Data sheet
L-9517-9862-02-A

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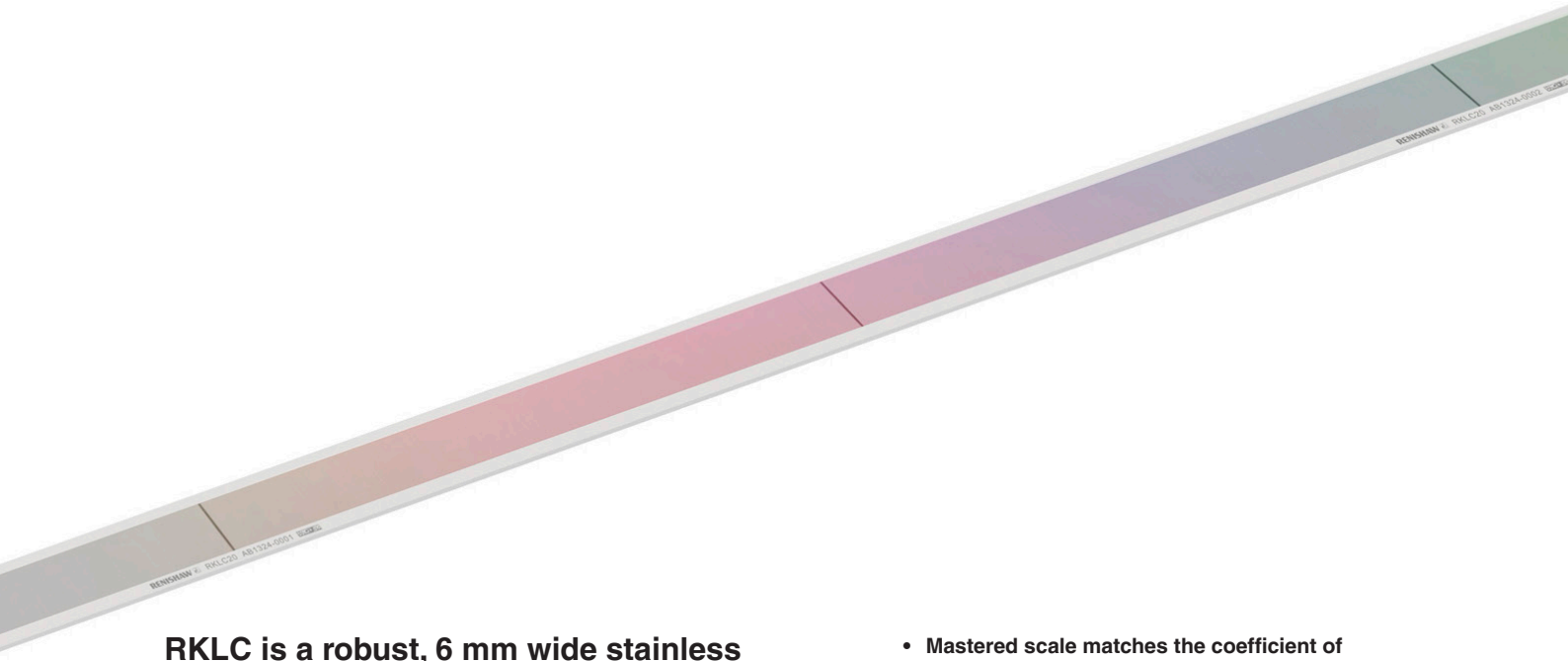
RKLC incremental linear scale



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**

RKLC-S scale specifications

Self-adhesive mounted incremental tape scale [1]

Description		Hardened and tempered stainless steel tape scale with self-adhesive backing tape for use with VIONiC, TONiC and QUANTiC readheads
Pitch	RKLC20-S	20 µm
	RKLC40-S / RKLC40H-S	40 µm
Form (height × width)		0.15 mm × 6 mm (including adhesive)
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
Mass		4.6 g/m
Supplied lengths		20 mm to 20 m (available in increments of 10 mm) [2]
Coefficient of thermal expansion (at 20 °C)		10.1 ± 0.2 µm/m/°C
Temperature	Storage	–20 °C to +80 °C
	Operating [3]	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	Sinusoidal 300 m/s² maximum @ 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 [4]

1 RKLC is suitable for partial arc applications. For more information on partial arc applications refer to *RKL scale for partial arc applications* data sheet (Renishaw part no. L-9517-9897).

