ROTARY TRANSDUCER

Content:

Series WP

Key-Features:

- Housing diameter 40 mm (WP-M) or 60 mm (WP)
- Shaft diameter 6 mm (WP-M) or 10 mm (WP)
- Measurement ranges from 90° to 43200 °C
- Linearity up to 0.05 %
- Analog output: Potentiometer, 0...10 V, 4...20 mA
- Teachable outputs: 0...5 V, 0...10 V, with an additional Open-Collector switching output
- Temperature range: -20...+85 °C (optional -40...+85 °C or -20...+120 °C)
- Rotational speed max. 200 r/min
- Housing: Aluminium anodised, stainless steel

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WayCon
Positionsmesstechnik

TECHNICAL DATA

		WP-M	WP
Housing diameter	[mm]	40	60
Shaft diameter	[mm]	6	10
Mounting		centering collar Ø 20 mm	clamping flange Ø 36 mm
Measurement range	[°]	90 to 3600 (see table below)	90 to 43200 (see table below)
Linearity	[%]	0.3 to 0.05 (see table below)	
Output signal		1 kΩ, 4...20 mA, 0...10 V, 0...5 V (see „Electrical Data“ auf Seite 3)	
Signal direction (view on shaft)		signal increasing counter clock wise	
Rotation speed max.	[r/min]	200	
Torque	[Nm]	0.008	
Shaft bearing		2 sealed bearing, type 2RS	
Shaft Load		radial: 40 N | axial: 25 N	radial: 50 N | axial: 30 N
Protection class		housing: IP67 | shaft: IP60 (optional: IP64 or IP67)	
Operating temperature	[°C]	-20...+85 (optional: -40...+85 or -20...+120 [1])	
Storage temperature	[°C]	-30...+85	
Life cycle		> 5 Million turns	
Connection		connector output M12 or cable output (TPE)	
Housing material		Aluminium, titanium grey anodised; stainless steel	
Shaft material		stainless steel	
Weight	[g]	approx. 130	approx. 260

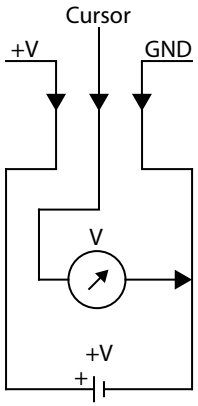
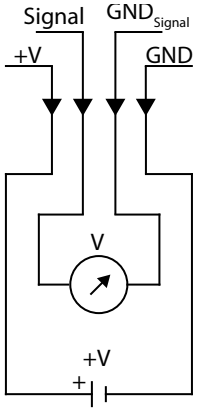
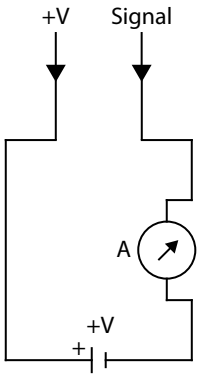
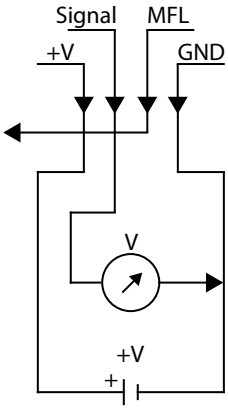
		WP-M-90 [2]	WP-M-180	WP-M-320	WP-M-3T	WP-M-5T	WP-M-10T
Measurement range	[°]	90	180	320	1000	1800	3600
Linearity	[%]	0.3			0.15		
Improved Linearity (optional)	[%]	0.2			0.1		
Potentiometer Type		1 turn			3 turn	5 turn	10 turn
Continuous rotation possible [3]		yes			no		

		WP-90 [2]	WP-180	WP-320	WP-3T	WP-5T	WP-10T	WP-15T	WP-20T	WP-25T	WP-30T
Measurement range	[°]	90	180	320	1000	1800	3600	5400	7200	9000	10800
Linearity	[%]	0.3			0.15			0.1			
Improved Linearity (optional)	[%]	0.2			0.1			0.05			
Potentiometer Type		1 turn			3 turn	5 turn	10 turn	10 turn [4]			
Continuous rotation possible [3]		yes			no						

		WP-40T	WP-45T	WP-50T	WP-60T	WP-70T	WP-75T	WP-80T	WP-90T	WP-100T	WP-120T
Measurement range	[°]	14400	16200	18000	21600	25200	27000	28800	32400	36000	43200
Linearity	[%]	0.1									
Improved Linearity (optional)	[%]	0.05									
Potentiometer Type		10 turn [4]									
Continuous rotation possible [3]		no									

