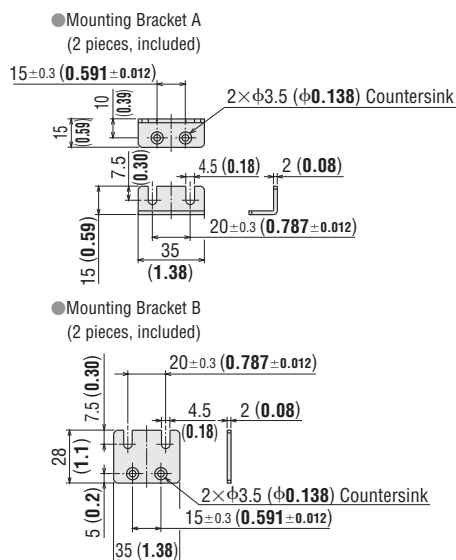
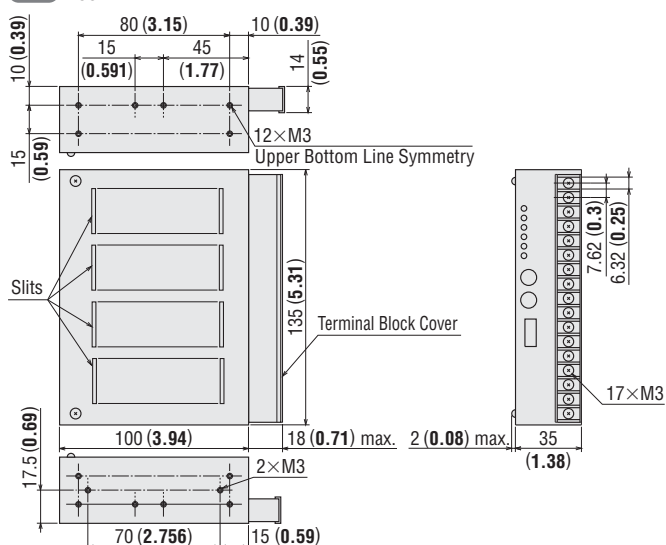


## ● Driver

③ UDK2109A, UDK2112A, UDK2120A

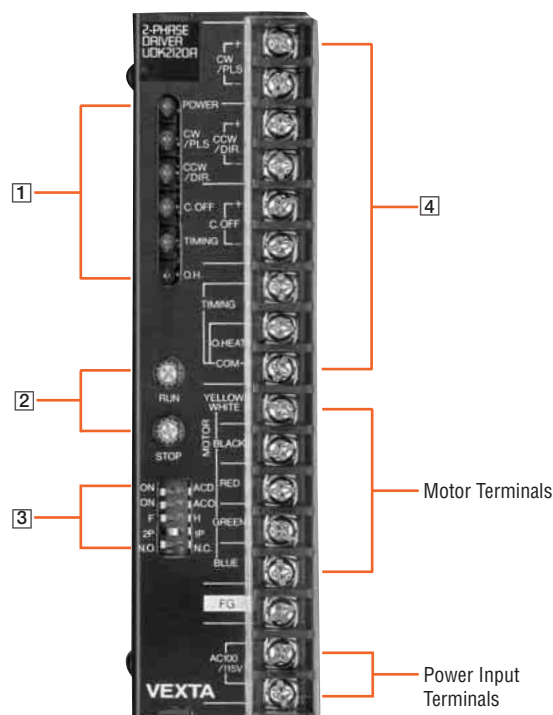
Mass: 0.47 kg (1 lb.)

DXF B087



## ■ Connection and Operation

### ● Names and Functions of Driver Parts



#### ① Signal Monitor Displays

Indication	Color	Function
POWER	Green	Power input display
CW/PLS	Green	Pulse/CW pulse input display
CCW/DIR.	Green	Rotation direction/CCW pulse input display
C.OFF	Green	All windings off input display
TIMING	Green	Excitation timing output display
O.H.	Red	Overheat output display

#### ② Current Adjustment Switches

Indication	Switch Name	Condition
RUN	Motor Run Current Switch	For adjusting the motor running current.
STOP	Motor Stop Current Switch	For adjusting the motor current at standstill.

