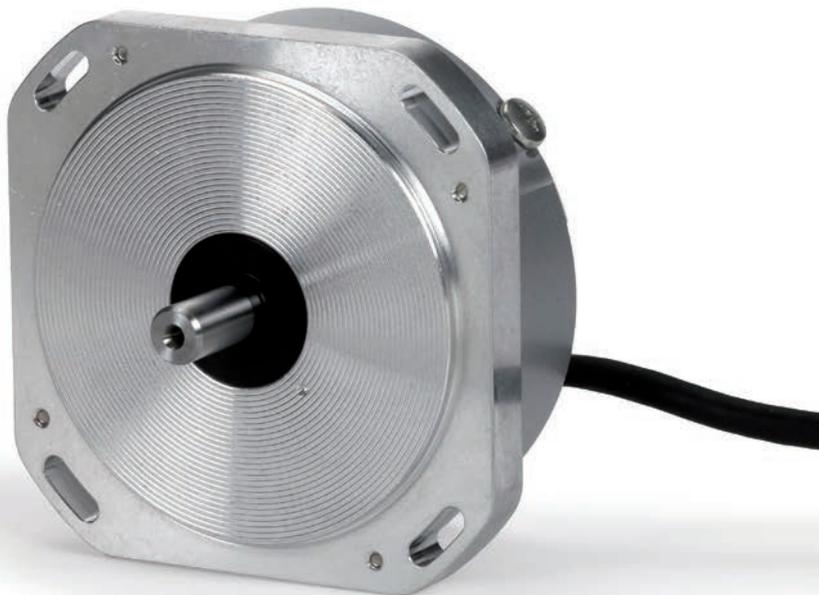# HEIDENHAIN

Product Information

ROD 200
ROD 700
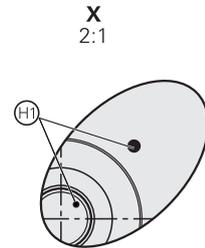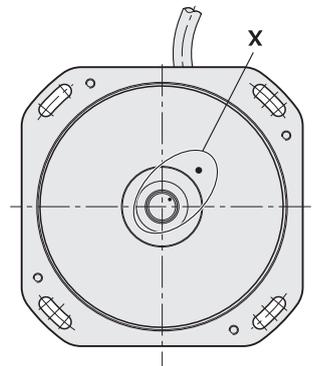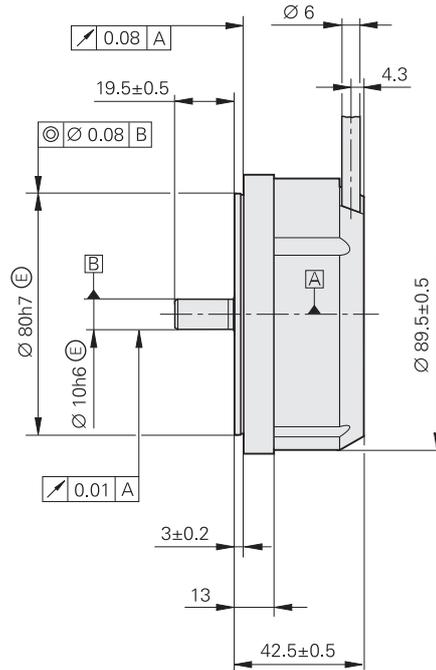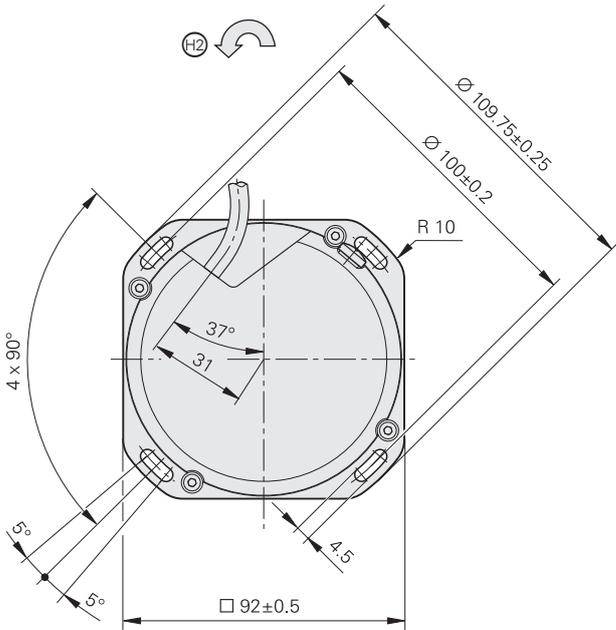# ROD 800

