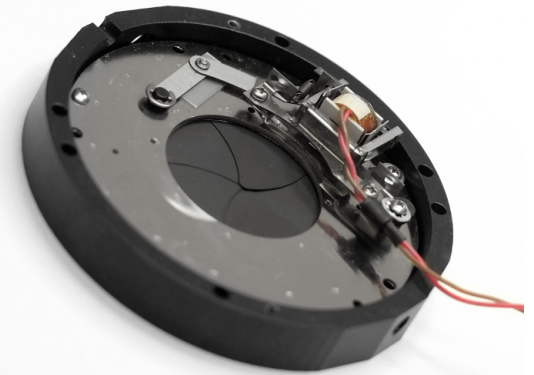


# Uniblitz® FS25

25mm Uni-Stable Optical Shutter



## Overview

The Uniblitz FS series shutters are designed and optimized to operate directly from +5VDC and do not require a separate driver. Removing the +5VDC (0VDC) closes these shutters. A simple control circuit can be used to operate these shutter devices from a TTL trigger pulse. This control can be also accomplished with our new VLM1 TTL control interface (available soon).

This low-cost innovation provides the reliability of Uniblitz shutters (typical lifetime >300K cycles) at a single operating voltage.

**Need Support?** Please [visit our website](#) or email us at [info@uniblitz.com](mailto:info@uniblitz.com).

Tel: 585-385-5930 | Toll-Free: 800-828-6972 | Fax: 585-385-6004 | 803 Linden Ave. Rochester, NY 14625  
Updated 1/20 | Datasheet Version 5.2 | ©2019 Vincent Associates

## Key Features

- 25mm aperture
- Default closed operation, +5VDC opens the shutter, 0VDC closes the shutter
- **RoHS Compliant**
- Transfer time on opening:  
**9.0 milliseconds**
- Total opening time:  
**16.0 milliseconds**

# Product Options

FS25 ② ③ ④ ⑤ ⑥ - ⑦

Ex: FS25S2C0L-EC

**① Shutter Series:**

- **FS25:** Normally Closed
- **FSR25:** Normally Open

**② Voltage:**

- **S:** Standard 5VDC

**③ Housing:**

- **1:** Un-Housed
- **2:** Half-Housed
- **3:** Fully-Housed

**④ Blades:**<sup>1</sup>

- **C:** Black carbon impregnated plastic (C-PET)
- **T:** Low Energy (Teflon®)
- **ZM:** High Energy (AlMgF2)<sup>2</sup>

**⑤ Electronic Sync:**

- **0:** Omitted
- **1:** Included

**⑥ Connector:**

- **L:** 18" flying leads

**⑦ Encapsulated Coil:**

- **EC:** Included<sup>3</sup>
- Leave blank if not required

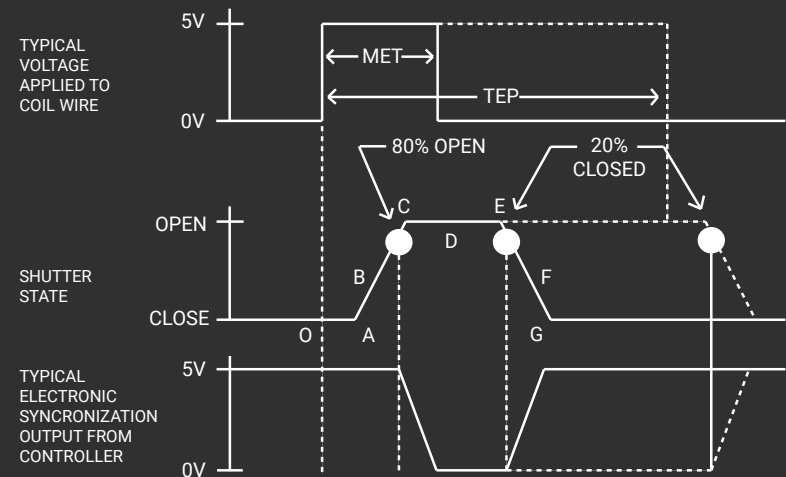
<sup>1</sup> Various mounting methods are available depending on housing option – see Key Features on website

<sup>2</sup> Other blade coating options may be available by special order.

<sup>3</sup> Input side only; Teflon® coating is on opposite side to protect shutter blade surface. Light source must be input to the reflective side only.

<sup>4</sup> Vacuum compatibility up to 10E-10 Torr

# Shutter Timing



**FS25 (w/ 5VDC and C-PET blades)**

**Time (msec.)**

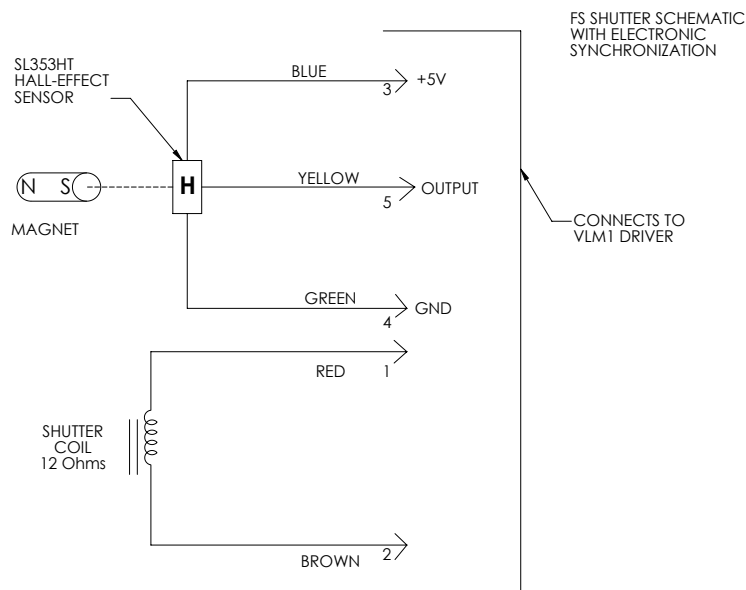
O - A	Delay time on opening after current applied	7.0
A - C	Transfer time on opening	9.0
O - C	Total opening time	16.0
C - E	Min. dwell time with min. input pulse	15.0
B - F	Min. equivalent exp. time	30.5
E - G	Transfer time on closing	22.0
A - G	Total window time	53.0
MET	Min. exposure time	30.0
TEP	Typical exposure pulse	>30.0

# Technical Specifications

Coil Resistance	Voltage to Open	Hold Voltage
12 Ω	+5 VDC at 425mA	+5 VDC

<sup>1</sup>(Continuous/Burst) Continuous frequency rating specified at shutter's minimum exposure pulse. Burst frequency rating specified for four (4) seconds maximum with one (1) minute minimum between bursts.

Series	Weight (Unhoused/Half/Housed)	Operating Temp.	Max. Opening Bounce	Max. Closing Bounce	Max. Freq. of Operation <sup>1</sup>	Number of Shutter Blades
FS25	22.0 g / 57.0 g / 92.5 g	-40 - +65 °C	15%	15%	5 Hz / 10 Hz	5

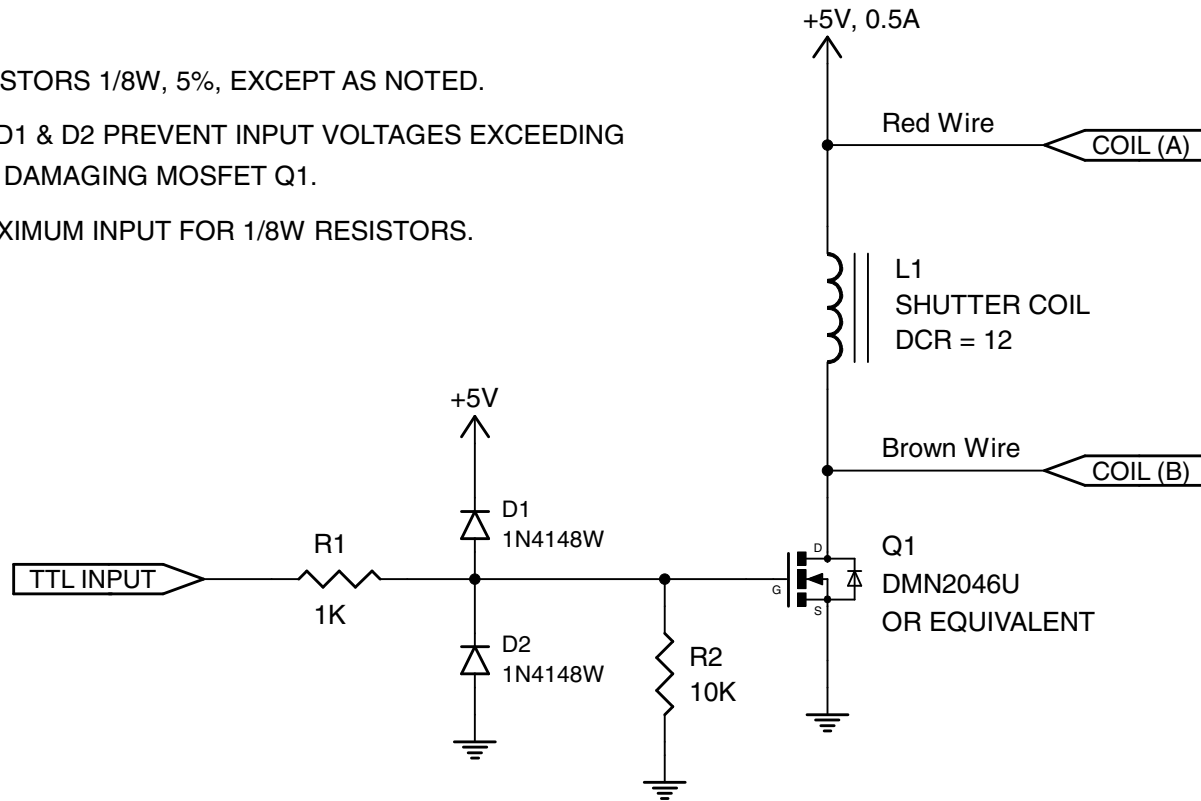


The synchronization system for FS shutter devices incorporates a small magnet mounted to the driving mechanism and a Hall effect sensor. When the device achieves approximately 80% of full open, the magnet causes the Hall effect sensor to change state, producing a signal to indicate that the shutter has switched to the active state. Shown to the left is the FS series shutter schematic which incorporates the electronic synchronization system. **There is no connection to the designated synchronization pins when an electronic sync. is not selected.**

# Typical Control Circuit

## NOTES:

1. ALL RESISTORS 1/8W, 5%, EXCEPT AS NOTED.
2. DIODES D1 & D2 PREVENT INPUT VOLTAGES EXCEEDING +5V AND DAMAGING MOSFET Q1.
3. +12V MAXIMUM INPUT FOR 1/8W RESISTORS.



