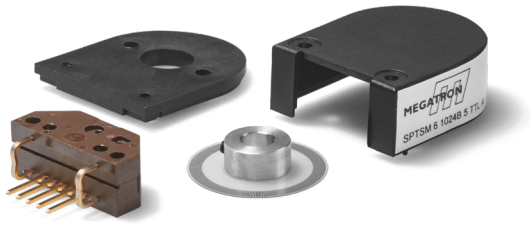
Data Sheet for Angle Sensors

Optical Kit Encoder — Series SPTSM



- Up to 1024 ppr.
- 2 channels + index pulse
- Outputs TTL compatible or as option linedriver
- Supply voltage 5 VDC
- Applicable on different shaft diameters
- Option: Housing with through hole for longer shafts
- Only 17 mm housing depth
- Simple assembling thanks to optional assembling tools

The optical incremental encoders of the SPTSM series as kit encoders are characterised by their reliability and long service life. The sensor detects angles without physical contact between encoder disk and module. The kit encoder is suitable for Ø4 mm to Ø8 mm shafts and is fastened using two screws.

Electrical Data		
Number of pulses	100, 256, 360, 400, 500, 512, 1000, 1024 ppr.	
Output channels	A, B, Z (Z not available for 1024 ppr.)	
Output electronics	TTL	
Supply voltage	5 VDC +/-10 %	
Current consumption (no load)	2 channels A/B typ. 17 mA	3 channels A/B/Z typ. 57 mA
Output voltage High @ IOH	Min. 2.4 V (2 channels A/B: IOH = -40 µA max., 3 channels A/B/Z: IOH = -200 µA max.)	
Output voltage Low @ IOL	Max. 0.4 V (2 channels A/B: IOL = 3.2 mA, IOL 3 channels 3.86 mA)	
Max. output current per channel	5 mA	
Limit frequency	100 kHz	

Mechanical and Environment Data	
Protection grade (IEC 60529): Ascertained in assembled condition (without solder or clamping terminals)	IP30
Operating temperature range	-20 °C up to +60 °C (other temperatures on request)
Storage temperature range	-40 °C up to +100 °C
Material housing	Thermoplastic
Material encoder disc / hub	Thermoplastic / aluminium
Included in delivery	2 screws for fixing the housing cover are included in (screws for mounting the base plate are not included in delivery)
Required mounting tools (not included): Mounting tools are required to install the sensor in the application and must be ordered separately.	1. Distance gauge: suitable for all shaft diameters 2. Centering gauge: to be ordered according to shaft diameter
Maximum permissible axial play	+/-0.25 mm
Maximum permissible eccentricity	+/-0.02 mm
Humidity	90 % RF no dewing
Mass (product without option ST or N)	ca. 25 g

Optical Kit Encoder — Series SPTSM

Order Code

Description	Selection: **standard=black/bold**, possible *options=grey/italic*							
Series	**SPTSM**							
Shaft diameter:								
Ø4 mm		*4*						
Ø5 mm		*5*						
Ø6 mm		**6**						
Ø6,35 mm		*6,35*						
Ø8 mm		*8*						
Pulses per revolution / number of channels:								
100 / 3 channels ABZ			**0100**		**BZ**			
200 / 3 channels ABZ			**0200**		**BZ**			
256 / 3 channels ABZ			**0256**		**BZ**			
360 / 3 channels ABZ			**0360**		**BZ**			
400 / 3 channels ABZ			**0400**		**BZ**			
500 / 3 channels ABZ			**0500**		**BZ**			
512 / 3 channels ABZ			**0512**		**BZ**			
1000 / 3 channels ABZ			**1000**		**BZ**			
1024 / 2 channels AB			**1024**		**B**			
Supply voltage:								
VSUP: 5 V (+/- 10%)				**5**				
Output signal:								
TTL						**TTL**		
Cover:								
Standard housing (cover is closed)							**A**	
Through hole Ø10 mm in the housing cover							*B*	
Electrical connection:								
Contact pins								**-**
5 pole socket (for 5 pol. connector with latch)								*ST*

Mounting tools are not supplied, but mandatory for correct mounting.
Please order them separately, see next page.

