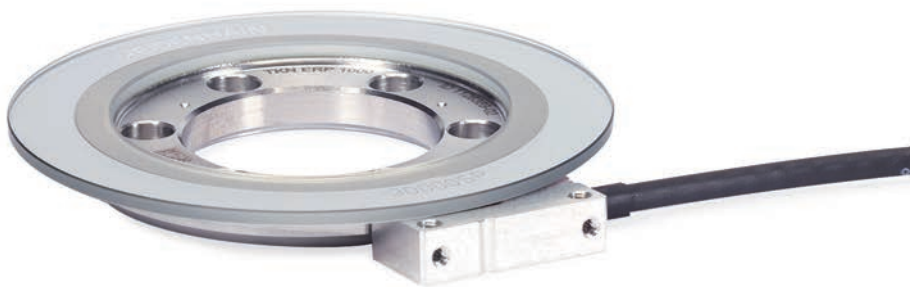




HEIDENHAIN



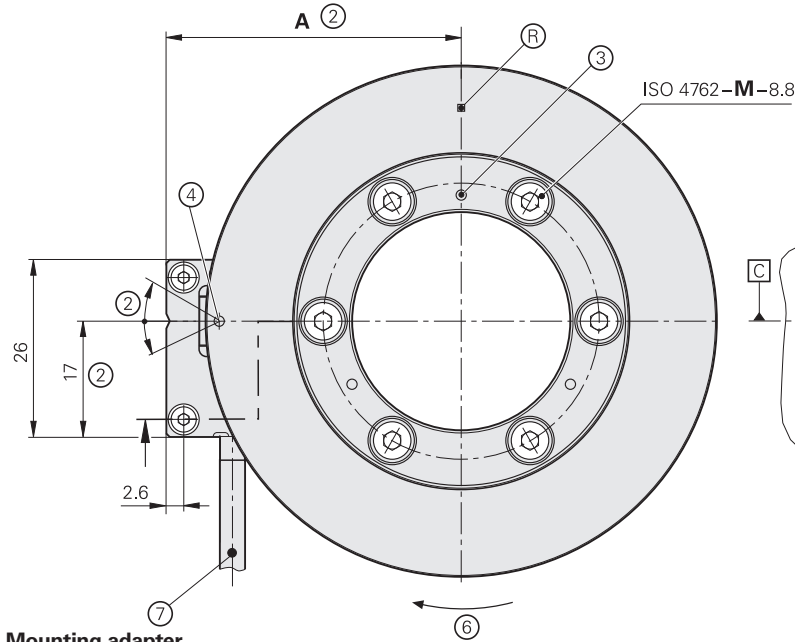
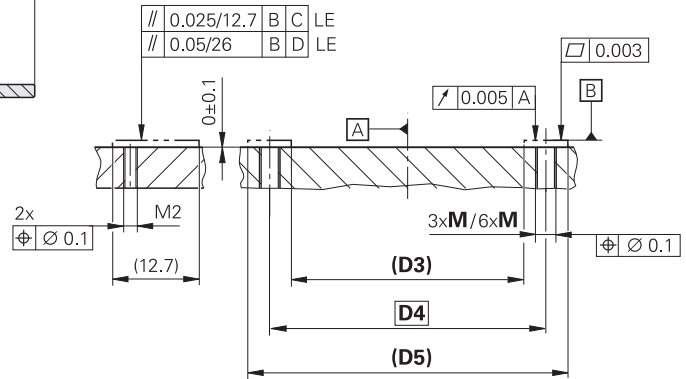
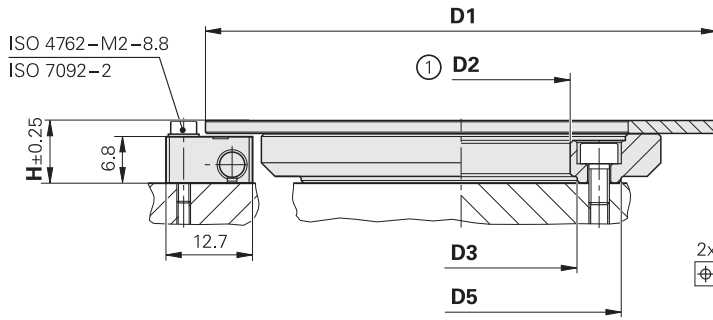
Product Information

