

# RLU200 laser unit



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

The RLU200 is a laser unit in the RLE family of interferometric laser encoder products. Using a frequency-stabilised Helium-Neon laser source, the RLU200 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 RLU200 incorporates automatic sub-divisional error correction and enhanced frequency stability, maintaining accurate position measurement over a broad range of operating conditions. Together with comprehensive diagnostic capabilities, these features make the RLU200 well suited to demanding high-precision applications where consistency and system uptime are critical.

### Benefits

#### Automatic SDE correction

The RLU200 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.

#### Backwards compatibility

The RLU200 laser unit is mechanically and electronically compatible with legacy RLE systems. Laser units and detector heads have the same mounting dimensions, with accessories available from Renishaw to make in-field upgrades to existing installations simple.

#### 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.

#### Increased range

Compared with the RLU20, the improved design of the RLU200 laser unit allows more applications to harness the flexibility of Renishaw's RLE system.

### Innovations

#### Plug and play detector heads

Compatible detector heads communicate with the laser unit and are automatically configured when they are connected to the RLU200 laser unit. Plug and play technology allows the RLU200 laser unit to use any compatible detector head without manual electronic matching.

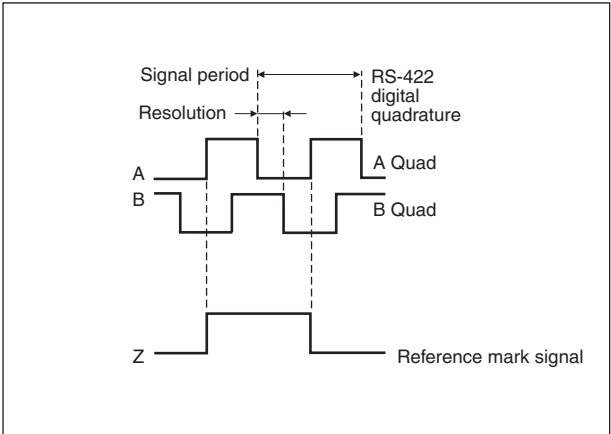
#### Enhanced diagnostics

The RLU200 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.

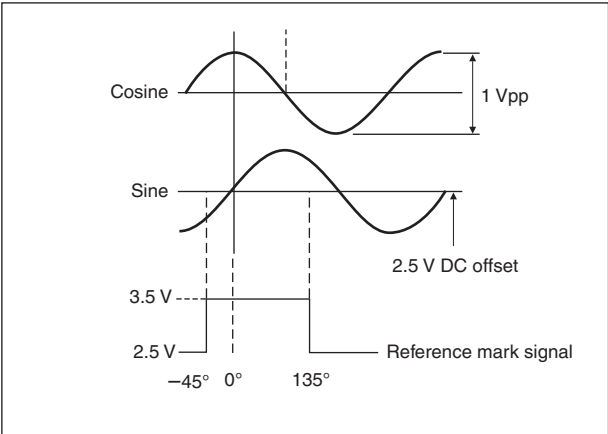
#### Condition-based monitoring

To maximise uptime in critical applications, RLU200 laser units continually monitor system operating parameters. Using the diagnostic interface, the laser unit provides advance warning that replacement should be scheduled.

