Data sheet
L-9517-9862-01-C

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RKLC incremental linear scale

RKLC is a robust, 6 mm wide stainless steel encoder tape scale with a thickness of 0.15 mm. This allows the scale, when rigidly fixed to a machine axis, to become 'mastered' to the machine substrate, matching its thermal expansion coefficient and behaviour. Differential movement between the scale and the machine is thus minimised, improving the metrological performance that can be achieved with simple thermal system compensation.

Index positions are provided by *IN-TRAC*™ optical reference marks which are directly embedded into the incremental scale markings to enable auto-phasing. The combination of these compact reference marks with the narrow 6 mm wide scale facilitates encoder installation in space-constrained applications.

RKLC tape scale also combines ±5 µm/m accuracy with the mechanical and chemical ruggedness of stainless steel, easy coiling and cut-to-length convenience.

RKLC is installed onto the axis substrate by a self-adhesive backing tape and a simple application tool makes this a quick, straightforward and inexpensive process. The scale ends are rigidly fixed to the axis substrate by means of epoxy fastened end clamps, eliminating the need to drill holes.

- **Mastered scale matches the coefficient of thermal expansion of the substrate**
- **Narrow 6 mm wide scale suitable for confined spaces**
- **Suitable for partial arc applications**
- ***IN-TRAC* optical reference marks**
- **20 µm and 40 µm pitch versions available**
- **'Cut-to-length' convenience**
- **Up to 20 m lengths (> 20 m available on request)**
- **Compatible with VIONiC™, TONiC™ and QUANTiC™ high-performance readheads**
- **High solvent immunity**
- **Scale accuracy up to ±5 µm/m. Further improvement possible with error correction**

Compatible readheads

	VIONiC	TONiC	QUANTiC
			
Scale type	RKLC20-S	RKLC20-S	RKLC40-S / RKLC40H-S
Pitch	20 µm	20 µm	40 µm
Outputs	Digital resolutions from 5 µm to 2.5 nm direct from the readhead	Analogue 1 Vpp only. RS422 digital resolutions from 5 µm to 1 nm available when connected to a Ti, TD or DOP interface	Digital resolutions from 10 µm to 50 nm direct from the readhead
SDE (typical)	< ±15 nm	±30 nm	< ±50 nm
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
UHV variant	No	Yes*	No

*Scale mastering is not guaranteed after system bakeout.

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.
- Diagnostic tool compatibility for detailed information on encoder performance.
- DOP Dual output interfaces available to provide simultaneous analogue and digital outputs (TONiC systems only).

RKLC scale specifications*

Form (H × W)		0.15 mm × 6 mm including adhesive
Pitch	RKLC20-S	20 µm
	RKLC40-S / RKLC40H-S	40 µm
Accuracy (at 20 °C)	RKLC20-S / RKLC40H-S	±5 µm/m
	RKLC40-S	±15 µm/m
Linearity (at 20 °C)	RKLC20-S / RKLC40H-S	±2.5 µm/m achievable with two point error correction
	RKLC40-S	±3 µm/m achievable with two point error correction
Supplied length		20 mm to 20 m (> 20 m available on request)
Material		Hardened and tempered stainless steel
Mass		4.6 g/m
Coefficient of thermal expansion (at 20 °C)		Matches that of substrate material when scale ends fixed by epoxy mounted end clamps
Temperature	Storage	–20 °C to +80 °C
	Operating†	0 °C to +70 °C
	Installation	+10 °C to +35 °C
Humidity		95% relative humidity (non-condensing) to IEC 60068-2-78
Shock	Operating	500 m/s², 11 ms, ½ sine, 3 axes
Vibration	Operating	300 m/s² max @ 55 to 2000 Hz, 3 axes
End fixing		Epoxy mounted end clamps (A-9523-4015) Approved epoxy adhesive (A-9531-0342) Scale end movement typically < 1 µm‡

Reference mark

Type	*IN-TRAC* reference mark✧, directly embedded into incremental track, 50 mm (nominal) spacing
Selection	Single reference mark selection by magnetic actuator (A-9653-0143) customer positioned
Repeatability	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 RKLC scale installation drawings)
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

*For more information on partial arc applications refer to *RKL scale for partial arc applications* data sheet (Renishaw part no. L-9517-9897).
†To limit maximum tension in the scale $(CTE_{substrate} - CTE_{scale}) \times (T_{use\ extreme} - T_{install}) \leq 550$ µm/m where $CTE_{scale} = \sim 10.1$ µm/m/°C.
‡Ensure that scale and end clamps have been installed following the installation process described in the relevant RKLC installation guide.
✧Scale available with no *IN-TRAC* reference mark; see scale part numbers for details.

