

RLU300 laser unit



High linearity and measurement stability make Renishaw's RLE interferometric fibre optic laser encoders ideal for high-performance motion control applications.

The RLU300 is a laser unit in the RLE family of interferometric laser encoder products. Using a frequency-stabilised Helium-Neon laser source, the RLU300 combines low noise with diagnostic capabilities to support system integration, monitoring and maintenance. A range of detector heads and accessories supports different machine architectures.

The RLU300 incorporates automatic sub-divisional error correction and delivers Renishaw's highest level of optical frequency stability. These capabilities minimise measurement uncertainty to meet the requirements of the most demanding motion control applications.

Benefits

Automatic SDE correction

The RLU300 laser unit includes automatic SDE correction. Offsets are minimised and gain is balanced throughout the analogue signal path, so large interpolation factors can be used to obtain stage position with high resolution across a wide range of signal levels.

Next-level performance

The RLU300 laser unit includes an innovative optical scheme to maximise the frequency stability of the laser source. This reduces noise and minimises positional uncertainty over the full range of motion.

Detachable fibres

The fibre optic interconnects between the laser unit and the detector head are fully detachable, facilitating exchange of system components with minimal downtime and low cost-of-ownership. Fibres are available in 3 m and 6 m lengths.

Innovations

Plug and play detector heads

Compatible detector heads communicate with the laser unit and are automatically configured when they are connected to the RLU300 laser unit. Plug and play technology allows the RLU300 laser unit to use any compatible detector head without manual electronic matching.

Enhanced diagnostics

The RLU300 laser unit features a communications interface which can be used for system configuration, control and monitoring. The diagnostic interface allows direct communication between the laser interferometer system and the host system.

Condition-based monitoring

To maximise uptime in critical applications, RLU300 laser units continually monitor system operating parameters. Using the diagnostic interface, the laser unit provides advance warning that replacement should be scheduled.

