LLM115 Userguide

Product Overview

Thanks for purchasing the LLM115, a laser diode module with a built-in (internal) line-generating optic. It emits a defined laser line that can be used to align objects by eye or camera in industrial environments.

Wavelengths of 520nm (green) and 635nm (red) are available with powers up to 5mW. The 1mW red LLM115 is a Class 2 laser, widely accepted as safe under all conditions. Additionally, the green LLM115 emits light that appears more than 2X brighter to the human eye than the equivalent power in 635nm. As a result, you're more likely to see these projections against dark materials, in high ambient light levels, or from long distances.

The LLM115 can be installed with a TTL modulation input allowing you to drive your laser using a digital voltage signal. You can then change the mark-to-space ratio to control the mean intensity of the output beam, modulate the laser with coded information, or synchronise the laser with an external measurement device such as a photodetector or camera.

Housed in a ruggedised metallic body measuring 11 mm in diameter, the LLM115 is recommended for industrial applications such as:

- Object alignment/positioning
- Edge detection
- Metrology
- Quality control
- Robot control

If you have any problems or require help when using the LLM115 then please contact us through sales@globallasertech.com or call your local representative.

Product Operation

The LLM115 is available in two variants, a CW model fitted with two input wires or a TTL model fitted with three wires.

A. CW Model

To operate laser in CW mode the Red & Black leads should be connected to the following:

	Green Models	Red Models
Red Lead	10 Vdc ±5%	+3.3 to 5 Vdc
Black Lead	0 Vdc	0 Vdc

B: LLM115 with TTL Enable Input

A common requirement for applications which use photo detectors, cameras and other non-visual sensing is the ability to rapidly switch the laser output ON and OFF. Simply applying and removing the supply voltage is rarely satisfactory and in certain cases can result in diode failure. This is because laser diodes are very sensitive to voltage spikes and surges that are often the result of uncontrolled supply switching.

To overcome this limitation the LLM115 can be installed with a third input wire that enables reliable and predictable laser TTL modulation. A logic LOW level turns the output completely OFF. However, applying logic HIGH turns the laser ON after a control input delay. This sets the maximum rate at which the module can switch fully ON and OFF.

To operate the laser in TTL mode connect the input wires in the below configuration:

	Green Models	Red Models
Red Lead	10 Vdc ±5%	+3.3 to 5 Vdc
Black Lead	0 Vdc	0 Vdc
Blue Leads	TTL Input (Connect to supply if using is CW Mode)	

Focus Adjustment & Manipulating The Line

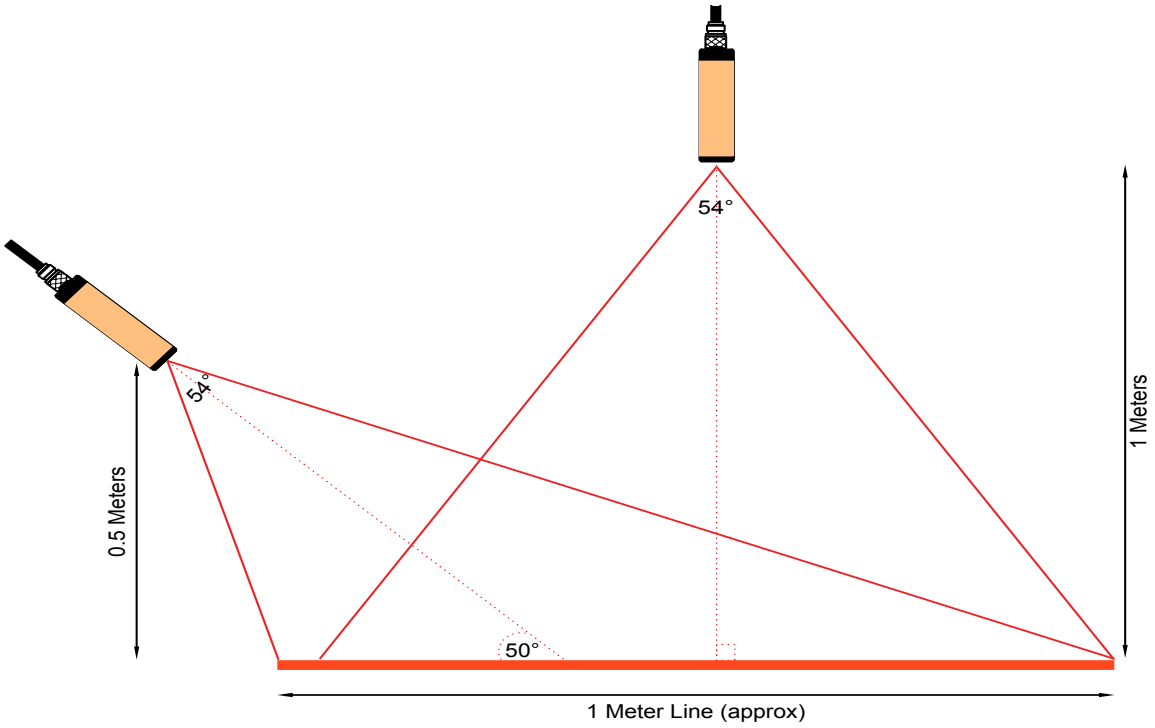
The focus of the laser can be adjusted using the supplied focus key (as shown in diagram B).
The LLM integrates an individual optical assembly situated in front of the focusing lens. This is the line-generating optical assembly. It must be removed in order to access the focusing lens and adjust the focus. To adjust the focus or change the orientation of the line, please follow the below instructions:

