HEIDENHAIN

Product Information

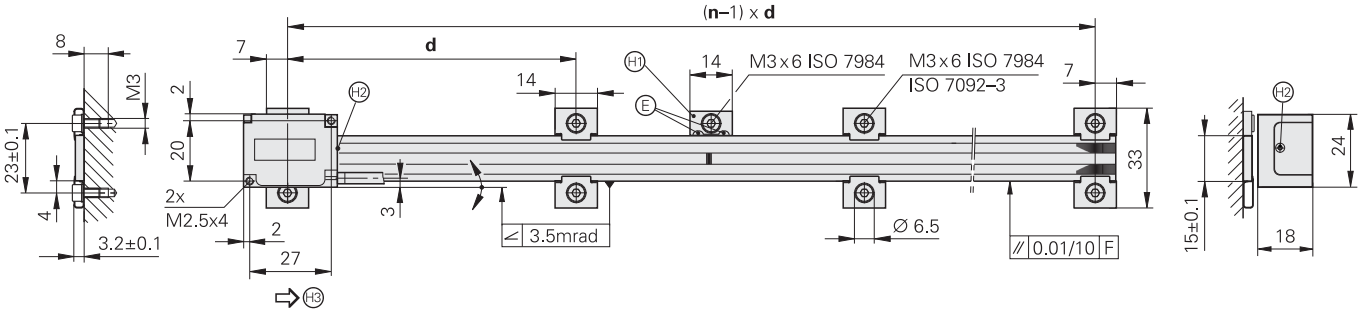
LIP 281

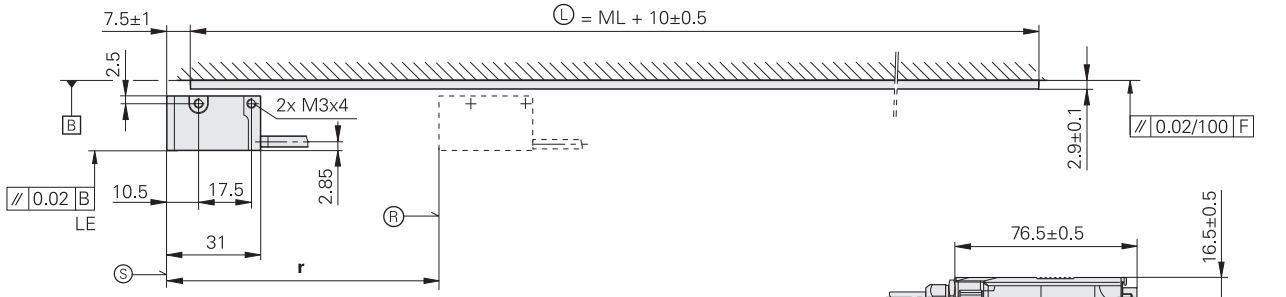
Exposed Linear Encoder

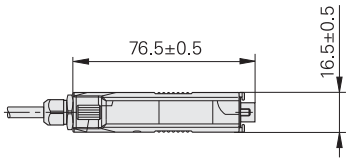
February 2012

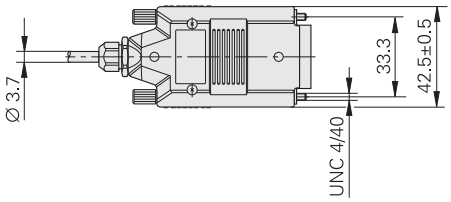
LIP 281 Series

Incremental linear encoders for very high accuracy and high position stability
- **For measuring steps of 0.001 µm (1 nm) and smaller**
- **For high traversing speeds and large measuring lengths**









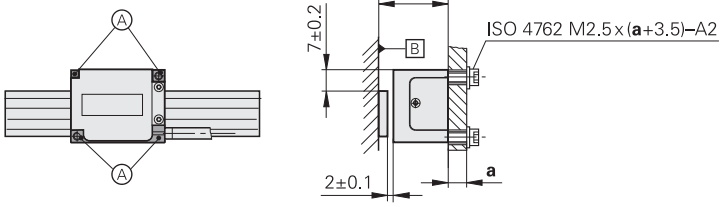
Distance r depends on the scale variant (standard: r = ML/2)
Quantity n of pairs of fixing clamps (mounting with fixing clamps at both ends)

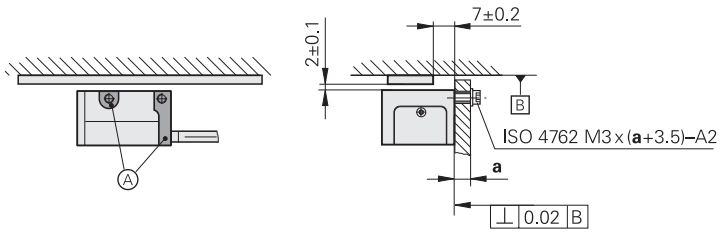
ML	n
ML ≤ 70	2
70 < ML ≤ 100	3
100 < ML ≤ 200	4
...	...

