

RLD10 90° detector head

For the fibre optic laser encoder

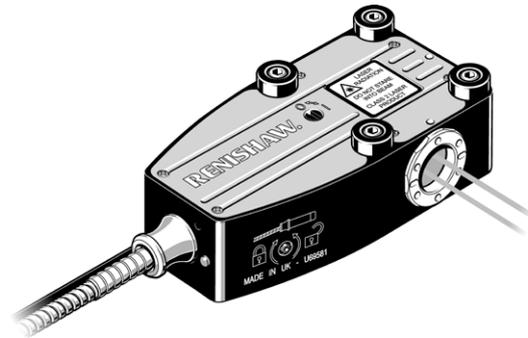
Renishaw's RLE fibre optic laser encoder uses interferometry to provide high resolution, high linearity position feedback.

The RLE system comprises an RLU laser unit and one or two RLD detector heads. This data sheet describes the RLD 90° detector head.

The detector head is the core of the optical measuring system containing the interferometer, reference optics, fringe detector, laser shutter and beam steerer.

To complete the interferometer configuration, only one additional optic is required in either plane mirror or retroreflector based configurations. For easy installation, the integral rotary beam steerer allows final adjustments to be made to optimise beam alignment after the head has been secured.

The head dissipates negligible power (<2 W) and is designed to be thermally stable.



Two versions of the RLD 90° detector head are available, one of which incorporates a plane mirror interferometer (PMI), the other a retroreflector interferometer (RRI). The fibre optic cable can be disconnected from the detector unit and the electrical cable can be disconnected from the laser head, thus allowing each to be pulled through small cable tracks and ducting. The detector head incorporates a safety interlock that prevents a laser beam being emitted if either the fibre or electrical cable are disconnected.

General outline and dimensions

Dimensions in mm (inches)

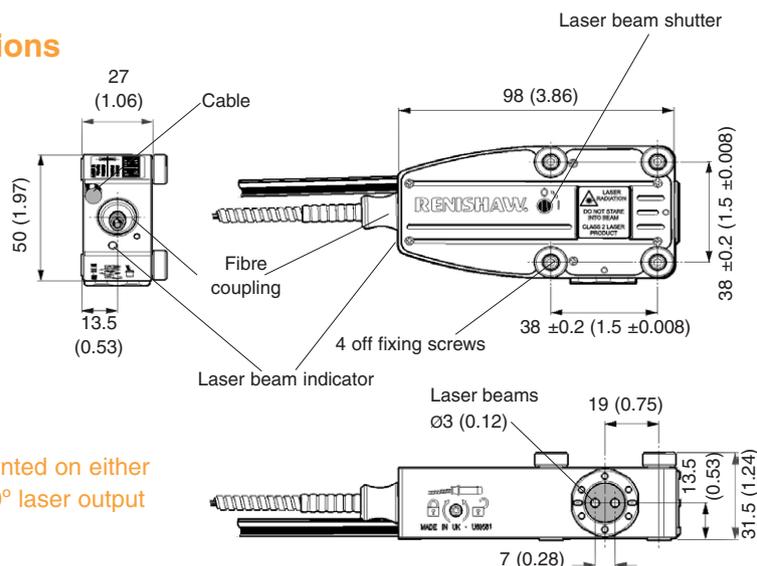
Overall dimensions:

Height: 31.5 (1.24)
Length: 98 (3.86)
Width: 50 (1.97)

Fixing:

4 off M3 x 0.5 x 35 mm or
5-40-UNC x 1³/₈ cap head screws
on a 38 mm square pitch.

The RLD 90° detector head can be mounted on either top or bottom faces providing 90° or 270° laser output from the same unit.



Legislative - Laser safety:

In accordance with IEC/EN60825-1, IEC/EN60825-2 and US standards 21CFR 1040 and ANSI Z136.1, Renishaw RLE lasers are Class II lasers and safety goggles are not required, since the blink reaction of a human will protect the eye from damage. Do not stare into the beam or shine it into the eyes of others. It is safe to view a diffuse-reflected beam. Do not dismantle the unit in any way; doing so may expose laser radiation in excess of Class II limits.

RLD 90° detector head operating parameters

Axis travel	PMI	0 m to 1 m
	RRI	0 m to 4 m
Optical signal period	PMI	$\lambda/4$ (158 nm)
	RRI	$\lambda/2$ (316 nm)
System non-linearity error (SDE)* *excluding interface	PMI	< ± 2.5 nm below 50 mm/sec with >70% signal strength < ± 7.5 nm at 1 m/sec with >50% signal strength
	RRI	< ± 5 nm below 100 mm/sec with >70% signal strength < ± 13 nm at 2 m/sec with >50% signal strength
Thermal drift coefficient	<100 nm/°C	Measured by mounting mirror and detector close together on a Zerodur® base and changing the temperature
Beam diameter	3 mm	
Beam separation	7 mm	Centre to centre
Beam alignment adjustment	$\pm 0.65^\circ$ pitch $\pm 1.5^\circ$ yaw	Integrated beam steering to simplify beam alignment
Beam alignment tolerance for plane mirror (1 m axis)	± 25 arcseconds	Tolerance applies to both pitch and yaw during operation
Cable length (standard)	3 m	Permanent attachment to the detector head and 15-way D-type connector at the laser
Cable diameter	6.5 mm	Terminated with a 15-way D-type connector
Fibre diameter (armoured)	5 mm	Removable from the detector head (connector 12 mm diameter)
Component weight	0.25 kg	
Operating environment		
Pressure	650 mbar to 1150 mbar	Normal atmospheric
Humidity	0% to 95% RH	Non-condensing
Temperature	10 °C to 40 °C	

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It is possible to operate an RLE system at axis lengths greater than those stated above, although the resulting signal strength will be affected by axis length, system velocity and optical alignment.

Laser beam alignment

The RLD 90° detector head incorporates a beam steerer to simplify the alignment process. Prior to installation, ensure that the alignment grooves are horizontal and that both locking screws are loose, as shown in Figure 1. Align the head on the 4 mounting screws by securing one of the two nearest the aperture and rotate (yaw) the detector head until the maximum output signal strength is achieved. To then increase the output signal strength to its optimum, rotate the beam steerer using the key, as shown in Figure 1 to adjust the pitch. Finally, tighten the locking screw on the top side and 4 fixing screws.

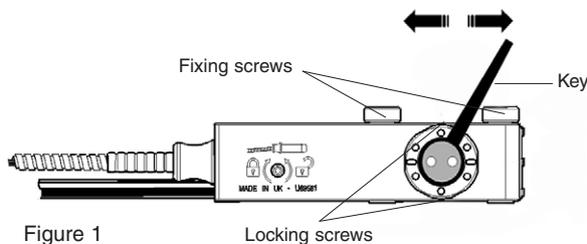
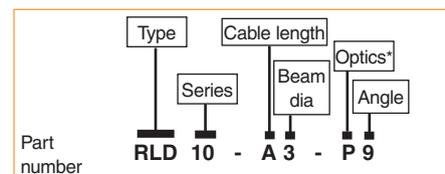


Figure 1

RLD identification and ordering

The RLD is normally supplied with the appropriate RLU laser unit as a configured RLE fibre optic laser encoder system. For full details of available RLE system configurations visit www.renishaw.com or consult a Renishaw representative. For special applications or spares requirements, the RLD is available separately; the generic form RLD detector head part number is shown below:



* P = plane mirror, R = retroreflector

