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RLU10 laser unit

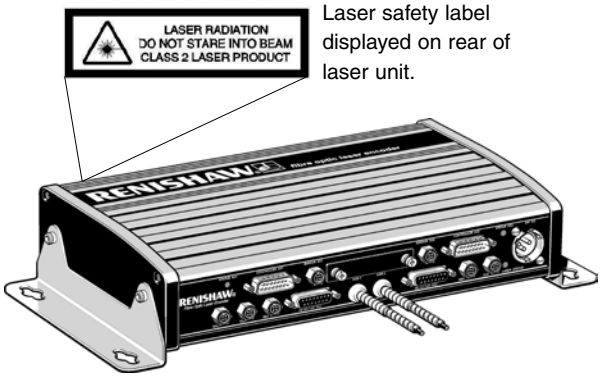
The Renishaw RLE fibre optic laser encoder uses interferometry to provide high resolution, high linearity position feedback.

The RLE system comprises an RLU laser unit and one or two RLD detector heads. The RLU laser unit contains the laser source and signal processing electronics. It is available with one or two fibre optic laser outputs that deliver laser light directly to the RLD detector heads. The detector head is the core of the optical measuring system containing the interferometer optics, novel Renishaw detection scheme and beam steering mechanism(s)*.

The RLE range offers a variety of laser units and detector heads to suit specific application requirements - all system components are compatible with each other.

This datasheet describes the RLU10 laser unit - see performance details overleaf. Position feedback signals are provided for each axis independently, in either digital quadrature format or analogue quadrature format.

* The differential interferometer detector head has separate beam steerers for each pair of beams.



Laser safety label displayed on rear of laser unit.

The resolution and format of the signals are determined by front panel switches and detector head type. The laser unit also provides system status outputs and allows configuration of signal bandwidth, direction sense and error monitoring.

Position feedback signals from the RLU can be used directly, or connected via either the RCU10 compensation system (which automatically compensates for air refraction and/or material expansion effects) or an interpolator unit to produce ultra-high resolution output.

The RLU10 includes an electrical signal input that can be used to shut off the laser beam without destabilising the laser.

General outline and dimensions

Dimensions in mm (inches)

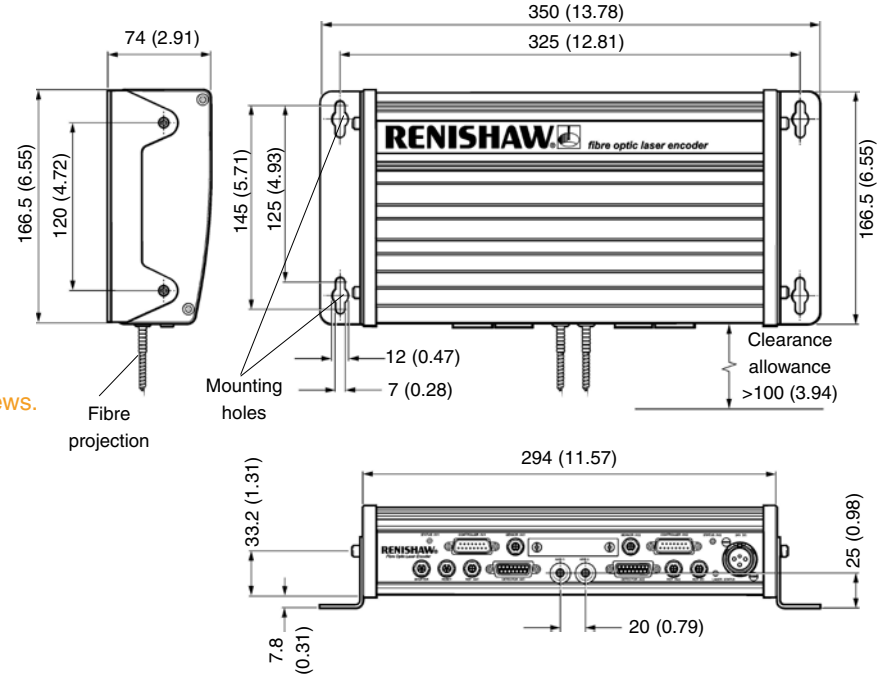
Overall dimensions:

Height: 74 (2.91)
Length: 350 (13.78)
Width: 166.5 (6.55)

The RLU can be mounted in any orientation, provided the surface is reasonably flat and free from vibration. Minimum cable and fibre bend radius is 25 mm (0.98).