Incremental Angle Encoders
with Integral Bearing for
Separate Shaft Coupling

ROD 200 series

- **For a separate shaft coupling**
- **System accuracy: ±5″**

Ø 109.75±0.25
Ø 100±0.2
R 10
37°
31
4.5
4 x 90°
5°
5°
□ 92±0.5
H2

0.08 A
Ø 6
4.3
19.5±0.5
Ø 0.08 B
Ø 80h7 Ⓔ
B
A
Ø 10h6 Ⓔ
0.01 A
3±0.2
13
42.5±0.5
Ø 89.5±0.5
X
X
2:1
H1

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

Radial cable (can also be used axially)
Ⓐ = Bearing
⊕ = Position of the reference mark signal ±5°
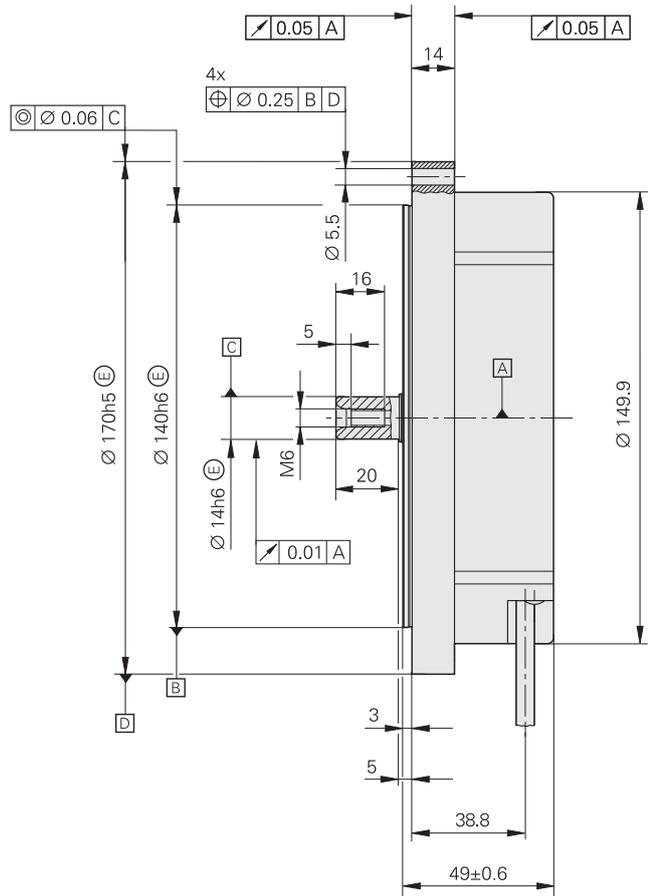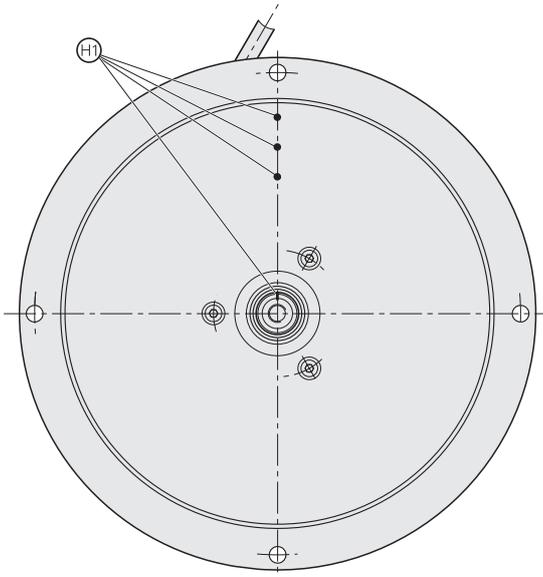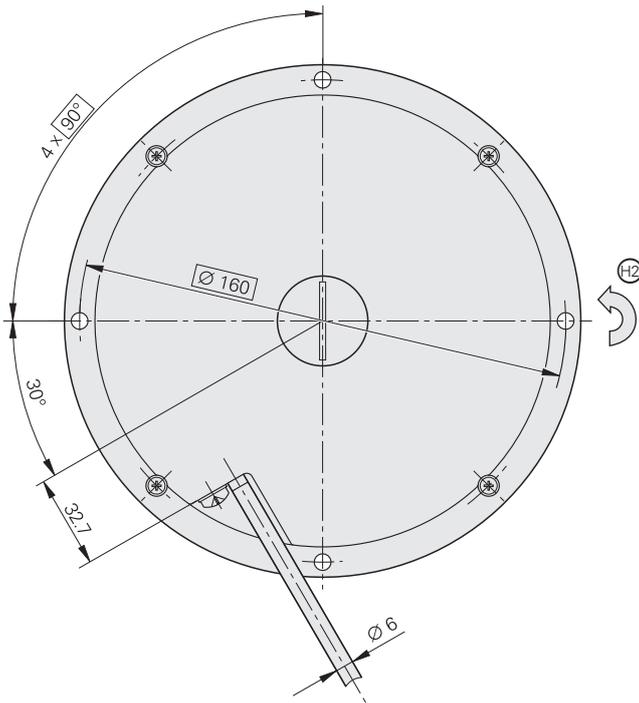⊙ = Direction of shaft rotation for output signals as per the interface description

