Product Information

ECN 413
ECN 425
ERN 487

Rotary Encoders for Elevator Drive Control (IP64 Degree of Protection)
ECN/ERN 400 series
Rotary encoders with integral bearings for elevator technology

- Simple installation
- Rigid shaft coupling
- Expanding ring coupling or plane-surface coupling
- Uniform dimensions for various electrical interfaces
<table>
<thead>
<tr>
<th></th>
<th>Absolute</th>
<th>ECN 425</th>
<th>ECN 413</th>
<th>Incremental</th>
<th>ERN 487</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part number</strong></td>
<td>683644-xx</td>
<td>1066932-xx</td>
<td>749143-xx</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>EnDat 2.2</td>
<td></td>
<td></td>
<td>~ 1 Vpp</td>
<td></td>
</tr>
<tr>
<td><strong>Ordering designation</strong></td>
<td>EnDat22</td>
<td>EnDat01</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Position values/revolution</strong></td>
<td>33554432 (25 bits)</td>
<td>8192 (13 bits)</td>
<td>Z1 track⁴</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electrically permissible speed/error</strong></td>
<td>≤ 12 000 rpm (for continuous position value)</td>
<td>≤ 1500 rpm/±1 LSB</td>
<td>≤ 12 000 rpm/±50 LSB</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Calculation time t_cal</strong></td>
<td>≤ 7 µs</td>
<td>≤ 9 µs</td>
<td>≤ 2 MHz</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Clock frequency</strong></td>
<td>≤ 8 MHz</td>
<td>≤ 9 µs</td>
<td>≤ 2 MHz</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Incremental signals</strong></td>
<td>-</td>
<td>~ 1 Vpp</td>
<td>~ 1 Vpp</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Line count/system accuracy</strong></td>
<td>2048/±20”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reference mark</strong></td>
<td>-</td>
<td></td>
<td></td>
<td>One</td>
<td></td>
</tr>
<tr>
<td><strong>Cutoff frequency –3 dB</strong></td>
<td>-</td>
<td>≥ 400 kHz</td>
<td>≥ 210 kHz</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>Cable 1 m/5 m with M12 coupling</td>
<td>Cable 1 m/5 m without coupling</td>
<td>Cable 1 m/5 m without coupling</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Voltage supply</strong></td>
<td>DC 3.6 V to 14 V</td>
<td>DC 5 V ±0.25 V</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>3.6 V: ≤ 600 mW</td>
<td>14 V: ≤ 700 mW</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Current consumption</strong></td>
<td>5 V: 85 mA (typical, without load)</td>
<td>≤ 130 mA (without load)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Stator coupling</strong></td>
<td>Expanding ring coupling or plane-surface coupling</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Shaft</strong></td>
<td>Taper shaft Ø 9.25 mm; taper 1:10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Mech. permis. speed n</strong></td>
<td>Expanding ring coupling: ≤ 12 000 rpm</td>
<td>Plane-surface coupling: ≤ 2000 rpm</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Starting torque</strong></td>
<td>≤ 0.01 Nm (at 20 °C)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Moment of inertia of rotor</strong></td>
<td>2.6 · 10⁻⁶ kgm²</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Permissible axial motion of the measured shaft</strong></td>
<td>Expanding ring coupling: ±0.5 mm</td>
<td>Plane-surface coupling: ±1.5 mm</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Radial runout of the measured shaft</strong></td>
<td>Expanding ring coupling: 0.02 mm</td>
<td>Plane-surface coupling: 0.13 mm (for static radial mounting tolerance also ±0.13 mm)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
<td>55 Hz to 2000 Hz</td>
<td>≤ 300 m/s² (EN 60 068-2-6)</td>
<td>≤ 2000 m/s² (EN 60 068-2-27)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>6 ms</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>-10 °C to +100 °C</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td>EN 60529</td>
<td>IP 64</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>~ 0.25 kg</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Please select when ordering
1) See catalog: *Interfaces of HEIDENHAIN Encoders*
2) Velocity-dependent deviations between the absolute value and incremental signals
3) One sine and one cosine signal per revolution
4) Compensation of mounting tolerances and thermal expansion, not dynamic motion
ECN/ERN 400 series
With expanding ring coupling 06

= Bearing of mating shaft
= Required mating dimensions
= Measuring point for operating temperature
= Clamping screw for coupling ring, width A/F 2. Tightening torque: 1.25—0.2 Nm
= Screw plug, width A/F 3 and 4. Tightening torque: 5+0.5 Nm
= Self-tightening screw M5 x 50 DIN 6912 width A/F 4, tightening torque 5+0.5 Nm
= M6 back-off thread
= M10 back-off thread
= Compensation of mounting tolerances and thermal expansion, no dynamic motion
= Direction of shaft rotation for output signals as per the interface description
With plane-surface coupling

- $\mathbb{A}$ = Bearing of mating shaft
- $\mathbb{B}$ = Bearing of encoder
- $\mathbb{C}$ = Required mating dimensions
- $\mathbb{D}$ = Measuring point for operating temperature
- $\mathbb{E}$ = Screw plug, width A/F 3 and 4. Tightening torque: 5+0.5 Nm
- $\mathbb{F}$ = Self-tightening screw M5x50 DIN 6912 width A/F 4, tightening torque 5+0.5 Nm
- $\mathbb{G}$ = M10 back-off thread
- $\mathbb{H}$ = M6 back-off thread
- $\mathbb{I}$ = Max. permissible tolerance during motor shaft rotation ±1.5 mm
- $\mathbb{J}$ = Max. permissible static radial offset of motor shaft in indicated direction ±0.13 mm
- $\mathbb{K}$ = Direction of shaft rotation for output signals as per the interface description

