

RESOLUTE™ absolute optical encoder for Panasonic serial communications



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, and high accuracy linear tape and spar scales.

RESOLUTE uses a unique single optical absolute track (a world first) with a nominal pitch of 30 μm , combined with sophisticated optics. This ensures wide set-up tolerances, very low sub-divisional error of ± 40 nm and ultra-low noise (jitter) of 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.

RESOLUTE is available with a variety of serial protocols. Please contact your local representative for the latest list.

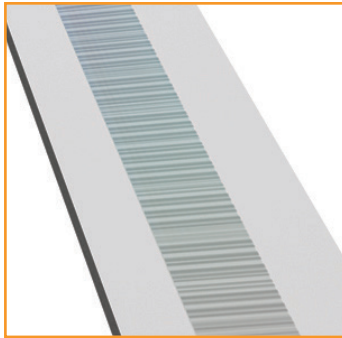
This version of **RESOLUTE** communicates using Panasonic's proprietary serial protocol, enabling it to connect directly to Panasonic A5L, A5NL, A5, A5N, A4AL and Omron G5 drives.

- True absolute non-contact optical encoder system: no batteries required
- Wide set-up tolerances for quick and easy installation
- High immunity to dirt, scratches and light oils
- Resolution options of 1 nm, 50 nm and 100 nm
- 40 m/s maximum speed for Panasonic
- 30 μm nominal 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
- Readhead and linear scales are bolt-hole compatible with **SIGNUM**™ encoders
- Operates up to 80 °C
- Integral over-temperature alarm
- Integral over-speed alarm
- Variety of serial protocols available. Contact your local representative for the latest list

Compatible with:

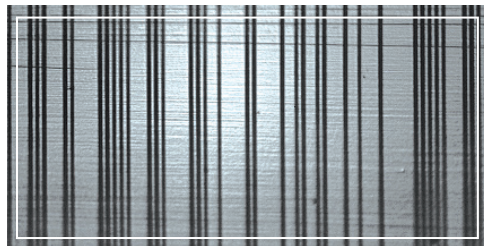
- **RELA** low expansion, high stability spar scales
- **RSLA** stainless steel spars
- **FASTRACK**™ with **RTLA**
- **RTLA-S** self adhesive tape scale

System features



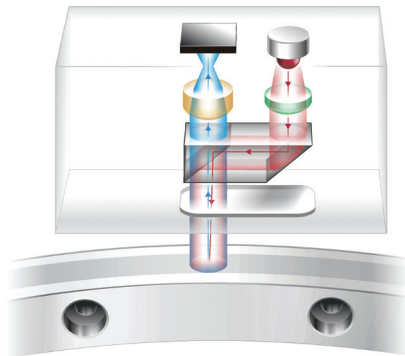
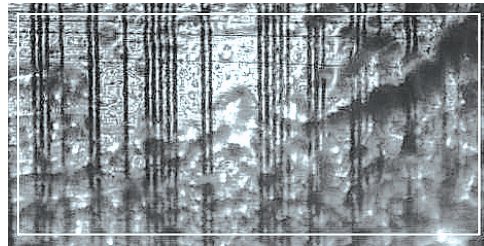
Unique single track absolute optical scale

- ▶ Absolute position is determined immediately upon switch-on
- ▶ No battery back-up
- ▶ No yaw de-phasing multiple-track systems
- ▶ Fine pitch (30 µm nominal 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

- ▶ Advanced 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
- ▶ Advanced optics and position determination algorithms are designed to provide low noise (jitter <10 nm RMS) and low sub-divisional error (SDE ±40 nm)

Range of linear scales

- ▶ Tough RELA low expansion nickel alloy spars with ±1 µm accuracy available up to 1130 mm length
- ▶ Shatter-proof RSLA stainless steel spar scale, offering higher accuracy than glass scales and long lengths up to 5 metres, with ±4 µm accuracy over a complete 5 metre length
- ▶ RTLA with *FASTRACK*, and RTLA-S tape scales with ±5 µm/m accuracy and easy installation

Range of protocols and resolutions

| Protocol | Resolutions |
|-----------|-------------|
| | Linear |
| Panasonic | 100 nm |
| | 50 nm |
| | 1 nm |

Other serial protocols are available. Please contact your local Renishaw representative for information.

