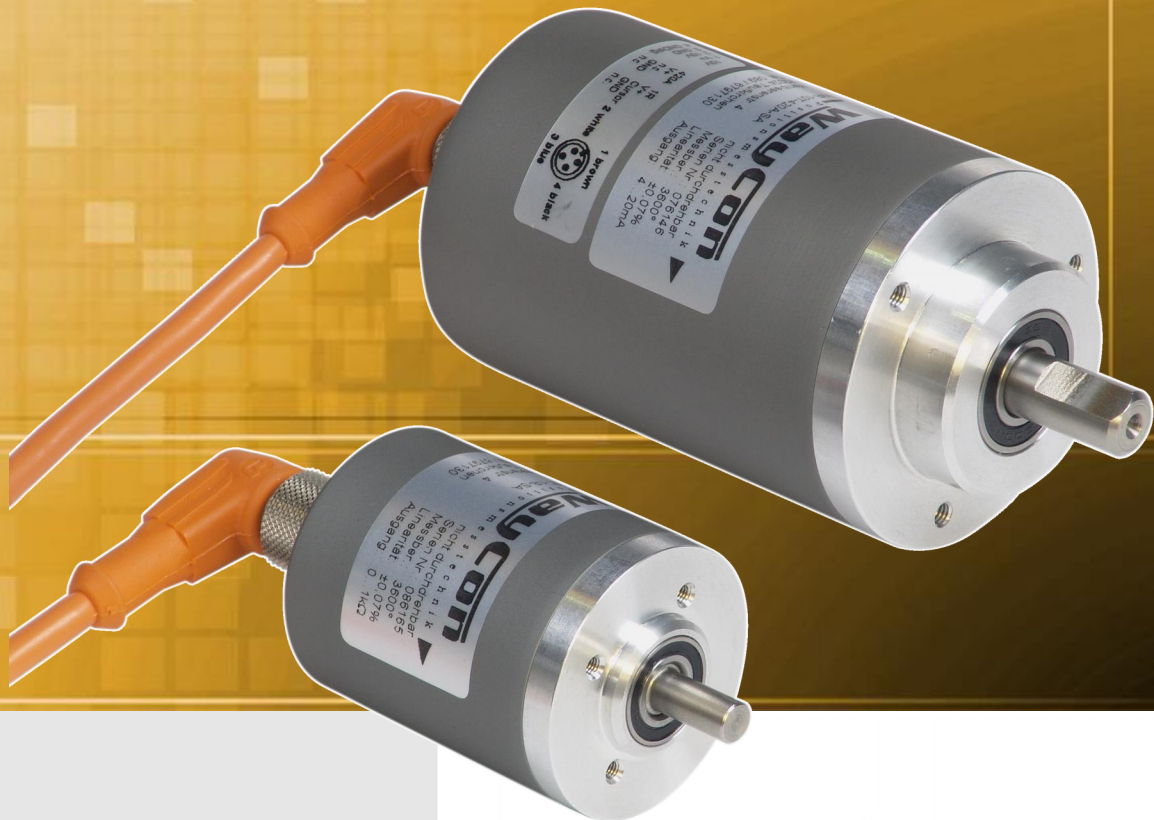


# Rotary Transducer

## Analog rotation & angle measurement



### Series WP, WP-M

#### Key-Features:

- Housing diameter WP-M: 40 mm, WP: 60 mm
- Sensor element: Precision potentiometer
- Measurement ranges from 90° to maximum 43200° (equals 120 turns)
- Protection class IP60, optional up to IP67
- Output: Potentiometer, 0...10 V or 4...20 mA
- teachable outputs: 0...5 V, 0...10 V, with an additional Open-Collector switching output
- Linearity up to 0.05 %
- Temperature range: -20...+85 °C (optional -40 °C or +120 °C)
- Revolution speed up to 200 U/min
- Life expectancy > 5 million turns
- Housing: anodised aluminium, stainless steel

#### Content:

Technical Data WP-M	....2
Technical Data WP	....3
Outputs & Connection	....4
Hints & Options	....5
Accessories	....6
Order Code	....7

