HP-7413-2

VEXTA®

2 Phase Stepping Motor Units

UMK Series

Standard Type

UMK24	**AA**	**UMK24**	**BA**
UMK26	**AA**	**UMK26**	**BA**

High Resolution Type

UMK24	**MAA**	**UMK24**	**MBA**
UMK26	**MAA**	**UMK26**	**MBA**

OPERATING MANUAL

Table of Contents

Thank you for purchasing ORIENTAL MOTOR products.
Please read this operating manual thoroughly before installing and operating products,
and always keep the manual where it is readily accessible.

Precautions

Precautions for Installation

Do not use in a place where there is flammable gas and / or corrosive gas.

Products for use only in equipment of protection class I.

The motor and the driver must be properly grounded.

When installing the motor into your equipment, ensure that the motor lead wires are fixed and do not move.

In addition, do not apply any pressure to these lead wires.

Installation must be performed by a qualified installer.

Precautions for Operation

Always turn off the power to the driver before conducting checks or performing work on the product.

The enclosure temperature of this motor and driver may exceed 70 (158°F) (depending on operation conditions).

In case product is accessible during operation, please attach the following warning label so that it is clearly visible.

Warning label

Precautions for Troubleshooting

Refer to "Troubleshooting" if the motor or driver is not functioning properly. If the problem can not be corrected, contact your nearest ORIENTAL MOTOR office as indicated at the back of this manual. Do not disassemble the motor or driver.

The driver incorporates double-pole/neutral fusing for the power input. If the driver POWER LED is off, it is possible that only the fuse is tripped. High voltage supplied on the hot side may cause electric shock. Turn the power off immediately and request service.

Package Contents

The **UMK** series comes as a combined stepping motor and driver set.

Confirm the motor and driver combination when unpacking.

The model names of the individual motors and drivers in each unit are as shown below.

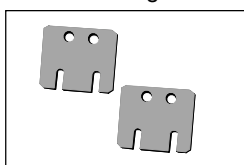| Model	Motor	Driver
UMK243AA	PK243-01AA	
UMK243BA	PK243-01BA	UDK2109A
UMK243MAA	PK243MAA	
UMK243MBA	PK243MBA	
UMK244AA	PK244-01AA	
UMK244BA	PK244-01BA	
UMK244MAA	PK244MAA	
UMK244MBA	PK244MBA	UDK2112A
UMK245AA	PK245-01AA	
UMK245BA	PK245-01BA	
UMK245MAA	PK245MAA	
UMK245MBA	PK245MBA	
UMK264AA	PK264-02A	
UMK264BA	PK264-02B	
UMK264MAA	PK264MA	
UMK264MBA	PK264MB	
UMK266AA	PK266-02A	
UMK266BA	PK266-02B	
UMK266MAA	PK266MA	UDK2120A
UMK266MBA	PK266MB	
UMK268AA	PK268-02A	
UMK268BA	PK268-02B	
UMK268MAA	PK268MA	
UMK268MBA	PK268MB	

Operating manual (this manual)…1pc.
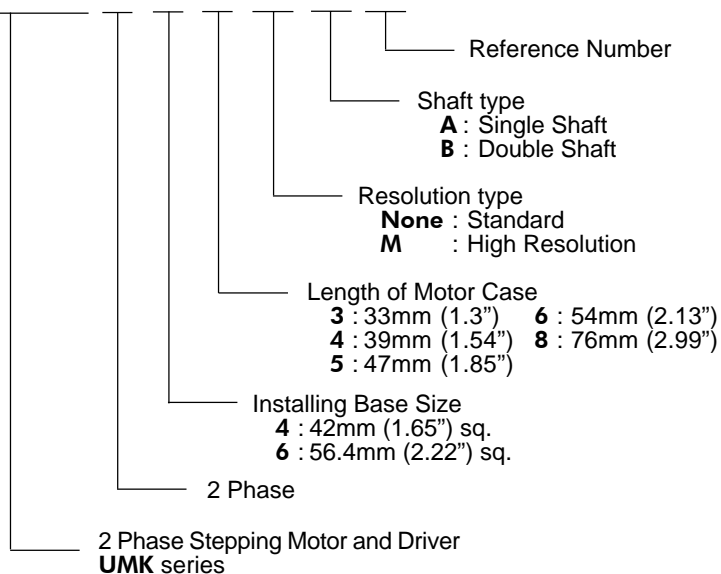
Accessories

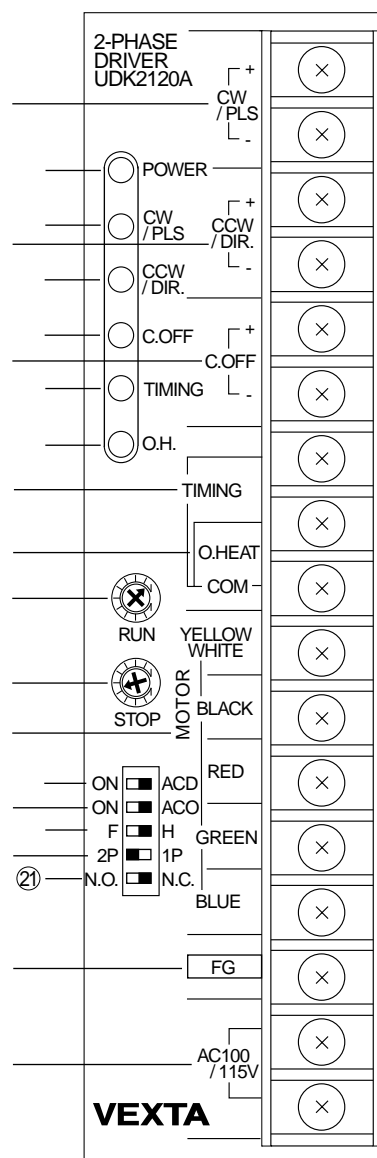Driver Mounting Bracket A…2pcs.
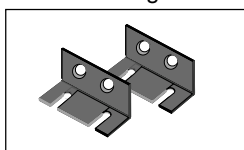
Driver Mounting Bracket B…2pcs.

M3 flat-headed screws…4pcs.
(for mounting brackets)

Interpreting the model name

U M K 2 6 6 M A A

Reference Number

Shaft type
A : Single Shaft
B : Double Shaft

Resolution type
None : Standard
M : High Resolution

Length of Motor Case
3 : 33mm (1.3")   **6** : 54mm (2.13")
4 : 39mm (1.54")   **8** : 76mm (2.99")
5 : 47mm (1.85")

Installing Base Size
4 : 42mm (1.65") sq.
6 : 56.4mm (2.22") sq.

2 Phase

2 Phase Stepping Motor and Driver
UMK series

Names and Functions of Driver Parts

```
2-PHASE
DRIVER
UDK2120A
            CW
            /PLS

  ( ) POWER
  ( ) CW      CCW
      /PLS     /DIR.
  ( ) CCW
      /DIR.
  ( ) C.OFF
            C.OFF
  ( ) TIMING
  ( ) O.H.

            TIMING

            O.HEAT
            COM
  (X)
  RUN   YELLOW
        WHITE

  (X)   BLACK
  STOP

            RED
 ON [ ] ACD
 ON [ ] ACO
  F [ ] H   GREEN
 2P [ ] 1P
 21 N.O. [ ] N.C.
            BLUE

      FG

  AC100
  /115V

  VEXTA
```

Pulse / CW Pulse Signal Input Terminals [P.11]
Pulse input for motor operation command. (Functions as CW rotation command pulse input in 2-pulse input mode.)

Rotation Direction / CCW Pulse Signal Input Terminals [P.11]
Input for rotation direction command. A "photocoupler ON" signal input commands a clockwise direction rotation. A "photocoupler OFF" signal input commands a counterclockwise direction rotation.

C.OFF (All Windings OFF) Signal Input Terminals [P.12]
Signal for cutting off the supply of electric current to the motor. When this signal has been input, the motor cannot be operated even by inputting a pulse signal.

Excitation Timing Signal Output Terminals [P.13]
Signal indicating that the motor excitation sequence is at step "0".
Full step mode : A signal is output once every 4 pulses.
Half step mode : A signal is output once every 8 pulses.

Overheat Signal Output Terminals [P.14]
Signal is output when the internal temperature of the driver rises above 80 (176°F). This is used to prevent excess heat from damaging the driver.

Motor Connection Terminals [P.17]
Motor output terminal.

Frame Ground Terminal [P.16]
Mounted on the driver case. Ground to your equipment.

Power Supply Connection Terminals [P.16]
Connects to a 115V AC ± 15% 60Hz power supply or a 100V AC ± 15% 50/60Hz power supply.

Run Potentiometer [P.18, 19]
Current adjustment potentiometer used to adjust the current level while the motor is running.

Stop Potentiometer [P.18, 19]
The current value on the stop potentiometer is active when the motor is at standstill (no pulse is input).

Power Source Input Indicator
Indicates that the power is turned on.

CW / PLS Input Indicator
Under the 1-pulse input mode, lights when a pulse has been received. (Under the 2-pulse input mode, lights when a CW pulse has been received at the CW / PLS terminals.)

CCW / DIR Input Indicator
Under the 1-pulse input mode, lights when a CW signal has been received. (Under the 2-pulse input mode, lights when a CCW pulse has been received at the CCW / DIR. terminals.)

C. OFF (All Windings Off) Input Indicator
Lights when an all windings off signal has been received at the C.OFF terminals.

Excitation Timing Output Indicator
Lights when an excitation timing output signal has been output from TIMING terminals.

Overheat Output Indicator
Lights when the overheat protection function is activated, and an overheat signal has been output from O.H terminals.

Automatic Current Cutback Select Switch [P.10]
Set to ON to decrease the output current to the motor when it is at rest resulting in lower heat generation and lower torque.

All Windings Off Select Switch (ON / ACO) [P.10]
Set to ON mode to cut the current to the motor if the overheat protection function is activated.

Step Angle Select Switch (F / H) [P.10]
Switch for selecting motor step angle.
    F : Full Step   1.8°/ step for Standard type
                  0.9°/ step for High Resolution type
    H : Half Step 0.9°/ step for Standard type
              0.45°/ step for High Resolution type

Pulse Input Mode Select Switch (2P/1P) [P.10]
Switch for selecting between 1-pulse input mode, in which control is performed with a pulse signal and a direction signal, and 2-pulse input mode, in which control is performed with two systems of pulse signals (CW pulse and CCW pulse).

㉑ Overheat Output Logic Select Switch [P.10]
Set to N.O. (Normal Open) so that photocoupler turns ON when the overheat signal is output. To reverse the logic, set to N.C. (Normal Close).

Mounting the Motor

Important

- Mount the motor and driver before connecting the motor, driver, and controller together.
- Install the motor so that it is securely fastened to a metal surface that is a good thermal conductor, such as steel or aluminum.

Mounting Location

In order to prevent damage to the motor, mount the motor in a place that meets the following conditions.

