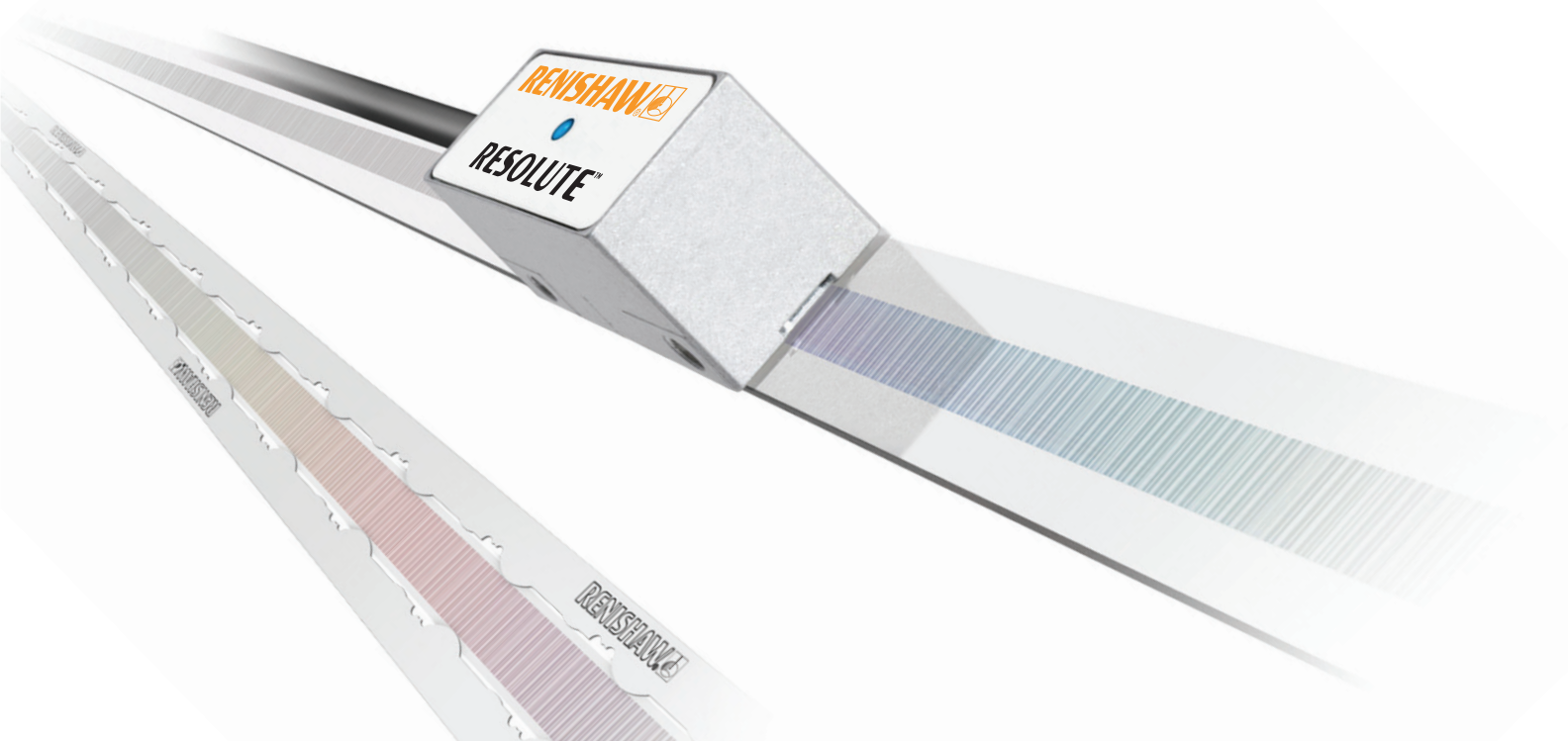


RESOLUTE™ absolute optical linear encoder



RESOLUTE is a revolutionary new true absolute, fine pitch optical encoder system, with excellent dirt immunity, offering an impressive specification that breaks new ground in position feedback!

RESOLUTE's patented technology combines 1 nm resolution with exceptionally high speed (up to 100 m/s) and high accuracy linear tape and spar scales.

RESOLUTE uses a unique single optical absolute track (a world first) of 30 μm pitch, combined with sophisticated optics to ensure wide set-up tolerances and impressive low-noise performance. The detection method also intrinsically provides very low sub-divisional error of ± 40 nm and ultra-low noise (jitter) less than 10 nm RMS, resulting in better velocity control performance and rock solid positional stability.