## TECHNICAL DATA – SERIES WP-M

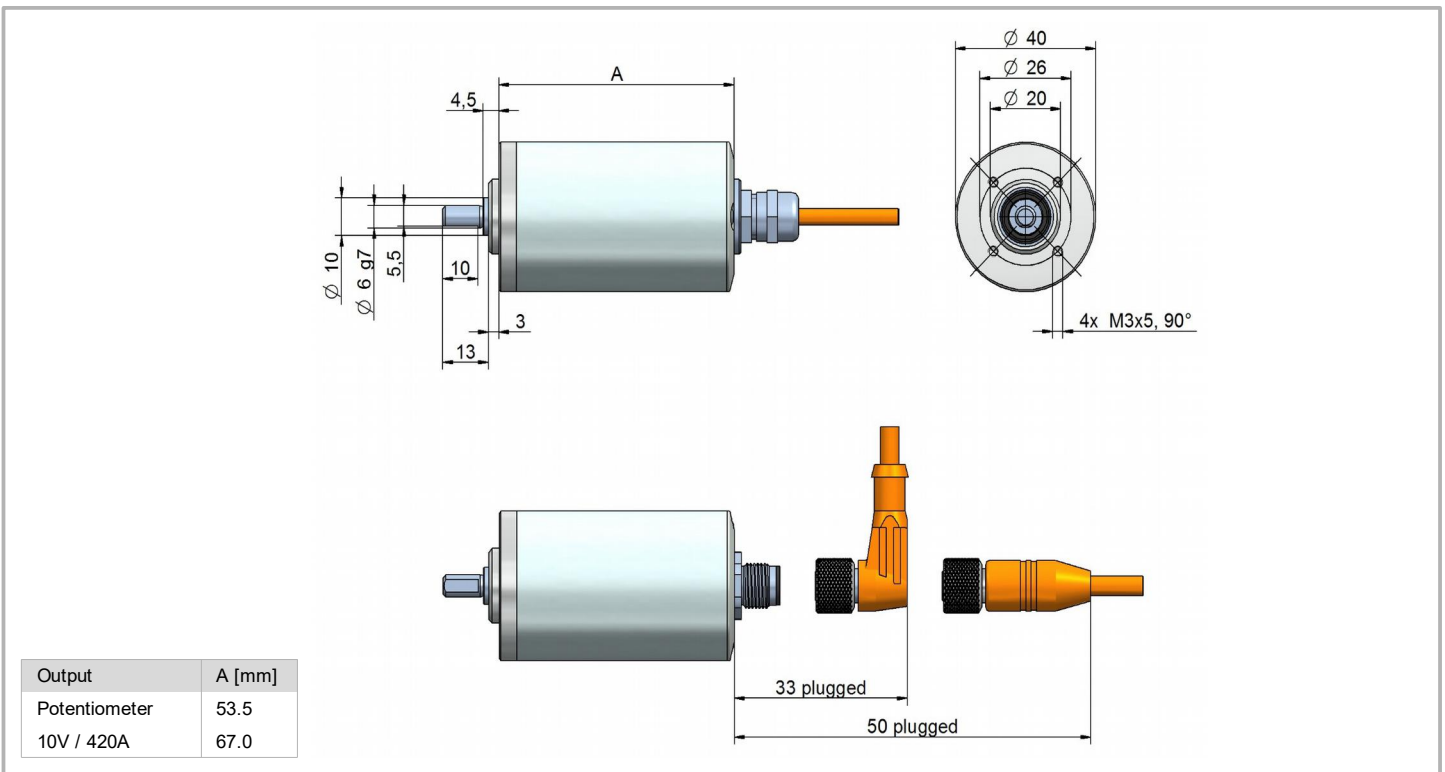
		WP-M-90	WP-M-180	WP-M-320	WP-M-3T	WP-M-5T	WP-M-10T
Measurement Range	[°]	90	180	320	1000	1800	3600
Linearity	[%]	0.30	0.30	0.30	0.15	0.15	0.15
Improved Linearity (optional)	[%]	0.20**	0.20**	0.20**	0.10**	0.10	0.10 (0.05**)
Potentiometer Type		1 Turn	1 Turn	1 Turn	3 Turn	5 Turn	10 Turn
Continuous rotation possible *		yes	yes	yes	no	no	no

\* see hints on page 5

\*\* only on request, please contact the WayCon Sales team.

