



HEIDENHAIN



Preliminary Product
Information

LIC 4000 Series

Exposed Absolute Linear
Encoders

April 2009



Specifications	LIC 4015 ¹⁾	LIC 4017	
Measuring standard	Steel scale tape with METALLUR absolute code track		
Coefficient of linear expansion	Depends on the mounting surface	$\alpha_{\text{therm}} \approx 10 \times 10^{-6} \text{ K}^{-1}$	
Accuracy grade	$\pm 5 \mu\text{m}$	$\pm 15 \mu\text{m}$ or $\pm 5 \mu\text{m}$ after linear length-error compensation in the subsequent electronics	
Measuring length ML* in mm	Up to 27 040 mm	Up to 6 040 mm	
Mounting	Steel scale-tape drawn into aluminum extrusions and tensioned	Steel scale-tape drawn into aluminum extrusions and fixed at center	
Absolute position values	EnDat 2.2		
Ordering designation	EnDat 22		
Resolution	0.001 μm (1 nm)		
Power supply	3.6 to 14 V		
Power consumption of encoder (without cable loss)	$\leq 1000 \text{ mW}$ ($\leq 250 \text{ mA}$ at 3.6 V)		
Electrical connection	Cable 3 m with 8-pin M12 connector (male)		
Traversing speed	$\leq 480 \text{ m/min}$		
Vibration 55 to 2000 Hz Shock 11 ms	$\leq 200 \text{ m/s}^2$ (EN 60068-2-6) $\leq 500 \text{ m/s}^2$ (EN 60068-2-27)		
Operating temperature	0 °C to 50 °C		
Protection	IP 40		
Weight	Scanning head Scale tape Set of parts Scale-tape carrier Cable Connector	16 g (without connecting cable) 31 g/m $80 \text{ g} + n^2 \cdot 27 \text{ g}$ 187 g/m 20 g/m 32 g	16 g (without connecting cable) 31 g/m 20 g 68 g/m 20 g/m 32 g

* Please select when ordering

¹⁾ In development; dimensions only apply for LIC 4017

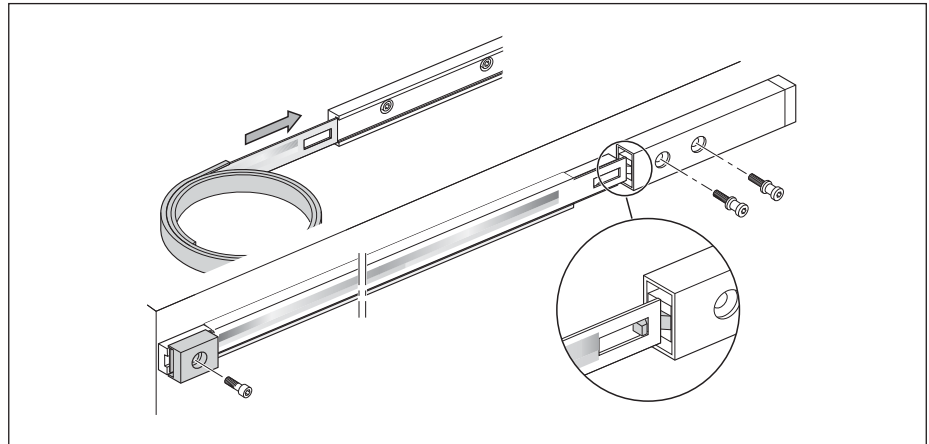
²⁾ $n = 1$ for ML 3 140 to 5 040 mm; $n = 2$ for ML 5 140 to 7 040 mm; etc.

Mechanical Design Types and Mounting

Exposed linear encoders consist of two components: the scanning head and the scale or scale tape. They are positioned to each other solely by the machine guideway.

