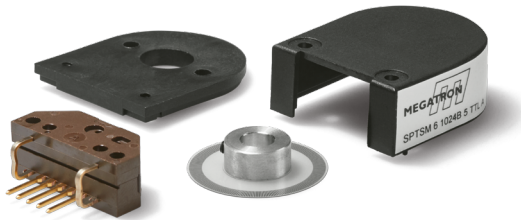


Data Sheet for Angle Sensors

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

Universal optical kit encoder, quick and safe to install with optional mounting tools. Virtually no mechanical wear. The option of a hole in the housing cover makes it suitable for use with long shafts.

Electrical Data

| | | |
|---------------------------------|--|-----------------------------|
| Number of pulses | 50, 96, 100, 200, 256, 360, 400, 500, 512, 1000, 1024 ppr. | |
| Output channels | A, B, Z (Z not available for 96 ppr. and 1024 ppr.) | |
| Output electronics | TTL or as an option linedriver | |
| 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 |

Data Sheet for Angle Sensors

Optical Kit Encoder

Series SPTSM

Order Code

| Description | Selection: standard=black/bold , possible <i>options=grey/italic</i> | | | | | | |
|---|---|----------|-------------|---|-----------|-----|----|
| Series: | SPTSM | | | | | | |
| Shaft diameter: | | | | | | | |
| Option Ø4 mm | | 4 | | | | | |
| Option Ø5 mm | | 5 | | | | | |
| Standard Ø6mm | | 6 | | | | | |
| Option Ø6,35 mm | | 6,35 | | | | | |
| Option Ø8 mm | | 8 | | | | | |
| Pulses per revolution and number of channels 1.) | | | | | | | |
| Option 50 pulses with 3 channels ABZ 2.) | | | 0050 | | BZ | | |
| Option: 96 pulses with 2 channels AB 2.) | | | 0096 | | B | | |
| Option: 100 pulses with 3 channels ABZ 3.) | | | 0100 | | BZ | | |
| Option: 200 pulses with 3 channels ABZ 2.) | | | 0200 | | BZ | | |
| Option: 256 pulses with 3 channels ABZ 2.) | | | 0256 | | BZ | | |
| 360 pulses with 3 channels ABZ | | | 0360 | | BZ | | |
| Option: 400 pulses with 3 channels ABZ 2.) | | | 0400 | | BZ | | |
| 500 pulses with 3 channels ABZ | | | 0500 | | BZ | | |
| Option: 512 pulses with 3 channels ABZ 2.) | | | 0512 | | BZ | | |
| 1000 pulses with 3 channels ABZ | | | 1000 | | BZ | | |
| Option: 1024 pulses with 2 channels AB 2.) | | | 1024 | | B | | |
| Supply voltage: | | | | | | | |
| VSUP: 5 V (+/- 10 %) | | | | 5 | | | |
| Output signal: | | | | | | | |
| TTL | | | | | | TTL | |
| Option Linedriver 2.) | | | | | | N | |
| Cover: | | | | | | | |
| Standard housing cover is closed without borehole for longer shafts | | | | | | | A |
| (in standard housing the shaft is located inside the SPTSM encoder housing due to its length) | | | | | | | |
| Option with through hole Ø10 mm in the housing cover | | | | | | | B |
| (shaft is longer than the housing depth of the SPTSM encoder housing => through hollow shaft) | | | | | | | |
| Electrical connection: | | | | | | | |
| Standard contact pin's | | | | | | | - |
| Option 5 pol. socket (for 5 pol. connector with latch) | | | | | | | ST |

Mounting tools are not supplied. Mounting tools are mandatory!
Please order mounting tools separately, for mounting tool code see next page.

- 1.) Option BZ = 3 Channels: Track A, Track B, Track Z (One index impulse per 360° rotation)
 Option B = 2 Channels: Track A, Track B, without index impulse
 The number of pulses per revolution and the possible number of channels can not be chosen arbitrarily.
 For example, it is not possible to get the optical resolution 1024ppr together with index track Z.
- 2.) This option is only available with minimum order quantity
- 3.) Optical resolution 100 ppr. in combination with 4 mm shaft diameter is not coupled to a minimum order quantity

Data Sheet for Angle Sensors

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:

- Other pulses.: 1250 / 2000 / 2048 / 2500 / 4000 / 4096 / 5000 ppr.
- Applicable on other shaft diameters ≤ 8 mm, for example wave 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 once needed):

| 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 psc. 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

Data Sheet for Angle Sensors

Optical Kit Encoder

Series SPTSM

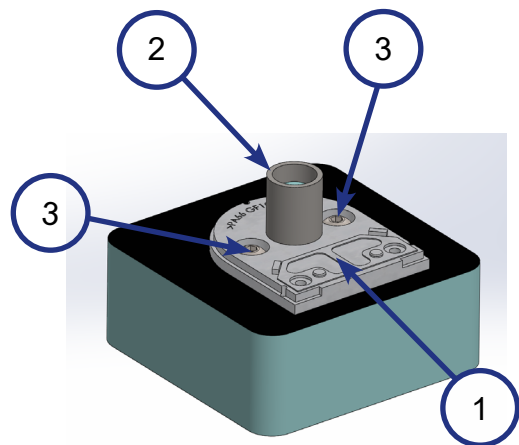
Mounting Instructions:

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.

