+0.05°)

#### Shaft Runout
- 0.002 inch (0.05 mm) T.I.R at top of output shaft

#### Radial Play
- 0.001 inch (0.25 mm) max. of 1.12 lb. (0.5 kg)

#### Axial Play
- 0.003 inch (0.075 mm) max. of 2.2 lb. (1 kg)

#### Concentricity
- 0.003 inch (0.075 mm) T.I.R

#### Perpendicularity
- 0.003 inch (0.075 mm) T.I.R

**Note:**
- Do not measure insulation resistance or perform a dielectric strength test while the motor and driver are connected.
### Permissible Overhung Load and Permissible Thrust Load

<table>
<thead>
<tr>
<th>Model</th>
<th>Overhung Load [inch (mm)]</th>
<th>Distance from Shaft End [inch (mm)]</th>
<th>Thrust Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0.2 (5)</td>
<td>0.39 (10)</td>
</tr>
<tr>
<td>UMK24</td>
<td>4.5</td>
<td>5.6</td>
<td>7.6</td>
</tr>
<tr>
<td>UMK24-IM</td>
<td>20</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td>UMK26</td>
<td>12.1</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>UMK26-IM</td>
<td>54</td>
<td>67</td>
<td>89</td>
</tr>
</tbody>
</table>

Unit = Upper values: lb.; Lower values: N

The permissible thrust load [lb. (N)] shall be no greater than the motor mass.

### Dimensions

**Standard and High-Resolution Type Motors**

1. **Motor Frame Size:** □ 1.65 in. ([□] 42 mm)

2. **Motor Frame Size:** □ 2.22 in. ([□] 56.4 mm)

The length of machining on double shaft model is \(0.591 \pm 0.010\) (15 ± 0.25).

These dimensions are for double shaft models. For single shaft models, ignore the shaded areas.

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- **Dimensions C-155**
- **Connection and Operation C-156**
- **Motor and Driver Combinations C-160**
### Connection and Operation

#### 1 Signal Monitor Display

<table>
<thead>
<tr>
<th>Indication</th>
<th>Color</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>Green</td>
<td>Power input display</td>
</tr>
<tr>
<td>CW/PLS</td>
<td>Green</td>
<td>Pulse/CW pulse input display</td>
</tr>
<tr>
<td>CCW/DIR.</td>
<td>Green</td>
<td>Rotation direction/CCW pulse input display</td>
</tr>
<tr>
<td>C.OFF</td>
<td>Green</td>
<td>All windings off input display</td>
</tr>
<tr>
<td>TIMING</td>
<td>Green</td>
<td>Excitation timing output display</td>
</tr>
<tr>
<td>O.H.</td>
<td>Red</td>
<td>Overheat output display</td>
</tr>
</tbody>
</table>

#### 2 Current Adjustment Switches

<table>
<thead>
<tr>
<th>Indication</th>
<th>Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUN</td>
<td>Motor run current switch</td>
<td>Adjusts the motor running current</td>
</tr>
<tr>
<td>STOP</td>
<td>Motor stop current switch</td>
<td>Adjusts the motor current at standstill</td>
</tr>
</tbody>
</table>

#### 3 Function Select Switches

<table>
<thead>
<tr>
<th>Indication</th>
<th>Switch Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.C.D./OFF</td>
<td>Automatic current cutback function switch</td>
<td>Automatically decreases output current to motor at motor standstill.</td>
</tr>
<tr>
<td>A.C./OFF</td>
<td>Automatic current off function switch</td>
<td>When the temperature inside the driver rises above 194°F (90°C), this function automatically switches the motor current off. The function can be set and released with this switch.</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>

---

**Driver**

UDK2109A, UDK2112A, UDK2120A

Weight: 1 lb. (0.47 kg)
**Connection Diagrams**

- **Controller**
  - Twisted-pair wire
  - Pulse Signal
  - Rotation Direction Signal
  - All Windings Off Signal

- **Driver**
  - TIMING
  - CW/PLS
  - CCW/DIR.
  - C.OFF

---

**2-phase stepping motor**

Motor leads:
- YELLOW
- WHITE
- BLACK
- RED
- GREEN
- BLUE

---

**Power Supply**

Can be used with a single-phase 115 VAC, 60 Hz or 100 VAC, 50/60 Hz power supply. Use a power supply that can supply sufficient input current. If power supply capacity is insufficient, a decrease in motor output can cause the following malfunctions:
- Motor does not rotate properly at high-speed (insufficient torque).
- Slow motor startup and stopping.

