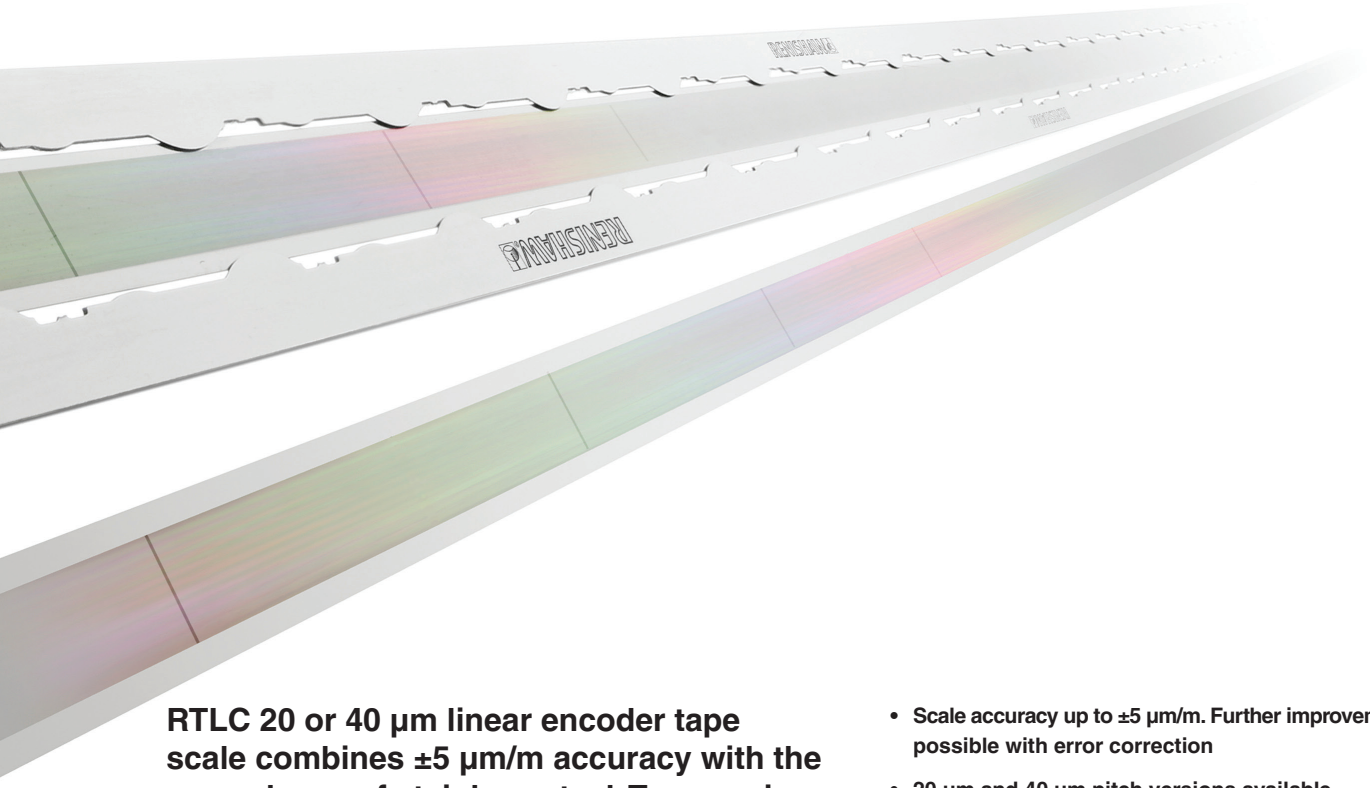
Data sheet
L-9517-9417-07-A

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RTLC incremental linear scale



RTLC 20 or 40 µm linear encoder tape scale combines ±5 µm/m accuracy with the ruggedness of stainless steel. Two versions are available: self-adhesive RTLC-S and RTLC for use with the revolutionary FASTRACK™ track system from Renishaw.

Designed for applications that demand high accuracy and an independent expansion coefficient with tape scale convenience, RTLC is read by Renishaw's compact and reliable VIONiC™, TONiC™ and QUANTiC™ readheads.