ERP 1000 Series

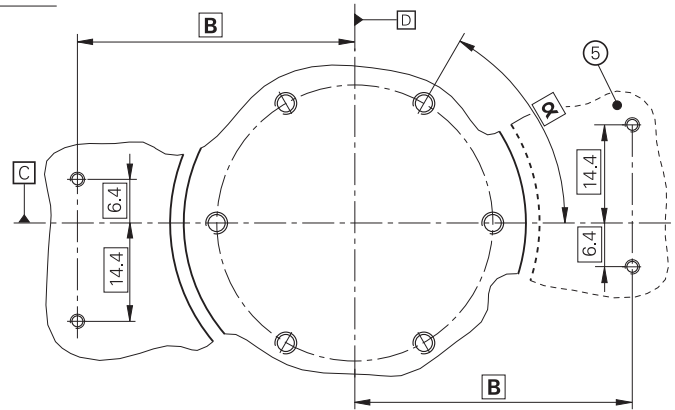
Angle Encoders without
Integral Bearing

ERP 1000 series

- Very high resolution and accuracy
- Low mass and low mass moment of inertia
- Consisting of AK scanning head and TKN circular scale



Mounting adapter



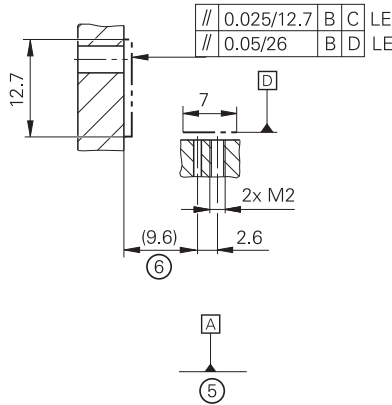
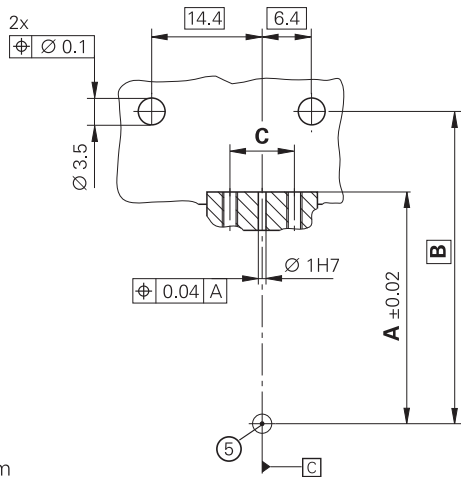
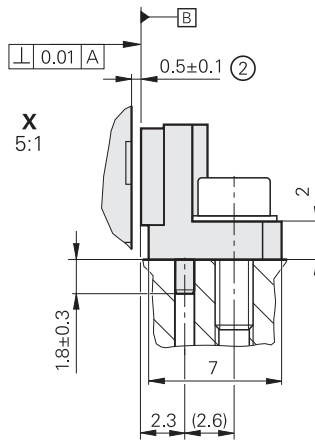
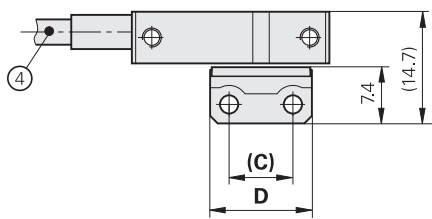
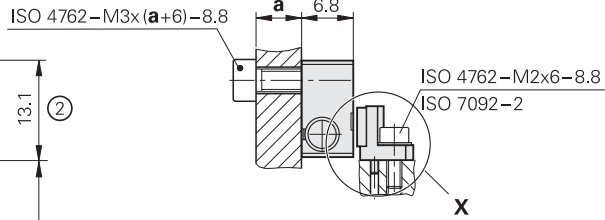
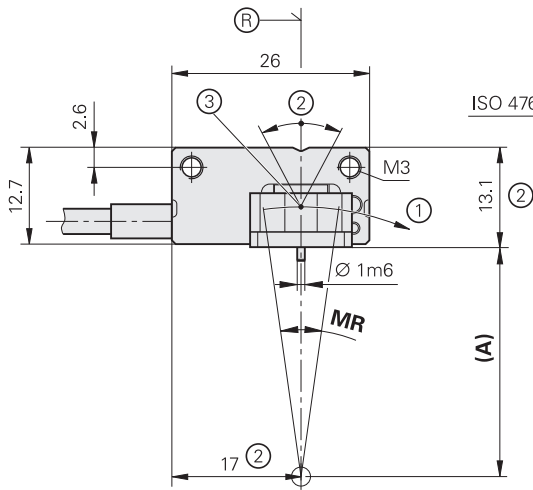
mm