#### ③ Function Select Switches

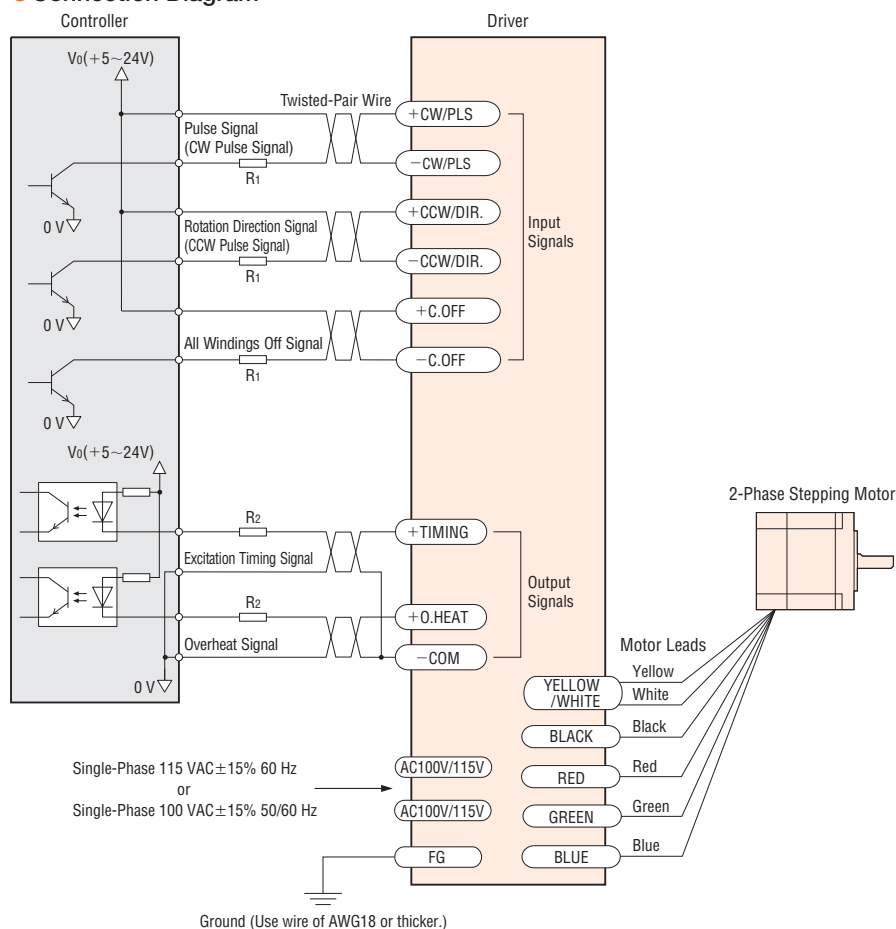
Indication	Switch Name	Function
ON/ACD	Automatic current cutback function switch	Automatically decreases output current to motor at motor standstill.
ON/ACO	Automatic current off function switch	When the temperature of the driver heat sink rises above 90°C (194°F), this function automatically switches the motor current off. The function can be set and released with this switch.
F/H	Step angle select switch	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
2P/1P	Pulse input mode switch	Switches between 1-pulse input and 2-pulse input.
N.O./N.C.	Overheat output logic switch	Select overheat alarm logic. N.O.: Normally open N.C.: Normally closed Use according to your equipment.

#### ④ Input/Output Signals

Input/Output	Signal Name	Function
Input	CW pulse signal (Pulse signal)	Operation command pulse signal (The motor will rotate in the CW direction when in 2-pulse input mode.)
	CCW pulse signal (Rotation direction signal)	Rotation direction signal, Photocoupler OFF: CCW; Photocoupler ON: CW (The motor will rotate in the CCW direction when in 2-pulse input mode.)
	All windings off signal	Cuts the output current to the motor and allows the motor shafts to be rotated by external force.
Output	Excitation timing signal	Outputs signals when the excitation sequence is at STEP "0."
	Overheat signal	When the temperature of the driver heat sink rises above 90°C (194°F), this signal will be output.