Optical Kit Encoder — Series SPTSM

Order example SPTSM Kit Encoder:

Requirement:
Applicable for shaft diameter Ø6.00 mm, optical resolution 512 ppr., 3 channels (A/B and index), electrical output: TTL, without through bore in housing cover, electrical connection: contact pin´s

Example for order code:
SPTSM 6 0512 BZ 5 TTL A

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

For example:
- Applicable on other shaft diameters ≤ 8 mm, for example shaft diameters in inch
- Special cable and connection design

Assembling Tools:

Important notes on ordering mounting tools:

1. To install the kit encoder in the application, the centering gauge is required in combination with the distance gauge.
2. The centering gauge is required once for each shaft diameter, the distance gauge can be used for all shaft diameters (i.e. only one distance gauge is required).
3. The mounting tools do not remain in the encoder kit after installation and can be used to mount additional encoder kits.
4. Mounting tools are required for the correct operation of the KIT encoder (mandatory!) and must therefore be ordered separately for SPTSM kit encoders.

1. Centering gauge (is required once for each shaft diameter):

Order no.:	Order designation:
134153	centering gauge for shaft diameter Ø4 mm
134154	centering gauge for shaft diameter Ø5 mm
134155	centering gauge for shaft diameter Ø6 mm
134156	centering gauge for shaft diameter Ø6.35 mm
134157	centering gauge for shaft diameter Ø8 mm

2. Distance gauge (only needed once):

Order no.:	Order designation:
134152	distance gauge

Order example mounting tools:

Example: purchase requisition
10 pcs. kit encoders 1024 ppr. for shaft diameter Ø6.00 mm and
10 pcs. kit encoder 256 ppr. for shaft diameter Ø4.00 mm

Example: required assembling tools
1 x #134155 centering gauge Ø6 mm
1 x #134153 centering gauge Ø4 mm
1 x #134152 distance gauge

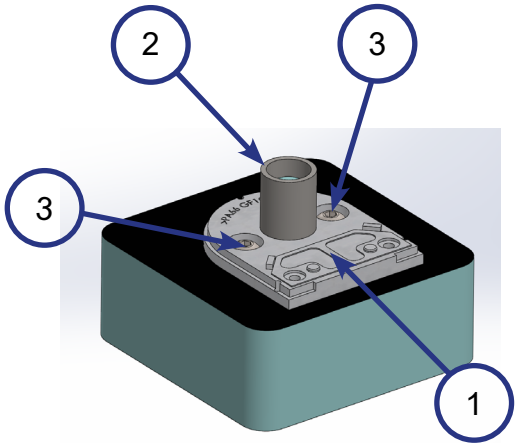
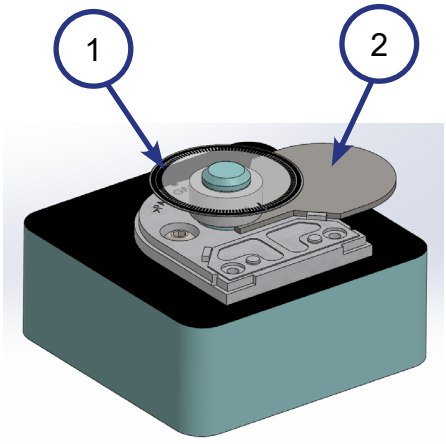
Mounting Instructions:

General mounting instructions:

1. When unpacking the components and during assembly, take care not to touch the optical disc in the area of the increments. The encoder disc and optical module must not come into contact with oil and/or grease. Wearing latex or cloth gloves during installation is helpful.

2. When handling the optical module, take care to comply with ESD protection guidelines. We recommend that you leave the ESD protection on the electrical contacts of the optical module as long as possible. Avoid skin contact with the contact pins when installing the optical module.

3. It is recommended that the screws securing the base plate and grub screw are secured. When mounting the encoder disc screw, use varnish (anaerobic liquid adhesive) for reliable and durable operation.

