



HEIDENHAIN



Product Information

LIP 471

LIP 481

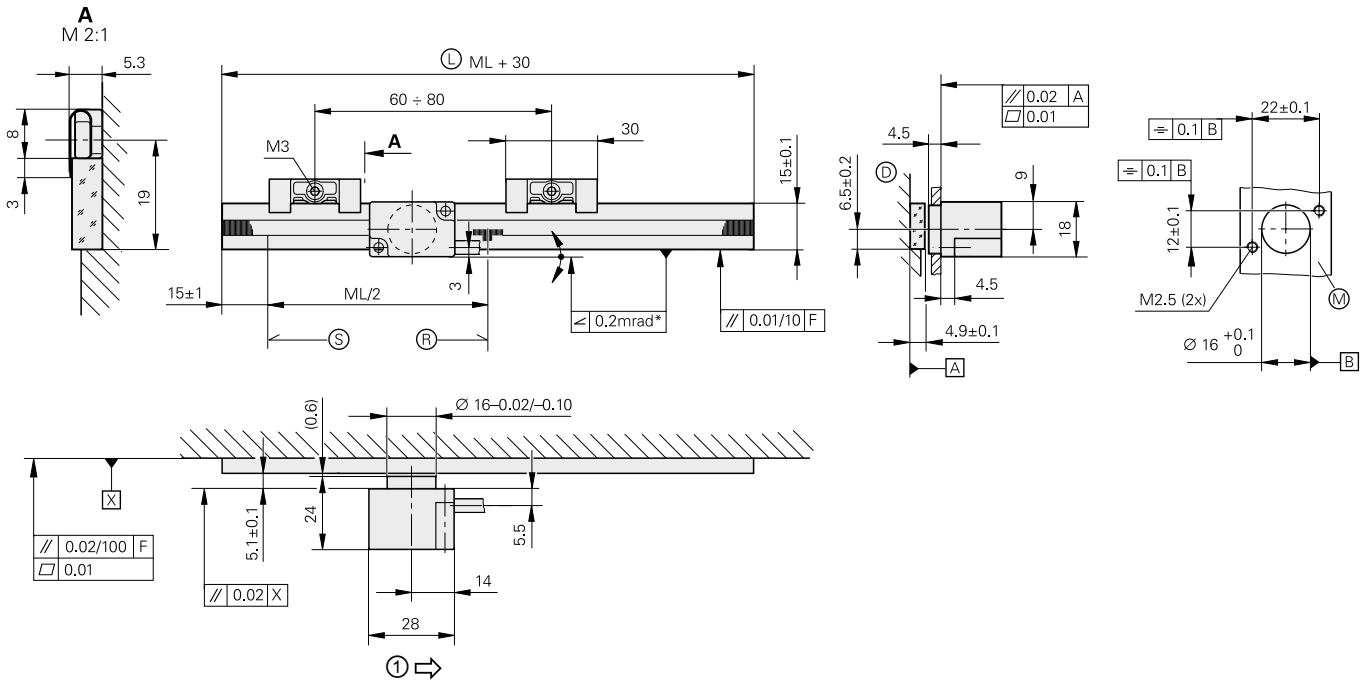
Exposed Linear Encoders

LIP 471, LIP 481

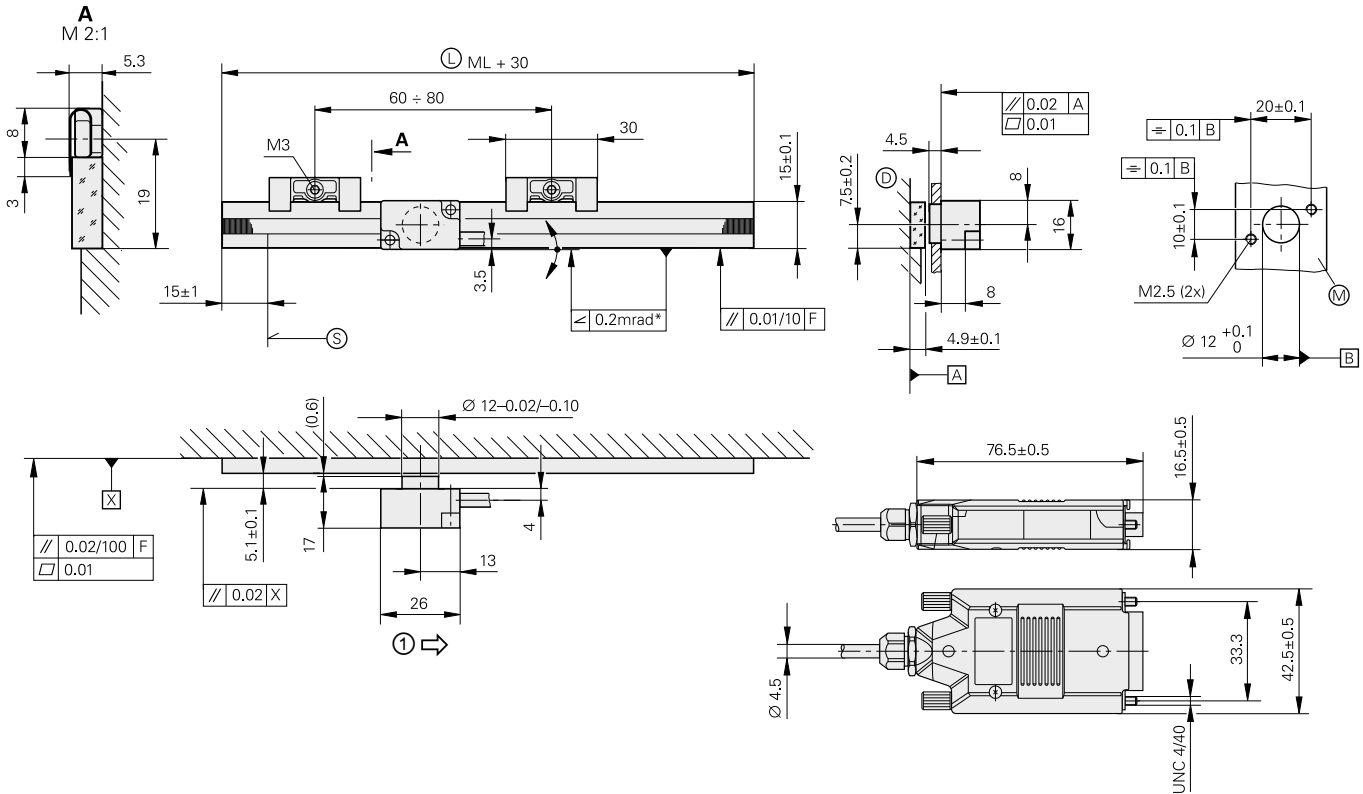
Incremental linear encoders with very high accuracy

- For limited installation space
- For measuring steps of 1 μm to 0.005 μm
- Measuring standard is fastened by fixing clamps
- Versions for high and ultrahigh vacuum are available (see Product Information LIP 471V/LIP 481U)

LIP 471 R/LIP 481 R



LIP 471 A/LIP 481 A



mm



Tolerancing ISO 8015

ISO 2768 - m H

< 6 mm: ±0.2 mm

* = Max. change during operation

F = Machine guideway

L = Scale length

⊙ = Shown without fixing clamps

Ⓢ = Beginning of measuring length ML

Ⓡ = Reference-mark position on LIP 4x1 R

Ⓜ = Mounting surface for scanning head

1 = Direction of scanning unit motion for output signals as per interface description