Tolerancing ISO 8015
ISO 2768 – m H
< 6 mm: ±0.2 mm
## Electrical connection

### Pin layouts

#### ECN 425 pin layout

**8-pin coupling, M12**

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Serial data transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

- **U<sub>p</sub>**
- **Sensor**
- **0 V**
- **Sensor 0 V**
- **DATA**
- **DATA**
- **CLOCK**
- **CLOCK**

| Shield connected with housing; **U<sub>p</sub>** = Power supply |
| Sensor: The sensor line is connected in the encoder with the corresponding power line. |
| Vacant pins or wires must not be used. |

#### ECN 413 pin layout

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>Incremental signals</th>
<th>Serial data transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U&lt;sub&gt;p&lt;/sub&gt;</strong></td>
<td><strong>Sensor</strong></td>
<td><strong>0 V</strong></td>
</tr>
<tr>
<td>Brown/Green</td>
<td>Blue</td>
<td>White/Green</td>
</tr>
</tbody>
</table>

| Shield connected with housing; **U<sub>p</sub>** = Power supply |
| Sensor: The sensor line is connected in the encoder with the corresponding power line. |
| Vacant pins or wires must not be used. |
### ERN 487 pin layout

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>Incremental signals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U&lt;sub&gt;p&lt;/sub&gt;</strong></td>
<td><strong>Sensor U&lt;sub&gt;p&lt;/sub&gt;</strong></td>
</tr>
<tr>
<td>Brown/ Green</td>
<td>Blue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other signals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C&lt;sup&gt;+&lt;/sup&gt;</strong></td>
</tr>
<tr>
<td>Gray</td>
</tr>
</tbody>
</table>

**Shield** connected with housing; **U<sub>p</sub>** = Power supply; **C, D** = Commutation signals for sinusoidal commutation

**Sensor**: The sensor line is connected with the corresponding supply voltage. Vacant pins or wires must not be used.
PWM 20
Together with the ATS adjusting and testing software, the PWM 20 phase angle measuring unit serves for diagnosis and adjustment of HEIDENHAIN encoders.

<table>
<thead>
<tr>
<th>Encoder input</th>
<th>PWM 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>• EnDat 2.1 or EnDat 2.2 (absolute value with or without incremental signals)</td>
<td></td>
</tr>
<tr>
<td>• DRIVE-CLiQ</td>
<td></td>
</tr>
<tr>
<td>• Fanuc Serial Interface</td>
<td></td>
</tr>
<tr>
<td>• Mitsubishi high speed interface</td>
<td></td>
</tr>
<tr>
<td>• Yaskawa Serial Interface</td>
<td></td>
</tr>
<tr>
<td>• Panasonic serial interface</td>
<td></td>
</tr>
<tr>
<td>• SSI</td>
<td></td>
</tr>
<tr>
<td>• 1 Vpp/TTL/11 µApp</td>
<td></td>
</tr>
<tr>
<td>• HTL (via signal adapter)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>USB 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply</td>
<td>AC 100 V to 240 V or DC 24 V</td>
</tr>
<tr>
<td>Dimensions</td>
<td>258 mm x 154 mm x 55 mm</td>
</tr>
</tbody>
</table>

ATS

<table>
<thead>
<tr>
<th>Languages</th>
<th>Choice between English and German</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>• Position display</td>
</tr>
<tr>
<td></td>
<td>• Connection dialog</td>
</tr>
<tr>
<td></td>
<td>• Diagnostics</td>
</tr>
<tr>
<td></td>
<td>• Mounting wizard for EBI/ECI/EQI, LIP 200, LIC 4000 and others</td>
</tr>
<tr>
<td></td>
<td>• Additional functions (if supported by the encoder)</td>
</tr>
<tr>
<td></td>
<td>• Memory contents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System requirements and recommendations</th>
<th>PC (dual-core processor &gt; 2 GHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RAM &gt; 2 GB</td>
</tr>
<tr>
<td></td>
<td>Operating system: Windows XP, Vista, 7, 8, 10 (32-bit/64-bit)</td>
</tr>
<tr>
<td></td>
<td>200 MB free space on hard disk</td>
</tr>
</tbody>
</table>

For more information, see the PWM 20/ATS Software Product Information document.

DRIVE-CLiQ is a registered trademark of SIEMENS AG.
PWT 100
The PWT 100 is a testing device for checking the function and adjustment of incremental and absolute HEIDENHAIN encoders. Thanks to its compact dimensions and robust design, the PWT 100 is ideal for mobile use.

You can find more information in the Product Information PWT 100.

<table>
<thead>
<tr>
<th>Encoder input</th>
<th>PWT 100</th>
</tr>
</thead>
</table>
| Only for HEIDENHAIN encoders | • EnDat
• Fanuc Serial Interface
• Mitsubishi High Speed Interface
• Panasonic Serial Interface
• Yaskawa Serial Interface
• 1 Vpp
• 11 µAPP
• TTL |

| Display | 4.3” color flat-panel display (touch screen) |
| Voltage supply | 24 V DC
Power consumption: max. 15 W |
| Operating temperature | 0 °C to 40 °C |
| Protection | EN 60 529
IP20 |
| Dimensions | ≈ 145 mm x 85 mm x 35 mm |