Uniblitz MS150B Connection and Operation Information

Thank you for considering a purchase of the MS150B for your large aperture application. You can be assured that the MS150B is designed and backed by more than 50 years of shutter design and experience. The following information will assist you in integrating your device into your system with relative ease. Please note, if you have any questions, please contact our technical staff.

The Uniblitz MS150B is a 150mm bi-stable shutter suitable for large scale imaging systems or where a large optical path needs to be reduced to zero transmittance. The shutter's lifetime is greater than 500,000 cycles – high for an aperture of its size – and its six blades are made from spring steel (coated with Teflon® black), are highly emissive (>98%), and positioned to avoid collisions during operation. With the on-board drive circuit, a user must only provide a +12VDC (2.5A) power supply and a pulse width determined (+5V TTL) exposure pulse.

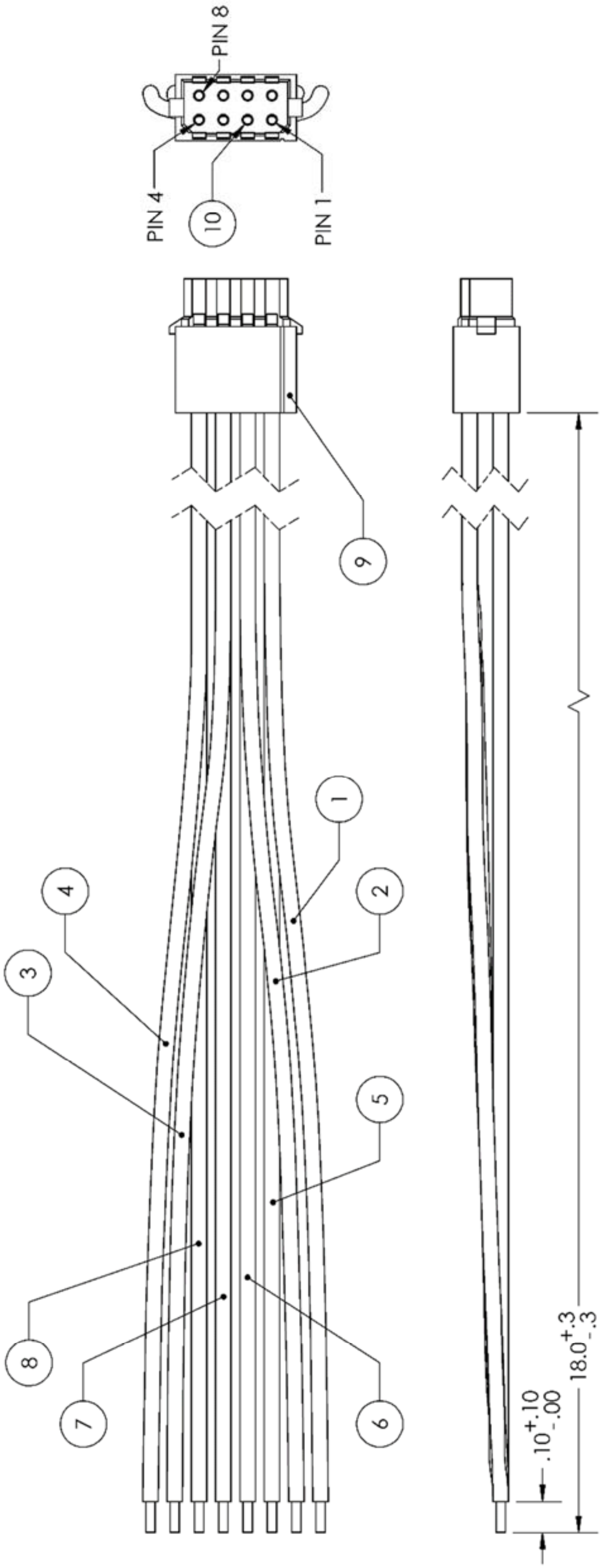
Bi-stable shutter devices, like the MS150B, require no power to hold the blades in either the open or closed state. The device is a new, innovative design, and is patented.

