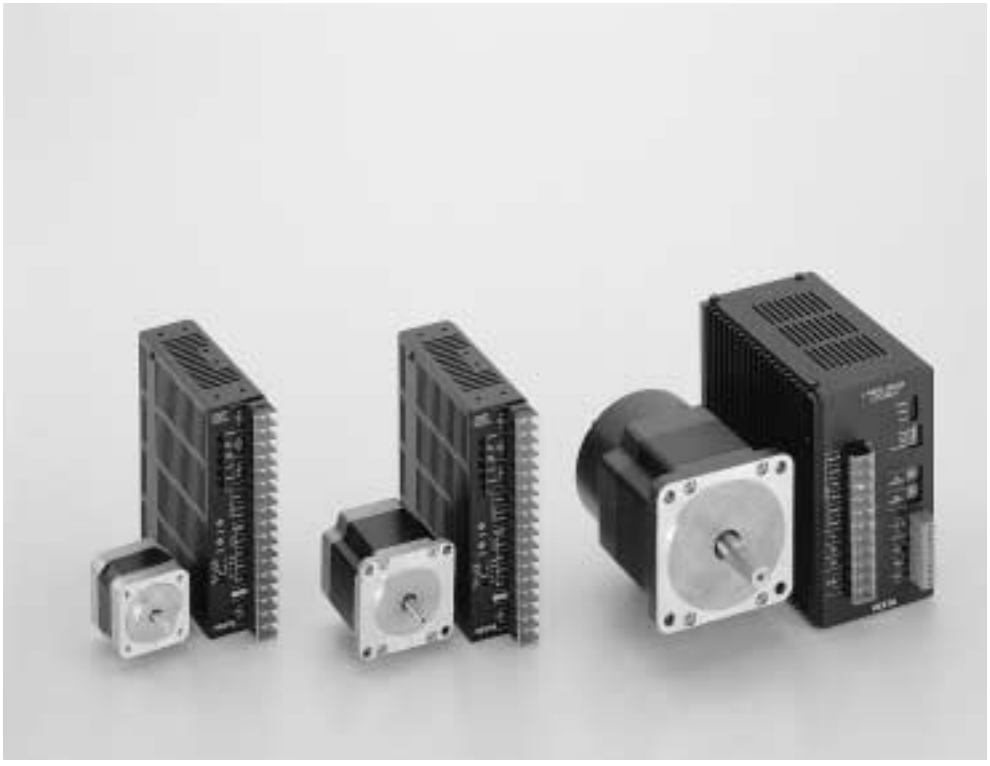
ORIENTAL MOTOR GENERAL CATALOG B



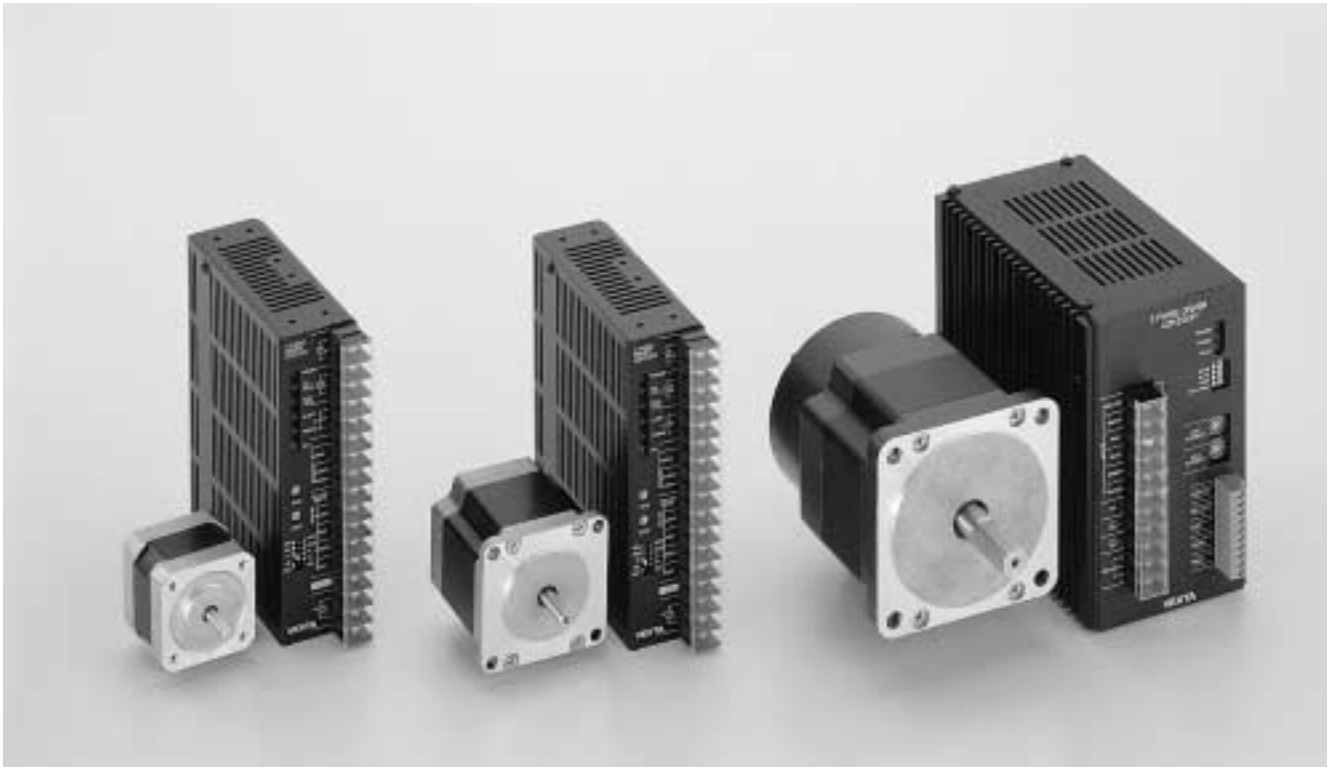
2-PHASE STEPPING MOTOR AND DRIVER PACKAGE

UMK Series

2-PHASE STEPPING MOTOR AND DRIVER PACKAGE

EASY WIRING | PLC DIRECT | RE-GENERATION | PACKAGE | AC INPUT

UMK *Series*



■ FEATURES

1. High Torque

UMK series combines a high torque **PK** motor with a dedicated driver.
Maximum holding torque is as follows:
UMK24□A: 22.2 oz-in (0.16 N·m) ~ 44.4 oz-in (0.32 N·m)
UMK26□A: 54.1 oz-in (0.39 N·m) ~ 187 oz-in (1.35 N·m)
UMK29□A(T): 430 oz-in (3.1 N·m) ~ 1291 oz-in (9.3 N·m)