Linear absolute encoder version

Resolutions and scale lengths

RESOLUTE with Panasonic serial comms is available with 1 nm, 50 nm and 100 nm resolution options. The maximum reading speed is 40 m/s. The maximum scale length is as described in the scale specifications below, i.e. it is not limited by serial word length.

Please contact your local Renishaw representative for details of other serial protocols.

Scale specifications


For more detailed scale information please refer to relevant scale data sheet

| | | |
|--------------------------------------|-----------------------|--|
| Description | RELA | High-performance low expansion spar scale for very high accuracy applications Lengths up to 1130 mm. |
| | RSLA | High-performance stainless steel spar for very high accuracy applications with longer axis lengths. Lengths up to 5 m. |
| | <i>FASTRACK</i> /RTLA | Track-mounted hardened stainless steel tape scale for high performance motion control systems requiring easier and faster scale installation and field replacement. RTLA lengths up to 10 m, <i>FASTRACK</i> lengths up to 25 m. |
| | RTLA-S | Self-adhesive hardened stainless steel tape scale for high performance motion control systems requiring easiest installation. Lengths up to 5 m. |
| Accuracy | RELA | ±1 µm up to 1130 mm @ 20 °C |
| | 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 |
| | RTLA | ±5 µm/m @ 20 °C |
| RTLA-S | ±5 µm/m @ 20 °C | |
| Thermal expansion coefficient | RELA | ~ 0.6 µm/m/°C (0 °C to 30 °C) |
| | | <1.4 µm/m/°C (30 °C to 100 °C) |
| | RSLA | ~10.8 µm/m/°C |
| | <i>FASTRACK</i> /RTLA | ~10.6 µm/m/°C |
| RTLA-S | ~10.6 µm/m/°C | |

Angle absolute encoder version

There is currently no rotary (angle) encoder version of RESOLUTE with Panasonic serial communications. However, please contact your local Renishaw representative if you have an application.

General specifications

| | | |
|---|---------------|--|
| Power supply | 5 V ±10% | 1.25 W maximum (250 mA @ 5 V) |
| | | 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. |
| | Ripple | 200 mVpp maximum @ frequency up to 500 kHz maximum |
| Temperature | Storage | -20 °C to +80 °C |
| | Operating | 0 °C to +80 °C |
| Humidity | | Rated up to +40 °C, 95% relative humidity (non-condensing) |
| Sealing | | IP64 |
| Acceleration (Readhead) | Operating | 500 m/s ² BS EN 60068-2-7:1993 |
| Shock (Readhead) | Non-operating | 1000 m/s ² , 6 ms, ½ sine BS EN 60068-2-27:2009 |
| Maximum acceleration of scale with respect to readhead | | 2000 m/s ² |
| | | NOTE: This is the worst case figure that is correct for the slowest communications request rates. For faster request rates, the maximum acceleration of scale with respect to the readhead can be higher. For more details, please contact your local representative. |
| Vibration | Operating | 300 m/s ² max @ 55 Hz to 2000 Hz BS EN 60068-2-6:1996 |
| Mass | Readhead | 18 g |
| | Cable | 32 g/m |
| EMC compliance | | BS EN 61326-1: 2006 |
| Cable | | Double-shielded, outside diameter 4.7 ±0.2 mm |
| | | Flex life >20 x 10 ⁶ cycles at 20 mm bend radius |
| | | UL recognised component  |

