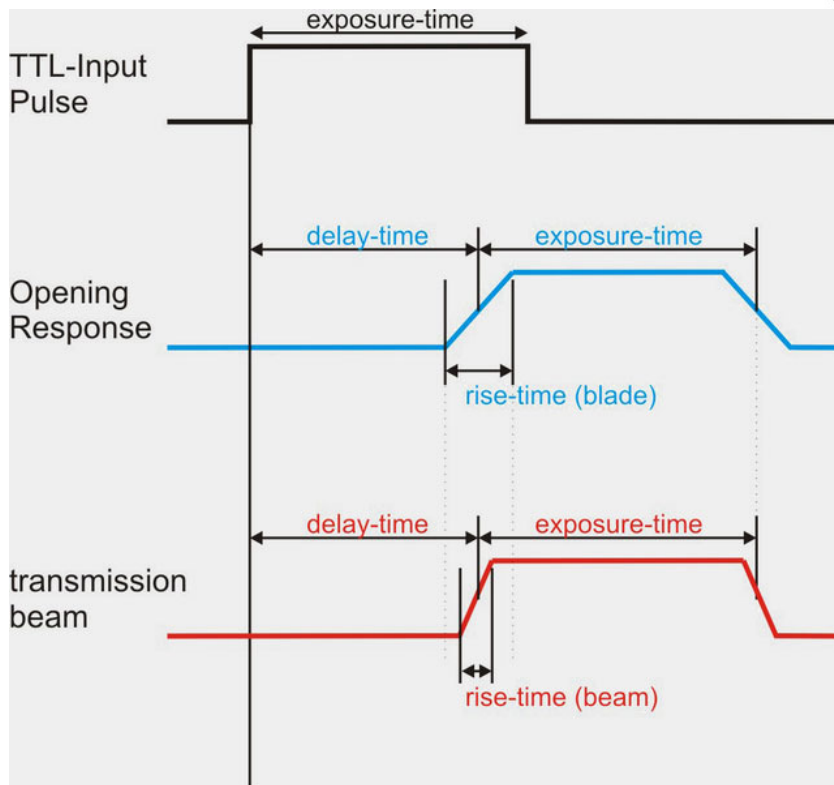
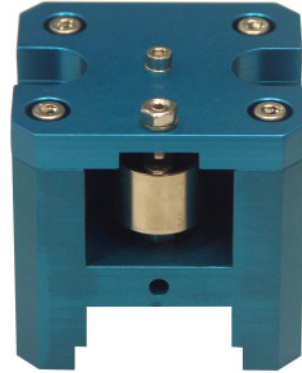
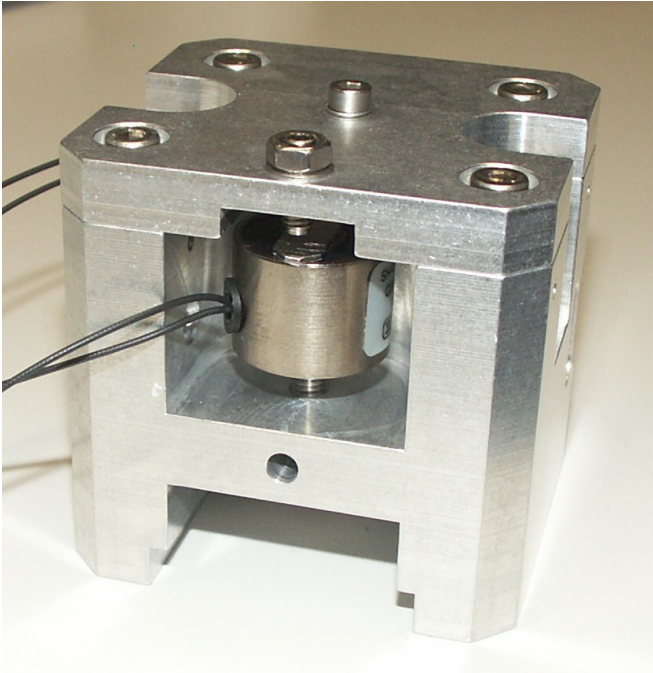


Millisecond Shutter specifications detailed V10 (20111115)



1. Specifications millisecond shutter

Aperture

Static aperture: Shutter fully open, not moving.