2. Low Vibration and Low Noise

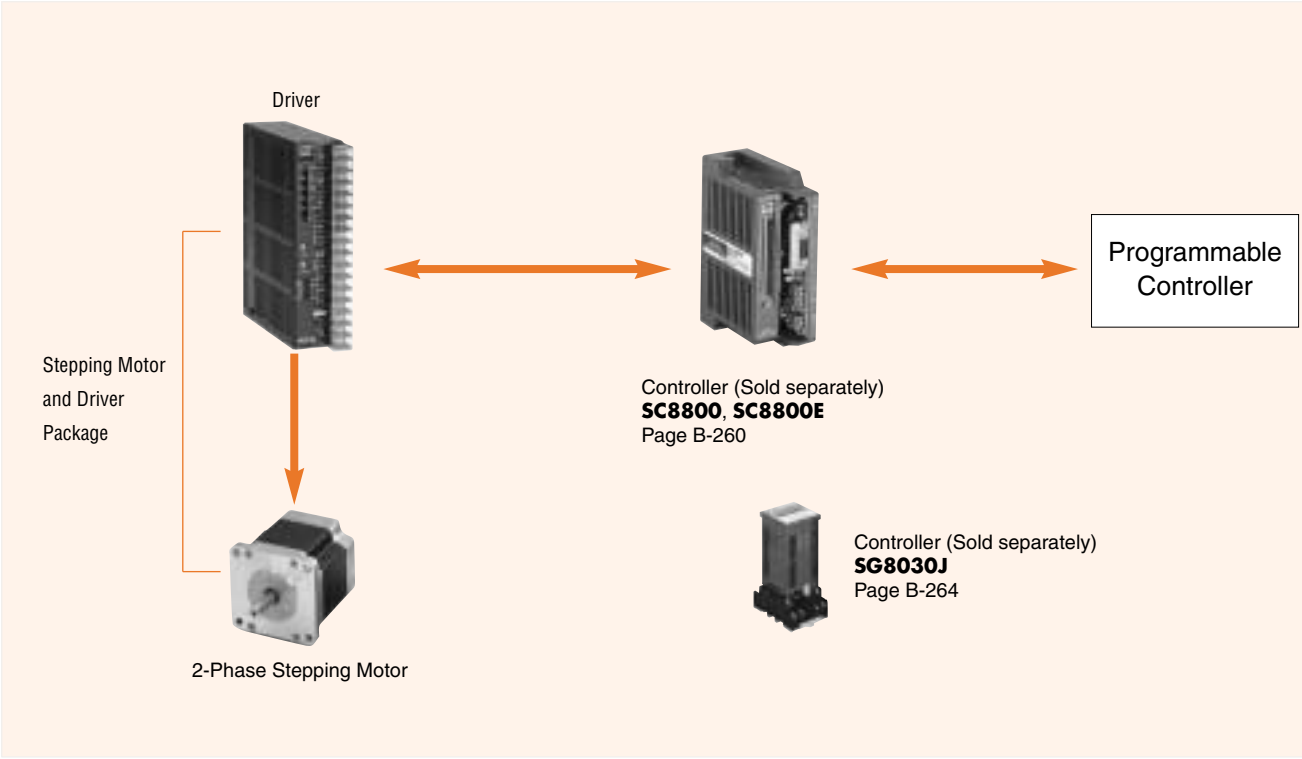
Raising the torque can increase vibration and audible noise. Attention was given to the **UMK** series to ensure low vibration and low noise. For a 2-phase stepping motor running at full step, rotation is achieved by continuous 1.8˚ steps. This is a type of motion that leads naturally to vibration. To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

3. High-Resolution Type

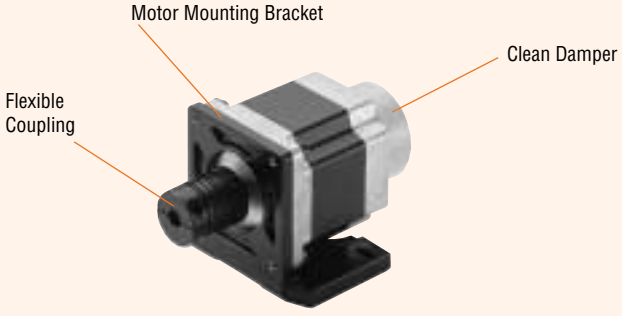
The product line for the **UMK** high-torque 2-phase stepping motor and driver package also includes high resolution types for which the basic step angle (1.8˚/step) for the 2-phase stepping motor is cut in half to 0.9˚/step (for full steps).
The resolution is doubled from the 200 steps per rotation for the standard types to 400 steps per rotation. Also, the high-resolution type can be half-stepped to obtain 800 steps per rotation.

■ UMK SERIES SYSTEM CONFIGURATION

A high-torque 2-phase stepping motor and dedicated driver are combined to make high-precision positioning with open loop control possible.



■ ACCESSORIES (Sold separately)



- Motor Mounting Brackets
  Page B-298

- Clean Dampers
  Page B-300

Effective at suppressing motor vibration and improving performance.

- Flexible Couplings
  Page B-301

MC Motor Couplings

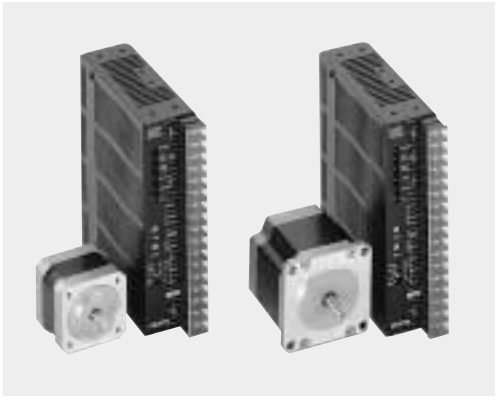
UMK Series Standard Type

(Basic Step Angle 1.8˚) Page B-214

The product line now has three frame sizes, in addition to the **UMK24**□ type with a motor frame size of 1.65 inch (42 mm) square and the 2.22 inch (56.4 mm) square **UMK26**□ type, there is now the new 3.35 inch (85 mm) **UMK29**□ type. The **UMK29**□ is also available with a terminal box.

Package Model		Maximum Holding Torque	
Single Shaft	Double Shaft	oz-in	N m
UMK243AA	**UMK243BA**	22.2	0.16
UMK244AA	**UMK244BA**	36.1	0.26
UMK245AA	**UMK245BA**	44.4	0.32
UMK264AA	**UMK264BA**	54.1	0.39
UMK266AA	**UMK266BA**	124	0.9
UMK268AA	**UMK268BA**	187	1.35
UMK296AA	**UMK296BA**	430	3.1
UMK296AAT*	—		
UMK299AA	**UMK299BA**	861	6.2
UMK299AAT*	—		
UMK2913AA	**UMK2913BA**	1291	9.3
UMK2913AAT*	—		

* Terminal Box Type



UMK Series High-Resolution Type

(Basic Step Angle 0.9˚) Page B-222

The **UMK** high-resolution type has a single step angle size of 0.9˚ (400 steps per revolution).
Two frame sizes are available: **UMK24**□**M** with a motor frame size of 1.65inch (42mm) square and **UMK26**□**M** with 2.22inch (56.4mm) square.

Package Model		Maximum Holding Torque	
Single Shaft	Double Shaft	oz-in	N m
UMK243MAA	**UMK243MBA**	22.2	0.16
UMK244MAA	**UMK244MBA**	36.1	0.26
UMK245MAA	**UMK245MBA**	44.4	0.32
UMK264MAA	**UMK264MBA**	54.1	0.39
UMK266MAA	**UMK266MBA**	124	0.9
UMK268MAA	**UMK268MBA**	187	1.35

The UMK Series of Dedicated Drivers. Functional and easy to use.

A full range of driver functions are on the front panel.