1. Align the focus key with grooves on the line optic assembly (at the end of the laser aperture)
2. Unscrew and remove the line optic assembly from the laser barrel
3. Insert the focus key into the laser barrel and align with focus control grooves on the focusing lens
4. Turn the focus key until your desired focus is achieved. A larger spot produces a thicker line
5. Replace the line optic assembly
6. Use the focus key to rotate the line optic assembly to achieve the desired line orientation

Fan Angle & Working Distance

The LLM115 is fitted with a line-generating optical assembly that produces a Gaussian line. The angular "spread" of the beam from the laser aperture (fan angle) is 54° as standard. The length of a projected line increases with the angle to the work surface (projection angle) and working distance (WD).

The diagram below illustrates two different laser positions that produce approximately equal line length. The adjacent table shows the line length over a range of working distances and at two different projection angles.



Drawings are not to scale.

Worling Distance (mm)	Line length @ 90° Projection Angle (mm)	Line length @ 50° Projection Angle (mm)
250	255	531
500	510	1062
1000	1019	2125
2500	2548	5313

NOTES: This data is based on a fixed laser fan angle of 54°. Alternative fan angles are available on request.

Mounting & Heatsinking

The lifetime and stability of your laser can be optimised when mounted on a suitable heat sink. This allows the case temperature to be kept within its specified range. Failure to properly heat sink your laser device could result in shortened lifetime or failure of the diode. As a general guideline, the lifetime of a laser diode decreases by a factor of two (approx.) for every 10°C increase in operating temperature.

There are three mounting clamps available for the LLM115: heavy duty clamp (with/without magnetic base), MK1 Mounting Kit, and swivel clamp.

Mounting the LLM115 in the Heavy Duty Clamp (See drawing C)

1. Secure the clamp to a surface. There are two methods:
a. Screw an M5 stud to the bottom of the base, or
b. Remove the base by removing 2 x grub screw B with the supplied Allen key, then thread an M5 cap screw through the top of the base. Then re-attach the base to the body of the clamp.
2. Loosen Allen screw A with the supplied Allen key
3. Slide your laser into the mounting hole and then tighten Allen screw A
4. Loosen grub screw A
5. Adjust the vertical angle of your laser and then tighten grub screw A
6. Loosen 2 x grub screw B. This will allow the main body of the mount to be rotated independently of the base
7. Adjust the horizontal angle of your laser and then tighten 2 x grub screw B

Mounting the LLM115 in the Heavy Duty Clamp with Magnetic Base (See drawing C & D)

1. Secure the magnetic base to the Heavy Duty Clamp
a. Screw the stud on the top of the magnetic base into the centre hole at the bottom of the Heavy Duty Clamp
2. Remove the keeper from the magnetic base and place on a ferrous surface
3. Loosen Allen screw A with the supplied Allen key
4. Slide your laser into the mounting hole and then tighten Allen screw A
5. Loosen grub screw A
6. Adjust the vertical angle of your laser and then tighten grub screw A
7. Loosen 2 x grub screw B. This will allow the main body of the mount to be rotated independently of the base
8. Adjust the horizontal angle of your laser and then tighten 2 x grub screw B

Mounting the LLM115 in the MK1 Mounting Kit (See Drawing E)