- Indoors
- Ambient temperature : -10   +50   (+14°F   +122°F) (where it won't freeze)
- Ambient humidity : 85% or less (where there is no condensation)
- Good ventilation
- No exposure in direct sunlight
- Free from corrosive / flammable gas and dust
- No exposure to water or oil (The motor is not waterproof. If there is a chance of it being exposed to liquid, provide a cover.)
- Not subject to continuous vibration

Mounting Direction and Method

- There are no restrictions on the direction of mounting, but motors are usually mounted sideways. They can also be mounted facing up or down.
- Fix the motor firmly. If motor drops, it may damage the air gap between the rotor and the stator, and cause the rotor not be turned.
- Mount the motor tightly against a metal surface with good thermal conductivity. Mounting brackets are available as an optional parts for easy mounting or fixing of the motor. Suitable mounting bracket for **UMK** series **PK26   (M)** type : **PAL2P-2**.

Connecting the Motor to the Machine (load)

When connecting the motor shaft to the machine being, it must be centered to the load.
Inadequate alignment will cause vibration and can drastically shorten the life of the motor's ball bearings, resulting in fatigue failure of the motor shaft. Use a flexible coupling to connect the motor shaft to the machine being used (load).
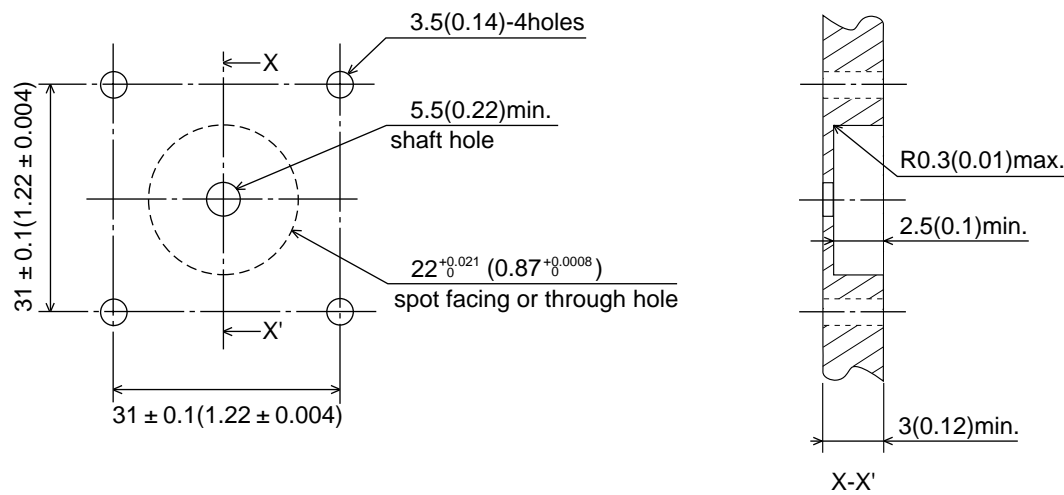
Stepping Motor

Flexible Coupling
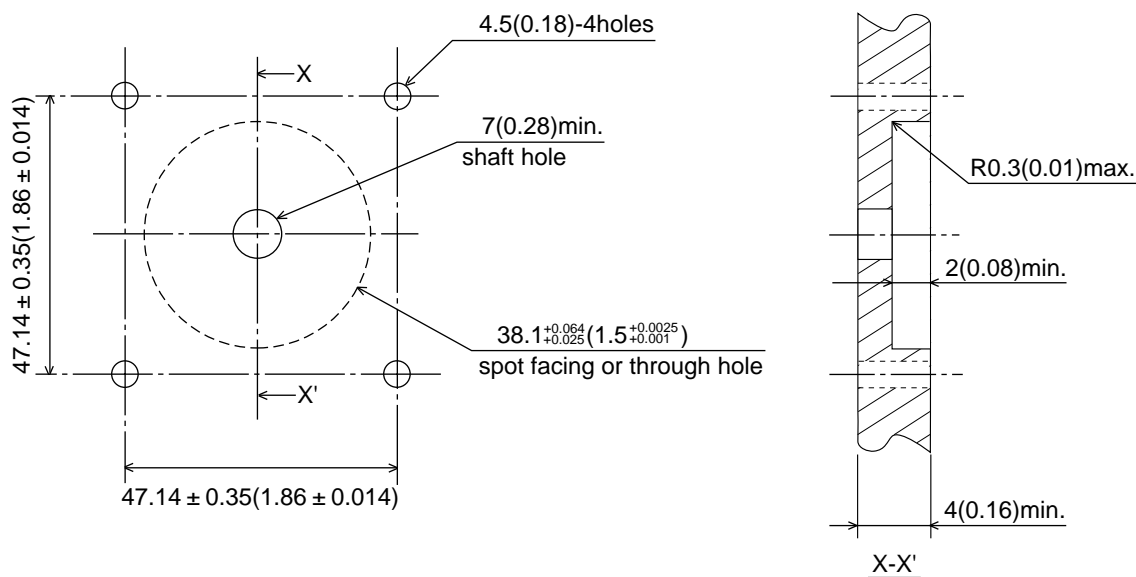
Ball Screw
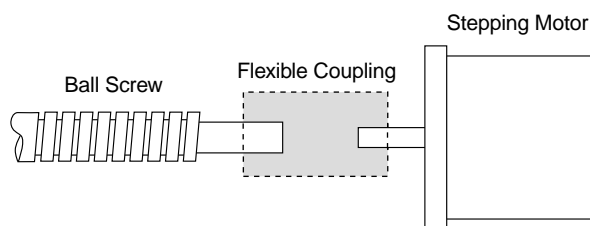
Notes

- Support the motor shaft when attaching a coupling, timing pulley, or other device to the shaft. Make sure that there is no thrust or overhung loads between the shaft and motor and avoid shock loading. Such loads or shock could damage the equipment or the motor.
- The air gap between the rotor and stator inside the motor is extremely small. Therefore, do not subject the motor shaft to any shocks. Shocks will cause the rotor and stator to rub against each other. This can also damage the shaft bearings.

Mounting Plate Dimensions   unit : mm (inch)

UMK24   (M)

3.5(0.14)-4holes

X

5.5(0.22)min.
shaft hole

$31 \pm 0.1(1.22 \pm 0.004)$

$22^{+0.021}_{0} (0.87^{+0.0008}_{0})$
spot facing or through hole

X'

$31 \pm 0.1(1.22 \pm 0.004)$

R0.3(0.01)max.

2.5(0.1)min.

3(0.12)min.

X-X'

UMK26   (M)

4.5(0.18)-4holes

X

7(0.28)min.
shaft hole

$47.14 \pm 0.35(1.86 \pm 0.014)$

$38.1^{+0.064}_{+0.025}(1.5^{+0.0025}_{+0.001})$
spot facing or through hole

X'

$47.14 \pm 0.35(1.86 \pm 0.014)$

R0.3(0.01)max.

2(0.08)min.

4(0.16)min.

X-X'

Mounting the Driver

Mounting Location

Mount the driver in a place that meets the following conditions.

- Indoors
- Ambient temperature : 0   +40   (+32°F   +104°F) (where it won't freeze) (When the ambient temperature exceeds 40   (104°F), use a fan to cool the driver, as overheating could damage the driver's components.)
- Ambient humidity : 85% or less non condensing
- Free from corrosive / flammable gas and dust
- No exposure to water or oil
- No exposure in direct sunlight
- Mount driver so that there is at least 25 mm (0.98") between each side of the driver and any other equipment or structural components.
- When mounting the driver in an airtight location, such as a control panel, or near to heat-generating equipment, be sure to establish ventilation holes to prevent overheating.
- When the driver is mounted close to a source of vibration, install shock absorbers in order to prevent damage to the driver.
- When there is a source of significant noise near the driver (high-frequency welding machine, large electromagnetic switch, etc.), take measures to prevent noise interference, such as inserting a noise filter or connecting the driver to a separate power supply line.
- Prevent conductive materials (filings, pins, pieces of electric wires, etc.) from adhering to the inside of the driver, as this could damage the circuits inside the driver.
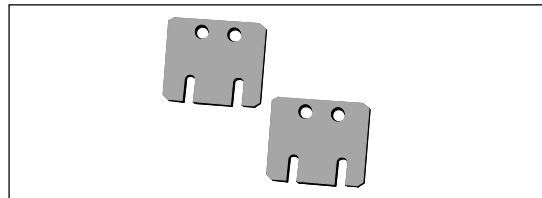
Mounting Direction and Method

The driver is designed to disperse heat through natural convection. When installing the driver, be sure to install only in the position shown below.

Use mounting bracket "A" when install the driver vertically to the equipment. When install it horizontally to bottom line of equipment, use mounting bracket "B".
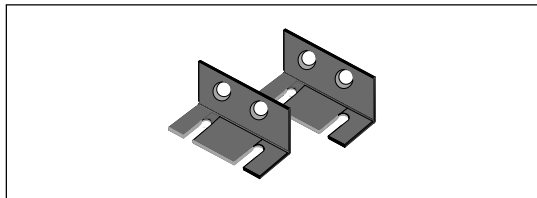
Driver Mounting Bracket A