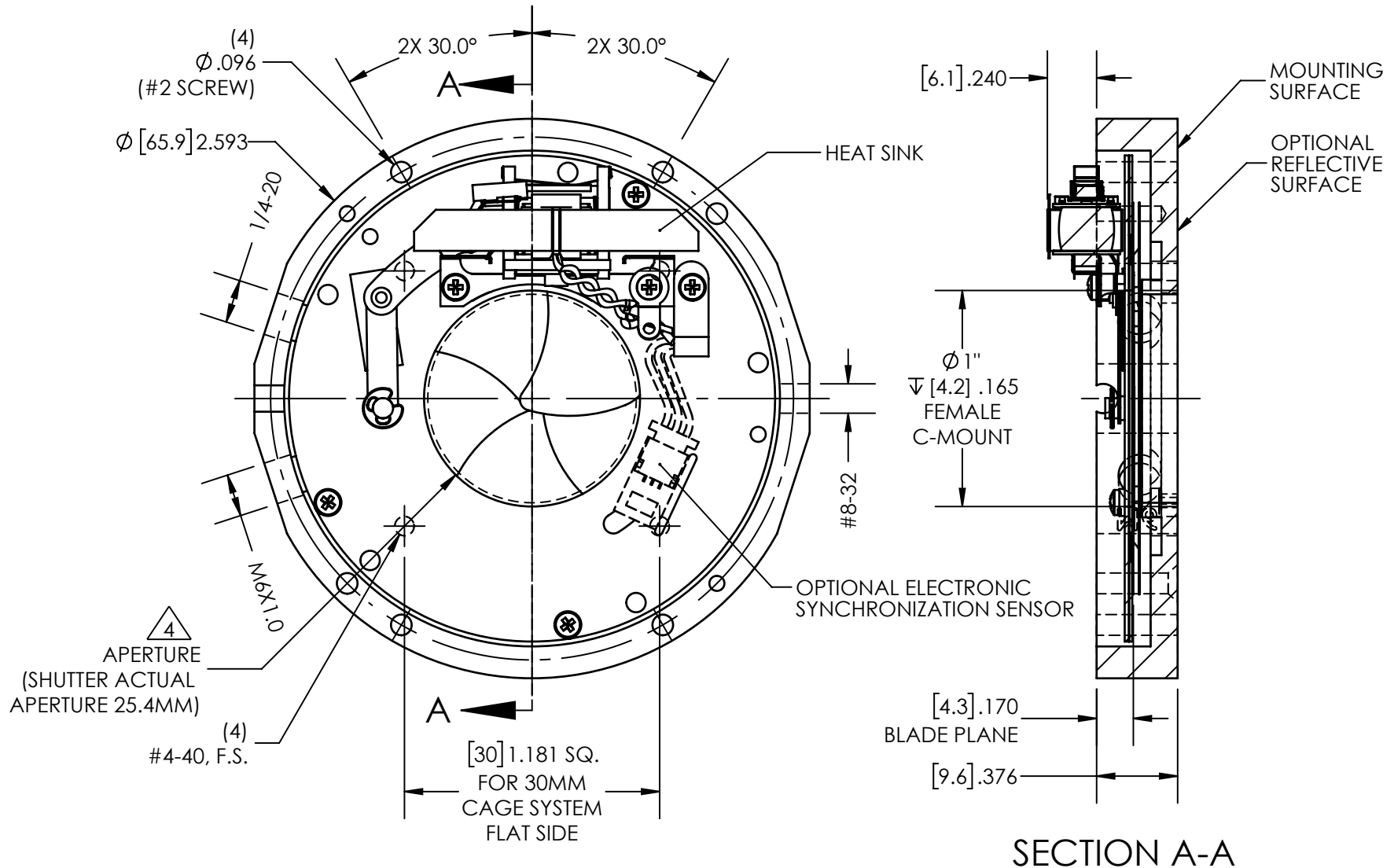
This simple control circuit can be used to operate the shutter device from a TTL trigger pulse.<sup>1</sup> This control can be also accomplished with our new VLM1 TTL control interface, which will be available soon.

<sup>1</sup> The shutter will not operate directly from a TTL signal.

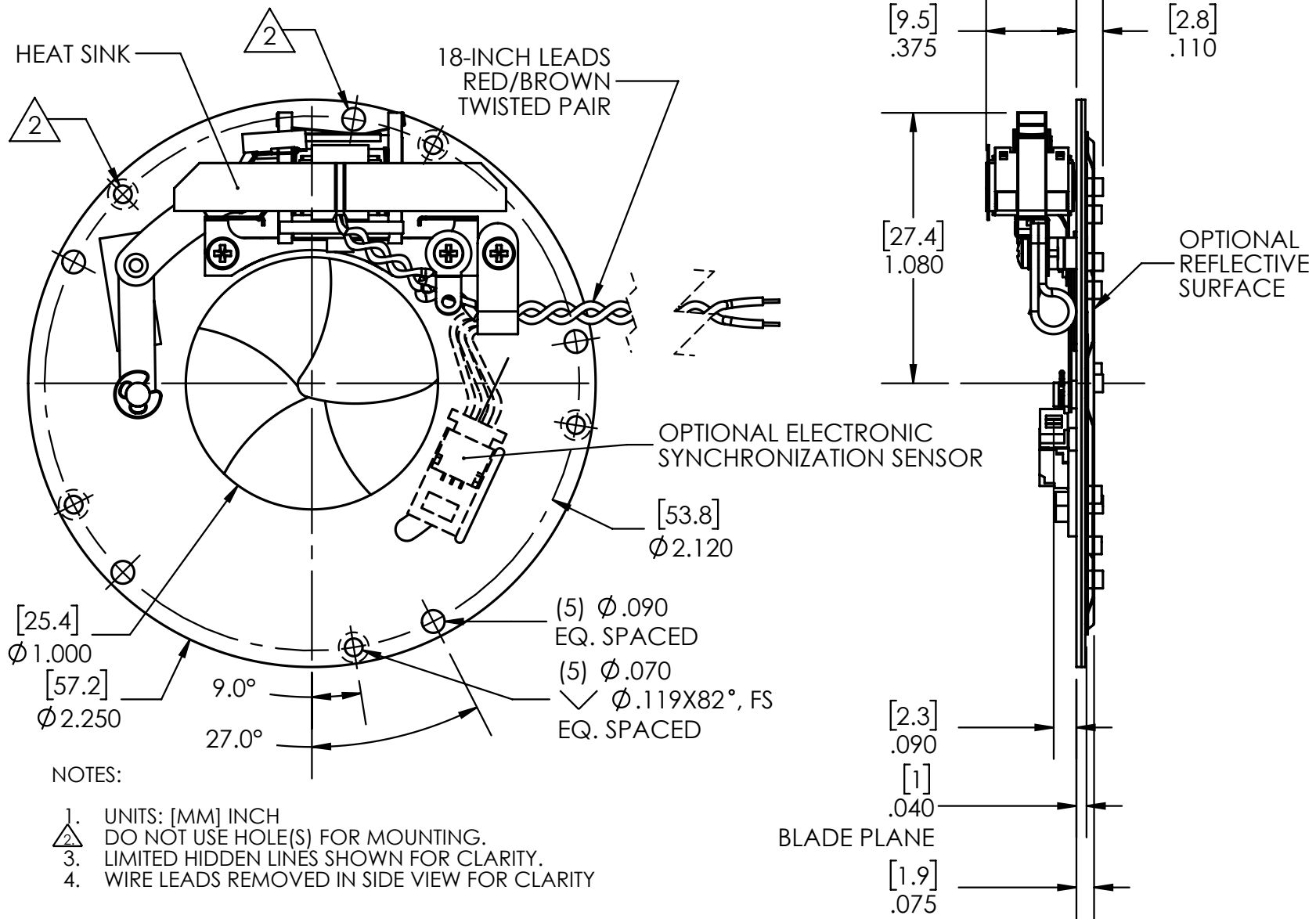
# Technical Drawings - FS25 (Half-Housed - FS25S2C0L)

NOTES:

1. UNITS: [MM] INCH.
2. LIMITED HIDDEN LINES SHOWN FOR CLARITY.
3. LEADS WIRES REMOVED FOR CLARITY.
4. SHUTTER ACTUAL APERTURE IS 25.4MM, IN MOUNT APERTURE IS REDUCED BY FEMALE C-MOUNT TO  $\varnothing .965$  [24.5MM].