1. Attach components as in drawing D
2. Loosen machine screw A with M3 Allen key
3. Set the length of the mounting post
4. Secure the clamp to a surface using machine screw A (M5 x 25 & M5 x 35 machine screws Mounting two M5 hex nuts & washers are supplied)

5. Tighten machine screw A with an M3 Allen key
6. Loosen Phillips screw A with a Phillips head screwdriver
7. Slide the laser into the mounting hole
8. Rotate the mounting clamp to the desired position and then tighten Phillips screw A

Mounting the LLM115 in the Swivel Mounting Clamp (See drawing F)

1. Secure the mounting base to a surface

a. You can use 2 x Ø9 mm slots, 4 x Ø4.5 mm holes, and/or 2 x Ø3.5 mm countersunk holes to ahieve this. If mounting via Ø3.5mm countersunk holes, the swivel bracket must be removed from the base and then reattached after mounting.

2. Loosen A llen screw A (M3)
3. Slide your laser into the mounting hole and then tighten Allen screw A
4. Loosen Allen screw B (M5)
5. Adjust tilt angle and then tighten Allen screw B
6. Loosen 2 x M4 screws attaching swivel bracket to base
7. Adjust swivel angle and then tighten 2 x M4 screws

Cleaning The Optics

If the laser pattern becomes fuzzy or unclear, please check the following:

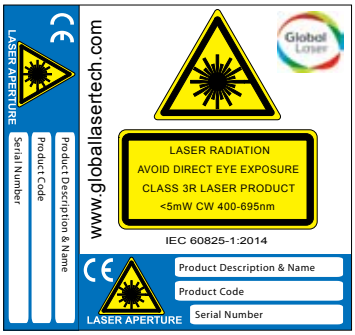
1. Check the laser is in focus.
2. Verify the optical lens is clean, if the area has been contaminated please remove dirt with dry air.

Note: Handle optics with care using powder-free latex or nitrile gloves. These prevent the transfer of oils and debris from hands to optics.

Safety & Classification

These modules are intended for incorporation into customer equipment. They are classified in accordance with IEC60825-1 2014, which should be consulted prior to designing or using any laser product. The following labels are supplied for attachment to the customer's equipment, but responsibility for compliance with the standard remains with the user.