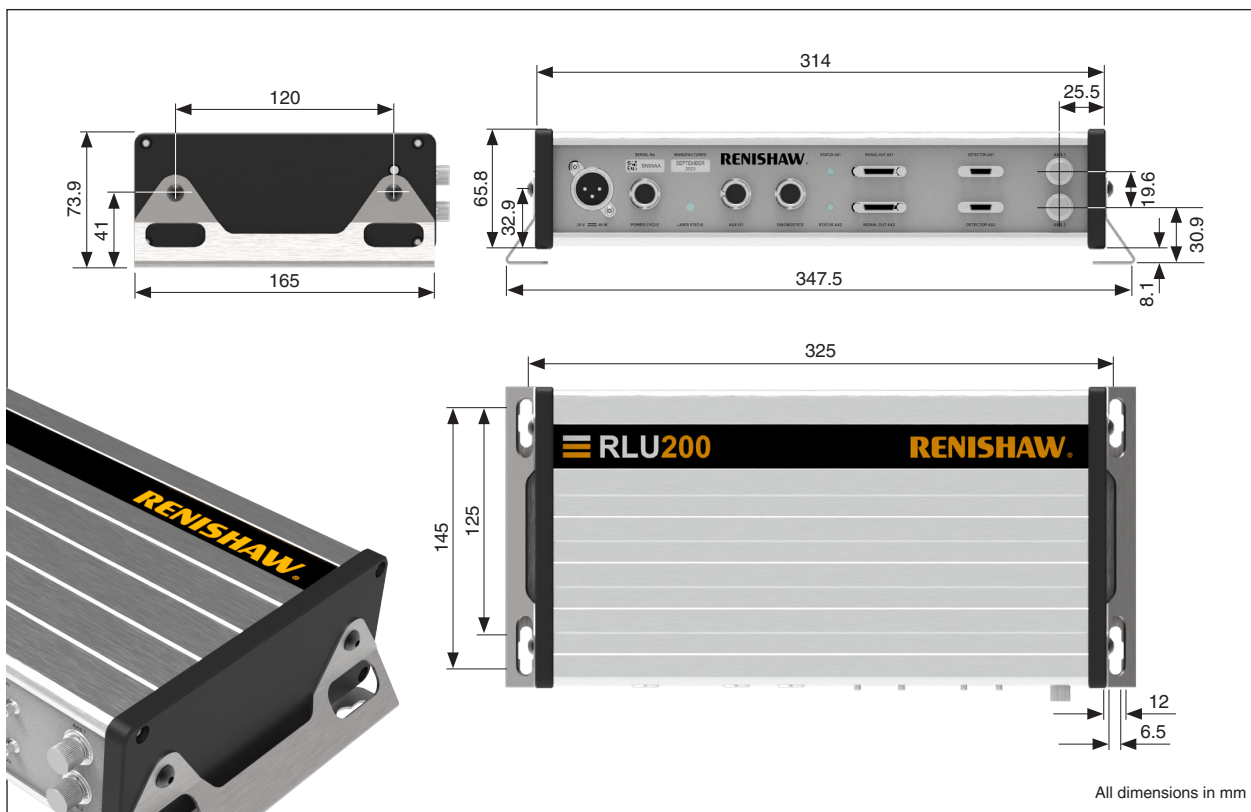
### Quadrature formats



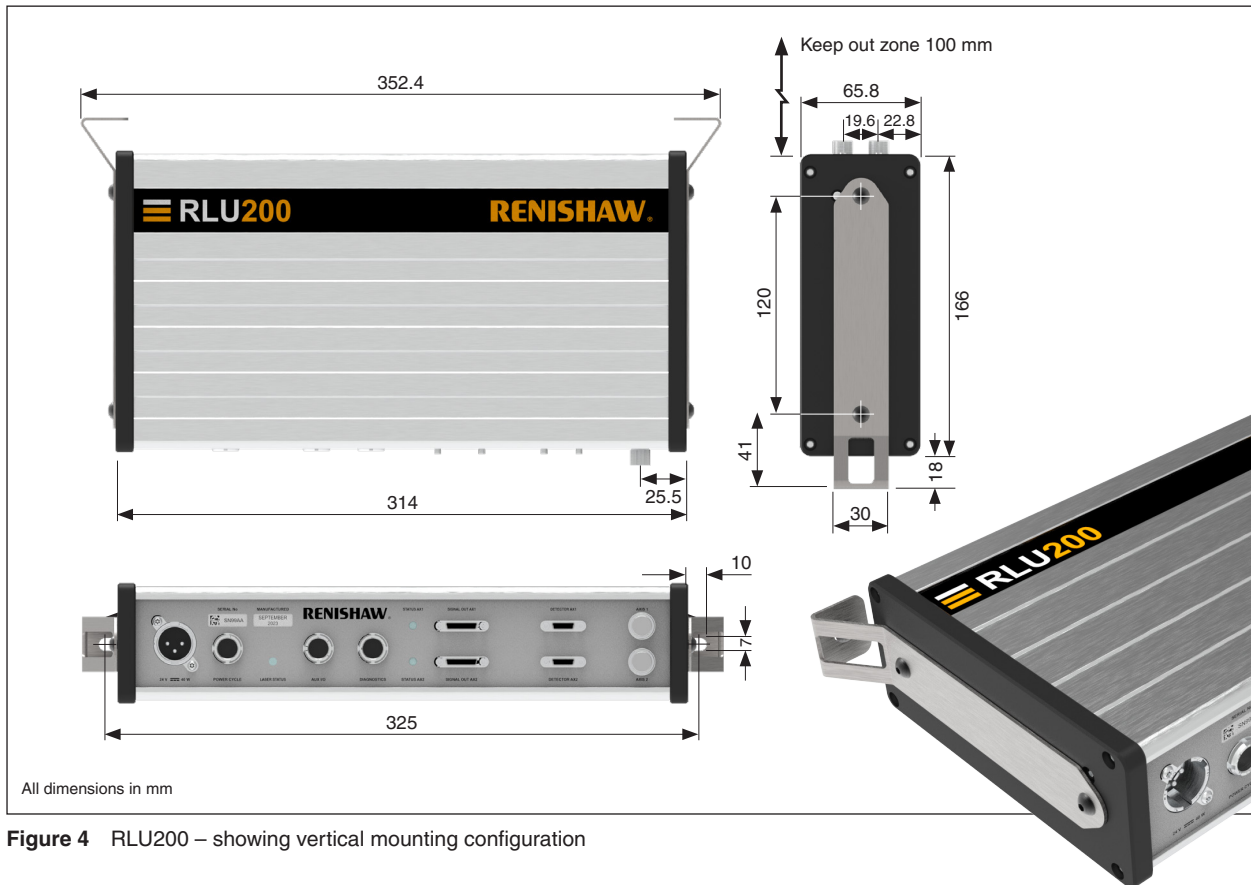
**Figure 1** Digital incremental – RS-422 digital quadrature



