Product Information

LIF 171
LIF 181
Incremental Linear Encoders
**Product Information LIF 171, LIF 181**

**Incremental linear encoders**
- For measuring steps down to 100 nm
- Easy mounting with PRECIMET® adhesive film, or fastening with fixing clamps
- Distance-coded reference marks
- For large measuring lengths of up to 3 m
- Measuring lengths of up to 6 m upon request

**Scale in clamped condition**

**Fixed-point bond for even number of fixing clamps**

**Fixed-point bond for odd number of fixing clamps**

**Scale in bonded condition**

**Fixed-point bond**

With stop pin at center

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**Tolerancing ISO 8015**

ISO 2768 - m H

≤ 6 mm: ±0.2 mm

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① = Adhesive
② = Scale length
③ = Machine guideway
④ = Max. change during operation
⑤ = Reference mark position LIF 101 R / 171 R / 181 R
⑥ = Reference mark positions LIF 101 C / 171 C / 181 C
⑦ = Beginning of measuring length ML
⑧ = Permissible overtravel
⑨ = Mounting surface for scanning head
⑩ = Positive direction of motion
⑪ = Mounting clearance between scanning head and scale
⑫ = Scale stop surface
ML = Measuring length
**Scale**

**LIF 101**

| Measuring standard Coefficient of linear expansion | SUPRADUR phase grating on Zerodur glass-ceramic or glass; grating period: 8 µm  
$$\alpha_{\text{therm}} = (0\pm0.1) \times 10^{-6} \text{ K}^{-1} \text{ (Zerodur glass-ceramic)}$$  
$$\alpha_{\text{therm}} = 8 \times 10^{-6} \text{ K}^{-1} \text{ (glass)}$$ |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy grade</strong></td>
<td>±3 µm; ±1 µm (only in Zerodur and up to a measuring length of 1640 mm)</td>
</tr>
<tr>
<td><strong>Baseline error</strong></td>
<td>≤ ±0.175 µm/5 mm</td>
</tr>
<tr>
<td><em><em>Measuring length ML</em> in mm</em>*</td>
<td>70  120  170  220  270  320  370  420  470  520  570  620  670  720  770  820  870  920  970  1040  1140  1240  1340  1440  1540  1640  1840  2040  2240  2440  2640  2840  3040</td>
</tr>
</tbody>
</table>
| **Reference marks** | LIF 101 R  
LIF 101 C  
One reference mark at midpoint of measuring length  
Distance-coded |
| **Mass** | 75 g + 0.25 g/mm of measuring length |

**Scanning head**

<table>
<thead>
<tr>
<th>LIF 18</th>
<th>LIF 17</th>
</tr>
</thead>
</table>
| **Interface** | ~ 1 Vpp  
TTL |
| **Integrated interpolation** |  
4 µm  
5-fold  
0.8 µm  
10-fold  
0.4 µm |
| **Cutoff frequency** | ≥ 1 MHz  
– |
| **Scanning frequency** | –  
≤ 200 kHz  
≤ 100 kHz  
≤ 50 kHz  
≤ 100 kHz  
≤ 50 kHz  
≤ 25 kHz |
| **Edge separation a** | –  
≥ 0.220 µs  
≥ 0.465 µs  
≥ 0.950 µs  
≥ 0.220 µs  
≥ 0.465 µs  
≥ 0.950 µs |
| **Traversing speed** | ≤ 240 m/min  
≤ 48 m/min  
≤ 24 m/min  
≤ 12 m/min  
≤ 12 m/min  
≤ 6 m/min |
| **Interpolation error** | ±12 nm  
0.6 nm  
(1 MHz²) |
| **Position noise RMS** | – |
| **Electrical connection** | Cable, 0.5 m/1 m/3 m, with 15-pin D-sub connector (male); interface electronics in connector |
| **Cable length** | With HEIDENHAIN cable: ≤ 30 m |
| **Supply voltage** | DC 5 V ±5 %  
DC 5 V ±5 % |
| **Current consumption** | ≤ 150 mA  
≤ 165 mA (without load) |
| **Vibration** | 55 Hz to 2000 Hz  
≤ 200 m/s² (IEC 60068-2-6) |
| **Shock** | 6 ms  
≤ 500 m/s² (IEC 60068-2-27) |
| **Operating temperature** | 0 °C to 50 °C |
| **Storage temperature** | –20 °C to 70 °C |
| **Protection** | EN 60529  
IP00; scanning head: IP50 |
| **Mass** | 25 g (without cable)  
38 g/m  
75 g |

* Please select when ordering
1) Only for TTL: Maximum traversing speed for referencing: 9.6 m/min · (40 kHz)
2) –3 dB cutoff frequency of the subsequent electronics
3) Measuring lengths of up to 6 m upon request
Electrical connection

LIF 171/181 pin layout

15-pin D-sub connector

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Incremental signals</th>
<th>Other signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 12 2 10</td>
<td>1 9 3 11 14 7 13 8 6 15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TTL</th>
<th>UP</th>
<th>Sensor 5 V</th>
<th>Sensor 0 V</th>
<th>Ua1</th>
<th>Ua1</th>
<th>Ua2</th>
<th>Ua2</th>
<th>Ua0</th>
<th>Ua0</th>
<th>UaS</th>
<th>Vacant</th>
<th>Vacant</th>
<th>PWT</th>
</tr>
</thead>
<tbody>
<tr>
<td>∼1Vpp</td>
<td>Brown/ Green</td>
<td>Blue</td>
<td>White/ Green</td>
<td>White</td>
<td>Brown</td>
<td>Green</td>
<td>Gray</td>
<td>Pink</td>
<td>Red</td>
<td>Black</td>
<td>Violet</td>
<td>Vacant</td>
<td>Vacant</td>
</tr>
</tbody>
</table>

Shield on housing; UP = Power supply
Sensor: The sensor line is connected in the connector with the corresponding power supply
Unused pins or wires must not be assigned!

Connecting cables

<table>
<thead>
<tr>
<th>PUR connecting cable</th>
<th>Ø 8 mm</th>
<th>Ø 6 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 × (2 × 0,19 mm²); AV = 0,19 mm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 × (2 × 0,16 mm²) + (4 × 0,5 mm²); AV = 0,5 mm²</td>
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<td></td>
</tr>
</tbody>
</table>

1) Max. total cable length: 9 m
A:P: Cross section of power supply lines

Further information:
Comply with the requirements described in the following documents to ensure correct operation:
- Brochure: Interfaces of HEIDENHAIN Encoders
- Brochure: Exposed Linear Encoders

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