Signals required to operate the MS150B:

Pin-out of H2 Connector and Wire Colors of the provided 8H18 Harness (see Figure #1) are provided below for control of the MS150B. Wires of the 8H18 Harness are 18 inches in length, #28AWG Teflon® wire, and must be connected as indicated to ensure proper operation of the device. Please note the H1 connector position is for a pass-through connection and its location within the drive circuit is provided for future design requirements. H1 is not required for standard operation of the shutter and the connector is not populated on the driver PCB – which is located under the actuator mount.

H2 Connector	Description	Harness Wire Color
PIN 1	+12VDC/2.5A POWER INPUT	RED
PIN 2	RETURN - GROUND	GREEN
PIN 3	TRIGGER INPUT (ACTIVE HIGH)	YELLOW
PIN 4	+5VDC OUTPUT	BLUE
PIN 5	+12VDC/2.5A POWER INPUT	RED
PIN 6	RETURN - GROUND	GREEN
PIN 7	SYNC 2 OUTPUT (ACTIVE LOW)	BLACK
PIN 8	SYNC 1 OUTPUT (ACTIVE LOW)	WHITE

When connecting the MS150 for operation, be sure to connect your +12V (2.5A) supply to both RED wires (Pin #1 and Pin #5). Connect the +12V Return to both GREEN wires (Pin #2 and Pin #6). Connect your signal returns to the GREEN wires. Connect the signal (Sync) returns to the GREEN wires as well. Be sure the BLUE wire is insulated as it carries +5V from the Driver board (If not used it is recommended to remove it from the Harness or insulate it completely. Additionally, as with the +5V wire, be sure the SYNC output wires are insulated (or removed) if they are not utilized by your system.



NOTES:
1. TRIM WIRES TO LENGTH SPECIFIED, STRIP AND TIN
2. WIRE TO BE RATED 250V, MIL-W-16878/6 OR BETTER

PIN	COLOR	DESCRIPTION
1	RED	12V POWER IN
2	GREEN	GROUND
3	YELLOW	TRIGGER IN
4	BLUE	5V POWER OUT
5	RED	12V POWER IN
6	GREEN	GROUND
7	BLACK	SYNC 2 OUT
8	WHITE	SYNC 1 OUT

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	23-0349	WIRE, #28 AWG, PTFE INSULATION, RED	19in
2	23-0346	WIRE, #28 AWG, PTFE INSULATION, GREEN	19in
3	23-0348	WIRE, #28 AWG, PTFE INSULATION, YELLOW	19in
4	23-0347	WIRE, #28 AWG, PTFE INSULATION, BLUE	19in
5	23-0349	WIRE, #28 AWG, PTFE INSULATION, RED	19in
6	23-0346	WIRE, #28 AWG, PTFE INSULATION, GREEN	19in
7	23-0351	WIRE, #28 AWG, PTFE INSULATION, BLACK	19in
8	23-0352	WIRE, #28 AWG, PTFE INSULATION, WHITE	19in
9	24-0422	HARWIN M80-6910898 8-PIN CONNECTOR HOUSING	1
10	25-0136	HARWIN M80-2840045 CRIMP TERMINAL	8

Figure #1 8H18 Wire Harness Assembly

See Figure #3 the schematic of the internal Integrated Driver for reference. This shows the internal circuitry of the driver control board. FYI the board is located under the actuator mount. This area also houses the open and close sensors. The sensors are Hall Effect type and determine the full open and full close status. These also double as the Sync Outputs and provide and open and a close signal.