Output signals	Potentiometer (1 kΩ), 4...20 mA, 0...10 V (see page 4)	
Signal direction	signal increasing counter clock wise (view on shaft)	
Housing	aluminium, titanium grey anodised; stainless steel	
Working temperature	-20...+85 °C, optional: -40...+85 °C, optional: -20...+120 °C (not for sensors with 1 Turn Potentiometer/ not for 4...20 mA, 0...10 V)	
Storage temperature	-30...+85 °C	
Connection	M12 connector or cable output with 2 m TPE-cable	
Rotation speed	up to 200 U/min	
Torque	0.8 Ncm	
Shaft material	stainless steel	
Shaft bearing	2 sealed bearings, type 2RS	
Shaft load	40 N radial, 25 N axial	
Increased corrosion protection	Option WP-CO: All external anodised aluminium parts of sensor are coated with HARTCOAT®.	
Protection class housing	IP67	
Protection class shaft side	IP60, optional: IP64 or IP67	
Life expectancy	> 5 Million turns	
Weight	approx. 130 g	

## TECHNICAL DRAWING – SERIES WP-M



## TECHNICAL DATA – SERIES WP

		WP-90	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	[%]	0.30	0.30	0.30	0.15	0.15	0.10	0.10	0.10	0.10	0.10
Improved Linearity (optional)	[%]	0.20*	0.20*	0.20*	0.10*	0.10	0.05*	0.05*	0.05*	0.05*	0.05*
Potentiometer Type		1 Turn	1 Turn	1 Turn	3 Turn	5 Turn	10 Turn	10 Turn**	10 Turn**	10 Turn**	10 Turn**
Continuous rotation possible ***		yes	yes	yes	no	no	no	no	no	no	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	[%]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Improved Linearity (optional)	[%]	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*
Potentiometer Type		10 Turn**	10 Turn**	10 Turn**	10 Turn**	10 Turn**	10 Turn**	10 Turn**	10 Turn**	10 Turn**	10 Turn**
Continuous rotation possible ***		no	no	no	no	no	no	no	no	no	no