Reliability is assured by **RESOLUTE**'s excellent dirt immunity, built-in separate position-checking algorithm, and IP64 sealed readhead with wipe-clean recovery.

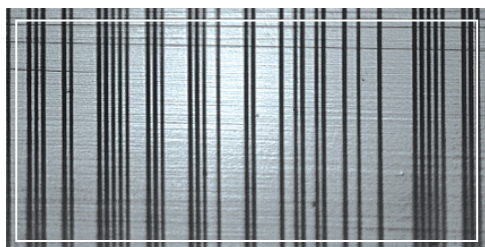
- True absolute non-contact optical encoder system: no batteries required!
- Wide set-up tolerances for quick and easy installation
- High dirt immunity to scratches and light oils
- Resolutions to 1 nm
- 100 m/s maximum speed for all resolutions
- 30 μm scale pitch ensures exceptional motion control performance
- ± 40 nm sub-divisional error for smooth velocity control
- Less than 10 nm RMS jitter for improved positional stability
- Built-in separate position-checking algorithm provides inherent safety
- IP64 sealed readhead for high reliability in harsh environments
- Integral set-up LED enables easy installation and provides diagnostics at a glance
- RELA Invar® spar scales give 'zero' thermal expansion and ± 1 μm accuracy on lengths up to 1130 mm
- RSLA Stainless steel spars with lengths up to 10 m, with ± 4 μm accuracy on 5 m
- **FASTRACK™** with RTLA for the quickest and easiest installation, with lengths to 10 m with ± 5 $\mu\text{m}/\text{m}$ accuracy
- Readhead and linear scales are bolt-hole compatible with **SIGNUM™** encoders
- Operates up to 80 °C
- Integral over-temperature alarm
- Variety of serial protocols available. Contact Renishaw for the latest list
- Angle encoder version also available, with ring diameters from 52 to 550 mm and system accuracy to ± 0.5 arc second

System features



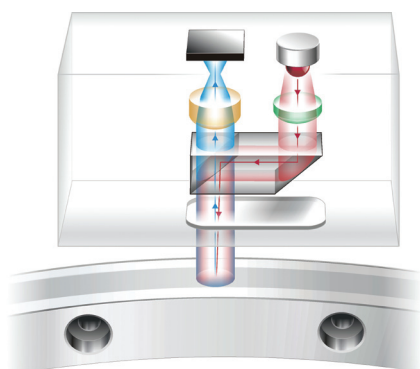
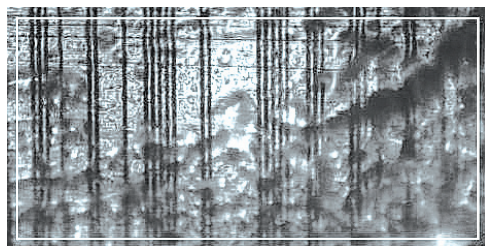
Unique single track absolute optical scale

- ▶ Absolute position is determined immediately upon switch-on
 - ▶ No battery back-up
 - ▶ Much higher tolerance to yaw de-phasing than dual-track systems
 - ▶ Fine pitch (30 μm period) optical scale for superior motion control compared to inductive, magnetic or other non-contact optical absolute encoders
 - ▶ High accuracy graduations marked directly onto tough engineering materials for outstanding metrology and reliability
-



High dirt immunity

- ▶ Filtering optics and embedded surplus code means **RESOLUTE** even reads dirty scale
- ▶ Absolute position can be determined in all three cases shown here; clean scale (left), grease contamination (below-left), particle contamination (below)



Unique detection method

- ▶ Readhead acts like an ultra fast miniature digital camera, taking photos of a coded scale
 - ▶ Photos are analysed by a high-speed DSP to determine absolute position
 - ▶ Built-in position-check algorithm constantly monitors calculations for ultimate safety and reliability
 - ▶ Filtering optics and determination algorithms are designed to provide low noise (jitter <math>< 10 \text{ nm RMS}</math>) and low sub-divisional error (SDE $\pm 40 \text{ nm}</math>)$
-



Range of linear and rotary (angle) scales

- ▶ Tough RELA high-precision Invar spars with $\pm 1 \mu\text{m}$ accuracy available up to 1130 mm length
- ▶ Shatter-proof RSLA high-precision stainless steel scale, offering higher accuracy than glass scales and long lengths up to 10 m, with $\pm 4 \mu\text{m}$ accuracy over a complete 5 m length
- ▶ *FASTRACK* with RTLA tape scale, for the fastest and easiest installation, with $\pm 5 \mu\text{m/m}$ accuracy
- ▶ High accuracy rotary scales (system accuracy to ± 0.5 arc second) also available, with speeds up to 36 000 rev/min and up to 27 bit resolution!

