

Data Sheet for Angle Sensors

Optical incremental Encoder

Series SPE



- Optical resolution up to 1000 pulses per revolution
- 22 mm housing diameter
- 11,7 mm housing depth
- Shaft diameters: 6 mm, 6.35 mm, 3.175 mm
- Ball or sleeve bearing
- Supply voltage 5 VDC
- Signal Output TTL
- Molex Connector

Compact optical incremental encoder with possibility of choice between three different operating torques. With increased torque option the SPE could be also used as a high quality optical panel encoder.

Electrical Data	TTL	Line Driver
Output signal	5 V - A, B	differential 3.8 V - A, /A, B, /B
Number of pulses	100..1000 Imp./U	
Output voltage high	≥ 2.4 V @ -8 mA with load (4 V @ no load)	≥ 4.75 V @ 25 mA with load (5 V typ. @ no load)
Output voltage low	≤ 0.4 V @ 8 mA with load (0.035 V @ no load)	≤ 0.6 V @ 4.5 mA with load (0.25 V typ. @ no load)
Differential output voltage	-	≥ 3.0 V @ RL = 100 Ω (typ. 3.8 V)
Limit frequency	100 kHz	
Supply voltage	5 VDC ±10 %	
Power consumption no load	≤ 30 mA (typ. 25 mA)	≤ 32 mA (typ. 27 mA)
Output capacity	8 mA per output channel (A or B)	
Output electronics	TTL	Line Driver
Switch on-delay	100 ns (rise time) / 50 ns (fall time)	20 ns (rise/fall time)

Mechanical and Environmental Data, Miscellaneous	
Mechanical angle of rotation /stroke 1.)	360° without stop
Lifetime 2.)	> 1 Mio. shaft revolutions for sleeve bearing
Bearing	Sleeve bearing or ball bearing
Max. operational speed	
Sleeve bearing	100 rev./min
Ball bearing	15000 rev./min
Max. acceleration	
Sleeve bearing	10000 rad/sec ²
Ball bearing	250000 rad/sec ²
Operational torque @ RT 1.) 2.)	
Sleeve bearing with low torque (Version NT)	0.2 Ncm
Sleeve bearing with increased torque	0.4 ±0,1 Ncm
Ball bearing with very low torque (Version KL)	0.01 Ncm
Operating temperature range	-20..+100 °C
Storage temperature range	-20..+100 °C
Protection grade shaft side (IEC 60529) standard	IP40

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Mechanical and Environmental Data, Miscellaneous

Vibration (IEC 68-2-6, Test Fc)	20 g / 20 bis 2000 Hz / sine waveform
Shock (IEC 68-2-27, Test Ea)	75 g / 6 ms / halfsine
Housing diameter / length	22 mm
Housing depth	11.73 mm
Shaft diameter	6 mm, 6.35 mm, 3.175 mm
Shaft type	Solid shaft
Max. radial load	< 1 N
Max. shaft load	< 8.9 N (sleeve bearing) / < 4,4 N (ball bearing)
Connection type	Molex coupling
Connection position	Radial
Sensor mounting	Bushing
Mass	app. 13 g
Fastening parts included in delivery	Hex nut and tooth washer
Fastening torque mounting nut	< 2.25 Nm
Material shaft	Stainless steel with sleeve bearing Brass with ball bearing
Material housing	Plastic
Material disc	Mylar
Immunity ESD, human body model (MIL-STD-883, Method 3015.8)	± 7 kV (TTL) / ± 12 kV (Line Driver)

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: standard=black/bold, possible options=grey/cursive					
Series	SPE						
Shaft diameter, shaft length: >>> The shaft length depends on the shaft diameter and the shaft bearing. Regarding the shaft length please refer to the table on the drawing - next page. <<<							
<i>Option Ø3.17 mm (1/8") x length</i> <i>(length depends on shaft diameter and bearing)</i>							
Standard: Ø6 mm x length <i>(length depends on shaft diameter and bearing)</i>							
Standard: Ø6.35 mm (1/4") x length <i>(length depends on shaft diameter and bearing)</i>							
<i>Option shaft length in mm</i>							
<i>Option shaft length in mm (≤6.35 mm)</i>							
Resolution in pulses per revolution:							
Standard: 100 ppr.							
<i>Option 108 ppr.</i>							
<i>Option 120 ppr.</i>							
<i>Option 125 ppr.</i>							
<i>Option 128 ppr.</i>							
<i>Option 200 ppr.</i>							
<i>Option 250 ppr.</i>							
<i>Option 256 ppr.</i>							
<i>Option 300 ppr.</i>							
Standard: 360 ppr.							
<i>Option 400 ppr.</i>							
<i>Option 500 ppr.</i>							
<i>Option 512 ppr.</i>							
<i>Option 720 ppr.</i>							
<i>Option 800 ppr.</i>							
<i>Option 1000 ppr.</i>							
Supply voltage:							
Standard: 5 V							
Output signal:							
Standard: A+B							
Output electronics:							
Standard: TTL							
<i>Option Line Driver differential</i>							
Bearing:							
Standard: Sleeve bearing with increased torque 0.4 ±0.1 Ncm							
Standard: sleeve bearing with low torque 0.2 Ncm							
<i>Option ball bearing with very low torque 0.01 Ncm</i>							