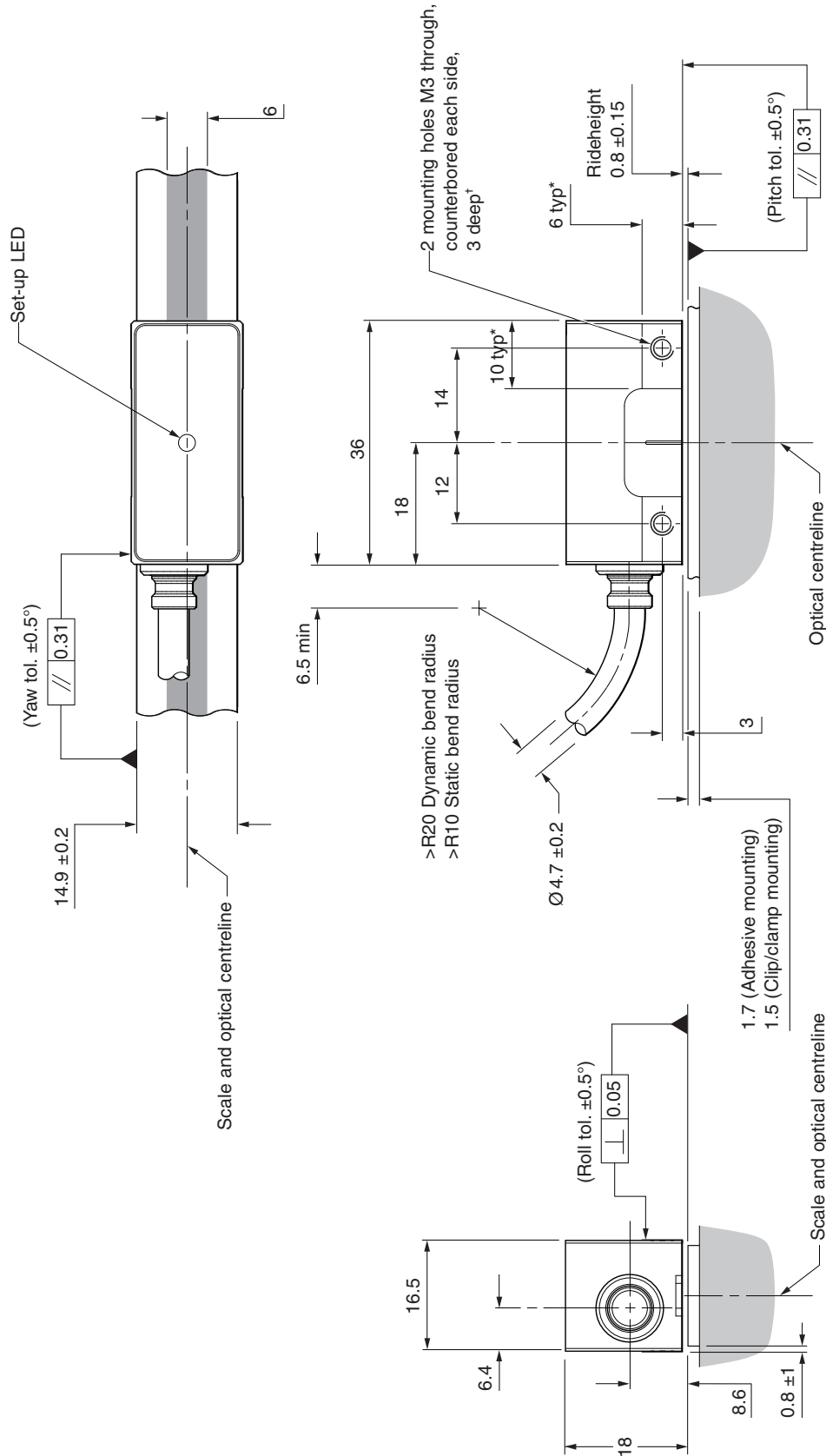
NOTE: For vacuum specifications refer to RESOLUTE UHV data sheet.

NOTE: There is no UHV side cable outlet readhead.

RESOLUTE installation drawing (on RSLA/RELA scale)

For detailed drawings, please refer to the RESOLUTE linear or rotary encoder installation guides

