

# BI-STABLE ROTARY OPTICAL SHUTTERS

## High Speed

- Both the shutter shape and the stop structure were designed to handle high-speed operation.

## Battery-Powered Capabilities

- The built-in permanent magnet allows for low power consumption, making this solenoid shutter remarkably energy-efficient.

## High Durability

- 5,000,000 cycles (Excluding BOS5-8-T)  
\*as tested by Takano Co. in a standard testing environment

## Compact/Lightweight

- Select your model from a range of different sizes, designed to fit into applications with limited space.

## FEATURES

### Bi-stable Driving Force

Since our models carry out reciprocal motion without the use of springs, operating instead on the change of electrical current, they maintain a stable response speed with no variation in torque upon activation.

### Custom Design Solutions

Takano is ready to utilize our expertise to design and develop custom-made models to meet your unique requirements, from the shape of the shutter to the materials that best fit your optics application.

### No Axial Stroke

Our rotary solenoids are driven by magnetic attraction and repulsion, so the shaft does not move forward or backward: it just rotates.

## SERIES COMPARATIVE TABLE

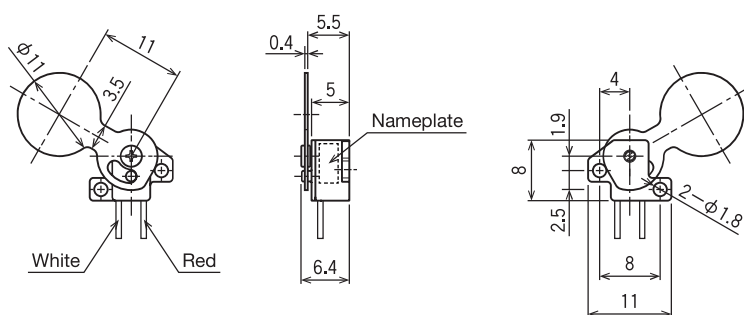
Series	Rated Voltage	Angle of Rotation	Response Speed	Rotary Solenoid Dimensions (mm)	Shutter Dimensions (mm)
BOS5-8-T	3V DC	60°	3V DC : < 50 msec	8×11×5	φ 11
BOS7/10-T010	3V DC	50°	3V DC : < 18 msec, 5V DC : < 13 msec	φ 7×10	12.3×10.3
BOS10/15-S	5V DC	50°	5V DC : < 13 msec, 12V DC : < 8 msec	φ 10×20	φ 10.2
BOS22/08-O035	12V DC	50°	12V DC : < 15 msec	φ 22×8	φ 15.2

### ◆ Main Specifications

Heat-Resistant Class		Class F (155 °C)
Working Voltage		3 (V DC) (Duty Cycle 35 (%) or less) 5 (V DC) (Duty Cycle 12 (%) or less)
DC Resistance		5 (Ω)
Coil Saturation Temperature Rise Δθ <sub>s</sub> (at 20 °C)		Δθ <sub>s</sub> ÷ 170 × W (°C) K ÷ 170 (°C/watt)
Temperature Rise Time Constant τ		0.5 minute
Mass		0.8 (g)
Shutter Dimensions		φ 11 (mm)
Operating Angle		60 (°)
Life Cycle/Durability		500,000 (cycles)
Response Speed	with Applied Voltage 3V DC	50 (msec) or less
	with Applied Voltage 5V DC	—
	with Applied Voltage 12V DC	—