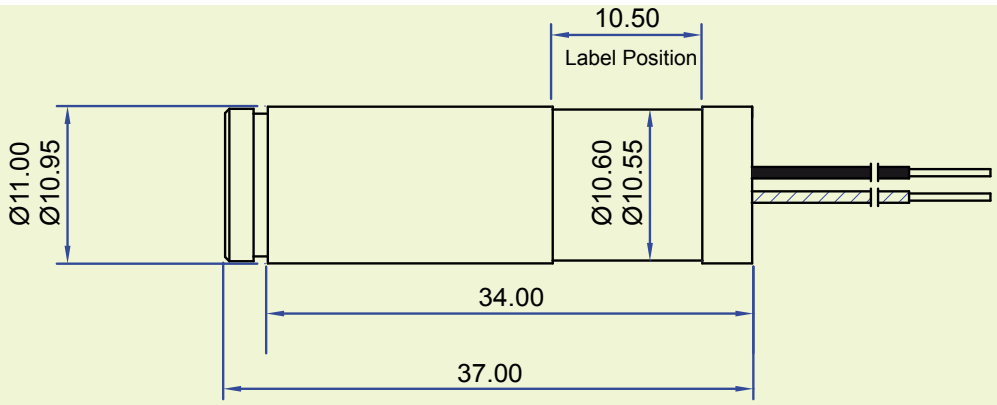
Class 2 Laser Label



Class 3R Laser Label

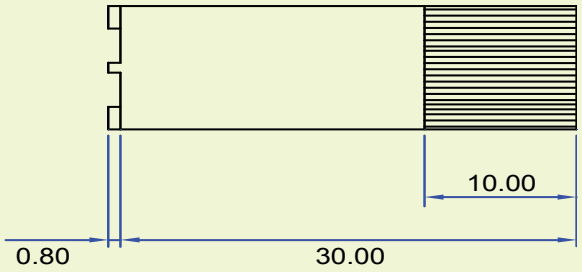
Diagrams

A) LLM115

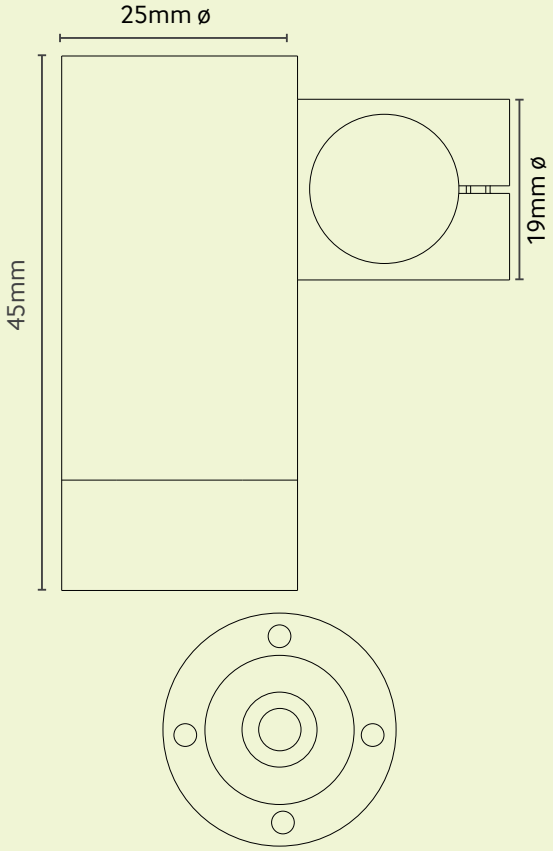


LLM115 with TTL Enable Input ***will have 3 wires***

B) Focus Key

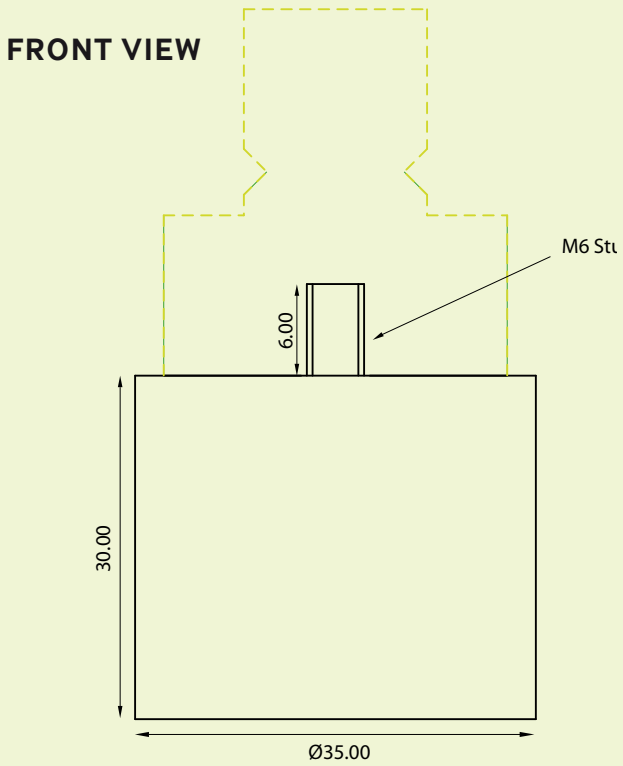


C) Heavy Duty Mounting Clamp

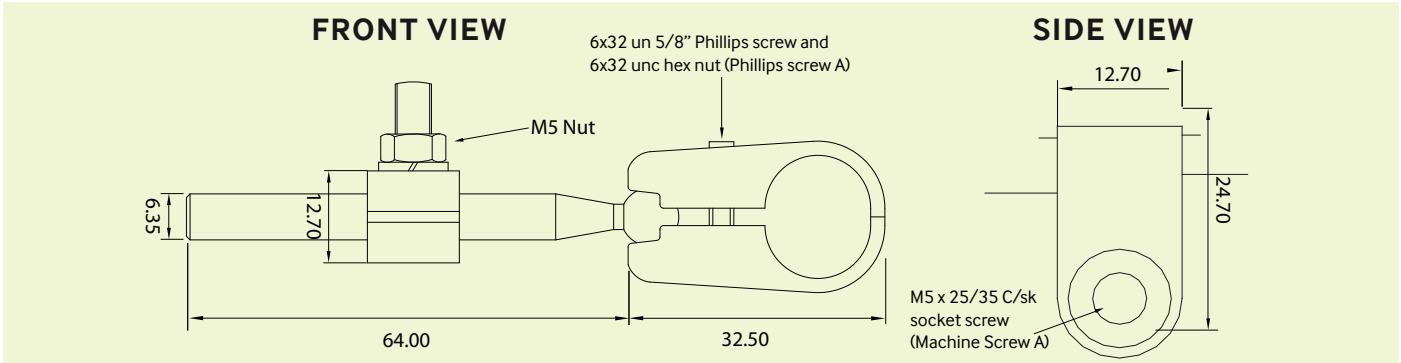


