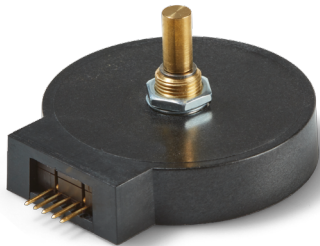


# Data Sheet for Angle Sensors

Optical incremental Encoder

Series OP



- Optical resolution until 10.000 pulses per revolution
- Only 12,6 mm housing depth
- Sleeve bearing or ball bearing
- 6mm or 6.35 shaft diameter
- 2 channels + index
- Supply voltage 5 VDC
- Output electronics TTL
- Temperature range -25° ..100° C

The OP is a shaft encoder, which offers a very high optical resolution. Also remarkable is the low installation depth with only 12.6 mm. The choice of three different operating torques contribute to the positive overall picture.

## Electrical Data

Output signal	5 V - A, B, Z-Index (option A, B)
Number of pulses	1000..10000 Imp./U (other resolutions on request)
Output voltage high	≥ 2 V @ IOH = -5 mA max. (3.5 V typ. @ no load)
Output voltage low	≤ 0,5 V @ IOL = 5 mA max. (0.25 V typ. @ no load)
Limit frequency	300 kHz
Supply voltage	5 VDC ±10 %
Power consumption (no load)	≤ 85 mA (typ. 72 mA)
Output capacity	min. -5 mA / max. 5 mA
Output electronics	TTL
Switch-on delay	50 ns (rise time) / 50 ns (fall time) @ ≥ 3600 Imp./U

## Mechanical and Environmental Data, Miscellaneous

Mechanical angle of rotation /stroke 1.)	360° without Stopp
Lifetime 2.)	>1 Mio. shaft revolutions for sleeve bearing
Bearing	Sleeve bearing or ball bearing
Max. operational speed	
Sleeve bearing	100 rpm
Ball bearing	10.000 rpm
Max. acceleration	
Sleeve bearing or ball bearing	250000 rad/sec <sup>2</sup>
Operational torque @ RT 1.) 2.)	
Sleeve bearing smooth running (option NT)	0.2 Ncm
Sleeve bearing with increased torque	0.3 ±0.2 Ncm
Ball bearing (option KL)	0.04 Ncm

# Data Sheet for Angle Sensors

Optical incremental Encoder

Series OP

## Mechanical and Environmental Data, Miscellaneous

Operating temperature range	-25..+100 °C
Storage temperature range	-40..+100 °C
Protection grade shaft side (IEC 60529) standard	IP40
Vibration (IEC 68-2-6, Test Fc)	20 g / 5 bis 2000 Hz / sine waveform
Housing diameter / length	61.47 mm x 55.96 mm
Housing depth	12.6 mm
Shaft diameter	6 mm, 6.35 mm
Shaft type	Solid shaft
Max. radial load	< 1 N
Max. axial load	< 8.9 N (sleeve bearing) / < 4.4 N (ball bearing)
Connection type	Contact pin's for soldering pitch 2.54 or compatible to Molex Plug (connection without possibility for interlocking)
Connection position	Radial
Sensor mounting	Bushing
Mass	app. 36 g
Fastening parts included in delivery	Hex nut and tooth washer
Fastening torque mounting nut	< 2.25 Nm
Material shaft	Stainless steel
Material housing	Plastic
Material disc	Mylar
Imunity ESD, human body model (MIL-STD-883, Method 3015.8)	± 4 kV

1.) According IEC 60393

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

# Data Sheet for Angle Sensors

Optical incremental Encoder

Series OP

## Order Code

Description		Selection: standard=black/bold, possible options=grey/cursive					
<b>Series:</b>	<b>OP</b>						
<b>Shaft diameter, shaft length:</b> <b>Standard: Ø6 mm x 20.2 mm</b> <i>Ø6.35 mm (1/4") x 20.2 mm</i> <i>Option shaft length in mm</i> <i>Option shaft diameter in mm (≤6.35 mm)</i>		<b>6</b> 6,35 <i>Ax,xx</i> <i>DMx,xx</i>					
<b>Resolution in pulses per revolution:</b> <i>Option 1000 ppr.</i> <i>Option 2048 ppr.</i> <b>Standard: 4000 ppr.</b> <i>Option 4096 ppr.</i> <i>Option 5000 ppr.</i> <b>Standard: 7200 ppr.</b> <i>Option 8000 ppr.</i> <i>Option 8192 ppr.</i> <i>Option 10000 ppr.</i>			1000 2048 <b>4000</b> 4096 5000 <b>7200</b> 8000 8192 10000				
<b>Supply voltage:</b> <b>Standard: 5 V</b>				<b>5</b>			
<b>Output signal:</b> <b>Standard: A+B+Z</b> <i>Option: A+B (For &gt; 2048 ppr. only option BZ available)</i>					<b>BZ</b> B		
<b>Output electronics:</b> <b>Standard: TTL</b>						<b>TTL</b>	
<b>Bearing:</b> <b>Standard: Sleeve bearing with increased torque (0.3 ±0.2 Ncm)</b> <i>Option sleeve bearing low torque (0.2 Ncm)</i> <i>Option ball bearing very low torque (0.04 Ncm)</i>							- NT KL

## Order example OP:

### Requirement:

Shaft diameter 6 mm / shaft length 20.2 mm, resolution 4000 pulses per revolution, supply voltage 5 V, 2 channels A+B+Z, output electronics TTL, sleeve bearing with increased torque