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

- ▢ = Bearing
- Ⓜ = Reference mark
- 1 = Centering collar
- 2 = Fine adjustment of the scanning head to obtain optimum incremental signals
- 3 = Marks for circular scale centering (3x 120°)
- 4 = Optical centering point
- 5 = For centering of circular scale with two scanning heads
- 6 = Positive direction of rotation
- 7 = Alternative cable outlet and connector are available

LE = Line element (ISO 1101: 2008)
 SP = Signal periods

SP/360°	23000	30000	50000	63000
A	34.08	43.3	60.05	81.05
B	31.48	40.7	57.45	78.45
D1	∅ 57	∅ 75	∅ 109	∅ 151
D2	∅ 13H6	∅ 32H6	∅ 62H6	∅ 104H6
D3	∅ 15.1	∅ 34.1	∅ 64.5	∅ 106.5
D4	∅ 21.5	∅ 40.5	∅ 72	∅ 114
D5	∅ 27.9	∅ 46.9	∅ 79.5	∅ 121.5
H	9.2	9.2	10.2	10.2
α	3x 120° = 360°	6x 60° = 360°	6x 60° = 360°	6x 60° = 360°
M	M3	M3	M4	M4



mm

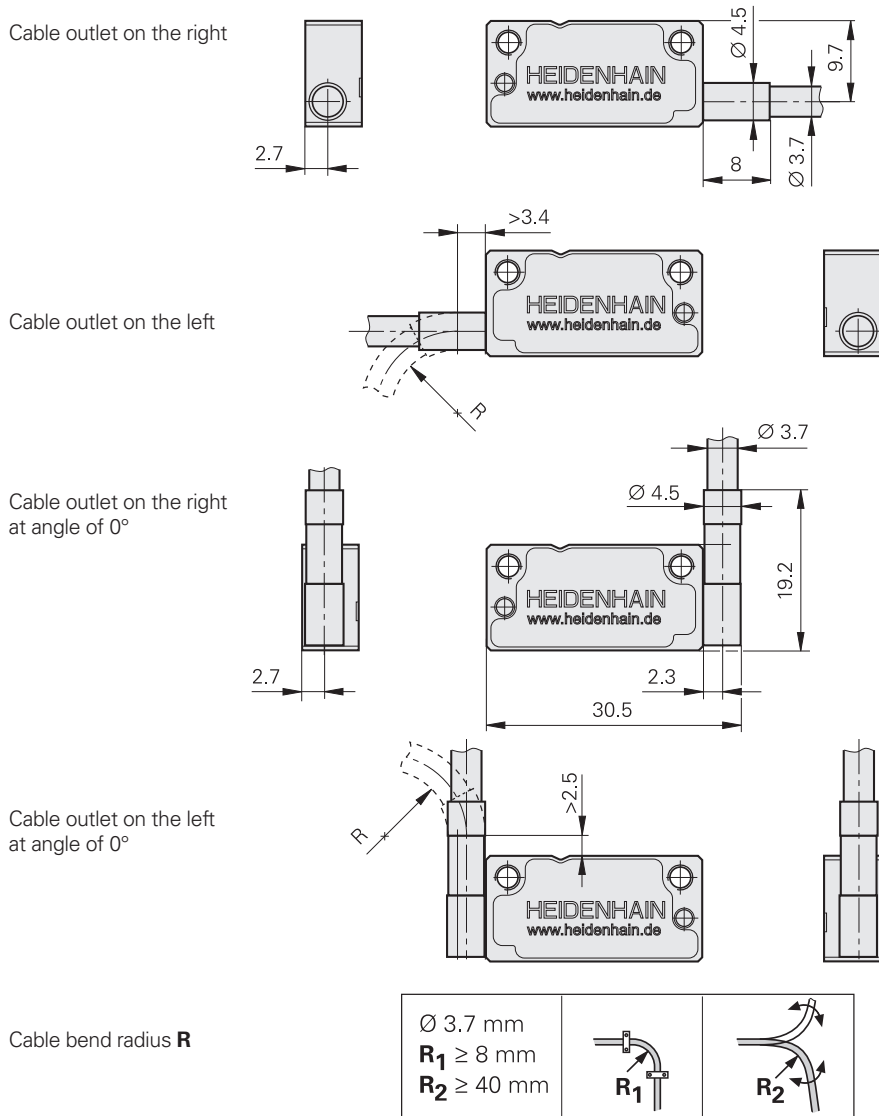
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

