Product Information

LIP 481V
LIP 481 U
Exposed Linear Encoders for High and Ultrahigh Vacuum Technology
LIP 481V; LIP 481 U

Incremental linear encoders with very high accuracy

- Special vacuum-compatible design for high and ultrahigh vacuum
- For measuring steps of less than 3 nm
- Measuring standard is fastened with fixing clamps

Shown without scanning head

Shown without fixing clamps

F = Machine guideway
* = Maximum change during operation
L = Scale length
k = Adhesive dries at room temperature in 24 h
s = Beginning of measuring length (ML)
r = Reference mark position
m = Mounting surface for scanning head
n = Quantity of fixing clamp pairs
d = Distance between fixing clamps
À = Direction of motion of scanning unit for ascending position values

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

#### Areas of application
- LIP 481 V: High vacuum, up to \(1 \cdot 10^{-7}\) mbar
- LIP 481 U: Ultrahigh vacuum, up to \(1 \cdot 10^{-11}\) mbar

#### Measuring standard*
- SUPRADUR phase grating on glass or Zerodur glass ceramic
  - Glass: \(\alpha_{\text{therm}} = 8 \cdot 10^{-6} \, \text{K}^{-1}\)
  - Zerodur glass ceramic: \(\alpha_{\text{therm}} = (0 \pm 0.1) \cdot 10^{-6} \, \text{K}^{-1}\)

#### Measuring standard* Coefficient of linear expansion
- Glass: \(\alpha_{\text{therm}} = 8 \cdot 10^{-6} \, \text{K}^{-1}\)
- Zerodur glass ceramic: \(\alpha_{\text{therm}} = (0 \pm 0.1) \cdot 10^{-6} \, \text{K}^{-1}\)

#### Accuracy grade*
- ±1 µm, ±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
- One at midpoint of measuring length

#### Output signals
- 

#### Signal period
- 2 µm

#### Cutoff frequency
- ≥ 300 kHz

#### Traversing speed
- 36 m/min

#### Interpolation error
- ±7 nm
- 2 nm (450 kHz)

#### Supply voltage
- DC 5 V ±5%

#### Current consumption
- < 190 mA

#### Electrical connection
- 15-pin D-sub connector (male); interface electronics integrated in connector

#### Housing feed-through*
- None (interface electronics in a vacuum)
- D-sub connector (not included in delivery; interface electronics not in a vacuum)

#### Cable length of scanning head to APE *
- 0.5 m or 1 m

#### Other cable lengths on request, but ≤ 3 m between scanning head and APE
- 0.5 m or 1 m to the housing feed-through and
- 0.5 m to the APE

#### Cable length after APE
- ≤ 20 m (with HEIDENHAIN cable)

#### Vibration
- 55 Hz to 2000 Hz
- ≤ 200 m/s² (EN 60068-2-6)
- ≤ 500 m/s² (EN 60068-2-27)

#### Shock
- 11 ms
- 200 m/s² (EN 60068-2-27)
- 500 m/s² (EN 60068-2-27)

#### Operating temperature
- 0 °C to 40 °C

#### Baking temperature
- 100 ºC
- 120 ºC

#### Materials
- PCB: Ceramic
- Adhesives: UHV-compatible, temperature resistant

#### Mass
- Scanning head: 50 g (without cable)
- Connector: 32 g
- Scale: 5.6 g + 0.2 g/mm measuring length
- Connecting cable: 38 g/m

* Please select when ordering
Electrical connection

**LIP 481V**
The scanning head cable has a 15-pin D-sub connector that contains the interface electronics. A vacuum feed-through (15-pin D-sub connector on DN63CF flange) and an extension cable are available as accessories.

**LIP 481U**
The encoder must contain no electronic components during use in ultrahigh vacuum. For this reason, the necessary interface electronics are outside of the UHV area.

The LIP 481 U is equipped with a cable and a UHV-compatible D-sub connector. An adapter cable with the interface electronics integrated in its D-sub connector is included in delivery. A vacuum feed-through (15-pin D-sub connector on DN63CF flange) and an extension cable are available as accessories.

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**15-pin D-sub connector with integrated interface electronics**

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**Shield** on housing; \( U_p \) = Power supply voltage

**Sensor**: The sense line is connected internally with the corresponding power line.

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**Further information:**

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

- Brochure: *Exposed Linear Encoders* 208960-xx
- Technical Information: *Linear Encoders for Vacuum Technology* 627568-xx

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