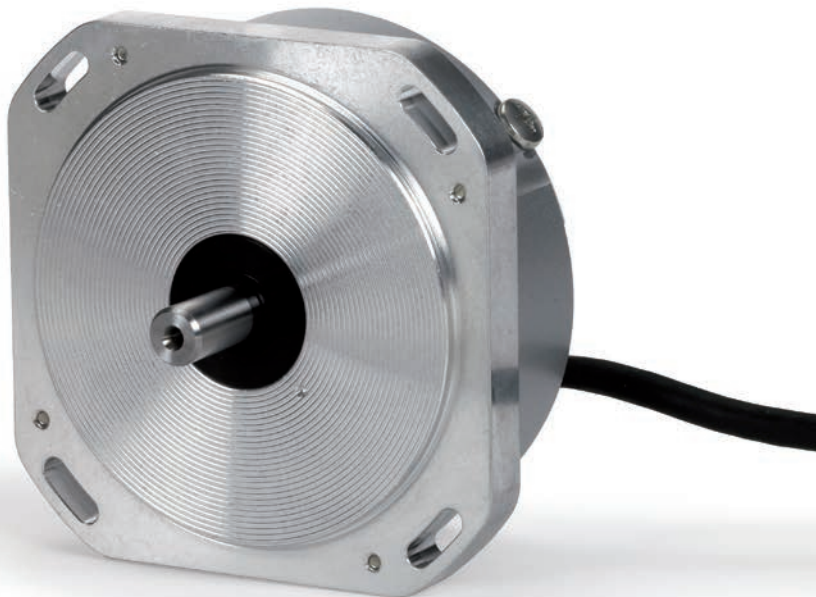




# HEIDENHAIN



Product Information

**ROD 200**

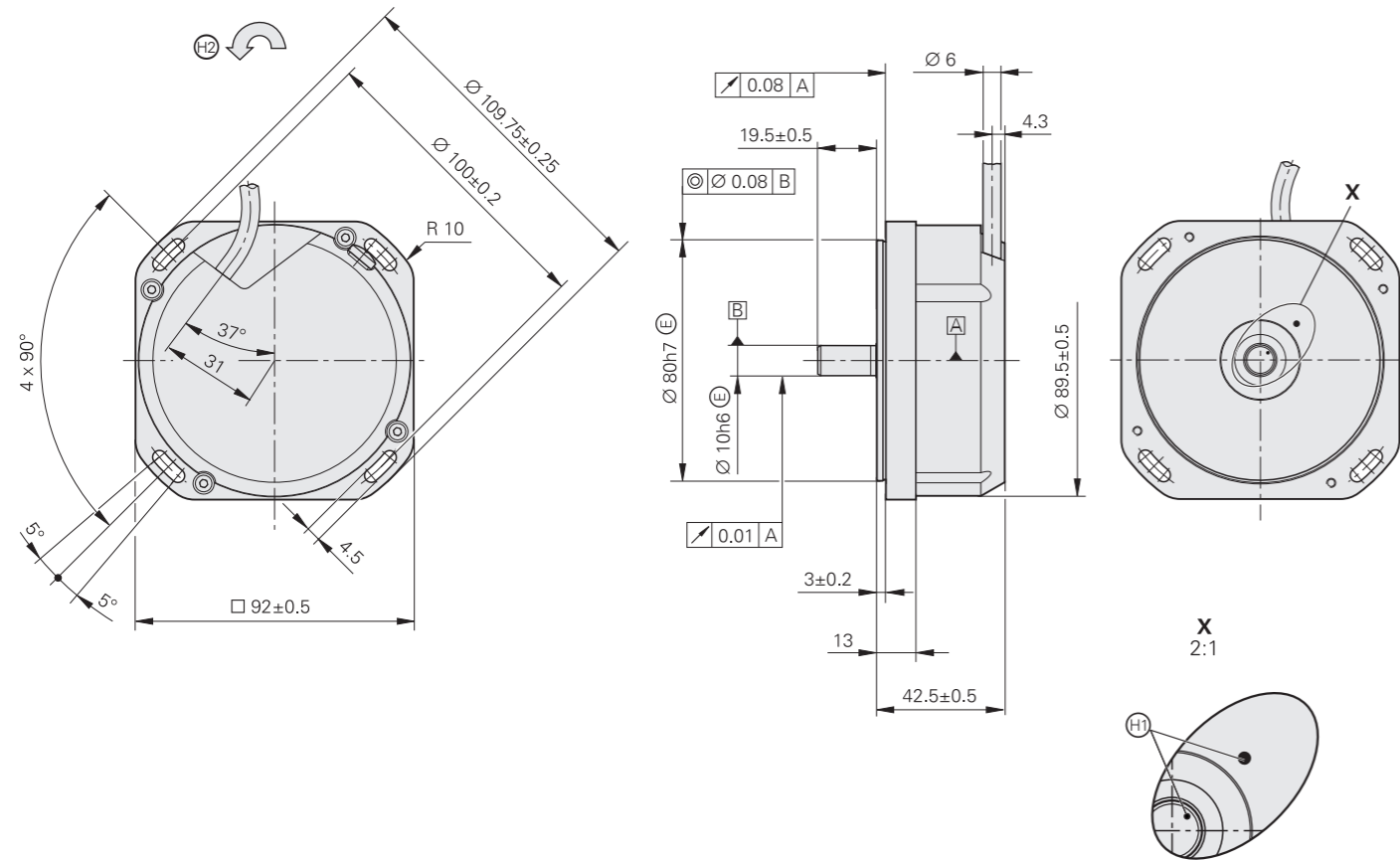
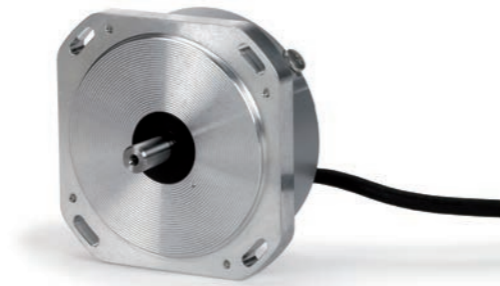
**ROD 700**