- ⊠ = Bearing
- Ⓜ = Position of the reference mark
- 1 = Positive direction of rotation
- 2 = Fine adjustment of the scanning head to obtain optimum incremental signals
- 3 = Optical centering point
- 4 = Alternative cable outlet and connector are available
- 5 = Center of rotation
- 6 = Adjustable

LE = Line element (ISO 1101: 2008)
SP = Signal periods
MR = Measuring range
MR* = Required range for electronic fine adjustment

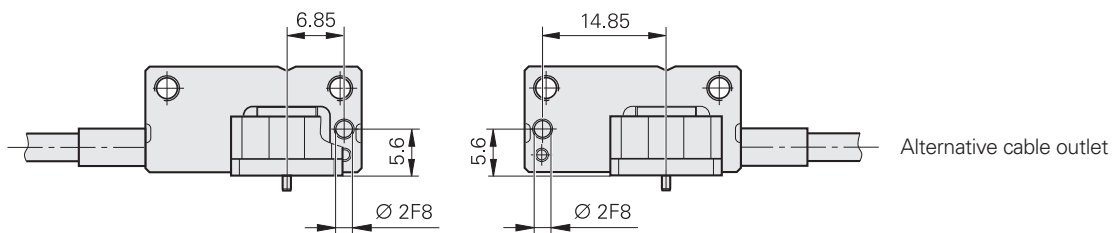
SP/360°	23000			30000			50000			63000		
MR	10°	23°	36°	8°	16°	31°	5°	11°	21°	4°	8°	15°
MR*	6.6°			5.2°			3.2°			2.4°		
A	20.98			30.2			46.95			67.95		
B	31.48			40.7			57.45			78.45		
C	5	8.4	13	5	8.4	13	5	8.4	13	5	8.4	13
D	10	13.4	22.9	10	13.4	22.9	10	13.4	22.9	10	13.4	22.9

Cable outlets



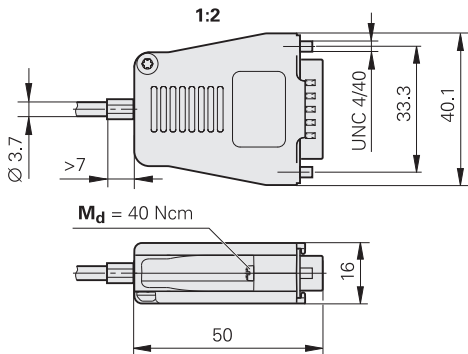
Pre-adjustment

Optional pre-adjustment of the scanning head using a pin ($\text{Ø } 2 \text{ mm}$).