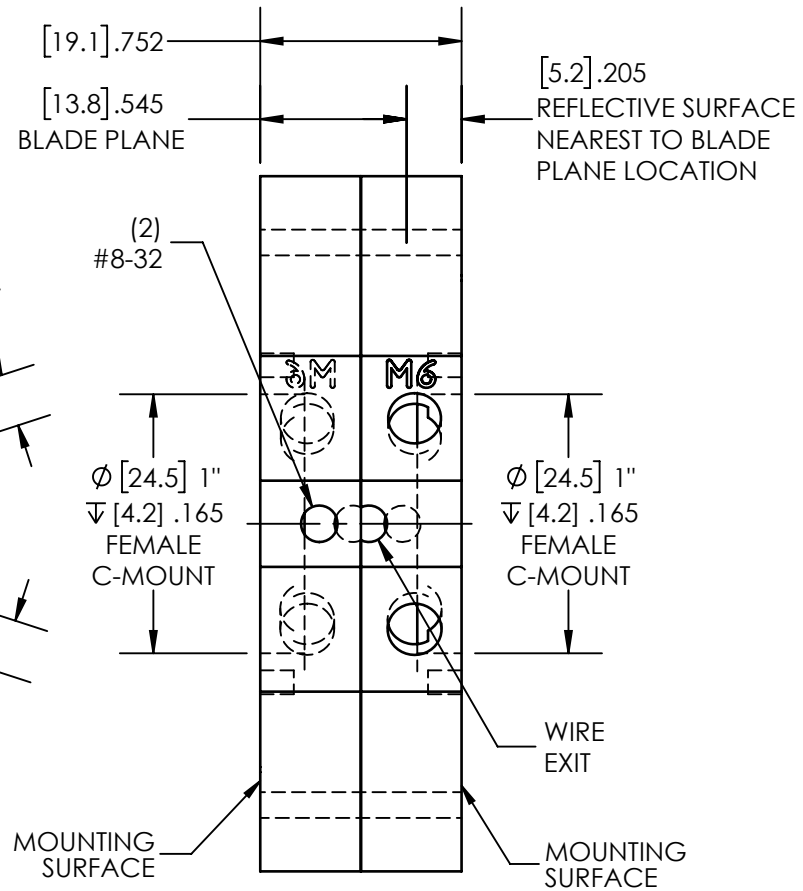
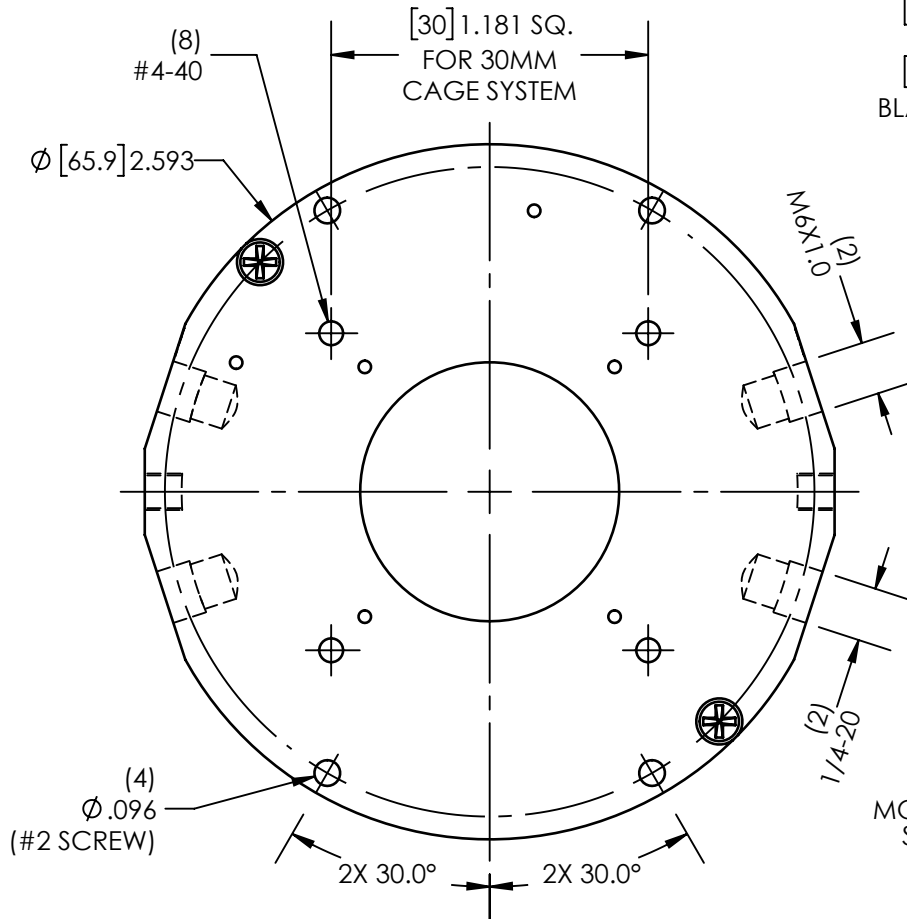
# Technical Drawings - FS25 (Un-Housed - FS25S1C0L)



# Technical Drawings - FS25 (Housed - FS25S3C0L)

NOTES:

1. UNITS: [MM] INCH
2. LIMITED HIDDEN LINES SHOWN FOR CLARITY.
3. SHUTTER APERTURE IS 25.4MM REDUCED TO (  $\phi$  .965 [24.5MM]) WHEN INSTALLED INTO HOUSING.
4. OPTIONAL REFLECTIVE SURFACE OPPOSITE ACTUATOR COIL SIDE.



# Uniblitz® FS35

35mm Uni-Stable Optical Shutter



## Overview

The Uniblitz FS series shutters are designed and optimized to operate directly from +5VDC and do not require a separate driver. Removing the +5VDC (0VDC) closes these shutters. A simple control circuit can be used to operate these shutter devices from a TTL trigger pulse. This control can be also accomplished with our new VLM1 TTL control interface (available soon).

This low-cost innovation provides the reliability of Uniblitz shutters (typical lifetime >300K cycles) at a single operating voltage.

**Need Support?** Please [visit our website](#) or email us at [info@uniblitz.com](mailto:info@uniblitz.com).

Tel: 585-385-5930 | Toll-Free: 800-828-6972 | Fax: 585-385-6004 | 803 Linden Ave. Rochester, NY 14625  
Updated 1/20 | Datasheet Version 5.1 | ©2019 Vincent Associates

## Key Features

- 35mm aperture
- Default closed operation, +5VDC opens the shutter, 0VDC closes the shutter
- **RoHS Compliant**
- Transfer time on opening:  
**20.0 milliseconds**
- Total opening time:  
**32.0 milliseconds**



# Product Options

FS35 2 3 4 5 6 - 7

Ex: FS35S2C0L-EC

## 1 Shutter Series:

- **FS35:** Normally Closed
- **FSR35:** Normally Open

## 3 Housing: <sup>1</sup>

- **1:** Un-Housed
- **2:** Half-Housed
- **3:** Fully-Housed

## 5 Electronic Sync:

- **0:** Omitted
- **1:** Included

## 7 Encapsulated Coil:

- **EC:** Included <sup>4</sup>
- Leave blank if not required

## 2 Voltage:

- **S:** Standard 5VDC

## 4 Blades: <sup>2</sup>

- **C:** Black carbon impregnated plastic (C-PET)
- **T:** Low Energy (Teflon<sup>®</sup>)
- **ZM:** High Energy (AlMgF<sub>2</sub>) <sup>3</sup>

## 6 Connector:

- **L:** 18" flying leads

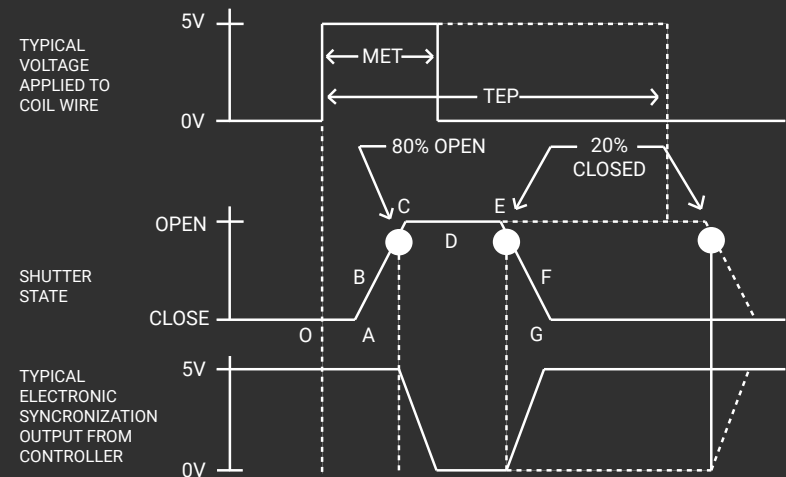
<sup>1</sup> Various mounting methods are available depending on housing option – see Key Features on website

<sup>2</sup> Other blade coating options may be available by special order.

<sup>3</sup> Input side only; Teflon<sup>®</sup> coating is on opposite side to protect shutter blade surface. Light source must be input to the reflective side only.

<sup>4</sup> Vacuum compatibility up to 10E-10 Torr

# Shutter Timing



## FS35 (w/ 5VDC and C-PET blades)

## Time (msec.)

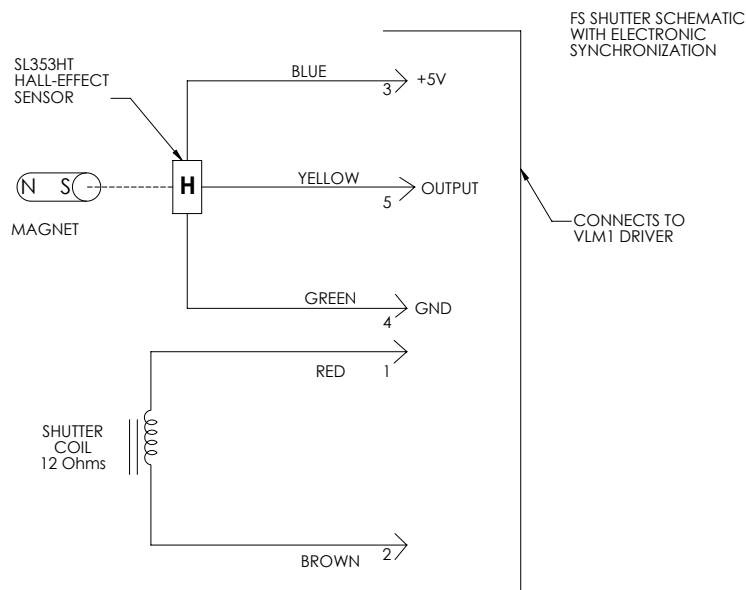
O - A	Delay time on opening after current applied	12.0
A - C	Transfer time on opening	20.0
O - C	Total opening time	32.0
C - E	Min. dwell time with min. input pulse	5.0
B - F	Min. equivalent exp. time	24.0
E - G	Transfer time on closing	18.0
A - G	Total window time	43.0
MET	Min. exposure time	30.0
TEP	Typical exposure pulse	>30.0

# Technical Specifications

Coil Resistance	Voltage to Open	Hold Voltage
12 Ω	+5 VDC at 425mA	+5 VDC

<sup>1</sup>(Continuous/Burst) Continuous frequency rating specified at shutter's minimum exposure pulse. Burst frequency rating specified for four (4) seconds maximum with one (1) minute minimum between bursts.

Series	Weight (Unhoused/Half/Housed)	Operating Temp.	Max. Opening Bounce	Max. Closing Bounce	Max. Freq. of Operation <sup>1</sup>	Number of Shutter Blades
FS35	48.5 g / 116.0 g / 183.5 g	-40 - +65 °C	15%	15%	5 Hz / 10 Hz	5