---

**Notes:**

- Keep the voltage Vo between 5 VDC and 24 VDC. When it is equal to 5 VDC, the external resistance Rs is not necessary. When it is above 5 VDC, connect Rs to keep the current between 10 mA and 20 mA, and connect Rs to keep the current below 10 mA.
- Use twisted-pair wire of AWG 24 or thicker and 6.6 feet (2 m) or less in length for the signal line.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. (Reference Page F-36)
- Use AWG 20 or thicker for motor lines (when extended) and power supply lines, and use AWG 18 or thicker for the wire for the grounding line.
- Use spot grounding for the grounding of the driver and external controller.
- Signal lines should be kept at least 3.9 inches (10 cm) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
- Use open collector transistors (sink type) for the signal output sections of the controller.

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**Terminals**

- Round terminals with insulator
  - 0.35 inch (9 mm) max.
  - 0.13 inch (3.2 mm) min.

- U terminals with insulator
  - 0.35 inch (9 mm) min.
  - 0.13 inch (3.2 mm) min.

Crimp terminals are not provided with the package.
Description of Input/Output Signals

Pulse (CW) Input and Rotation Direction (CCW) Input Signal

♦ Input Circuit and Sample Connection

![Diagram showing input circuit and sample connection](image)

The characters indicate signals under the 1-pulse input mode, while the characters in parentheses indicate signals under the 2-pulse input mode.

Note:
- When Vo is equal to 5 VDC, the external resistance (R) is not necessary. When Vo is above 5 VDC, connect the external resistance (R) and keep the input current between 10 mA and 20 mA.

1-Pulse Input Mode

Pulse Signal
"Pulse" signal is input to the pulse signal terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step. The direction of rotation is determined by the following rotation direction signal.

Rotation Direction Signal
The "Rotation Direction" signal is input to the rotation direction signal input 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 and CCW refer to clockwise and counterclockwise direction respectively, from a reference point of facing the motor output shaft.

CW Pulse Signal
When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in the clockwise direction.

CCW Pulse Signal
When the photocoupler is state changes from "ON" to "OFF", the motor rotates one step in the counterclockwise direction.

♦ Pulse Waveform Characteristics

(Photocoupler state corresponding to the input pulse)
- The shaded area indicates when the photocoupler is ON. The motor moves when the photocoupler state changes from ON to OFF as indicated by the arrow.

Pulse signal
Photocoupler ON
Photocoupler OFF
Rotation direction signal
Photocoupler ON
Photocoupler OFF

- 2 µs max.
- 25 µs min.
- 30 µs max.

Note:
- When Vo is equal to 5 VDC, the external resistance (R) is not necessary. When Vo is above 5 VDC, connect the external resistance (R) and keep the input current between 10 mA and 20 mA.

Pulse Signal Characteristics
- The pulse voltage is 4.5 to 5V in the "photocoupler ON" state, and 0 to 1V in the "photocoupler OFF" state.
- Input pulse signals should have a pulse width over 2µs, pulse rise/fall time below 1µs and a pulse duty below 50%.
- Keep the pulse signal at "photocoupler OFF" when no pulse is being input.
- The minimum interval time when changing rotation direction is 50 µs.
This value varies greatly depending on the motor type, pulse frequency and load inertia. It may be necessary to increase this time interval.
- In 1-pulse input mode, leave the pulse signal at rest ("photocoupler OFF") when changing rotation directions.

All Windings Off (A.W.OFF) Input Signal

♦ Input Circuit and Sample Connection

![Diagram showing input circuit and sample connection](image)

Note:
- When Vo is equal to 5 VDC, the external resistance (R) is not necessary. When Vo is above 5 VDC, connect the external resistance (R) and keep the input current between 10 mA and 20 mA.

When the "All Windings 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.

When the "All Windings Off * signal is in the "photocoupler OFF" state, the motor holding torque is proportional to the current set by the current adjustment rotary switches. During motor operation be sure to keep the signal in the "photocoupler OFF" state.

This signal is used when moving the motor by external force or manual home position is desired. If this function is not needed, it is not necessary to connect this terminal.

Switching the "All Windings Off * signal from "photocoupler ON" to "photocoupler OFF" does not alter the excitation sequence.

When the motor shaft is manually adjusted with the "All Windings Off * signal input, the shaft will shift up to ±3.6˚ from the position set after the "All Windings Off * signal is released.
Excitation Timing Signal (TIM.) Output Signal

Output Circuit and Sample Connection

Note:
- Keep the voltage between 5 VDC and 24 VDC.
- Keep the current below 10 mA.
- If the current exceeds 10 mA, connect external resistance (R).