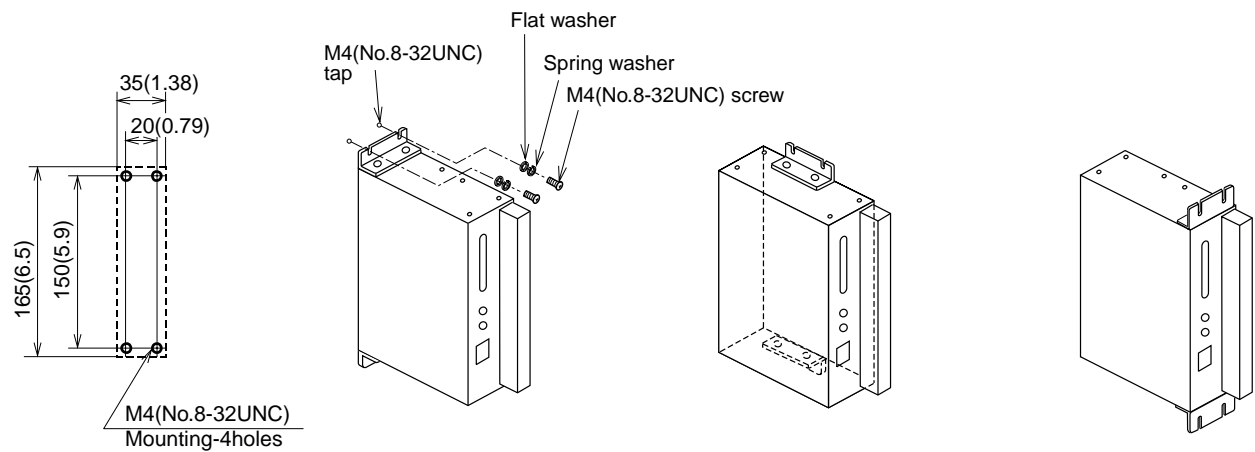Driver   Mounting Bracket B

Notes

- Fix the drivers to a metal plate at least 2 mm (0.08") thick with good heat-conduction such as aluminum or steel.
- When mounting the driver directly to the machine without using the mounting bracket provided with the product, pay attention to length of mounting screws. Use the screws to extend 2   3.5 mm (0.08"   0.14") into the driver. Screws that are longer than necessary length may cause bad insulation.
- When the overheat signal output indicator lights, an overheat signal is output, cool the driver using cooling fan.
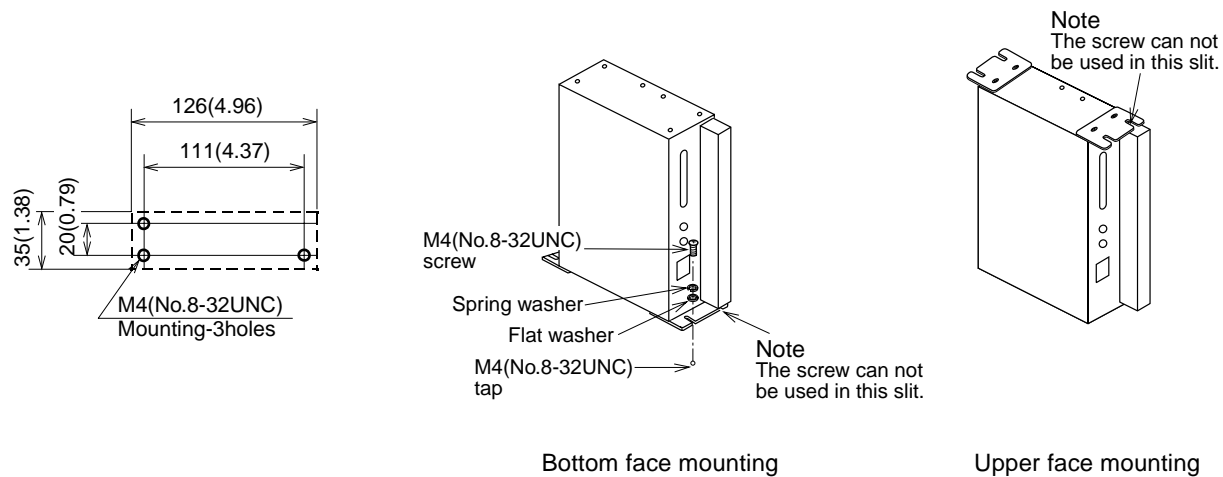
When Using Multiple Drivers

When using multiple drivers in a series, the heat produced by the drivers will raise the ambient temperature. Leave at least 20 mm (0.79") between drivers to prevent overheating and damage to the drivers.

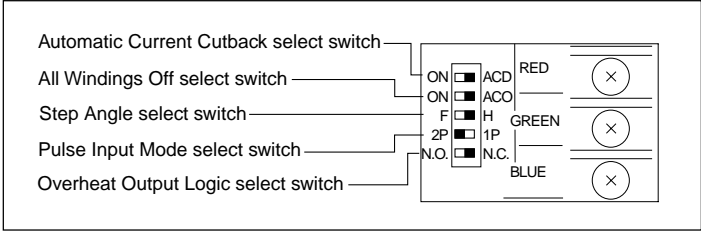# Mounting Dimensions   unit : mm (inch)

Using mounting bracket A

35(1.38)
20(0.79)
165(6.5)
150(5.9)

M4(No.8-32UNC)
Mounting-4holes

Flat washer

M4(No.8-32UNC)
tap

Spring washer

M4(No.8-32UNC) screw

Using mounting bracket B

126(4.96)
111(4.37)
35(1.38)
20(0.79)

M4(No.8-32UNC)
Mounting-3holes

M4(No.8-32UNC)
screw

Spring washer

Flat washer

M4(No.8-32UNC)
tap

Note
The screw can not
be used in this slit.

Note
The screw can not
be used in this slit.

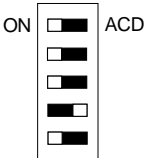Bottom face mounting

Upper face mounting

Function Switches

The following function select switches are used to change the driver's factory settings. (The factory settings are as indicated in the following diagram.)

Automatic Current Cutback select switch
All Windings Off select switch
Step Angle select switch
Pulse Input Mode select switch
Overheat Output Logic select switch

ON — ACD   RED
ON — ACO
F — H   GREEN
2P — 1P
N.O. — N.C. BLUE

Automatic Current Cutback at motor standstill (ON / ACD)

ON — ACD

When switch is flipped to "ON" , the automatic current reduction (current cutback) at motor standstill function is set. Approximately 0.1 seconds after pulses cease, the motor output current is automatically lowered to suppress heat generation in the motor and driver. The rate of current reduction (current cutback) is shown in the paragraph of "Current reduction at motor standstill" on page 18.

Generally , the switch should be at "ON" side. If it is flipped to "ACD", the automatic current reduction at motor standstill function is canceled.

Notes

- When stopping the pulse signal, always set it in the "photocoupler Off" state. Setting it in the "photocoupler ON" state prevents the automatic current reduction function from working.
- Since the holding torque is proportional to output current, holding torque is lowered when current is lowered (Holding torque is proportional to stop current that is commanded by "STOP" potentiometer)

All Windings Off (ON / ACO)

ON — ACO
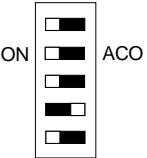
Set automatic current off function flipping this switch to "ON". When the overheat protection function is activated (When temperature inside the driver becomes extremely hot) current output to the motor is automatically stopped and the motor comes to a natural stop.

In situation where stopping of the motor due to overheat protection could pose problems, automatic current off can be overridden by setting this switch to "ACO". However, as a rule, whenever the overheat protection function is active (shown by overheat signal on display) the motor should be stopped as soon as possible.

Step Angle (F / H)

F — H
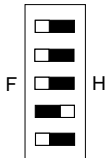
When step angle switch is flipped to "F" :
  Standard type : The driver is set for 1.8 /step (200 pulses per revolution).
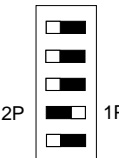 High Resolution type : The driver is set for 0.9 /step (400 pulses per revolution).
When the switch is flipped to "H" :
  Standard type : The driver is set for 0.9 /step (400 pulses per revolution).
  High Resolution type : The driver is set for 0.45 /step (800 pulses per revolution).

Pulse Input Mode (2P / 1P)

2P — 1P

The driver is designed to function under either of the following pulse output mode.

When the switch is flipped to "1P", the driver is set for the 1-pulse input mode, in which a pulse signal and a direction of rotation signal are used to control the motor. When pulse input switch is flipped to "2P", the driver is set for the 2-pulse input mode, in which two types of pulse signal (one each for CW and CCW) are used to control the motor.

Notes

1-Pulse Input Mode

Switch direction of rotation when the pulse signal is stopped (when it is in the "photocoupler Off" state).

2-Pulse Input Mode

Do not input CW pulse and CCW pulse signals simultaneously. When either the CW or CCW pulse signal is in the "photocoupler ON" state, the motor will not function properly even if a pulse is input to the other signal.

Overheat Output Logic (N.O. / N.C.)

N.O. — N.C.
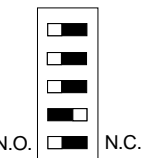
Overheat Output Logic switch set to "N.O." : When the overheat signal is output, the photocoupler is switched on ; during normal operation, photocoupler is off.
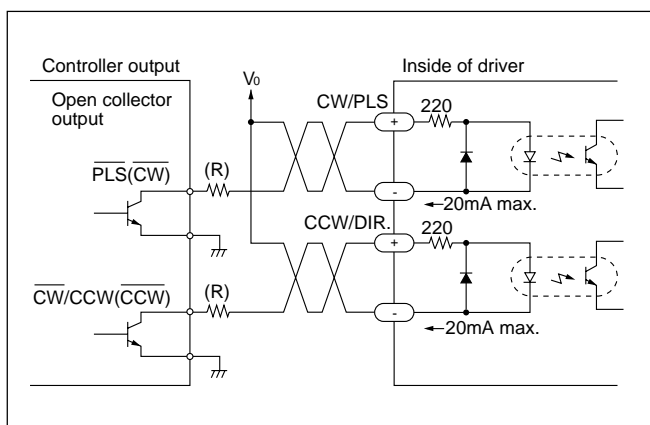
Overheat Output Logic switch set to "N.C." : When the overheat signal is output, the photocoupler is switched off ; during normal operation, photocoupler is on.

Input / Output Signals

Pulse, Direction (CW, CCW) Input

Input Circuits and Connection Example

Signals inside parentheses indicate signals in 2-pulse input mode.

When V_0 is 5V, external resistance (R) is not needed.
When V_0 exceeds 5V, connect external resistance (R) and adjust the input current to 20mA or less.

1-Pulse Input Mode

Pulse signal

Pulse signal is input to the CW pulse / pulse signal input 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 signals.

Rotation direction signal

The rotation direction signal is input to CCW pulse / 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 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 state changes from "ON" to "OFF" the motor rotates one step in the counterclockwise direction.

Pulse Waves

Shaded areas represent when the photocoupler is on.
The motor moves when the photocoupler state changes from "ON" to "Off" (arrow).
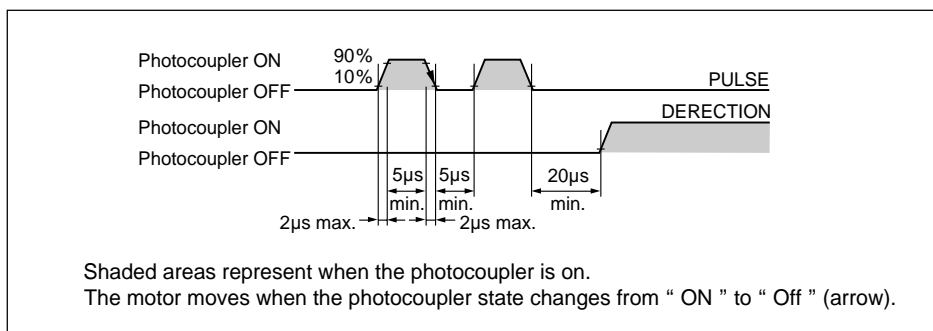
- Pulse voltage : Photocoupler OFF = +4 ～ +5V, Photocoupler ON = 0 ～ +0.5V
- Input a pulse with a pulse width of 5μs or more, pulse rise / fall time of 2μs or less, and pulse duty of 50% or less.
  (Responds up to 25 kHz with a pulse of 50%. When using at a faster speed, reduce the pulse width [shorten the photocoupler ON time].)
- When switching from clockwise to counterclockwise direction, an interval of 20μs or more is needed for the circuit response. The time required for motor response varies considerably depending on the load inertia and the pulse rate.

Notes

1-Pulse Input Mode

Switch Rotation Direction when the pulse signal is stopped (when it is photocoupler OFF).
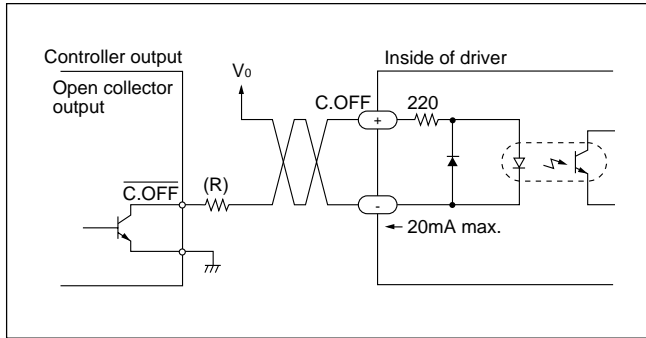
2-Pulse Input Mode

Do not input CW pulse and CCW pulse signals simultaneously.
When either the CW or CCW pulse signal is photocoupler ON, the motor will not function properly even if a pulse is input to the other signal.