### ◆ External Dimensions (mm)

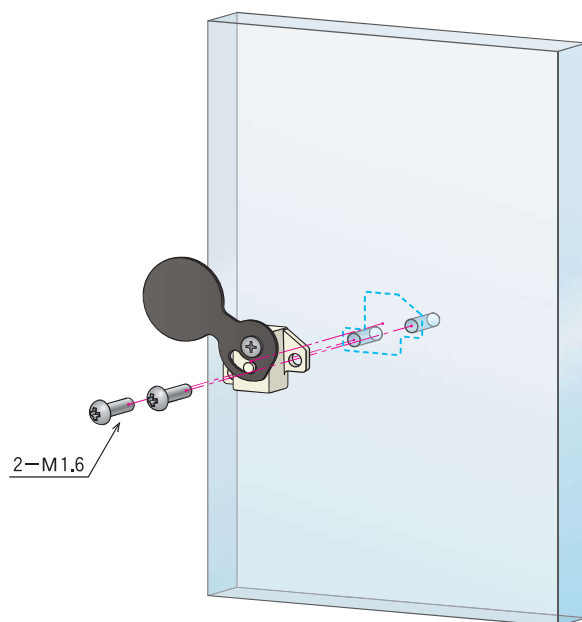


### Terminal Specifications

Lead Wire Length (mm) : 195  
AWG Size : 30

- In this diagram, the shutter is shown magnetically latched to the clockwise side.
- When a positive electrode is connected to the Red lead wire, and a negative electrode to the White lead wire, the shaft rotates counter-clockwise; when a negative electrode is connected to the Red lead wire, and a positive to the White lead wire, the shaft rotates clockwise.

### ◆ How to Mount

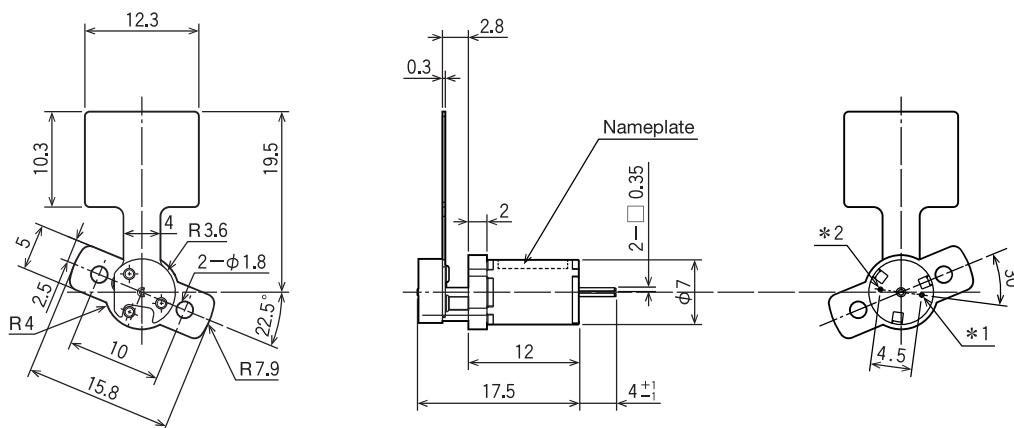


## ◆ Main Specifications

Heat-Resistant Class		Class E (120 °C)
Rated Voltage		3 (V DC)
DC Resistance		9.5 (Ω)
Coil Saturation Temperature Rise Δθ <sub>s</sub> (at 20 °C)		Δθ <sub>s</sub> ≐ 59 × W (°C) K ≐ 59 (°C/watt)
Temperature Rise Time Constant τ		1 minute
Mass		4 (g)
Shutter Dimensions		12.3 × 10.3 (mm)
Operating Angle		50 (°)
Life Cycle/Durability		5,000,000 (cycles)
Response Speed	with Applied Voltage 3V DC	18 (msec) or less
	with Applied Voltage 5V DC	13 (msec) or less
	with Applied Voltage 12V DC	—