Resolutions and scale lengths

The maximum scale length is determined by the readhead resolution multiplied by the number of position bits in the serial word. For **RESOLUTE** readheads with fine resolution and short word length, the maximum scale length will be limited accordingly. Conversely, coarser resolutions or longer word lengths enable the use of longer scale lengths.

RESOLUTE is available with a variety of serial protocols, but the example here shows **RESOLUTE** using *BiSS-C* (Uni-directional) protocol with two options for the position word length; 32 bits and 26 bits. The 32 bit position word facilitates longer lengths that can be a significant benefit, especially at fine resolutions.

For 5 nm and 50 nm resolution readheads with a 32 bit position word, it is possible to use the full 10 m scale length offered by RTLA and RSLA.


For other serial protocols, please contact your local Renishaw representative for details.

Resolution (nm)	1	5	50
Max scale length with 32 bit position word	4.285 m	10 m	10 m
Max scale length with 26 bit position word	57 mm	326 mm	3.345 m
Maximum reading speed	100 m/s	100 m/s	100 m/s

Linear scale specifications

Description	RELA	High-performance Invar spar scale for very high accuracy applications requiring 'zero' thermal expansion. Lengths up to 1130 mm.
	RSLA	High-performance stainless steel scale for very high accuracy applications with longer axis lengths. Lengths up to 10 m.
	FASTRACK RTLA	Track-mounted hardened stainless steel tape scale for high performance motion control systems requiring easier and faster scale installation and field replacement. Lengths up to 10 m.
Accuracy	RELA	±1 µm up to 1130 mm
	RSLA	±1.5 µm up to 1 m @20 °C
		±2.25 µm up to 2 m @20 °C
		±3 µm up to 3 m @20 °C
		±4 µm up to 5 m @20 °C
		±6 µm up to 7.5 m @20 °C
±8 µm up to 10 m @20 °C		
FASTRACK RTLA	±5 µm/m	
Thermal expansion coefficient	RELA	~ 0.4 µm/m/°C
	RSLA	~10.8 µm/m/°C
	FASTRACK RTLA	~10.6 µm/m/°C

Operating and electrical specifications

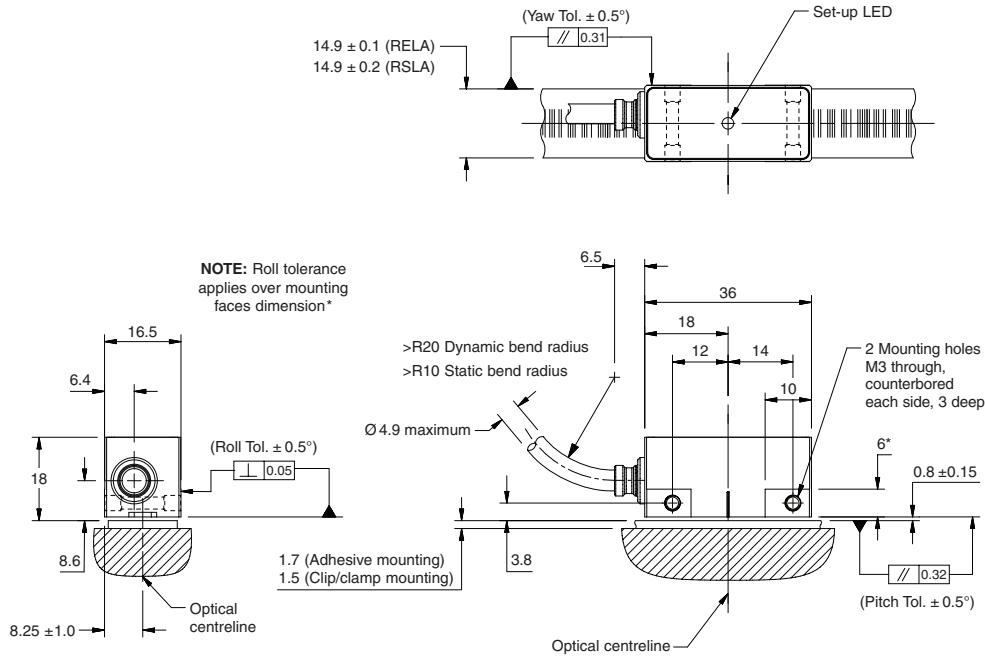
Power supply	5 V ±10%	250 mA (typical)
	Ripple	<p>NOTE: Current consumption figures refer to terminated RESOLUTE systems. Renishaw encoder systems must be powered from a 5 V dc supply complying with the requirements for SELV of standard EN (IEC) 60950.</p> 200 mVpp maximum @ frequency up to 500 kHz maximum
Temperature	Storage	-20 °C to +85 °C
	Operating	0 °C to +80 °C
Humidity	Storage	95% maximum relative humidity (non-condensing)
	Operating	80% maximum relative humidity (non-condensing)
Sealing		IP64
Acceleration	Operating	500 m/s ² BS EN 60068-2-7:1993 (IEC 68-2-7:1983)
Shock	Non-operating	1000 m/s ² , 6 ms, ½ sine BS EN 60068-2-27:1993 (IEC 68-2-27:1987)
Vibration	Operating	300 m/s ² max @ 55 Hz to 2000 Hz BS EN 60068-2-6:1996 (IEC 68-2-6:1995)
Mass	Readhead	18 g
	Cable	32 g/m
EMC compliance		BS EN 61326-1: 2006
Cable		Double-shielded, outside diameter 4.5 mm maximum Flex life >20 x 10 ⁶ cycles at 20 mm bend radius UL recognised component 