**ROD 800**

Incremental Angle Encoders  
with Integral Bearing for  
Separate Shaft Coupling

# ROD 200 series

- For a separate shaft coupling
- System accuracy:  $\pm 5''$



mm  
 Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm:  $\pm 0.2$  mm

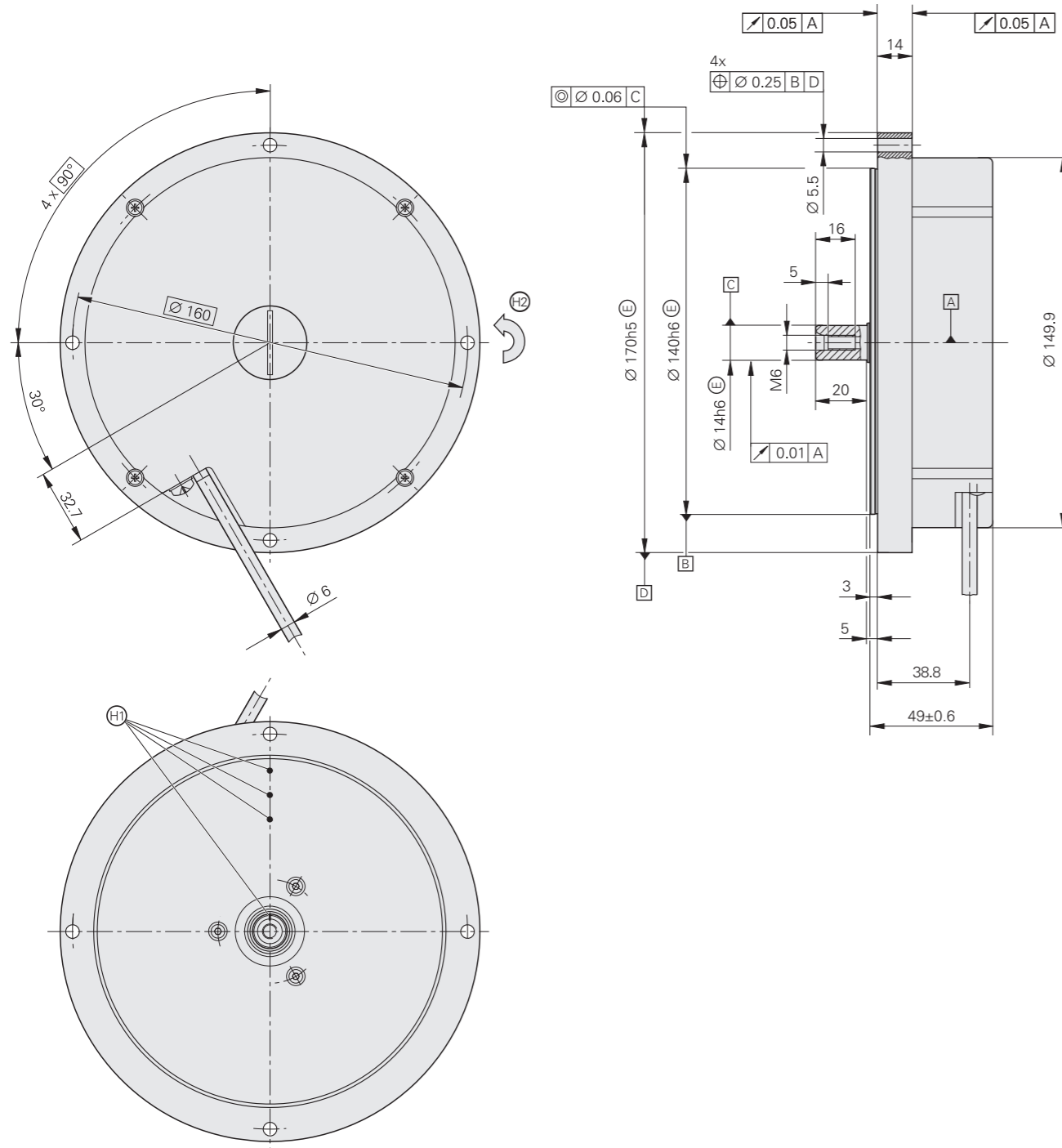
Radial cable (can also be used axially)  
 ▣ = Bearing  
 ⊕ = Position of the reference mark signal  $\pm 5''$   
 ⊗ = Direction of shaft rotation for output signals as per the interface description

	Incremental ROD 270	ROD 280
<b>Measuring standard</b>	DIADUR circular scale with incremental track	
Line count	18000	18000
<b>System accuracy</b>	$\pm 5''$	
Position error per signal period	$\leq \pm 0.7''$	
<b>Interface</b>	□TTL	$\sim 1 V_{PP}$
Integrated interpolation Output signals/rev	10-fold 180000	- 18000
Reference mark*	One	ROD 280: One ROD 280C: Distance-coded