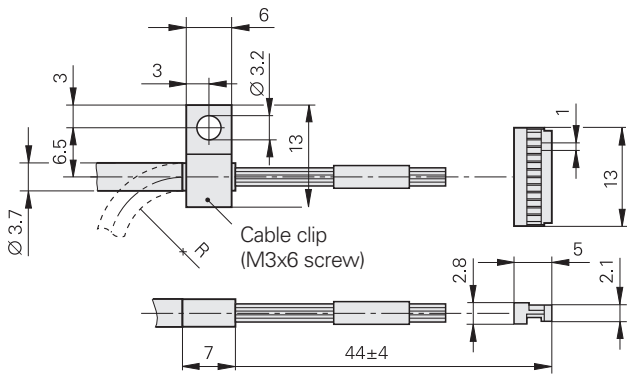


Connectors

D-SUB $\sim 1 V_{PP}$ and TTL

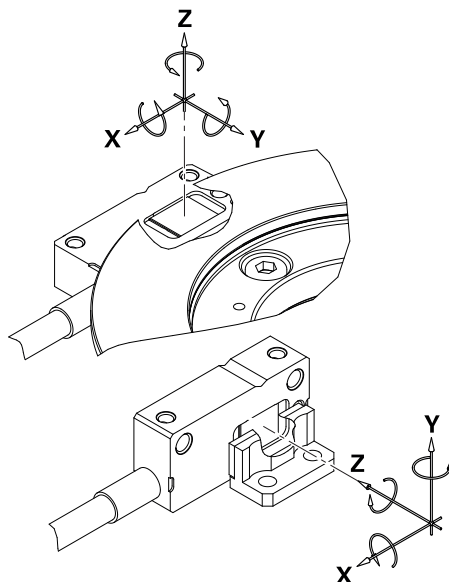


SHR-12V-S $\sim 1 V_{PP}$



Operating tolerances

Operating tolerances after optimum mounting (in combination)



Signal periods/ 360°	23000	30000	50000	63000
	For incremental signals			
X	± 0.06	± 0.08	± 0.1	± 0.12
Y	± 0.06	± 0.08	± 0.1	± 0.12
Z	± 0.2			
R _x	± 5mrad			
R _y	± 5mrad			
R _z	± 3mrad			
	At the reference mark position			
X	± 0.015	± 0.025	± 0.035	± 0.045
Y	± 0.015	± 0.025	± 0.035	± 0.045
Z	± 0.1			
R _x	± 2mrad			
R _y	± 2mrad			
R _z	± 0.3mrad			

Specifications

Scanning head		AK ERP 1070						
Interface	□□TTL							
Reference mark signal	Square-wave pulse							
Integrated interpolation*	1-fold ¹⁾	5-fold	10-fold	25-fold	50-fold	100-fold	500-fold	1000-fold
Scanning frequency ²⁾	≤ 450 kHz	≤ 312.5 kHz		≤ 250 kHz	≤ 125 kHz	≤ 62.5 kHz	≤ 12.5 kHz	≤ 6.25 kHz
Edge separation a	≥ 0.125 μs	≥ 0.135 μs	≥ 0.07 μs	≥ 0.03 μs				
Electrical connection	15-pin D-sub connector (male) with 0.5 m/1 m/1.5 m cable; interface electronics in the connector; cable outlet on the left/right and straight/angled							
Cable length	With HEIDENHAIN cable: ≤ 20 m; during signal adjustment using PWM 21: ≤ 3 m							
Voltage supply	DC 5 V ±0.5 V							
Current consumption	≤ 300 mA (without load)							
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 500 m/s ² (EN 60068-2-6) ≤ 1000 m/s ² (EN 60068-2-27)							
Operating temperature	-10 °C to 70 °C							
Protection	IP50							
Mass	Scanning head	≈ 5 g (without cable)						
	Connector	≈ 74 g						
	Cable	≈ 22 g/m						

Scanning head		AK ERP 1080						
Interface	~ 1 V _{PP}							
Reference mark signal	Square-wave pulse							
Cutoff frequency -3 dB	≥ 1 MHz							
Electrical connection	15-pin D-sub connector (male) with 0.5 m/1 m/1.5 m/3 m cable 12-pin SHR-12V-S connector (female) with 0.5 m/1 m/1.5 m/3 m cable Cable outlet on the left/right and straight/angled							
Cable length	With HEIDENHAIN cable: ≤ 20 m; during signal adjustment using PWM 21: ≤ 3 m							
Voltage supply	DC 5 V ±0.5 V							
Current consumption	≤ 150 mA (without load)							
Vibration 55 Hz to 2000 Hz Shock 6 ms	≤ 500 m/s ² (EN 60068-2-6) ≤ 1000 m/s ² (EN 60068-2-27)							
Operating temperature	-10 °C to 70 °C							
Protection	IP50							
Mass	Scanning head	≈ 5 g (without cable)						
	Connector	≈ 71 g						
	Cable	≈ 22 g/m						

* Please select when ordering

¹⁾ Suitable for applications that measure the time between individual TTL output signal edges; non-clocked output signals provide for a lower amount of edge jitter