NOTE: Class 1 LED product. LED radiation. Do not view directly with optical instruments.

RESOLUTE installation drawing (on RSLA/RELA scale)

Dimensions and tolerances in mm

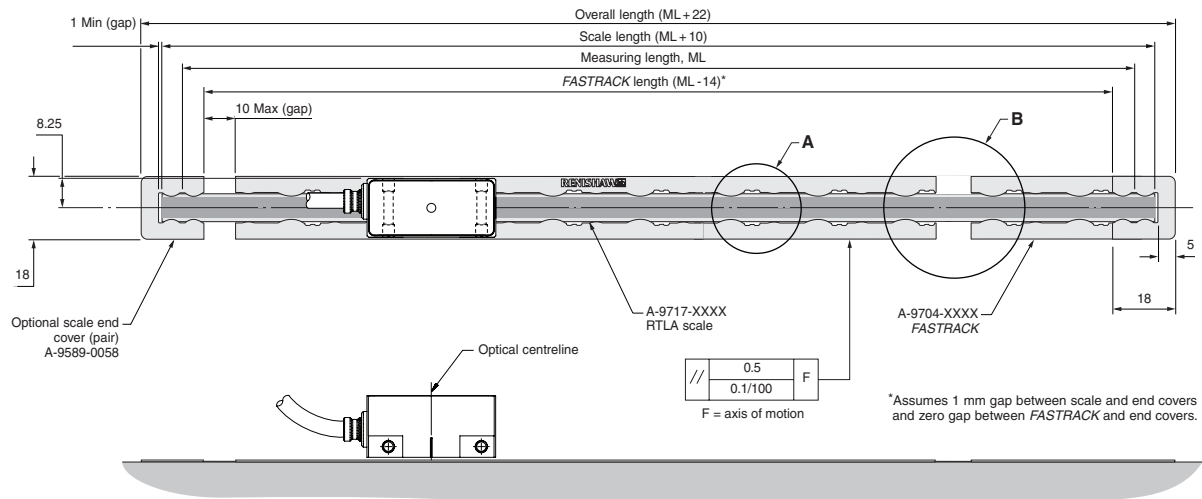
For detailed drawings, please refer to the RESOLUTE linear encoder installation guide



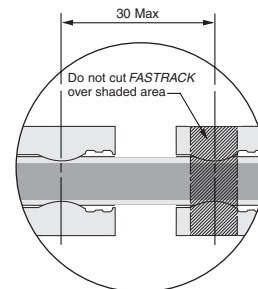
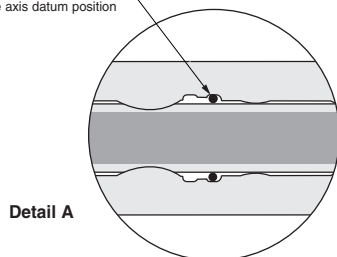
RESOLUTE installation drawing (on FASTRACK)

Dimensions and tolerances in mm

For detailed drawings, please refer to the RESOLUTE linear encoder installation guide



Spot of Loctite 435 (2 positions) to secure axis datum position



For worldwide contact details, please visit our main website at www.renishaw.com/contact

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