[1] Option -20...+120 °C not for sensors with 1 turn potentiometer, 4...20 mA, 0...10 V or 0...5 V
[2] not in combination with output 1R
[3] see „Potentiometer Notes“ auf Seite 3
[4] with gearing

ELECTRICAL DATA

	Potentiometer 1 kΩ	Voltage 0...10 V	Current 4...20 mA	Voltage 0...5 V, 0...10 V (teachable)
Output	1 kΩ	0...5 V, 0...10 V, galvanically isolated, 4 conductors	4...20 mA, 2 conductors	0...5 V, 0...10 V, 3 conductors
Power supply	max. 30 V	12...30 VDC		8...35 VDC
Recommended cursor current	< 1 µA	-		
Current consumption max.	-	25 mA (unloaded)	-	
Power consumption max.	-	-	-	200 mW
Output current	-	max. 10 mA, min. load 10 kΩ	max. 50 mA in case of error	max. 10 mA, min. load 1 kΩ
Dynamics	-	< 3 ms from 0...100 % and 100...0 %	< 1 ms from 0...100 % and 100...0 %	1 ms
Resolution	theoretically unlimited, limited by the noise			1 mV
Noise	dependent on the quality of the power supply	0.5 mV_{eff}	1.6 $µA_{eff}$	2 mV_{eff}
Inverse-polarity protection	-	yes		
Short-circuit proof	-	yes	-	yes
Working temperature	-20...+85 °C / optional: -40...+85 °C or -20...+120 °C	-20...+85 °C / optional: -40...+85 °C		
Temperature coefficient	±0.0025 %/K	0.0037 %/K	0.0079 %/K	0.0016 %/K
EMC	-	according to EN 61326-1:2013		
Circuit				 MFL = multi-functional line for the use of the Squeezer

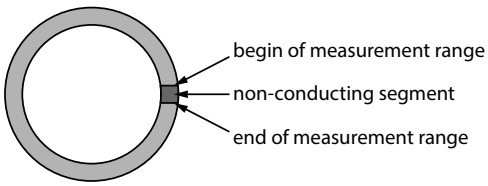
POTENTIOMETER NOTES

Rotary transducers with 1 turn potentiometer

This type of potentiometer is used to measure angles smaller than 360°. The sliding track has a circular shape. A certain segment of the sliding track is non-conducting. This way the beginning and the end of the measurement range is defined. With view on shaft the signal increases when the shaft is turned counter-clockwise. The output signal drops to zero as soon as the cursor reaches the non-conducting part of the sliding track. If turned further, the signal starts to increase again as soon as the beginning of the measurement range is reached. A continuous rotation is possible.

Generally spoken the 1 turn potentiometer is made for use within the measurement range. If the sensor is used in a continuous rotation mode, the cursor gets dragged over the non-conducting segment of the sliding track which leads to an increased wear.

Schematic diagram of the sliding track (view on shaft)



Rotary transducers with 3, 5 or 10 turn potentiometers

This type of potentiometer has a start and an end stop (no continuous rotation). With view on shaft the signal increases when the shaft is turned counter-clockwise.