Dynamic aperture: Aperture when shutter in operation (bouncing on the edges).

- Vertical dynamic aperture from 0.8mm to 1.5mm (specify at order)
- Horizontal aperture 6mm or 10mm.

t_d opening-delay

This is the time until the mechanics react to the TTL-input-pulse, it is depending on the device.

1mm-Version: ~1.8ms (Std. Dev. < 0.05ms) (with 0.3mm diameter laser beam)

t_o exposure-time

This is the time the shutter is open and let's light pass actually:

"Full width at half maximum" **FWHM**.

This exposure-time depends on at least the following parameters (beam size, beam position, adjustment, repetition-rate, temperature, ...)

For this reason the absolute value of t_o is up to 1-2 ms different from TTL-input-pulse-length.

But the time-jitter is usually:

1mm-Version: <= 0.25ms (Std. Dev.)

Repetition rate

1mm-Version: maximum: 40Hz at 50% duty cycle (for less then 1 hour).

But the above specifications are only reliable for repetition rate <= 10Hz.

10Hz can be applied for longer then 1hour.

Beam path / Absorption

1mm-Version: beam height 49mm

Please see "Beam path / Absorption" for more information.

Lifetime

The shutter is designed to move ~ 1Mio cycles / year (over 5 Years), assuming 1second exposure time.

Vacuum Version

The same timing-values are achieved with the vacuum version.

HV-version: 10^{-6} mbar, UHV-version (on request)

Attention High Voltage

Careful on the wires to the coils there are for several milliseconds > 100VDC!

Warranty

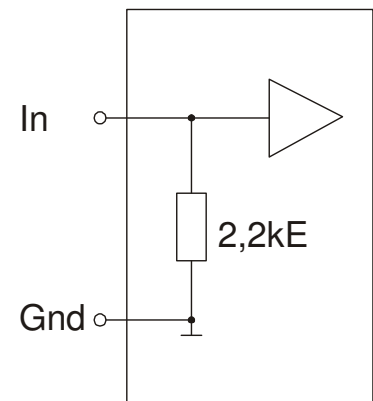
There is one year warranty on the shutter and driver.

2. Parts

- Shutter (different versions: 2mm / 4mm / air / HV / UHV / special)



- Driver-Box:



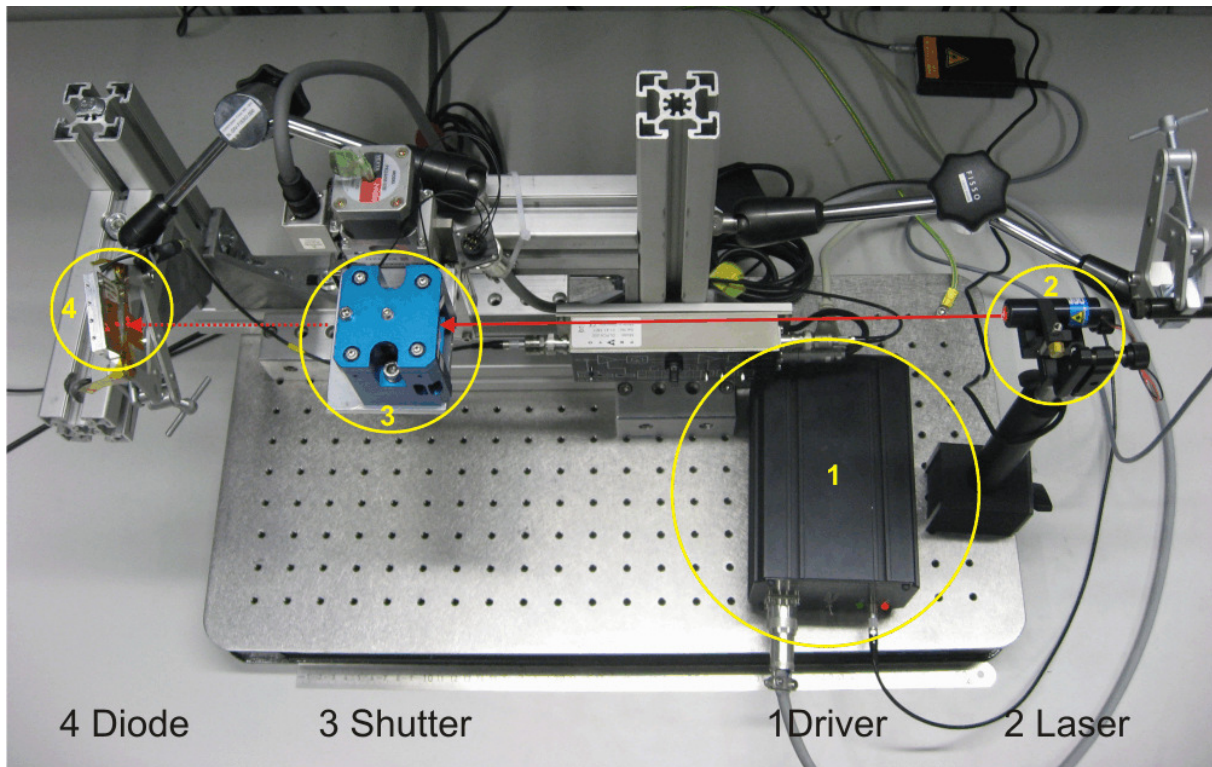
Input circuit.

Input Voltage:	TTL 5V --> open shutter
Connector to Shutter:	Souriau: UT00104PH
Fuse:	230V-Version --> 0.5A
Fuse:	115V-Version --> 1.0A

- Connection Cable
Opening coil: Pin 1 and 2
Closing coil: Pin 3 and 4



3. FAT (Factory acceptance test) Test-Setup



Shutter sits on a vertical translation stage.
Laser beam should be horizontal.

Laser

Diode-Laser from OWIS (<http://www.owis-staufen.de>)
670nm (red) 0...1mW adjustable.

Diode

Large area Si PIN Diode: s3590-02 Hamamatsu

Function Generator

HP 33120A

4-channel Oscilloscope

Tektronix DPO 4104

4. Opening scan of shutter

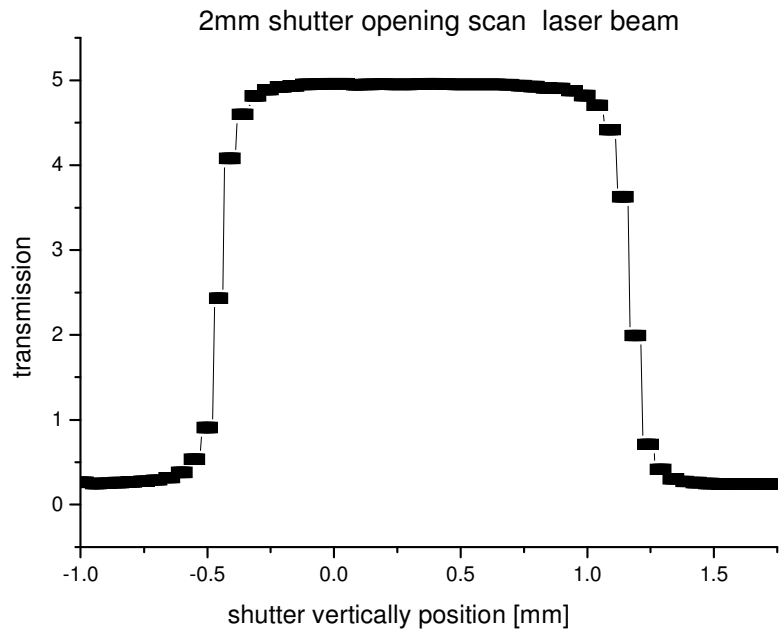
For this scan the position (vertically) of the shutter is scanned by a motor.