LIC 4015 scale

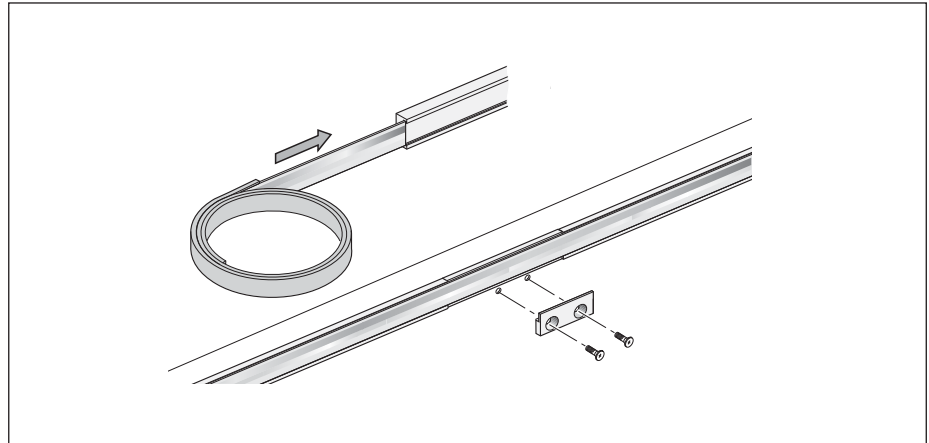
The scale carrier sections are secured to the bearing surface with screws or with PRECIMET adhesive film. Then the one-piece steel scale tape is pulled into the carrier, **tensioned in a defined manner**, and **fixed at its ends** to the machine base. The LIC 4x5 therefore shares the thermal behavior of its mounting surface.



LIC 4015 scale

LIC 4017 scale

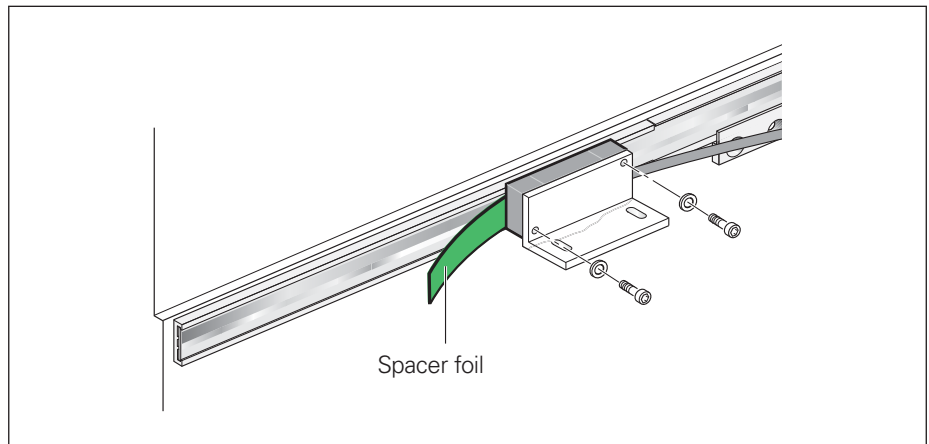
The scale carrier sections are fixed to the bearing surface with PRECIMET adhesive mounting film; the one-piece scale tape is pulled in and **the midpoint is fixed** to the machine bed. This mounting method allows the scale to expand freely at both ends and ensures a defined thermal behavior.



LIC 4017 scale

LIC 4000 scanning head

There are three options for mounting the scanning head (see Dimensions). A spacer foil makes it quite easy to set the gap between the scanning head and the scale or scale tape.

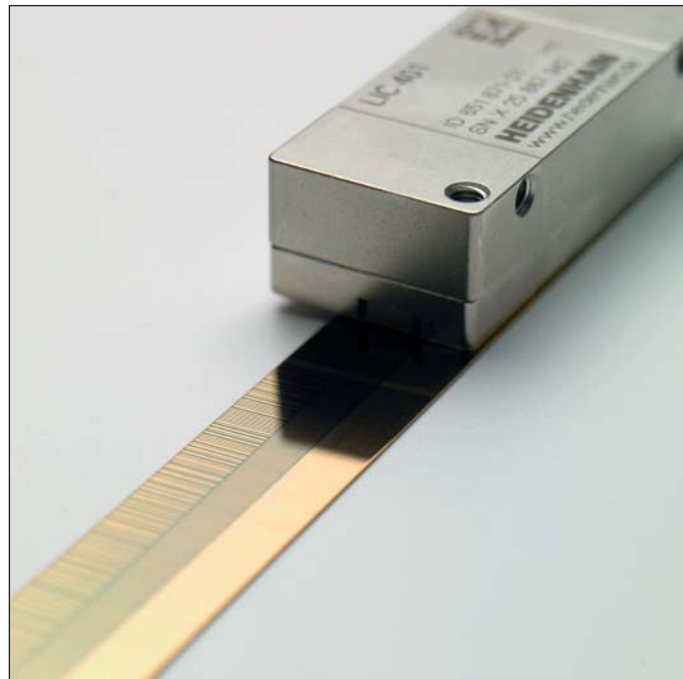


Scanning head

Linear Encoders for Absolute Position Measurement

Linear encoders of the LIC 4000 series are exposed **absolute linear encoders** for **measuring lengths up to 27 m**. They have the same dimensions as the incremental LIDA 400.