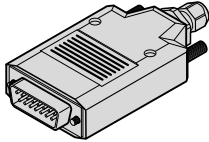

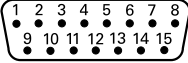




	LIP 481	LIP 471						
Measuring standard* Coefficient of linear expansion	DIADUR phase grating on Zerodur glass ceramic or glass; grating period 4 μm $\alpha_{\text{therm}} = (0 \pm 0.1) \cdot 10^{-6} \text{ K}^{-1}$ (Zerodur glass ceramic) $\alpha_{\text{therm}} \approx 8 \cdot 10^{-6} \text{ K}^{-1}$ (glass)							
Accuracy grade*	±1 μm (higher accuracy grades available on request) ±0.5 μm							
Baseline error	≤ ±0.175 μm/5 mm							
Measuring length ML* in mm	70	120	170	220	270	320	370	420
Reference marks*	LIP 4x1 R: One at midpoint of measuring length LIP 4x1 A: None							
Interface	~ 1 V _{PP}		□ TTL					
Integrated interpolation* Signal period	– 2 μm		5-fold 0.4 μm		10-fold 0.2 μm			
Cutoff frequency –3 dB	≥ 300 kHz		–					
Scanning frequency* Edge separation <i>a</i>	–		≤ 200 kHz ≥ 0.220 μs	≤ 100 kHz ≥ 0.465 μs	≤ 50 kHz ≥ 0.950 μs	≤ 100 kHz ≥ 0.220 μs	≤ 50 kHz ≥ 0.465 μs	≤ 25 kHz ≥ 0.950 μs
Traversing speed	≤ 36 m/min	≤ 24 m/min	≤ 12 m/min	≤ 6 m/min	≤ 12 m/min	≤ 6 m/min	≤ 3 m/min	
Interpolation error Position noise RMS	±7 nm 2 nm (450 kHz) ¹⁾							
Electrical connection*	Cable 0.5 m, 1 m, 2 m, or 3 m with 15-pin D-sub connector; interface electronics in the connector							
Cable length	See the interface description in the <i>Exposed Linear Encoders</i> brochure, but ≤ 30 m (with HEIDENHAIN cable)							
Power supply	DC 5 V ±0.25 V							
Current consumption	< 190 mA		< 200 mA (without load)					
Vibration 55 Hz to 2000 Hz Shock 11 ms	≤ 200 m/s ² (EN 60068-2-6) ≤ 500 m/s ² (EN 60068-2-27)							
Operating temperature	0 °C to 40 °C							
Mass	Scanning head	LIP 4x1 A: 25 g, LIP 4x1 R: 50 g (each without cable)						
	Linear scale	5.6 g + 0.2 g/mm measuring length						
	Connecting cable	38 g/m						
	Connector	140 g						

* Please select when ordering

¹⁾ At –3 dB cutoff frequency of the subsequent electronics

Electrical connection

Pin layout

15-pin D-sub connector Interface electronics integrated														
  														
	Power supply				Incremental signals						Other signals			
	4	12	2	10	1	9	3	11	14	7	5/6/8/15	13	/	
 1V _{PP}	U _P	Sensor U _P	0V	Sensor 0V	A+	A-	B+	B-	R+	R-	Vacant	Vacant	Vacant	
 TTL	U _P	Sensor U _P	0V	Sensor 0V	U _{a1}	\overline{U}_{a1}	U _{a2}	\overline{U}_{a2}	U _{a0}	\overline{U}_{a0}	Vacant	\overline{U}_{aS}	Vacant	
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	/	Violet	Yellow	

Cable shield connected to housing; U_P = Power supply voltage

Sensor: The sense line is connected in the encoder with the corresponding power supply line.

Vacant pins or wires must not be used!

HEIDENHAIN

DR. JOHANNES HEIDENHAIN GmbH

Dr.-Johannes-Heidenhain-Straße 5

83301 Traunreut, Germany

☎ +49 8669 31-0

FAX +49 8669 32-5061

E-mail: info@heidenhain.de

www.heidenhain.de

This Product Information document supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information valid when the contract is made.



Further information:

Comply with the requirements described in the following documents to ensure the correct operation of the encoder:

- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Exposed Linear Encoders* 208960-xx
- Product Information: *LIP 481V, LIP 481 U* 1037419-xx