

# Data Sheet for Angle Sensors

## Optical Encoders

## Series MOZ30



- High-quality encoder in metal housing
- 28mm housing diameter
- Ball bearing
- 5mm shaft diameter
- 36...1500 pulses per revolution
- 2 channels + index
- Operating voltage 5 V, 12 V, 24 V
- Output electronics: push-pull, voltage-output, open collector, line-driver

The high quality encoder is based on its compact housing dimensions and the variety of electrical outputs suitable for a wide range of applications. The robust metal housing combined with a ball bearing ensures long life.

Electrical Data	Voltage Output "NPN"	Open Collector "K"	Line Driver "N"
Output signal		A, B, Z	A, /A, B, /B, Z, /Z
Number of pulses		36..1500 pulses per rev.	
Output voltage high	Vcc-1 min	---	2.5V min
Output voltage low		0.5 V max	
Limit frequency		150 kHz	
Supply voltage	5 V ±10 % 12 V ±10 %	24 V ±10 %	5 V ± 5 %
Power consumption (no load)	≤ 80 mA	≤ 60 mA	≤ 150 mA
Output capacity		20 mA	
Max. pull-up voltage		50 V	
Insulation voltage 1.)		500 VAC, 1 min	
Insulation resistance 1.)		50 MOhm @ 500 VDC	
Output electronics	Voltage output	Open Collector	Line Driver
Switch-on delay		max. 1 µs	max. 200 ns

## Mechanical and Environmental Data, Miscellaneous

Mechanical angle of rotation /stroke 1.)	360° without stop
Bearing	Ball bearing
Max. operational speed	6000 rpm
Shaft acceleration	1x10 <sup>-5</sup> rad/s <sup>2</sup>
Moment of inertia	2x10 <sup>-7</sup> kg • m <sup>2</sup>
Operational torque @ ambient temperature1.) 2.	≤ 0.98 Ncm
Operating temperature range	-10 °C up to +70 °C
Storage temperature range	-30 °C up to +80 °C
Protection grade (IEC 60529)	IP50
Vibration (IEC 68-2-6, Test Fc)	10..55 Hz / 1.5 mm; X, Y, Z, each 2h
Shock (IEC 68-2-27, Test Ea)	490 m/s <sup>2</sup> , 11ms, X, Y, Z, each 3x

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## Mechanical and Environmental Data, Miscellaneous

Housing diameter	28 mm	
Housing depth	Voltage output (NPN), Open Collector output (K) 30 mm	Linedriver (N) 35 mm
Shaft diameter	5 mm	
Shaft type	Solid shaft	
Max. radial load	< 9.8 N	
Max. axial load	< 4.9 N	
Connection type	Round cable 0.5 m	
Connection position	Axial	
Sensor mounting	Insert nuts 2 x M3 depth 4	
Mass	ca. 60 g	
Fastening parts included in delivery	None	
Material shaft	Stainless steel	
Material housing	Aluminium	
Material disc	Metal	
Immunity ESD, human body model (MIL-STD-883, Method 3015.8)	±4 kV (contact) ±8 kV (air)	

1.) According IEC 60393

2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

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## Order Code

Description	Selection: <b>standard=black/bold</b> , possible <i>options=grey/italic</i>					
<b>Series</b>	<b>MOZ30</b>					
<b>Shaft diameter, shaft length:</b> <b>Standard: Ø5 x 12 mm</b> <i>Option shaft length in mm</i> <i>Option shaft diameter in mm (≤5 mm)</i>		- <i>Ax,xx</i> <i>Dx,xx</i>				
<b>Resolution in pulses per revolution:</b> <i>Option 36 ppr.</i> <i>Option 50 ppr.</i> <i>Option 60 ppr.</i> <i>Option 100 ppr.</i> <i>Option 150 ppr.</i> <i>Option 200 ppr.</i> <i>Option 250 ppr.</i> <i>Option 300 ppr.</i> <b>Standard: 360 ppr.</b> <i>Option 400 ppr.</i> <b>Standard: 500 ppr.</b> <i>Option 512 ppr.</i> <i>Option 600 ppr.</i> <i>Option 800 ppr.</i> <i>Option 1000 ppr.</i> <b>Standard: 1024 ppr.</b> <i>Option 1500 ppr.</i>						
<b>Supply voltage:</b> <i>Option supply voltage 5 V ±10 % &amp; voltage output (NPN)</i> <i>Option supply voltage 12 V ±10 % &amp; voltage output (NPN)</i> <i>Option supply voltage 5 V ±10 % open collector output (K)</i> <i>Option supply voltage 12 V ±10 % &amp; open collector output (K)</i> <b>Standard: Supply voltage 24 V ±10 % &amp; Open Collector output (N)</b> <i>Option supply voltage 5 V ±5 % &amp; linedriver output (N)</i>						
<b>Output signal:</b> <b>Standard: A+B+Z (Index)</b>					<b>BZ</b>	
<b>Electrical connection:</b> <b>Standard: Round cable 0.5 m</b> <i>Option round cable 1 m</i> <i>Option round cable 3 m</i> <i>Option user defined cable length in m</i>						- <i>R1</i> <i>R3</i> <i>Rx,xx</i>