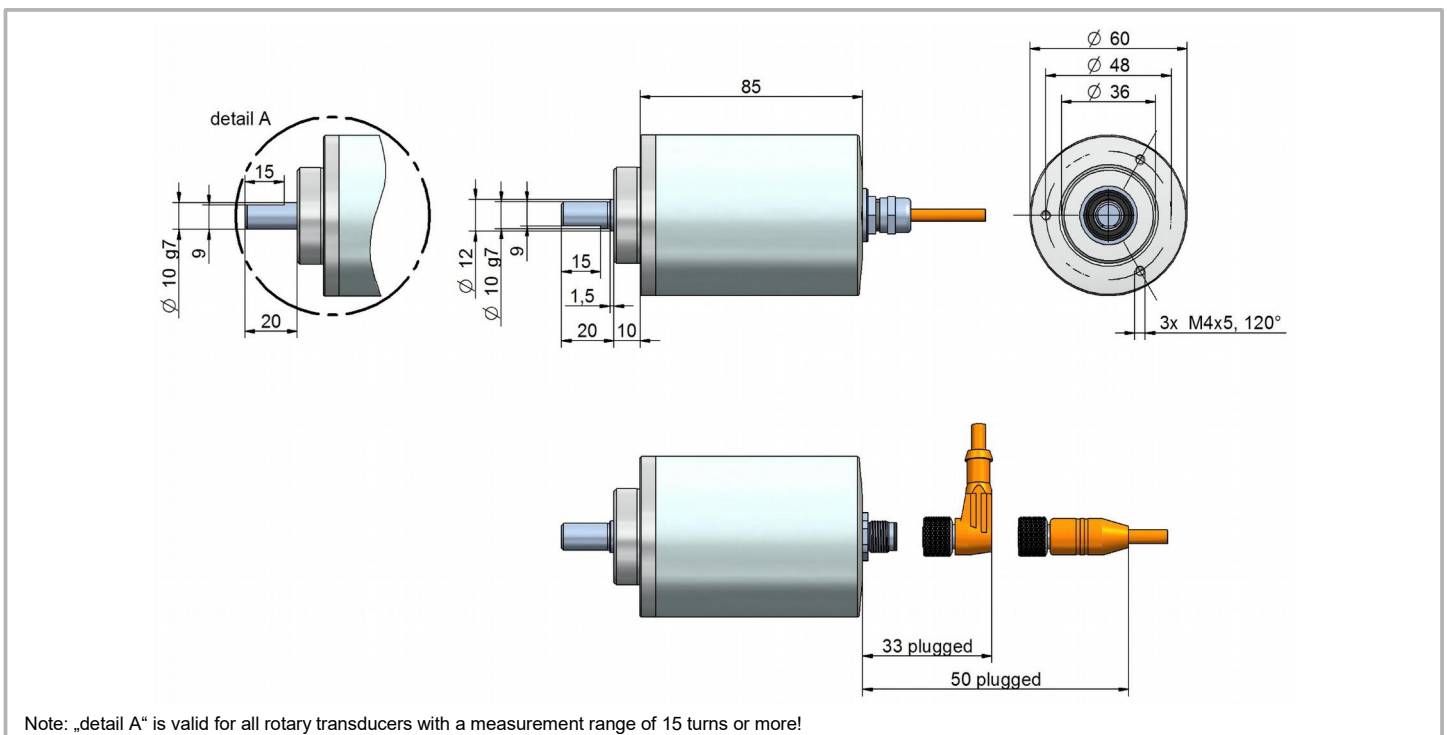
\*\*\* see hints on page 5

\* only on request, please contact the WayCon Sales team.

\*\* with gearing

Output signals	Potentiometer (1 kΩ), 4...20 mA, 0...10 V (see page 4)	
Signal direction	signal increasing counter clock wise (view on shaft)	
Housing	aluminium, titanium grey anodised; stainless steel	
Working temperature	-20...+85 °C, optional: -40...+85 °C, optional: -20...+120 °C (not for sensors with 1 Turn Potentiometer/ not for 4...20 mA, 0...10 V)	
Storage temperature	-30...+85 °C	
Connection	M12 connector or cable output with 2 m TPE-cable	
Rotation speed	up to 200 U/min	
Torque	0.8 Ncm	
Shaft material	stainless steel	
Shaft bearing	2 sealed bearings, type 2RS	
Shaft load	50 N radial, 30 N axial	
Increased corrosion protection	Option WP-CO: All external anodised aluminium parts of sensor are coated with HARTCOAT®.	
Protection class housing	IP67	
Protection class shaft side	IP60, optional: IP64 or IP67	
Life expectancy	> 5 Million turns	
Weight	approx. 260 g	

## TECHNICAL DRAWING – SERIES WP

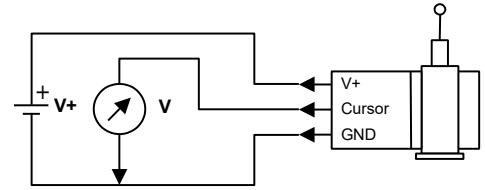


Note: „detail A“ is valid for all rotary transducers with a measurement range of 15 turns or more!

## TYPES OF OUTPUT

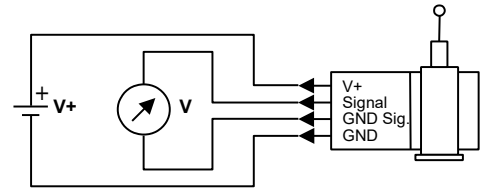
### Output: Potentiometer (voltage divider)

Output	1 k $\Omega$
Supply	max. 30 V
Recommended cursor current	< 1 $\mu$ A
Resolution	theoretically unlimited, limited by the noise
Noise	dependent on the quality of the power supply
Working temperature	-20...+85 °C , optional: -40...+85 °C / -20...+120 °C
Temperature coefficient	$\pm$ 0.0025 %/K