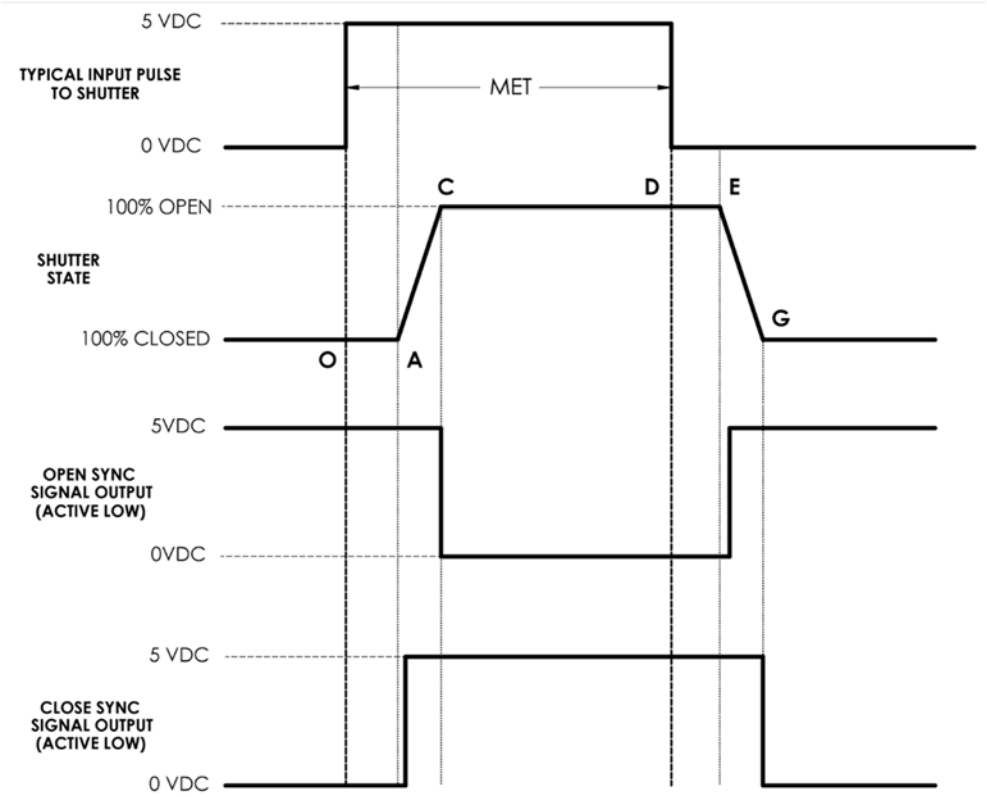


Figure #2 Timing Diagram illustrating the operation of the Integrated Shutter Driver

The Trigger or Exposure Pulse is an Active High signal. When it is presented to Pin #3 (Yellow wire of standard harness) the shutter will open on the rising edge. Once the shutter opens, although there is no hold current provied or required from the internal driver, the exposure pulse is required to stay high to keep the shutter in the open position. Therefore, the shutter is commanded to open on the rising edge of the Exposure pulse and is required to be held open for a Minimum Exposure Time (MET) of 300msec. With the falling edge of the Exposure pulse (the falling edge of the MET) the shutter will be operated through a close cycle and the signal must remain low for a minimum of 300msec for a complete close and allow the device to close completely. Maximum repetition rate is 1 Hz in order to keep heating of the actuator to a minimum.

The firmware of the integrated shutter driver is designed to allow the exposure to simply be determined by the duration of the exposure pulse. The exposure can be any length greater than 300msec, howewver, it must have a minimum lenth of 300msec and must be low for a minimum of 300msec to properly execute a close cycle.

Additionally the driver will output two status pulses. These status pulses can be used to indicate an open and a closure. These are referred to as the synchronization (Sync) signals. These signals are in opposite phase of each other and provide a convenient method to determine if the shutter has opened and closed. These outputs are optoisolated, and routed to their specific outputs, to insure that if the signals are comprimised for any reason, the shutter will continue to operate. These signals are also used by the shutter driver to signal the driver firmware that a full open and/or a full close has occurred. The timing of the signals are shown in Figure #2. When either of the signals are "Low", 0VDC (or less than 1.0VDC) that signal is considered active. When the Open sensor is low (0VDC) this indicates that the shutter is in the open state. When this signal returns to a "High" state +5VDC and the close signal goes Low, the shutter is in the close state. These signals can be routed into your system and their circuits are as shown in Figure #3.