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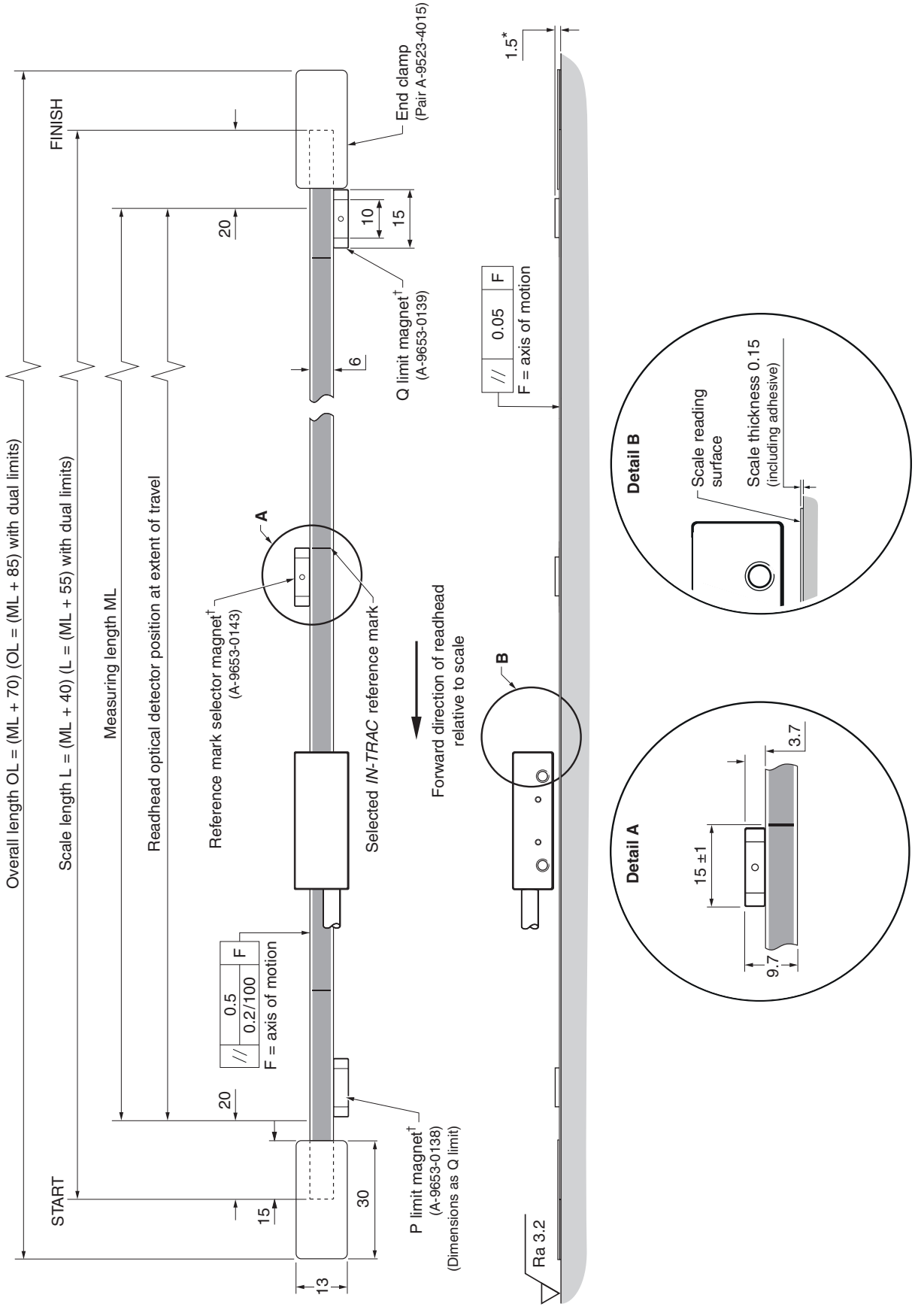
RKLC scale installation drawing

Dimensions and tolerances in mm



*Dimensions from substrate surface. †Bolted reference mark selector magnet and limit magnet available. See relevant system installation guide for further details.
NOTE: The reference mark selector and limit actuator locations are correct for the readhead orientation shown.