Driver operating status is visible at a glance

Signal monitor display — 1, ①

Easy to confirm I/O signals. (✻: **UMK24**□ and **UMK26**□ Only)

POWER	Power input display
CW/PLS✻	CW pulse/pulse input display
CCW/DIR.✻	CCW pulse/rotation direction input display
C.OFF✻	All windings off input display
TIM	Excitation timing output display
O.H.✻	Overheat output display
FAULT	Fault signal output display

Motor operating current adjustment switch
Motor resting current adjustment switch — 2, ②

The motor current is easy to adjust with the potentiometer. No ammeter is necessary.

Automatic current off function switch — 3, ④

If the level of heat within the driver reaches abnormal levels, this function automatically switches the motor current off. The function can be set and released by this switch.

Step angle switch — 4, ⑥

Switches the motor's step angle.
Standard Type F: 1.8˚/step, H: 0.9˚/step
High-Resolution Type F: 0.9˚/step, H: 0.45˚/step

Pulse input method switch — 5, ③

Switches between 1-pulse input and 2-pulse input.

Overheat output logic switch — 6

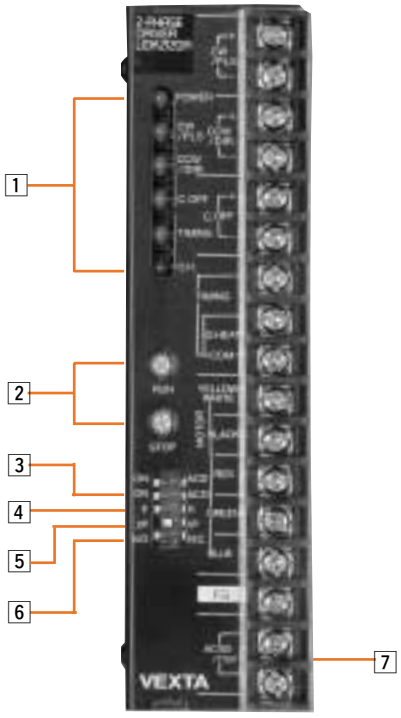
Switches the overheat alarm output logic.
N.O.: Normal open
N.C.: Normal close
Match the setting to the device.

TEST — ⑤

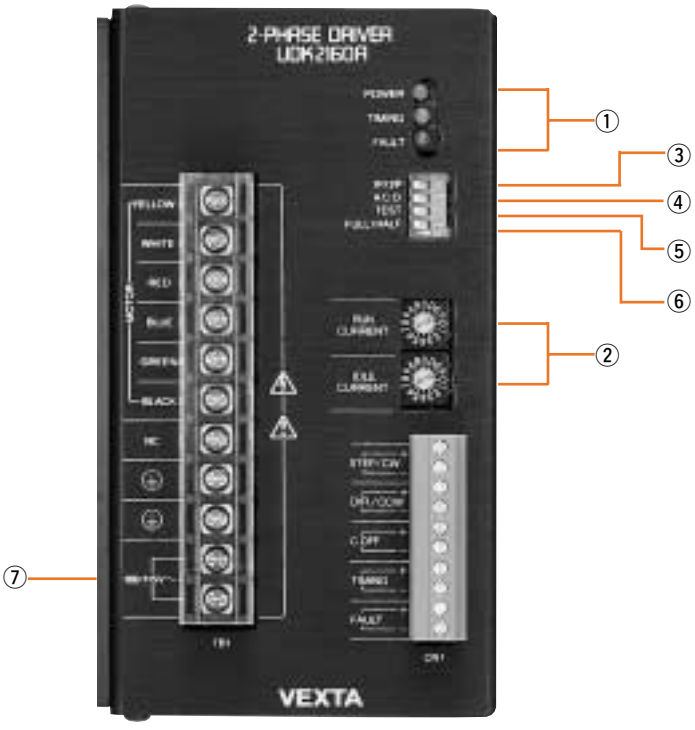
Executing the self- test function switch this function allows for verification of correct wiring connections between the motor and driver. The test can be enabled and disabled with this switch.

Power Supply Terminal — 7, ⑦

Driver for standard type
UMK24□, **UMK26**□



Driver for standard type
UMK29□



PRODUCT NUMBER CODE

UMK 2 6 6 M A A

- **UMK** series
- 2-phase
- Motor Frame Size **4**: 1.65in. (42mm) sq. **6**: 2.22in. (56.4mm) sq.
- Motor Case Length
- High-Resolution Type
- Shaft Type **A**: Single Shaft **B**: Double Shaft
- USA Version

SPECIFICATIONS HIGH-RESOLUTION TYPE

Package Model		Single Shaft	UMK243MAA	UMK244MAA	UMK245MAA	UMK264MAA	UMK266MAA	UMK268MAA
		Double Shaft	UMK243MBA	UMK244MBA	UMK245MBA	UMK264MBA	UMK266MBA	UMK268MBA
Maximum Holding Torque		oz-in N · m	22.2 0.16	36.1 0.26	44.4 0.32	54.1 0.39	124 0.9	187 1.35
Rotor Inertia		oz-in^2 kg· m^2	0.192 35×10^{-7}	0.296 54×10^{-7}	0.372 68×10^{-7}	0.66 120×10^{-7}	1.64 300×10^{-7}	2.63 480×10^{-7}
Rated Current		A/phase	0.95	1.2		2		
Basic Step Angle			0.9°					
Insulation Class			Class B [266°F (130°C)]					
Power Source			Single-Phase 115V AC±15% 60Hz or Single-Phase 100V AC ± 15% 50/60 Hz					
			0.7A maximum		0.8A maximum	1.3A maximum		
Output Current		A/phase	0.95	1.2		2		
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 220Ω, 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 direction command pulse 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.					
	● Rotation Direction Signal (CW Pulse Signal)		Rotation direction pulse signal, Photocoupler ON: CW, Photocoupler OFF: CCW (CCW direction command pulse signal at 2-pulse input mode. Pulse width: 5μs minimum, Pulse rise/fall: 2μs maximum. Motor move 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: 24 V 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 194°F (90°C). (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, Pulse 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					
Weight (Mass)		Motor lb. (kg)	0.47 (0.21)	0.6 (0.27)	0.78 (0.35)	1 (0.45)	1.55 (0.7)	2.21 (1)
		Driver lb. (kg)	1.04 (0.47)					
Insulation Resistance		Motor	100MΩ minimum under normal temperature and humidity, when measured by a DC500V megger between the motor coils and the motor casing.					
		Driver	100MΩ minimum under normal temperature and humidity, when measured 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		Motor	Sufficient to withstand 1.0kV (0.5kV for **UMK24□M** type), 60Hz applied between the motor coils and casing for one minute, under normal temperature and humidity.					
		Driver	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		Motor	+14°F～+122°F (−10°C～+50°C)					
		Driver	+32°F～+104°F (0°C～+40°C)					

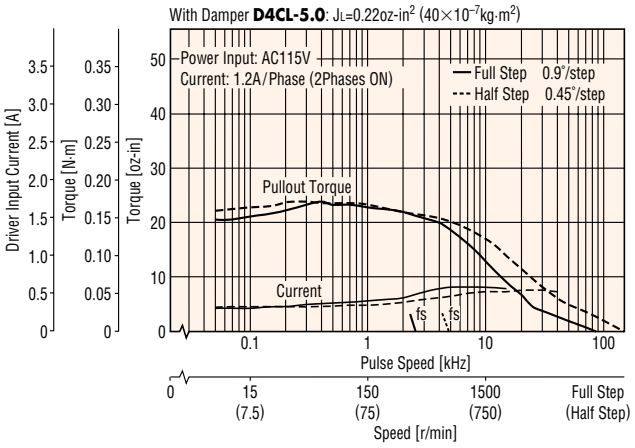
- Maximum holding torque refers to the holding torque at motor standstill when the rated current is supplied to the motor (2 phase excitation). Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.
- The power source input current value represents the maximum current. (The input current varies according to the pulse frequency.)