	Incremental ROD 270	ROD 280
Measuring standard	DIADUR circular scale with incremental track	
Line count	18 000	18 000
System accuracy	±5″	
Position error per signal period	≤ ±0.7″	
Interface	⎍ TTL	∿ 1 V$_{PP}$
Integrated interpolation Output signals/rev	10-fold 180 000	– 18 000
Reference mark*	One	ROD 280: One ROD 280 C: Distance-coded
Cutoff frequency –3 dB Output frequency Edge separation a	– ≤ 1 MHz ≥ 0.22 µs	≥ 180 kHz – –
Elec. permiss. shaft speed	≤ 333 rpm	–
Electrical connection*	Cable (1 m), with or without a 12-pin M23 coupling (male)	
Cable length[1]	≤ 100 m	≤ 150 m
Supply voltage	DC 5 V ±0.5 V/≤ 150 mA (without load)	
Shaft	Solid shaft D = 10 mm	
Mech. permissible speed	≤ 10 000 rpm	
Starting torque	≤ 0.01 Nm at 20 °C	
Moment of inertia of rotor	$20 \cdot 10^{-6}$ kgm^2	
Shaft load	Axial: 10 N Radial: 10 N at shaft end	
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 100 m/s^2 (EN 60068-2-6) ≤ 200 m/s^2 (EN 60068-2-27)	
Operating temperature	Frequent flexing: –10 °C to 70 °C Stationary cable: –20 °C to 70 °C	
Protection EN 60529	IP64	
Mass	≈ 0.7 kg	

* Please select when ordering
[1] With HEIDENHAIN cable

ROD 780/ROD 880

- **For a separate shaft coupling**
- **System accuracy: ±1″ or ±2″**

Ø 160

4 × 90°

30°

32.7

Ø 6

H1

H2

0.05 A   14   0.05 A

4x
⊕ Ø 0.25 B D

◎ Ø 0.06 C

Ø 5.5

16

5

C

Ø 170h5 (E)

Ø 140h6 (E)

Ø 14h6 (E)

A

Ø 149.9

M6

20

0.01 A

B

D

3

5

38.8

49±0.6

Radial cable (can also be used axially)
Ⓐ = Bearing
1 = Position of the reference mark signal ±5°
2 = Direction of shaft rotation for ascending position values

