



# HEIDENHAIN



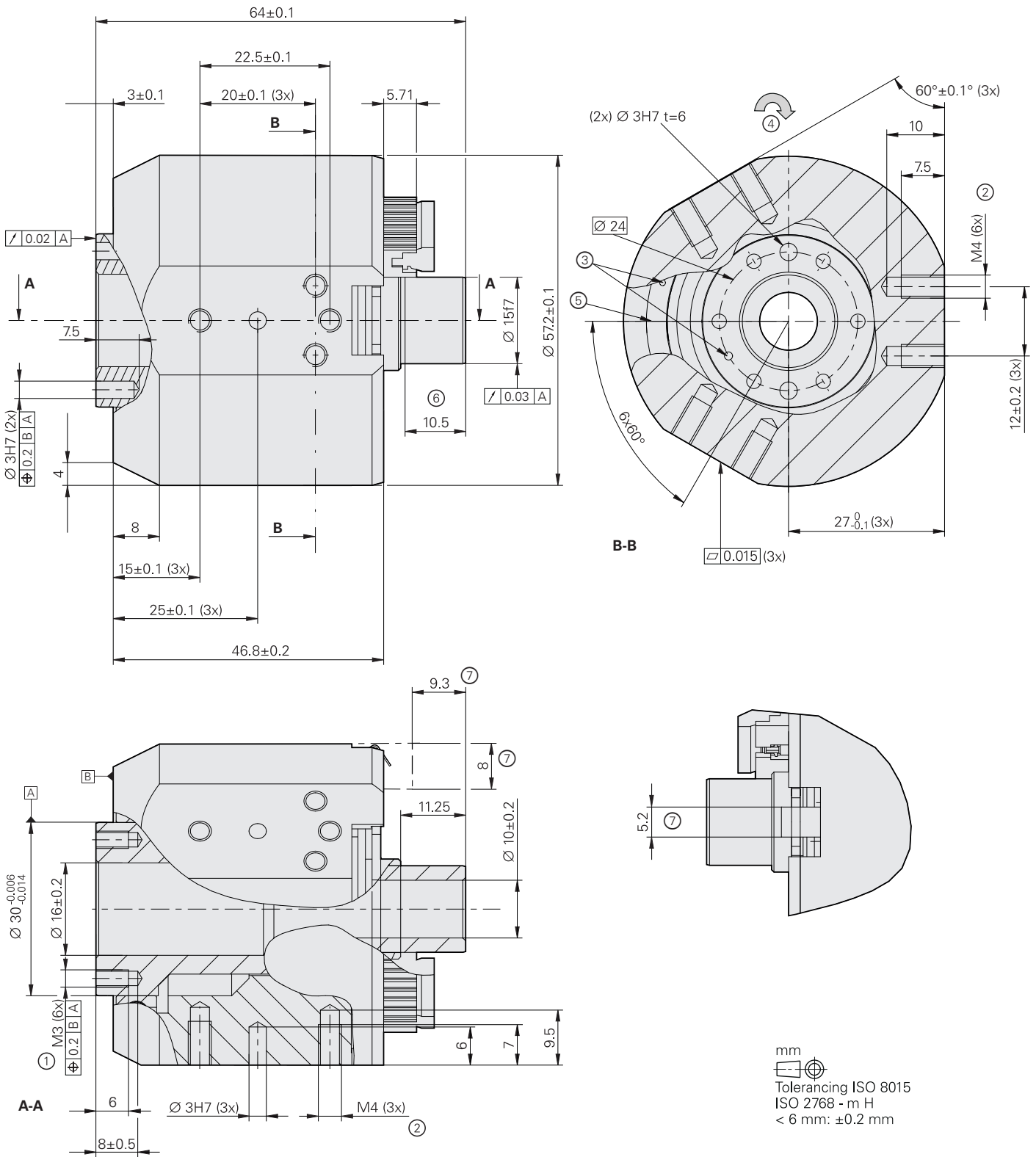
Preliminary  
Product Information

## **MRS 2200 Series** Angle Encoder Modules

# MRS 2280

## Angle encoder module with integrated encoder and bearing

- Compact dimensions
- High measuring and bearing accuracy
- Hollow shaft  $\varnothing 10$  mm
- High resistance to tilt