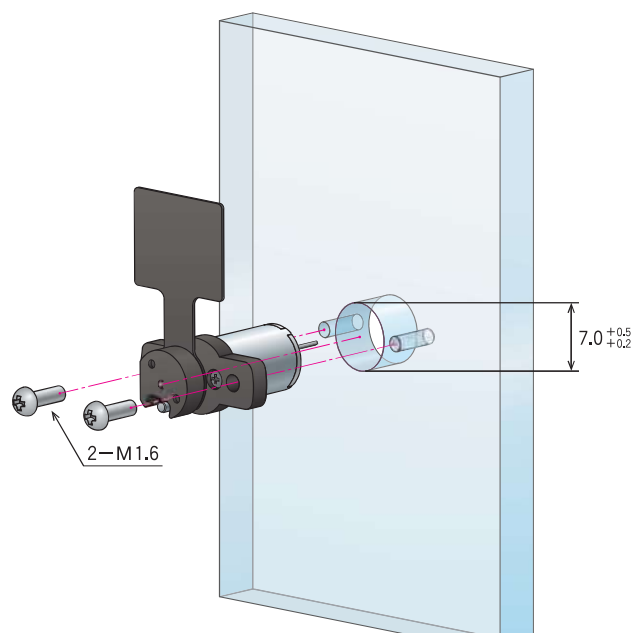


## ◆ External Dimensions (mm)



- In this diagram, the shutter is shown magnetically latched to the counterclockwise side.
- When a positive electrode is connected to \*1 and a negative to \*2, the shaft rotates counter-clockwise; when a negative electrode is connected to \*1 and a positive to \*2, the shaft rotates clockwise.

## ◆ How to Mount

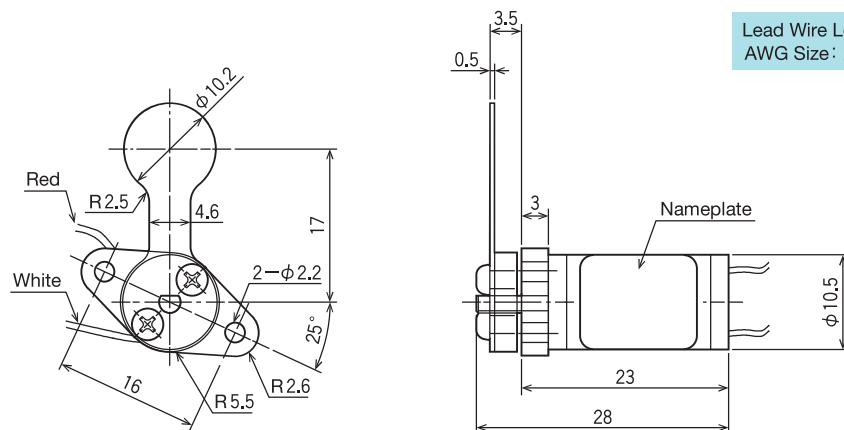


### ◆ Main Specifications

Heat-Resistant Class		Class E (120 °C)
Rated Voltage		5 (V DC)
DC Resistance		13 (Ω)
Coil Saturation Temperature Rise Δθ <sub>s</sub> (at 20 °C)		Δθ <sub>s</sub> ÷ 21.5 × W (°C) K ÷ 21.5 (°C/watt)
Temperature Rise Time Constant τ		0.5 (minutes)
Mass		11 (g)
Shutter Dimensions		ϕ10.2 (mm)
Operating Angle		50 (°)
Life Cycle/Durability		5,000,000 (cycles)
Response Speed	with Applied Voltage 3V DC	—
	with Applied Voltage 5V DC	13 (msec) or less
	with Applied Voltage 12V DC	8 (msec) or less