RTLC-S is laid onto the substrate using its self-adhesive backing tape. An application tool makes this a quick, simple and inexpensive process. A datum clamp is fitted at a single point to lock the scale to the substrate.

RTLC (without self-adhesive) is used with FASTRACK. In this case, the scale is held securely in place by two miniature, yet rugged, guide rails. Again, the scale is clamped in a single point to allow independent expansion with extremely low hysteresis, even over wide temperature ranges. If damaged, the scale can be pulled out of the guide rails and quickly replaced, even where access is limited, thus reducing machine downtime. This feature also makes the new linear encoder system ideal for large machines that need to be sectioned for transportation.

- **Scale accuracy up to ±5 µm/m. Further improvement possible with error correction**
- **20 µm and 40 µm pitch versions available**
- **'Cut to length' flexibility**
- **Compatible with VIONiC, TONiC and QUANTiC high-performance readheads**
- **RTLC scale expands at its own low thermal coefficient (10.1 ±0.2 µm/m/°C @ 20 °C)**
- **Use with FASTRACK for very low hysteresis**
- **FASTRACK guide rails are pre-aligned in reels for cut-to-suit flexibility**
- **Quick installation. FASTRACK adds fast scale replacement capability**
- **Scale can be locked to the substrate at a single datum point anywhere along the axis**
- **RTLC scale can bridge gaps in the FASTRACK up to 25 mm**
- **High solvent immunity**

General specifications

RTL* scale and FASTRACK carrier

Coefficient of thermal expansion (at 20 °C)		10.1 ±0.2 µm/m/°C
Temperature (system)	Storage	–20 °C to +70 °C
	Operating	0 °C to +70 °C
Humidity (system)		95% relative humidity (non-condensing) to IEC 60068-2-78
Shock (system)	Operating	500 m/s², 11 ms, ½ sine, 3 axes
Vibration (system)	Operating	Sinusoidal 100 m/s² maximum @ 55 to 2000 Hz, 3 axes

RTLC-S scale specifications

Self-adhesive mounted incremental tape scale

Description		Hardened and tempered martensitic stainless steel tape scale with self-adhesive backing tape for use with VIONiC, TONiC and QUANTiC readheads
Pitch	RTLC20-S	20 µm
	RTLC40-S / RTLC40H-S	40 µm
Form (height × width)		0.4 mm × 8 mm (including adhesive)
Accuracy (at 20 °C)	RTLC20-S / RTLC40H-S	±5 µm/m
	RTLC40-S	±15 µm/m
Linearity (at 20 °C)	RTLC20-S / RTLC40H-S	±2.5 µm/m achievable with two point error correction
	RTLC40-S	±3 µm/m achievable with two point error correction
Mass		12.9 g/m
Supplied lengths		20 mm to 10 m (available in increments of 10 mm) [1]

RTLC scale and FASTRACK carrier specifications

Incremental tape scale for use with the FASTRACK carrier self-adhesive mounting system

Description		Hardened and tempered martensitic stainless steel tape scale for use with the FASTRACK carrier and VIONiC, TONiC and QUANTiC readheads
Pitch	RTLC20	20 µm
	RTLC40 / RTLC40H	40 µm
Form (height × width)		0.4 mm × 18 mm (including adhesive)
Accuracy (at 20 °C)	RTLC20 / RTLC40H	±5 µm/m
	RTLC40	±15 µm/m
Linearity	RTLC20 / RTLC40H	±2.5 µm/m achievable with two point error correction
	RTLC40	±3 µm/m achievable with two point error correction
Mass	RTLC	12.2 g/m
	FASTRACK	24 g/m
Supplied lengths	RTLC	20 mm to 10 m (available in increments of 10 mm)
	FASTRACK	100 mm to 25 m (available in increments of 25 mm) [2]

[1] For lengths > 2 m, FASTRACK carrier with RTLC scale is recommended.

[2] 100 mm is the recommended minumum length for the FASTRACK carrier.