	Incremental **ROD 780**	**ROD 880**
Measuring standard	DIADUR circular scale with incremental track	
Line count*	18000 36000	36000
System accuracy	±2″	±1″
Position error per signal period	*18000 lines:* ≤ ±0.7″ *36000 lines:* ≤ ±0.35″	≤ ±0.35″
Interface	$\sim$ 1 V_{PP}	
Reference mark*	*ROD x80:* One *ROD x80C:* Distance-coded	
Cutoff frequency –3 dB	≥ 180 kHz	
Electrical connection*	Cable (1 m), with or without a12-pin M23 coupling (male)	
Cable length[1]	≤ 150 m	
Supply voltage	DC 5 V ±0.5 V/≤ 150 mA (without load)	
Shaft	Solid shaft D = 14 mm	
Mech. permissible speed	≤ 1000 rpm	
Starting torque	≤ 0.012 Nm at 20 °C	
Moment of inertia of rotor	$0.36 \cdot 10^{-3}$ kgm^2	
Shaft load	*Axial:* 30 N *Radial:* 30 N at shaft end	
Vibration 55 Hz to 2000 Hz **Shock** 6 ms	≤ 100 m/s^2 (EN 60068-2-6) ≤ 200 m/s^2 (EN 60068-2-27)	
Operating temperature	0 °C to 50 °C	
Protection EN 60529	IP64	
Mass	≈ 2.4 kg	

* Please select when ordering
[1] With HEIDENHAIN cable

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.
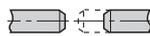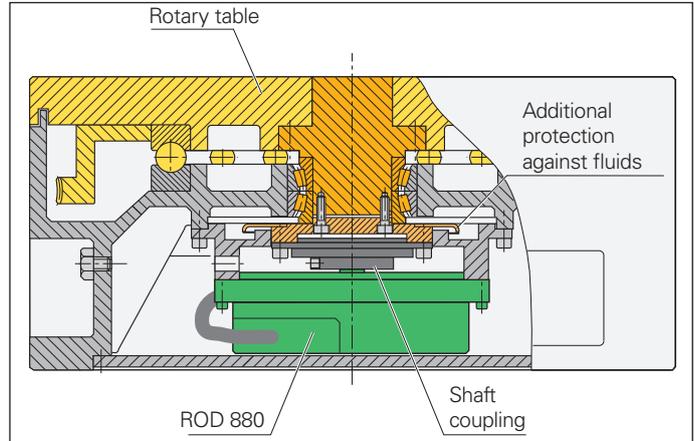
Radial offset λ
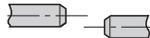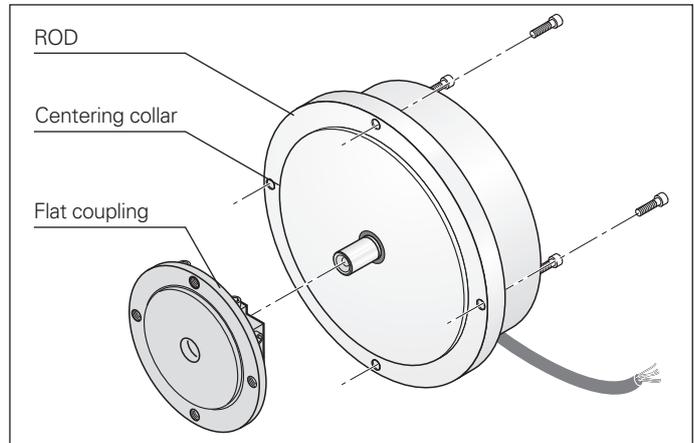
Angular error α