The "Excitation Timing" signal is output to indicate when the motor excitation (current flowing through the winding) is in the initial stage (step "0" at power up).

The "Excitation Timing" signal can be used to increase the accuracy of home position detection by setting the mechanical home position of your equipment (for example, a photo-sensor) to coincide with the excitation sequence initial stage (step "0").

The motor excitation stage changes simultaneously with pulse input, and returns to the initial stage for each 7.2˚ rotation of the motor output shaft. When the power is turned ON, the excitation sequence is reset to step "0".

The TIM. LED lights when the "Excitation Timing" signal is output. While the motor is rotating, the LED will turn ON and OFF at a high speed and will appear to be continuously lit.

The "Excitation Timing" signal is output simultaneously with a pulse input each time the excitation sequence returns to step "0".

The excitation sequence will complete one cycle for every 7.2˚ rotation of the motor output shaft.

Full Step (the switch is set to F position): Signal is output once every 4 pulses.

Half Step (the switch is set to H position): Signal is output once every 8 pulses.

Timing chart at full step

Note:
- When the power is turned ON, the excitation sequence is reset to STEP 0 and the LED lights up.
- The LED flashes quickly while the motor runs, appearing continuously lit.
- When connected as shown in the example connection, the signal will be "photocoupler ON" at step "0".

Overheat (O.HEAT) Output Signal

Output Signal and Sample Connection

Note:
- Keep the voltage between 5 VDC and 24 VDC.
- Keep the current below 10 mA.
- If the current exceeds 10 mA, connect external resistance (R).

The "Overheat" signal is output to protect the driver against burnout when its internal temperature rises abnormally high due to high ambient temperature. The O.HEAT lamp on the front panel lights up when output.

When used as shown in the sample connection with the overheat output logic switch set to NO, the signal becomes "photocoupler ON". (Switch to NC to set to the "photocoupler OFF".)

If the A.C.O. (Automatic Current OFF) function is set, the output current to the motor drops to zero and the motor stops automatically.

When the "Overheat" signal is output, check the operating conditions (ambient temperature, driver settings) and cool the driver.

The "Overheat" signal automatically releases as the internal temperature of the driver drops. The overheat signal turns "photocoupler OFF" and the O.HEAT indicator turns off.

Please be aware that the above return/release cannot be controlled by external signals or by restarting the system.
### Timing Chart

<table>
<thead>
<tr>
<th>Motor</th>
<th>CW Pulse Input Signal</th>
<th>CCW Pulse Input Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Input</td>
<td>2-Pulse Input Mode</td>
<td>1-Pulse Input Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PW</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>PW</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**#1** Switching time to change CW, CCW pulse (2-pulse input mode)
Switching time to change direction (1-pulse input mode) 50 μs is shown as a response time of circuit. Motor needs a time more than that.

**#2** Depends on load inertia, load torque, start frequency.

**#3** Never input a step pulse signal immediately after switching the "All Winding Off" signal to the photocoupler off state. The motor may not start.

**#4** Wait 5 seconds before cycling the power on.

### List of Motor and Driver Combinations

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Motor Model</th>
<th>Driver Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>UMK243/A</td>
<td>PK243-01/A</td>
<td>UDK2109A</td>
</tr>
<tr>
<td></td>
<td>UMK244/A</td>
<td>PK244-01/A</td>
<td>UDK2112A</td>
</tr>
<tr>
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<td>UMK245/A</td>
<td>PK245-01/A</td>
<td>UDK2112A</td>
</tr>
<tr>
<td></td>
<td>UMK264/A</td>
<td>PK264-02/A</td>
<td>UDK2120A</td>
</tr>
<tr>
<td></td>
<td>UMK266/A</td>
<td>PK266-02/A</td>
<td>UDK2120A</td>
</tr>
<tr>
<td></td>
<td>UMK268/A</td>
<td>PK268-02/A</td>
<td>UDK2120A</td>
</tr>
<tr>
<td>High-Resolution</td>
<td>UMK243M/A</td>
<td>PK243M/A</td>
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<tr>
<td></td>
<td>UMK268M/A</td>
<td>PK268M/A</td>
<td>UDK2120A</td>
</tr>
</tbody>
</table>

Enter A (single shaft) or B (double shaft) in the box (□) within the model numbers.