### ◆ External Dimensions (mm)

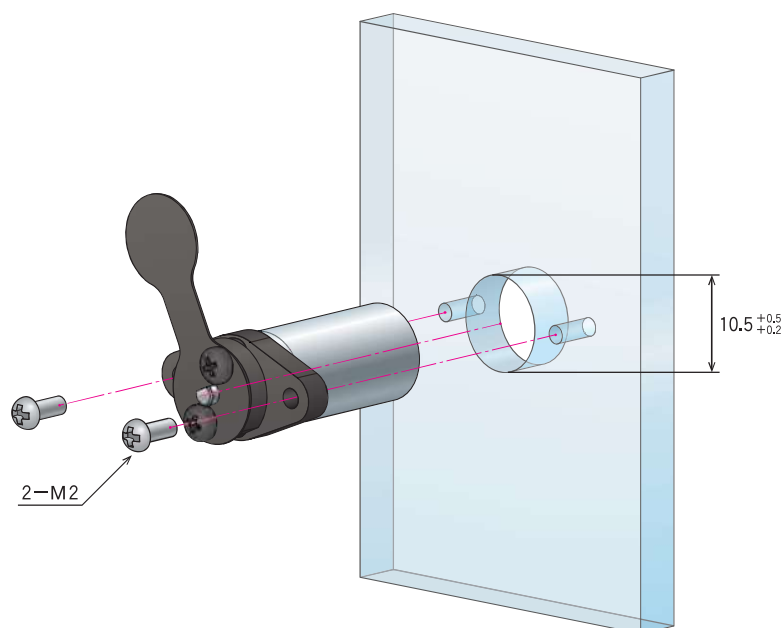


### Terminal Specifications

Lead Wire Length (mm) : 320  
AWG Size : 26

- In this diagram, the shutter is shown magnetically latched to the counterclockwise side.
- When a positive electrode is connected to the Red lead and a negative to the White, the shaft rotates clockwise; when a negative electrode is connected to the Red lead and a positive to the White, the shaft rotates counter-clockwise.

### ◆ How to Mount

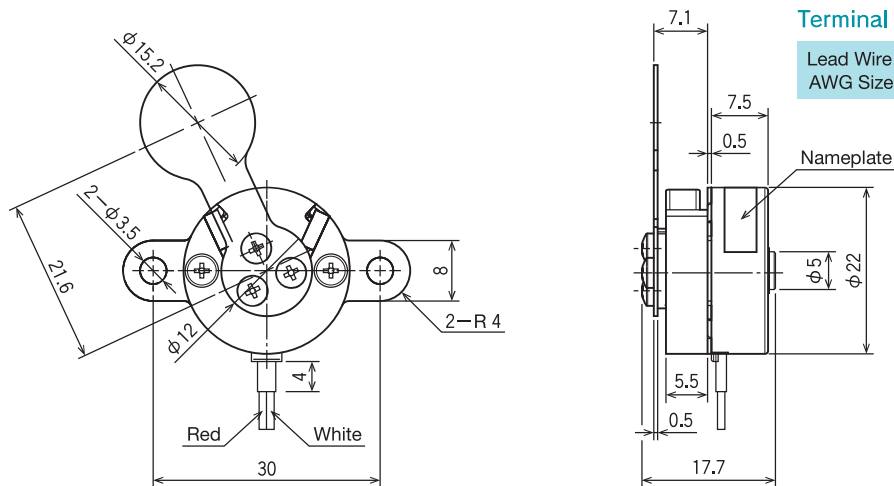


## ◆ Main Specifications

Heat-Resistant Class		Class H (180 °C)
Rated Voltage		12 (V DC)
DC Resistance		35 (Ω)
Coil Saturation Temperature Rise $\Delta\theta_s$ (at 20 °C)		$\Delta\theta_s \doteq 36 \times W$ (°C) K $\doteq 36$ (°C/watt)
Temperature Rise Time Constant $\tau$		6 (minutes)
Mass		22 (g)
Shutter Dimensions		$\phi$ 15.2 (mm)
Operating Angle		50 (°)
Life Cycle/Durability		5,000,000 (cycles)
Response Speed	with Applied Voltage 3V DC	—
	with Applied Voltage 5V DC	—
	with Applied Voltage 12V DC	15 (msec) or less