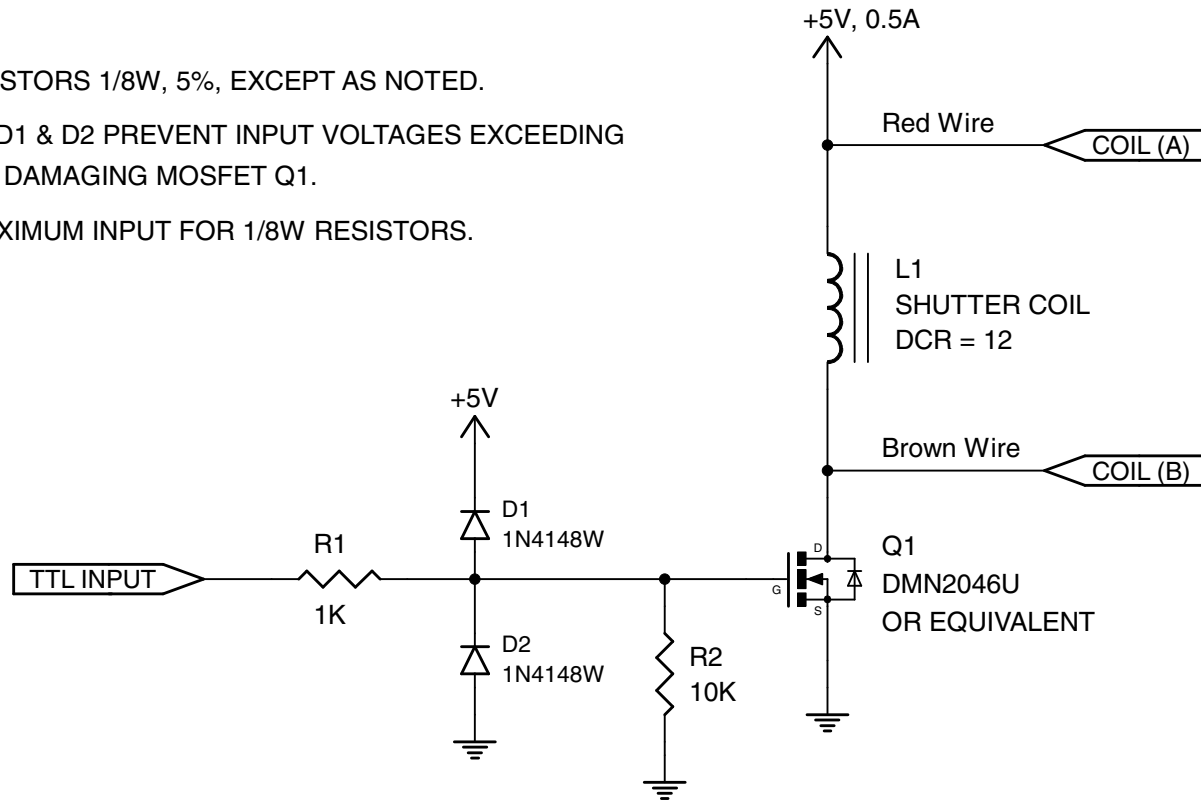


The synchronization system for FS shutter devices incorporates a small magnet mounted to the driving mechanism and a Hall effect sensor. When the device achieves approximately 80% of full open, the magnet causes the Hall effect sensor to change state, producing a signal to indicate that the shutter has switched to the active state. Shown to the left is the FS series shutter schematic which incorporates the electronic synchronization system. **There is no connection to the designated synchronization pins when an electronic sync. is not selected.**

# Typical Control Circuit

## NOTES:

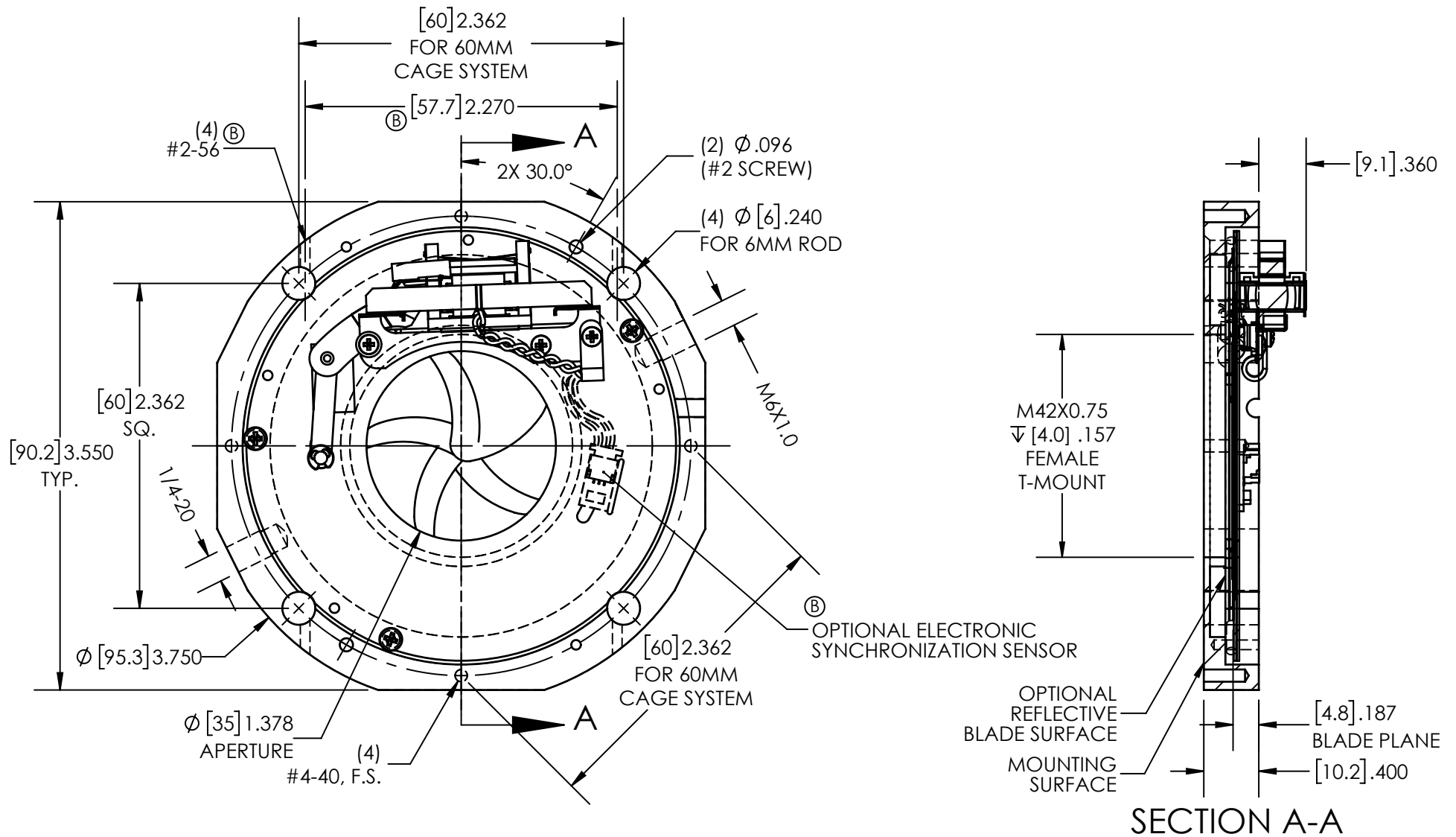
1. ALL RESISTORS 1/8W, 5%, EXCEPT AS NOTED.
2. DIODES D1 & D2 PREVENT INPUT VOLTAGES EXCEEDING +5V AND DAMAGING MOSFET Q1.
3. +12V MAXIMUM INPUT FOR 1/8W RESISTORS.



This simple control circuit can be used to operate the shutter device from a TTL trigger pulse.<sup>1</sup> This control can be also accomplished with our new VLM1 TTL control interface, which will be available soon.

<sup>1</sup> The shutter will not operate directly from a TTL signal.

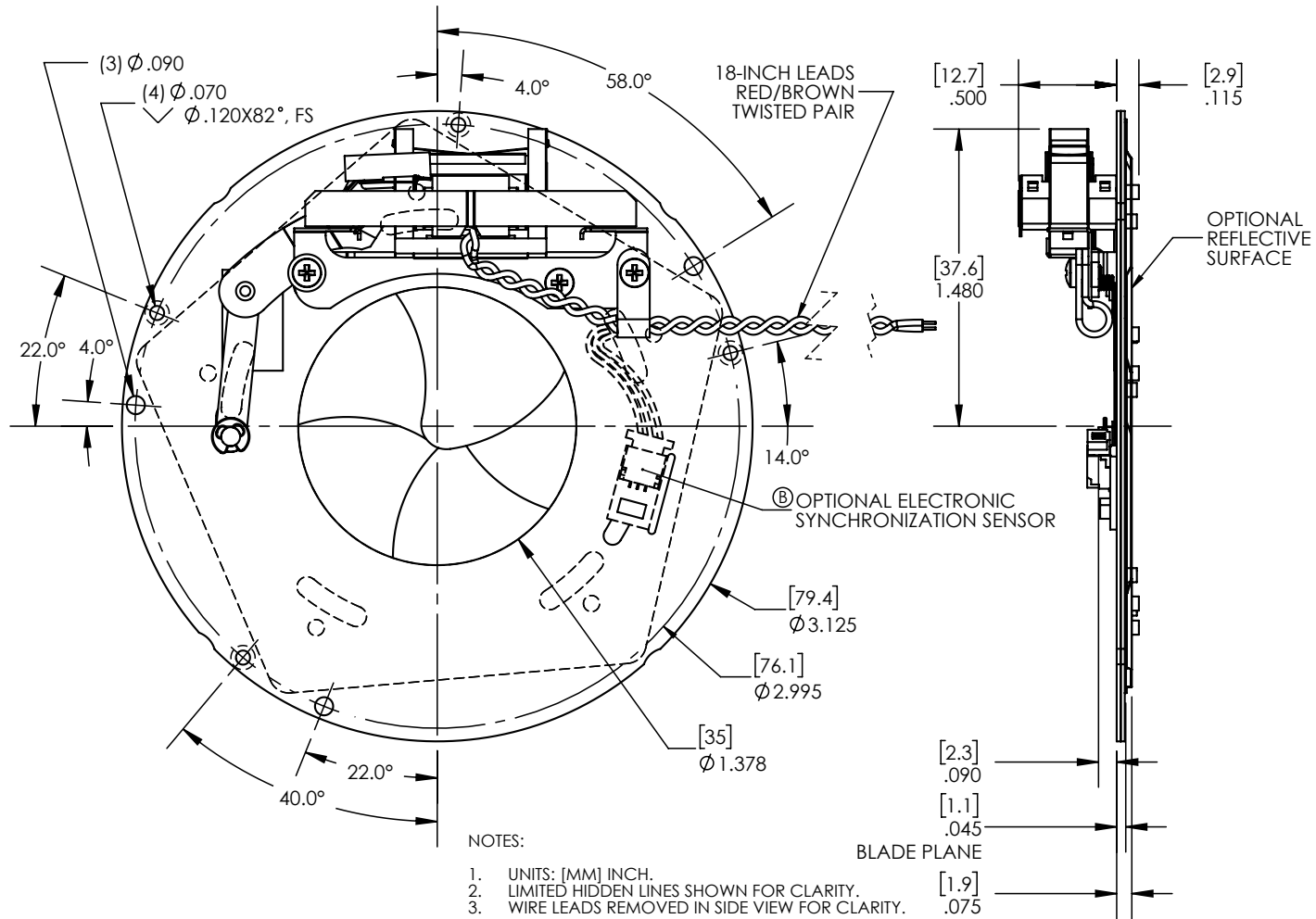
# Technical Drawings - FS35 (Half-Housed - FS35S2C0L)