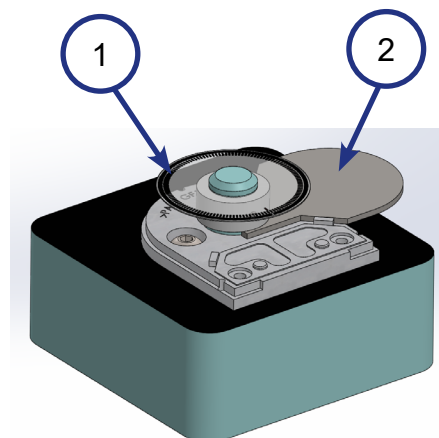
Step A

- 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.



Data Sheet for Angle Sensors

Optical Kit Encoder

Series SPTSM

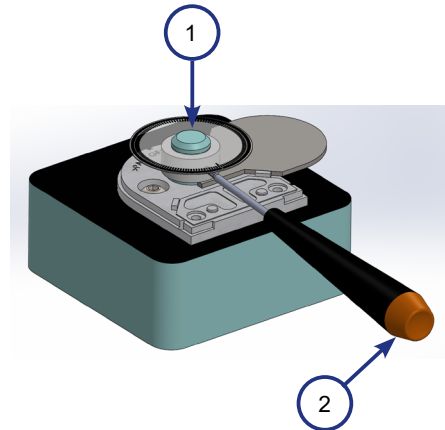
Mounting Instructions:

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

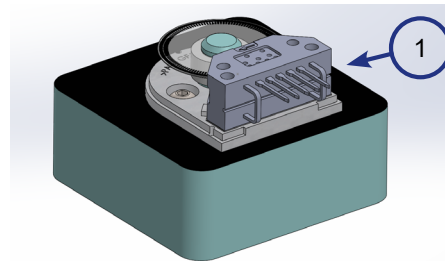
Secure the grub screw by means of a screw safety varnish (anaerobe liquid adhesive)



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.

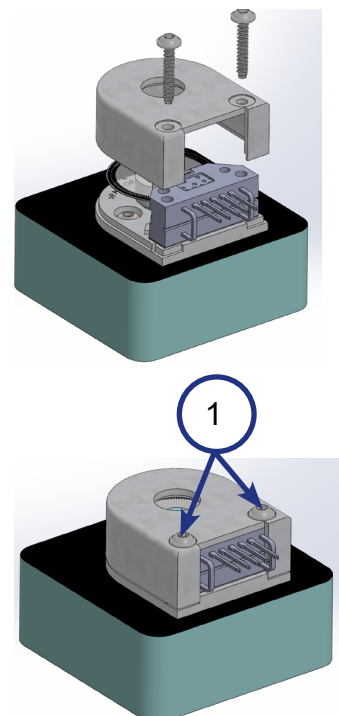


Step E

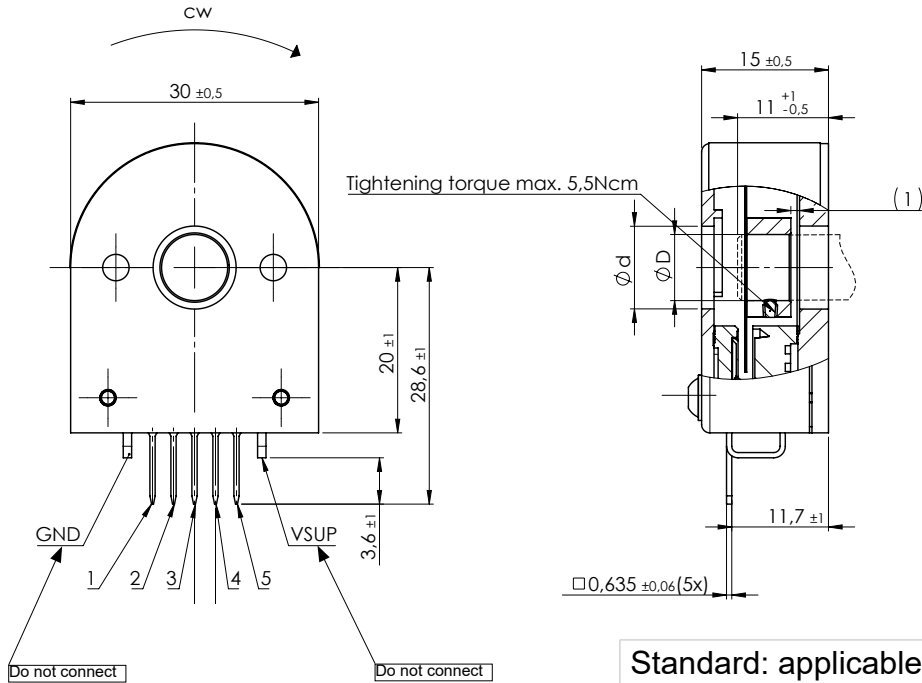
E1. Attach the housing cover to the two included Torx screws STS-plus KN6038 2,5x15-T8, A2. tightening torque max. 20 Ncm (1)