Fixing:

4 off M6 x 1.0 x 15 mm or $^{1}/_{4}$-20-UNC x $^{5}/_{8}$ cap head screws.



Renishaw plc

New Mills, Wotton-under-Edge
Gloucestershire GL12 8JR
United Kingdom

T +44 (0) 1453 524524
F +44 (0) 1453 524901
E uk@renishaw.com

www.renishaw.com

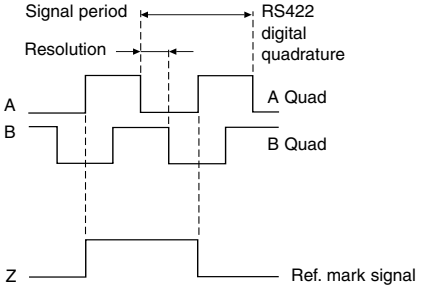
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RLU10 laser unit performance

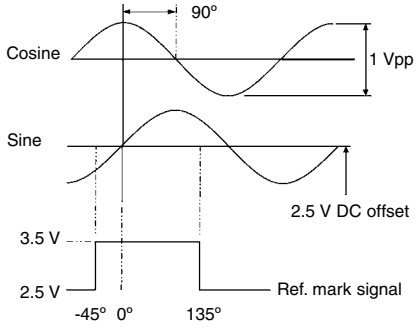
Laser type Output beam intensity	HeNe Class II <300 µW (cw)	Maximum output power from laser tube <1 mW During preheat this can rise up to 600 µW
Laser beam diameter	3 mm	
NTP wavelength T = 20 °C, P = 1013.25 mbar, RH = 50%	632.818270 nm 632.819719 nm	Axis 1 Axis 2
Vacuum wavelength accuracy	±0.1 ppm over three years	
Laser frequency stability	<±10 ppb <±50 ppb <±50 ppb	1 minute 1 hour 8 hours
Fibre optic diameter (armoured)	5 mm	
Analogue output signal period	158 nm 316 nm	Plane mirror interferometer Retroreflector interferometer
Digital quadrature nominal output resolutions	10, 20, 39.5, 79, 158, and 316 nm 20, 39.5, 79, 158, 316 and 633 nm	Plane mirror interferometer Retroreflector interferometer
Output update rates	0.3125, 0.625, 1.25, 2.5, 5, 10 and 20 MHz	User selectable update rate options
Maximum velocity (resolution dependent)	1 m/sec 2 m/sec	Plane mirror interferometer Retroreflector interferometer
Output formats	Dual RS422 differential digital quadrature 1 V peak to peak sine/cosine signals	
Power supply requirements	24 V ±2 V @ 2.5 A 24 V ±2 V @ 1.6 A 24 V ±2 V @ 0.6 A	Inrush (first 10 ms) Warm-up (~10 mins) Operation at room temperature (20 °C)
RLU weight	2.8 kg	
Operating environment Pressure Humidity Temperature	 650 mbar to 1150 mbar 0% to 95% RH 10 °C to 40 °C	 Normal atmospheric Non-condensing

RLU output signals

Digital incremental - RS422 digital quadrature



Analogue incremental - 1 Vpp differential sine and cosine



RLU identification and ordering

The RLU is normally supplied with the appropriate RLD detector heads as a configured RLE fibre optic laser encoder system. For special applications or spares requirements the RLU10 laser unit is available separately.

For full details of available RLE system configurations and part numbers visit www.renishaw.com or consult a Renishaw representative.

РЕМСТАНМАШ
ТЕХНОЛОГИИ ДЛЯ ПРОИЗВОДСТВА

ООО «Ремстанмаш»
г. Смоленск, Верхне-Сенная, д.4, офис 223.
сайт. www.cnchelp.ru
Тел. 8-800-511-02-67
Тел. +7(499)704-02-67
Тел. 8-919-046-48-46 (WhatsApp, Viber)

For worldwide contact details, please visit our main website at www.renishaw.com/contact

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