Reference mark

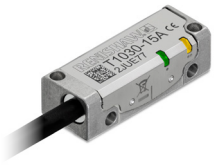
Type	Customer selected IN-TRAC™ reference mark, directly embedded into the incremental track. Bi-directional position repeatability.
Scale length ≤ 100 mm	Single reference mark at scale centre
Scale length > 100 mm	Reference marks at 50 mm spacing (first reference mark 50 mm from scale end)
Selection	Customer positioned selector magnet (A-9653-0143) for selecting desired IN-TRAC reference mark
Repeatability Operating	Unit of resolution repeatability (bi-directional) across full system rated speed and temperature ranges

Limit switches

Type	Magnetic actuators; with dimple triggers Q limit, without dimple triggers P limit (see scale installation drawings on pages 5 and 6)
Trigger point	The limit output is nominally asserted when the readhead limit switch sensor passes the limit magnet leading edge, but can trigger up to 3 mm before that edge
Mounting	Customer placed at desired locations
Repeatability	< 0.1 mm

NOTE: Limit magnets are available in 10 mm (standard), 20 mm, 25 mm, 50 mm and 60 mm lengths and provided on a back plate with self-adhesive tape.

Compatible readheads

	VIONiC	TONiC	QUANTiC
			
Scale type	RTLC20-S / RTLC20	RTLC20-S / RTLC20	RTLC40-S / RTLC40H-S / RTLC40 / RTLC40H
Pitch	20 µm	20 µm	40 µm
Outputs	Digital resolutions from 5 µm to 2.5 nm direct from the readhead	Analogue 1 Vpp. Digital resolutions from 5 µm to 1 nm when connected to a Ti, TD or DOP interface.	Analogue 1 Vpp. Digital resolutions from 10 µm to 50 nm direct from the readhead.
Sub-divisional error (typical)	< ±15 nm	±30 nm	< ±80 nm [1]
Jitter (RMS)	Down to 1.6 nm	Down to 0.5 nm	Down to 2.73 nm
Maximum speed	12 m/s	10 m/s	24 m/s [1]
UHV variant	No	Yes [2]	No
Functional Safety variant	No	Yes [3]	No

Readhead features

- Filtering optics and Auto Gain Control for high reliability and solid Lissajous signals.
- Dynamic signal processing ensures ultra-low sub-divisional error (SDE). Result: smoother scanning performance.
- High signal-to-noise ratio provides ultra-low jitter for optimum positional stability.
- Auto-phasing of IN-TRAC reference mark.
- Clocked outputs ensure optimised speed performance for all resolutions, for a wide variety of industry-standard controllers.
- DOP Dual output interfaces available to provide simultaneous analogue and digital outputs (TONiC systems only).