11

All Windings Off Signal

Input Circuits and Connection Example

When V_0 is 5V, external resistance (R) is not needed.
When V_0 exceeds 5V, connect external resistance (R) and adjust the input current to 20mA or less.

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 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 positioning etc. 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 $\pm$ 3.6° for standard type ($\pm$ 1.8° for high resolution type) from the position set after the all windings off signal is released.
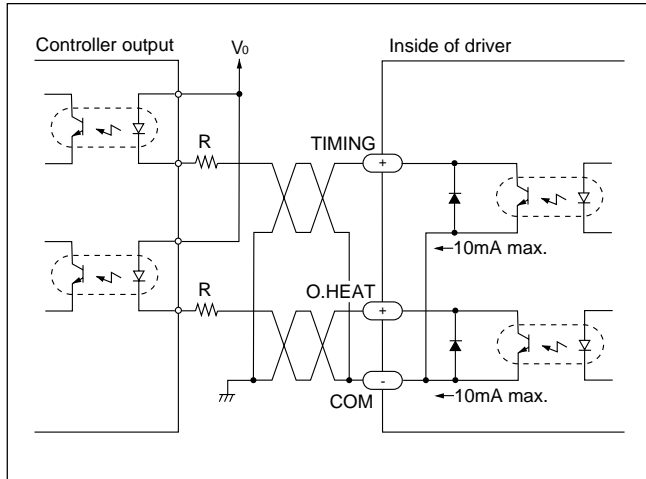
Manual Home Position Determination

When manually setting the shaft's position and using that position as the home position, input the all windings off signal, set the shaft's position, and then cancel the all windings off signal.
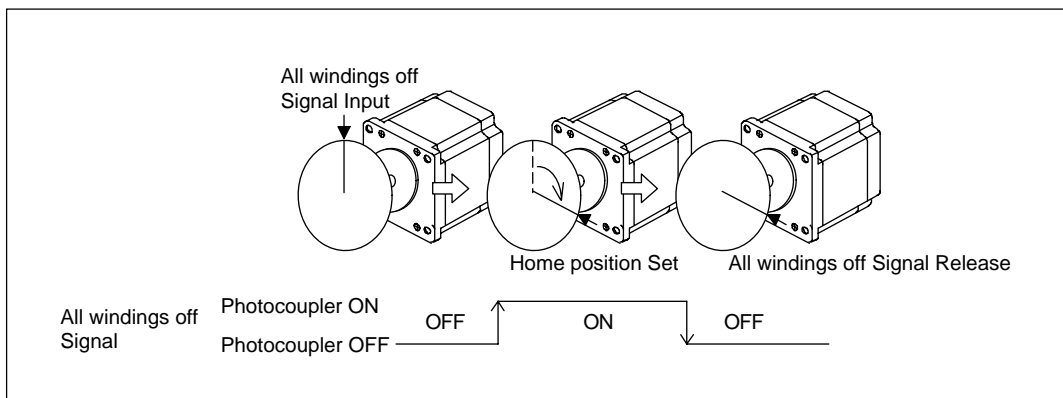
Timing (Excitation Timing) Output
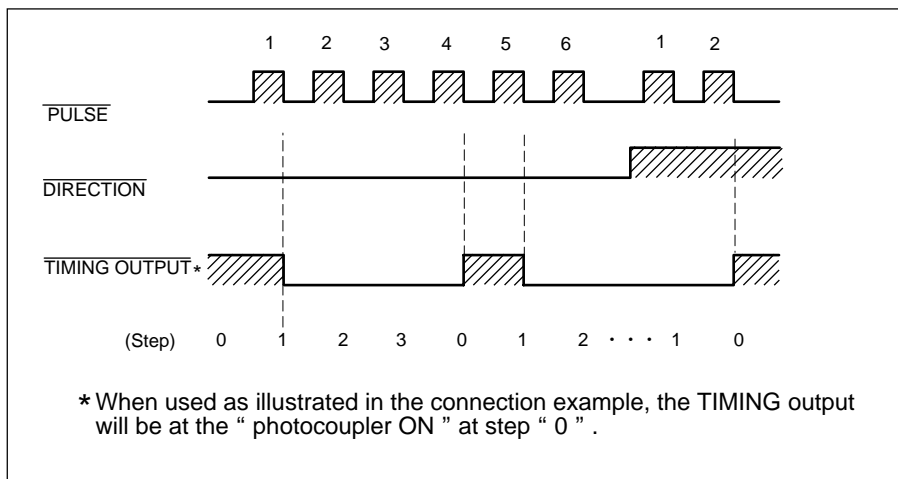## Output Circuits and Connection Example

Set V_0 so that it is between 5V and 24V.
Set the current to 10mA or less (for each output).

- The excitation timing signal indicates that the motor's excitation sequence is at its initial setting (step "0"). This signal is used to align the apparatus's mechanical home position and the motor's excitation home position (step "0"), to achieve more accurate home position detection.
- A signal is output every time the excitation sequence returns to step "0" in sync with the input pulse. The excitation sequence is configured so that when the motor shaft moves 7.2°, it complete one electrical cycle.
  - Full step : once every 4 pulses
  - Half step : once every 8 pulses

The timing indicator on the front panel lights at same time.

Timing Chart : (Full-Step Mode)

* When used as illustrated in the connection example, the TIMING output will be at the "photocoupler ON" at step "0".

Notes

- When the power supply is turned on, the excitation sequence is reset to "0" and the timing indicator lights.
- The timing indicator blinks at high speeds when the motor is running, so it may appear to be on continuously.
- When using this signal, input the pulse signals in multiples of 4 in full-step mode and in multiples of 8 in half-step mode.

O.HEAT (Overheat) Output
Output Circuits and Connection Example
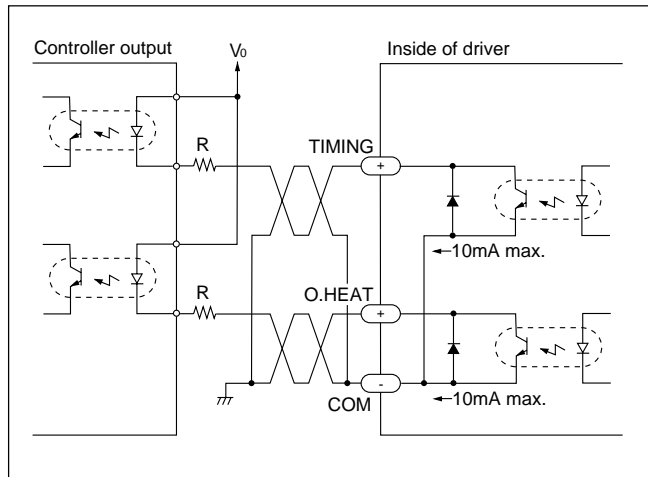
Set V_0 so that it is between 5V and 24V.
Set the current to 10mA or less (for each output).

- The overheat signal is output when the temperature of the driver rise above 80 (176 F). The overheat indicator on the front panel lights when this signal is output.
- If the automatic current off function has been set at this time, output current to the motor drops to "0" and the motor comes to a natural stop.
- On the above connecting diagram, the output signal is "photocoupler ON" when the switch is set to "N.O.". If "photocoupler OFF" signal is required, set the switch to "N.C.".
- When an overheat signal is output, either reconsider the operating conditions (ambient temperature, operating patterns, etc.) or take other measures such as forced cooling of the driver.
- Overheat signal will be canceled automatically as soon as the inner temperature of the driver drops. (The overheat signal returns to "photocoupler OFF" state at this time and the overheat indicator on the front panel goes out.)
  Be aware that the above return/release cannot be controlled by external signals or by restarting the system.

Notes
When the overheat protection function is activated

Cut the power to the driver and check the conditions (ambient temperature, operation pattern, etc.) ; or, reduce the driver's temperature by cooling it with a fan, etc.

Possible condition for overheating

- Placement of the driver in a location with insufficient air circulation for proper heat radiation, or when the driver's internal temperature becomes high due to high ambient temperatures and the heat generated by the driver.
- Continuous operation of the driver at the pulse rate with the largest current input to the driver. Input to the driver varies considerably according to motor size and pulse rate. Achieves its max. Input at 10 30kHz. Please refer to the driver input current ratings in the "speed torque characteristics" section of the catalog.

Timing Chart

1-Pulse Mode

Current reduction(current cutback)

All windings off

CW
Motor
CCW

5μ s min.   approximately 100ms.

Pulse   photocoupler ON
photocoupler OFF

20μ s. min.

*2

Rotation direction   photocoupler ON
photocoupler OFF

50μ s. min.

All windings off   photocoupler ON
photocoupler OFF

*1

2-Pulse Mode

Current reduction(current cutback)

All windings off

CW
Motor
CCW

5μ s min.   approximately 100ms.

*3

CW pulse   photocoupler ON
photocoupler OFF

20μ s. min.

*2

CCW pulse   photocoupler ON
photocoupler OFF

All windings off   photocoupler ON
photocoupler OFF

*1

Notes

- ▨ shaded areas represent photocoupler diode luminescence.
- When the pulse signal is in the "photocoupler ON" state, the automatic current reduction (current cutback) function will not operate. Always return the signal in the "photocoupler OFF" state after the pulse signal ends.

*1 : After pulses are stopped, stepping motors come to rest after a series of slight overshoots and undershoots. The time involved varies with the inertial load, friction load and motor type. Activation of the output current off before the motor stops can cause inaccurate positioning. Therefore, always wait until the motor has stopped.

*2 : Do not input pulse signals immediately after switching the all windings off input signal to the "photocoupler OFF" state, as this will affect the motor's start-up characteristics. Ordinarily, the interval should be around 100 ms.

*3 : When a pulse is input while either the CW pulse input or CCW pulse input is low, the motor will not operate properly.

Connections

Power Supply

The **UMK** series can be used with either a single-phase 115V 60Hz or single-phase 100V 50/60Hz power supply.

The power supply input current is :

UMK243 type : 1A max.   **UMK243M/244M** type : 0.7A max.

UMK244/245 type : 1.4A max.   **UMK245M** type : 0.8A max.

UMK264/266/268 type : 2.2A max.   **UMK264M/266M/268M** type : 1.3A max.

Use a power source which is able to provide sufficient input current.

(The listed for the power supply input current is the driver's maximum input current when a load has been applied to the motor.)

Notes

When the power capacity is insufficient, the following problems may arise due to a drop in the motor's output.

· The motor does not rotate normally during high speed operation (insufficient torque).

· The motor starts and stops slowly.

Indicators Illuminated When Turning on the Unit

Before turning on the unit confirm that there are no mis-wirings in the signal lines, motor and power lines.

Power Source Input Indicator

Normally illuminated when turning on the power.

Excitation Timing Output Indicator

When turning on the power, the motor excitation sequence is reset to its original position at step "0" and this indicator is illuminated.

Note

Turning the power back on

After the power has been turned off, wait 5 seconds before turning it back on again. If the power is turned on again immediately after it has been turned off, the timing indicator will not be illuminated and the motor excitation sequence will not be reset to step "0".

Frame Ground (FG) Terminal

FG terminal must be properly grounded to reduce the chance of electrical shock.

Ground the FG terminal of the external controller (pulse generator) to same point in order to prevent malfunctions due to external noise.