Order example SPE

Requirement:

Shaft diameter 6 mm, resolution 100 pulses per revolution, supply voltage 5 V, 2 channels A+B, output electronics TTL, sleeve bearing with increased torque 0.4 ±0.1 Ncm

Example for order code: SPE 6 100 5 B TTL

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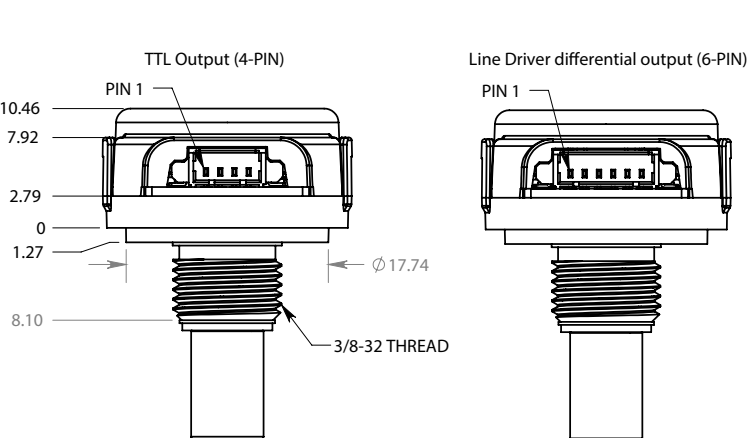
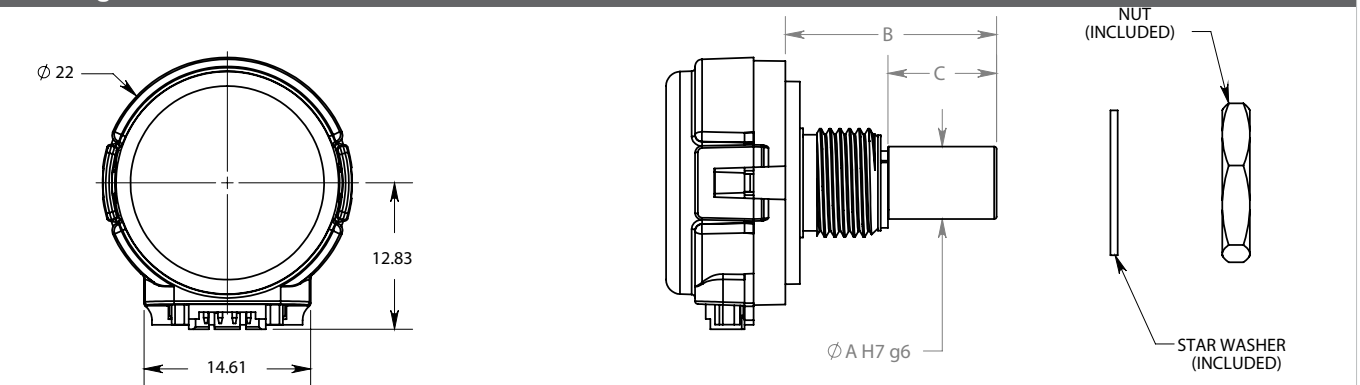
Series SPE

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

For example:

- Special shaft
- Other operational torques
- Special connector and cable design

Drawing



	A	B	C
SLEEVE BEARING	Ø 3,17	18,54	8,89
	Ø 6	18,54	8,89
BALL BEARING	Ø 6,35	18,54	9,53
	Ø 3,17	18,80	9,53
	Ø 6	18,42	9,53
	Ø 6,35	18,42	9,53

Dimensions in mm

Connection diagram		
	TTL	Line Driver
PIN 1	+5 VDC	Ground
PIN 2	Channel A	Channel A
PIN 3	GND	Channel A/
PIN 4	Channel B	+5 VDC
PIN 5	not existing	Channel B
PIN 6	not existing	Channel B/

Matting Connector:
Housing: Molex# 51021-0400
Pins: Molex # 50079-8100

Matting Connector:
Housing: Molex# 51021-0600
Pins: Molex # 50079-8100

Accessory not included in delivery:
Matting connector with 500 mm AWG28 leads

Output waveform