* Responds up to approximately 25kHz with a pulse duty of 50%. When using it at higher speeds, narrow the pulse width (shorten the photocoupler's ON time.)

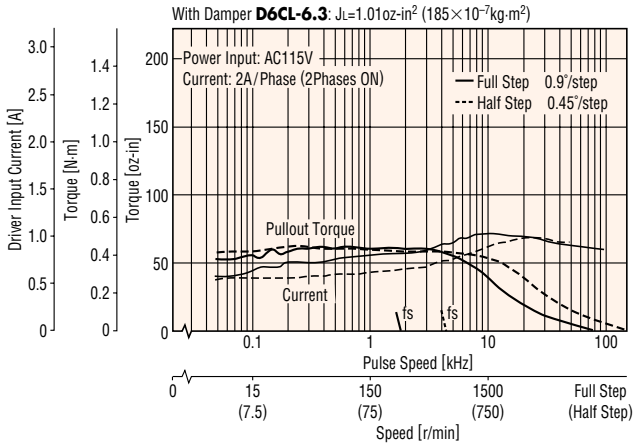
■ SPEED vs. TORQUE CHARACTERISTICS

fs: Maximum Starting Pulse Rate

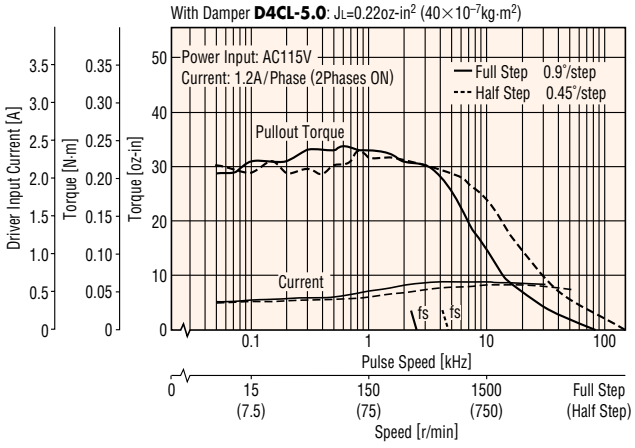
UMK243MBA



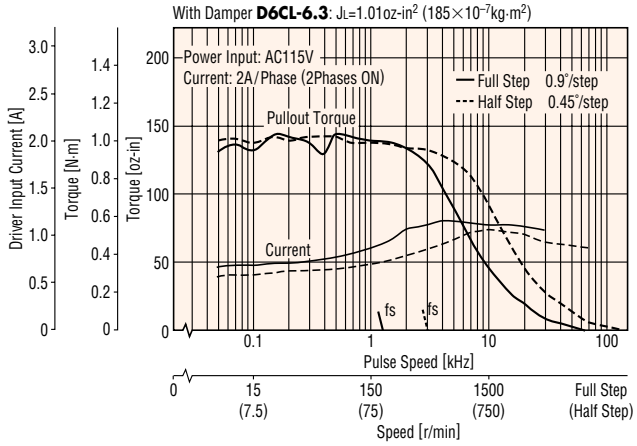
UMK264MBA



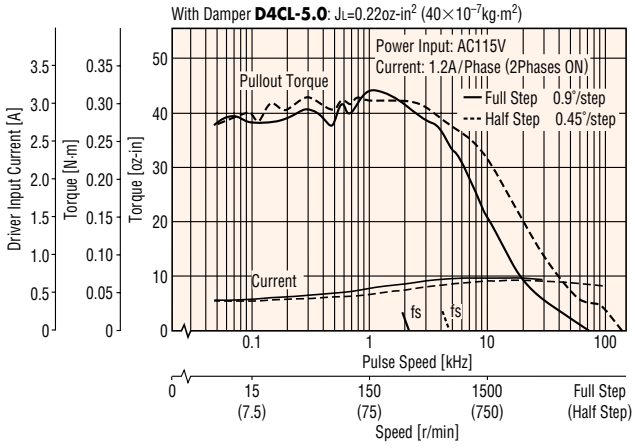
UMK244MBA



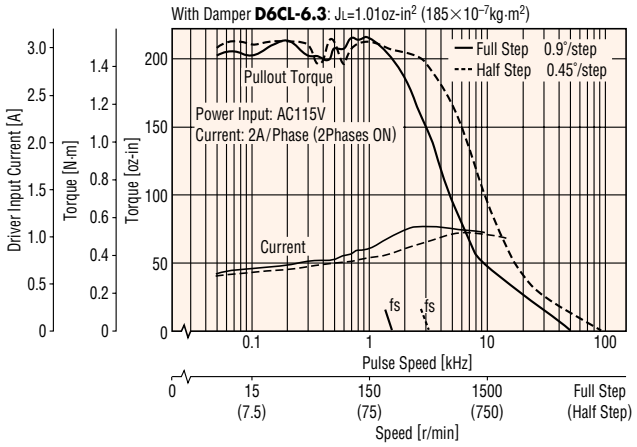
UMK266MBA



UMK245MBA



UMK268MBA



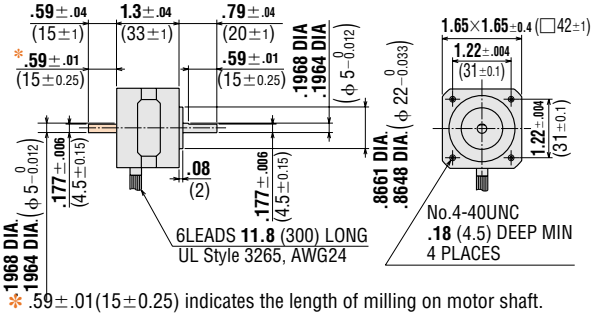
Note:

- Pay attention to heat dissipation from the motor and driver. The motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 212°F (100°C).
- When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 40%.

■ DIMENSIONS scale 1:4, unit = inch (mm)

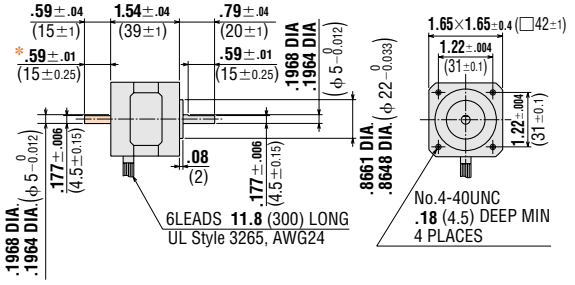
●MOTOR

UMK243MAA (Single shaft)
Motor Model: PK243MAA Weight 0.47 lb. (Mass 0.21kg)
UMK243MBA (Double shaft)
Motor Model: PK243MBA Weight 0.47 lb. (Mass 0.21kg)



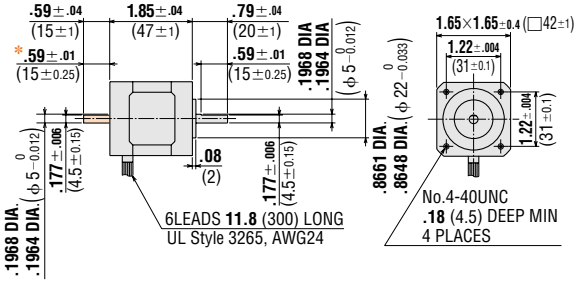
*.59±.01(15±0.25) indicates the length of milling on motor shaft.