1 QUANTiC digital variants.

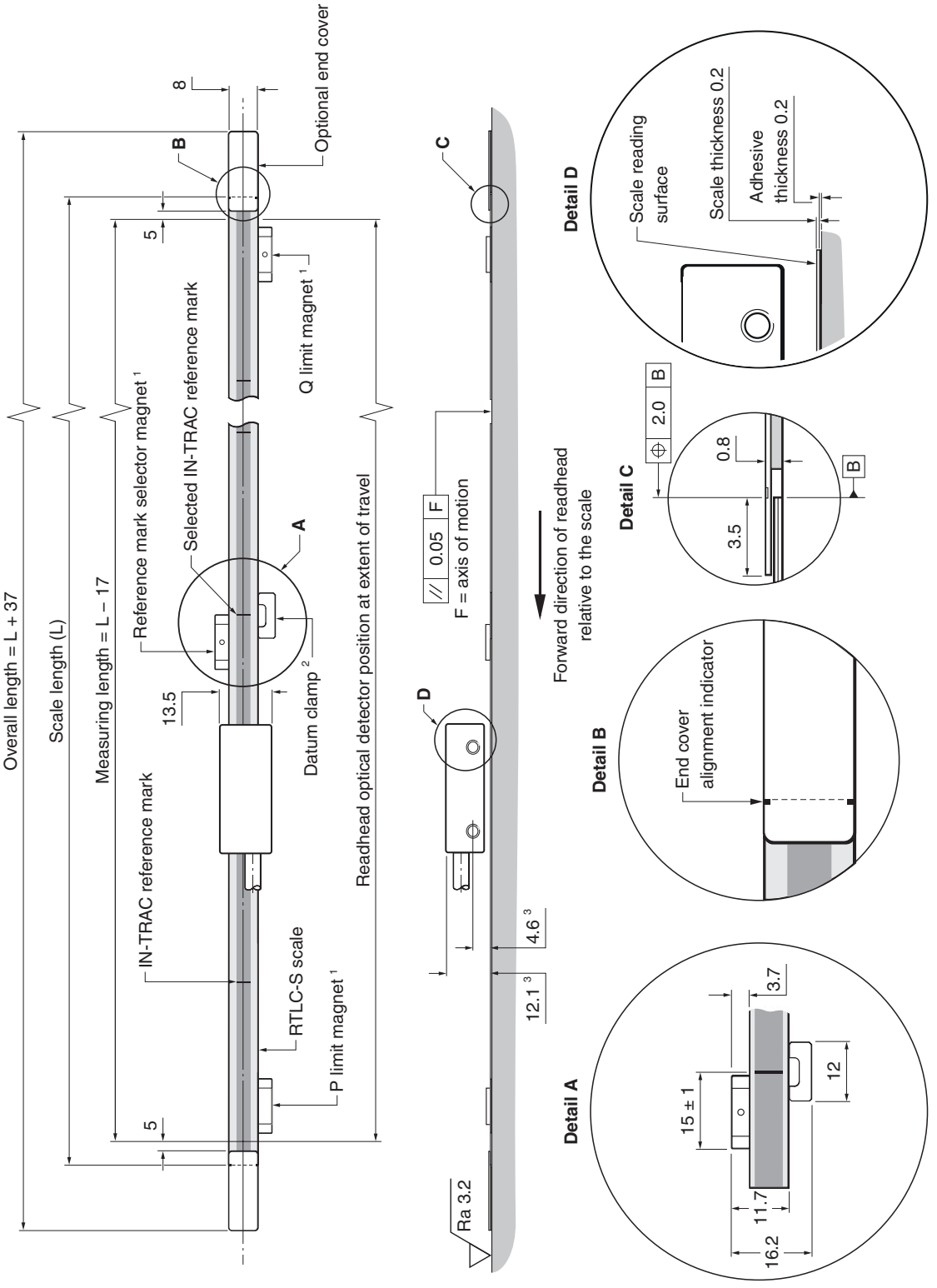
2 See *TONiC™ UHV encoder syste*m data sheet (Renishaw part no. L-9517-9426) for further details.

3 See *TONiC™ Functional Safety incremental encoder system* data sheet (Renishaw part no. L-9517-9878) for further details.