Scale part numbers

RKLC-S

Stainless steel tape scale with self-adhesive backing tape.

Available lengths	Available in increments of	Reference mark spacing*	Distance from scale end to first reference mark	Part number (where xxxx is the length in cm)†		
				RKLC20-S (Compatible with VIONiC and TONiC)	RKLC40-S (Compatible with QUANTiC)	RKLC40H-S (Compatible with QUANTiC)
20 mm to 100 mm	10 mm	Middle of scale length	Middle of scale length	A-6663-xxxx	A-6665-xxxx	A-6685-xxxx
> 100 mm to 20 m‡	10 mm	50 mm	50 mm			

RKLR-S (no reference mark)

Stainless steel tape scale with self-adhesive backing tape.

Available lengths	Available in increments of	Part number (where xxxx is the length in cm)†	
		RKLR20-S (Compatible with VIONiC and TONiC)	RKLR40-S (Compatible with QUANTiC)
20 mm to 20 m‡	10 mm	A-6753-xxxx	A-6744-xxxx

*Only calibrated reference mark is bi-directionally repeatable.
†Ordering A-6663-0070 for example, will result in a 70 cm length of RKLC20-S.
‡Lengths greater than 20 m available on request.

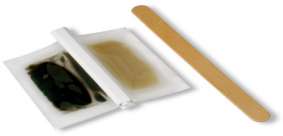
Accessory part numbers

Reference mark and limit magnets*

Part description	Part number	Product image
Reference mark selector magnet – Adhesive mounted	A-9653-0143	
Bolted reference mark selector magnet	A-9653-0290	
Q limit switch actuator magnet – Adhesive mounted	A-9653-0139	
Bolted Q limit switch actuator magnet	A-9653-0291	
P limit switch actuator magnet – Adhesive mounted	A-9653-0138	
Bolted P limit switch actuator magnet	A-9653-0292	
Magnet applicator device (Aids positioning)	A-9653-0201	
Guillotine (For cutting RKLC scale)	A-9589-0071	
RKLC-S side mount scale applicator (Compatible with all VIONiC, TONiC and QUANTiC side mount systems)	A-6547-1912	
RKLC-S top mount scale applicator (Required for TONiC top mounted systems only)	A-6547-1915	

* Longer limit magnets are available. Contact your local Renishaw representative for more information.

End clamp accessories

Part description	Part number	Product image
RGC-F End clamp kit – epoxy mounted. The RGC-F end clamps master the RKLC scale to the substrate material to match its thermal expansion.	A-9523-4015	
End clamp kit, epoxy mounted, narrow The end clamps master the RKLC scale to the substrate material to match its thermal expansion.	A-9523-4027	
RGG-2 (2 part epoxy) The RGG-2 epoxy is recommended for the mounting of end clamps.	A-9531-0342	

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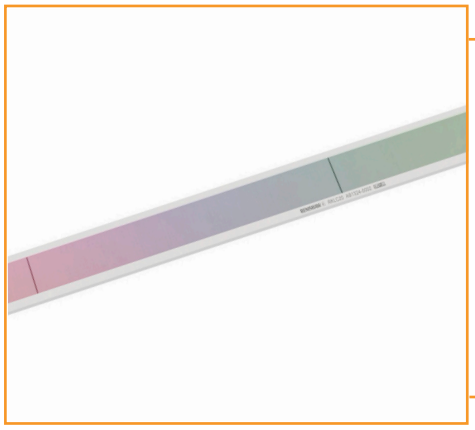
Compatible products



RKLC20-S

VIONiC

TONiC

RKLC40-S
RKLC40H-S

QUANTiC

For worldwide contact details, visit www.renishaw.com/contact

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