UMK244MAA (Single shaft)
Motor Model: PK244MAA Weight 0.6 lb. (Mass 0.27kg)
UMK244MBA (Double shaft)
Motor Model: PK244MBA Weight 0.6 lb. (Mass 0.27kg)



*.59±.01(15±0.25) indicates the length of milling on motor shaft.

UMK245MAA (Single shaft)
Motor Model: PK245MAA Weight 0.78 lb. (Mass 0.35kg)
UMK245MBA (Double shaft)
Motor Model: PK245MBA Weight 0.78 lb. (Mass 0.35kg)

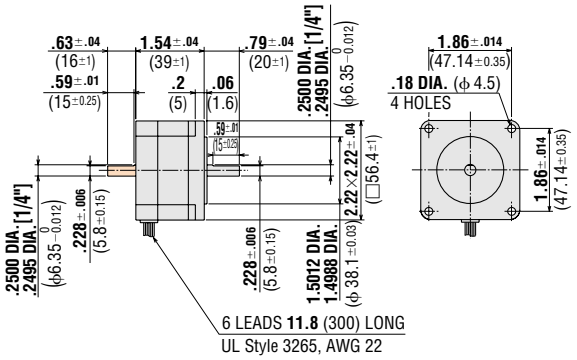


*.59±.01(15±0.25) indicates the length of milling on motor shaft.

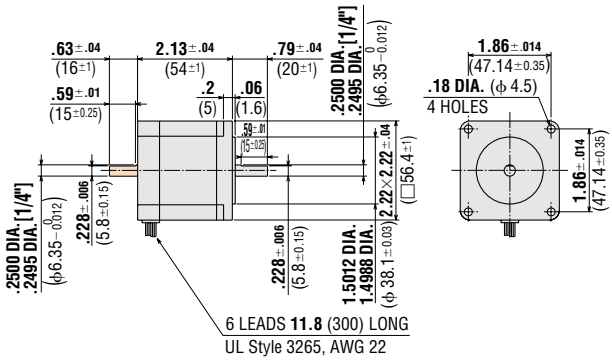
●These external appearance drawings are for doubleshaft models. For a single shaft, ignore the colored areas.

See page B-36 for information on motor installation.

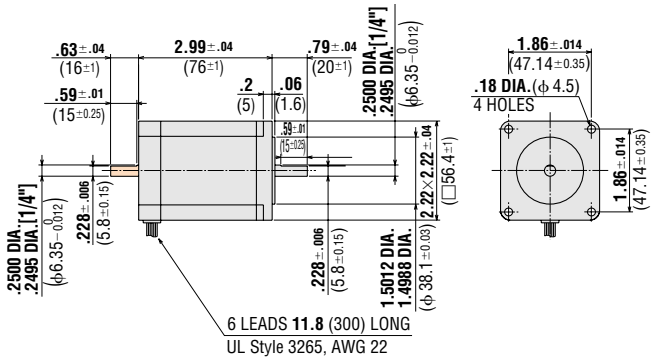
UMK264MAA (Single shaft)
Motor Model: PK264MAA Weight 1 lb. (Mass 0.45kg)
UMK264MBA (Double shaft)
Motor Model: PK264MB Weight 1 lb. (Mass 0.45kg)



UMK266MAA (Single shaft)
Motor Model: PK266MA Weight 1.55 lb. (Mass 0.7kg)
UMK266MBA (Double shaft)
Motor Model: PK266MB Weight 1.55 lb. (Mass 0.7kg)

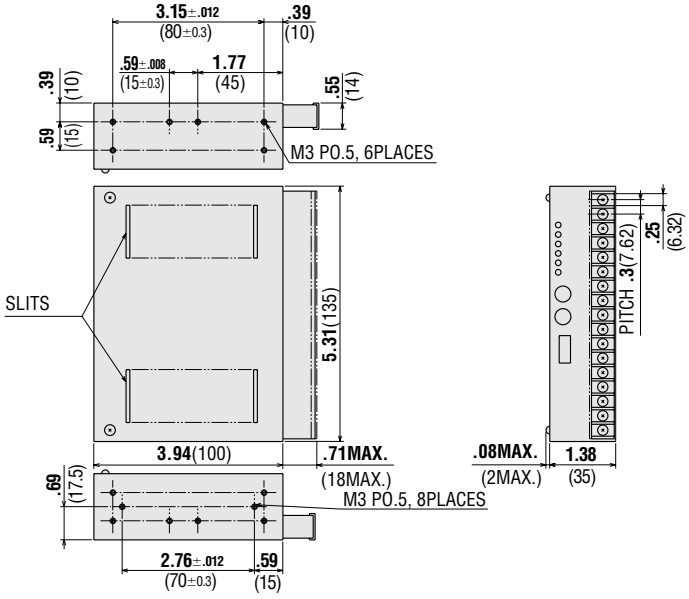


UMK268MAA (Single shaft)
Motor Model: PK268MA Weight 2.21 lb. (Mass 1kg)
UMK268MBA (Double shaft)
Motor Model: PK268MB Weight 2.21 lb. (Mass 1kg)

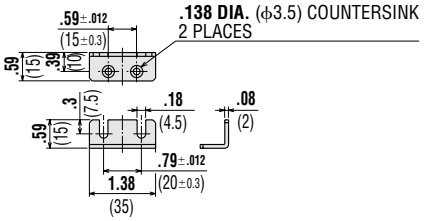


●Driver

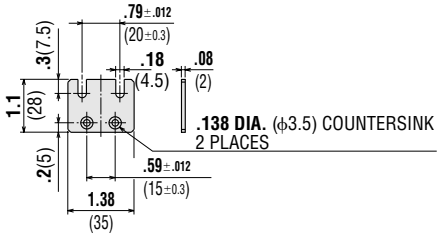
Driver: UDK2109A (For **UMK243M□A**)
UDK2112A (For **UMK244M□A** and **UMK245M□A**)
UDK2120A (For **UMK264M□A**, **UMK266M□A** and **UMK268M□A**)
Weight 1.04 lb. (Mass 0.47kg)



●Mounting tab A (included)



●Mounting tab B (included)



See page B-38 for information on motor installation.