### ◆ External Dimensions (mm)

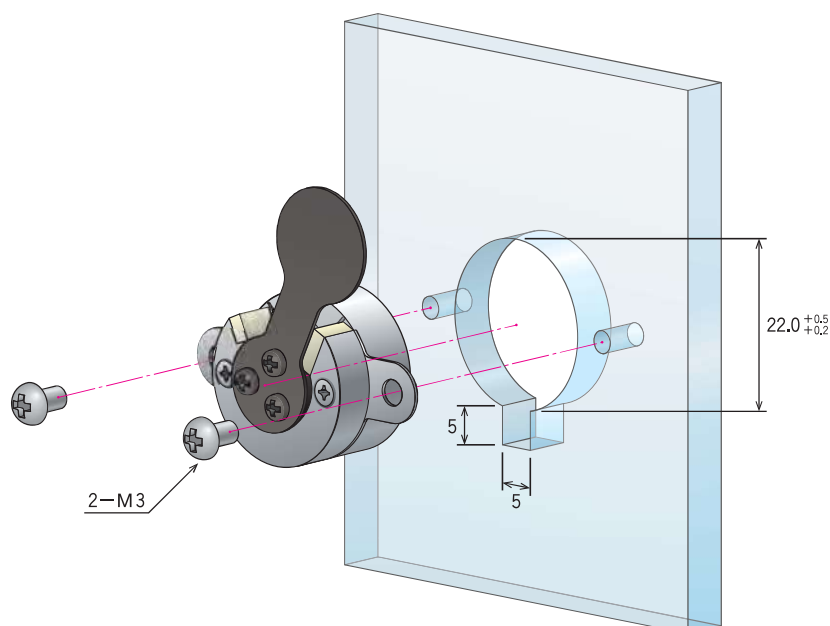


## Terminal Specifications

Lead Wire Length (mm) : 320  
AWG Size : 28

- In this diagram, the shutter is shown magnetically latched to the counterclockwise side.
- When a positive electrode is connected to the Red lead and a negative to the White, the shaft rotates clockwise; when a negative electrode is connected to the Red lead and a positive to the White, the shaft rotates counter-clockwise.

## ◆ How to Mount



# MULTI LIGHT SHUTTERS

## Slim/Lightweight

- 14.7×34.7×3.4 mm
- 2.5g

## Battery-Powered Capabilities

- The built-in permanent magnet allows for low power consumption and high efficiency.



## Economical

- At every stage of the manufacturing process, from design to assembly, this product was crafted with structural simplicity in mind.

## FEATURES

### 1 Bi-stable Driving Force

Since our models carry out reciprocal motion without the use of springs, operating instead on the change of electrical current, they maintain a stable response speed with no variation in torque upon activation.

### 2 Power-Saving

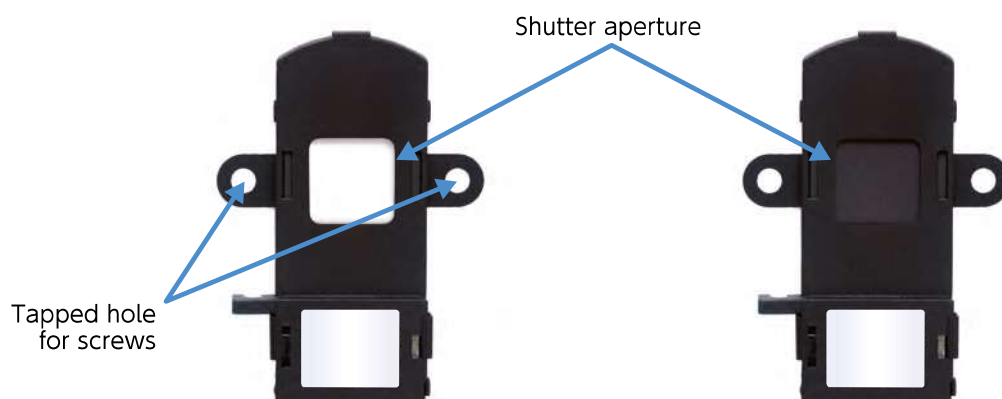
The shutter is held in place by a permanent magnet even after power is cut off, making it remarkably energy-efficient.