RTLC-S installation drawing

Dimensions and tolerances in mm





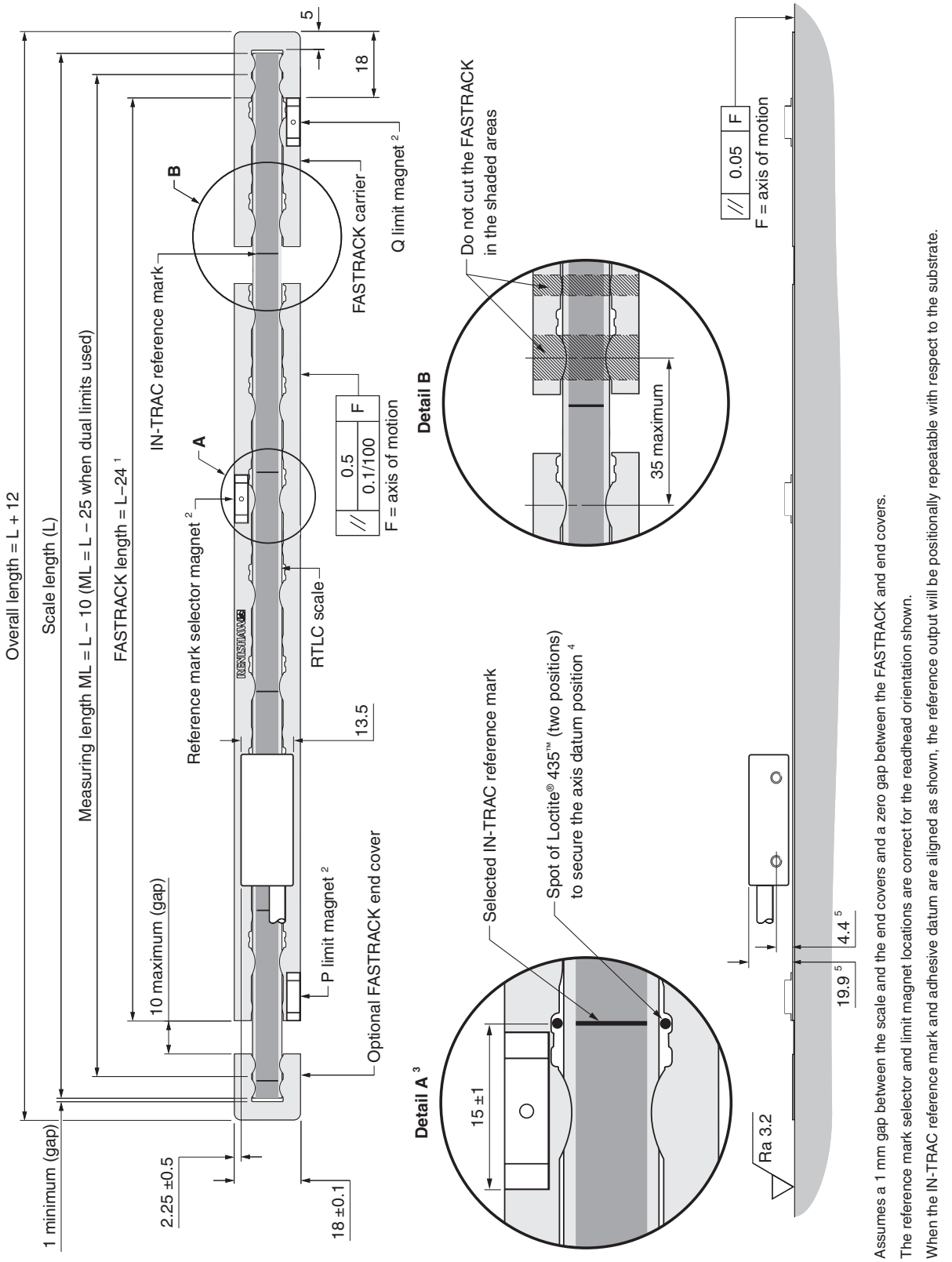
1 The reference mark selector and limit magnet locations are correct for the readhead orientation shown. Bolted reference mark selector and limit magnets are available. See the relevant system installation guide for further details.

2 Adhesive datum clamp method shown. For further details refer to the relevant encoder system installation guide.

3 Dimensions from the scale surface.

RTLC and FASTRACK installation drawing

Dimensions and tolerances in mm



1 Assumes a 1 mm gap between the scale and the end covers and a zero gap between the FASTRACK and end covers.

2 The reference mark selector and limit magnet locations are correct for the readhead orientation shown.

3 When the IN-TRAC reference mark and adhesive datum are aligned as shown, the reference output will be positionally repeatable with respect to the substrate.

4 For the alternative mechanical datum clamp method refer to the relevant encoder system installation guide.

5 Dimensions from the FASTRACK surface.

Scale and FASTRACK part numbers

RTLC-S

Stainless steel tape scale with self-adhesive backing tape.