**Example for order code:** OP 6 4000 5 BZ TTL

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

For example:

- Linedriver
- Other number of pulses: 64, 100, 200, 400, 500, 512, 1024, 1800, 2000, 2500, 3600 pulses per revolution
- Special shaft design
- Special torque
- Special connector and cable design

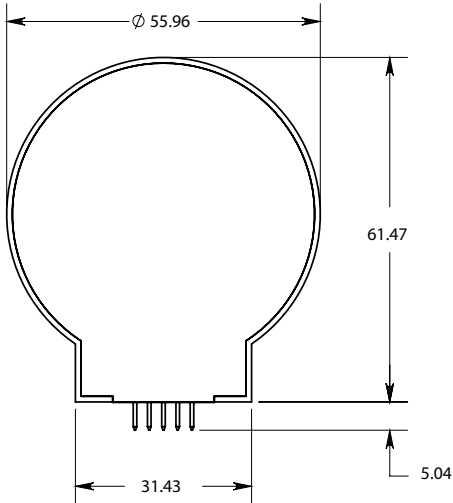
# Data Sheet for Angle Sensors



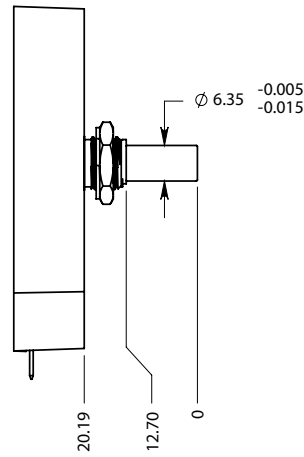
Optical incremental Encoder

Series OP

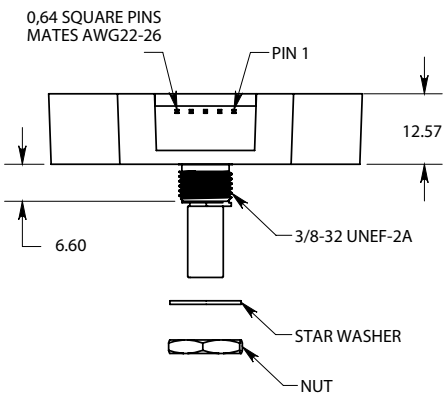
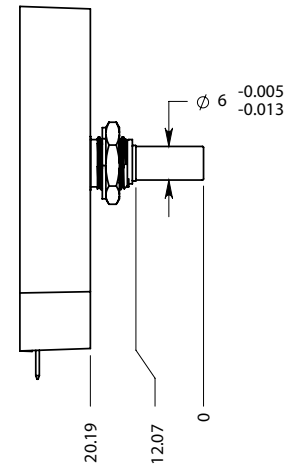
## Technical Drawing



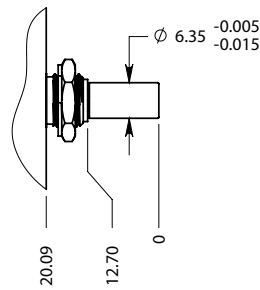
1/4" Sleeve Bearing



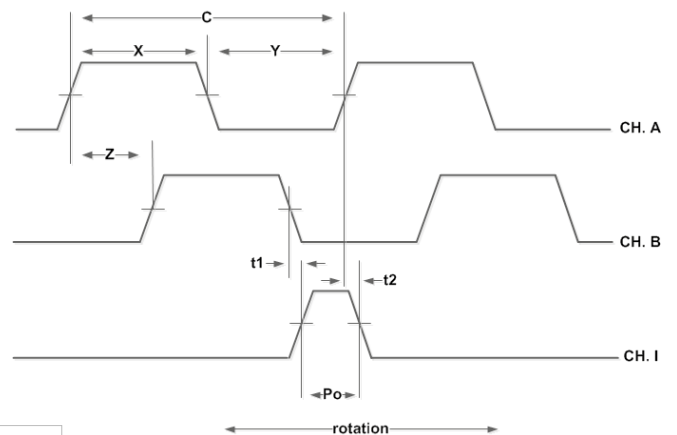
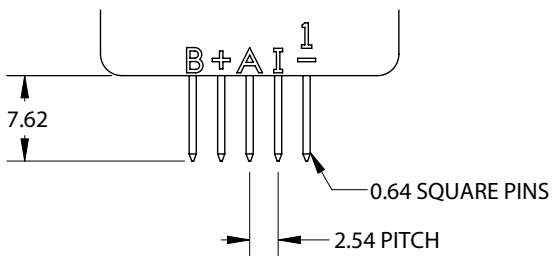
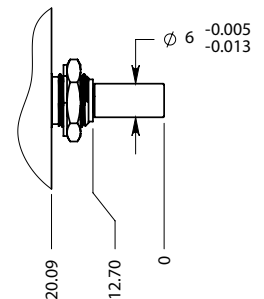
6 mm Sleeve Bearing



1/4" Ball Bearing



6 mm Ball Bearing



Connection diagram

PIN 1	GND
PIN 2	Index (Z)
PIN 3	Channel A
PIN 4	+5 VDC
PIN 5	Channel B

Dimensions in mm

**Recommendation for mating connector:**  
**Standard, contact pins (TTL output):**  
 MOLEX: KK 254 crimp housing, 5 circuits, series 2695  
 KK254 crimp terminals series 2759