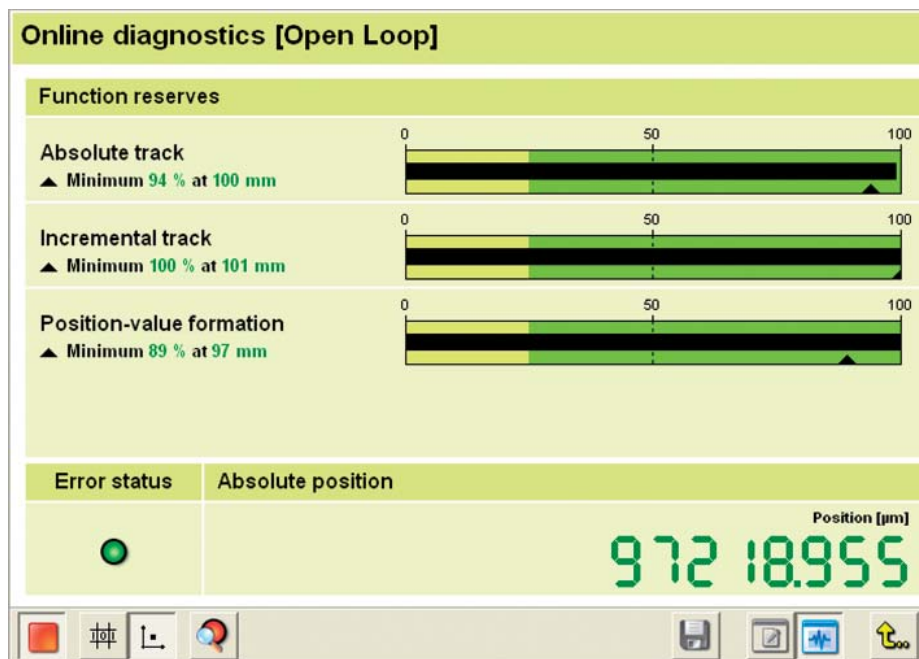
With the **absolute measuring method**, the position value is available from the encoder immediately upon switch-on and can be called at any time by the subsequent electronics. There is no need to move the axes to find the reference position. The absolute position information is read **from the scale-tape graduation**, which is formed from a serial absolute code structure.



Adjustment and Diagnosis

Adjustment is quite easy with the Adjusting and Testing package based on valuation numbers. The valuation numbers provide the current state of the encoder and ascertain the encoder's "functional reserves."

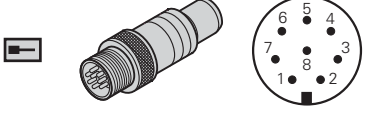


Cyclical output of the valuation numbers is also possible during normal operation in order to evaluate or diagnose the encoder functions.



Screen showing the valuation numbers as functional reserves (e.g. with IK 215)

Electrical Connection





Pin Layout

8-pin coupling M12								
								
	Power supply				Absolute position values			
	2	8	1	5	3	4	7	6
	$U_P^{1)}$	U_P	$0V^{1)}$	$0V$	DATA	$\overline{\text{DATA}}$	CLOCK	$\overline{\text{CLOCK}}$
	Blue	Brown/Green	White	White/Green	Gray	Pink	Violet	Yellow

Cable shield connected to housing; U_P = power supply voltage

¹⁾ For parallel supply lines

Connecting Cables

PUR connecting cables		8-pin: $[(4 \times 0.14 \text{ mm}^2) + (4 \times 0.34 \text{ mm}^2)] \text{ } \varnothing 6 \text{ mm}$
Complete with 8-pin M12 connector (female) and 8-pin M12 coupling (male)		368330-xx
Complete with 8-pin M12 connector (female) and 15-pin D-sub connector (female) for IK 220		533627-xx
Complete with 8-pin M12 connector (female) and 15-pin D-sub connector (male) for IK 215		524599-xx
With one M12 connector (female) 8-pin		634265-xx

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5

83301 Traunreut, Germany

☎ +49 (8669) 31-0

FAX +49 (8669) 5061

E-mail: info@heidenhain.de

www.heidenhain.de

For more information

- Catalog: *Exposed Linear Encoders*
- *EnDat* Technical Information