(The motor can be grounded to a device using the assembly screws.)

· If the noise generated from the motor lead wires should cause a problem, shield the motor lead wires with conductivity tape or wire mesh.
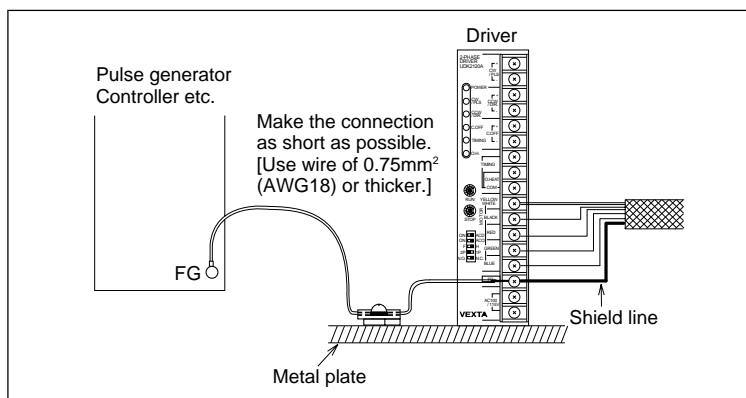
Notes

· Use twisted-pair wire of 2m (78.7") or less in length for the signal lines.

· Use wire of $0.5mm^2$ (AWG20) or thicker for motor lines and power supply lines, and use $0.75mm^2$ (AWG18) or thicker for the wire for the ground line.

· Signal lines should be kept away at least 10cm (0.39") from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.

· Use an open collector transistor (sink type) at the controller signal output.

Connection Diagram
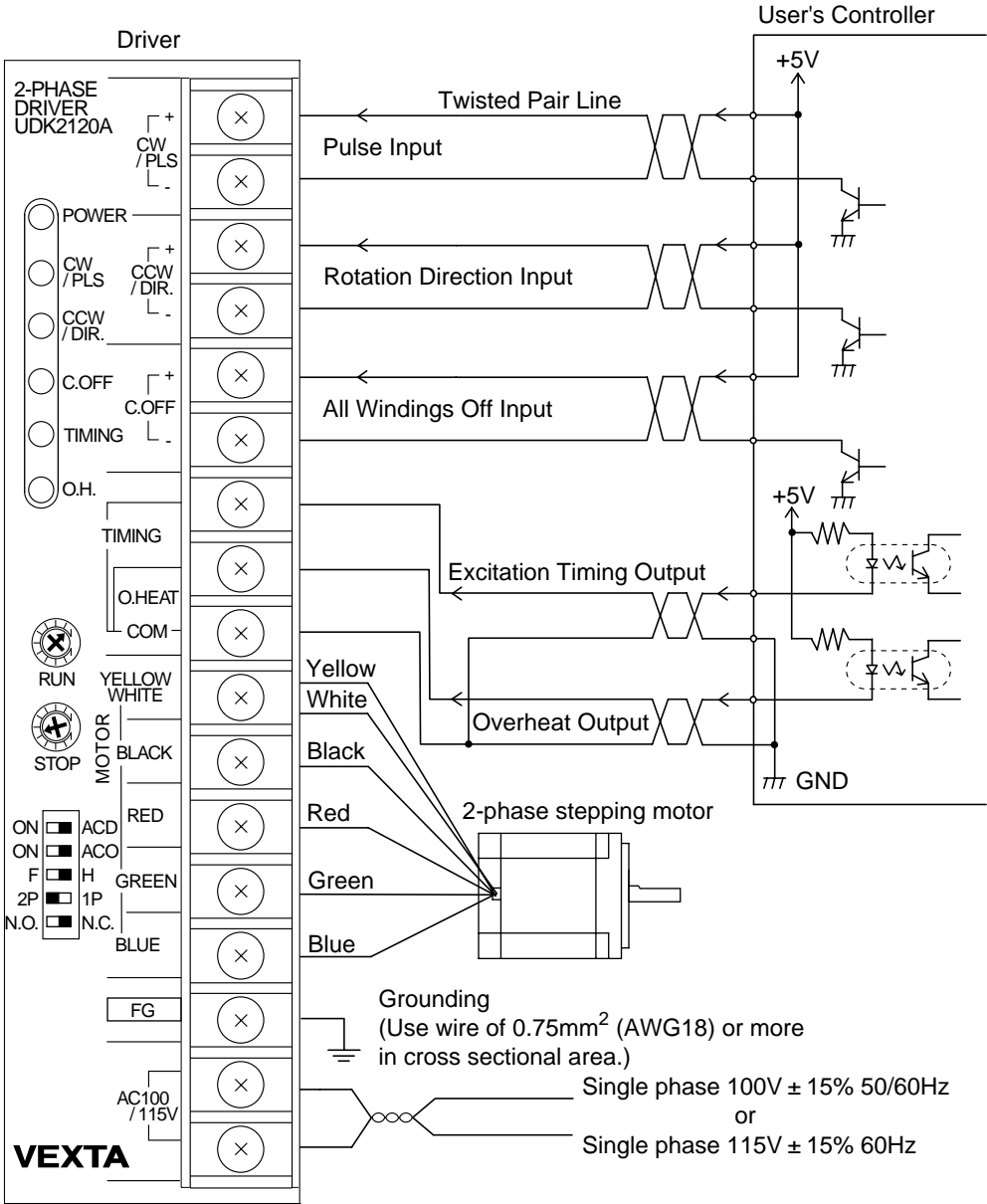
Adjusting the Driver Output Current

The **UMK** driver is shipped with the motor rated current set to either 0.95 / 1.2 / 2A / phase depending on the driver model   and the standstill current reduction (current cutback) ratio set to approximately 40% . It is not necessary to adjust the current under normal operating conditions. However, readjust the current setting in the following cases.

· When you want to prevent the motor and driver from becoming too hot ⇒ Lower the motor's running current and standstill current

· When there is slack in terms of torque and you want to prevent vibration ⇒ Lower the motor's running current

· When you want to increase the motor's standstill holding torque ⇒ Raise the motor's standstill current
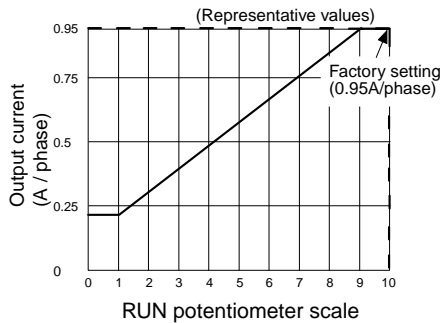
Notes

  · Since the torque is proportional to current, when lowering the current be careful not to lower it too much.

  · Raising the motor's standstill current increases the magnitude of the motor and driver's temperature rise.

  · Do not set the motor's running current above the rated current, since doing so could damage both driver and motor.

  · The current reduction ratio varies depending on the motor running current setting, as indicated below.

The relationship between the potentiometers and the current setting is shown in this diagram.

UMK243(M)   Motor running current   Motor standstill current
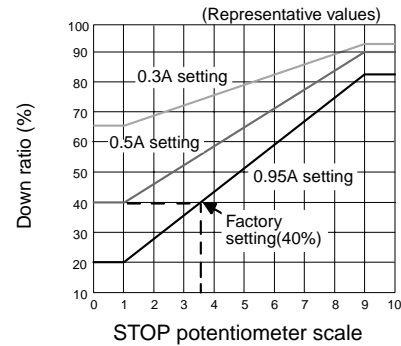
UMK244(M), 245(M)
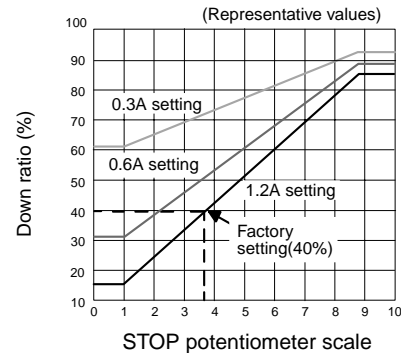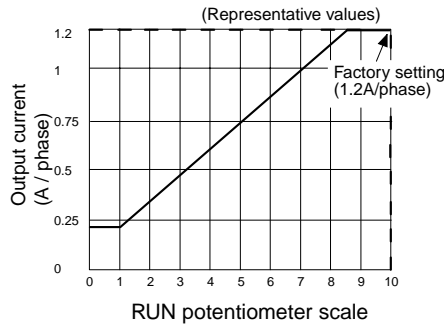
UMK26   (M)
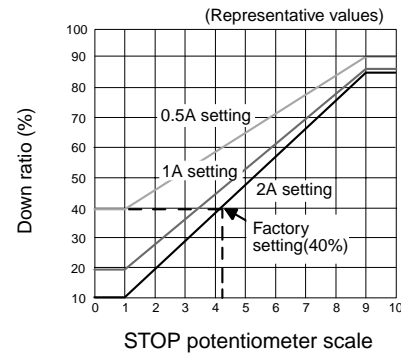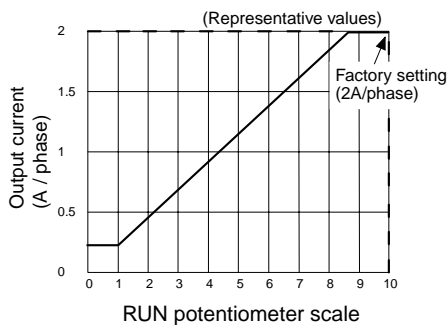
Holding torque can be calculated using the following formulas. (Holding torque is proportional to output current.)

· Current reduction (current down) ratio (%) $= \dfrac{\text{Standstill current setting}}{\text{Running current setting}} \times 100$

· Holding torque (oz · in) $= \dfrac{\text{Maximum holding torque (oz · in)} \times \text{Current reduction ratio (\%)}}{100}$

Adjusting the Current Using an Ammeter

When more precise current adjustments are necessary, make them by connecting an ammeter between the driver and motor, as shown in the diagram below.

Note

    With the connection shown here, the current flowing to the ammeter is twice that of a single phase.

    Therefore, the current setting (per single phase) is equivalent to half the value indicated on the ammeter.

    For example, when the ammeter indicates 0.5A, the setting is 0.25A / phase.

Note

    Inputting pulses input changes the value ; therefore, perform the setting without any input other than what designated.

Setting the Motor Running Current

(1) Switch automatic current reduction to "ACD".
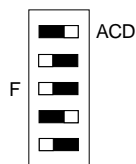
(2) After connecting the motor and DC ammeter, turn the power on.

(3) Set the current using the RUN potentiometer.