Once the Power and Return signals are provided, the shutter is operated by simply providing a TTL, Active High signal for a minimum duration 300msec. These sync signals can be utilized if required, however, they do not need to be utilized for operation of the shutter. These signals are routed internally to the actuator control circuitry.

Please note that if required, the user can opt to build and implement their own driver or place the driver remotely. In either case, the sensors used internally are required to be utilized if you build your own driver or move the driver circuit off of the shutter's frame. If the driver is located remotely from the shutter the sensors and the sensor support circuitry must be utilized with your circuit so that the shutter can be properly calibrated to open and close properly. We do not recommended that you design or place the driver remotely to the mechanics of the shutter, however, if this is required our technical support personnel can assist you.

MS150B (Timing w/ 12VDC/2.5A Power Supply and six Teflon Coated Spring Streel blades – corresponds to timing graph in Figure #2 above). Time below in (msec.)

O-A:	Delay time on opening after current applied	30.0
A-C:	Typical Transfer time on opening	200.0
D-E:	Delay time on closing after current applied	15.0
E-G:	Typical Transfer time on closing	205.0
MET:	Min. exposure time/Minimum close time	300.0

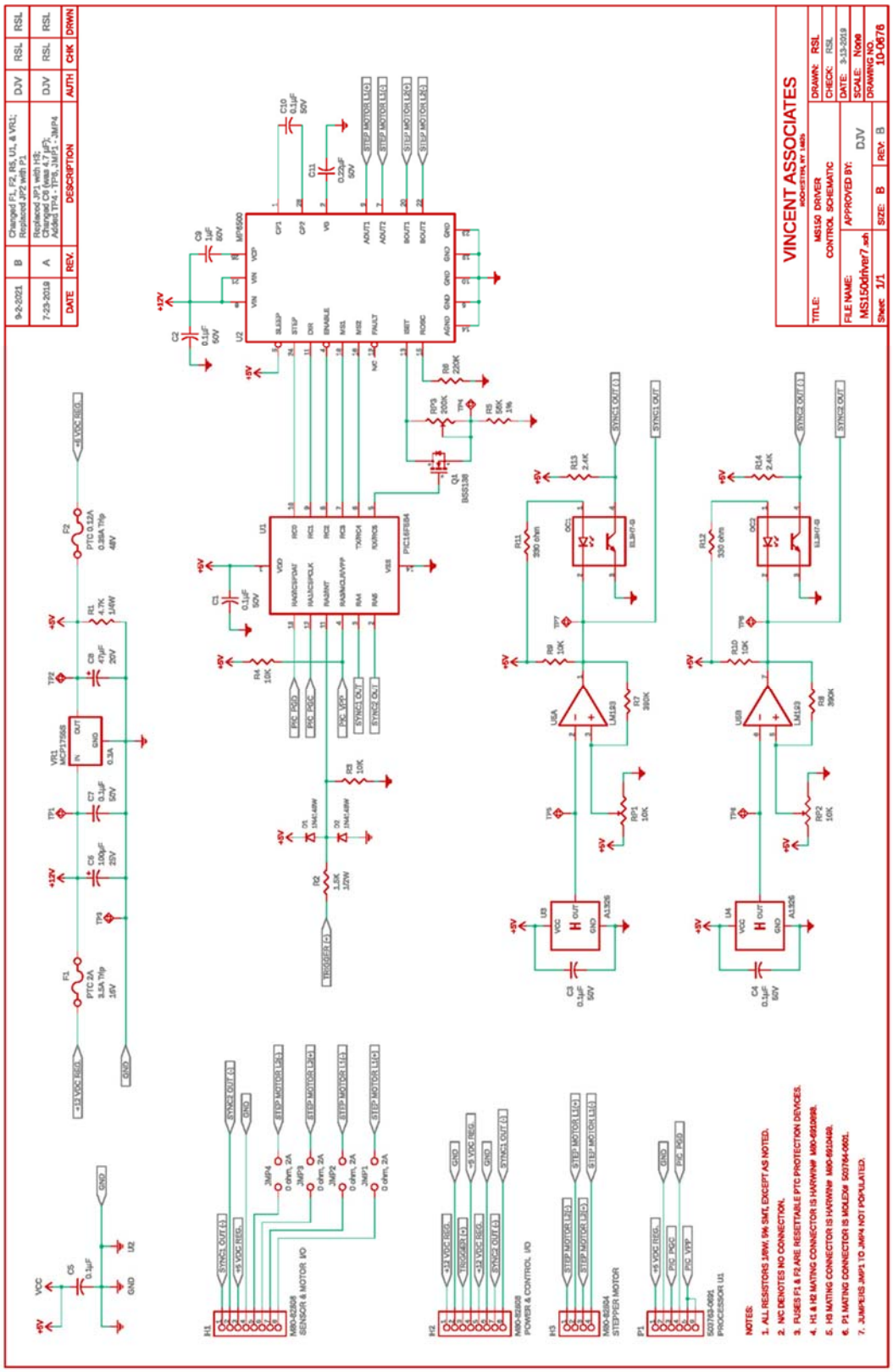


Figure #3 – Integrated Driver Schematic (Provided for Reference)

What you should know if you are required to supply your own Ext Driver or to move the driver remotely from the shutter:

The integrated driver has been designed, calibrated, and carefully adjusted by our shutter assembly technicians to acquire the established and rated minimum lifetime and ensure proper shutter timing and operation. It is not recommended to disassemble the driver or to remove the actuator. Doing so can change the calibration and may result in either a non-working device or a premature shutter failure.

If you believe it may be necessary to design or remotely move your driver from the shutter, it is best to contact and work with our technicians and establish the change in design ahead of integrating the device into your system. We would be pleased to quote on a new driver system and test and calibrate the shutter for you prior to shipping in order to preserve the device's operation and reliability.

Life Cycle information:

The shutter is rated to achieve a minimum cycle before failure (MCBF) of 500K open and close cycles. This assumes that the shutter is operated with the proper voltage and timing as stipulated within the device's specifications. See the information under the MS150B device's Specification tab at https://www.uniblitz.com/products/ms150b/.

Blade Emissivity Data:

The shutter's six blades are constructed of Spring Steel and coated with an industrial Teflon® black coating. This provides a highly emissive (>98% from 400nm to 3000nm), low friction, and light-tight blade surface. The blades are specially reinforced to provide a movable optical surface that are highly reliable for an aperture of 150mm. The shutter blades are ideally suited for optics applications requiring high emissivity and high optical density. See Figure #4 for the MS150 Blade %Emissivity Graph. The red dotted line indicates the trend line through the data. The maximum blade surface temperature is limited by the Teflon coating and should not exceed 200°C. *(Emissivity data supplied is courtesy of Accucoat, Inc.)*