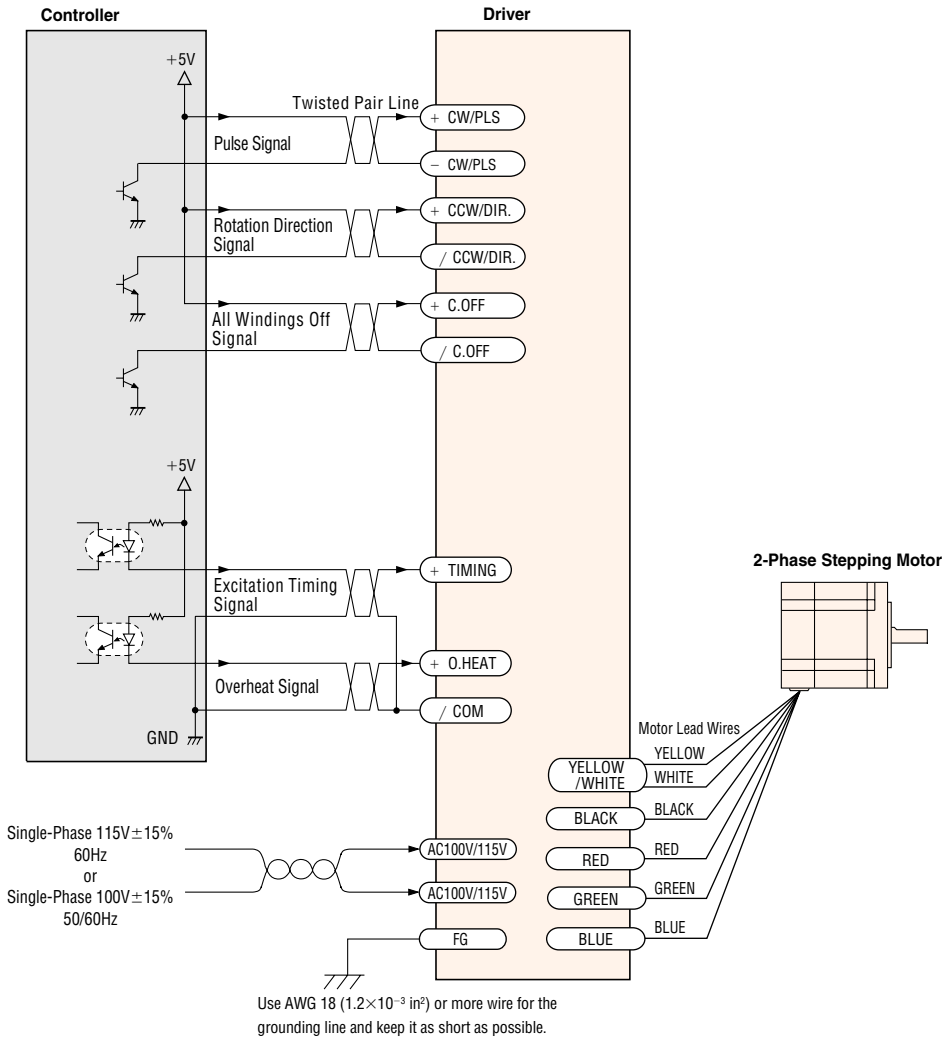
■ LIST OF MOTOR AND DRIVER COMBINATIONS

Type	Package model	Stepping motor		Driver
		Model	Current A/phase	Model
STANDARD	**UMK243□A**	PK243-01□A	0.95	UDK2109A
	UMK244□A **UMK245□A**	PK244-01□A PK245-01□A	1.2	UDK2112A
	UMK264□A **UMK266□A** **UMK268□A**	PK264-02□ PK266-02□ PK268-02□	2	UDK2120A
	UMK296□A **UMK296AAT** **UMK299□A** **UMK299AAT**	PK296-03□A PK296-03AAT PK299-03□A PK299-03AAT	3.2	UDK2160A-4.5
	UMK2913□A **UMK2913AAT**	PK2913-02□A PK2913-02AAT	2.8	UDK2160A-4.0
HIGH-RESOLUTION	**UMK243M□A**	PK243M□A	0.95	UDK2109A
	UMK244M□A **UMK245M□A**	PK244M□A PK245M□A	1.2	UDK2112A
	UMK264M□A **UMK266M□A** **UMK268M□A**	PK264M□ PK266M□ PK268M□	2	UDK2120A

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

■ WIRING DIAGRAMS

●UMK24□A, UMK24□MA
UMK26□A, UMK26□MA



■ Power Supply

Use a power supply that can supply sufficient input current.
When 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)
- Motor startup and stopping is slow.

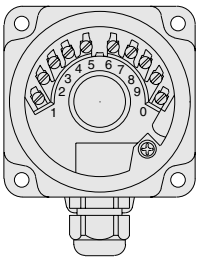
Note:

- Use twisted-pair wire of 3.1×10^{-4} in.^{2} (0.2mm^2) or thicker and 6.6 feet (2m) or iess in length for the signal line.
- Use wire 7.8×10^{-4} in.^{2} (0.5mm^2) or thicker for motor lines (when extended) and power supply lines, and use 1.2×10^{-3} in.^{2} (0.75mm^2) 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 away at least 3.94 in. (10 cm) from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.

●UMK29□A, UMK29□AAT

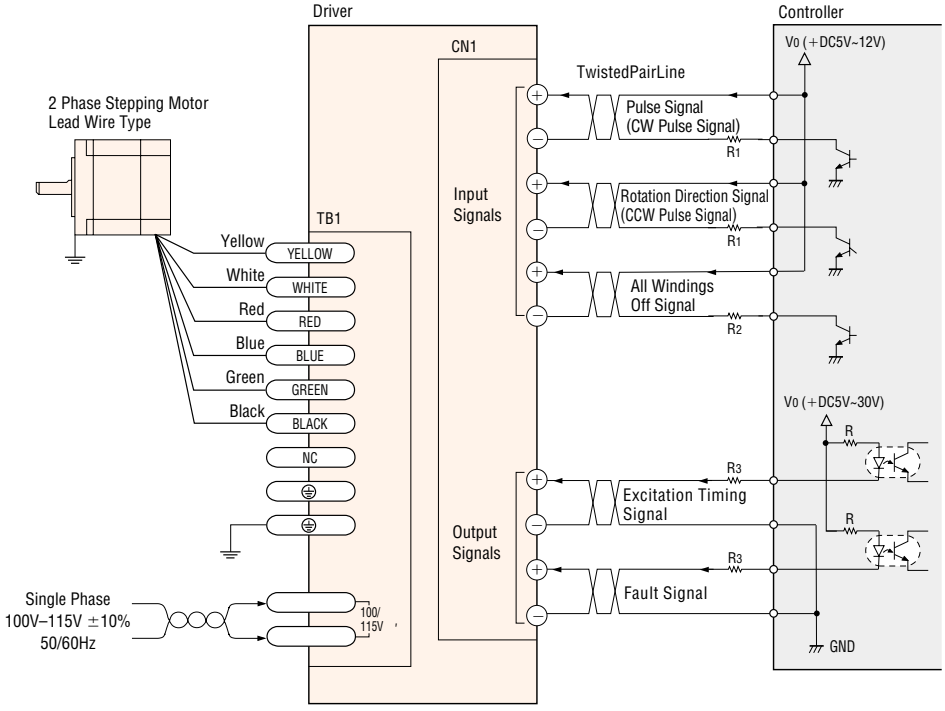
2-Phase Stepping Motor
Terminal Box Type

Terminal Box Layout



●Connection between the motor terminal and the driver TB1 terminal

Motor Terminal No.	Driver TB1 Terminal
1	BLACK
2	YELLOW
3	GREEN
4	No Connection
5	No Connection
6	No Connection
7	No Connection
8	RED
9	WHITE
0	BLUE



■ Power Supply

Use a power supply that can supply sufficient input current.
When 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)
- ●Motor startup and stopping is slow.