Dimensions and tolerances in mm

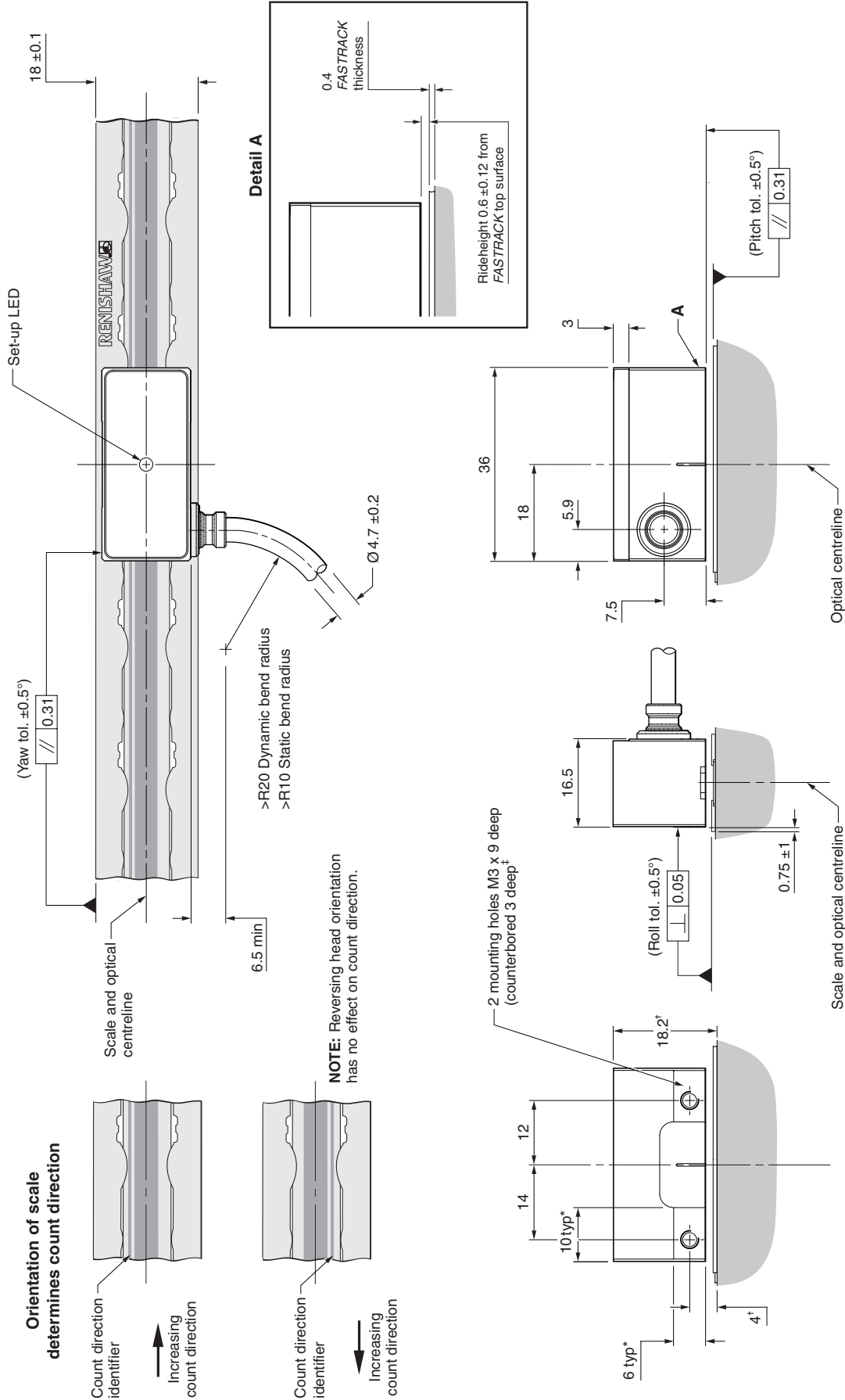


*Extent of mounting faces. *Recommended thread engagement 5 mm (8 including counterbore). Recommended tightening torque 0.5 to 1.0 Nm.

RESOLUTE installation drawing - side cable outlet
(on **FASTRACK/RTL** scale)

Dimensions and tolerances in mm

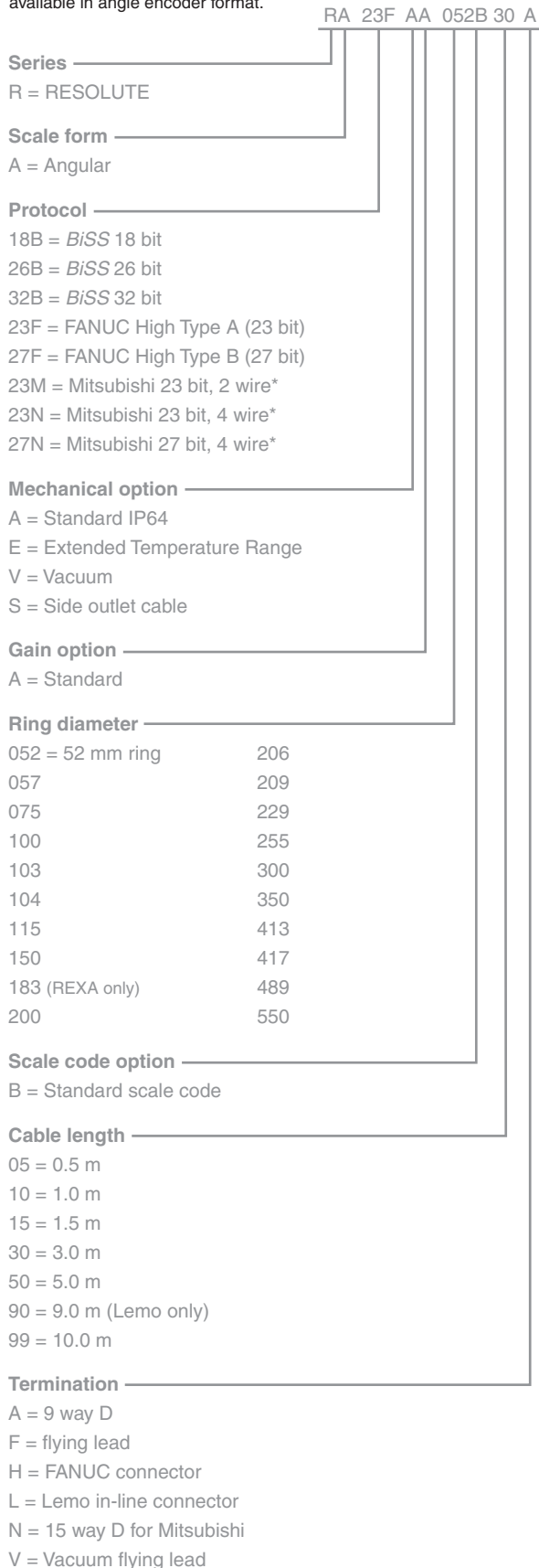
For detailed drawings, please refer to the RESOLUTE linear or rotary encoder installation guides