## Order example MOZ30

### Requirement:

Shaft diameter 5 mm, shaft length 12 mm, 360 pulses per revolution, supply voltage 24 V ±10 %, 2 channels + index, open collector electronic, round cable 0,5m

**Example for order coder:** MOZ30 360 24 BZ K

## For higher quantities or on-going demand, additional options are available as described below

For example:

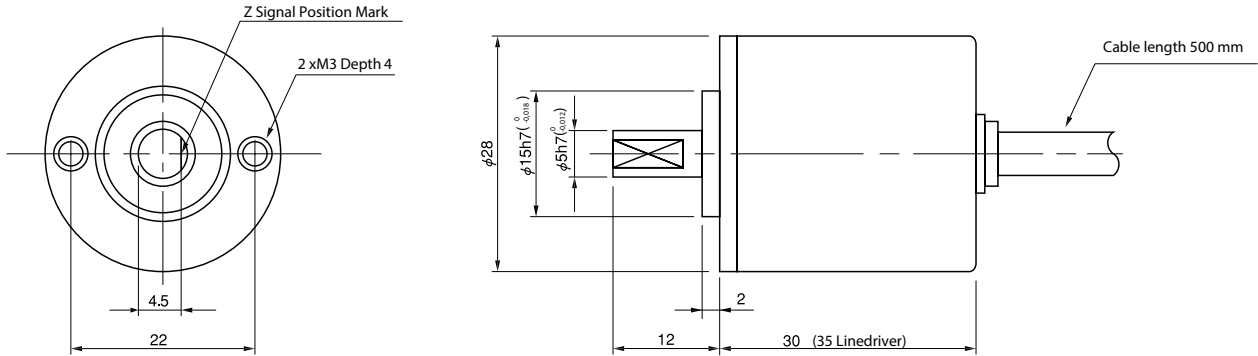
- Other resolutions
- Specials shaft design
- Special connector and cable design
- Other operational torque

# Data Sheet for Angle Sensors

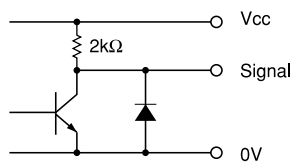
Optical Encoders

Series MOZ30

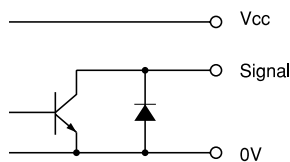
## Drawing



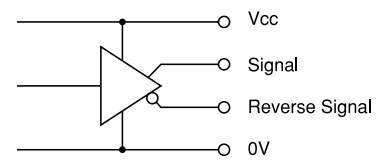
### Transistor Output (NPN)



### Open Collector (K)

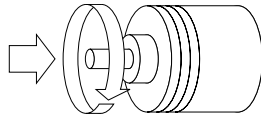


### Linedriver (N)



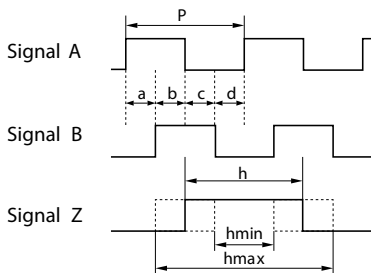
## Wave Form

CW → Rotating Toward Clockwise Viewed from an Arrow



Rising point of A-Signal is always at one point while Z-Signal is at H-Level in CW.

### NPN and K

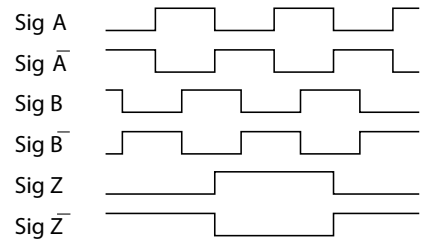


$$P = \frac{1}{\text{Resolution}}$$

$$a, b, c, d = \frac{P}{4} \pm \frac{P}{8} \quad \frac{P}{2} \leq h \leq \frac{3P}{2}$$

Wave Ratio (Duty);  $50 \pm 25\%$

### N



## Electrical Connections

### NPN and K

Color	Signal
Red	Power Supply(Vcc)
Black	0V
Green or Blue	Signal A
White	Signal B
Yellow	Signal Z
Shield	NC

### N

Color	Signal	Color	Signal
Red	Power Supply(Vcc)	White	Signal B
Black	0V	Gray	Signal B-bar
Green	Signal A	Yellow	Signal Z
Blue	Signal A-bar	Orange	Signal Z-bar
Shield	NC		

Dimensions in mm