### Output: Voltage 0...10 V

Output	0...10 V, galvanically isolated, 4 conductors
Supply	12...30 VDC
Current consumption	max. 22.5 mA (unloaded)
Output current	max. 10 mA, min. load 10 k $\Omega$ m
Dynamics	< 3 ms from 0...100 % and 100...0 %
Resolution	limited by the noise
Noise	3 mV <sub>ss</sub> typical, max. 37 mV <sub>ss</sub>
Inverse-polarity protection	yes, infinite
Short-circuit proof	yes, permanent
Working temperature	-20...+85 °C , optional: -40...+85 °C
Temperature coefficient	0.0037 %/K
Electromagnetic compatibility (EMC)	according to EN 61326-1:2006

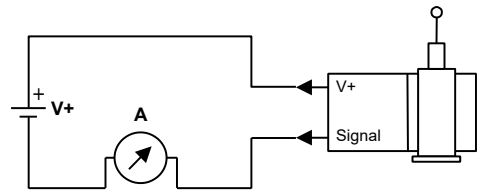


Note: GND Sig. and GND may be connected in a 3-wire system.

### Output: Current 4...20 mA

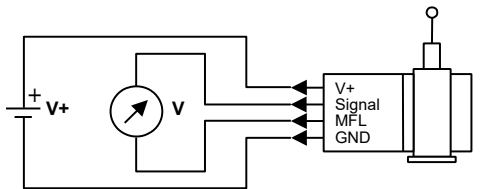
Output	4...20 mA, 2 conductors
Supply	12...30 VDC
Output current	max. 50 mA in case of error *
Dynamics	< 1 ms from 0...100 % and 100...0 %
Resolution	limited by the noise
Noise	0.03 mA <sub>ss</sub> = 6 mV <sub>ss</sub> an 200 $\Omega$ m
Inverse-polarity protection	yes, infinite
Working temperature	-20...+85 °C , optional: -40...+85 °C
Temperature coefficient	0.0079 %/K
Electromagnetic compatibility (EMC)	according to EN 61326-1:2006

\* e. g. exceeding the specified measurement range at sensors with continuous rotation (see also page 5 top)



### Output: Voltage 0...5 V, 0...10 V teachable up to approx. 50% of full scale

Output	0...5 V, 0...10 V, 3 wire system
Supply	8...35 VDC
Power consumption	max. 150 mW
Output current	max. 10 mA, min. load 1 k $\Omega$ m
Dynamics	1 ms
Resolution	1 mV
Noise	3 mV <sub>ss</sub> typical, max. 37 mV <sub>ss</sub>
Inverse-polarity protection	yes, infinite
Short-circuit proof	yes, permanent
Working temperature	-40...+85 °C
Temperature coefficient	0.0016 %/K
Electromagnetic compatibility (EMC)	according to EN 61326-1:2006



MFL: Multi-functional line

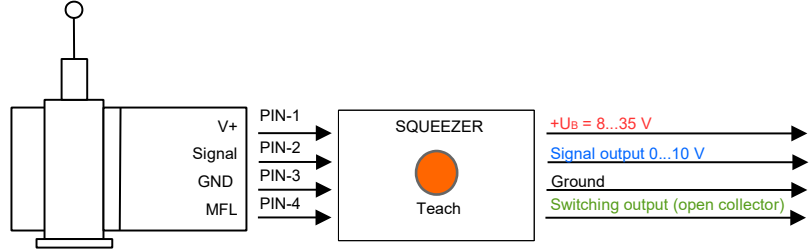
## TEACHABLE OUTPUT 5VT, 10VT, SQUEEZER

The signals provided by the potentiometer are digitized by the VT-Electronics. This digital information is first processed by the electronics, then transformed back and given out as an analogue output signal 0 to 10 V or 0 to 5 V.