**Figure 2** Analogue incremental – 1 Vpp differential sine and cosine



**Figure 3** RLU200 – showing horizontal mounting configuration



**Figure 4** RLU200 – showing vertical mounting configuration

## RLU200 laser unit performance

|                                                     |                                                                                                     |                                                                                        |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Laser type</b>                                   | Class II                                                                                            |                                                                                        |
| <b>Output beam intensity</b>                        | < 500 $\mu$ W (cw) / axis                                                                           | During preheat this can increase to 1000 $\mu$ W                                       |
| <b>Vacuum wavelengths</b>                           | 632.990000 nm<br>632.991450 nm                                                                      | Axis 1<br>Axis 2                                                                       |
| <b>Vacuum wavelength accuracy</b>                   | $\pm$ 0.1 ppm over three years                                                                      |                                                                                        |
| <b>Laser frequency stability</b>                    | < 1 ppb<br>< 2 ppb<br>< 10 ppb                                                                      | 1 minute<br>1 hour<br>8 hours                                                          |
| <b>Analogue output signal period</b>                | $\lambda/4$ (158 nm nominal)                                                                        | Differential and plane mirror interferometers                                          |
| <b>Digital quadrature nominal output resolution</b> | User selectable from 0.3 nm to 20 $\mu$ m                                                           | Differential and plane mirror interferometers                                          |
| <b>Digital quadrature update rate</b>               | User selectable between 312.5 kHz and 50 MHz                                                        |                                                                                        |
| <b>Output formats</b>                               | Dual RS-422 differential digital quadrature<br>1 V peak to peak sine/cosine signals                 |                                                                                        |
| <b>Diagnostics format</b>                           | RS-485 serial communications                                                                        |                                                                                        |
| <b>Automatic sub-divisional error correction</b>    | Automatic Offset Control and Automatic Balance Control can be toggled via diagnostic communications |                                                                                        |
| <b>Stabilisation time</b>                           | < 20 minutes                                                                                        | Time taken for a unit switched on from cold to stabilise                               |
| <b>Warm-up time</b>                                 | < 2 hours                                                                                           | Time taken for a unit switched on from cold to meet frequency stability specifications |
| <b>Power supply requirements</b>                    | 24 V $\pm$ 2 V @ 2.5 A<br>24 V $\pm$ 2 V @ 1.6 A<br>24 V $\pm$ 2 V @ 0.6 A                          | Inrush (first 10 ms)<br>Warm-up (~10 minutes)<br>Operation at room temperature (20 °C) |
| <b>Weight</b>                                       | 2.9 kg                                                                                              |                                                                                        |
| <b>Operating environment</b>                        | Pressure<br>Humidity<br>Temperature                                                                 | 650 mbar to 1150 mbar<br>0% to 95% RH<br>10 °C to 40 °C                                |
|                                                     |                                                                                                     | Normal atmospheric<br>Non-condensing                                                   |

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Part no.: L-9970-9051-02-A

Issued: 08.2026