Step A A 1. Position the base plate (1) A 2. Slide the centering gauge onto the shaft (2) A 3. Align the base plate with the centering gauge A 4. Fasten the base plate with two screws (3) ISO7380-1M3, max. tightening torque 0.6 Ncm	
Step B B1. Position the distance gauge (2) as shown in the picture on the right B2. Slide the hub incl. encoder disk (1) onto the shaft. The encoder disc must be at the top.	

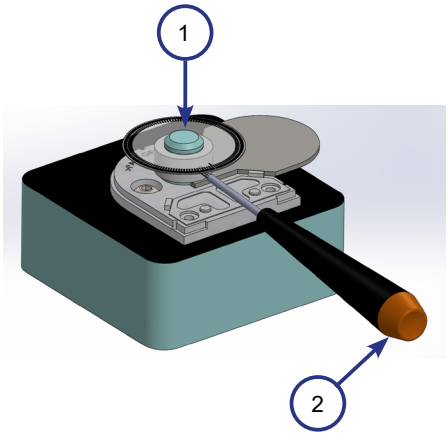
Mounting Instructions:

Step C

C 1. Apply light pressure on the encoder disk from above (1) meanwhile you fasten the grub screw with a grub screw (hexagon) screwdriver wrench width 0.9 (2)

Ensure that the torque applied to the set screw does not exceed 5.5 Ncm

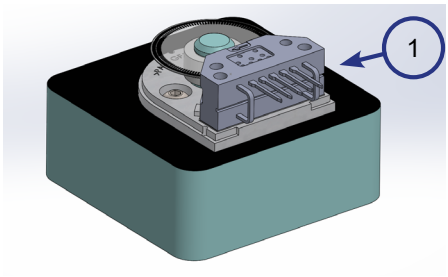
Secure the grub screw by means of a screw safety varnish (anaerobe liquid adhesive)



Step D

D1. Place the optical module as shown in the image, with the pins upwards on the base plate (1)

Note:
Avoid touching the contact pins of the optical module during assembly. Leave the ESD protection supplied ex works on the electrical connections of the module as long as possible.

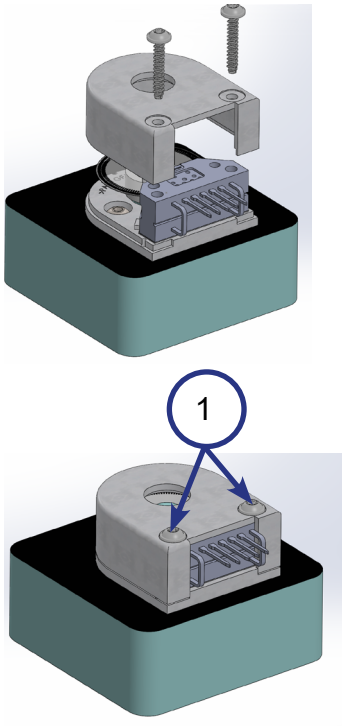


Step E

E1. Attach the housing cover to the two included Torx screws STS-plus KN6038 2,5x15-T8, A2. tightening torque max. 20 Ncm (1)