Cutoff frequency -3 dB	-	$\geq 180$ kHz
Output frequency	$\leq 1$ MHz	-
Edge separation a	$\geq 0.22$ $\mu s$	-
Elec. permiss. shaft speed	$\leq 333$ rpm	-
<b>Electrical connection*</b>	Cable (1 m), with or without a 12-pin M23 coupling (male)	
Cable length <sup>1)</sup>	$\leq 100$ m	$\leq 150$ m
Supply voltage	DC 5 V $\pm 0.5$ V / $\leq 150$ mA (without load)	
<b>Shaft</b>	Solid shaft D = 10 mm	
Mech. permissible speed	$\leq 10000$ rpm	
Starting torque	$\leq 0.01$ Nm at 20 °C	
Moment of inertia of rotor	$20 \cdot 10^{-6}$ kgm <sup>2</sup>	
Shaft load	Axial: 10 N Radial: 10 N at shaft end	
<b>Vibration</b> 55 Hz to 2000 Hz <b>Shock</b> 6 ms	$\leq 100$ m/s <sup>2</sup> (EN 60068-2-6) $\leq 200$ m/s <sup>2</sup> (EN 60068-2-27)	
<b>Operating temperature</b>	Frequent flexing: -10 °C to 70 °C Stationary cable: -20 °C to 70 °C	
<b>Protection</b> EN 60529	IP64	
<b>Mass</b>	$\approx 0.7$ kg	

