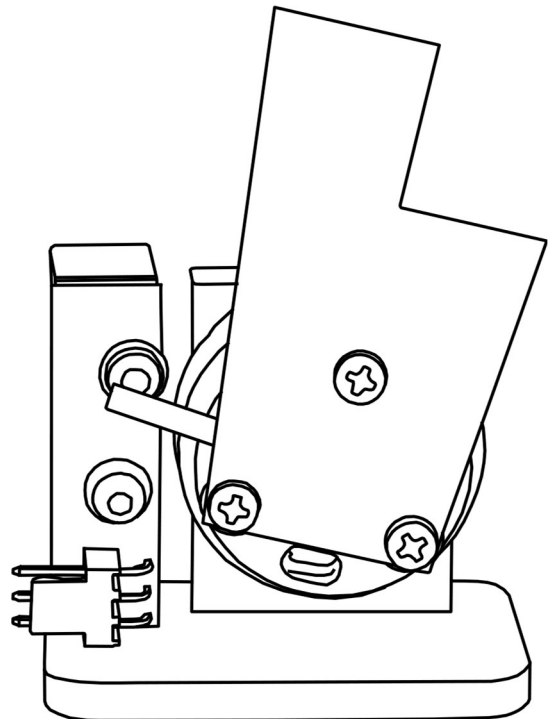


SH-10 Spring-Loaded Shutter

The SH-10 shutter consists of a blade mounted on a rotary solenoid with a limited rotation angle. When the shutter is powered, the blade moves to an “ON” position and clears the path for a laser beam. When the power is turned off, the return spring of the shutter moves the blade to an “OFF” position and blocks the laser beam. The standard blade material is 0.01” thick anodized aluminum. Other materials and thickness are available for uses such as plasma, X-ray, laser light, VIS, IR, and UV.

FEATURES AND ADVANTAGES

- Integrated return spring
- 0.5” (13mm) aperture, larger optional
- Small size
- Low cost
- High reliability, long life
- Standard and custom blades
- Returns to “OFF” position with a power failure
- 5V, 12V or 15V, or 24V DC operation
- Position indicators to verify if shutter is open or closed
- Simple drive circuit for TTL input commands
- RoHS compliant



SH-10 Spring-Loaded Shutter

SPECIFICATIONS

Aperture size	0.5 inch (13 mm)
Blade thickness	0.01 inch standard, configurable
Power requirements	5 VDC, 700 mA or 12 VDC, 300 mA or 24 VDC, 160 mA
Solenoid wires	10 inch (250 mm) length, AWG24
Response time	15 mSec
Expected life	Standard: 2 million cycles minimum -L option: 50 million cycles minimum
Return spring torque	0.0055 to 0.009 Nm
Dimensions	Standard: 1.7" W x 2.3" L x 1.2" D -B option: 1.9" W x 2.8" L x 1.3" D
Shutter weight	60 grams, configuration dependent
Max operating temperature	75 °C

OPTIONS

-5	5V shutter operating voltage (not compatible with DSH-10 driver).
-12	12V shutter operating voltage (not compatible with DSH-10 driver).
-24	24V shutter operating voltage (compatible with DSH-10 driver).
-L (Long-Life)	Long-life (50 million cycles minimum). Can be specified for all models.
-M (Mount)	Shutter is enclosed in a black anodized box.
-MP (Mounting Plate)	Shutter includes a mounting plate for horizontal and vertical mounting directly to an optical table.
-B (Box)	Shutter is enclosed in a black anodized box with 0.42" through-hole.
-PI (Position Indicator)	Shutter includes magnetic switches (sensors) to indicate the position of the blade (open or closed). Can be specified for all -MP and boxed models.
-DM (Deflective Mirror)	When power is turned off a mirror for high power laser beam, epoxied on the blade of the safety shutter, deflects the laser beam.