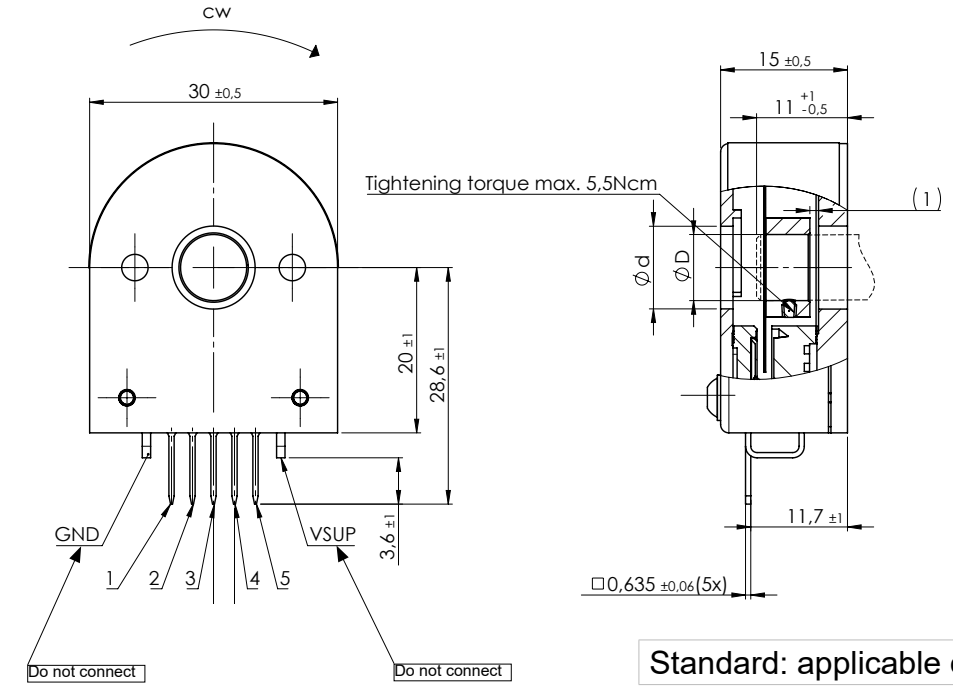
Notes:
When using a plug for an electrical connection to the optical module, make sure that the plug is plugged on the optical module only in a voltage-free state.

If the contact pins shall be connected via soldering, make sure that effect of heat on the contact pins is as short as possible to avoid damage to the bond wires within the optical module.



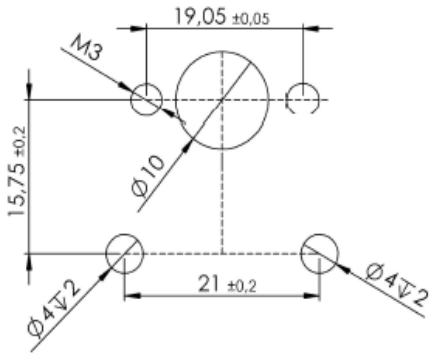
Optical Kit Encoder — Series SPTSM

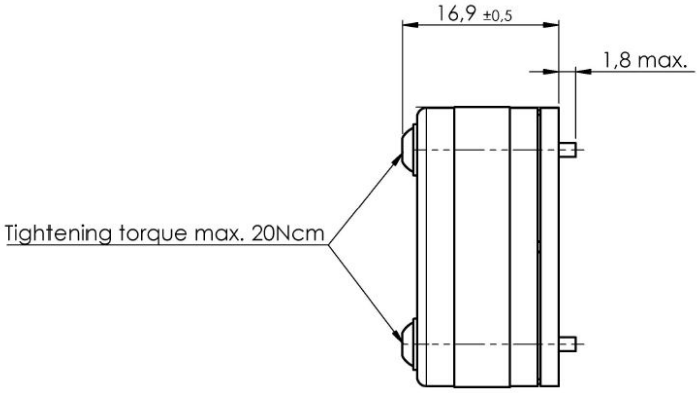
Drawing



Standard: applicable on shaft diameter D 6 mm

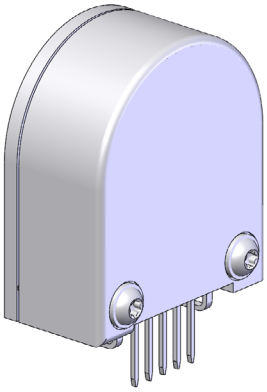
Recommended Drilling Pattern:



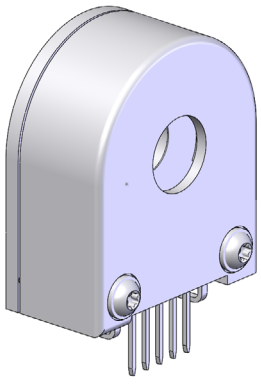


Option Through Hole in Case Cover

Standard: A Without borehole in cover

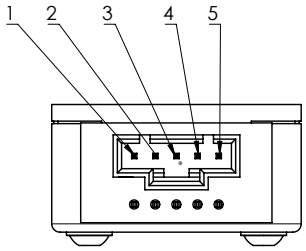


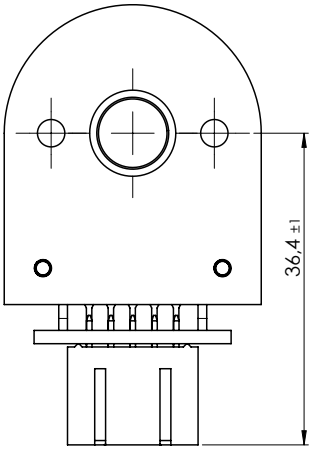
Option: B With borehole in cover for longer shafts