\* Please select when ordering  
 1) With HEIDENHAIN cable

# ROD 780/ROD 880

- For a separate shaft coupling
- System accuracy:  $\pm 1''$  or  $\pm 2''$



	Incremental ROD 780	ROD 880
<b>Measuring standard</b>	DIADUR circular scale with incremental track	
Line count*	18000 36000	36000
<b>System accuracy</b>	$\pm 2''$	
Position error per signal period	18000 lines: $\leq \pm 0.7''$ 36000 lines: $\leq \pm 0.35''$	$\leq \pm 0.35''$
<b>Interface</b>	$\sim 1 V_{PP}$	
Reference mark*	ROD x80: One ROD x80 C: Distance-coded	
Cutoff frequency -3 dB	$\geq 180$ kHz	
<b>Electrical connection*</b>	Cable (1 m), with or without a 12-pin M23 coupling (male)	
Cable length <sup>1)</sup>	$\leq 150$ m	
Supply voltage	DC 5 V $\pm 0.5$ V / $\leq 150$ mA (without load)	
<b>Shaft</b>	Solid shaft D = 14 mm	
Mech. permissible speed	$\leq 1000$ rpm	
Starting torque	$\leq 0.012$ Nm at 20 °C	
Moment of inertia of rotor	$0.36 \cdot 10^{-3}$ kgm <sup>2</sup>	
Shaft load	Axial: 30 N Radial: 30 N at shaft end	
<b>Vibration</b> 55 Hz to 2000 Hz <b>Shock</b> 6 ms	$\leq 100$ m/s <sup>2</sup> (EN 60068-2-6) $\leq 200$ m/s <sup>2</sup> (EN 60068-2-27)	
<b>Operating temperature</b>	0 °C to 50 °C	
<b>Protection</b> EN 60529	IP64	
<b>Mass</b>	$\approx 2.4$ kg	

\* Please select when ordering  
<sup>1)</sup> With HEIDENHAIN cable

mm  
  
 Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm:  $\pm 0.2$  mm

Radial cable (can also be used axially)  
  
 = Bearing  
 1 = Position of the reference mark signal  $\pm 5^\circ$   
 2 = Direction of shaft rotation for ascending position values

# Mounting

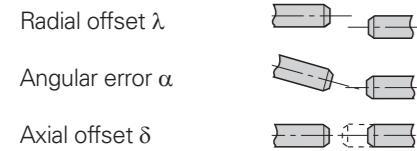
Angle encoders of the **ROD** product family require a separate coupling for connection to the drive shaft. The shaft coupling compensates for axial movement and misalignment between the shafts, thereby preventing excessive encoder bearing loads. For realizing high accuracies, it is necessary that the shaft of the angle encoder be optimally aligned with the shaft of the machine. The HEIDENHAIN product portfolio includes diaphragm couplings and flat couplings designed for connecting the shaft of the ROD angle encoder to the drive shaft.