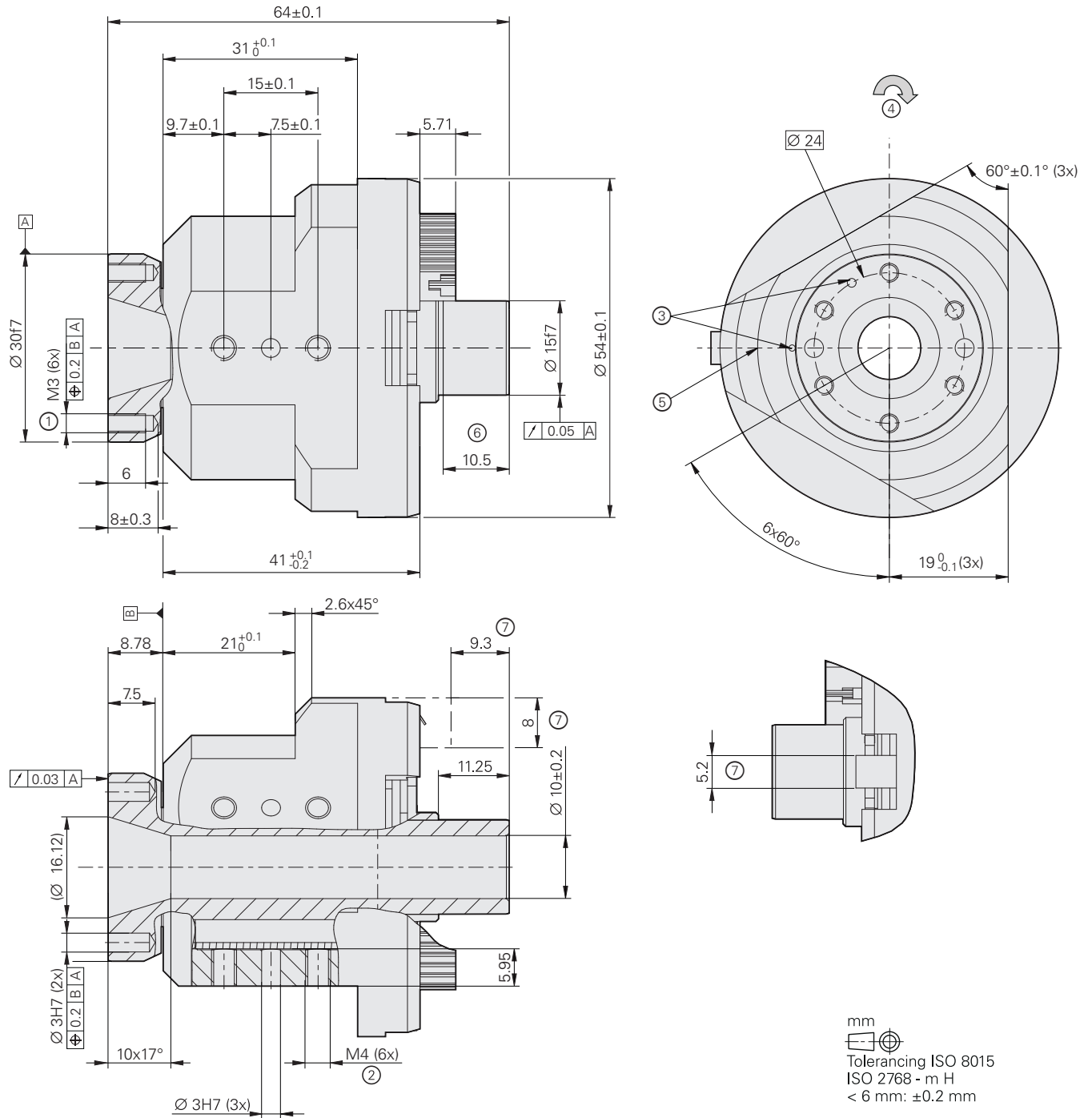


- 1 = Tightening torque of the M3 – 8.8 cylinder head screw: 1.1 Nm ±0.05 Nm
- 2 = Tightening torque of the M4 – 8.8 cylinder head screw: 2.5 Nm ±0.13 Nm
- 3 = Mark for 0° position ±5°
- 4 = Direction of shaft rotation for ascending position values
- 5 = LED position
- 6 = Permitted for shaft clamping
- 7 = Area available for flex PCB

