



# HEIDENHAIN



Product Information

**ECN 413**

**ECN 425**

**ERN 487**

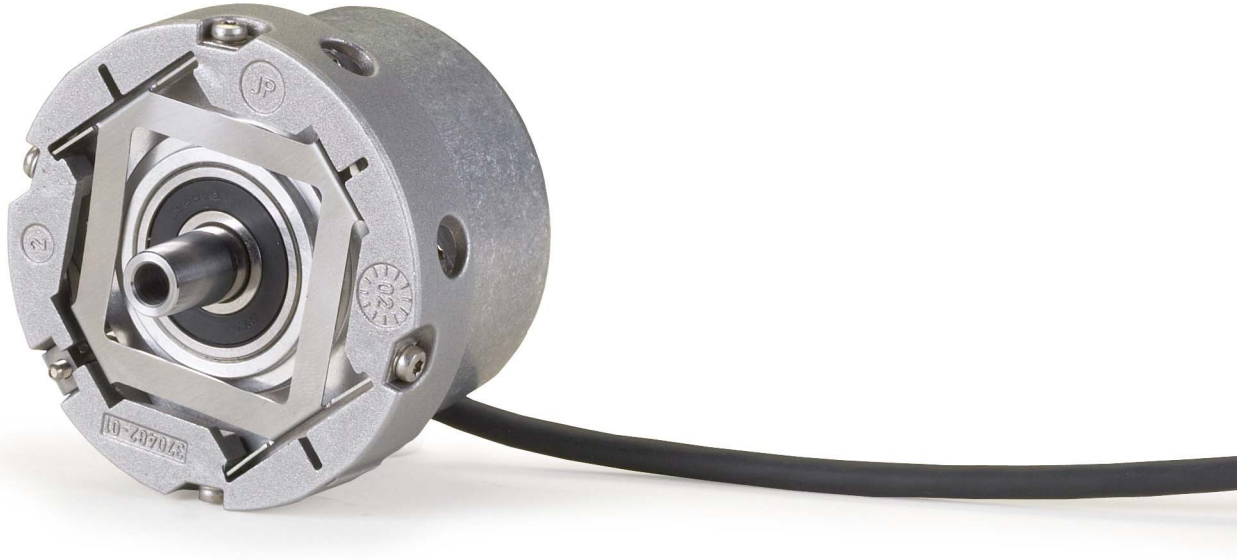
Rotary Encoders for  
Elevator Drive Control  
(IP64 Degree of Protection)

June 2017

## 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



ECN/ERN 400 series with expanding ring coupling



ECN/ERN 400 series with plane-surface coupling

	<b>Absolute</b>		<b>Incremental</b>
	<b>ECN 425</b>	<b>ECN 413</b>	<b>ERN 487</b>
<b>Part number</b>	683644-xx	1065932-xx	749143-xx
<b>Interface<sup>1)</sup></b>	EnDat 2.2		~ 1 V <sub>PP</sub>
Ordering designation	EnDat22	EnDat01	–
Position values/revolution	33554432 (25 bits)	8192 (13 bits)	Z1 track <sup>3)</sup>
Electrically permissible speed/error <sup>2)</sup>	≤ 12 000 rpm (for continuous position value)	≤ 1500 rpm/±1 LSB ≤ 12 000 rpm/±50 LSB	–
Calculation time t <sub>cal</sub> Clock frequency	≤ 7 μs ≤ 8 MHz	≤ 9 μs ≤ 2 MHz	–
Incremental signals <sup>1)</sup>	–	~ 1 V <sub>PP</sub>	~ 1 V <sub>PP</sub>
Line count/system accuracy	2048/±20"		
Reference mark	–		One
Cutoff frequency –3 dB	–	≥ 400 kHz	≥ 210 kHz
<b>Electrical connection*</b>	Cable 1 m/5 m with M12 coupling	Cable 1 m/5 m without coupling	Cable 1 m/5 m without coupling
<b>Voltage supply</b>	DC 3.6 V to 14 V		DC 5 V ±0.25 V
<b>Power consumption<sup>1)</sup></b> (maximum)	3.6 V: ≤ 600 mW 14 V: ≤ 700 mW		–
<b>Current consumption</b>	5 V: 85 mA (typical, without load)		≤ 130 mA (without load)
<b>Stator coupling*</b>	Expanding ring coupling or plane-surface coupling		
<b>Shaft</b>	Taper shaft Ø 9.25 mm; taper 1:10		
Mech. permiss. speed n	<i>Expanding ring coupling:</i> ≤ 12 000 rpm <i>Plane-surface coupling:</i> ≤ 2 000 rpm		
Starting torque	≤ 0.01 Nm (at 20 °C)		
Moment of inertia of rotor	2.6 · 10 <sup>–6</sup> kgm <sup>2</sup>		
Permissible axial motion of the measured shaft <sup>4)</sup>	<i>Expanding ring coupling:</i> ±0.5 mm <i>Plane-surface coupling:</i> ±1.5 mm		
Radial runout of the measured shaft	<i>Expanding ring coupling:</i> 0.02 mm <i>Plane-surface coupling:</i> 0.13 mm (for static radial mounting tolerance also ±0.13 mm)		
<b>Vibration</b> 55 Hz to 2000 Hz <b>Shock</b> 6 ms	≤ 300 m/s <sup>2</sup> (EN 60 068-2-6) ≤ 2000 m/s <sup>2</sup> (EN 60 068-2-27)		
<b>Operating temperature</b>	–10 °C to +100 °C		
<b>Protection</b> EN 60529	IP 64		
<b>Mass</b>	≈ 0.25 kg		