Axial offset δ

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 $\alpha \leq 0.09°$	$\pm 3''$	$\pm 1''$	$\pm 0.5''$ At $\lambda \leq 0.05$ mm and $\alpha \leq 0.03°$	
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 λ	≤ 0.3 mm				
Perm. angular error α	$\leq 0.5°$			$\leq 0.2°$	$\leq 0.5°$
Perm. axial offset δ	≤ 0.2 mm			≤ 0.1 mm	≤ 1 mm
Moment of inertia (approx.)	$20 \cdot 10^{-6}$ kgm^2	$75 \cdot 10^{-6}$ kgm^2	$200 \cdot 10^{-6}$ kgm^2		$400 \cdot 10^{-6}$ kgm^2
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
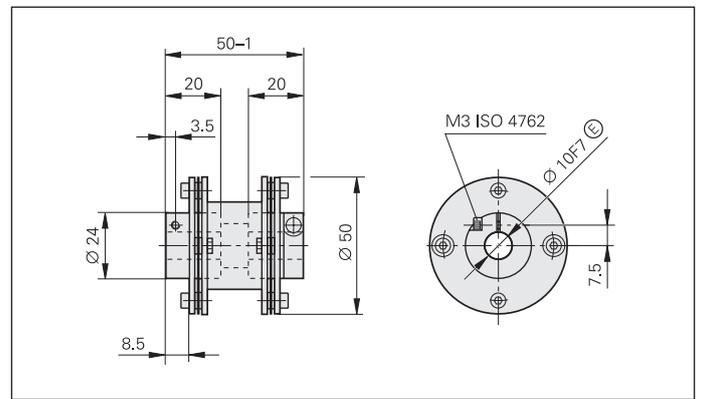
K 18 flat coupling
ID 202227-01
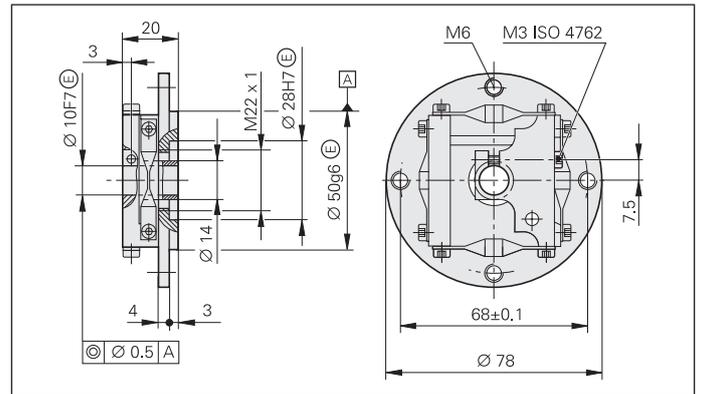
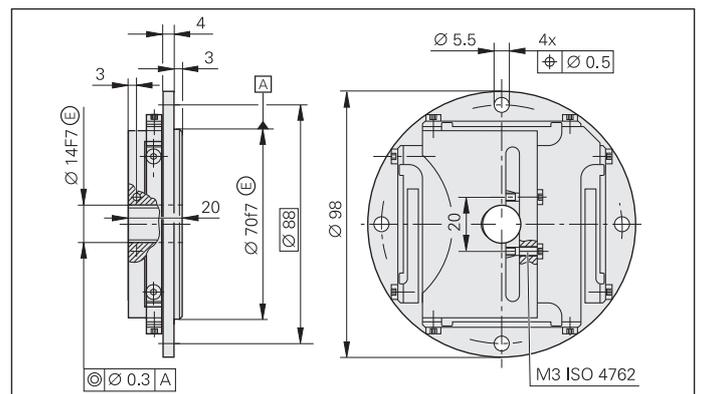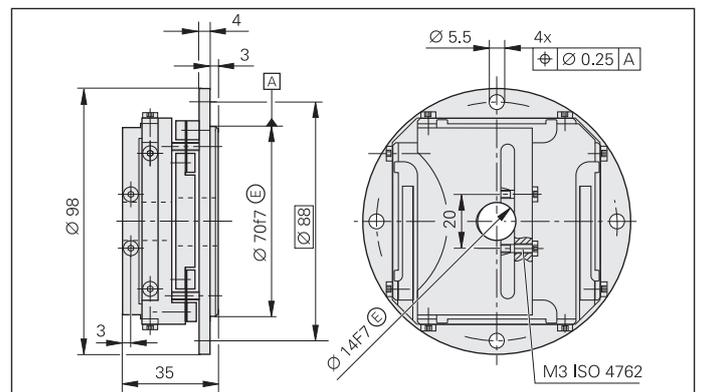
K 01 diaphragm coupling
ID 200301-02
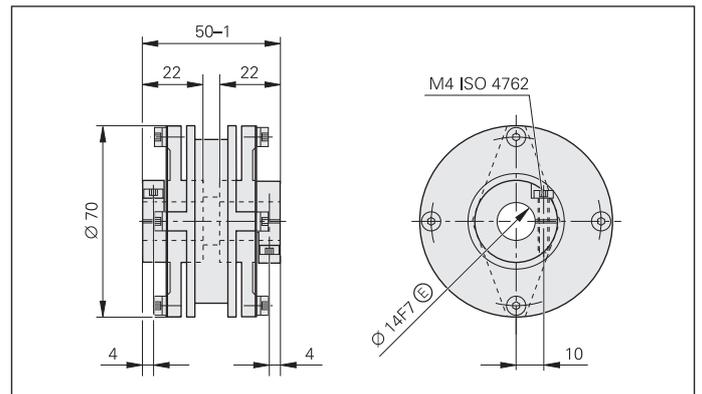
K 15 flat coupling
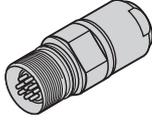ID 255797-01