Out of the edge one reads the diameter of the laser-beam **~0.3mm**

It is very important that the beam passes the shutter absolute horizontally.

Shutter static Opening
~1.7mm (only example)
Configurable form 1mm
to 2.5mm

The shutter was moved
to its vertically position of
0.35mm → middle of
opening



Beam path / Absorption

The shutter blade consists of **IRON (soft iron)**.

Here you see a calculation of the length of the absorbing material in beam direction.

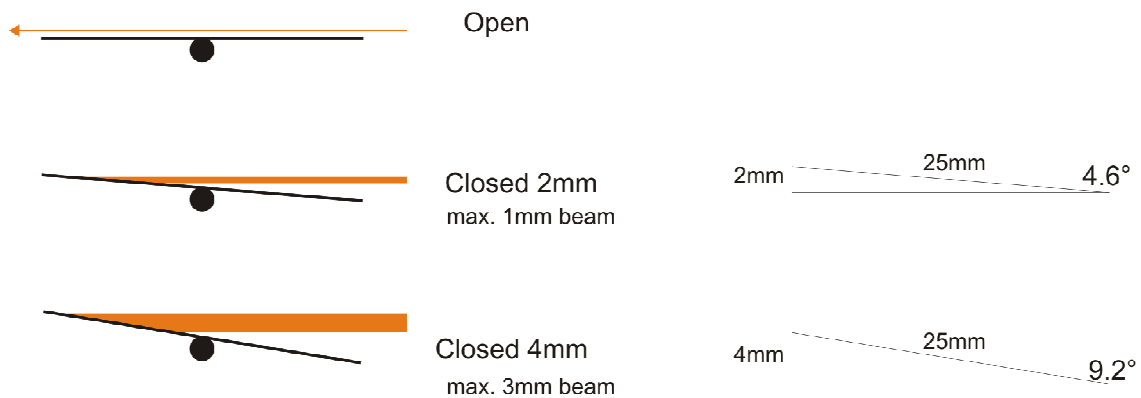
2mm-version: ~12mm iron (small beam) | worst case: 1mm beam --> **7.5mm**

If the beam becomes wider, the absorption length becomes smaller!

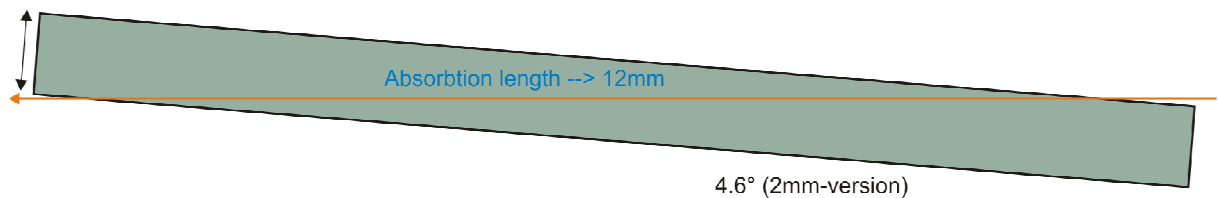
Beam height from mounting floor:

2mm-version: 49mm

4mm-Version not available any more!

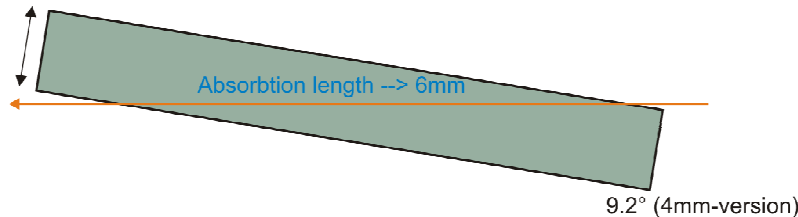


Absorption Material
1mm thick



2mm-version --> 12mm Fe absorber

Absorption Material
1mm thick



4mm-version --> 6mm Fe absorber