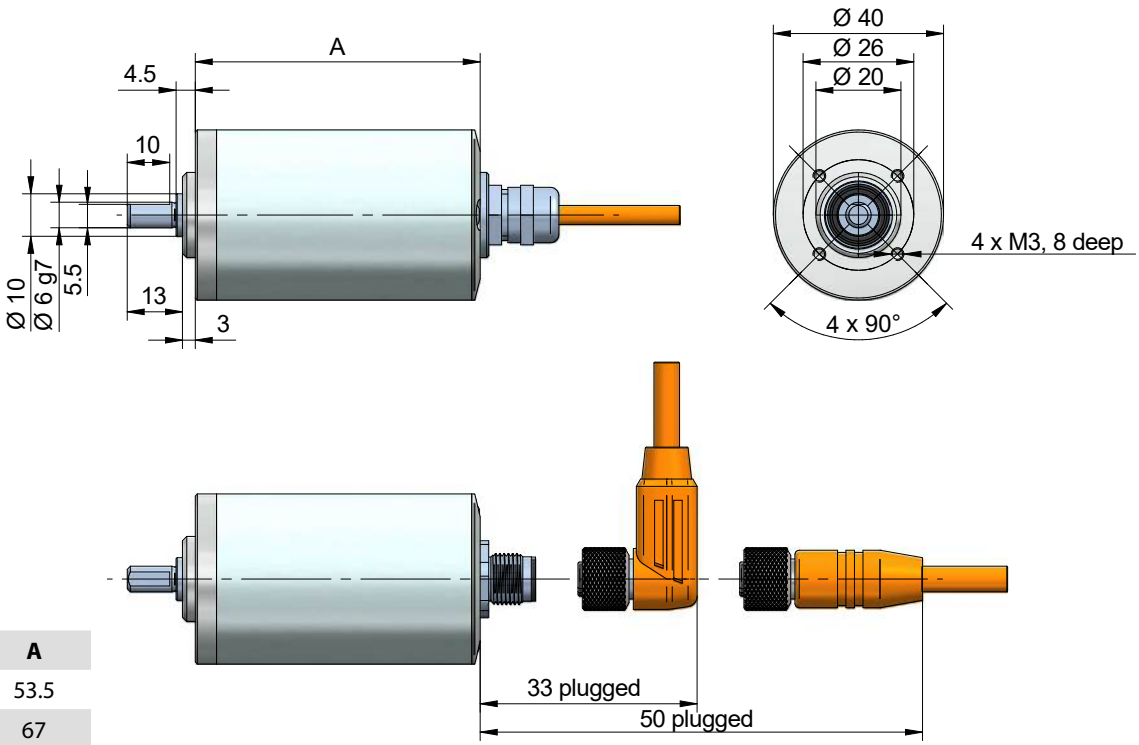
Installation of the sensor

Before installing the rotary transducer, it is very important to manually turn the shaft clockwise (view on the shaft) until the initial stop is reached and then a few degrees back again. After this procedure, the sensor can be installed (without turning the shaft).

This is the only way to make sure that the beginning of the measurement range corresponds with the start of the sliding track and an over-winding at the end of the measurement range is avoided.