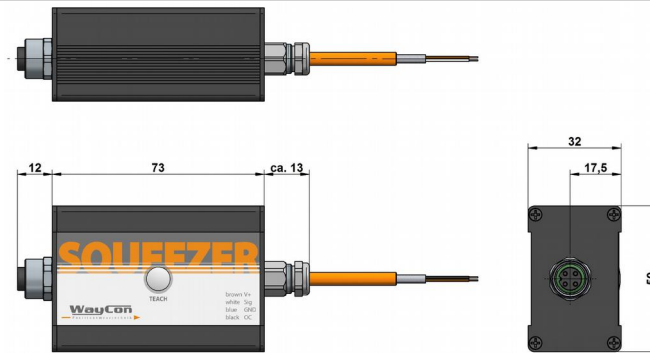
The digitization offers two possibilities of adjustment, by which the sensor can be configured individually using the squeezer:

- 1) Teaching of the measurement range. After a successful teaching process the squeezer can be pulled off the sensor and be replaced by a standard cable or connector.
- 2) Setting an individual switching point. The squeezer allows the setting of an individual switching point open collector. The switching signal is emitted through the Multi-functional line MFL.

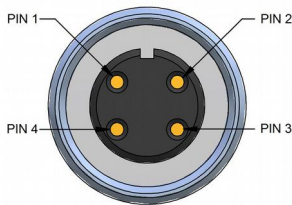
You will find a detailed description of the functions in a separate manual.



## TECHNICAL DRAWING SQUEEZER



## ELECTRICAL CONNECTION SQUEEZER



Pin assignment	Pin	Cable colour	Wire
Pin 1	V+	brown	V+
Pin 2	Signal	white	Signal
Pin 3	GND	blue	GND
Pin 4	MFL*	black	OC**

\* Multi-functional line

\*\* Open Collector

## ELECTRICAL CONNECTION ANALOG OUTPUT

### Cable output

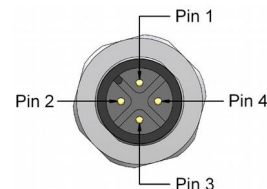
Cable type	TPE, flexible			
Cable direction	axial			
Length	standard: 2 m, (others on request)			
Diameter	4.5 mm			
Wire	0.25 mm <sup>2</sup>			
Temperature	fixed installation -30...+85 °C			
	flexible installation -20...+85 °C			

Cable colour	0...10 V	4...20 mA	1 kOhm	0...5 V, 0...10 V (teachable)
brown	V +	V +	V +	V +
white	Signal	n. c.	Cursor	Signal
blue	GND	Signal	GND	GND
black	GND Signal	n. c.	n. c.	MFL*

\* Multi-functional line

### Connector output

- M12, 4 poles



Pin	0...10 V	4...20 mA	1 kOhm	0...5 V, 0...10 V (teachable)
1	V +	V +	V +	V +
2	Signal	n. c.	Cursor	Signal
3	GND	Signal	GND	GND
4	GND Signal	n. c.	n. c.	MFL

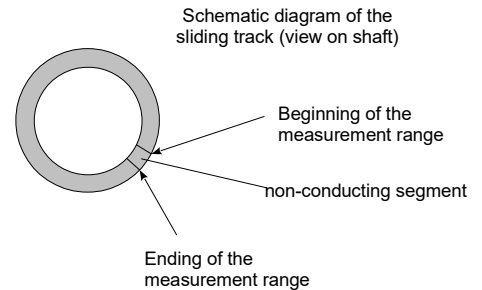
\* Multi-functional line

## HINTS

### 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 clock wise. 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.



### Rotary transducers with 3, 5, 10 Turn Potentiometers

This type of Potentiometer has a start and a end stop (no continuous rotation). With view on shaft the signal increases when the shaft is turned counter clock wise.



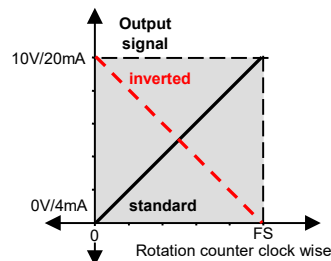
#### Installation of the sensor

Before installing the rotary transducer it is very important to manually turn the shaft clockwise (view on the shaft) until the start 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.