\* Please select when ordering

<sup>1)</sup> See catalog: *Interfaces of HEIDENHAIN Encoders*

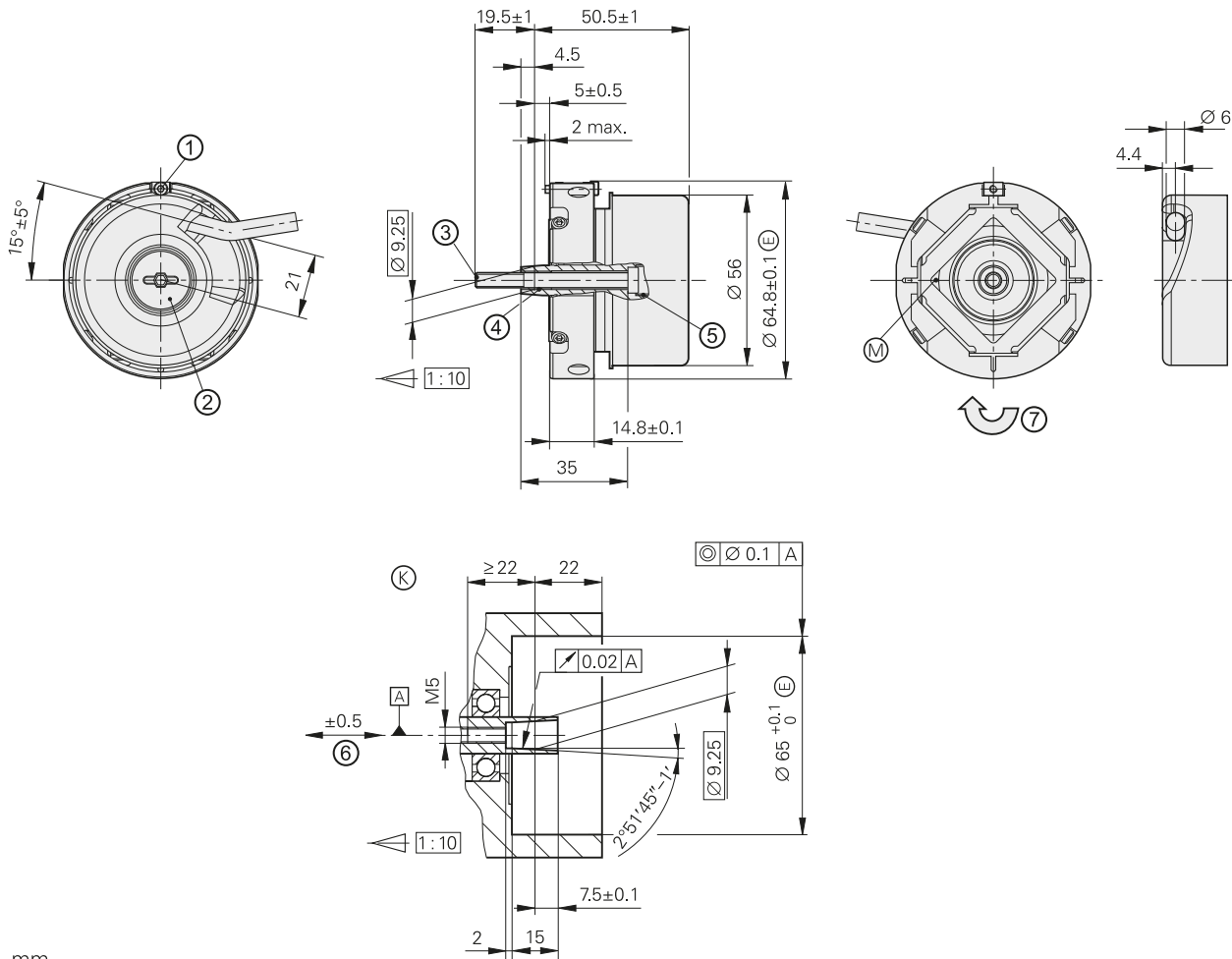
<sup>2)</sup> Velocity-dependent deviations between the absolute value and incremental signals