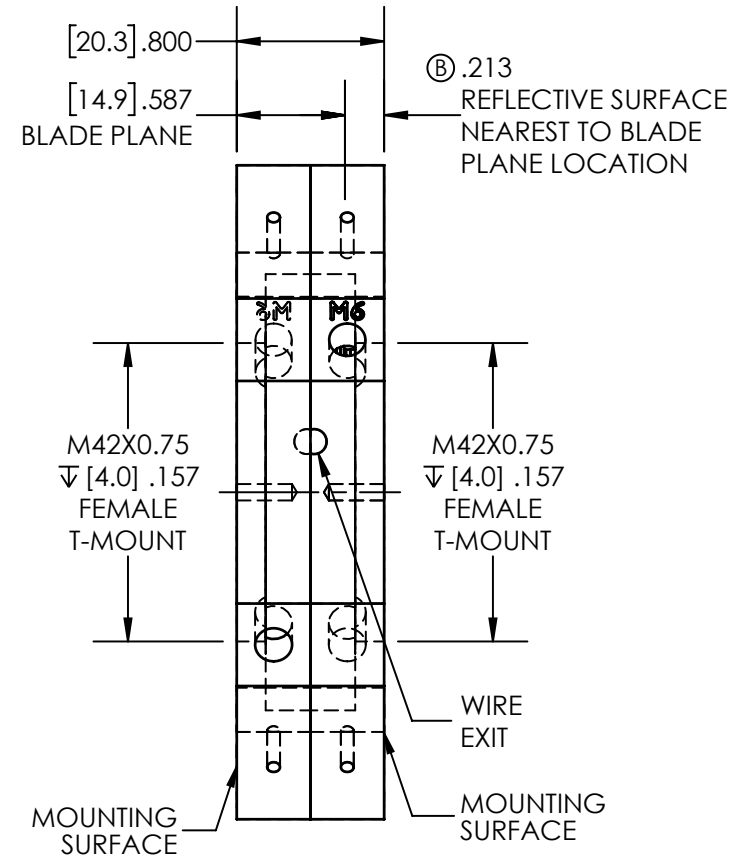
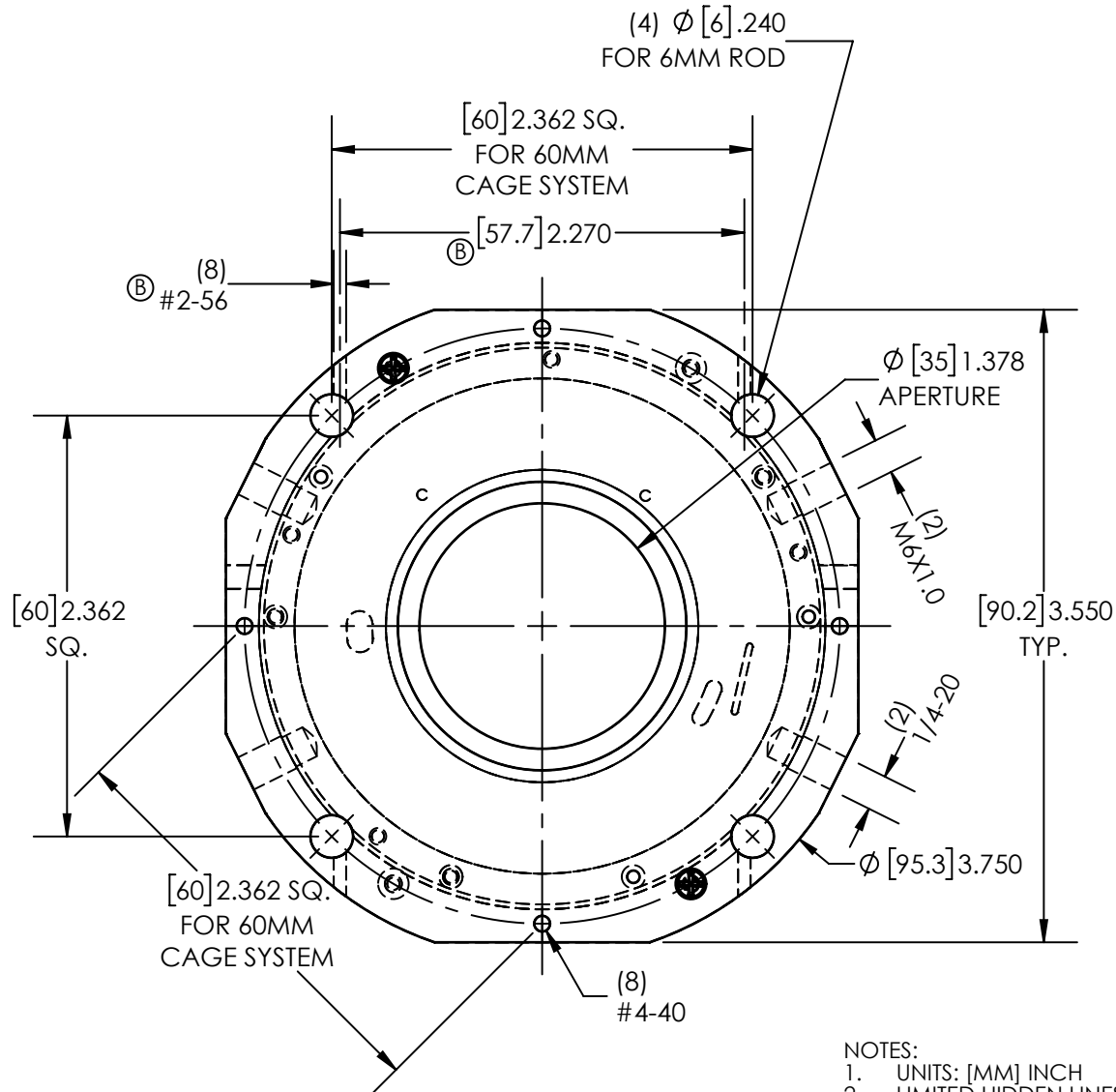
## NOTES:

1. UNITS: [MM] INCH.
2. LIMITED HIDDEN LINES SHOWN FOR CLARITY.
3. LEADS WIRES REMOVED FOR CLARITY.

# Technical Drawings - FS35 (Un-Housed - FS35S1C0L)



# Technical Drawings - FS35 (Housed - FS35S3C0L)



## NOTES:

1. UNITS: [MM] INCH
2. LIMITED HIDDEN LINES SHOWN FOR CLARITY.
3. OPTIONAL REFLECTIVE SURFACE OPPOSITE ACTUATOR COIL SIDE.

# FS Series Application Note #001

## Features, Options, and Operational Set-up

- [Key Features – Expanded](#)
- [Optional Features](#)
- [Mounting Methods](#)
- [Cage System Mounting Methods](#)
- [VLM1/VLM1B Interface Module](#)

## Key Features - Expanded

- 25mm (FS25) and 35mm (FS35) apertures available
- Default closed operation, +5VDC opens the shutter and sustains the device in the open position, 0VDC closes the shutter
  - For certain applications where the small heat rise in the actuator coil may be an issue, the hold voltage can be decreased to reduce heat rise in the coil, i.e. vacuum applications, etc. Therefore, the shutter will require 5V at 425mA to open and can sustain this voltage indefinitely in ambient. If required, the hold voltage can be reduced to 2.5V at 210mA this reduces the power dissipated within the coil from 2.13W to .53W. Contact Technical Support for additional information and to discuss your specific application.
  - Alternative two stage driver circuits can be recommended.
- Slim, small form-factor
- **RoHS Compliant**
- Operation at +5VDC (open and hold) – Two wire operation, 18-inch flying leads for connection to the actuator coil. Place +5VDC on Red wire, +5V Return on Brown wire – Shutter opens. Remove +5V from the Red wire, shutter closes.

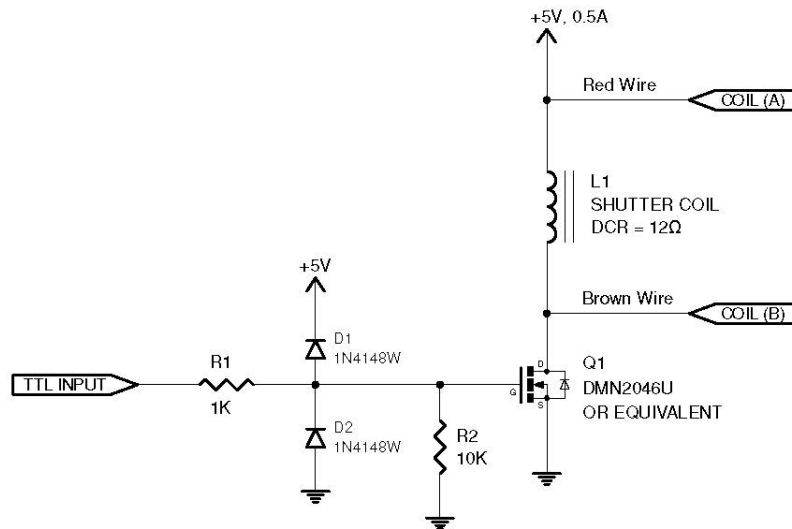


Figure #1 Sample Drive circuit to control the FS Series Shutter from TTL

- To operate the shutter from a TTL signal, Figure #1 illustrates a typical, simple circuit that can be used to open and close the shutter. Active High TTL on the TRIG Input opens the shutter, Low on the TRIG Input closes the Shutter. **The FS Series Shutters will not operate directly from TTL.**
- This circuit is also built into the new **VLM1, TTL Interface Module**. For further information on the VLM1 See (*insert web link here*) and/or see below within the document – “**VLM1 Interface Module – For Use with the FS Series**”.
- [Black carbon impregnated plastic \(C-PET\)](#) shutter blades (5 each) - Blade surface only can handle up to 100°C and laser power up to 50mW/mm<sup>2</sup>.
  - C-Pet is not recommended for laser applications >50mW/mm<sup>2</sup>, however, please contact technical support for your specific laser application. Alternative blade materials and coatings are available. See Optional Features.
- Black anodized aluminum mount (included – Half Housed and (2) included with Full Housed version) provides multiple mounting options – see below for standard mounting methods. Please note - the mount provides a quick method of mounting the shutter into your optical system, it is not required for shutter



operation and can be eliminated (purchased without the mount) for OEM applications.