## OPTIONS

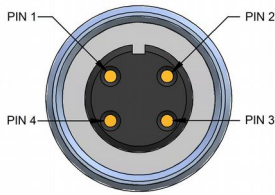
Option	Order code	Description
Protection class IP64	WP-IP64	Please use this option in case the sensor is used in a humid environment. An improved bearing is used that prevents the entering of humidity into the sensor.
Protection class IP67	WP-IP67	Please use this option in case the sensor (temporarily) immersed in water. All bearings are made of stainless steel which prevents rusting. The shaft is equipped with a sealing that prevents water from entering. Because of this sealing a certain hysteresis may be noticed in the output signal.
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 low	WP-T40	The use of special components and special grease enables the sensor to work at a temperature range -40...+85 °C.
Inverted output signal	WP-IN	Standard: the analog signal increases when turning the shaft counter clock wise. Option IN inverts the signal, so that the sensor signal decreases when turning the shaft counter clock wise.
Increased temperature range high	WP-T120	Devices with Potentiometer output (1R) and cable output can be supplied with this option. Temperature Range -20...+120 °C. (NOT for sensors with 0...10 V and 4...20 mA output or with 1 Turn Potentiometers)



## ACCESSORIES

### Cable with connector M12, 4 poles, shielded

K4P2M-S-M12	2 m, connector straight, IP67
K4P5M-S-M12	5 m, connector straight, IP67
K4P10M-S-M12	10 m, connector straight, IP67
K4P2M-SW-M12	2 m, connector angular, IP67
K4P5M-SW-M12	5 m, connector angular, IP67
K4P10M-SW-M12	10 m, connector angular, IP67



PIN	cable colour	PIN	cable colour
1	brown	3	blue
2	white	4	black

### Mating Connector M12, 4 poles, shielded, IP67

D4-G-M12-S	straight, M12 for self assembly
D4-W-M12-S	angular, M12 for self assembly
cable passage: $\varnothing 4 \dots 8$ mm	
wire cross-section: $0.14 \dots 0.75$ mm <sup>2</sup>	



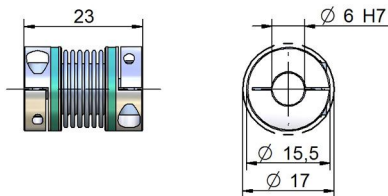
### Couplings

Bellows couplings are used for the free of backlash connection between an encoder and a shaft. The couplings are free of wear and compensate lateral, axial and angular shaft misalignment. The mounting on the shaft is done by clamping hubs.

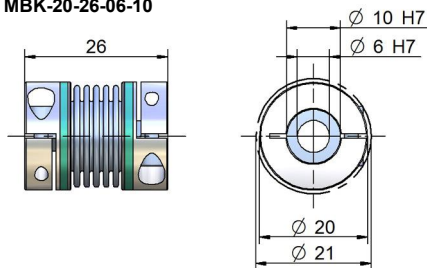


Standard couplings:

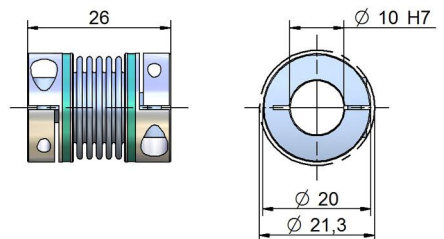
#### MBK-15.5-23-06-06



#### MBK-20-26-06-10



#### MBK-20-26-10-10



### Digital display - PAXD ( for Potentiometer)

Use the PAXD display to visualise the measured distance of the position transducer with a potentiometer as sensor element. A transmission of the measurement data to a computer or PLC can be done with interface plug-in cards.

Inputs:	Potentiometer signal
Analog output (plug-in cards):	0...20 mA, 4...20 mA, 0...10 V
Serial interfaces (plug-in cards):	RS485, RS232, DeviceNet, USB, Profibus, Relay output, Transistor output
Protection class:	IP65 (Front panel)
Display:	5 digits

PAXD000B:	1 channel, power supply: 85 to 250 VAC
PAXD001B:	1 channel, power supply: 11 to 36 VDC/24 VAC

For further information please see the data sheet of the PAXD display series



### Digital displays PAXP (1 channel) and PAXDP (2 channels) for sensors with analog output signals 0..10 V or 4..20 mA

Use the PAXD or PAXDP display to visualise the measured distance of transducers with an analog output signal. A transmission of the measurement data to a computer or PLC can be done with interface plug-in cards.

