Data sheet
L-9970-9062-02-A

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Plane mirror interferometer (PMI) detector heads

Renishaw's RP0-LP and RP9-LP plane mirror detector heads perform interferometric displacement measurements for precision motion systems.

As part of Renishaw's RLE family of fibre optic laser encoder products, the RP0-LP and RP9-LP detector heads are used with an RLU100, RLU200 or RLU300 laser unit for position measurement in high-performance motion stage applications. Their plane mirror interferometer (PMI) configurations allow the measurement axis to be aligned with the stage's axis of interest, eliminating Abbe error. Two optical configurations are available, with the RP0-LP directing the measurement beam straight ahead and the RP9-LP turning it through 90°.

The RP0-LP and RP9-LP plane mirror interferometer detector heads offer minimal power dissipation in applications requiring up to 1 m/s motion velocity. The plane mirror detector heads can be mounted in any orientation.

High Velocity detector head variants, the RP0-HV and RP9-HV, are planned for future release and are intended for applications requiring measurement speeds greater than 1 m/s. Contact Renishaw for availability.

Benefits

Expanded operating range
The improved optical and electronic subsystems of the PMI detector heads, along with compatible laser units, ensure accuracy is maintained over greater distances, mirror angles and signal levels.

Increased optical immunity
The interferometers used in PMI detector heads include additional components to improve accuracy and increase immunity to back-reflections.

Backwards compatibility
Upgrading existing 3 m and 6 m RLD10 installations is straightforward. The RP0-LP and RP9-LP detector heads share the same mounting and output beam locations.

Innovations

Simple cleanroom preparation
The detector heads simplify the process of preparing the heads for use in cleanroom environments.

Enhanced beam pointing stability
Renishaw's RLE fibre optic laser encoder systems include an innovative collimator locking mechanism. When locked, the optical components are isolated from mechanical loads on the fibre optic interconnect.

Plug and play
No manual set-up is required to use any combination of compatible detector heads and laser units. The PMI detector heads communicate with the laser unit automatically.