²⁾ Maximum scanning frequency during referencing: 70 kHz

Circular scale	TKN ERP 1000 (full circle)			
Measuring standard	OPTODUR graduation on glass			
Signal periods*	23 000	30 000	50 000	63 000
Accuracy of graduation ²⁾	±4''	±3''	±1.8''	±1.5'' or ±0.9''
Interpolation error ²⁾	±0,06''	±0.04''	±0.025''	±0.02''
Position noise RMS (1 MHz)	0.006''	0.004''	0.003''	0.002''
Reference marks	One			
Hub inside diameter	13 mm	32 mm	62 mm	104 mm
Circular scale outside diameter	57 mm	75 mm	109 mm	151 mm
Mechanically permissible speed	≤ 2600 rpm	≤ 2000 rpm	≤ 1200 rpm	≤ 950 rpm
Moment of inertia	$1.6 \times 10^{-5} \text{ kgm}^2$	$5.7 \times 10^{-5} \text{ kgm}^2$	$3.1 \times 10^{-4} \text{ kgm}^2$	$1.1 \times 10^{-3} \text{ kgm}^2$
Protection EN 60529	Complete encoder in mounted condition: IP00			
Mass	≈ 57 g	≈ 92 g	≈ 185 g	≈ 289 g

Circular scale	TKN ERP 1002 (segment)			
Measuring standard	OPTODUR graduation on glass			
Signal periods/360°*	23 000	30 000	50 000	63 000
Reference marks	One			
Measuring range	10°/23°/36°	8°/16°/31°	5°/11°/21°	4°/8°/15°
Protection EN 60529	Complete encoder in mounted condition: IP00			
Mass	≈ 0.6 g/1 g/1.7 g			

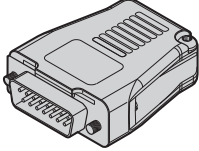

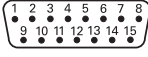
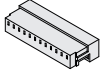

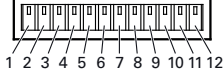




* Please select when ordering

¹⁾ The position error within one signal period and the accuracy of the graduation together yield the encoder-specific error; for information on additional errors as a result of mounting and bearing of the measured shaft, see *Measuring accuracy* in the brochure *Modular Angle Encoders with Optical Scanning*

²⁾ When centering with two scanning heads

Electrical connection

Pin layout

15-pin D-sub connector (male)					12-pin SHR-12V-S connector (female)									
														
	Voltage supply				Incremental signals						Other signals			
	4	12	2	10	1	9	3	11	14	7	13	15	5/6/8	
	1	-	2	-	3	4	6	5	8	7	9	11	12/10	
TTL	U _P	Sensor U _P	0V	Sensor 0V	U _{a1}	\bar{U}_{a1}	U _{a2}	\bar{U}_{a2}	U _{a0}	\bar{U}_{a0}	\bar{U}_{aS}	Vacant ¹⁾	Vacant ¹⁾	
 1V _{PP}	U _P	Sensor U _P	0V	Sensor 0V	A+	A-	B+	B-	R+	R-	Vacant ¹⁾	Vacant ¹⁾	Vacant	
	Brown/ Green	/	White/ Green	/	Brown	Green	Gray	Pink	Red	Black	Violet	Yellow	/	






Shield on housing; **U_P** = Power supply voltage

Sensor: The sensor line is connected in the connector with the corresponding power line.

Unused pins or wires must not be assigned!

¹⁾ Required for signal adjustment using PWM 21

Adapter cables and connecting cables

PUR connecting cable [6 x (2 x 0.19 mm ²)]; A _P = 2 x 0.19 mm ²			
PUR connecting cable [4 x (2 x 0.14 mm ²) + (4 x 0.5 mm ²)]; A _P = 2 x 0.5 mm ²		Ø 8 mm	Ø 6 mm ¹⁾
Adapter cable with 15-pin D-sub connector (female) to 12-pin M23 connector (male)		331693-xx	355215-xx
Connecting cable with 15-pin D-sub connector (female) to free cable end		332433-xx	355209-xx
Adapter cable with 15-pin D-sub connector (female) to 15-pin D-sub connector (male)		335074-xx	355186-xx
Connecting cable with 15-pin D-sub connector (female) to pin layout for IK 220		335077-xx	349687-xx
Signal cable with free cable ends, 15-pin		816317-xx	816323-xx

¹⁾ Cable length for Ø 6 mm: max. 9 m

A_P: Cross section of supply lines

Accessories

Adapter connector from SHR-12V-S to D-sub for signal adjustment using PWM 21

1234385-01

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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:

- Brochure: *Modular Angle Encoders with Optical Scanning*
- Brochure: *Interfaces of HEIDENHAIN Encoders*

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