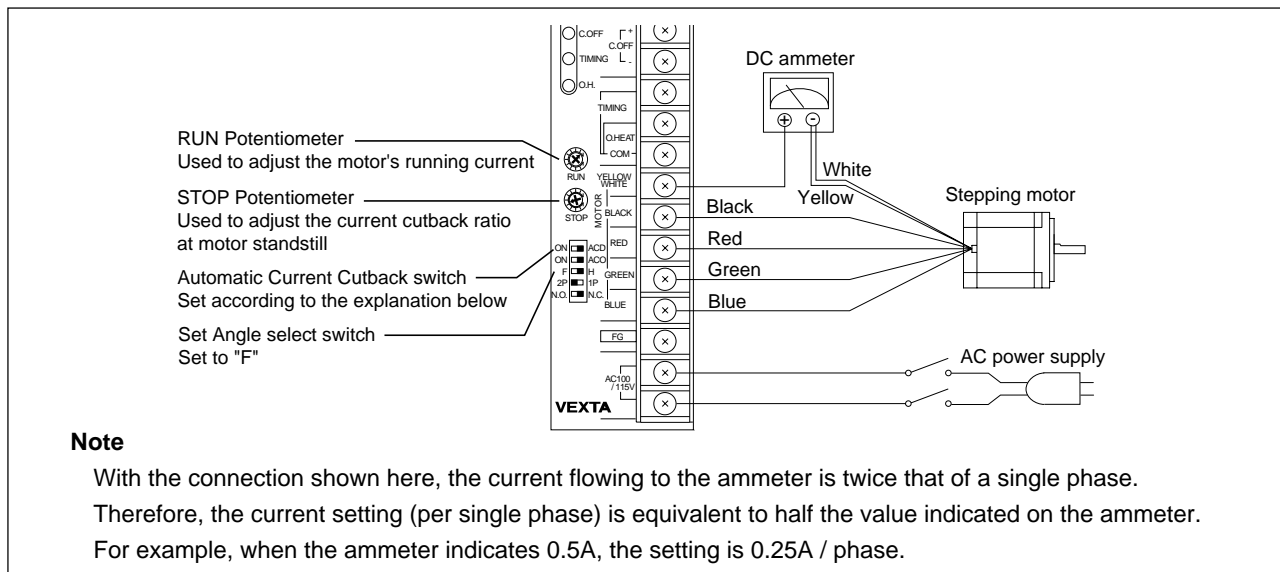   · Set the value indicated on the ammeter to twice the desired current setting (per phase).

(4) Turn the automatic current reduction switch back to "ON".

(5) Set the step angle select switch back to desired position.

Setting the Motor Standstill Current

(1) Switch automatic current reduction to "ON".
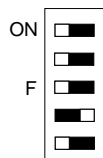
(2) After connecting the motor and DC ammeter, turn the power on.

(3) Set using the STOP potentiometer.

    · Set the value indicated on the ammeter to twice the desired current setting (per phase).

    · The standstill current is set at the factory to approximately 40% of the running current.

(4) Turn the automatic current reduction switch back to "ON".

(5) Set the step angle select switch back to desired position.

Note

To suppress heat generation, always keep the automatic current reduction switch on (except when setting the current).

Troubleshooting

When your stepping motor is not operating properly, identify the problem using the table below and then take the measures described therein.

If that does not solve the problem, inquire at your nearest sales office.

Notes

- Do not take the motor apart. The motor may not perform as indicated in the specifications after reassembling.

Problem	Things to Check	Possible Solution
The motor doesn't have any holding torque. (The shaft can be easily turned by hand.)	(1) Is the driver's power indicator on? (It should be on.)	- If it is not on, check the power connection voltage, and then recheck to see if the power indicator is on.
	(2) Is the driver's C.OFF indicator off? (It should be off.)	- When the all windings off signal has been input, the C.OFF indicator is illuminated and the motor ceases to be excited (has no holding torque).
	(3) Is the driver's O.H. indicator off? (It should off.)	- The O.H. indicator is illuminated when the driver's overheat protection function has been activated (see page 14). When the automatic current off function switch is in the "ACO" position, the motor ceases to be excited (has no holding torque).
	(4) Have the driver, motor and power supply been connected correctly and securely?	- Check the wiring configuration. If the lead wires have been extended, check the connection.
	(5) Have the driver's RUN and STOP potentiometers been turned down too far?	- The problem lies in the potentiometer for adjusting the output current to the motor (see pages 18 and 19). If it is turned down too far, turn it back to the factory setting and then recheck.
	If the motor fails to return to normal even after checking all of the above, the problem could be that the driver is damaged. If that appears to be the case, have the unit repaired after checking the power supply voltage and connections once again.	
The motor doesn't move.	- Begin by checking items (1), (2), (3), (4) and (5).	
The motor doesn't move even after a pulse signal is input.	(6) After input of the pulse signal, are the driver's CW / PLS or CCW / DIR. indicators illuminated?	- If neither the CW / PLS nor the CCW / DIR. indicators are illuminated, check the connections and the pulse signal's voltage and waveform (see page 11).
	(7) When using the 1-pulse input mode (when the pulse input switch is set to "1P"), has the pulse signal been miswired to the CCW / DIR. terminal?	- Connect the pulse signal to the CW / PLS terminal.
	(8) When using the 2-pulse input mode (when the pulse input switch is set to "2P"), are the CW / PLS and CCW / DIR. indicators illuminated simultaneously?	- When a pulse is being input, the motor will not operate if the other pulse input terminal is already in the "photocoupler ON" state. Be sure to set the other terminal to the "photocoupler OFF" state.
The motor rotates in the opposite direction as the CW / CCW pulse signal (or direction signal).	(9) When using the 1-pulse input mode (when the pulse input mode switch is set to "1P"), input a pulse signal to the CW / PLS terminal without making any connections to the CCW / DIR. terminal.	- If the motor then rotates in the CCW / DIR. the motor and driver are functioning properly. Check the level of the rotation direction signal once again. (The correct configuration is "photocoupler ON" = CW / PLS, "photocoupler OFF" = CCW / DIR.).
	(10) When using the 2-pulse input mode (when the pulse input mode switch is set to "2P"), have the CW / PLS and CCW / DIR. pulse signals been connected in reverse?	- Connect the CW pulse to the CW / PLS terminal and the CCW pulse to the CCW / DIR. terminal.

Problem	Things to Check	Possible Solution
The motor isn't operating properly.	· Begin by checking items (4), (5), and (6).	
Start-up is irregular.	(11) In 2-pulse input mode (pulse input mode select switch set to 2P) : Are the driver's CW / PLS indicator and CCW / DIR. line both illuminated at the same time?	· The motor will run irregularly if two pulses are input at the same time.
	(12) Are the motor and load accurately centered? Is the load too large?	· Reduce the load on the motor at start-up by aligning the motor and load shaft centers, reducing statical friction load, etc.
The motor doesn't move enough. The motor moves too much.	(13) Is the actual motor step angle the same as the motor step angle required by the device? (Full / Half step)	· Check the driver's step-angle-select switch setting.
	(14) Is the number of pulses sent to the driver what you expect? Check your controller gettings.	· Check the setting on the controller.
The motor loses synchronism during acceleration (or operation).	(15) Begin by checking item (3).	
	(16) Is the start pulse rate too high?	· Reduce it, and then check.
	(17) Is the acceleration time too short?	· Extend it, and then check.
	(18) Is external noise having an effect?	· Turn off any devices thought to be possible sources of noise, and check the motor when it is operating alone.
There is too much vibration.	(19) There may be excessive torque.	· Try lowering the motor's running current.
	(20) Try changing the pulse rate.	· If changing the pulse rate reduces vibration, the source may be motor resonance. Try changing the pulse rate or the step angle. · Try installing a clean damper (double-shaft motors only).
The motor is too hot. [temperature of the motor case must be less than 100 (212°F)?]	(21) The motor is running too long.	· Shorten running time or extend break time.
	(22) Is the automatic current cutback function turned off?	· Set the current reduction (current cutback) switch on the driver to ON.
	(23) Try changing the pulse rate.	· The motor's temperature rise varies depending on the pulse rate. Refer to the speed-torque characteristics in the catalog, and operate at a lower input speed. · Do not let the motor case get hotter than 100 (212°F).
The automatic current cutback function doesn't work.	(24) Is the pulse indicator OFF after the pulse signals are complete?	· This function doesn't work, and the motor current is not reduced, when the pulse signal is held at the "photocoupler ON". Always return it to the "photocoupler OFF".
	(25) Is the automatic current reduction (current cutback) function turned off?	· Set the current reduction (current cutback) switch on the driver to ON.

Specifications

UMK24 □AA / BA

Package model	Single shaft	**UMK243AA**	**UMK244AA**	**UMK245AA**
	Double shaft	**UMK243BA**	**UMK244BA**	**UMK245BA**

Motor

Motor model	Single shaft	PK243-01AA	PK244-01AA	PK245-01AA
	Double shaft	PK243-01BA	PK244-01BA	PK245-01BA
Max. holding torque	N·m (oz·in)	0.16 (22.2)	0.26 (36.1)	0.32 (44.4)
Rotor inertia	kg·m^2 (oz·in^2)	35×10^{-7} (0.192)	54×10^{-7} (0.296)	68×10^{-7} (0.372)
Rated current	A/phase	0.95	1.2	
Mass	kg (lbs.)	0.21 (0.47)	0.27 (0.6)	0.35 (0.78)
Step angle		1.8°		
Shaft runout	mm (inch)	0.05 (0.002) T.I.R.		
Concentricity	mm (inch)	0.075 (0.003) T.I.R.		
Perpendicularity	mm (inch)	0.075 (0.003) T.I.R.		
Step accuracy		± 3minutes		
Insulation class		Class B [130 (266°F)]		
Insulation resistance		100M□ minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.		
Dielectric strength		Sufficient to withstand 0.5kV, 60Hz applied between the motor coils and casing for one minute, under normal temperature and humidity.		
Ambient temperature range		-10□ +50□ (+14°F +122°F)		

Notes

Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2 phase extitation). Use this value to compare motor torque performance. When using the motor with the included driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 40%.

The value given for max. holding torque is the value for the custom driver with rated current and 2 phase excitation.

Step Accuracy : At full step with no load. (It varies with load.)

Driver

Driver model		UDK2109A	UDK2112A
Driving mode		Constant current chopper drive	
Driving motor current		0.95A / phase max.	1.2A / phase max.
Excitation mode		Full step (2 phase excitation) : 1.8°/ step Half step (1-2 phase excitation) : 0.9°/ step	
Input signals	Input signal circuit	Photocoupler input, Input resistance 220□, Input current 20mA maximum. Signal voltage Photocoupler ON : +4 +5V, Photocoupler OFF : 0 +0.5V	
	Pulse signal (CW pulse signal)	Step command pulse signal (CW step command signal at 2-pulse input mode) Pulse width : 5µs minimum, Pulse rise / fall : 2µs maximum Motor moves when the photocoupler state changes from ON to OFF.	
	Rotational direction signal (CCW pulse signal)	Counterclockwise rotation command (Directional command at 1-pulse input mode, Photocoupler ON : CW, Photocoupler OFF : CCW) Pulse width : 5µs min., pulse rise / pulse fall time : 2µs max. Motor moves when the photocoupler state changes from ON to OFF.	
	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 level set by the RUN switch is supplied to the motor.	
Output signals	Output signal circuit	Photocoupler, open-collector output External use condition : 24V DC maximum, 10mA maximum	
	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 90□ (194°F) (photocoupler : ON or OFF, automatic return available). The motor stops 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, Self-test, Pulse input switch, Step angle switch, Overheat output logic switch.	
Indicator (LED)		Power source input, CW pulse / pulse input, CCW pulse / rotational direction input, All windings off input, Excitation timing output, Overheat output	
Driver cooling method		Natural ventilation	
Power supply voltage		Single-phase 115V AC ± 15% 60Hz 1A max. or Single-phase 100V AC ± 15% 50/60Hz 1A max.	Single-phase 115V AC ± 15% 60Hz 1.4A max. or Single-phase 100V AC ± 15% 50/60Hz 1.4A max.
Weight (Mass)	kg (lbs.)	0.47 (1.04)	
Insulation resistance		100M□ minimum under normal temperature and humidity, when measure by a DC500V megger between the case and power input terminal, case and signal input / output terminal, power input terminal and signal input / output terminal.	
Dielectric strength		Sufficient to withstand 1.0kV, 60Hz applied between the case and power input terminal, case and signal input / output terminal power input terminal and signal input / output terminal for one minute, under normal temperature and humidity.	
Ambient temperature range		0□ +40□ (+32°F +104°F)	

Note

The value for the power supply current is the driver's maximum input current when the motor is under a load. The minimum required value varies within range depending on the type of motor, operating rate, and load.