Description of input/output signals → Page C-130

## ● Connection Diagram



### ◇ Input Signal Connection

Signals can be connected directly when 5 VDC is supplied. If the signals are used at a voltage exceeding 5 VDC, be sure to provide an external resistor to prevent the current exceeding 20 mA from flowing. Internal components will be damaged if a voltage exceeding 5 VDC is supplied directly without using an external resistor.

Example: If the voltage is 24 VDC, connect a resistor ( $R_1$ ) of 1.5 to 2.2 k $\Omega$  and 0.5 W or more.

### ◇ Output Signal Connection

Use output signals at 24 VDC or less and 10 mA or less.

If these specifications are exceeded, the internal components may be damaged.

Check the specification of the connected equipment.

When the current is above 10 mA, connect an external resistor  $R_2$ .

### ◇ Power Supply

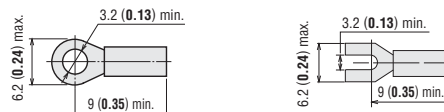
Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in motor output can cause the following malfunctions:

- Motor does not operate properly at high-speed.
- Slow motor startup and stopping

### ◇ Notes on Wiring

- Use twisted-pair wires of AWG24 or thicker and keep wiring as short as possible [within 2 m (6.6 ft.)].
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. Technical reference → Page F-54
- Use wires of AWG20 or thicker for motor line (when extended) and power supply lines, and use wire of AWG18 or thicker for protective earth line.
- To ground the driver and controller, lead the ground conductor from the protective earth terminal and connect the ground conductor to provide a common ground point.
- Provide a minimum distance of 10 cm (3.9 in.) between the signal lines and power lines (AC lines, motor lines and other large-current circuits). Do not run the signal lines in the same duct as power lines or bundle them with power lines.

### ◇ Recommended Crimp Terminals Unit = mm (in.)



- Crimp terminals are not provided with the products. They must be purchased separately.

## ● Description of Input/Output Signals

### Indication of Input/Output Signal "ON" "OFF"

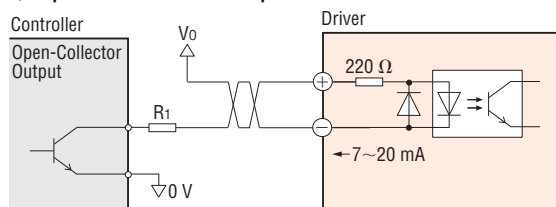
Input (output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

Photocoupler OFF ON

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

### All Windings Off (C.OFF) Input Signal

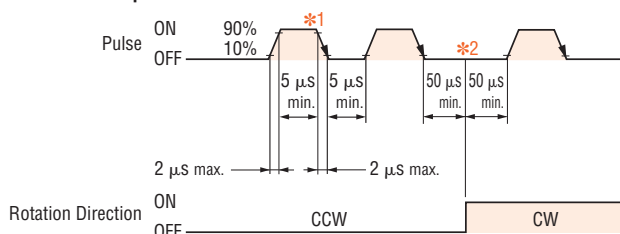
#### ◇ Input Circuit and Sample Connection



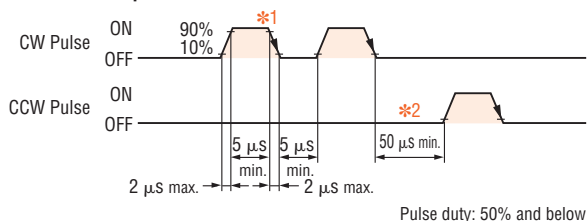
#### ◇ Pulse (CW) and Rotation Direction (CCW) Input Signal

##### Pulse Waveform Characteristics

##### ● 1-Pulse Input Mode



##### ● 2-Pulse Input Mode



\*1 The shaded area indicates that the photocoupler diode is ON. The motor moves when the photocoupler state changes from ON to OFF.