- FS25S2C0L Mounting Methods – 25mm clear aperture (aperture is reduced to .965 inches – 24.5mm when purchased with half or full housing) due to the max diameter of the C-Mount.
  - Allows 30mm Cage System Extension Rods to be directly attached to 4-40 threaded holes in mount surface.
  - C-Mount Female threaded aperture bore
  - ¼-20 and M6 threaded holes included for post mounting
  - Provides a flat surface for ease of mounting into an optical system
  - See drawings under the FS25 Specification tab
- FS35S2C0L Mounting Methods – 35mm clear aperture
  - Can be utilized in a 60mm Cage System. Rods can slide through either half or full housing to allow placement of the shutter to be adjusted or attached with 4-40 threaded holes.
  - T-Mount Female threaded aperture bore
  - ¼-20 and M6 threaded holes included for post mounting
  - Provides a flat surface for ease of mounting into an optical system
  - See drawings under the FS35 Specification Tab
- Operating temperature range: -40°C to +65°C

## Optional Features

- The Housing Option selection (Half, Full, and Un-housed) along with the Electronic Sync are options available for purchase through our on-line ordering portal. Additional options may be available, please contact our technical personnel for additional information on availability and purchase.
- Default open configuration (Normally open) -The shutter can be manufactured to be in the open position with 0V and close when 5V is applied to the actuator coil.
- Electronic Synchronization – The shutter can be equipped with a sensor to sense when the shutter achieves an open (or a closed) position. See a further description of the Sync Circuit under the Specification tab. Sync Operation: As

the shutter opens to approximately 80% of full open, the magnet is brought into proximity of Hall Effect (HE) sensor by the mechanical movement of the shutter. This causes the HE sensor to change state and provide a TTL Active High output. Once the shutter moves closed approximately 20%, the sensor again changes state to indicate the shutter is no longer fully open. See shutter schematic and connections illustrated in Figure #2:

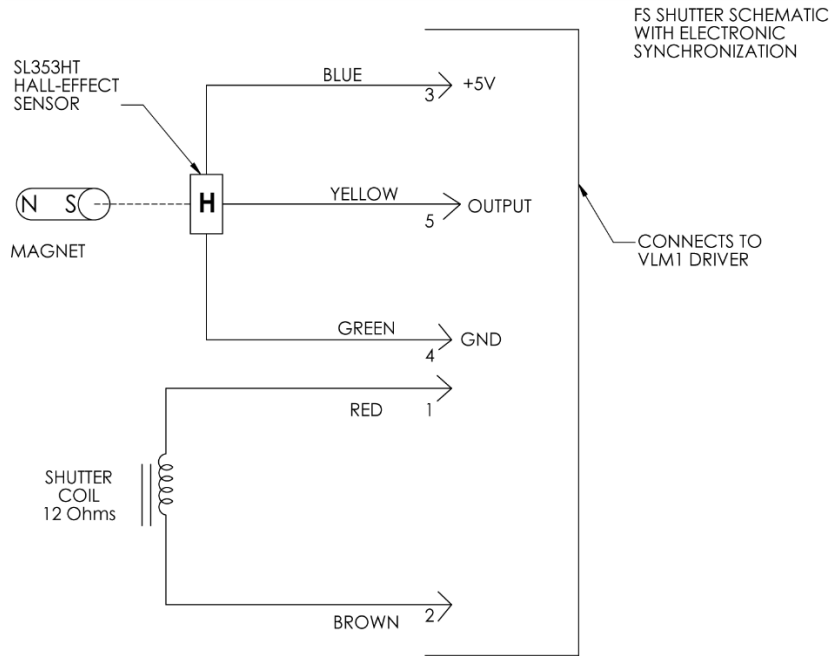


Figure #2 FS Electronic Synchronization Circuit

- Blade Type/substrate material – These materials are available and can be used to increase the damage threshold on the shutter blades. Although these materials and coatings can enhance the blade energy threshold capability, these will tend to slow the response time of the shutter.
  - Teflon® (T) black coating (Both sides of the aperture) on a Stainless-Steel substrate (up to 100mW/mm<sup>2</sup>)
  - AlMgF<sub>2</sub> (ZM) Polished reflective input surface coated with AlMgF<sub>2</sub> (up to 5W/mm<sup>2</sup>). Laser must be input to the reflective surface. Backside of the blades are Teflon (black coated). Contact Technical support for determination of Laser Damage Threshold.
- Vacuum compatibility up to 10E-10 Torr – Shutter will need to be equipped with an EC (Encapsulated Coil), all lubricants and materials used on the standard

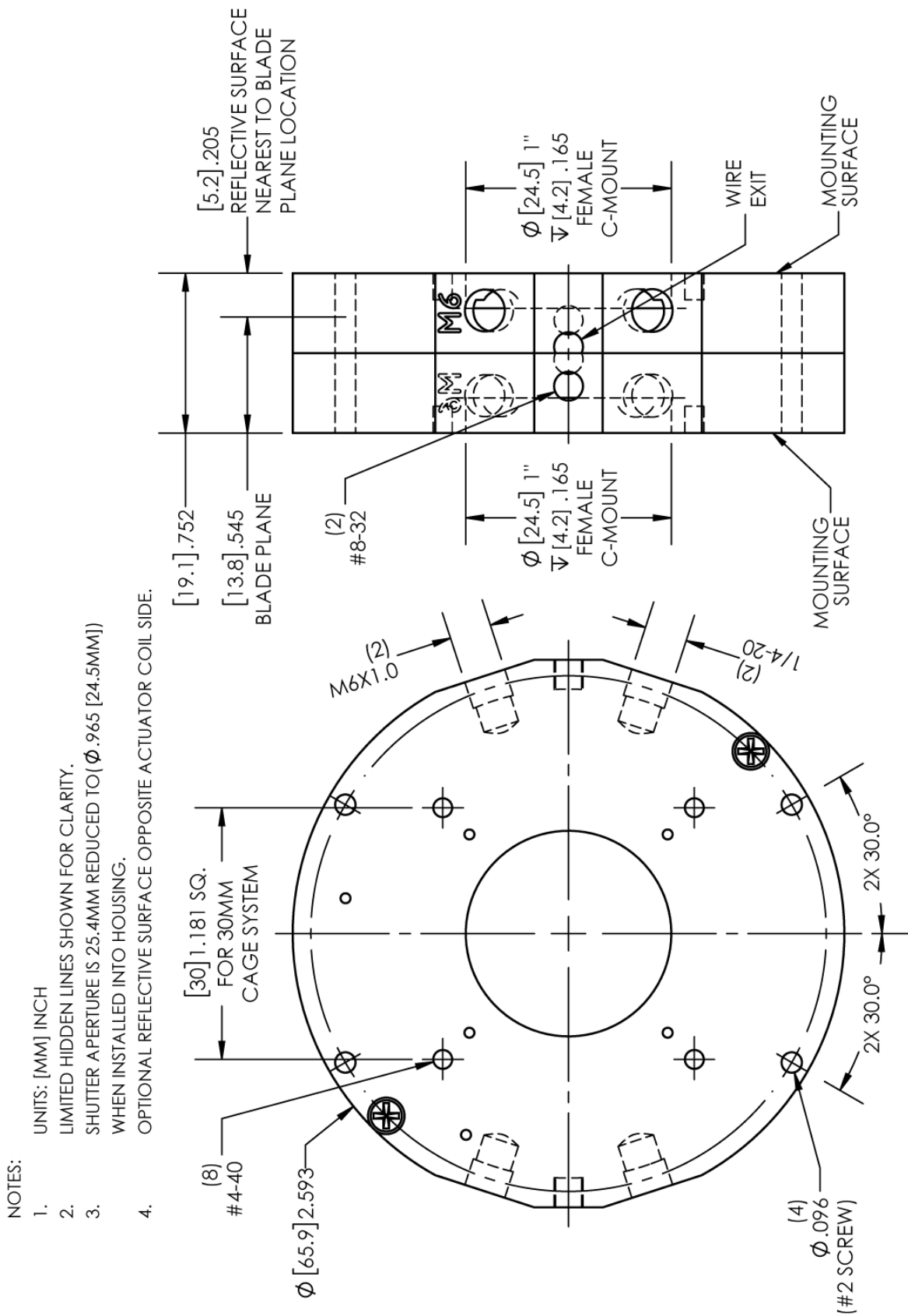
device will be upgraded to be vacuum compatible. Contact Technical support for additional details.

- Housed option:
  - FS25S3C0L version – 25mm aperture - A second, identical, aluminum, half housing will be attached to the existing half housing and provide an encapsulated aluminum enclosure for the shutter. See Figure #3.
    - A C-Mount Female threaded aperture bore will be on both sides. Additionally, the housing will now contain (2) each M6 and (2) each ¼-20 post holes.
  - FS35S3C0L version – 35mm aperture - A second, identical, aluminum, half housing will be attached to the existing half housing and provide an encapsulated aluminum enclosure for the shutter. See Figure #4.
    - A T-Mount Female threaded aperture bore will be on both sides. Additionally, the housing will now contain (2) each M6 and (2) each ¼-20 post holes.
- Available without the aluminum mount or housing for use in an OEM application (Un-Housed). Due to the configuration of the unhoused device, please contact technical support for mounting considerations. Proper clearances must be maintained from the moving components of the shutter to prevent damage to the shutter or to the user's optical system.
- +12VDC (Open & Hold) - two wire operation - *Future availability* – A special coil may be available at a future date to allow the user to open and close the shutter with +12V to open and 0V to close. If you have a specific single voltage you require to open and hold the shutter, please contact our technical support staff. We can assist by designing a special coil or by designing an interface circuit to solve your individual application.

## Mounting Methods

- FS25S2C0L – 25mm Aperture with Standard (Half-Housed or Full-Housed) Mount
  - Allows 30mm Cage System Extension Rods to be directly attached to the shutter using 4-40 threaded holes