UMK26 AA / BA

Package model	Single shaft	**UMK264AA**	**UMK266AA**	**UMK268AA**
	Double shaft	**UMK264BA**	**UMK266BA**	**UMK268BA**

Motor

		UMK264	UMK266	UMK268
Motor model	Single shaft	PK264-02AA	PK266-02AA	PK268-02AA
	Double shaft	PK264-02BA	PK266-02BA	PK268-02BA
Max. holding torque	N·m (oz·in)	0.39 (54.1)	0.9 (124)	1.35 (187)
Rotor inertia	kg·m^2 (oz·in^2)	120×10^{-7} (0.66)	300×10^{-7} (1.64)	480×10^{-7} (2.63)
Rated current	A/phase	2		
Mass	kg (lbs.)	0.45 (1)	0.7 (1.55)	1 (2.21)
Step angle		1.8°		
Shaft runout	mm (inch)	0.05 (0.002) T.I.R.		
Concentricity	mm (inch)	0.075 (0.003) T.I.R.		
Perpendicularity	mm (inch)	0.075 (0.003) T.I.R.		
Step accuracy		± 3minutes		
Insulation class		Class B [130 (266°F)]		
Insulation resistance		100M minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.		
Dielectric strength		Sufficient to withstand 1kV, 60Hz applied between the motor coils and casing for one minute, under normal temperature and humidity.		
Ambient temperature range		-10 +50 (+14°F +122°F)		

Notes
  Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2 phase extitation). Use this value to compare motor torque performance. When using the motor with the included driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 40%.
  The value given for max. holding torque is the value for the custom driver with rated current and 2 phase excitation.
  Step Accuracy : At full step with no load. (It varies with load.)

Driver

Driver model		UDK2120A
Driving mode		Constant current chopper drive
Driving motor current		2A / phase max.
Excitation mode		Full step (2 phase excitation) : 1.8°/ step Half step (1-2 phase excitation) : 0.9°/ step
Input signals	Input signal circuit	Photocoupler input, Input resistance 220 , Input current 20mA maximum. Signal voltage Photocoupler ON : +4 +5V, Photocoupler OFF : 0 +0.5V
	Pulse signal (CW pulse signal)	Step command pulse signal (CW step command signal at 2-pulse input mode) Pulse width : 5µs minimum, Pulse rise / fall : 2µs maximum Motor moves when the photocoupler state changes from ON to OFF.
	Rotational direction signal (CCW pulse signal)	Counterclockwise rotation command (Directional command at 1-pulse input mode, Photocoupler ON : CW, Photocoupler OFF : CCW) Pulse width : 5µs min., pulse rise / pulse fall time : 2µs max. Motor moves when the photocoupler state changes from ON to OFF.
	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 level set by the RUN switch is supplied to the motor.
Output signals	Output signal circuit	Photocoupler, open-collector output External use condition : 24V DC maximum, 10mA maximum
	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 90 (194°F) (photocoupler : ON or OFF, automatic return available). The motor stops 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, Self-test, Pulse input switch, Step angle switch, Overheat output logic switch.
Indicator (LED)		Power source input, CW pulse / pulse input, CCW pulse / rotational direction input, All windings off input, Excitation timing output, Overheat output
Driver cooling method		Natural ventilation
Power supply voltage		Single-phase 115V AC ± 15% 60Hz 2.2A max. or Single-phase 100V AC ± 15% 50/60Hz 2.2A max.
Weight (Mass)	kg (lbs.)	0.47 (1.04)
Insulation resistance		100M minimum under normal temperature and humidity, when measure by a DC500V megger between the case and power input terminal, case and signal input / output terminal, power input terminal and signal input / output terminal.
Dielectric strength		Sufficient to withstand 1.0kV, 60Hz applied between the case and power input terminal, case and signal input / output terminal power input terminal and signal input / output terminal for one minute, under normal temperature and humidity.
Ambient temperature range		0 +40 (+32°F +104°F)

Note
  The value for the power supply current is the driver's maximum input current when the motor is under a load. The minimum required value varies within range depending on the type of motor, operating rate, and load.

UMK24　MAA / MBA

Package model	Single shaft	**UMK243MAA**	**UMK244MAA**	**UMK245MAA**
	Double shaft	**UMK243MBA**	**UMK244MBA**	**UMK245MBA**

Motor

Motor model	Single shaft	PK243MAA	PK244MAA	PK245MAA
	Double shaft	PK243MBA	PK244MBA	PK245MBA
Max. holding torque	N·m (oz·in)	0.16 (22.2)	0.26 (36.1)	0.32 (44.4)
Rotor inertia	kg·m^2 (oz·in^2)	35 × 10^{-7}(0.192)	54 × 10^{-7}(0.296)	68 × 10^{-7}(0.372)
Rated current	A/phase	0.95	1.2	
Mass	kg (lbs.)	0.21 (0.47)	0.27 (0.6)	0.35 (0.78)
Step angle		0.9°		
Shaft runout	mm (inch)	0.05 (0.002) T.I.R.		
Concentricity	mm (inch)	0.075 (0.003) T.I.R.		
Perpendicularity	mm (inch)	0.075 (0.003) T.I.R.		
Step accuracy		± 3minutes		
Insulation class		Class B [130　(266°F)]		
Insulation resistance		100M　minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.		
Dielectric strength		Sufficient to withstand 0.5kV, 60Hz applied between the motor coils and casing for one minute, under normal temperature and humidity.		
Ambient temperature range		-10　+50　(+14°F　+122°F)		

Notes

　Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2 phase extitation). Use this value to compare motor torque performance. When using the motor with the included driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 40%.

　The value given for max. holding torque is the value for the custom driver with rated current and 2 phase excitation.

　Step Accuracy : At full step with no load. (It varies with load.)

Driver

Driver model		UDK2109A	UDK2112A	
Driving mode		Constant current chopper drive		
Driving motor current		0.95A / phase max.	1.2A / phase max.	
Excitation mode		Full step (2 phase excitation) : 0.9°/ step Half step (1-2 phase excitation) : 0.45°/ step		
Input signals	Input signal circuit	Photocoupler input, Input resistance 220　, Input current 20mA maximum. Signal voltage Photocoupler ON : +4　+5V, Photocoupler OFF : 0　+0.5V		
	Pulse signal (CW pulse signal)	Step command pulse signal (CW step command signal at 2-pulse input mode) Pulse width : 5µs minimum, Pulse rise / fall : 2µs maximum Motor moves when the photocoupler state changes from ON to OFF.		
	Rotational direction signal (CCW pulse signal)	Counterclockwise rotation command (Directional command at 1-pulse input mode, Photocoupler ON : CW, Photocoupler OFF : CCW) Pulse width : 5µs min., pulse rise / pulse fall time : 2µs max. Motor moves when the photocoupler state changes from ON to OFF.		
	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 level set by the RUN switch is supplied to the motor.		
Output signals	Output signal circuit	Photocoupler, open-collector output External use condition : 24V DC maximum, 10mA maximum		
	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 90　(194°F) (photocoupler : ON or OFF, automatic return available). The motor stops 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, Self-test, Pulse input switch, Step angle switch, Overheat output logic switch.		
Indicator (LED)		Power source input, CW pulse / pulse input, CCW pulse / rotational direction input, All windings off input, Excitation timing output, Overheat output		
Driver cooling method		Natural ventilation		
Power supply voltage		PK243MAA, PK243MBA Single-phase 115V AC ± 15% 60Hz 0.7A max. or Single-phase 100V AC ± 15% 50/60Hz 0.7A max.	PK244MAA, PK244MBA Single-phase 115V AC ± 15% 60Hz 0.7A max. or Single-phase 100V AC ± 15% 50/60Hz 0.7A max.	PK245MAA, PK245MBA Single-phase 115V AC ± 15% 60Hz 0.8A max. or Single-phase 100V AC ± 15% 50/60Hz 0.8A max.
Weight (Mass)	kg (lbs.)	0.47 (1.04)		
Insulation resistance		100M　minimum under normal temperature and humidity, when measure by a DC500V megger between the case and power input terminal, case and signal input / output terminal, power input terminal and signal input / output terminal.		
Dielectric strength		Sufficient to withstand 1.0kV, 60Hz applied between the case and power input terminal, case and signal input / output terminal power input terminal and signal input / output terminal for one minute, under normal temperature and humidity.		
Ambient temperature range		0　+40　(+32°F　+104°F)		

Note

　The value for the power supply current is the driver's maximum input current when the motor is under a load. The minimum required value varies within range depending on the type of motor, operating rate, and load.

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UMK26　MAA / MBA

Package model		UMK264MAA	UMK266MAA	UMK268MAA
	Single shaft	**UMK264MAA**	**UMK266MAA**	**UMK268MAA**
	Double shaft	**UMK264MBA**	**UMK266MBA**	**UMK268MBA**

Motor

		UMK264	UMK266	UMK268
Motor model	Single shaft	PK264MA	PK266MA	PK268MA
	Double shaft	PK264MB	PK266MB	PK268MB
Max. holding torque	N·m (oz·in)	0.39 (54.1)	0.9 (124)	1.35 (187)
Rotor inertia	kg·m^2 (oz·in^2)	120 × 10^{-7} (0.66)	300 × 10^{-7} (1.64)	480 × 10^{-7} (2.63)
Rated current	A/phase		2	
Mass	kg (lbs.)	0.45 (1)	0.7 (1.55)	1 (2.21)
Step angle			0.9°	
Shaft runout	mm (inch)		0.05 (0.002) T.I.R.	
Concentricity	mm (inch)		0.075 (0.003) T.I.R.	
Perpendicularity	mm (inch)		0.075 (0.003) T.I.R.	
Step accuracy			± 3minutes	
Insulation class			Class B [130　(266°F)]	
Insulation resistance		100M　minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.		
Dielectric strength		Sufficient to withstand 1kV, 60Hz applied between the motor coils and casing for one minute, under normal temperature and humidity.		
Ambient temperature range		-10　+50　(+14°F　+122°F)		

Notes

Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2 phase extitation). Use this value to compare motor torque performance. When using the motor with the included driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 40%.

The value given for max. holding torque is the value for the custom driver with rated current and 2 phase excitation.

Step Accuracy : At full step with no load. (It varies with load.)