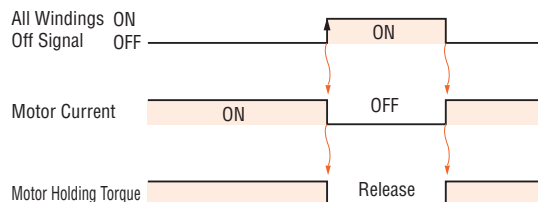
\*2 The minimum interval time when changing rotation direction is 50 μs. This value varies greatly depending on the motor type and load inertia.

#### ◇ Pulse Signal Characteristics

- Keep the "Pulse" signal at the "photocoupler OFF" state when no pulses are being input.
- In 1-pulse input mode, leave the pulse signal at rest ("photocoupler OFF") when changing rotation directions.
- In 2-pulse input mode, do not input a CW pulse and CCW pulse simultaneously.

#### ◇ All Windings Off (C.OFF) Input Signal

- Inputting this signal puts the motor in a non-excitation (free) state.
- This signal is used when moving the motor by external force or manual home position is desired. The photocoupler must be "OFF" when operating the motor.



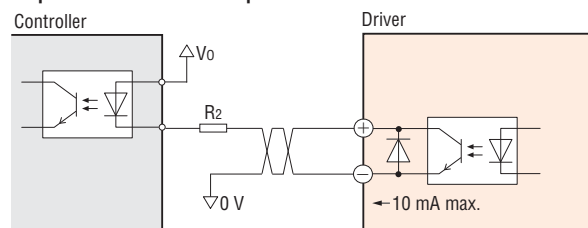
The shaded area indicates that the motor provides holding torque in proportion to standstill current set by STOP switch.

- Switching the "All Windings Off" (C.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  $\pm 3.6^\circ$  from the position set after the "All Windings Off" signal is released.

## Excitation Timing (TIMING) Output Signal

### Overheat (O.HEAT) Output Signal

#### ◇ Output Circuit and Sample Connection



#### ◇ Excitation Timing (TIMING) Output Signal

- The "Excitation Timing" signal is output when the motor excitation is in the initial stage (step "0").
- 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.

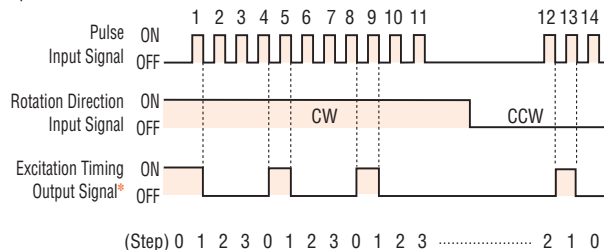
Full step: Signal is output once every 4 pulses.

Half step: Signal is output once every 8 pulses.

The TIMING LED lights on the front panel when the "Excitation Timing" signal is output.

#### Timing chart at 1.8°/step (full step)

\* When connected as shown in the sample connection, the signal will be "photocoupler ON" at step "0."



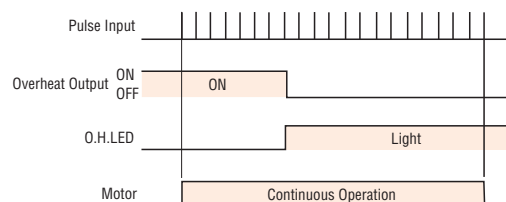
#### Note:

- When power is turned on, the excitation sequence is reset to step "0" and the "Excitation Timing" signal will be output.