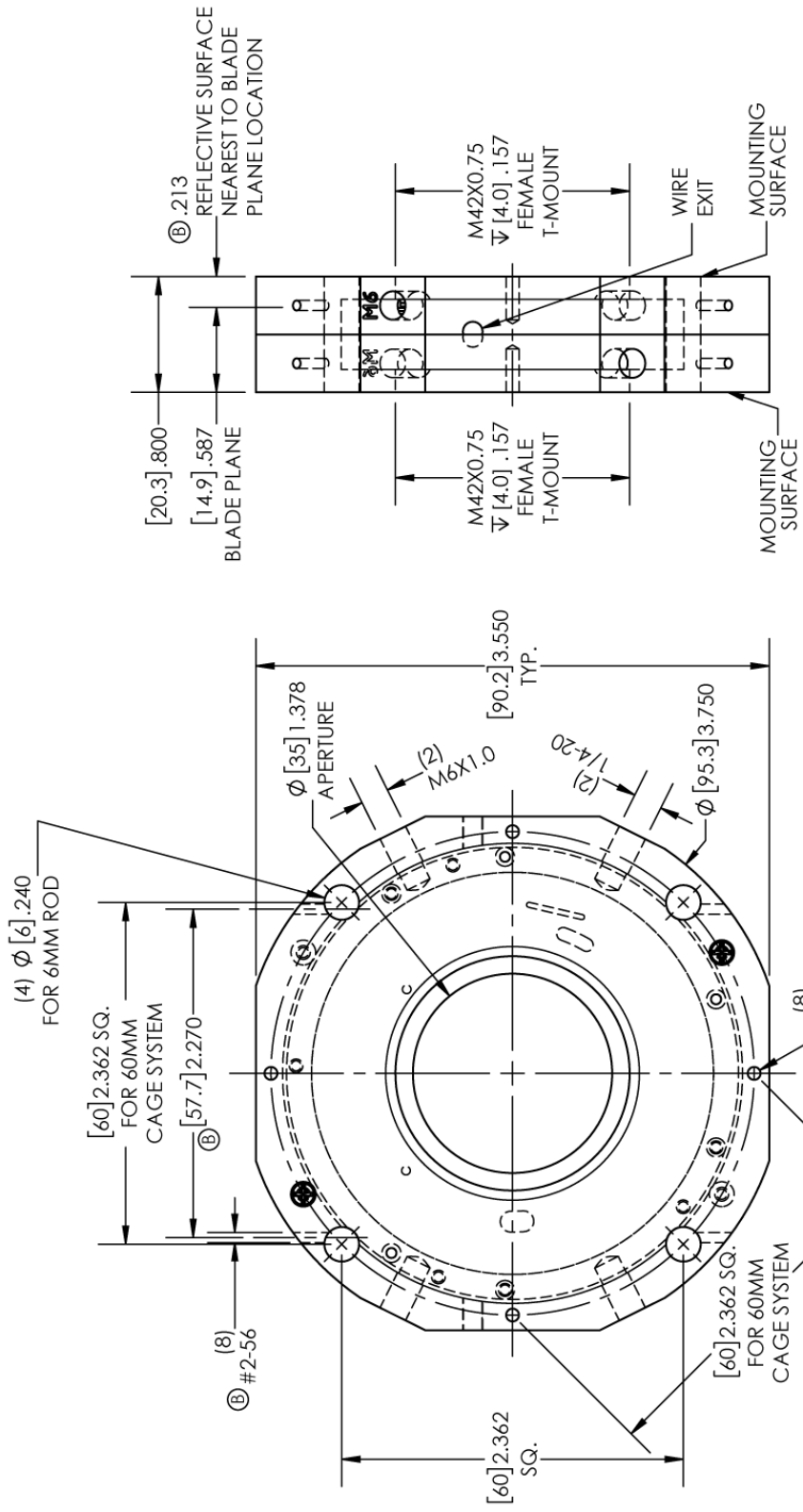
- This device can be fit into 30mm Cage systems from an Optical Component supplier that can provide these Extension Rods to the following specifications:
  - Extension Rods must be equipped with a 4-40 threaded stud, each end, stud length 0.100 inches (2.5mm). The overall diameter must be 0.240 inches (6.0mm).
  - See Figure #5, #6, #7 for Cage System examples under Cage System Mounting Methods below.
- C-Mount Female threaded aperture bore – (1.000”x32TPI) located at the optical center of the assembly.
- 1/4-20 & M6 threaded holes included for post mounting
- Provides a flat surface for ease of mounting into customer optical system – The optimum configuration is the half-housed version. This configuration offers the best match of cost and versatility. The device can easily be mounted on the flat side of the aluminum half-housing with no interference concerns to the shutter mechanism.
- See Figure #3.



- NOTES:
1. UNITS: [MM] INCH
  2. LIMITED HIDDEN LINES SHOWN FOR CLARITY.
  3. SHUTTER APERTURE IS 25.4MM REDUCED TO  $\phi .965 [24.5MM]$  WHEN INSTALLED INTO HOUSING.
  4. OPTIONAL REFLECTIVE SURFACE OPPOSITE ACTUATOR COIL SIDE.

Figure #3 FS25 Full-Housed Drawing Showing all Mounting Options

- FS35S2C0L – 35mm Aperture with Standard (Half-Housed or Full-Housed) Mount
  - Allows 60mm Cage System Extension Rods to be directly attached using 4-40 threaded holes or these specified rods can slide through either half or both parts of the Full Housing to allow shutter position to be adjusted along the Extension Rod length.
    - This device can be fit into 60mm Cage systems from an Optical Component supplier that can provide these Extension Rods to the following specifications:
      - Extension Rods must be equipped with a 4-40 threaded stud, each end, stud length 0.100 inches (2.5mm). The overall diameter must be 0.240 inches (6.0mm).
    - See Figure #5, #6, and #7 for Cage System examples under Cage System Mounting Methods below.
  - T-Mount Female threaded aperture bore – M42x0.75 thread – located at the optical center of the assembly.
  - 1/4-20 and M6 threaded holes included for post mounting
  - Provides a flat surface for ease of mounting into customer optical system – The optimum configuration is the half-housed version. This configuration offers the best match of cost and versatility. The device can easily be mounted on the flat side of the aluminum half-housing with no interference concerns to the shutter mechanism.
  - See Figure #4.

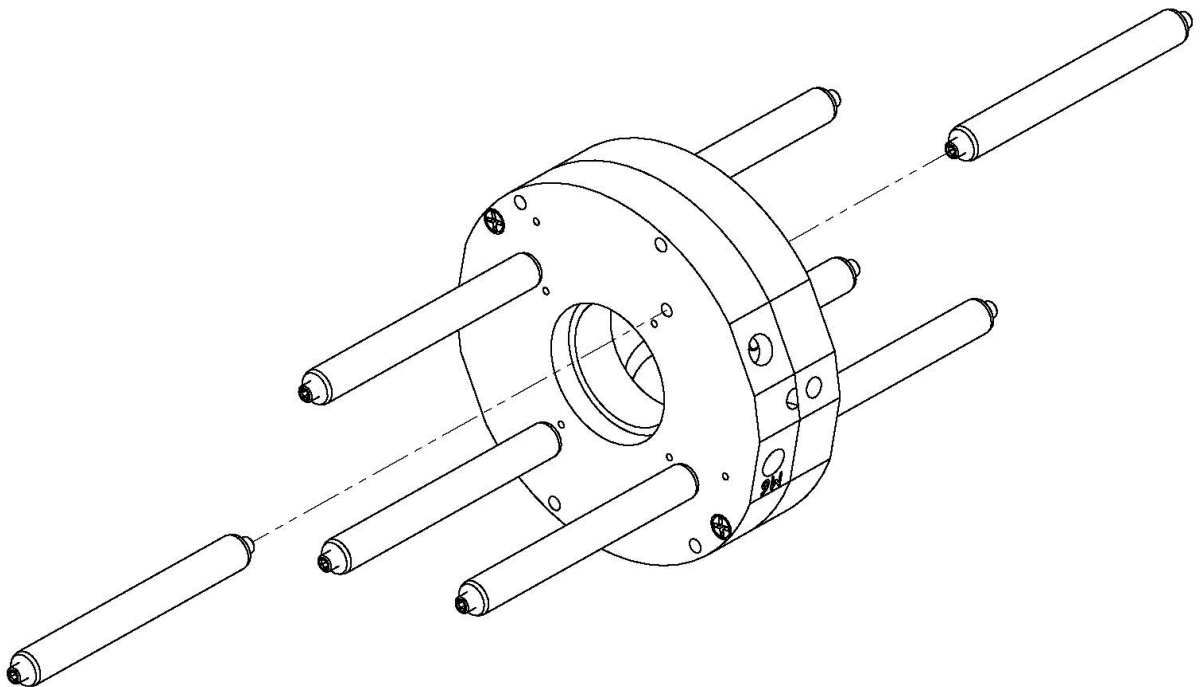


NOTES:  
 UNITS: [MM] INCH  
 1. LIMITED HIDDEN LINES SHOWN FOR CLARITY.  
 2. OPTIONAL REFLECTIVE SURFACE OPPOSITE ACTUATOR COIL SIDE.

Figure #4 FS35 Full-Housed Drawing Showing all Mounting Options

# Cage Systems Mounting Methods

- As described above, in addition to post mounting (M6 or ¼-20) or mounting using the optical thread provided at the aperture center (C or T Mount respectively), the FS Series of devices has the capability to be utilized in an Optical Cage System. These Optical Cage systems are versatile and are available from several Optical Component suppliers. We have designed the FS Series with the ability to be installed into either a 30mm cage system (the FS25) or a 60mm cage system (the FS35). By utilizing several readily available components, one could easily install these shutters quickly and accurately into an existing or new Optical System without the need to design and/or fabricate mounts. Below is an example of how the FS25 and FS35 can be configured with these components
  - Figure #5 below illustrates how 30mm Cage System Extension Rods are attached onto the FS25 with a Full-Housed option. This option will allow Extension Rods to be attached to both sides of the shutter.



• Figure #5



- Figure #6 below illustrates how 60mm Cage System Extension Rods are attached onto the FS35 with a Full-Housed option. This option will allow Extension Rods to be attached to both sides of the shutter.

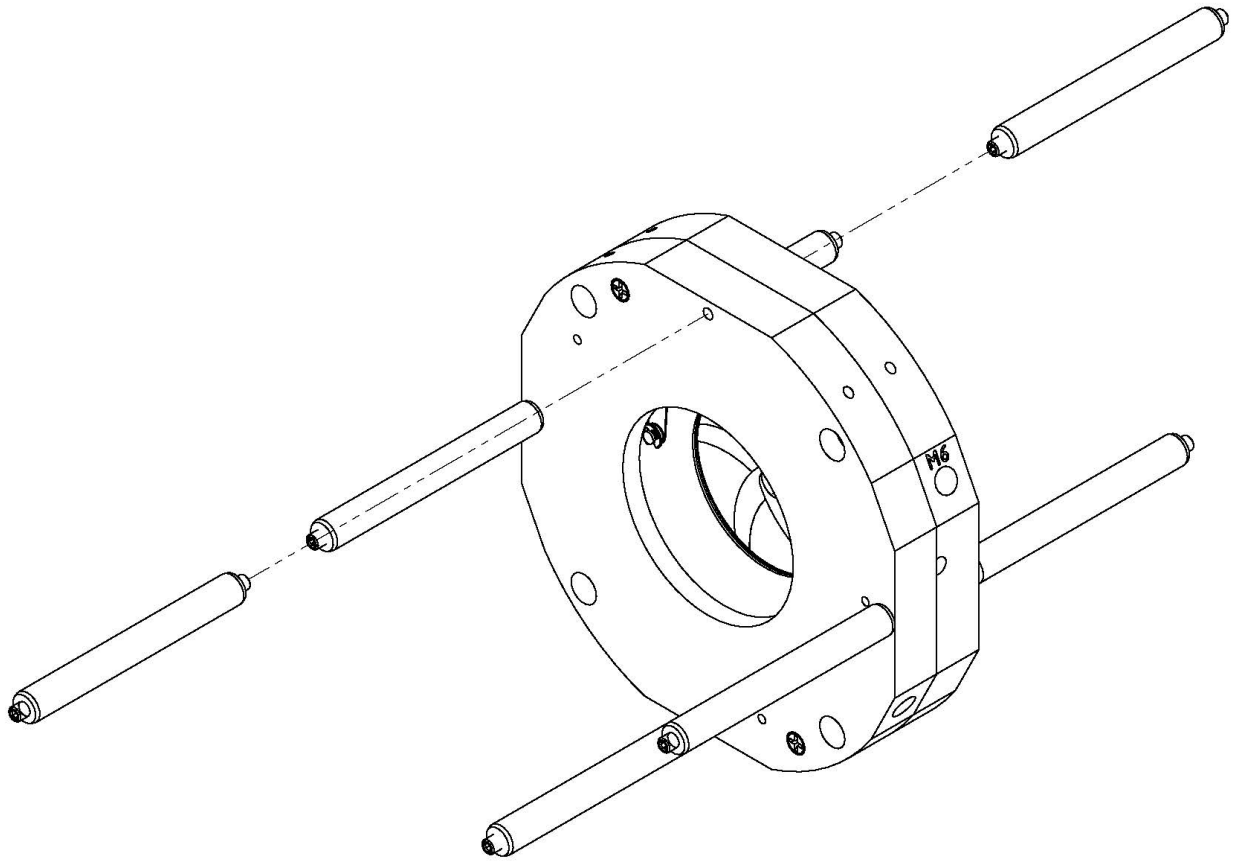


Figure #6

- In addition, the FS35 contains (4) 6mm holes into which these same Extension rods can be placed into, allowing the shutter to be adjusted along the length of these rods. (Shutter can be moved along the path shown by the arrows). The final position can be secured by tightening the set screw(s) on each of the (4) Rods.

