

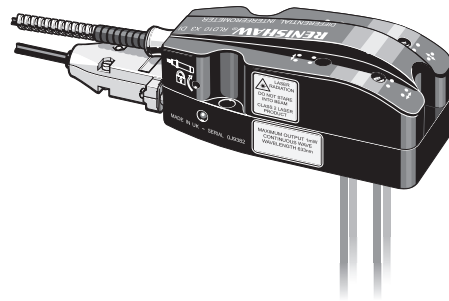
RLD10 DI (differential interferometer) detector head

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 mechanisms.

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 data sheet describes the RLD10-X3-DI differential interferometer detector head, which measures the relative displacement between two plane mirror targets including one fixed-position reference mirror. This ensures accurate positioning between critical process components and eliminates common mode errors.



In vacuum chamber applications, the detector head is mounted on the outside of the chamber with the laser beams entering through a suitably positioned viewport. To enable laser alignment to be completed from outside the chamber, this RLD head includes individual pitch and yaw adjusters for both the reference and measurement beams.

Both the fibre optic and electrical cables can be disconnected from the detector unit, further simplifying integration. 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

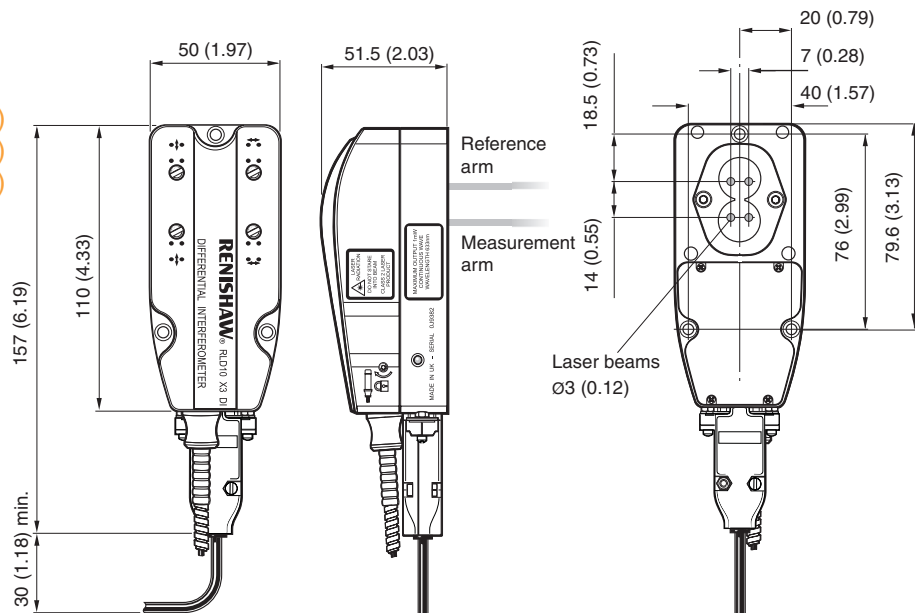
Dimensions in mm (inches)

Overall dimensions:

Height: 51.5 (2.03)
Length: 110 (4.33)
Width: 50 (1.97)

Fixing:

See overleaf



Legislative - Laser safety:

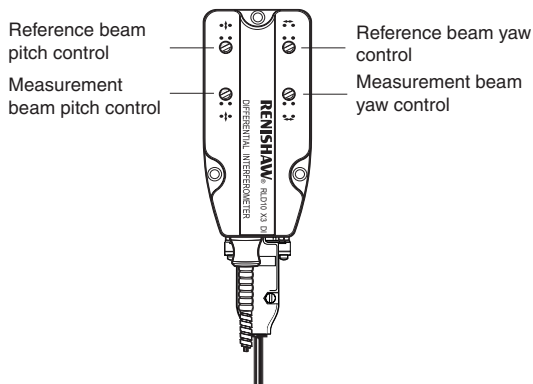
In accordance with IEC/EN60825-1, IEC/EN60825-2 and US standards 21CFR 1040 and ANSI Z136.1, Renishaw RLE lasers are Class II lasers and safety goggles are not required, since the blink reaction of a human will protect the eye from damage. Do not stare into the beam or shine it into the eyes of others. 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.

RLD10-X3-DI detector head performance

| | | |
|---|--|---|
| Axis travel | 0 m to 1 m 0 m to 0.5 m | Measurement arm Reference arm (fixed path length) |
| Optical signal period | $\lambda/4$ (158 nm) | |
| Non-linearity error | < ± 0.8 nm < ± 5 nm | Below 50 mm/sec with >70% signal strength At 1 m/s with >70% signal strength |
| Thermal drift coefficient | <50 nm/°C | |
| Beam diameter | 3 mm | |
| Beam separation | 7 mm x 14 mm | See diagram overleaf |
| Beam alignment adjustment | $\pm 1^\circ$ pitch $\pm 1^\circ$ yaw | Integrated beam steering to simplify beam alignment |
| Plane mirror alignment tolerance (1 m axis) | ± 25 arcseconds | |
| Cable length (standard) | 3 m | Detachable at the laser unit and detector head |
| Electrical cable diameter | 6.5 mm | Terminated with a 15-way D-type connector and 15-way high density D-type at the other end |
| Fibre cable diameter (armoured) | 5 mm | Removable from the detector head (connector 12 mm diameter) |
| Component weight | 400 g 290 g | RLD10-X3-DI head with no cable attached 3 m cable |
| Operating environment | | |
| Pressure | 650 mbar to 1150 mbar | Normal atmospheric |
| Humidity | 0% to 95% RH | Non-condensing |
| Temperature | 15 °C to 30 °C | |

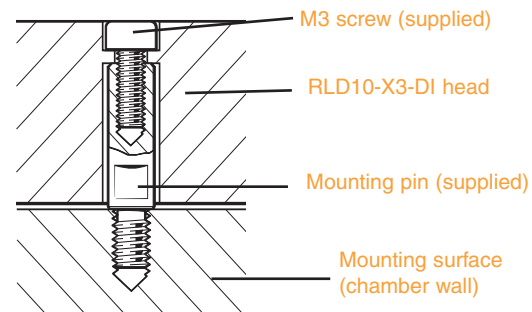
Laser beam alignment

The RLD10-X3-DI detector head contains four integrated beam steerers so that pitch and yaw adjustments can be made on the measurement and reference beams.



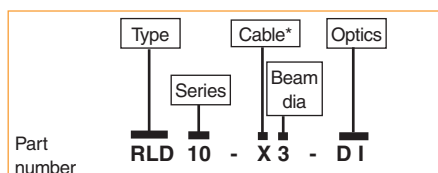
Mounting

The detector head is designed to mount directly onto three pins (supplied with the detector head), located on the mounting surface. The mounting technique accommodates any differential expansion between the mounting surface and head. The user is required to machine three M4 tapped holes for the pins and install an anti-reflection optical grade window for the laser beams. For alternative mounting requirements please contact a Renishaw representative.



RLD identification and ordering

The RLD10-X3-DI detector head 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 RLD10-X3-DI is available separately, using the part number shown below:



* Cable only supplied when RLD10-X3-DI is purchased as part of a system. If you require a cable, please order A-5225-0260.