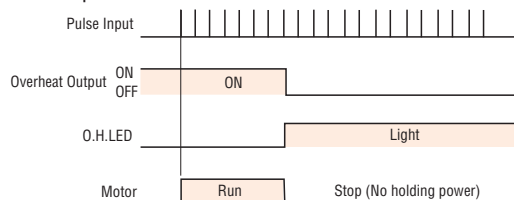
### ◇ Overheat (O.HEAT) Output Signal

- The "Overheat" signal is output to protect the driver from heat damage if the internal temperature of the driver heat sink rises above 90°C (194°F). The O.H. LED lights on the front panel when the "Overheat" signal is output.
- When used as shown in the sample connection with the overheat output logic switch set to "N.O.", the signal becomes "photocoupler ON." (Switch to "N.C." to set to the "photocoupler OFF.")
- You can select whether to stop the motor or continue the operation when an "Overheat" signal is output.
- If the automatic current off function switch is set to ACO position, output current is cut off to stop the motor when the "Overheat" signal is output.

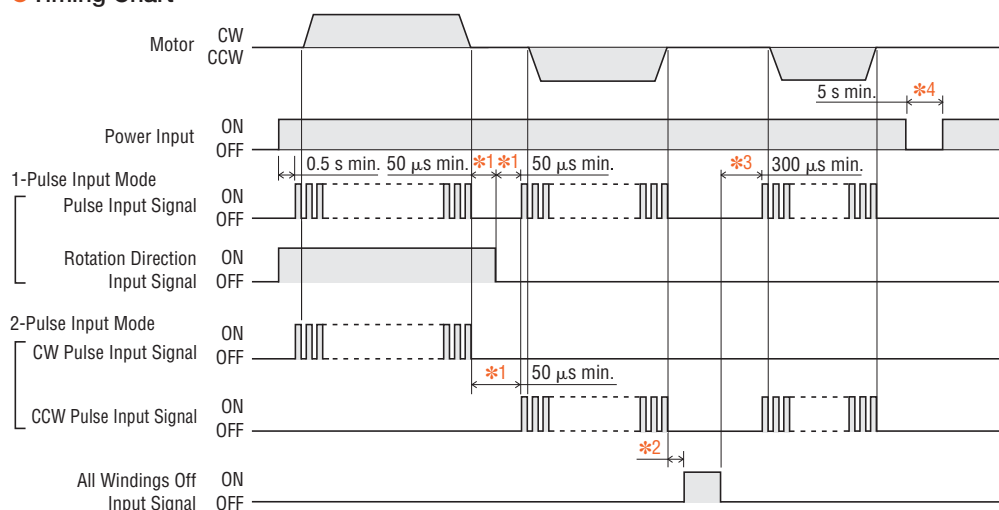
- If the automatic current off function switch is set to "OFF" position, the motor continues operation when the "Overheat" signal is output.



- To clear the "Overheat" signal, first resolve the cause and check for safety, then turn power on again.



### ● Timing Chart



- \*1 The minimum switching time to change direction (1-pulse input mode), and switching time to change CW, CCW pulse (2-pulse input mode) 50 μs is shown as a response time of circuit. The motor may need more time than that.
- \*2 Depends on load inertia, load torque and starting frequency.
- \*3 Never input a pulse signal immediately after switching the "All Windings Off" signal to the "photocoupler OFF" state. The motor may not start.
- \*4 Wait at least five seconds before turning on the power again.

## ■ List of Motor and Driver Combinations

Model names for motor and driver combinations are shown below.

Type	Model	Motor Model	Driver Model
Standard	UMK243□A	PK243-01□A	UDK2109A
	UMK244□A	PK244-01□A	UDK2112A
	UMK245□A	PK245-01□A	UDK2112A
	UMK264□A	PK264-02□	UDK2120A
	UMK266□A	PK266-02□	UDK2120A
	UMK268□A	PK268-02□	UDK2120A
High-Resolution	UMK243M□A	PK243M□A	UDK2109A
	UMK244M□A	PK244M□A	UDK2112A
	UMK245M□A	PK245M□A	UDK2112A
	UMK264M□A	PK264M□	UDK2120A
	UMK266M□A	PK266M□	UDK2120A
	UMK268M□A	PK268M□	UDK2120A

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