2 > 20 m lengths available on request.

3 To limit maximum tension in the scale $(CTE_{substrate} - CTE_{scale}) \times (T_{use\ extreme} - T_{instal}) \leq 550$ µm/m where CTE_{scale} = ~ 10.1 µm/m/°C.

4 Ensure that scale and end clamps have been installed following the installation process described in the relevant RKLC installation guide.

Reference mark

Type	Customer selected IN-TRAC reference mark [1], 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

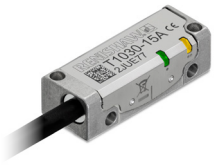
Limit switches

Type	Magnetic actuators; with dimple triggers Q limit, without dimple triggers P limit (see RKLC installation drawing on pages 5)
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.

[1] Scale available with no IN-TRAC reference marks; see scale part numbers on page 6 for details.

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. 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.

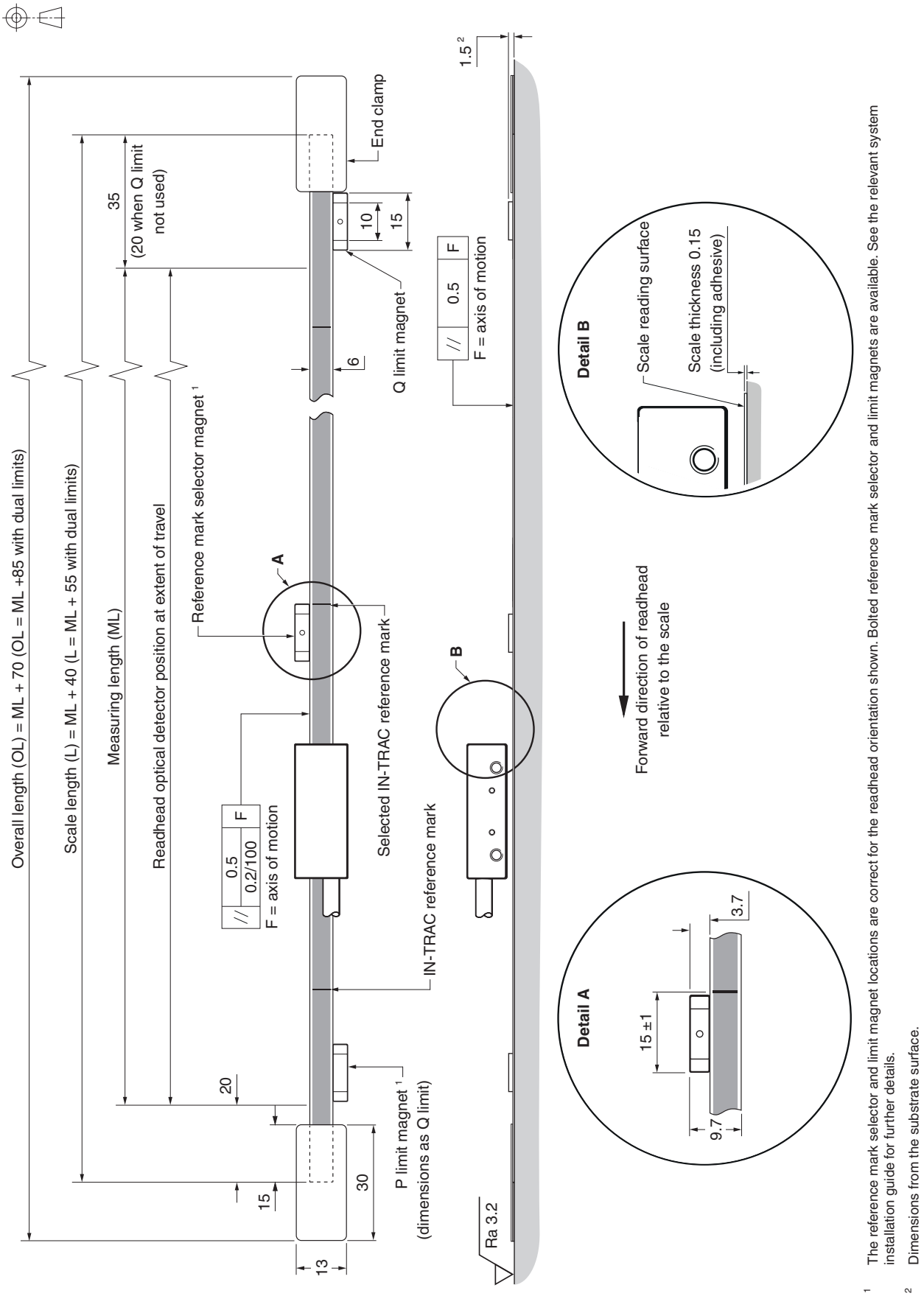
NOTE: RKLC scale mastering is not guaranteed after system bakeout.