SH-10 Spring-Loaded Shutter

-BD (Beam Dump)	Shutter is boxed with a deflection mirror for absorbing laser power up to 100 mW. When power is turned off, a mirror epoxied on the safety shutter blade deflects the laser beam into the integrated beam dump.
-BD-5W (Beam Dump 5W)	Shutter is boxed with integrated beam dump for laser power up to 5 watts.
-BD-10W (Beam Dump 10W)	Shutter is boxed with integrated beam dump for laser power up to 10 watts.
-BARE	Shutter blade is bare aluminum.
-1mm	1mm thick aluminum blade.
-3mm	3mm (1/8 inch) thick aluminum blade.

The SH-10 shutter is highly customizable to meet various design requirements. A 5V, 12V, or 24V activation voltage of the shutter can be selected when ordering the shutter.

Several mounting and enclosure options are available. A position indication option allows electronic confirmation of the shutter's open or closed position.

Numerous blade options are available, including different blade thicknesses, anodized and bare aluminum, reflective blades, tantalum blades, gold plated blades, and mounted mirrors (enhanced aluminum, silver coated, gold coated, dielectric).

DRIVERS

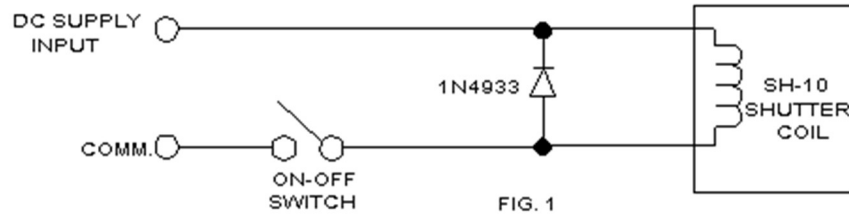
The optional DSH-10 driver is specifically designed to control the SH-10 optical shutter. The driver is easily operated using the TTL mode or manual mode control switch.

Alternatively, the example circuit configurations below can be used to control the shutter blade's position.



SH-10 Spring-Loaded Shutter

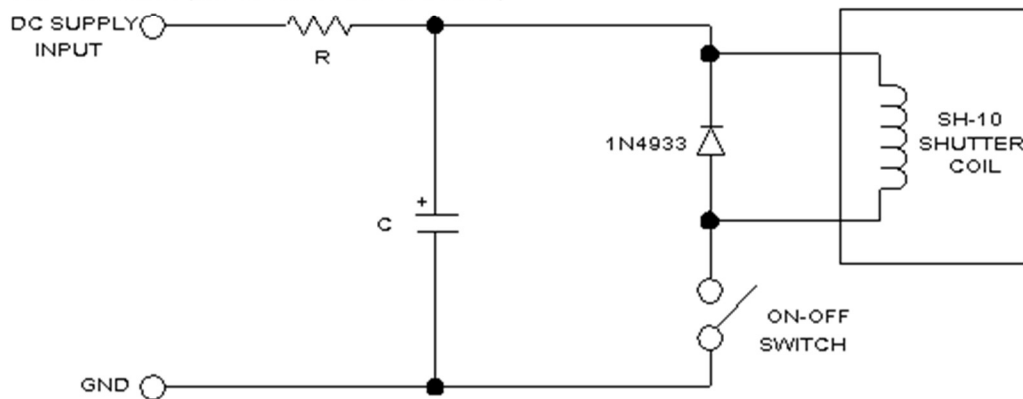
1. THE SH-10 WILL "OPEN" WHEN IT IS CONNECTED TO A DC POWER SUPPLY
(SEE FIG. 1 AND TABLE 1)



SHUTTER TYPE	DC SUPPLY
SH-10-5	5V, 750mA
SH-10-12	12V, 300mA
SH-10-24	24V, 170mA

TABLE 1

2. THE POWER CONSUMPTION CAN BE REDUCED BY USING THE FOLLOWING
"RC" CIRCUIT. (SEE FIG. 2 AND TABLE 2)



SHUTTER TYPE	DC SUPPLY	R	C
SH-10-5	5V, 350mA	6.8 Ω 2W	10,000 μ F, 10V
SH-10-12	12V, 150mA	39 Ω , 2W	4,700 μ F, 25V
SH-10-24	24V, 85mA	150 Ω 2W	2,200 μ F, 35V