<sup>3)</sup> One sine and one cosine signal per revolution

<sup>4)</sup> Compensation of mounting tolerances and thermal expansion, not dynamic motion

# ECN/ERN 400 series

With expanding ring coupling 06



mm



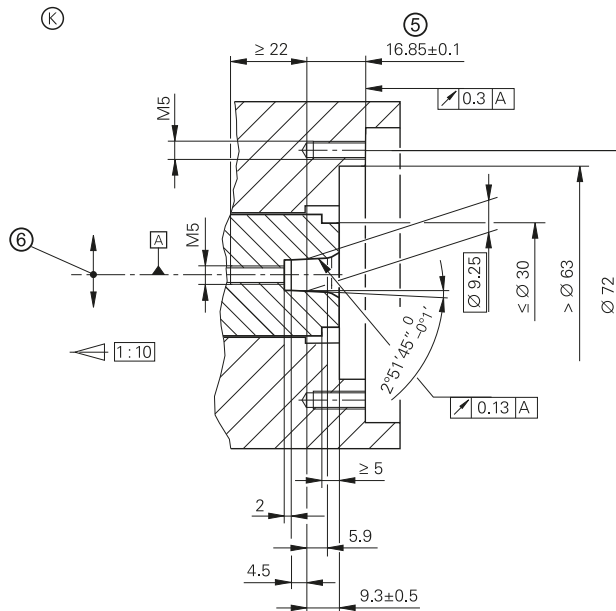
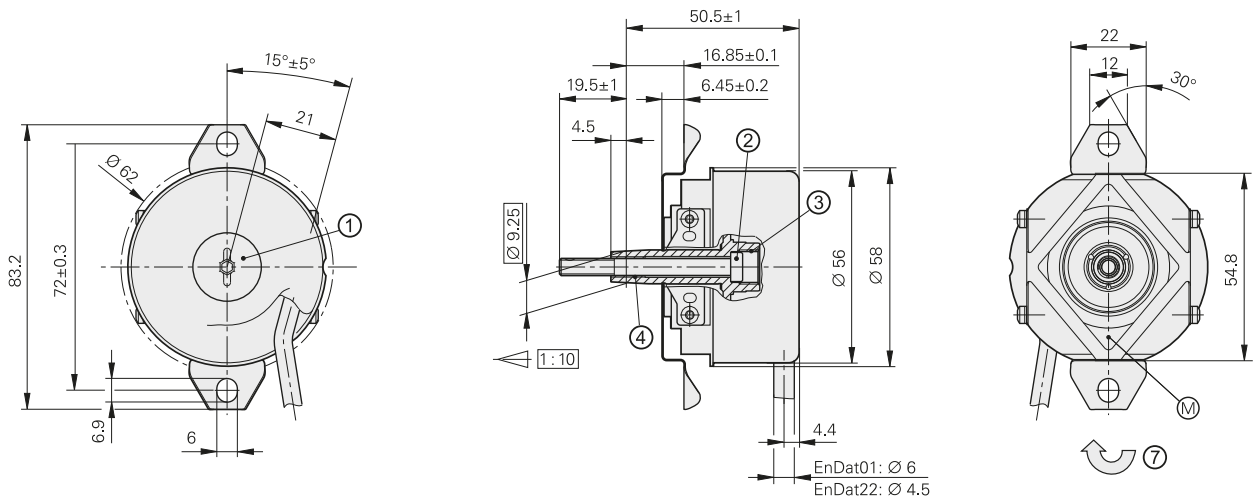
Tolerancing ISO 8015

ISO 2768 - m H

< 6 mm: ±0.2 mm

- ▢ = Bearing of mating shaft
- ⊙ = Required mating dimensions
- Ⓜ = Measuring point for operating temperature
- ① = Clamping screw for coupling ring, width A/F 2. Tightening torque: 1.25—0.2 Nm
- ② = Screw plug, width A/F 3 and 4. Tightening torque: 5+0.5 Nm
- ③ = Self-tightening screw M5 x 50 DIN 6912 width A/F 4, tightening torque 5+0.5 Nm
- ④ = M6 back-off thread
- ⑤ = 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