Inputs:	0...10 V or 4...20 mA, 2 independent counters (for PAXDP)
Analog output (plug-in cards):	0...20 mA, 4...20 mA, 0...10 V
Serial interfaces (plug-in cards):	RS485, RS232, DeviceNet, USB, Profibus, Relay output, Transistor output
Protection class:	IP65 (front panel)
Display:	5 digits

PAXP000B:	1 channel, power supply: 85 to 250 VAC
PAXP001B:	1 channel, power supply: 11 to 36 VDC/24 VAC
PAXDP000B:	2 channels, power supply: 85 to 250 VAC
PAXDP001B:	2 channels, power supply: 11 to 36 VDC/24 VAC

For further information please see the PAXD and PAXDP data sheet.



## ORDER CODE

WP / WP-M\* — □ — □ — □ — □

Measurement range		
90°	continuous rotation possible	90
180°	continuous rotation possible	180
320°	continuous rotation possible	320
3 Turn		3T
5 Turn		5T
10 Turn		10T
15 Turn		15T
20 Turn		20T
25 Turn		25T
30 Turn		30T
40 Turn		40T
45 Turn		45T
50 Turn		50T
60 Turn		60T
70 Turn		70T
75 Turn		75T
80 Turn		80T
90 Turn		90T
100 Turn		100T
120 Turn		120T

\* WP-M only available up to max. 10T

- O	<b>Version</b> Standard Sensor with additional options
SA12 KA__	<b>Connection</b> M12 connector output, 4 poles, axial Cable output axial, specify length in meter Standard length is 2 m (minimum): KA02
10V 5VT 10VT 420A 1R	<b>Analog output</b> 0...10 V voltage output 0...5 V (teachable) voltage output 0...10 V (teachable) voltage output 4...20 mA current output 1 kOhm potentiometer
WP-L10 WP-L20 WP-L05 WP-IP64 WP-IP67 WP-IN WP-CO WP-T40 WP-T120*	<b>Additional options</b> improved linearity 0.10 % (for MR 3T/5T/10T) improved linearity 0.20 % (for MR 90/180/320) improved linearity 0.05 %, on request improved protection class shaft side IP64 improved protection class shaft side IP67 inverted output signal HARTCOAT® coating temperature range -40...85 °C temperature range -20...+120 °C (only 1R + KA)

\* only for measurement range 3T or greater

## ACCESSORIES

### Cable with mating connector M12, 4-pole, 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

### Mating Connector M12, 4-pole, shielded

D4-G-M12-S	straight, M12 for self assembly
D4-W-M12-S	angular, M12 for self assembly

### SQUEEZER

SQUEEZER2000	2 m cable, open ends
--------------	----------------------

### Connection cable for SQUEEZER, 4-pole, shielded

K4P1,5M-SB-M12	1.5 m, M12-connector, M12 mating connector straight
----------------	---

### Digital display 1 channel, 0...10V/4...20 mA

PAXP000B	1 channel, supply: 85 to 250 VAC
PAXP001B	1 channel, supply: 11...36 VDC/24 VAC

### Digital display 2 channels, 0...10V/4...20 mA

PAXDP00B	2 channels, supply: 85 to 250 VAC
PAXDP01B	2 channels, supply: 11...36 VDC/24 VAC

### Digital display 1 channel, Potentiometer

PAXD000B	1 channel, supply: 85 to 250 VAC
PAXD001B	1 channel, supply: 11...36 VDC/24 VAC

### Couplings

MBK-15.5-23-06-06	coupling, bore diameter: 2 x ø 6 mm
MBK-20-26-06-10	coupling, bore diameter: ø 6 mm, ø 10 mm
MBK-20-26-10-10	coupling, bore diameter: 2 x ø 10 mm

Subject to change without prior notice.

WayCon Positionsmesstechnik GmbH

email: [info@waycon.de](mailto:info@waycon.de)  
internet: [www.waycon.de](http://www.waycon.de)

Head Office

Mehlbeerenstr. 4  
82024 Taufkirchen  
Tel. +49 (0)89 67 97 13-0  
Fax +49 (0)89 67 97 13-250

Office Köln

Auf der Pehle 1  
50321 Brühl  
Tel. +49 (0)2232 56 79 44  
Fax +49 (0)2232 56 79 45