TABLE 2

SH-10 Spring-Loaded Shutter

3. TO CONTROL THE SHUTTER WITH A TTL INPUT SIGNAL, AND NOT BY THE ON-OFF SWITCH, THE FOLLOWING DRIVE CIRCUIT IS ADVISED (TO "OPEN" OR "CLOSE" THE SHUTTER). CONNECT THE POWER SUPPLY TO "DC SUPPLY INPUT AND "COMMON". CONNECT THE TTL SIGNAL TO "INPUT" AND "COMMON". (SEE FIG. 3 AND TABLE 3)

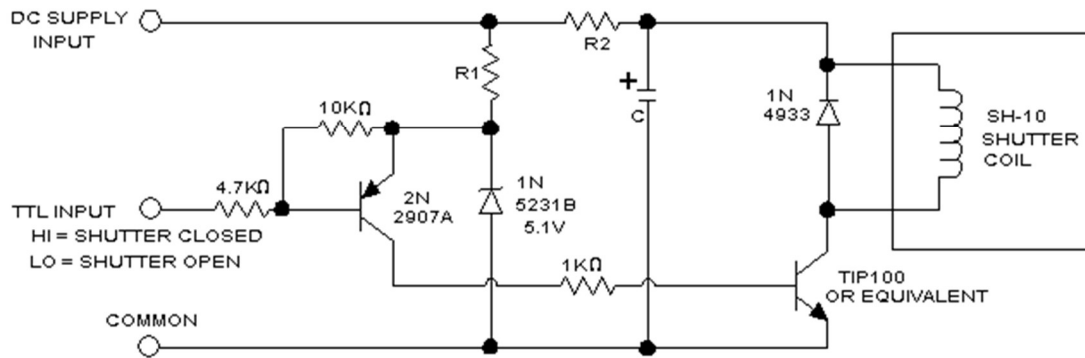


FIG. 3

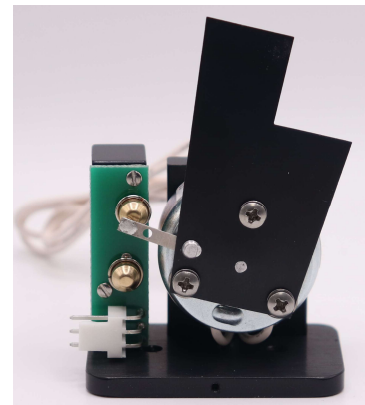
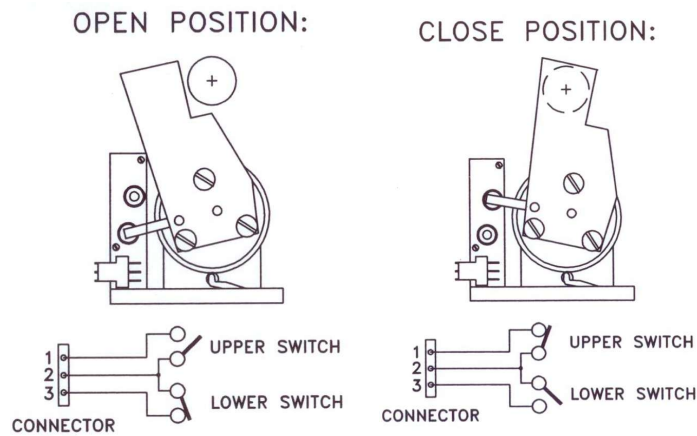
SHUTTER TYPE	DC SUPPLY	R1	R2	C
SH-10-5	5V 350mA	100 Ω 1/4W	6.8 Ω 2W	10,000 uF 10V
SH-10-12	12V 150mA	1K Ω 1/4W	39 Ω 2W	4,700 uF 25V
SH-10-24	24V 85mA	3.3K Ω 1/4W	150 Ω 2W	2,200 uF 35V