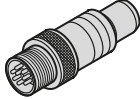



mm  
  
 Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

- ▣ = Bearing of mating shaft
- ▣ = Bearing of encoder
- ⊙ = Required mating dimensions
- ⊙ = Measuring point for operating temperature
- ① = Screw plug, width A/F 3 and 4. Tightening torque: 5+0.5 Nm
- ② = Self-tightening screw M5x50 DIN 6912 width A/F 4, tightening torque 5+0.5 Nm
- ③ = M10 back-off thread
- ④ = M6 back-off thread
- ⑤ = Max. permissible tolerance during motor shaft rotation ±1.5 mm
- ⑥ = Max. permissible static radial offset of motor shaft in indicated direction ±0.13 mm
- ⑦ = Direction of shaft rotation for output signals as per the interface description

# Electrical connection

## Pin layouts

### ECN 425 pin layout


8-pin coupling, M12								
								
	Power supply				Serial data transfer			
	<b>8</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>6</b>
	<b>U<sub>P</sub></b>	<b>Sensor U<sub>P</sub></b>	<b>0V</b>	<b>Sensor 0V</b>	<b>DATA</b>	<b>DATA</b>	<b>CLOCK</b>	<b>CLOCK</b>
	Brown/Green	Blue	White/Green	White	Gray	Pink	Violet	Yellow

**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


Voltage supply						Incremental signals				Serial data transfer			
	<b>U<sub>P</sub></b>	<b>Sensor U<sub>P</sub></b>	<b>0V</b>	<b>Sensor 0V</b>	<b>Internal shield</b>	<b>A+</b>	<b>A-</b>	<b>B+</b>	<b>B-</b>	<b>DATA</b>	<b>DATA</b>	<b>CLOCK</b>	<b>CLOCK</b>
	Brown/Green	Blue	White/Green	White	/	Green/Black	Yellow/Black	Blue/Black	Red/Black	Gray	Pink	Violet	Yellow


**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**

	Voltage supply					Incremental signals					
	<b>U<sub>P</sub></b>	<b>Sensor</b> U <sub>P</sub>	<b>0V</b>	<b>Sensor</b> 0V	<b>Internal shield</b>	<b>A+</b>	<b>A-</b>	<b>B+</b>	<b>B-</b>	<b>R+</b>	<b>R-</b>
	Brown/ Green	Blue	White/ Green	White	/	Green/ Black	Yellow/ Black	Blue/ Black	Red/Black	Red	Black

	Other signals			
	<b>C+</b>	<b>C-</b>	<b>D+</b>	<b>D-</b>
	Gray	Pink	Yellow	Violet

**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.

# HEIDENHAIN measuring equipment

## 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.



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

	PWM 20
<b>Encoder input</b>	<ul style="list-style-type: none"> <li>• EnDat 2.1 or EnDat 2.2 (absolute value with or without incremental signals)</li> <li>• DRIVE-CLiQ</li> <li>• Fanuc Serial Interface</li> <li>• Mitsubishi high speed interface</li> <li>• Yaskawa Serial Interface</li> <li>• Panasonic serial interface</li> <li>• SSI</li> <li>• 1 V<sub>PP</sub>/TTL/11 μA<sub>PP</sub></li> <li>• HTL (via signal adapter)</li> </ul>
<b>Interface</b>	USB 2.0
<b>Voltage supply</b>	AC 100 V to 240 V or DC 24 V
<b>Dimensions</b>	258 mm x 154 mm x 55 mm

	ATS
<b>Languages</b>	Choice between English and German
<b>Functions</b>	<ul style="list-style-type: none"> <li>• Position display</li> <li>• Connection dialog</li> <li>• Diagnostics</li> <li>• Mounting wizard for EBI/ECI/EQI, LIP 200, LIC 4000 and others</li> <li>• Additional functions (if supported by the encoder)</li> <li>• Memory contents</li> </ul>
<b>System requirements and recommendations</b>	PC (dual-core processor > 2 GHz) RAM > 2 GB Operating system: Windows XP, Vista, 7, 8, 10 (32-bit/64-bit) 200 MB free space on hard disk

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*.

	PWT 100
<b>Encoder input</b> Only for HEIDENHAIN encoders	<ul style="list-style-type: none"><li>• EnDat</li><li>• Fanuc Serial Interface</li><li>• Mitsubishi High Speed Interface</li><li>• Panasonic Serial Interface</li><li>• Yaskawa Serial Interface</li><li>• 1 V<sub>PP</sub></li><li>• 11 μA<sub>PP</sub></li><li>• TTL</li></ul>
<b>Display</b>	4.3" color flat-panel display (touch screen)
<b>Voltage supply</b>	24 V DC Power consumption: max. 15 W
<b>Operating temperature</b>	0 °C to 40 °C
<b>Protection EN 60 529</b>	IP20
<b>Dimensions</b>	≈ 145 mm x 85 mm x 35 mm

# HEIDENHAIN

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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.



### For more information:

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

- Brochure: *Position Encoders for Servo Drives*
- Brochure: *Rotary Encoders*
- Brochure: *Interfaces of HEIDENHAIN Encoders*