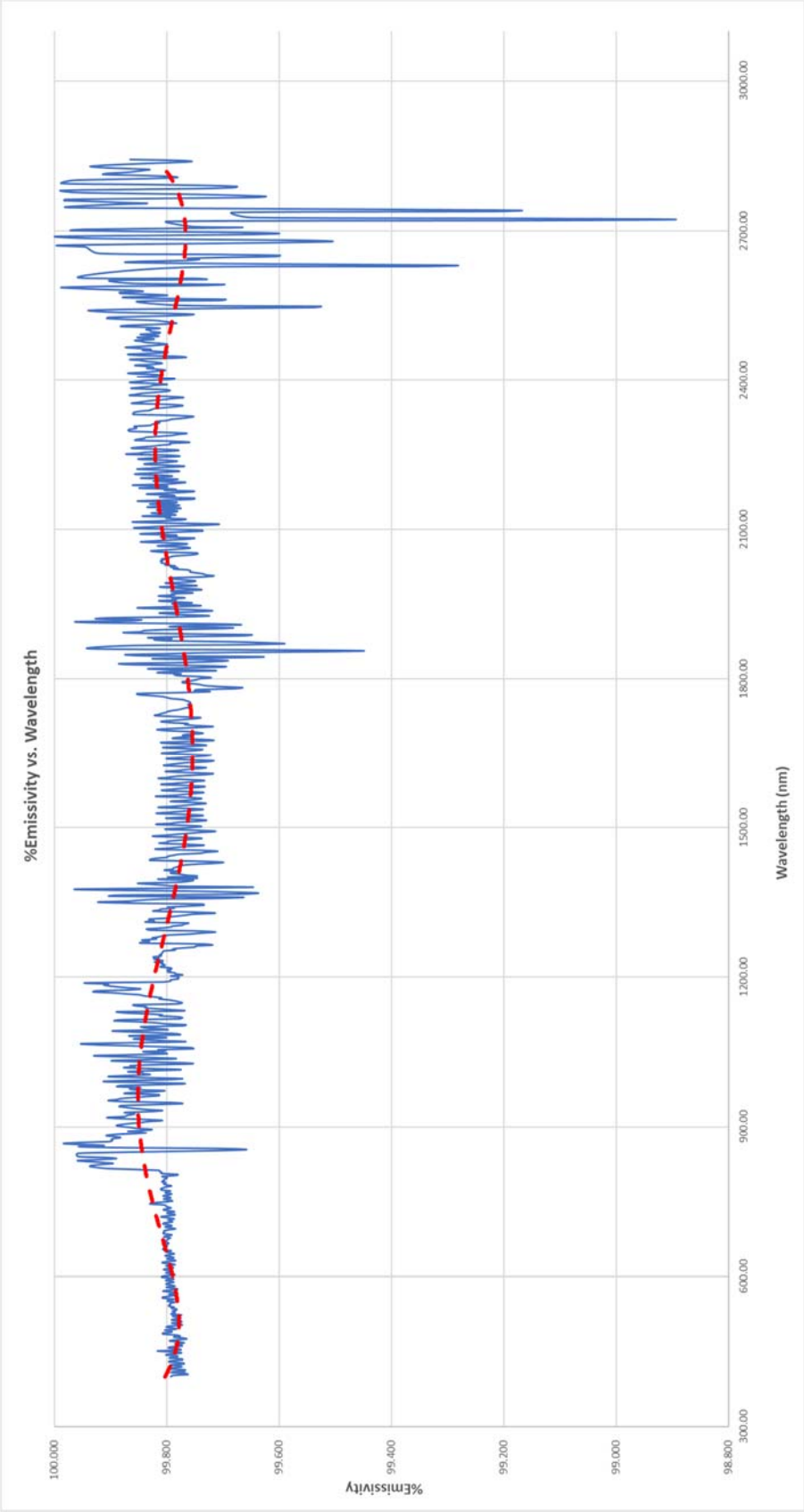


Figure #4 %Emissivity vs. Wavelength

Mounting Considerations:

The MS150B is designed, ensured to be flat, and requires to be mounted with up to (6) #6 mounting screws. The shutter must be mounted to a surface that will not cause the shutter to torque or torsion parallel to the blade plane. Excessive torsion of the shutter could cause the blades to bind under operation and in excessive cases can cause damage.

The base mounting plane is the surface opposite the actuator and therefore will not require a clearance for the actuator and the actuator mount/driver cover. If the shutter is required to be mounted to the flat surface on the actuator side of the device, adequate clearance must be provided and allowance for connection of the control harness the 8H18.

Please also note the Light Cone clearance required to clear the actuator's highest point off the shutter's frame. 3D Models to aid in installing the device into your system are available on our web site and are provided in STEP format. If an alternative format is required, please contact our technical personnel for more information on how to obtain them.