## Mounting

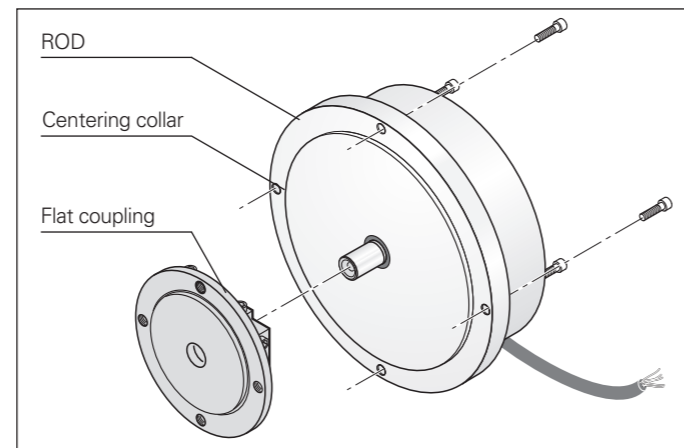
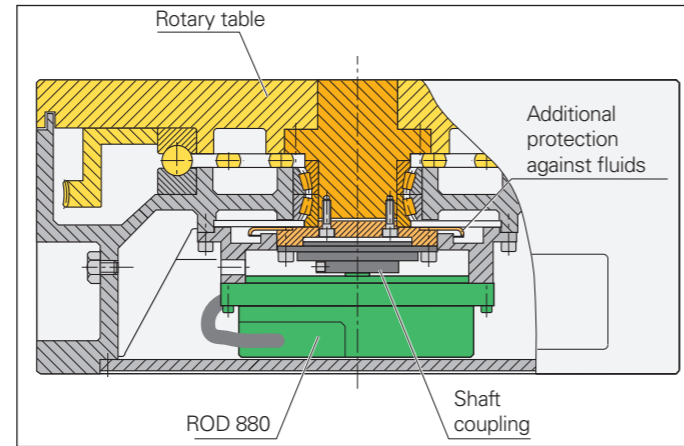
ROD angle encoders have an integral mounting flange with a centering collar. The encoder shaft is connected to the machine shaft by means of a diaphragm coupling or flat coupling.

## Shaft couplings

The shaft coupling compensates for axial movement and misalignment between the encoder shaft and the drive shaft, thereby preventing excessive encoder bearing loads.