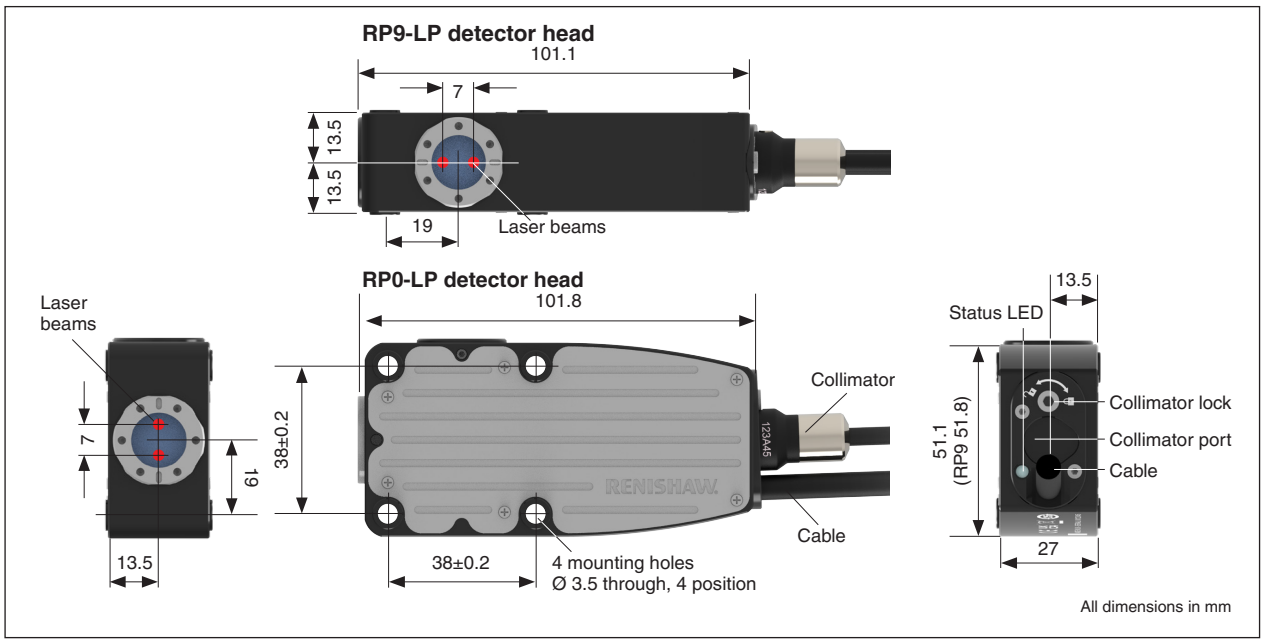

Figure 1 RP0-LP and RP9-LP detector heads

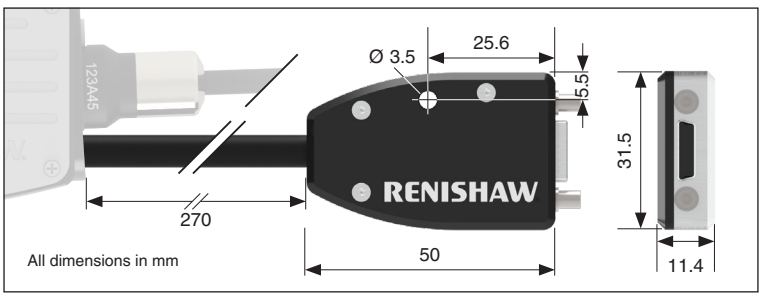

Figure 2 Connector housing

PMI detector head specifications

Measurement range	2 m ±400 µrad	At optimal mirror alignment Angular, at 1 m. Tolerance applies to both pitch and yaw during operation
Optical signal period	λ/4 (158 nm nominal)	
Maximum motion velocity	1.0 m/s	
Sub-divisional error (SDE) [1]	< ±1 nm	Velocities up to 200 mm/s, without automatic SDE correction. Further reduced by automatic SDE correction on the RLU200 and RLU300.
Electronic noise [2]	< 10 pm < 200 pm	1 Hz - 50 kHz band 1 Hz - 25 MHz band
Zero-point drift	< 100 nm/°C	
Beam diameter	3 mm Up to 3.5 mm Up to 4.0 mm	Nominal For mirror distances up to 1 m For mirror distances up to 2 m
Beam separation	7 mm	Centre to centre
Beam alignment adjustment	±0.65° pitch / ±1.5° yaw	Integrated beam steering to simplify beam alignment
Fixed tail length	270 mm	Permanently attached cable between the detector head and connector housing. A separate 3 m or 6 m electronic cable is required to connect the detector head to the laser unit.
Power dissipation	0.14 W	
Component weight	275 g	Including fixed tail and connector housing
Operating environment Pressure Humidity Temperature	650 mbar to 1150 mbar 0% to 95% RH 10°C to 40°C	Normal atmospheric Non-condensing Not vacuum compatible
Overall dimensions (mm) [3]	27 (height) × 104 (length) × 52 (width)	
Fixing	4 M3 × 0.5 × 35 mm or 5-40-UNC × 1⅜ cap head screws on a 38 mm square pitch	

1 At optimal alignment (excludes interface).

2 Electronic noise values assume that the system is in its factory configuration and achieves 100% signal strength.

3 Includes collimator locking mechanism. When using mounting kit, 4.5 mm is added to the height.

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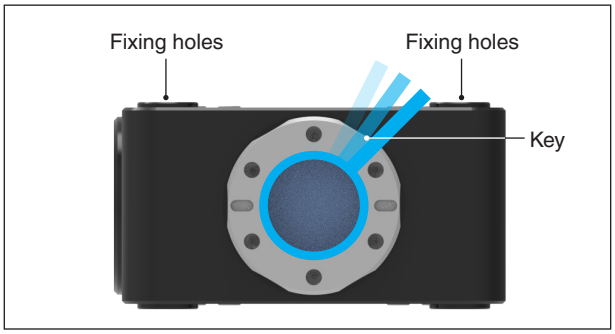
Laser beam alignment

PMI detector heads include an optical beam steerer to assist in axis alignment. Using the adjustment key, the pitch of the laser beam can be aligned to the motion axis. The four mounting locations allow for manual adjustment of the detector head yaw alignment during installation.



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