

# **LASERMET**

## **LS-100-12 SHUTTER**

### **INSTRUCTION MANUAL**



**GRAVITY FED, FAIL-SAFE LASER BEAM SHUTTER  
FOR SAFETY APPLICATIONS**

## **LASERMET LS-100-12 Instruction Manual**

### **Contents**

1	Declaration of Conformity .....	3
2	Safety Warnings.....	4
3	Concept.....	5
4	Installation .....	5
5	Wiring .....	5
6	Operation.....	6
7	Specifications.....	7
8	Warranty.....	8
9	Contact Details.....	9

## 1 Declaration of Conformity



**LASERMET LIMITED**

**LASER BEAM SHUTTER**

**Part no. LS-100-12**

**DECLARATION OF CONFORMITY**

This is to certify that the Laser Beam Shutter designated by Lasermet Part Number LS-100-12 has been tested in accordance with the following directives and standards and found to comply.

Lasermet certifies that this product complies with the basic requirements for health and safety as provided by the following directives and standards:

Directives: Machinery Directive 2006/42/EC

Standards: EN 60825-4:2006 +A1:2008 +A2:2011  
*Safety of Laser Products, Part 4 – Laser Guards*


The relevant Protective Exposure Limits are:

Irradiated Area	PEL (T2) 100s
4 mm <sup>2</sup>	5 MW/m <sup>2</sup>
1000 mm <sup>2</sup>	200 kW/m <sup>2</sup>

Supplier:  
Lasermet Limited  
Lasermet House  
137 Hankinson Road  
Bournemouth  
BH9 1HR  
Dorset  
United Kingdom

Country of Origin: England

Signed:

  
Paul Tozer  
Managing Director

Date: 10 June 2019



## **2 Safety Warnings**

This device is intended to be used as part of a safety system which may be used to protect personnel and equipment from possible injury, damage, or loss.

As such it must be installed and wired according to these instructions and tested by suitably qualified persons. No attempt may be made to tamper with the parts, open them, or use them outside of the parameters contained herein.

The units are only designed to be fixed to surfaces using their inbuilt fixing holes. They must not come into contact with each other or any other moving part when in use. The parts should never be subject to impact or mechanical strain.

Safety switches should never be defeated or bypassed. It is imperative that all steps are taken to ensure that any spare actuators are made unavailable, such that they cannot be used to defeat the switch or reduce the protection offered by the system in any way.

### 3 Concept

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-6. 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.

Lasermet provides a full range of laser interlock equipment including control systems, interlock switches, illuminated warning signs, laser shutters, door locks, external power supplies etc. which can be connected to provide a complete laser interlock system. Full support, design and installation is available from Lasermet, please contact us for any queries. Contact details are given at the end of this manual.

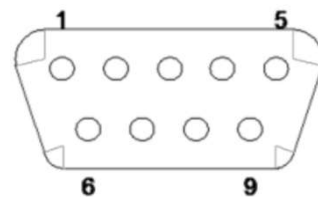
### 4 Installation

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.

### 5 Wiring

The Shutter is equipped with a 9-way male 'D' connector. The pin connections on the shutter are as follows:

Pin	Function
1	+12 to 24V DC power to shutter
2	0V
3	Remote open input
4	Remote open input
5	'Open' status output
6	'Closed' status output
7 - 9	Optional electrical Interlock option - see below.



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 its 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.

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.

## 6 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 LEDs is available from Lasernet.

#### 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 (NB. 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.

## 7 Specifications

Supply Voltage	12 – 24VDC
Current Consumption	200mA max.
Status Output Voltage	As incoming supply
Status Output Current Rating	100mA max. non-inductive

### Optical Specification

Maximum Optical Power	20W ave.
Maximum Beam Diameter	50mm
Maximum Power Density	as per DoC

Dimensions are approximate. Values given as 'typical' are average values measured across a number of samples and are not guaranteed. Lasermet reserve the right to alter any specification without prior notice.

Whilst every care has been made in the provision of this information Lasermet Ltd. or its agents accept no liability for any errors or omissions. The End User is responsible for the safe use of this product and Lasermet Ltd. or its agents shall not be liable for any damage or injury caused by the use or misuse of this product. In the event of defective product liability shall be limited to the value of the product.

## **8      Warranty**

Lasermet provide a 12-month warranty for defects in materials and manufacture, from the date of installation or delivery. Installations completed by Lasermet are covered against defects in workmanship for 12 months.

Damage or defects caused by other factors are not covered. For example, industrial contamination, incorrect cleaning, storm damage. Consequential loss is not covered under warranty. Compensation for indirect or direct loss or damage is expressly excluded. Rectification of the defects or a replacement does not initiate a new warranty period.

For all deliveries, payments and other legal transactions, English law takes precedence for any litigation.



## 9 Contact Details

Lasermet provide a full range of laser interlock equipment including interlock switches, illuminated warning signs, laser shutters, entry keypads with built-in fail-safe override timer, door locks, external power supplies etc. which can be interconnected to provide a complete system. We also supply equipment and consultancy covering all aspects of laser safety. Full support, design, and installation is available from Lasermet, please contact us for any queries.

For sales and technical support:

**Lasermet Ltd.**

Lasermet House,  
137 Hankinson Road,  
Bournemouth  
BH9 1HR  
United Kingdom.

Tel: +44 (0) 1202 770740

Fax: +44 (0) 1202 770730

Email: [sales@lasermet.com](mailto:sales@lasermet.com)

Website: [www.lasermet.com](http://www.lasermet.com)

**Lasermet Inc.**

10N Martingale Road, Suite 400,  
Schaumburg, Illinois 60173  
United States.

Tel: 847 466 1475

Email: [usa@lasermet.com](mailto:usa@lasermet.com)

Website: [www.lasermet.com](http://www.lasermet.com)