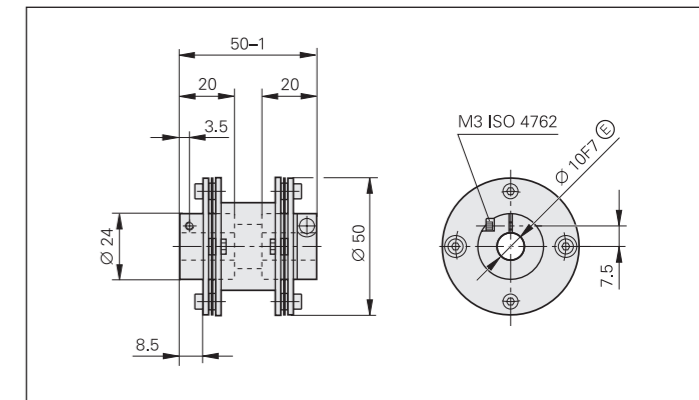
Mounting example for the ROD 880



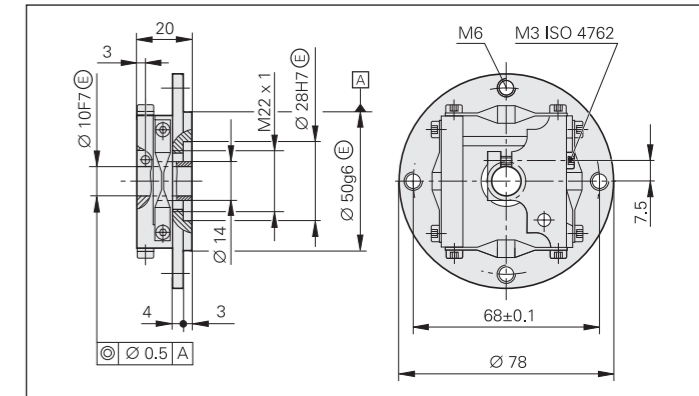
Mounting an ROD with a flat coupling

Shaft coupling	ROD 200 series		ROD 700 series, ROD 800 series		
	K 03 Diaphragm coupling	K 18 Flat coupling	K 01 Diaphragm coupling	K 15 Flat coupling	K 16 Flat coupling
Hub bore	10 mm		14 mm		
Kinematic transfer error	$\pm 2''$ At $\lambda \leq 0.1$ mm and $\alpha \leq 0.09^\circ$		$\pm 1''$	$\pm 0.5''$ At $\lambda \leq 0.05$ mm and $\alpha \leq 0.03^\circ$	
Torsional rigidity	1500 Nm/rad	1200 Nm/rad	4000 Nm/rad	6000 Nm/rad	4000 Nm/rad
Permissible torque	0.2 Nm	0.5 Nm			
Perm. radial offset $\lambda$	$\leq 0.3$ mm				
Perm. angular error $\alpha$	$\leq 0.5^\circ$			$\leq 0.2^\circ$	$\leq 0.5^\circ$
Perm. axial offset $\delta$	$\leq 0.2$ mm			$\leq 0.1$ mm	$\leq 1$ mm
Moment of inertia (approx.)	$20 \cdot 10^{-6}$ kgm <sup>2</sup>	$75 \cdot 10^{-6}$ kgm <sup>2</sup>	$200 \cdot 10^{-6}$ kgm <sup>2</sup>		$400 \cdot 10^{-6}$ kgm <sup>2</sup>
Permissible shaft speed	10000 rpm	1000 rpm	3000 rpm	1000 rpm	
Tightening torque of clamping screws (approx.)	1.2 Nm		2.5 Nm	1.2 Nm	
Mass	100 g	117 g	180 g	250 g	410 g