Note:

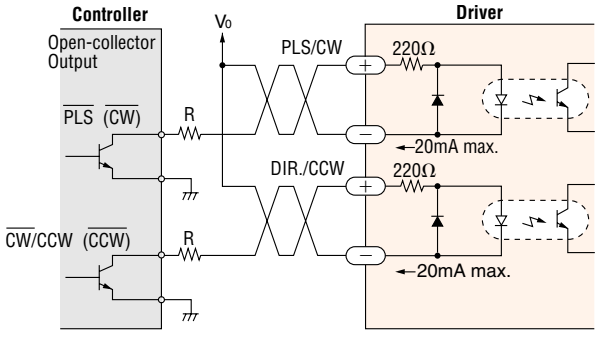
- ●When voltage is above DC 5V, connect external resistance R_1 and keep the input current below 8mA, and connect external resistance R_2 and keep the input current below 10mA.
- ●If the current exceeds 10mA, connect external resistance R_3.
- ●Use twisted-pair wire of 3.1×10^{-4} in.^{2} (0.2mm^2) or thicker and 6.6 feet (2m) or iess in length for the signal line.
- ●Use wire 7.8×10^{-4} in.^{2} (0.5mm^2) or thicker for motor lines (when extended) and power supply lines, and use 1.2×10^{-3} in.^{2} (0.75mm^2) 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 away at least 3.94 in. (10 cm) from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.

■ DESCRIPTION OF INPUT/OUTPUT SIGNALS

●UMK24□A, UMK26□A type

1. Pulse Input

■ Input circuit and sample connection



Keep the voltage between DC 5V and DC 24V.
When voltage is equal to DC 5V, external resistance (R) is not necessary. When voltage is above DC 5V, connect external resistance (R) and keep the input current below 20mA.

1. 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 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. 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

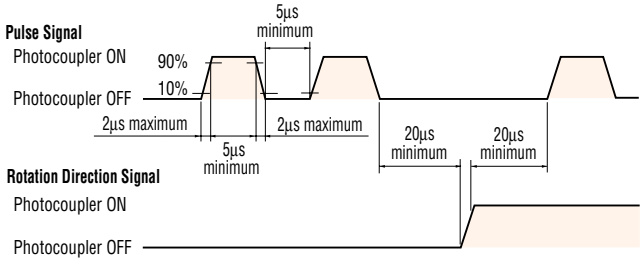
When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in the clockwise direction.

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 the input pulse)



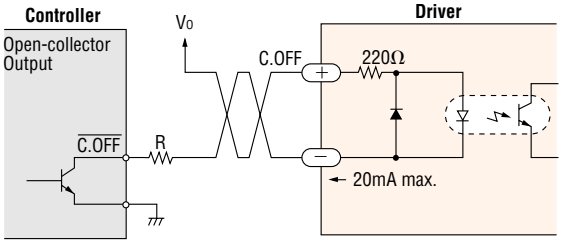
The shaded area indicates when the photocoupler diode is ON. The motor moves when the photocoupler state changes from ON to OFF as indicated by the arrow.

Pulse Signal Characteristics

- The pulse voltage is 4~5V in the "photocoupler ON" state, and 0~0.5V in the "photocoupler OFF" state.
- Input pulse signals should have a pulse width over 5μs, pulse rise/fall below 2μs types 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 20μs. 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.

2. C.OFF (All Windings Off) Input

■ Input circuit and sample connection



Keep the voltage between DC 5V and DC 24V.
When voltage is equal to DC 5V, external resistance (R) is not necessary. When voltage is above DC 5V, connect external resistance (R) and keep the input current below 20mA.

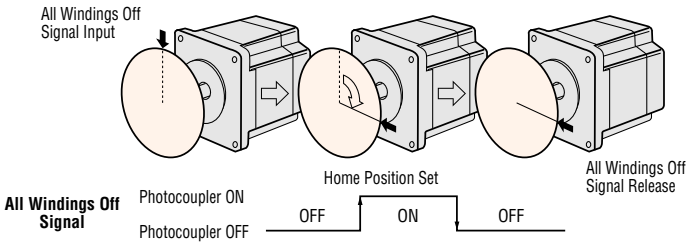
When the "All Windings Off " signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand.

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.

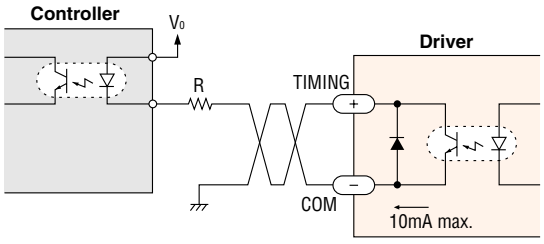
■ Manual Detection of the Home Position

Input the "All Windings Off " signal, set the motor to the desired position, then release the "All Windings Off " signal.



3. TIM. (Excitation Timing) Output

■ Output Circuit and Sample Connection



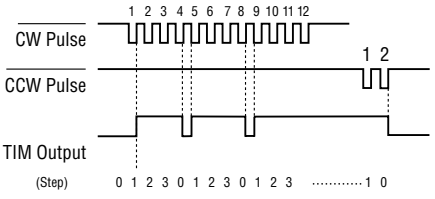
Keep the voltage between DC 5V and DC 24V.
Keep the current below 10mA. If the current exceeds 10mA, connect external resistance (R).

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

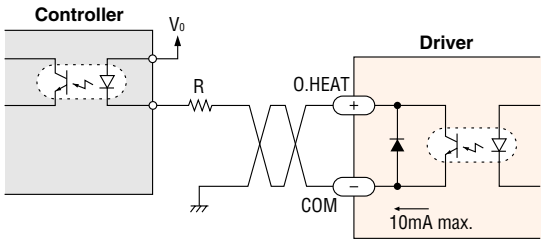


When used as indicated in the sample connection, the level becomes “L” at STEP 0.

Notes:
- When the power is turned ON, the excitation sequence is reset to STEP 0 and the timing lamp light up.
- The timing lamp flashes quickly while the motor runs appearing continuously lit.

4. O. HEAT (Overheat) Output

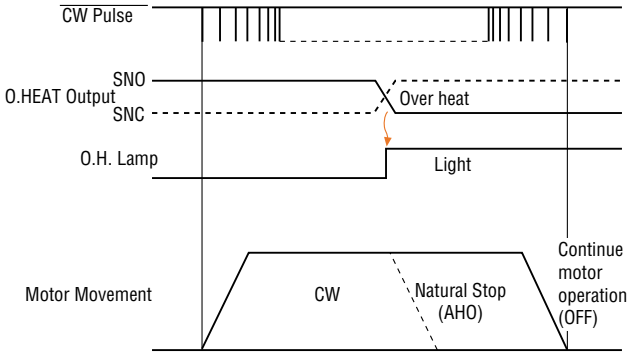
■ Output circuit and sample of connection



Keep the voltage between DC 5V and DC 24V.
Keep the current below 10mA. If the current exceeds 10mA, connect external resistance (R).

The "Overheat" signal is output to protect the driver against burnout when the internal temperature of the driver 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 SNO, the level becomes “L” upon the output of the "Overheat" signal. Switch to SNC to set to the “H” levle.
If the AHO (Auto Heat 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 returns to the “H” level and the O.HEAT indicator turns off.

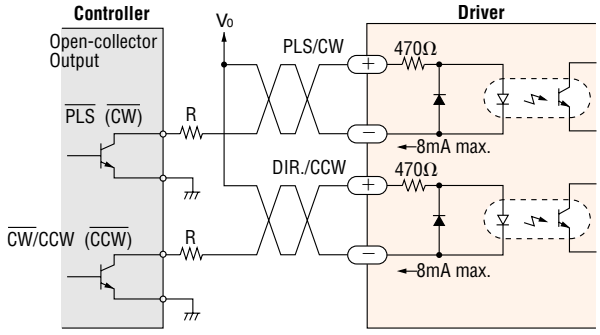
Please be aware that the above return/release cannot be controlled by external signals or by restarting the system.