Driver

Driver model		UDK2120A
Driving mode		Constant current chopper drive
Driving motor current		2A / phase max.
Excitation mode		Full step (2 phase excitation) : 0.9°/ step Half step (1-2 phase excitation) : 0.45°/ step
Input signals	Input signal circuit	Photocoupler input, Input resistance 220　, Input current 20mA maximum. Signal voltage Photocoupler ON : +4　+5V, Photocoupler OFF : 0　+0.5V
	Pulse signal (CW pulse signal)	Step command pulse signal (CW step command signal at 2-pulse input mode) Pulse width : 5μs minimum, Pulse rise / fall : 2μs maximum Motor moves when the photocoupler state changes from ON to OFF.
	Rotational direction signal (CCW pulse signal)	Counterclockwise rotation command (Directional command at 1-pulse input mode, Photocoupler ON : CW, Photocoupler OFF : CCW) Pulse width : 5μs min., pulse rise / pulse fall time : 2μs max. Motor moves when the photocoupler state changes from ON to OFF.
	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 level set by the RUN switch is supplied to the motor.
Output signals	Output signal circuit	Photocoupler, open-collector output External use condition : 24V DC maximum, 10mA maximum
	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 90　(194°F) (photocoupler : ON or OFF, automatic return available). The motor stops 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, Self-test, Pulse input switch, Step angle switch, Overheat output logic switch.
Indicator (LED)		Power source input, CW pulse / pulse input, CCW pulse / rotational direction input, All windings off input, Excitation timing output, Overheat output
Driver cooling method		Natural ventilation
Power supply voltage		Single-phase 115V AC ± 15% 60Hz 1.3A max. or Single-phase 100V AC ± 15% 50/60Hz 1.3A max.
Weight (Mass)	kg (lbs.)	0.47 (1.04)
Insulation resistance		100M　minimum under normal temperature and humidity, when measure by a DC500V megger between the case and power input terminal, case and signal input / output terminal, power input terminal and signal input / output terminal.
Dielectric strength		Sufficient to withstand 1.0kV, 60Hz applied between the case and power input terminal, case and signal input / output terminal power input terminal and signal input / output terminal for one minute, under normal temperature and humidity.
Ambient temperature range		0　+40　(+32°F　+104°F)

Note

The value for the power supply current is the driver's maximum input current when the motor is under a load. The minimum required value varies within range depending on the type of motor, operating rate, and load.
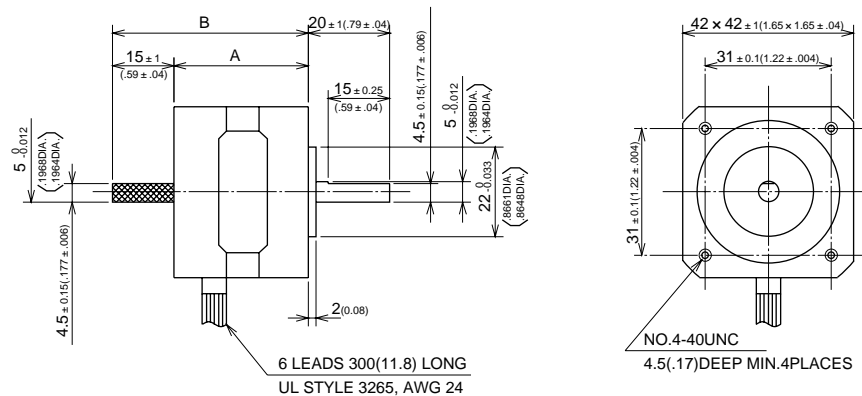
Dimensions

Motor   Unit : mm (inch)

UMK24   (M)

Package model Single shaft Double shaft	Motor model Single shaft Double shaft	Dimension A mm (inch)	Dimension B mm (inch)
UMK243AA, UMK243MAA	PK243-01AA, PK243MAA	33 ± 1 (1.3 ± 0.04)	———
UMK243BA, UMK243MBA	PK243-01BA, PK243MBA		48 ± 2 (1.89 ± 0.08)
UMK244AA, UMK244MAA	PK244-01AA, PK244MAA	39 ± 1 (1.54 ± 0.04)	———
UMK244BA, UMK244MBA	PK244-01BA, PK244MBA		54 ± 2 (2.13 ± 0.08)
UMK245AA, UMK245MAA	PK245-01AA, PK245MAA	47 ± 1 (1.85 ± 0.04)	———
UMK245BA, UMK245MBA	PK245-01BA, PK245MBA		62 ± 2 (2.44 ± 0.08)

Flat length 15 ± 0.25 (.59 ± .01)

6 LEADS 300(11.8) LONG
UL STYLE 3265, AWG 24

NO.4-40UNC
4.5(.17)DEEP MIN.4PLACES

Note : ▨ Shaded areas indicate double shaft models only.

UMK26   (M)

Package model Single shaft Double shaft	Motor model Single shaft Double shaft	Dimension A mm (inch)	Dimension B mm (inch)
UMK264AA, UMK264MAA	PK264-02A, PK264MA	39 ± 1 (1.54 ± 0.04)	———
UMK264BA, UMK264MBA	PK264-02B, PK264MB		55 ± 2 (2.17 ± 0.08)
UMK266AA, UMK266MAA	PK266-02A, PK266MA	54 ± 1 (2.13 ± 0.04)	———
UMK266BA, UMK266MBA	PK266-02B, PK266MB		70 ± 2 (2.76 ± 0.08)
UMK268AA, UMK268MAA	PK268-02A, PK268MA	76 ± 1 (2.99 ± 0.04)	———
UMK268BA, UMK268MBA	PK268-02B, PK268MB		92 ± 2 (3.62 ± 0.08)

6 LEADS 300(11.8) LONG
UL STYLE 3265, AWG 22
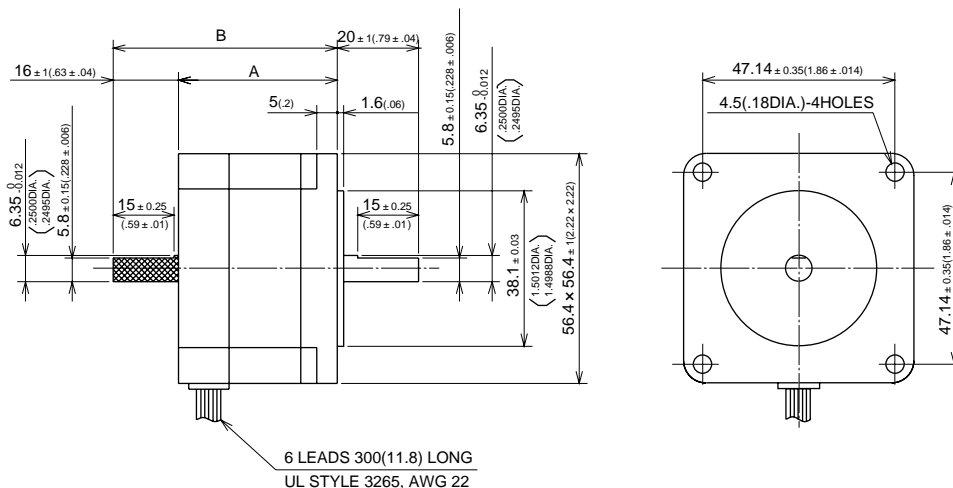
Note : ▨ Shaded areas indicate double shaft models only.

Driver

Unit : mm (inch)

Model : UDK2109A / 2112A / 2120A

SLITS

TERMINAL STAND COVER

M3-17 PLACES

12-M3 P0.5
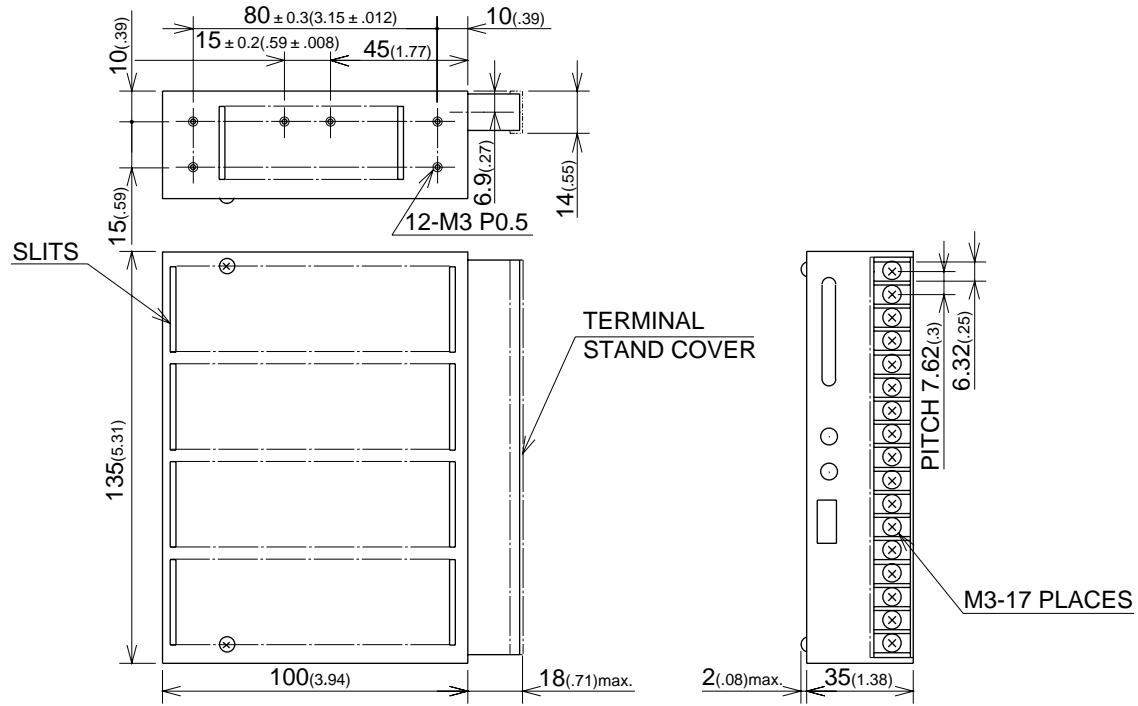
Mounting bracket

Unit : mm (inch)

Mounting bracket A

3.5(.138DIA.) COUNTERSINK 2 PLACE

Mounting bracket B

3.5(.138DIA.) COUNTERSINK 2 PLACE
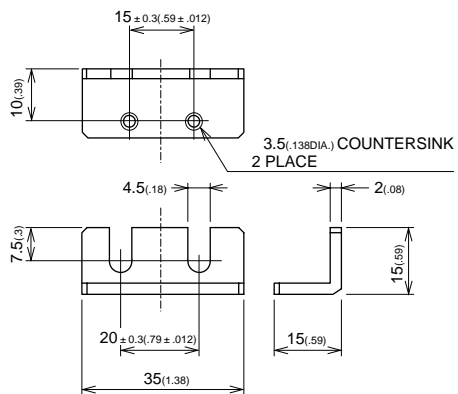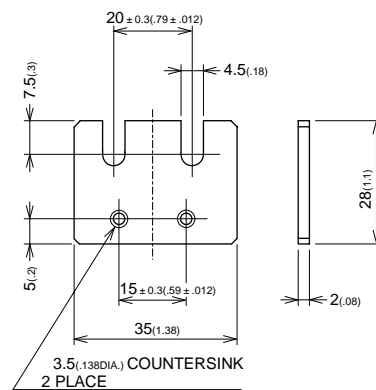
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