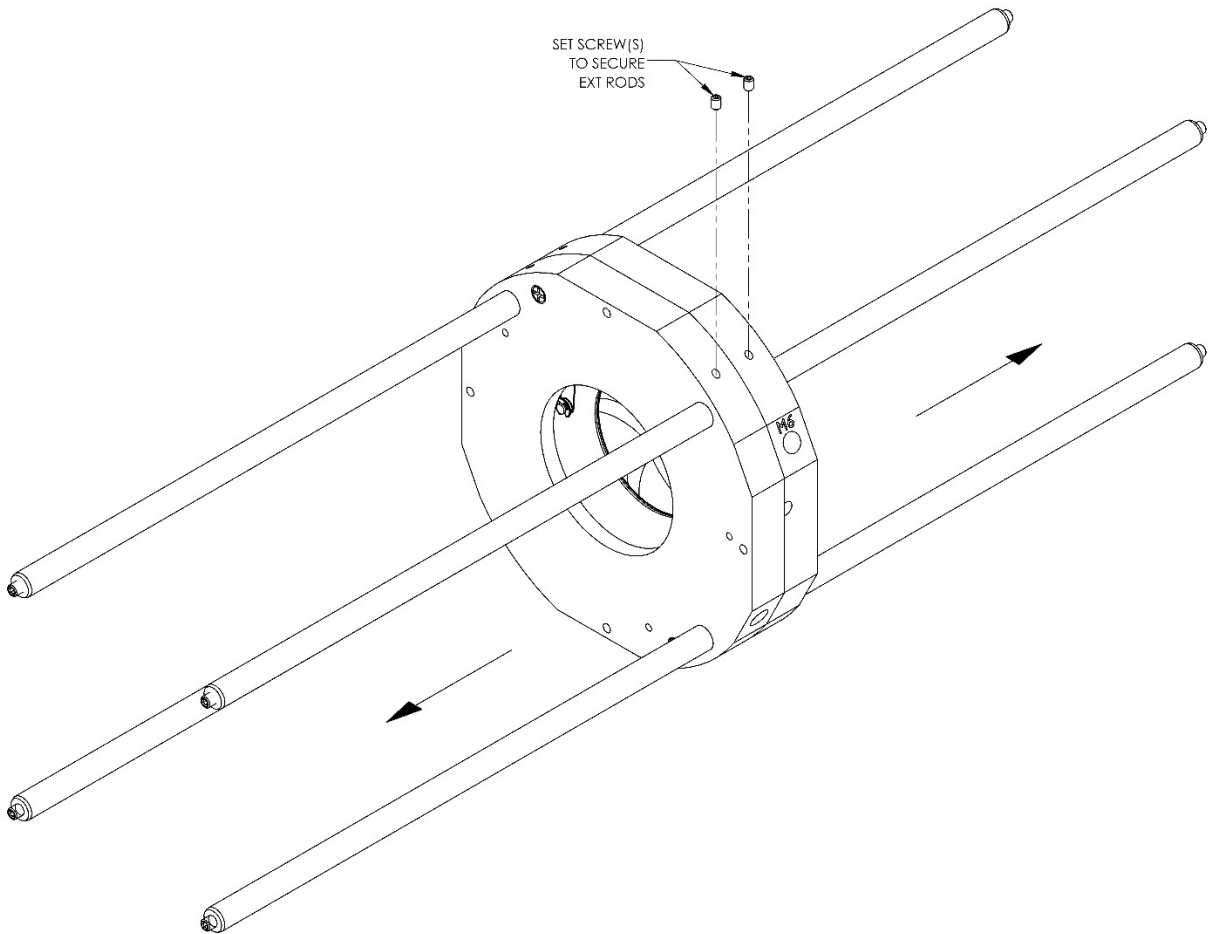


Figure #7

# VLM1/VLM1B Interface Module

- As indicated, the FS Series Shutters do not require a special driver, only +5VDC to open the Shutter and when removing the +5VDC (0VDC) the shutter will return to the close position. However, for those customers that wish to control the FS shutter via a TTL pulse, a computer Serial port, and do not wish to build their own interface, the VLM1/VLM1B Interface Module is available. The VLM1 will allow the user to connect the shutter (equipped with or without an Electronic Sync) and control the shutter manually, via a TTL signal, or via ASCII commands through a computer's USB port. The VLM1 comes equipped with a 5V/1A (5W) power supply that can be connected to the Serial port when a computer is not available for power. A **USB A 2.0 To USB Micro B 2.0** 6 ft (1.83m) cable is included with the VLM1. (The VLM1B includes the PCB only. 5V/1A Power Supply and USB cable can be purchased separately.)
  - Figure #8 below illustrates how to connect an FS shutter to the VLM1 for simple, pushbutton open/close operation. Note, a TTL signal can be input to the PULSE Input BNC to provide Pulse Width Determined Exposure Time control. Additionally, if the shutter is equipped with an Electronic Sync, this can also be interfaced with the VLM1 and the sync signal can be accessed via the SYNC Output BNC. See the Timing Diagram in the FS25 or FS35 Shutter Specification tab. (Connection to the VLM1B shutter connection is the same, except there is no enclosure. In addition, the +5.0VDC Power Supply and the USB Interface Cable are not included.)
  - Operation from a Computer Serial Port can be set up and the protocol is described in further detail within the VLM1 user's manual. When using this feature, power for the shutter will be provided from the Computer's Serial port. The port must be able to provide a minimum of 0.5A for proper shutter operation.

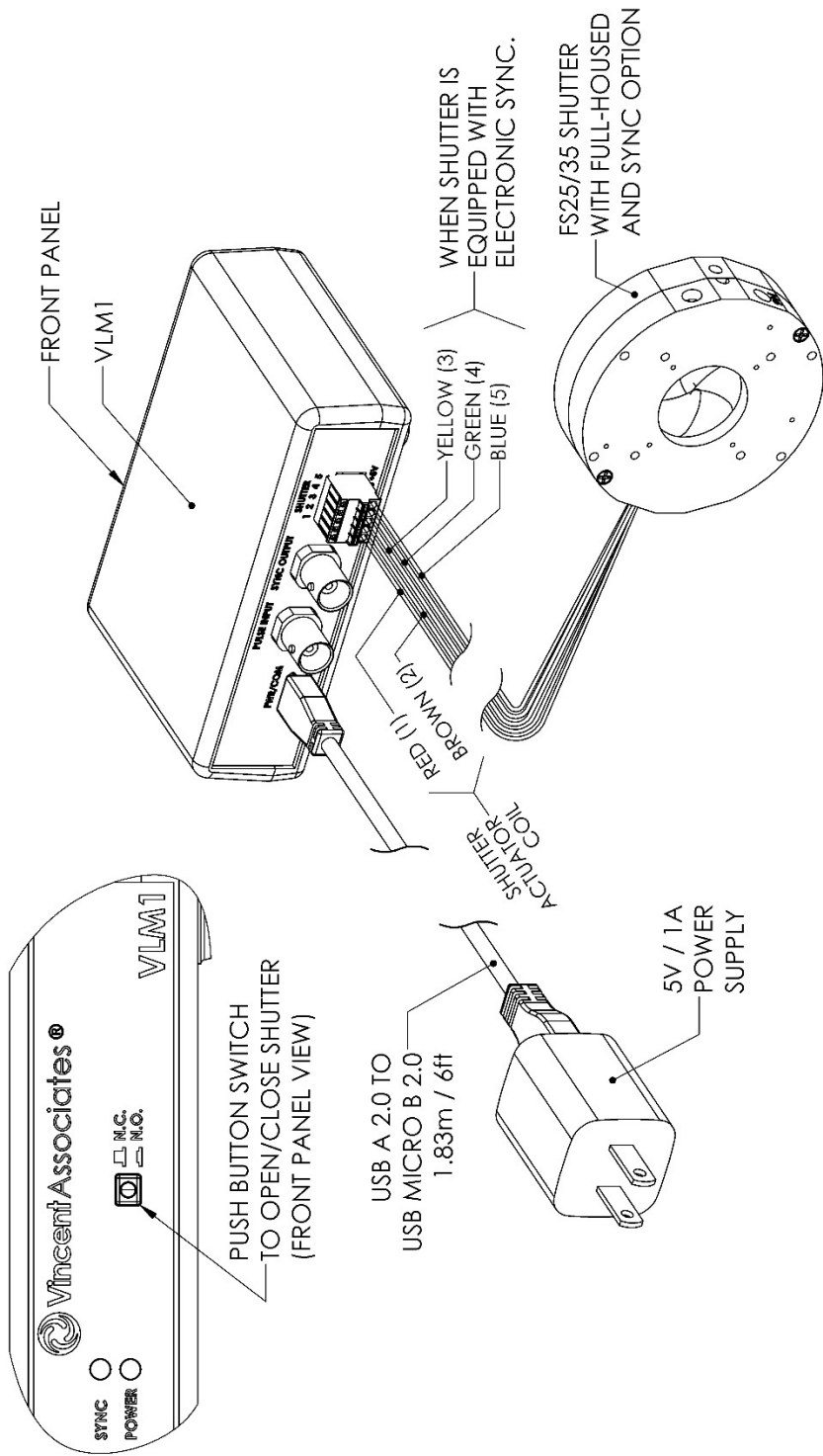


Figure #8 VLM1 to FS Series Shutter Interconnection Diagram