# MRS 2281

Angle encoder module with integrated encoder and bearing

- Compact dimensions
- High measuring and bearing accuracy
- Hollow shaft  $\varnothing 10$  mm
- High resistance to tilt



- 1 = Tightening torque of the M3 – 8.8 cylinder head screw: 1.1 Nm  $\pm 0.05$  Nm
- 2 = Tightening torque of the M4 – 8.8 cylinder head screw: 2.5 Nm  $\pm 0.13$  Nm
- 3 = Mark for 0° position  $\pm 5^\circ$
- 4 = Direction of shaft rotation for ascending position values
- 5 = LED position
- 6 = Permitted for shaft clamping
- 7 = Area available for flex PCB

# Specifications

<b>Encoder characteristics</b>	<b>Incremental</b> <b>MRS 2280</b>
<b>Measuring standard</b>	DIADUR circular scale
Signal periods	2048
<b>System accuracy</b>	$\pm 10''$
Position error per signal period	$\pm 1.5''$
Repeatability	<i>From both directions: 3''</i>
RMS position noise	Typically 0.07''
<b>Interface</b>	$\sim 1 V_{PP}$
Reference marks	One
Cutoff frequency -3 dB	$\geq 210$ kHz
<b>Electrical connection</b>	14-pin header; adapter cable with quick connector as accessory
Cable length	$\leq 30$ m (with HEIDENHAIN cable)
Supply voltage	DC 5 V $\pm 0.25$ V
Power consumption (max.)	5.25 V: $\leq 700$ mW
Current consumption (typical)	<i>Without load:</i> $I_P = 60$ mA; max. 120 mA <i>With load:</i> max. 130 mA



**MRS 2280**



**MRS 2281**

# Specifications

Bearing properties	Incremental	
	MRS 2280	MRS 2281
<b>Shaft</b>	Hollow through shaft D = 10 mm	
Max. permissible axial load <sup>1)</sup>	100 N (centered load)	50 N (centered load)
Max. permissible radial load <sup>1)</sup>	45 N	
Max. permissible tilting torque <sup>1)</sup>	5 Nm	2.5 Nm
Contact stiffness	<i>Axial:</i> 54 N/μm <i>Radial:</i> 153 N/μm (calculated values)	<i>Axial:</i> 27 N/μm <i>Radial:</i> 77 N/μm (calculated values)
Resistance to tilt	52 Nm/mrad (calculated value)	24 Nm/mrad (calculated value)
Mechanically perm. speed	1000 rpm	
Moment of friction	≤ 20 mNm	≤ 15 mNm
Starting torque	≤ 30 mNm	≤ 20 mNm
Max. transferable shaft torque <sup>1)</sup>	1 Nm	
Moment of inertia of rotor	$1.5 \cdot 10^{-5} \text{ kgm}^2$	$0.9 \cdot 10^{-5} \text{ kgm}^2$
Radial guideway accuracy	Measured at distance h = 52 mm from the ball race: ≤ 1 μm	
Non-reproducible radial guideway accuracy	Measured at distance h = 52 mm from the ball race: ≤ 1 μm	
Axial guideway accuracy	≤ ±0.6 μm	
Axial runout of the surface	≤ 20 μm	≤ 30 μm
Radial runout	≤ 30 μm	≤ 50 μm
Wobble of the axis	4"	
<b>Vibration</b> 55 Hz to 2000 Hz <b>Shock</b> 6 ms	≤ 200 m/s <sup>2</sup> (EN 60068-2-6) ≤ 100 m/s <sup>2</sup> (EN 60068-2-27) (without load)	
<b>Protection</b> EN 60529	IP00 <sup>2)</sup>	
<b>Operating temperature</b> <b>Storage temperature</b>	0 °C to 50 °C 0 °C to 50 °C	
<b>Relative air humidity</b>	≤ 75 % without condensation	
<b>Mass</b>	0.34 kg (without cable or connector)	0.23 kg (without cable or connector)

<sup>1)</sup> Purely static load, without additional vibrations or shock load. The overlapping of individual loads is not taken into account.

<sup>2)</sup> The electromagnetic compatibility of the complete system must be ensured by taking the correct measures during installation.