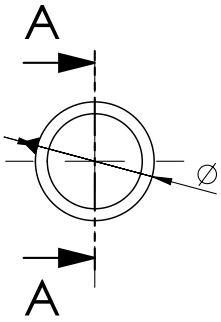
Drawing

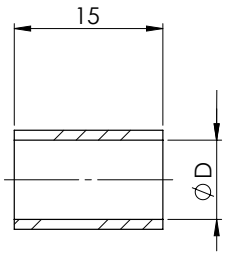
Option ST

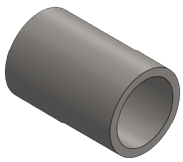




Mounting Tool: Centering Gauge

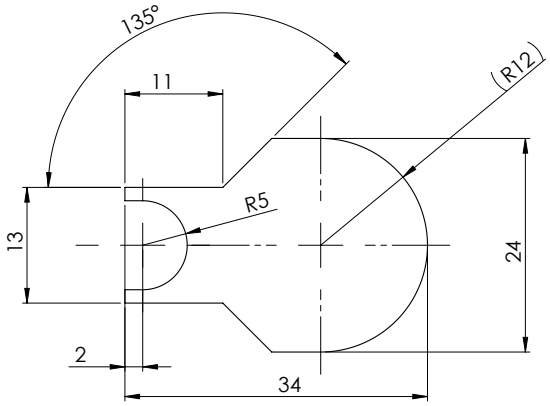


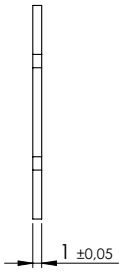


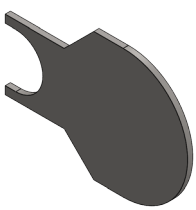


Art. Nr.	D H7
134153	Ø 4 mm
134154	Ø 5 mm
134155	Ø 6 mm
134156	Ø 6.35 mm
134157	Ø 8 mm

Mounting Tool: Distance Gauge







Optical Kit Encoder — Series SPTSM

PIN Assignment

Function	Option B (2 Channels)	Option BZ (3 Channels)
PIN 1	GND	GND
PIN 2	Do not connect !	Channel Z (Index)
PIN 3	Channel A	Channel A
PIN 4	VSUP	VSUP
PIN 5	Channel B	Channel B

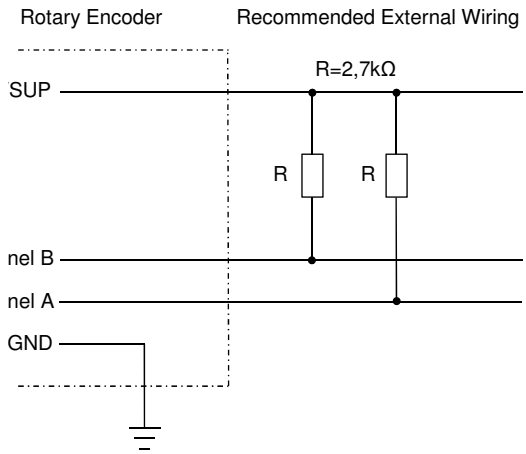
Recommendations for mating connectors:

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

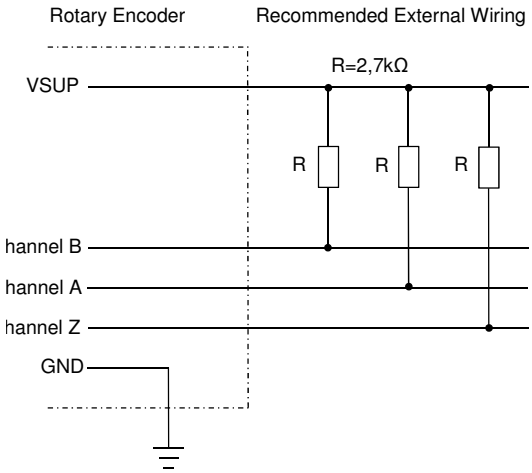
For Option ST (with plug and TTL output):
MOLEX: SL crimp housing, 5 circuits, series 70066
SL crimp terminals series 70058

For Option N (with plug and linedriver output):
MOLEX: SL housing, 8 circuits, series 70066
SL crimp terminals series 70058

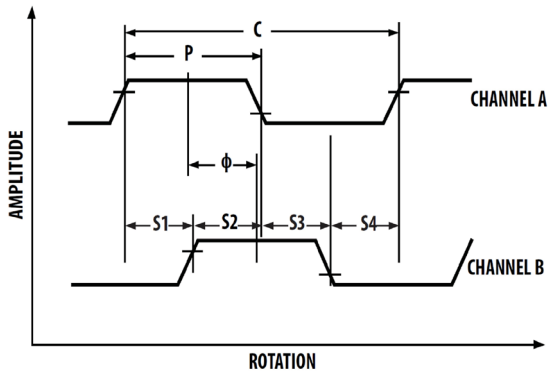
Recommended Output Circuit TTL (2 Channels)



Recommended Output Circuit TTL (3 Channels)



Output Signals TTL (2 Channels)
Sense of Rotation: CW (Clockwise)



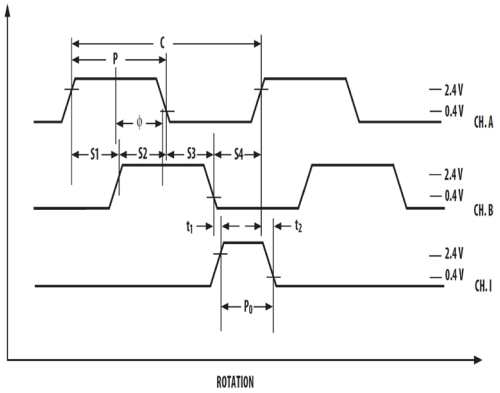
Possible Output Signal Deviations (2 Channels)

$$S1, S2, S3, S4 = \frac{C}{4} \pm \frac{C}{12}$$

$$P = \frac{C}{2} \pm \frac{C}{12}$$

$$\Phi = \frac{C}{4} \pm \frac{C}{24}$$

Output Signals TTL (3 Channels)
Sense of Rotation: CW (Clockwise)



Possible Output Signal Deviations (3 Channels)

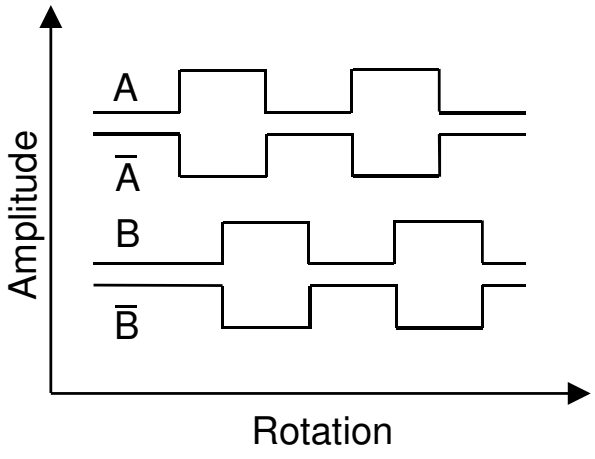
$$S1, S2, S3, S4 = \frac{C}{4} \pm \frac{C}{12}$$

$$P = \frac{C}{2} \pm \frac{C}{12}$$

$$\Phi = \frac{C}{4} \pm \frac{C}{24}$$

$$P_O = \frac{C}{4} \pm \frac{C}{12}$$

Output Signals Linedriver (2 Channels)
Sense of Rotation: CW (Clockwise)



Output Signals Linedriver (3 Channels)
Sense of Rotation: CW (Clockwise)