Quadrature formats

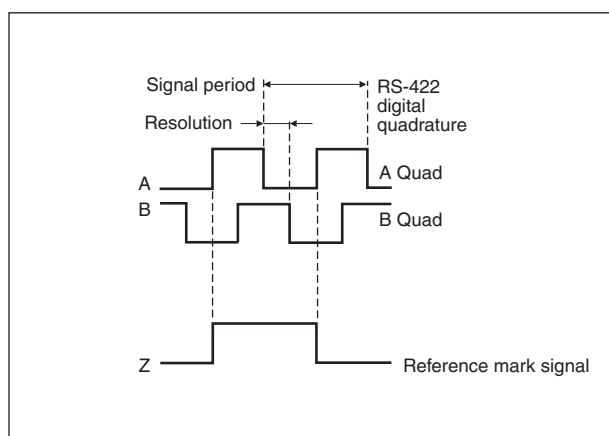


Figure 1 Digital incremental – RS-422 digital quadrature

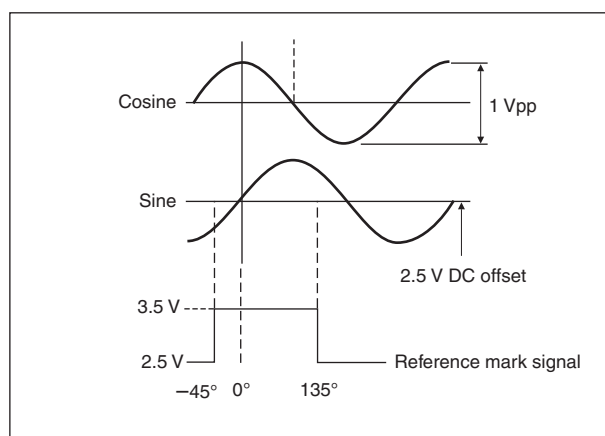


Figure 2 Analogue incremental – 1 Vpp differential sine and cosine

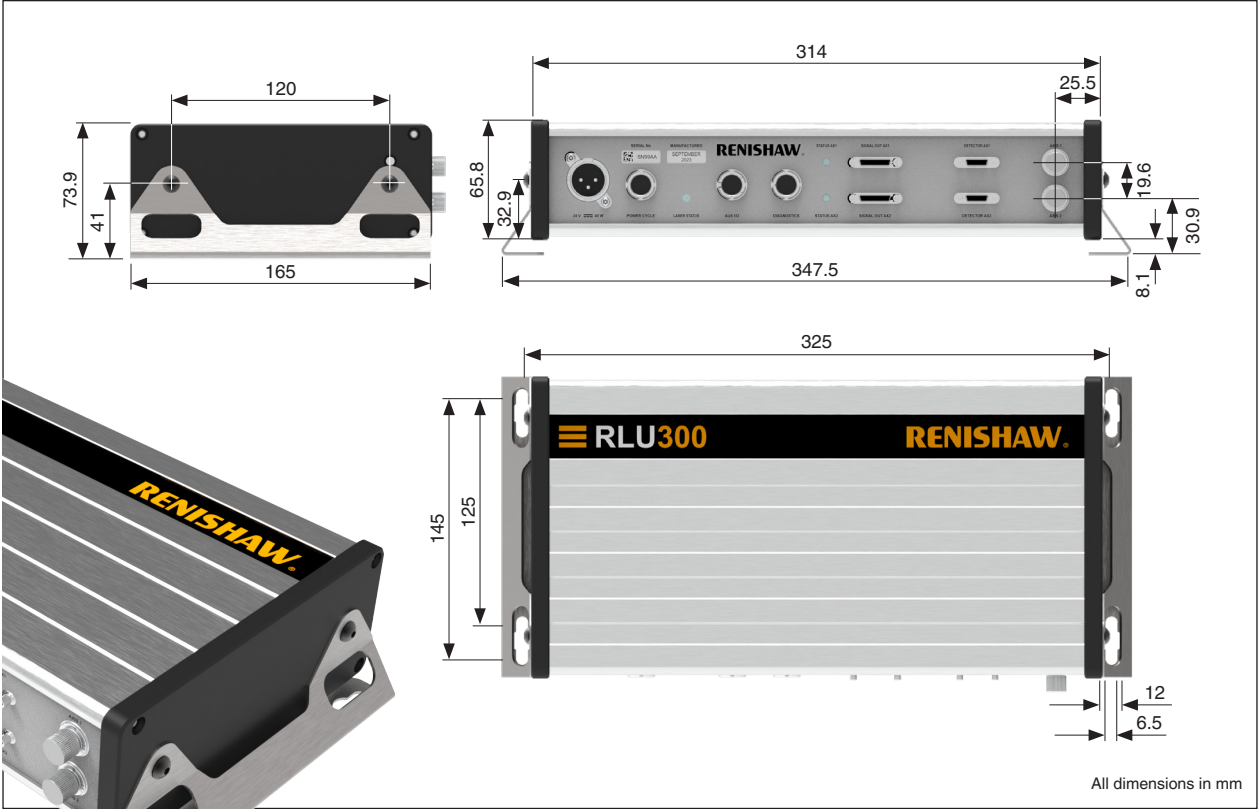


Figure 3 RLU300 – showing horizontal mounting configuration

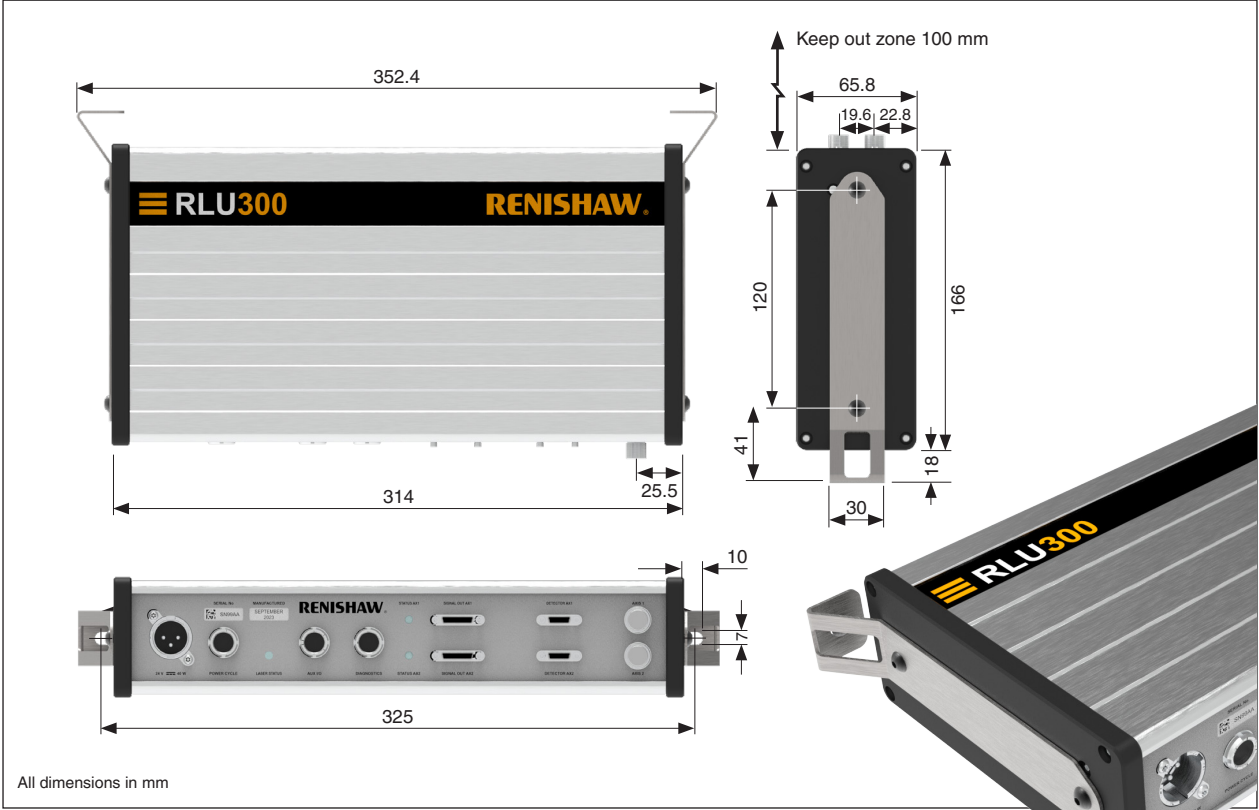


Figure 4 RLU300 – showing vertical mounting configuration

RLU300 laser unit performance

Laser type	Class II	
Output beam intensity	< 500 μ W (cw) / axis	During preheat this can increase to 1000 μ W
Vacuum wavelengths	632.990000 nm 632.991450 nm	Axis 1 Axis 2
Vacuum wavelength accuracy	$\pm$ 0.1 ppm over three years	
Laser frequency stability	< 0.1 ppb < 0.5 ppb < 1.0 ppb < 3.0 ppb	3 seconds 1 minute 1 hour 8 hours
Analogue output signal period	$\lambda/4$ (158 nm nominal)	Differential and plane mirror interferometers
Digital quadrature nominal output resolution	User selectable from 0.3 nm to 20 μ m	Differential and plane mirror interferometers
Digital quadrature update rate	User selectable between 312.5 kHz and 50 MHz	
Output formats	Dual RS-422 differential digital quadrature 1 V peak to peak sine/cosine signals	
Diagnostics format	RS-485 serial communications	
Automatic sub-divisional error correction	Automatic Offset Control and Automatic Balance Control can be toggled via diagnostic communications	
Stabilisation time	< 20 minutes	Time taken for a unit switched on from cold to stabilise
Warm-up time	< 2 hours	Time taken for a unit switched on from cold to meet frequency stability specifications
Power supply requirements	24 V $\pm$ 2 V @ 2.5 A 24 V $\pm$ 2 V @ 1.6 A 24 V $\pm$ 2 V @ 0.7 A	Inrush (first 10 ms) Warm-up (~10 minutes) Operation at room temperature (20 °C)
Weight	3.0 kg	
Operating environment	Pressure Humidity Temperature	650 mbar to 1150 mbar 0% to 95% RH 10 °C to 40 °C
		Normal atmospheric Non-condensing

www.renishaw.com/contact



#renishaw

+44 (0) 1453 524524

uk@renishaw.com

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