TECHNICAL DRAWING

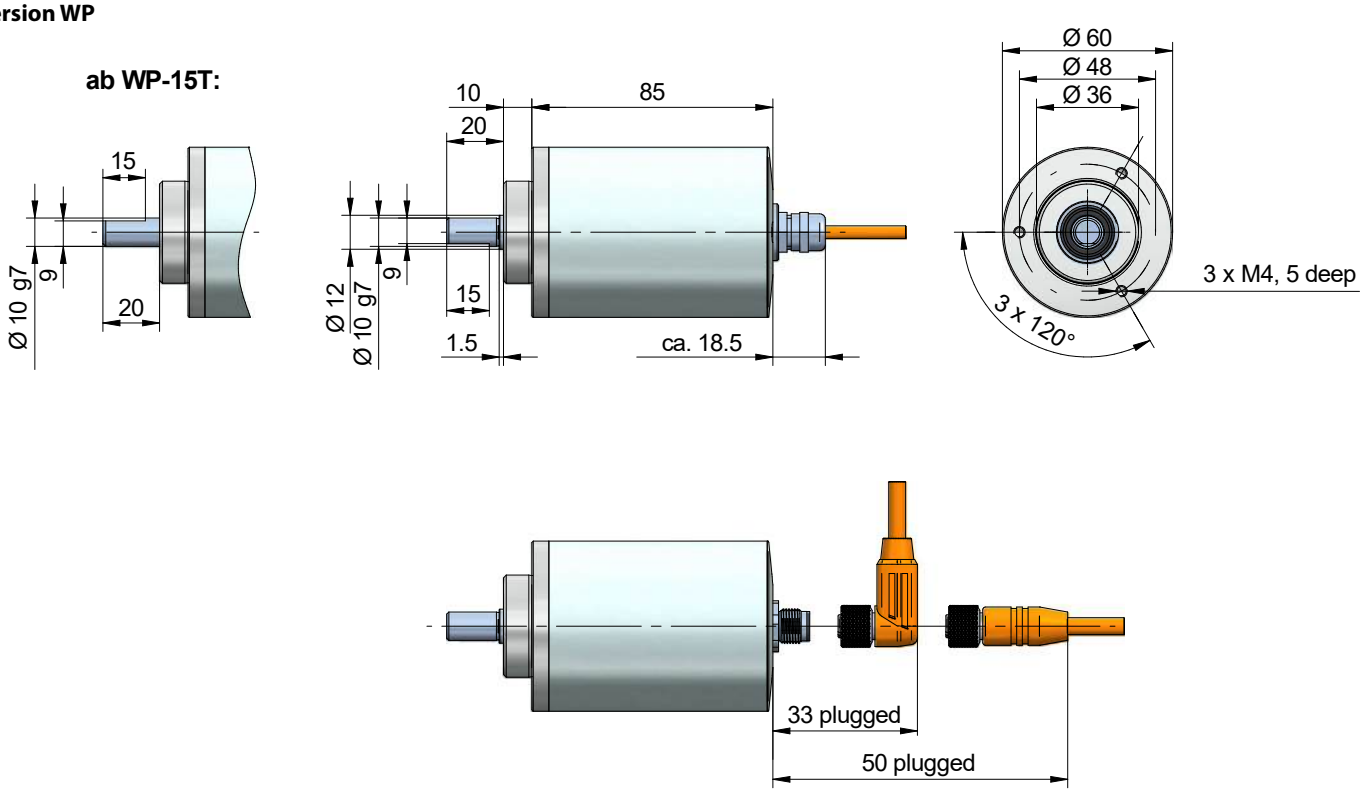
Version WP-M



Output	A
Potentiometer	53.5
0...10 V / 4...20 mA	67

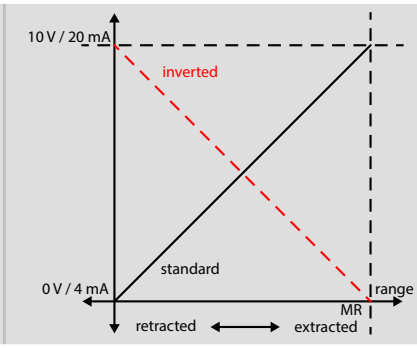
Version WP

ab WP-15T:



OPTIONS

The following table gives an overview of frequently used options, with which the standard sensors can be equipped. Please pay attention that not all options can be combined. Information on possible combinations can be found in the order codes.

Option	Order code	Description
Improved linearity	WP-L20, WP-L10, WP-L05	Improved linearity 0.2 % (WP-L20), 0.1 % (WP-L10) or 0.05 % (WP-L05)
Inverted output signal	WP-IN	The analog signal of the sensor is increasing by extracting the rope (standard). Option IN inverts the signal, i.e. the signal of the sensor declines by extracting the rope. 
Protection class IP64	WP-IP64	Please use this option in case the sensor is used in a humid environment.
Protection class IP67	WP-IP67	Please use this option in case the sensor (temporarily) immersed in water.
Corrosion protection HARTCOAT®	WP-CO	All external anodised aluminium parts of sensor are coated with HARTCOAT®. This coating is a hard-anodic oxidation that protects the sensor from corrosion by aggressive media (e. g. sea water) with a hard ceramics-like layer.
Increased temperature range high	WP-H120	Devices with potentiometer output and cable output can be supplied with this option. Temperature range -20...+120 °C. (Potentiometer output 1R with cable output and measurement range ≥3T only)
Increased temperature range low	WP-T40	The use of special components and grease enables the sensor to work at a temperature range -40...+85 °C.

ELECTRICAL CONNECTION

Cable output, 4 poles

Cable colour	1 kΩ	0...10 V	4...20 mA	0...5 V, 0...10 V (teachable)
BN	+V	+V	+V	+V
WH	Cursor	Signal	n. c.	Signal
BU	GND	GND_{supply}	Signal	GND
BK	n. c.	GND_{signal}	n. c.	MFL [1]

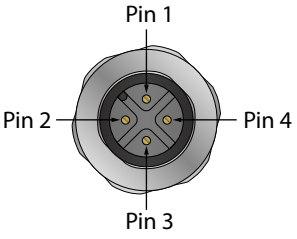
[1] Multi-functional line

Cable specifications	
Cable type	TPE, flexible
Diameter	Ø4.5 mm
Wire	0.25 mm²
Temperature	fixed installation: -30...+85 °C, flexible installation: -20...+85 °C

Connector output M12, male, 4 poles

Pin	1 kΩ	0...10 V	4...20 mA	0...5 V, 0...10 V (teachable)	Connection cable K4P Cable colour
1	+V	+V	+V	+V	BN
2	Cursor	Signal	n. c.	Signal	WH
3	GND	GND_{supply}	Signal	GND	BU
4	n. c.	GND_{signal}	n. c.	MFL [1]	BK

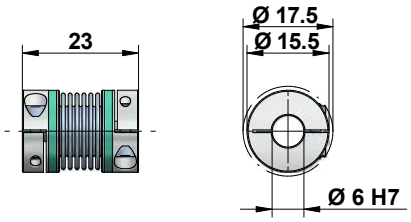
[1] Multi-functional line



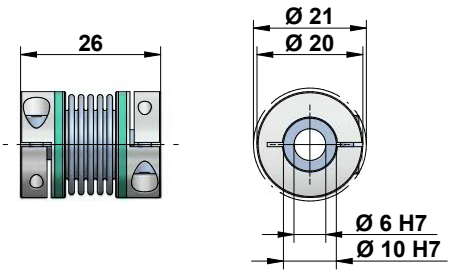
ACCESSORIES COUPLINGS

Metal bellow couplings are used for the backlash-free connection of encoders and drive shafts (e.g. motor shafts). The couplings work wear-free and compensate for axial, radial and angular misalignment. Mounting on the shafts is effected by means of frictional locking using clamping hubs.
The following couplings are available as standard accessories:

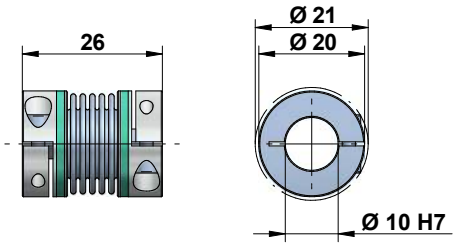
MBK-15.5-23-06-06



MBK-20-26-06-10



MBK-20-26-10-10



ORDER CODE

WP – □ – □ – □ – □ – □

Housing diameter	
40 mm, shaft diameter 6 mm	M
60 mm, shaft diameter 10 mm	-

Measurement range [1]		
90° (continuous rotation possible) [2]		90
180° (continuous rotation possible)		180
320° (continuous rotation possible)		320
1000°		3T
1800°	(5 turns)	5T
3600°	(10 turns)	10T
5400°	(15 turns)	15T
7200°	(20 turns)	20T
9000°	(25 turns)	25T
10800°	(30 turns)	30T
14400°	(40 turns)	40T
16200°	(45 turns)	45T
18000°	(50 turns)	50T
21600°	(60 turns)	60T
25200°	(70 turns)	70T
27000°	(75 turns)	75T
28800°	(80 turns)	80T
32400°	(90 turns)	90T
36000°	(100 turns)	100T
43200°	(120 turns)	120T

Output signal		
Potentiometer	1 kΩ	1R
Voltage	0...10 V	10V
Current	4...20 mA	420A
Voltage (teachable)	0...5 V	5VT
Voltage (teachable)	0...10 V	10VT

	Version
-	Standard
O	Sensor with options

Option	**Description**
WP-L20	Improved linearity 0.2 % [3]
WP-L10	Improved linearity 0.1 % [4]
WP-L05	Improved linearity 0.05 % [5]
WP-IN	Inverted output signal
WP-IP64	Protection class shaft side IP64
WP-IP67	Protection class shaft side IP67
WP-CO	Corrosion protection
WP-T40	Temperature range -40...+85 °C
WP-H120	Temperature range -20...+120 °C [6]

	Connection
SA12	Connector output M12, axial
KA02	Cable output, axial, 2 m
KA05	Cable output, axial, 5 m
KA10	Cable output, axial, 10 m

[1] WP-M: measurement range max. 10T
[2] not in combination with output 1R
[3] measurement ranges 90, 180, 320 only
[4] WP-M: measurement ranges 3T, 5T, 10T only
WP: measurement ranges 3T, 5T, 10T only
[5] measurement ranges >10T only
[6] measurement ranges ≥3T in combination with output 1R and connection KA only

ACCESSORIES

Teach accessories for teachable outputs 5VT and 10VT	
SQUEEZER2M	2 m cable
SQUEEZER5M	5 m cable
SQUEEZER10M	10 m cable

Cable with mating connector M12 (female), 4 poles, shielded	
K4P2M-S-M12	2 m, straight connector
K4P5M-S-M12	5 m, straight connector
K4P10M-S-M12	10 m, straight connector
K4P2M-SW-M12	2 m, angular connector
K4P5M-SW-M12	5 m, angular connector
K4P10M-SW-M12	10 m, angular connector

Digital displays for sensors with analog output, 2 channel	
WAY-AX-S	touch screen, supply: 18...30 VDC
WAY-AX-S-AC	touch screen, supply: 115...230 VAC

For more information and options please refer to the WAY-AX data sheet.

Couplings	
MBK-15.5-23-06-06	Metal bellow coupling, 2 x Ø 6 mm
MBK-20-26-06-10	Metal bellow coupling, Ø 6 mm, Ø 10 mm
MBK-20-26-10-10	Metal bellow coupling, 2 x Ø 10 mm

Mating connector M12 (female), 4 poles, shielded	
D4-G-M12-S	straight, M12 for self assembly
D4-W-M12-S	angular, M12 for self assembly

Connection cable sensor to Squeezer	
K4P1,5M-SB-M12	1.5 m, 4-pole, shielded

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