M5 Mounting hole on base

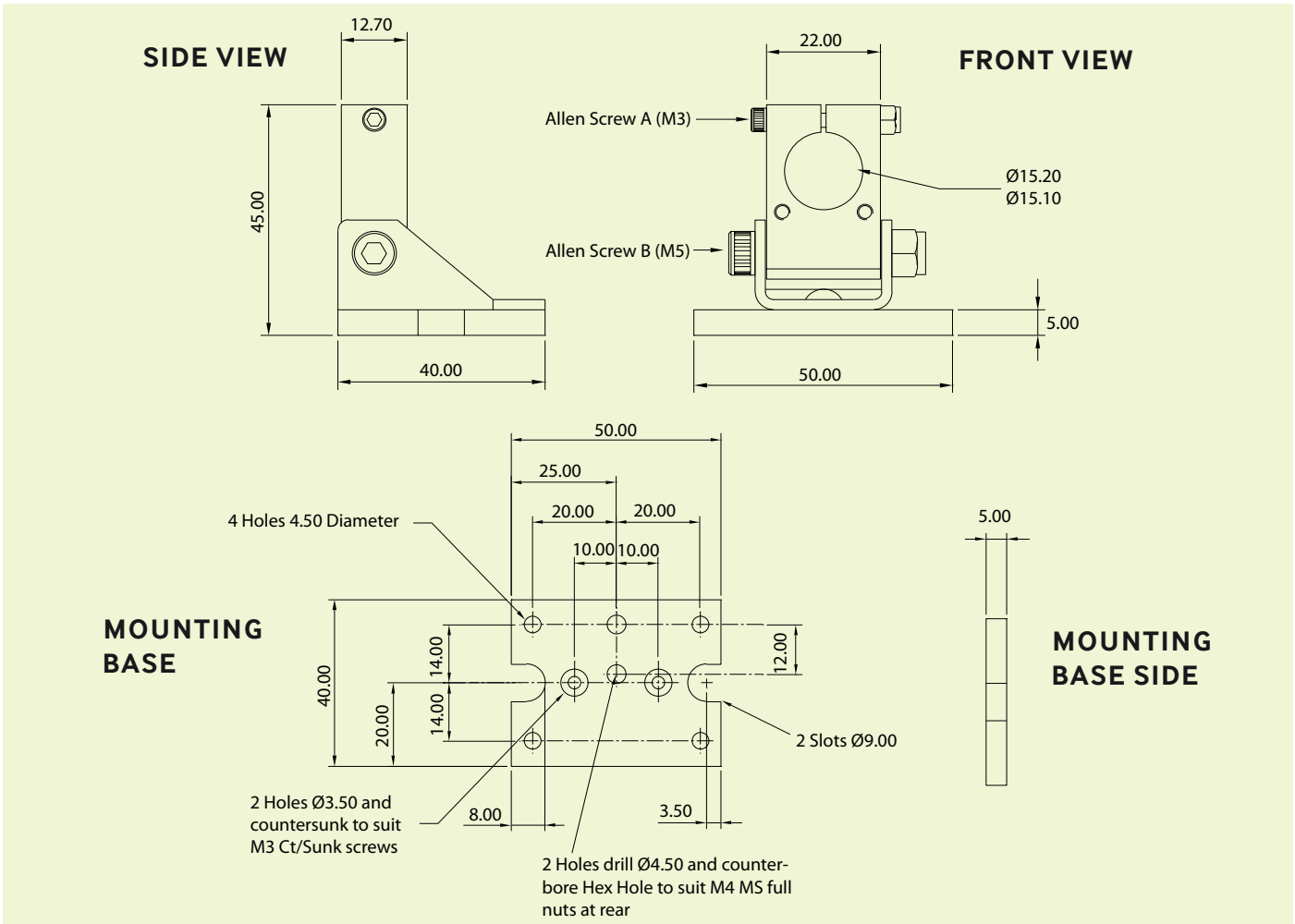
D) Magnetic Base



E) MK1 Mounting Clamp



F) Swivel Mount



Drawings are not to scale.

Please Note: Global Laser reserve the right to change descriptions and specifications without notice.

ISO9001 Certified

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