K 16 flat coupling
ID 258878-01

mm

Tolerancing ISO 8015
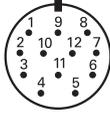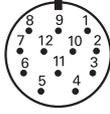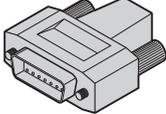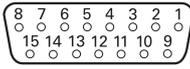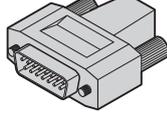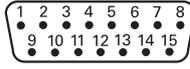ISO 2768:1989-mH
≤ 6 mm: ±0.2 mm

Interfaces

〜 1 V_PP incremental signals

Pin layout

12-pin M23 coupling		12-pin M23 connector	

15-pin D-sub connector for HEIDENHAIN controls and the IK 220		15-pin D-sub connector 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_P	Sensor[1] U_P	0 V	Sensor[1] 0 V	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_P = Power supply voltage
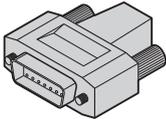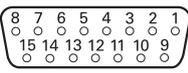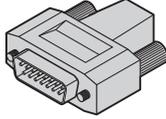**Sensor:** The sense line is connected in the encoder with the corresponding power line.
Vacant pins or wires must not be used!
[1] **LIDA 2xx:** Vacant

⎍TTL incremental signals

Pin layout

12-pin M23 coupling	12-pin M23 connector

15-pin D-sub connector for HEIDENHAIN controls and the IK 220	15-pin D-sub connector at the encoder or for the PWM

	Power supply				Incremental signals						Other signals		
▭ ▭	12	2	10	11	5	6	8	1	3	4	7	/	$9^{3)}$
⊐	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	$15^{3)}$
	U_P	$Sensor^{1)}$ U_P	0 V	$Sensor^{1)}$ 0 V	U_{a1}	$\overline{U_{a1}}$	U_{a2}	$\overline{U_{a2}}$	U_{a0}	$\overline{U_{a0}}$	$\overline{U_{aS}}^{2)}$	Vacant	Vacant
▭	Brown/ Green	Blue	White/ Green	White	Brown	Green	Gray	Pink	Red	Black	Violet	/	Yellow

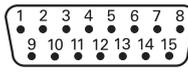**Cable shield** connected to housing; U_P = Power supply voltage
Sensor: The sense line is connected in the encoder with the corresponding power line.
Vacant pins or wires must not be used!
[1] **LIDA 2xx:** Vacant   /   [2] **ERO 14xx:** Vacant
[3] **Exposed linear encoders:** Conversion from TTL to 11 µA$_{PP}$ for the PWT, otherwise unassigned

HEIDENHAIN

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.*