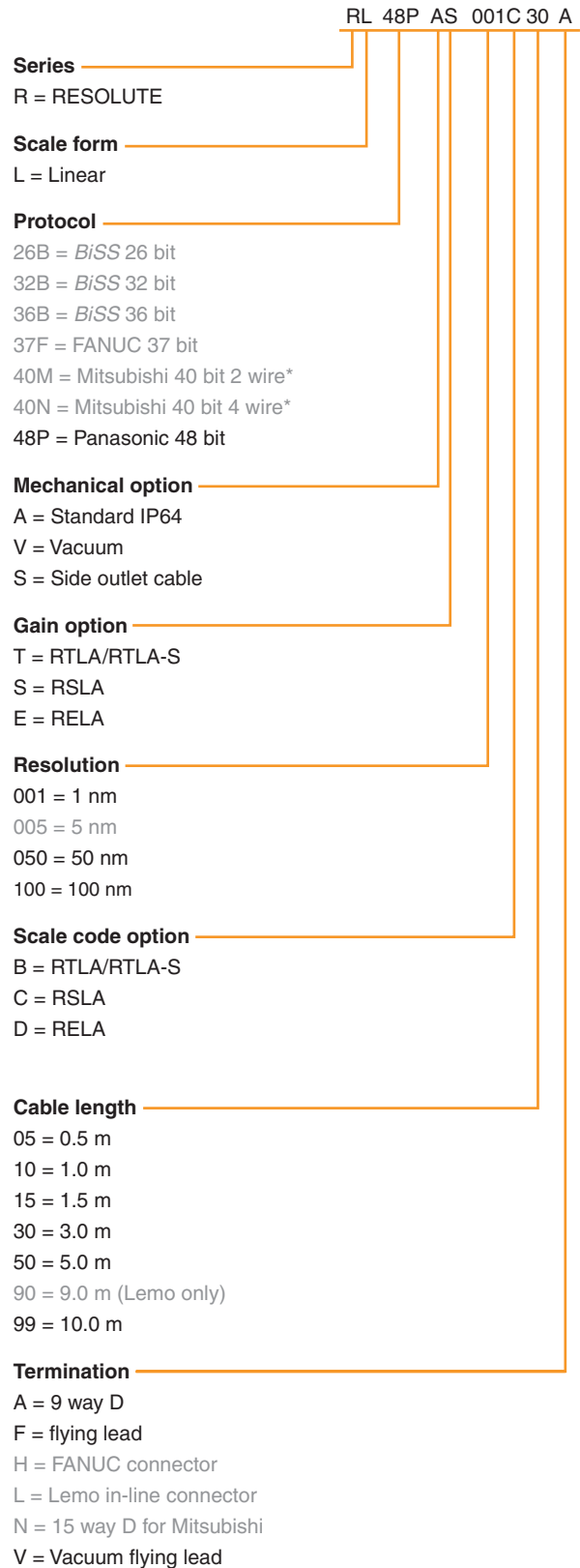
*Extent of mounting faces
†Dimensions from substrate surface.
‡Recommended thread engagement 5 min (8 mm including counterbore). Recommended tightening torque 0.5 to 1.0 Nm.