TABLE 3

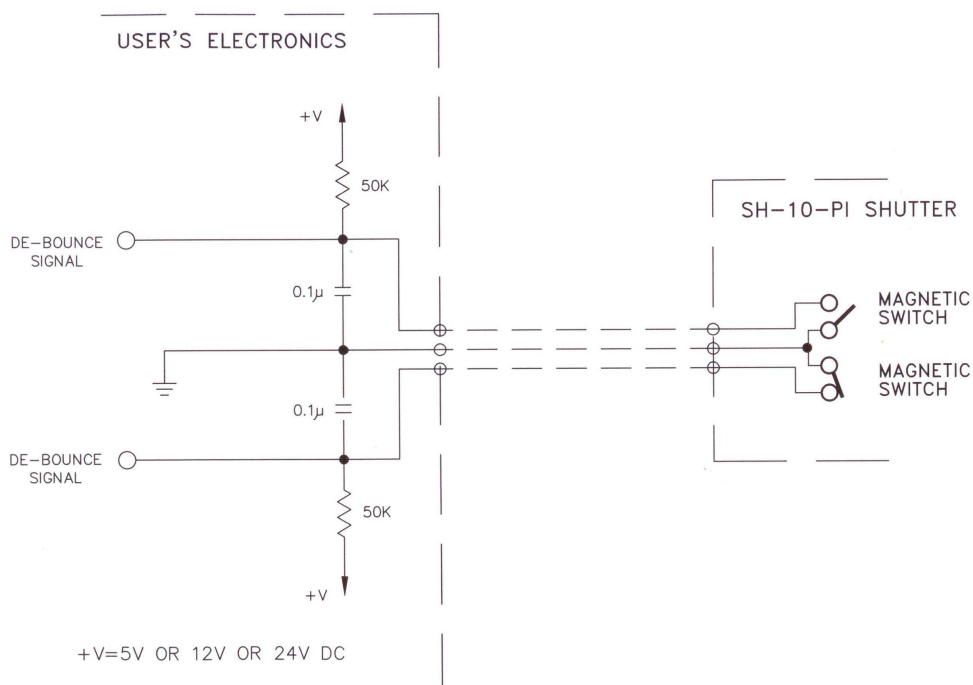
SH-10 Spring-Loaded Shutter

POSITION INDICATION

The -PI option provides position feedback to the user. A magnetic arm attached to the shutter blade activates magnetic switches indicating position (open or closed). The SH-10-PI includes a 3-pin female Molex connector (PN 22-01-2037 or equivalent) for signal transmission.



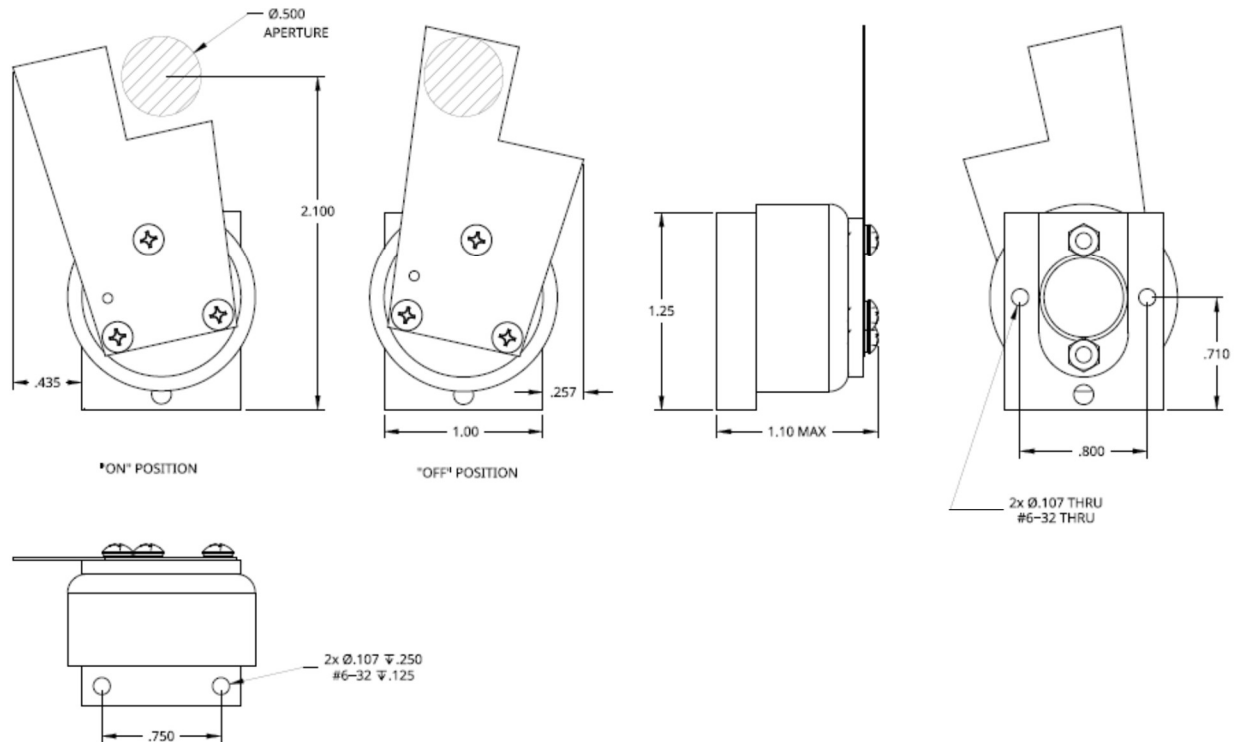
Recommended de-bouncing circuit for sh-10-pi magnetic switches:



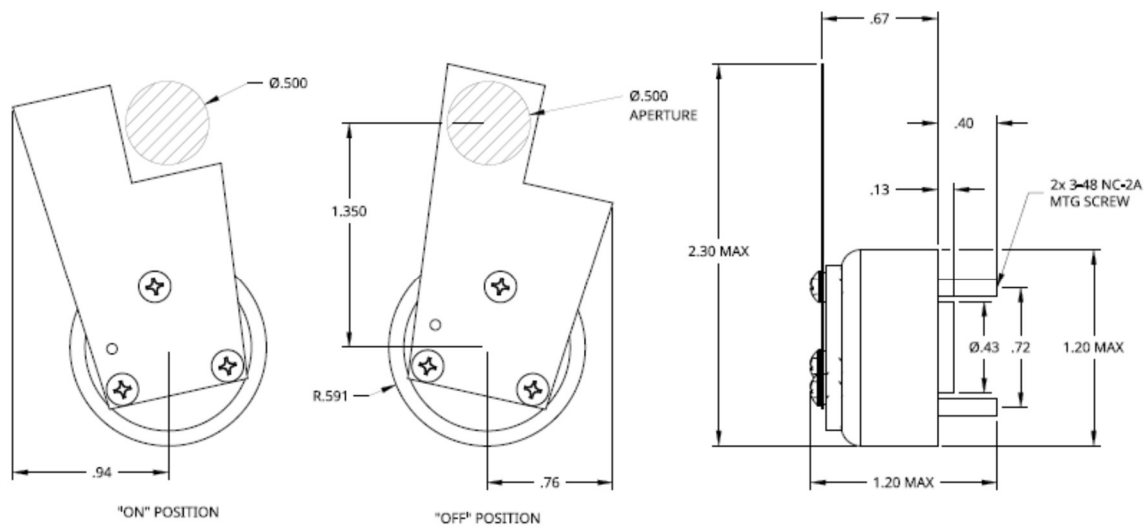
SH-10 Spring-Loaded Shutter

DRAWINGS

SH-10

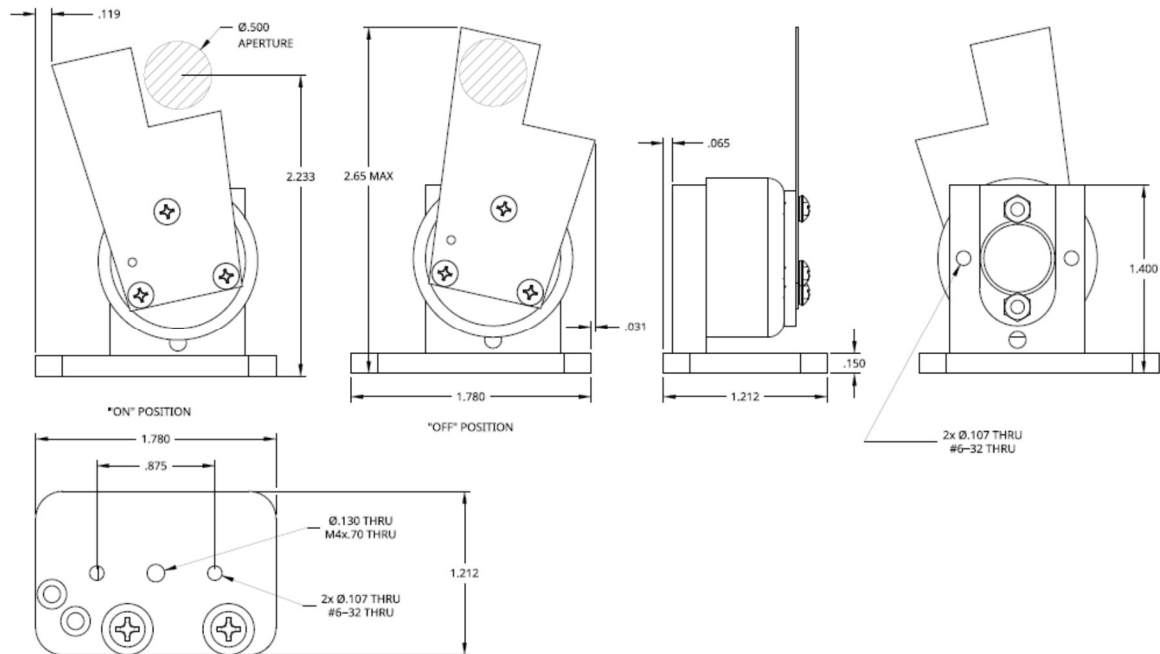


SH-10-M

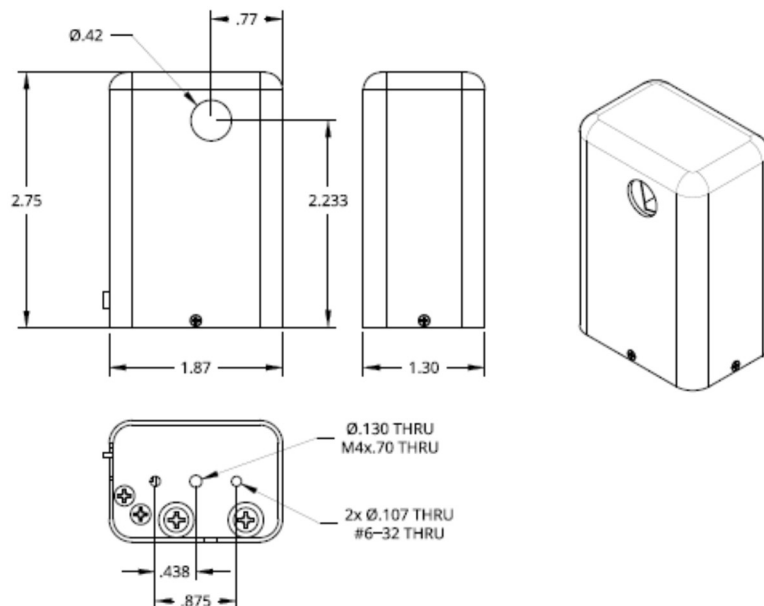


SH-10 Spring-Loaded Shutter

SH-10-MP

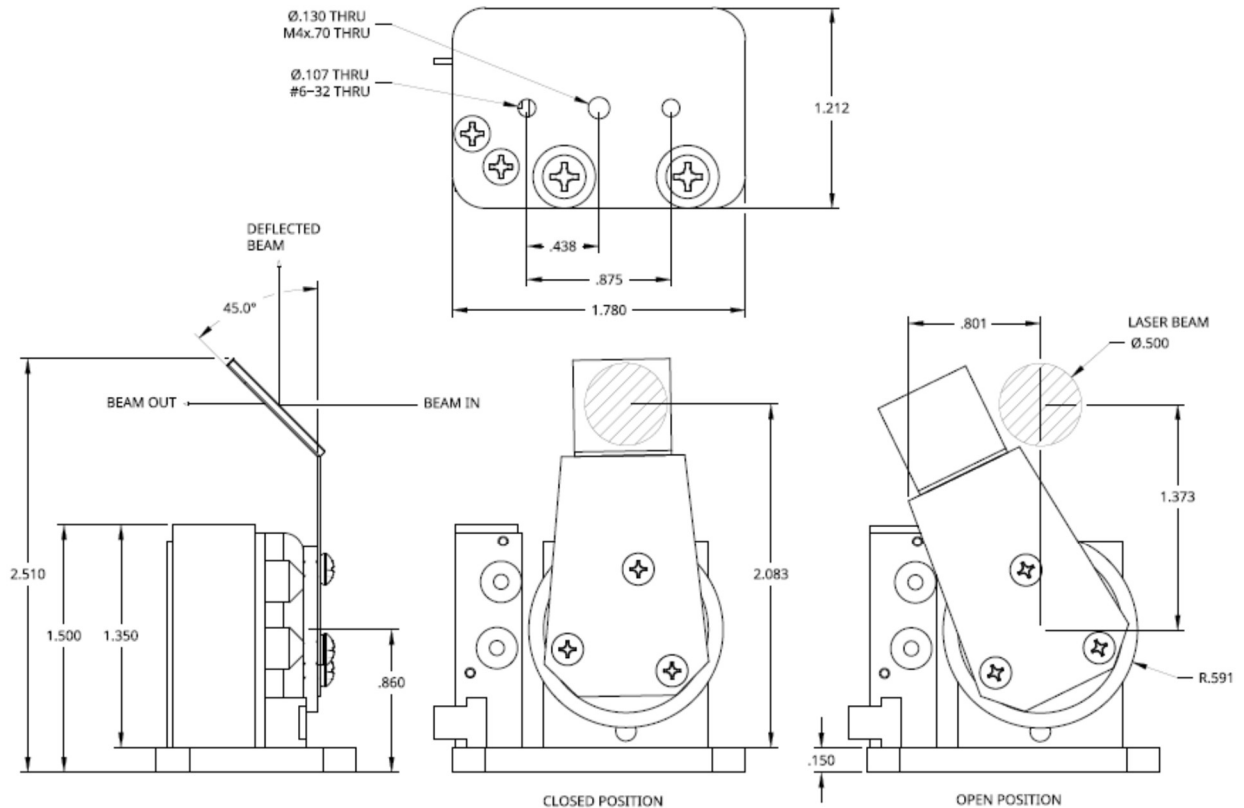


SH-10-B



SH-10 Spring-Loaded Shutter

SH-10-DM



ORDERING INFORMATION

TYPE [SH-10]; MOUNTING OPTIONS [-M, -MP, M4, M6, 8-32, 1/4-20]; BOXED OPTION [-B]; EXPECTED LIFE [-L]; POSITION INDICATOR [-PI]; OPERATION VOLTAGE [-5V, -12V, -24V]

Example 1: PART NO. SH-10-MP-L-TANT with DSH-10-110-BNC. This part number specifies the model SH-10 shutter, long life (50 million cycles minimum), with a tantalum blade and with mounting holes that fit an optical table and with a cased driver 5.3" x 5.3" x 2" operating from a line voltage of 110 VAC with a BNC connector for TTL input.

SH-10 Spring-Loaded Shutter

Example 2: PART NO. SH-10-B-12. This part number specifies the model SH-10 shutter, boxed with a cutout for laser light and 12V operating voltage.

Example 3: PART NO. SH-10-PI-B-L-24-REF. This part number specifies the model SH-10-PI shutter with a position indicator, boxed with a cutout for laser light, 24V operating voltage, with a reflective blade (polished Nickel plating) and long-life operation (50 million cycles minimum).

Example 4: PART NO. SH-10-BD5W-12-L-PI-mirror for 980nm shutter with DSH-10-110-BNC driver. This part number specifies the model SH-10-BD5W, a boxed shutter with a cutout for laser light, that has an integrated beam dump (heat sink) to withstand power up to 5 watts. Position indicators reveal the position of the mirror. 12V operating voltage and long-life operation 50 million cycles minimum. The mirror is coated for 980nm wavelength. The driver is a cased driver 5.3" x 5.3" x 2", operating from a line voltage of 110 VAC, with a BNC connector for TTL input.

SH-10 Spring-Loaded Shutter

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