Available lengths	Available in increments of	Reference mark spacing [1]	Distance from the scale end to the first reference mark	Part number (where xxxx is the length in cm) [2]		
				RTLC20-S (compatible with VIONiC and TONiC)	RTLC40-S (compatible with QUANTiC)	RTLC40H-S (compatible with QUANTiC)
20 mm to 90 mm	10 mm	Middle of the scale length	L/2 [3]	A-9715-xxxx	A-6567-xxxx	A-6670-xxxx
100 mm to 10 m	10 mm	50 mm	50 mm			

RTLC

Stainless steel tape scale for use with the FASTRACK carrier.

Available lengths	Available in increments of	Reference mark spacing [1]	Distance from the scale end to the first reference mark	Part number (where xxxx is the length in cm) [2]		
				RTLC20 (compatible with VIONiC and TONiC)	RTLC40 (compatible with QUANTiC)	RTLC40H (compatible with QUANTiC)
20 mm to 90 mm	10 mm	Middle of the scale length	L/2 [3]	A-9705-xxxx	A-6566-xxxx	A-6668-xxxx
100 mm to 10 m	10 mm	50 mm	50 mm			

FASTRACK carrier

Stainless steel carrier for use with the RTLC tape scale.

Available lengths	Available in increments of	Part number (where xxxx is the length in cm) [2]
100 mm to 25 m	25 mm [4]	A-9704-xxxx

1 Only the calibrated reference mark is bi-directionally repeatable.

2 Ordering A-9705-0070, for example, will result in a length of 70 cm of RTLC20.

3 L = scale length.

4 Part numbers for FASTRACK lengths ending in 25 mm are: A-9704-xxx3
Part numbers for FASTRACK lengths ending in 75 mm are: A-9704-xxx8

Accessory part numbers

Reference mark and limit magnets [1]

Part description	Part number	Product image
10 mm long reference mark selector magnet (Adhesive mounted)	A-9653-0143	
10 mm long bolted reference mark selector magnet (For use with RTLC-S only)	A-9653-0290	
10 mm long Q limit switch actuator magnet (Adhesive mounted)	A-9653-0139	
10 mm long bolted Q limit switch actuator magnet (For use with RTLC-S only)	A-9653-0291	
10 mm long P limit switch actuator magnet (Adhesive mounted)	A-9653-0138	
10 mm long bolted P limit switch actuator magnet (For use with RTLC-S only)	A-9653-0292	
Magnet applicator device (Aids positioning)	A-9653-0201	

Datum clamps

Part description	Part number	Product image
Self-adhesive datum clamp (For use with RTLC-S only)	A-9585-0028	
Loctite 435 adhesive – 20 g bottle (For securing axis datum position of RTLC in FASTRACK carrier or RTLC-S)	P-AD03-0012	
Dispensing tip for Loctite 435 adhesive	P-TL50-0209	
Bolted datum clamp (For use with RTLC and FASTRACK only)	A-9589-0077	

[1] Longer limit magnets are available. Contact your local Renishaw representative for more information.

RTLC/RTLC-S scale and FASTRACK accessories

Part description	Part number	Product image
Guillotine (For cutting RTLC/RTLC-S scale and FASTRACK carrier)	A-9589-0071	
Shears (For cutting RTLC/RTLC-S scale and FASTRACK carrier)	A-9589-0133	
RTLC-S scale applicator	A-9589-0115	
FASTRACK centre section removal tool (Removes centre section of FASTRACK when carrier has been mounted)	A-9589-0066	
FASTRACK separator assembly (Removes centre section of FASTRACK when carrier has been mounted – includes removable side panels for use when FASTRACK is mounted against a ledge or dowels)	A-9589-0122	
RTLC scale pulling tool (Aids installation of RTLC scale through the FASTRACK carrier)	A-9589-0420	
End cover kit containing two end covers (RTLC-S only)	A-9585-0035	
End cover kit containing two end covers (FASTRACK only)	A-9589-0058	

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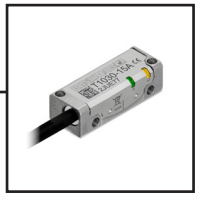
Compatible products



RTLC20
RTLC20-S



VIONiC readhead



TONiC readhead

RTLC40
RTLC40-S
RTLC40H
RTLC40H-S



QUANTiC readhead

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