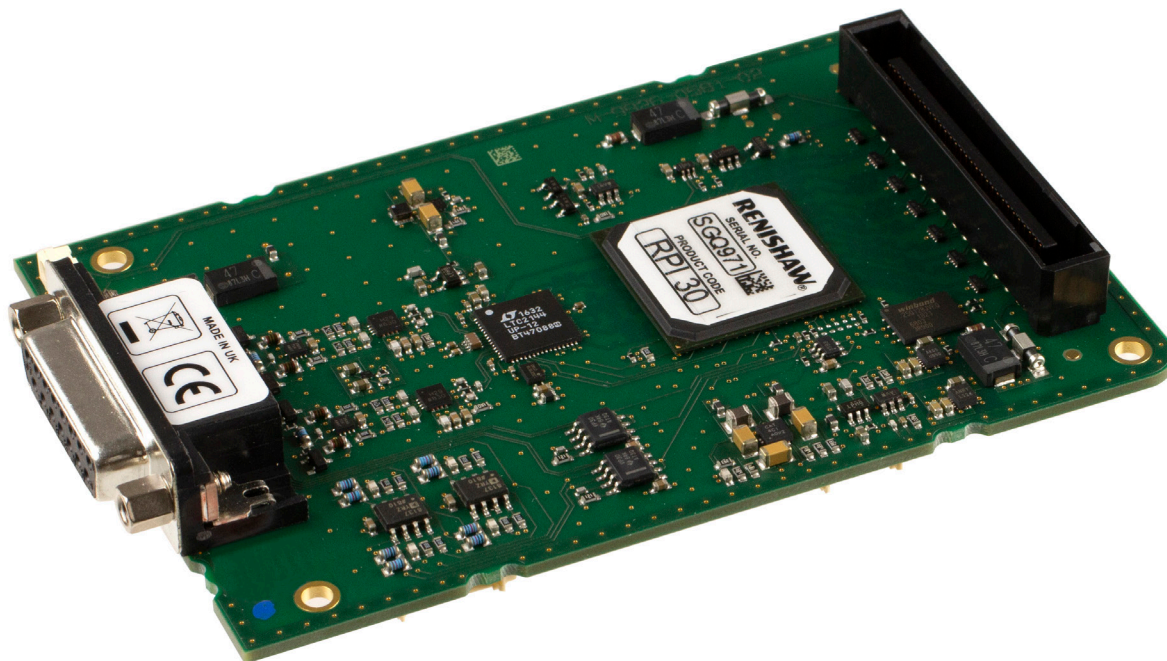


RPI30 parallel interface



The RPI30 parallel interface accepts differential analogue 1 Vpp sine/cosine signals, interpolates by 4096 and provides an output in parallel format with up to 36 bits of position data being available. When used in combination with a double pass plane mirror interferometer system (PMI) (fundamental period of sinusoids is nominally 158 nm), this results in an LSB of 38.6 picometres at velocities of up to 2 m/s. Active Lissajous correction can be enabled to compensate for DC offset and AC mismatch from the laser encoder to improve the sub divisional error (SDE) to ± 0.1 nm at low velocities.

The parallel interface is similar to the RPI20 running at 3.0V (3.3V tolerant). Control and monitoring of the RPI30 is performed via an SPI interface in the parallel bus connector. Options such as address, direction, resolution and Lissajous correction are stored in EEPROM and loaded on power up. RPI30 parallel interfaces can be configured before installation if no SPI interface is available.

Optional connections for active feedthrough of the analogue quadrature (uncorrected) and RS-422 full duplex diagnostics interface are provided.

Information available over the diagnostics (RS-422) and control (SPI) interfaces includes:

- Device information including version and serial number
- ADC data at full resolution
- Full range magnitude (signal strength)
- Full resolution position independent of parallel interface settings
- Parallel interface settings
- Full error information and ability to reset errors independently of position
- Lissajous correction status
- Lissajous correction setup and control
- Internal datalogger which can capture position or ADC data up to the full 100 MHz internal sample rate.

Performance specification

Values stated define the contribution of the RPI30 on the system performance, not the complete laser interferometer system performance.