●UMK29□A(T) type

1. Pulse Input

■ Input circuit and sample connection



Keep the voltage between DC 5V and DC 12V.
When voltage is equal to DC 5V, external resistance (R) is not necessary. When voltage is above DC 5V, connect external resistance (R) and keep the input current below 8mA.

1. 1-Pulse Input Mode

Pulse Signal

The "Pulse" signal is input to the pulse/CW pulse signal input terminal, the motor rotates one step on the pulse rising edge.
The direction of rotation is determined by the following rotation direction signals.

Rotation Direction Signal

The "Rotation Direction" signal is input to rotation direction/CCW pulse signal input terminal.
An "L" level signal input (photocoupler ON) commands a clockwise direction rotation.
An "H" level signal input (photocoupler OFF) commands a counterclockwise direction rotation.

2. 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

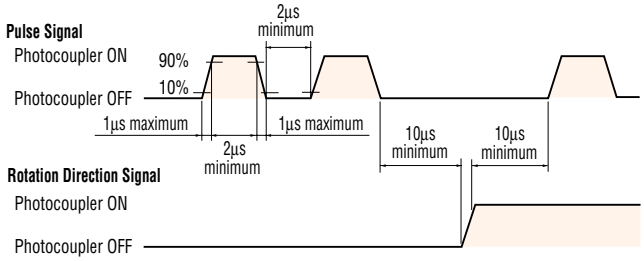
The "Pulse" signal is input to the pulse/CW pulse signal input terminal, the motor rotates one step in the clockwise direction on the pulse rising edge.

CCW Pulse Signal

The "Pulse" signal is input to the rotation direction/CCW pulse signal input terminal, the motor rotates one step in the counterclockwise direction on the pulse rising edge.

■ Pulse Waveform Characteristics

(Photocoupler state corresponding the input pulse)



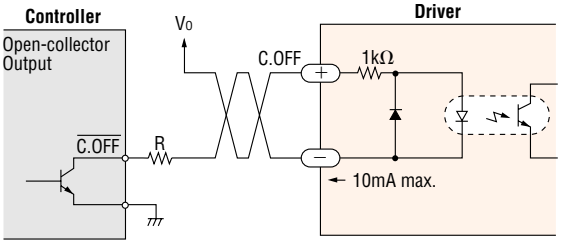
The shaded area indicates when the photocoupler diode is ON. The motor moves when the photocoupler state changes from ON to OFF as indicated by the arrow.

Pulse Signal Characteristics

- The pulse voltage is 4~5V in the "photocoupler ON" state, and 0~0.5V in the "photocoupler OFF" state.
- Input pulse signals should have a pulse width over 2μs, pulse rise/fall below 1μs types 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 10μs. 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.

2. C.OFF (All Windings Off) Input

■ Input circuit and sample connection



Keep the voltage between DC 5V and DC 12V.
When voltage is equal to DC 5V, external resistance (R) is not necessary. When voltage is above DC 5V, connect external resistance (R) and keep the input current below 10mA.

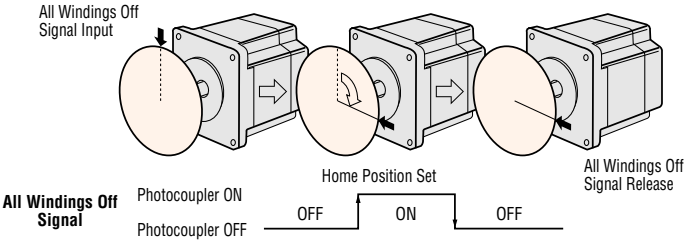
When the "All Windings Off " signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand.

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.

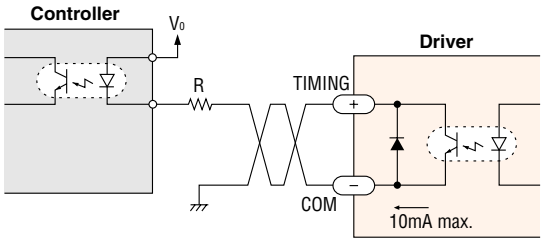
■ Manual Detection of the Home Position

Input the "All Windings Off " signal, set the motor to the desired position, then release the "All Windings Off " signal.



3. TIM. (Excitation Timing) Output

■ Output Circuit and Sample Connection



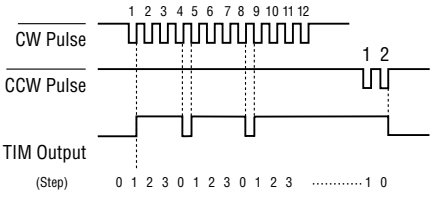
Keep the voltage between DC 5V and DC 30V.
Keep the current below 10mA. If the current exceeds 10mA, connect external resistance (R).

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

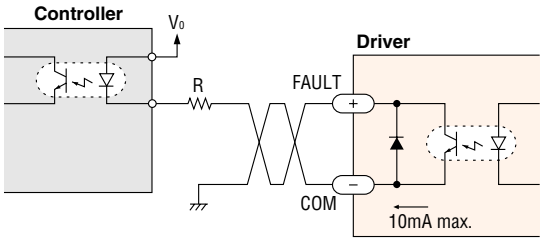


When used as indicated in the sample connection, the level becomes “L” at STEP 0.

Note:
- When the power is turned ON, the excitation sequence is reset to STEP 0 and the timing lamp light up.
- The timing lamp flashes quickly while the motor runs appearing continuously lit.

4. Fault Output

■ Output circuit and sample of connection



Keep the voltage between DC 5V and DC 30V.
Keep the current below 10mA. If the current exceeds 10mA, connect external resistance (R).

The "Fault" signal is output to protect the driver from heat damage if the internal temperature of the driver rises above 176°F (80°C).
When connected as shown in the example connection, the signal will be "H" level (photocoupler OFF) during normal conditions, and "L" level (photocoupler ON) when the temperature exceeds 176°F (80°C).
When the "Fault" signal is output, turn the driver power OFF, then adjust the operating conditions (ambient temperature, driver/controller settings, etc.), or use a fan to cool the driver. After taking appropriate measures, turn the power ON. Turning the power ON will reset the "Fault" signal, and release the "Automatic Current Off" condition.
FAULT LED: This LED is turned on if there is an operational fault detected in the system. There are 3 type of faults which can be discovered by the system, but there is only one fault status line available in parallel with the LED, a visual recognizable method was developed to help the user to determine what type of fault has occurred. To do this the timing LED is used to indicate the fault source:

1) Overheat: The internal temperature of the driver exceeded ~176°F (80°C).
   When set to A.C.O.
   -TIMING LED flashes twice per second.
   -FAULT LED = ON constant.
   When set to OFF
   -TIMING LED operates normally.
   -FAULT LED = ON constant.
2) Over Current: Shorted winding.
   -TIMING LED flashes once per second.
   -FAULT LED = ON constant.
3) Winding Connection:
   -TIMING LED flashes once every two second.
   -FAULT LED = ON constant.

Under a fault condition, the fault led will remain constantly on and the driver will stop responding to the pulse input. To remove the fault, the only way is to recycle the AC power.

Note:
When turning off the power, allow at least 3-5 seconds for the drive power to bleed off before the power can be re-applied and to clear the fault.