LS-100-12 SHUTTER MANUAL

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The LS-100-12 is a laser beam shutter and beam dump designed specifically for safety applications. It can, however, also be used for beam control (i.e. turning a laser beam on and off). When used for safety applications the electrical power to the LS-100-12 must be supplied by an interlocked shutter supply such as the Lasermet ICS-5, 6 or 15. It will then provide fail safe interlocking of your laser beam to protect persons entering the laser room from the laser beam hazard.
The LS-100-12 is designed as a combined shutter and beam dump and will not reflect the beam back out of the shutter. Consequently there is no requirement for an additional beam dump. When used for safety interlocking the shutter input tube should be butted up against the laser to totally enclose the beam and ensure that there is no accessible laser beam when the shutter is closed. This beam shutter is gravity fed and not reliant upon springs, electrical power or any other drives or devices for return to the safe mode.

### Optical Specification
- Maximum Optical Power: 200W Ave
- Maximum Beam Diameter: 50mm
- Maximum Power Density as per DoC

### Electrical Specification
- Power Supply: +12 to 24 VDC
- Current Consumption: 200mA max
- Status Output Voltage: As incoming supply
- Status Output Current Rating: 100mA maximum, non-inductive

### Mechanical Installation
Mount the LS-100-12 in front of the laser aperture with the ‘Beam input’ side facing the laser aperture. For safety interlocking applications, if there is any space between the laser aperture and the shutter input tube, metal tube must be used to enclose the beam. The shutter must be mounted vertically with its face perpendicular to the laser beam. There are M6 threads in the base plate for mounting onto optical posts.

### Electrical Installation
The Shutter is equipped with a 9-way male ‘D’ connector. The pin connections on the shutter are as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+12 to 24V DC power to shutter</td>
</tr>
<tr>
<td>2</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>Remote open input</td>
</tr>
<tr>
<td>4</td>
<td>Remote open input</td>
</tr>
<tr>
<td>5</td>
<td>‘Open’ status output</td>
</tr>
<tr>
<td>6</td>
<td>‘Closed’ status output</td>
</tr>
<tr>
<td>7 - 9</td>
<td>Optional electrical Interlock option - see below.</td>
</tr>
</tbody>
</table>

A +12 to +24V DC shutter power supply is required. Connect pin 1 to the +ve side of the supply and pin 2 to 0 Volts. Note that this supply should be on whenever the laser is operating, as it is required not only to open the shutter but also to operate an internal cooling fan when the shutter is closed. The internal fan is activated automatically when the internal beam dump gets above 45 °C.

If controlling the shutter just using it’s buttons, connect the DC supply + to pins 1 and 4, – to pin 2. If using remote control with a switched DC supply connect a continuous DC supply + to pin 1, – to pin 2 and a switched DC supply + to pin 4 and – to pin 2.
LS-100-12 Laser Beam Shutter

If using a volt-free contact to control the shutter, connect the DC supply + to pins 1 and 4, - to pin 2. Wire the volt-free contact between pins 3 and 4. The unit can be factory set such that the remote control will directly control the shutter. By default the remote control will directly enable or inhibit the use of the buttons. The shutters are manufactured with the link in the BC position. The brightness of the amber LED is set by the manufacturer.

**Normal Operation.** When the power supply to the shutter comes on, the middle yellow LED will light. The green LED will also light indicating that the shutter is fully closed. Pressing the green button momentarily will open the shutter. The Orange LED will light indicating that the shutter is fully open and the beam is exposed. To manually close the shutter, press the red button. Loss of power to the shutter, such as when a door interlock switch trips the interlocked power supply, will also cause it to close.

**Alternative Switching Configurations for the LS-100-12 Shutter.** (These are most commonly used when the shutter is situated within an enclosure and the pushbuttons on top of the shutter case cannot be easily accessed)

**Remote Switching.** Interrupt the + ve supply line to Pin 1 with a normally closed switch. This will be the remote ‘Close Shutter’ switch. Wire a normally open switch across Pin’s 3 and 4. This will be the remote ‘Open Shutter’ switch. The existing pushbuttons will still work as normal. A remote switching unit (part number: LS-RS) with indication LED’s is available from Lasermet.

**Bypass of Open & Close Switches**

This is set by the manufacturer.

**Status Outputs – pins 5 and 6.** When the shutter is open, a DC signal is output on connector pin 5. When the shutter is closed, the incoming DC voltage is output on connector pin 6 (n.b. if operating in the Remote Power Mode, no signal is output on pin 6 when the shutter is closed since power is removed from the unit). The maximum load that may be placed on these outputs is 100mA non-inductive. If connecting them to an inductive load such as a relay coil, a diode should be fitted across the load with the anode to 0V.

**Optional Interlock - pins 7, 8 and 9.** These connections are reserved for an optional internal electrical interlock board (part no: LS-10-IB) which provides two volt-free contacts indicating the state of the shutter. This option may be specified at time of ordering.

**Indicator Lamps**

Green = Shutter closed. Yellow = Power on. Orange = Shutter open - Beam exposed

**Fan Operation** When the shutter is closed the laser beam is directed onto a large heat sink which is thermally coupled to a thermostat. When the heat sink temperature goes above 45 °C and the shutter is closed, the fan will turn on.

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LS-100-12 manual v2 17.09.2013