Measurement performance

		Plane mirror - PMI	Retro Reflector - RRI
LSB resolution – user selectable		38.6, 77.2, 154.4 or 308.8 pm	77.2, 154.4, 308.8 or 617.6 pm
Maximum speed		2 m/s	4 m/s
Positional noise contribution (RMS) signal strength > 25%		< 38.6 pm	< 77.2 pm
SDE contribution (excluding RLE and without correction enabled)	Velocity < 50 mm/s (PMI) Velocity < 100 mm/s (RRI) Signal strength > 25%	< ±0.5 nm	< ±1.0 nm
	Velocity > 50 mm/s and < 2 m/s (PMI) Velocity > 100 mm/s and < 4 m/s (RPI)	< ±2.0 nm	< ±4.0 nm
SDE (including RLE with correction enabled)	Velocity < 50 mm/s (PMI) Velocity < 100 mm/s (RRI) Signal strength > 50%	< ±0.1 nm	< ±0.2 nm
Position data format		36-bit (two's complement)	
Propagation delay (actual position is sampled) before latch enable signal		135 ns	
Propagation delay variation		±5 ns	

RPI30 power requirements

Voltage	5 V ±0.25 V
Operating current	500 mA
Noise and ripple	50 mVpp (DC to 10 MHz)

NOTE: The 5 V power supply should be single fault tolerant certified to EN (IEC) 60950-1.

Environmental specification

Pressure	Normal atmospheric pressure (650 mbar - 1150 mbar)	
Humidity	0% to 95% RH (non-condensing)	
Temperature	Storage	–20 °C to +70 °C
	Operating	+10 °C to +40 °C

Parallel bus and SPI interfaces

	Minimum (V)	Maximum (V)
Input low	–0.3	0.8
Input high	1.7	3.5
Output low	0	0.2
Output high	2.8	3.0

NOTE: The digital interface on JAE connector is 3.0 V LVCMOS, although they are compatible with 3.3 V LVCMOS.

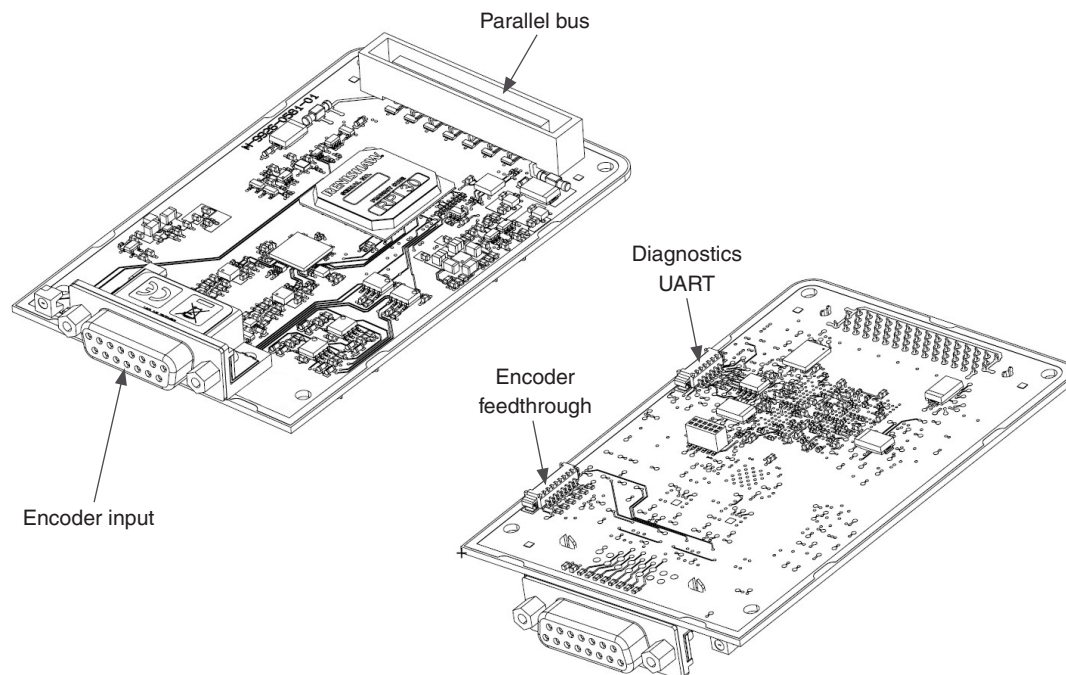
Encoder feedthrough

	Plane mirror - PMI	Retro Reflector - RRI
Analogue quadrature	Nominal 1 V pp into 120 Ω termination	Copy of encoder output, no SDE correction applied.
Error	RS-422 differential error	Encoder error only.
SDE contribution Velocity < 50 mm/s (PMI) Velocity < 100 mm/s (RRI) Signal strength > 25%	< ± 0.5 nm	< ± 1.0 nm
Max velocity	2 m/s	4 m/s

Diagnostics UART

Signal level	RS-422 full duplex
Baud rate	3 Mbaud
Format	1 start bit, 8 data bits, 1 stop bit, no parity

RPI connectors



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Part no.: L-9926-9211-02-A

Issued: 08.2026