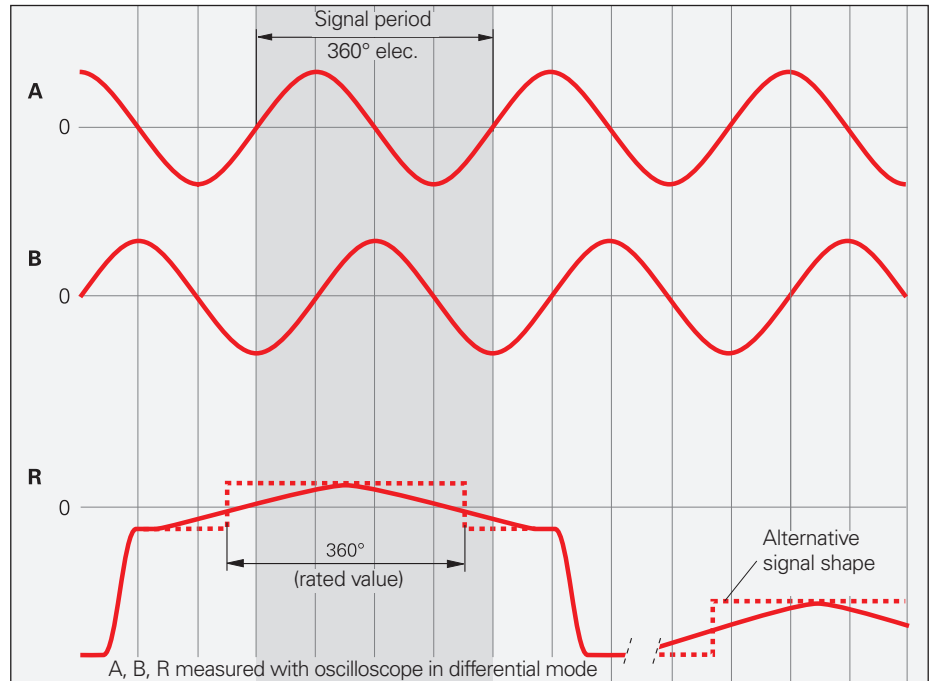
# Interfaces

## ~ 1 V<sub>PP</sub> incremental signals

HEIDENHAIN encoders with ~ 1 V<sub>PP</sub> interface provide voltage signals that can be highly interpolated.

The sinusoidal **incremental signals** A and B are phase-shifted by 90° elec. and have amplitudes of typically 1 V<sub>PP</sub>. The illustrated sequence of output signals—with B lagging A—applies to the direction of motion shown in the dimension drawing.

The **reference mark signal** R has a unique assignment to the incremental signals. The output signal may be lower next to the reference mark.

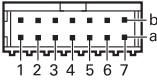





### Further information:

For detailed descriptions of all available interfaces, as well as general electrical information, please refer to the *Interfaces of HEIDENHAIN Encoders* brochure.

# Electrical connection

## Pin layout


14-pin PCB connector													
													
	Power supply				Incremental signals						Other signals		
	<b>1b</b>	<b>7a</b>	<b>5b</b>	<b>3a</b>	<b>6b</b>	<b>2a</b>	<b>3b</b>	<b>5a</b>	<b>4b</b>	<b>4a</b>	/	/	/
	<b>U<sub>P</sub></b>	<b>Sensor</b> U <sub>P</sub>	<b>0V</b>	<b>Sensor</b> 0V	<b>A+</b>	<b>A-</b>	<b>B+</b>	<b>B-</b>	<b>R+</b>	<b>R-</b>	<b>Vacant</b>	<b>Vacant</b>	<b>Vacant</b>
	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	/	Violet	Yellow

**Cable shield** connected to housing; **U<sub>P</sub>** = Power supply voltage

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

Vacant pins or wires must not be used!

## 1 V<sub>pp</sub> cable

<b>PUR output cable</b> Ø 3.7 mm 6 × (2 × 0.05 mm <sup>2</sup> )		
With 14-pin PCB connector and 15-pin D-sub connector (female)		1160480-xx


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# HEIDENHAIN

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This Product Information document 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.



#### Further information:

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

- *Angle Encoder Modules* brochure 1102713-xx
- *Interfaces of HEIDENHAIN Encoders* brochure 1078628-xx