RESOLUTE angle nomenclature

NOTE: RESOLUTE with Panasonic serial comms is not currently available in angle encoder format.



RESOLUTE linear nomenclature

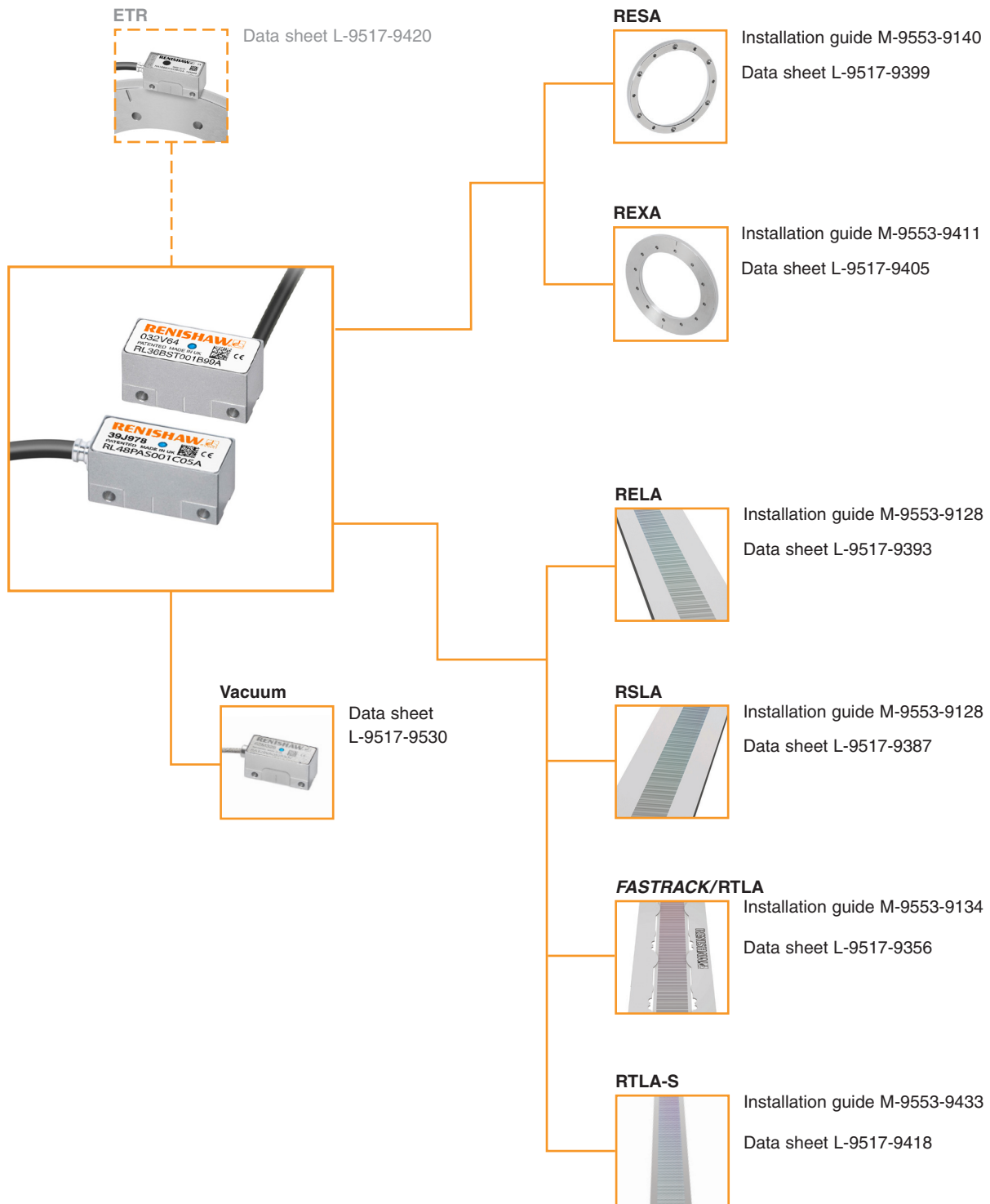


*2 wire: MR-J4 series 4 wire: MDS-D series

Greyed-out options not available for this variant.

RESOLUTE compatible products:

NOTE: RESOLUTE with Panasonic serial communications is not currently available in rotary (angle) encoder format.



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