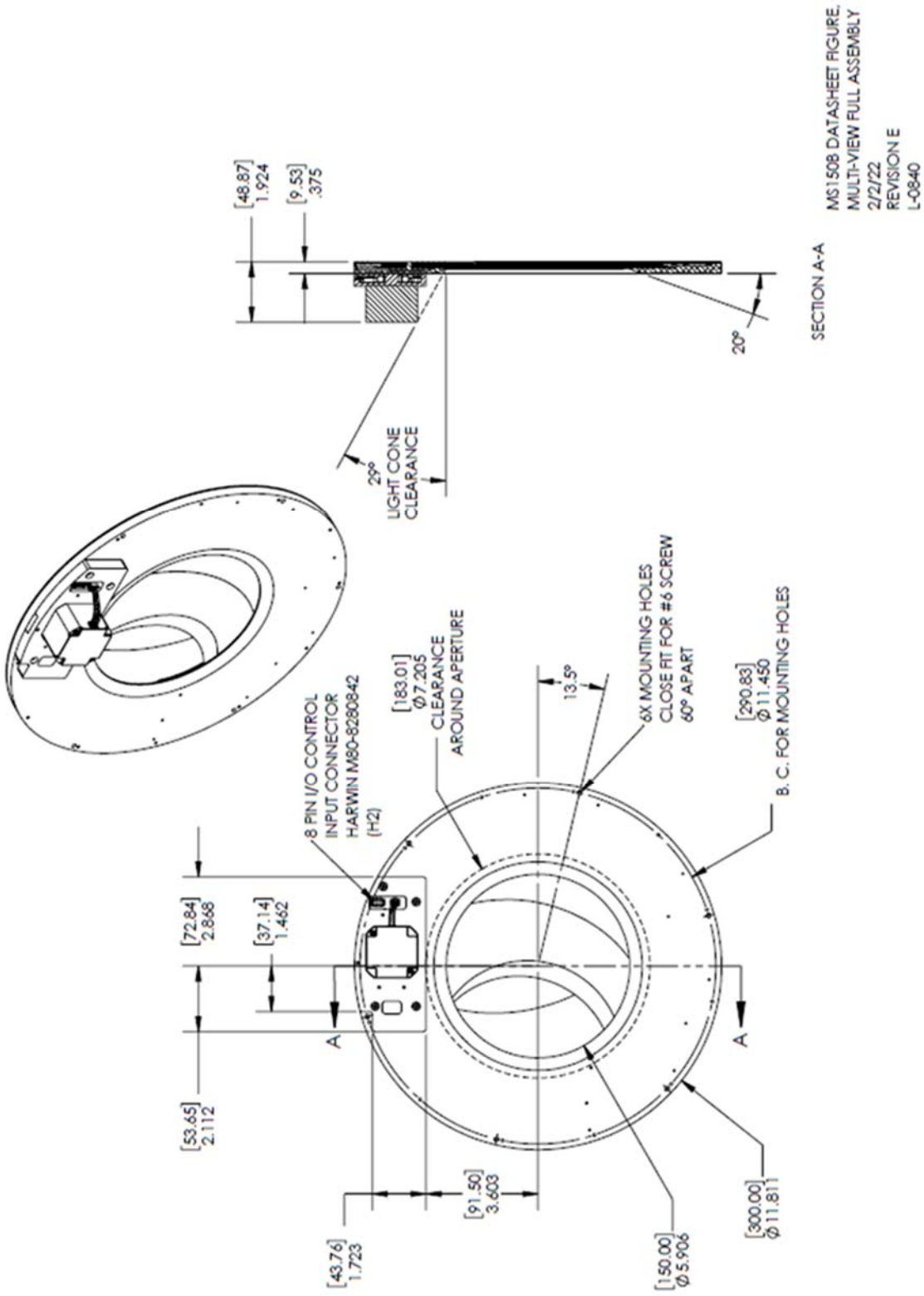


Figure #5 Shutter Layout Drawing