Distance d between fixing clamps:

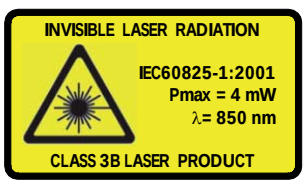
$$\mathbf{d} = \frac{ML - 4}{\mathbf{n} - 1}$$

Possibilities for mounting the scanning head





mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm



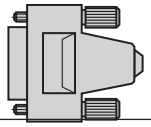
F = Machine guideway
Ⓡ = Reference mark position
Ⓛ = Scale length
Ⓢ = Beginning of measuring length (ML)
Ⓔ = Adhesive according to Mounting Instructions
Ⓐ = Mounting surface
Ⓗ1 = Mounting element for hard adhesive bond in order to define the thermal fixed point
Ⓗ2 = Max. protrusion of screw head 0.5 mm
Ⓗ3 = Direction of scanning unit motion for output signals in accordance with interface description

Specifications	LIP 281	
Measuring standard Coefficient of linear expansion	OPTODUR phase grating on Zerodur glass ceramic $\alpha_{therm} \approx (0 \pm 0.1) \times 10^{-6}\ K^{-1}$	
Accuracy grade*	± 1 µm	± 3 µm (higher accuracy grades available on request)
Measuring length ML* in mm	20 30 50 70 120 170 220 270 320	370 420 470 520 570 620 670 720 770 820 870 920 970 1020 1140 1240 1340 1440 1540 1640 1840 2040 2240 2440 2640 2840 3040
Reference marks* *LIP 281R* *LIP 281C*	One at midpoint of measuring length Distance-coded (upon request)	
Incremental signals	⌒ 1 V_{PP} [1)]	
Grating period	2.048 µm	
Signal period	0.512 µm (512 nm)	
Cutoff frequency –3 dB	≥ 3 MHz	
Traversing speed	≤ 90 m/min (higher available on request)	
Laser class	3B	
Power supply Current consumption	DC 5 V ± 5 % < 390 mA	
Electrical connection*	Cable 0.5 m, 1 m, 2 m or 3 m with D-sub connector (15-pin) Interface electronics integrated in connector	
Cable length	≤ 30 m (with HEIDENHAIN cable)	
Vibration 55 to 2000 Hz **Shock** 11 ms	≤ 200 m/s^2 (IEC 60068-2-6) ≤ 400 m/s^2 (IEC 60068-2-27)	
Operating temperature	0 °C to 50 °C	
Storage temperature	–20 °C to 70 °C (in the packaging)	
Weight Scanning head Connector Scale Connecting cable	59 g 140 g 0.11 g/mm overall length 22 g/m	

***** Please select when ordering

[1)] Additional interfaces via external interface electronics with integrated interpolation. Please request more information about:
- TTL with APE 371 (the traversing speed depends on the interpolation)
- EnDat 2.2 with EIB 392 (traversing speed ≤ 12.2 m/min; 16384-fold subdivision)
- Fanuc Serial Interface with EIB 392F (traversing speed ≤ 12.2 m/min; 16384-fold subdivision)
- Mitsubishi High Speed Serial Interface with EIB 392M (traversing speed ≤ 12.2 m/min; 16384-fold subdivision)

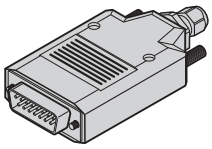
Electrical Connection

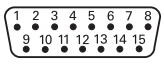
Mating element on connecting cable to connector on encoder cable	**D-sub connector (female),** 15-pin
	
For connecting cable ∅ 8 mm ∅ 6 mm	315650-14

PUR connecting cable∅ 8 mm [4(2 x 0.14 mm²) + (4 x 0.5 mm²) + 2 x (2 x 0.14 mm²)] Shield on housing **PUR connecting cable∅ 6 mm** [6(2 x AWG28) + (4 x 0.14 mm²)]	∅ 8 mm	∅ 6 mm[1)]
Complete with D-sub connectors (female and male) 	335074-xx	355186-xx
With one D-sub connector (female) 	332433-xx	355209-xx
Cable only 	244957-01	291639-01

[1)] Cable length for ∅ 6 mm max. 9 m

15-pin D-sub connector with integrated interface electronics





	Power supply				Incremental signals						Other signals			
	**4**	**12**	**2**	**10**	**1**	**9**	**3**	**11**	**14**	**7**	**13**	**15**	**5**	**6/8**
	U_P	**Sensor** 5 V	**0 V**	**Sensor** 0 V	**A+**	**A–**	**B+**	**B–**	**R+**	**R–**	**SLC**[1)]	**SDA**[1)]	**TEST**[1)]	**/**
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	Violet	Yellow	Red/ Black	/

Shield on housing; **U_P** = Power supply voltage
Sensor: The sensor line is connected internally with the corresponding power line
[1)] Only for adjusting; do not use in normal operation

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For more information
- *Exposed Linear Encoders* brochure
- *EIB 392* Product Information
- *APE 371* Product Information