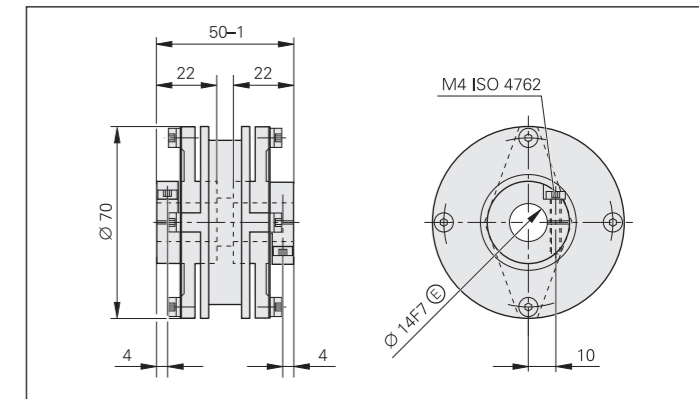
## K 03 diaphragm coupling ID 200313-04



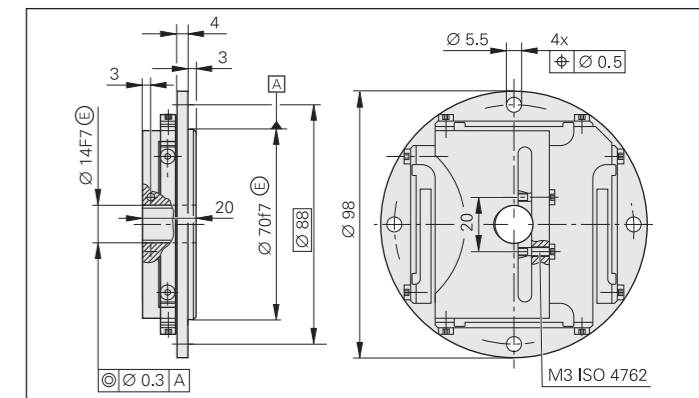
## K 18 flat coupling ID 202227-01



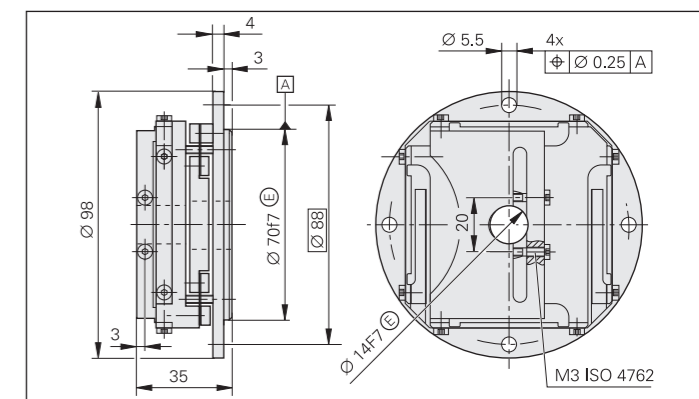
## K 01 diaphragm coupling ID 200301-02



## K 15 flat coupling ID 255797-01



## K 16 flat coupling ID 258878-01



mm  
  
 Tolerancing ISO 8015  
 ISO 2768:1989-mH  
 $\leq 6$  mm:  $\pm 0.2$  mm

# Interfaces

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

## Pin layout

<b>12-pin M23 coupling</b>				<b>12-pin M23 connector</b>									
<b>15-pin D-sub connector</b> for HEIDENHAIN controls and the IK 220				<b>15-pin D-sub connector</b> at the encoder or for the PWM									
	Power supply				Incremental signals				Other signals				
	12	2	10	11	5	6	8	1	3	4	9	7	/
	1	9	2	11	3	4	6	7	10	12	5/8/13/15	14	/
	4	12	2	10	1	9	3	11	14	7	5/6/8/15	13	/
	U <sub>P</sub>	Sensor <sup>1)</sup> U <sub>P</sub>	0V	Sensor <sup>1)</sup> 0V	A+	A-	B+	B-	R+	R-	Vacant	Vacant	Vacant
	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!

<sup>1)</sup> LIDA 2xx: Vacant

# TTL incremental signals

## Pin layout

<b>12-pin M23 coupling</b>				<b>12-pin M23 connector</b>									
<b>15-pin D-sub connector</b> for HEIDENHAIN controls and the IK 220				<b>15-pin D-sub connector</b> at the encoder or for the PWM									
	Power supply				Incremental signals				Other signals				
	12	2	10	11	5	6	8	1	3	4	7	/	9 <sup>3)</sup>
	1	9	2	11	3	4	6	7	10	12	14	8/13/15	5
	4	12	2	10	1	9	3	11	14	7	13	5/6/8	15 <sup>3)</sup>
	U <sub>P</sub>	Sensor <sup>1)</sup> U <sub>P</sub>	0V	Sensor <sup>1)</sup> 0V	U <sub>a1</sub>	U <sub>a1</sub>	U <sub>a2</sub>	U <sub>a2</sub>	U <sub>a0</sub>	U <sub>a0</sub>	U <sub>aS</sub> <sup>2)</sup>	Vacant	Vacant
	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!

<sup>1)</sup> LIDA 2xx: Vacant / <sup>2)</sup> ERO 14xx: Vacant

<sup>3)</sup> **Exposed linear encoders:** Conversion from TTL to 11 μA<sub>PP</sub> for the PWT, otherwise unassigned

## HEIDENHAIN

**DR. JOHANNES HEIDENHAIN GmbH**

Dr.-Johannes-Heidenhain-Straße 5

**83301 Traunreut, Germany**

+49 8669 31-0

+49 8669 32-5061

info@heidenhain.de

[www.heidenhain.com](http://www.heidenhain.com)

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 placed.

### More information:

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

- Brochure: *Angle Encoders with Integral Bearing* 591109-xx
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx
- Brochure: *Cables and Connectors* 1206103-12

For brochures and Product Information documents, visit [www.heidenhain.com](http://www.heidenhain.com).