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

NOTE: RKLC scale cannot be used with Functional Safety certified TONiC readheads.

RKLC-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 Dimensions from the substrate surface.

Scale part numbers

RKLC-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]		
				RKLC20-S (compatible with VIONiC and TONiC)	RKLC40-S (compatible with QUANTiC)	RKLC40H-S (compatible with QUANTiC)
20 mm to 90 mm	10 mm	Middle of the scale length	L/2 [3]	A-6663-xxxx	A-6665-xxxx	A-6685-xxxx
100 mm to 20 m [4]	10 mm	50 mm	50 mm			

RKLR-S (no IN-TRAC reference marks)

Stainless steel tape scale with self-adhesive backing tape.

Available lengths	Available in increments of	Part number (where xxxx is the length in cm) [2]	
		RKLR20-S (compatible with VIONiC and TONiC)	RKLR40-S (compatible with QUANTiC)
20 mm to 20 m [4]	10 mm	A-6753-xxxx	A-6744-xxxx

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

2 Ordering A-6663-0070, for example, will result in a length of 70 cm of RKLC20-S.

3 L = scale length.

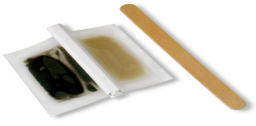
4 Lengths greater than 20 m are available on request.

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	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	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	A-9653-0292	
Magnet applicator device (Aids positioning)	A-9653-0201	

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. Supplied as a pair)	A-9523-4015	
Narrow end clamp kit - epoxy mounted (The narrow end clamps master the RKLC scale to the substrate material to match its thermal expansion. Supplied as a pair)	A-9523-4027	
RGG-2 two part epoxy (The RGG-2 epoxy is recommended for the mounting of the end clamps)	A-9531-0342	

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

RKLC scale accessories

Part description	Part number	Product image
Guillotine (For cutting RKLC scale)	A-9589-0071	
Shears (For cutting RKLC scale)	A-9589-0133	
RKLC side mount scale applicator (Compatible with all VIONiC, TONiC, and QUANTiC readhead side mounted systems)	A-6547-1912	
RKLC top mount scale applicator (Required for TONiC readhead top mounted systems only)	A-6547-1915	

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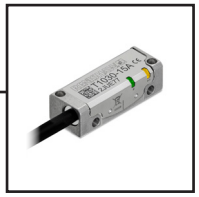
Compatible products

RKLC20-S
RKLR20-S

VIONiC readhead



TONiC readhead

RKLC40-S
RKLC40H-S
RKLR40-S

QUANTiC readhead

www.renishaw.com/contact

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