## STRUCTURE OF SHUTTER APERTURE AND HOW TO ASSEMBLE

The shutter blade moves in and out of a 8×8mm square aperture. Since its mounting surface is flat, the shutter can be installed easily with two M2 screws.

〈when open:〉

〈when closed:〉



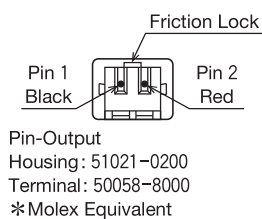
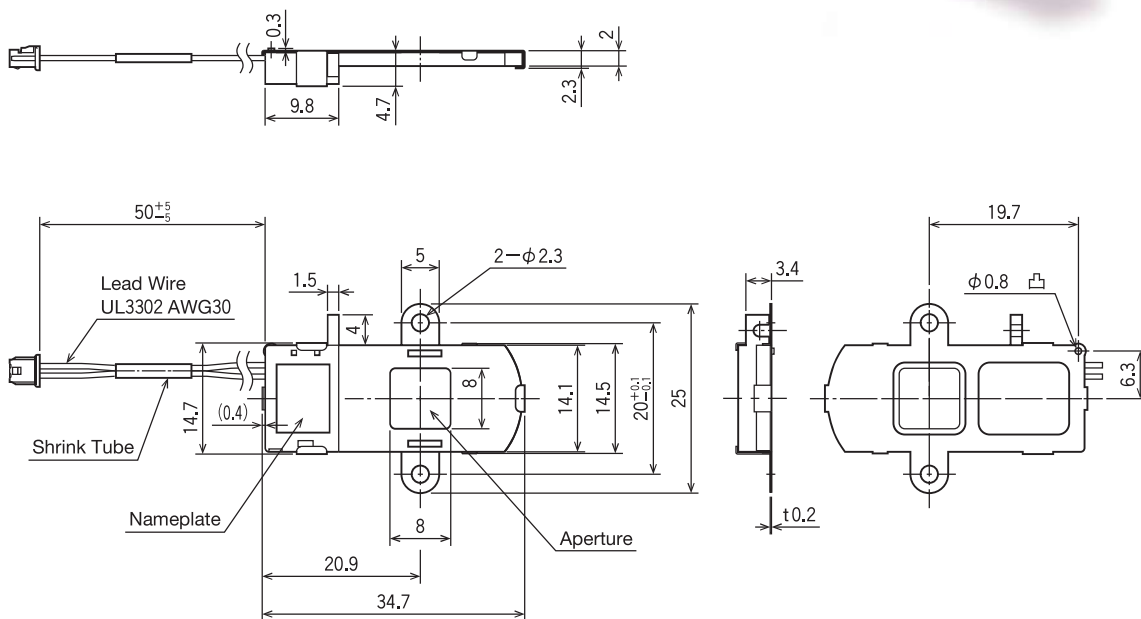


## ◆ Main Specifications

Aperture Size	8×8 (mm)
Shutter Plate Material	PET Anti-Reflection Treatment
Drive Voltage	5.0 (V DC) ±10 (%)
Resistance Value	40 (Ω) ±10% at 25 (°C)
Duty Cycle	25 (%) or less
Input Valve Width	50 ~ 500 (msec)
Heat-Resistant Class	Class Y (90 °C)
Response Time	50 (msec) or less
Environmental Conditions	-10 ~ 50 (°C) 10 ~ 85 (%)
Storing Environment	-20 ~ 70 (°C) 10 ~ 85 (%)
Life Cycle/Durability	100,000 (cycles) 1 cycle of opening and closing



## ◆ External Dimensions (mm)



	Pin 1 Black	Pin 2 Red	Shutter Operation
Polarity	(+)	(-)	Open
	(-)	(+)	Close