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.

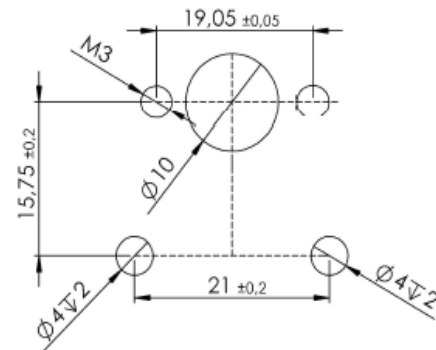
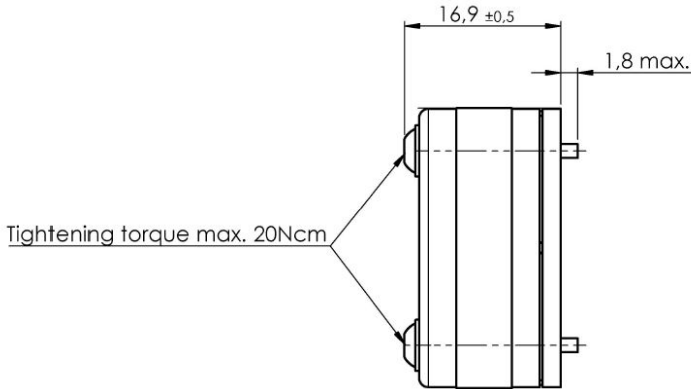


Drawing



Standard: applicable on shaft diameter D 6 mm

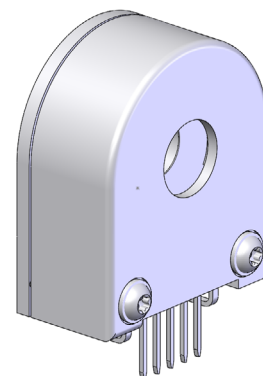
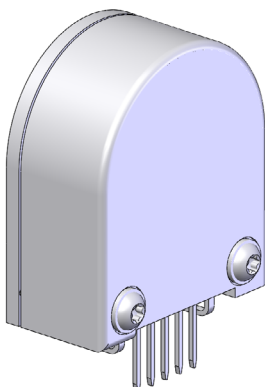
Recommended Drilling Pattern:



Option Through Hole in Case Cover

Standard: A Without borehole in cover

Option: B With borehole in cover for longer shafts



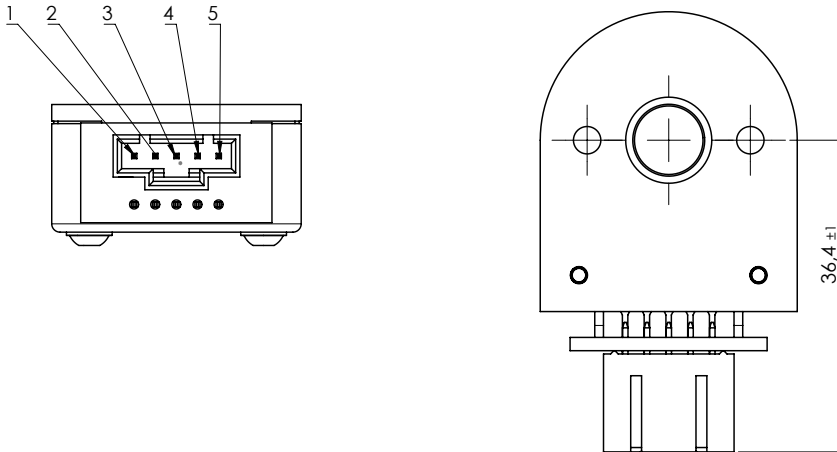
Data Sheet for Angle Sensors

Optical Kit Encoder

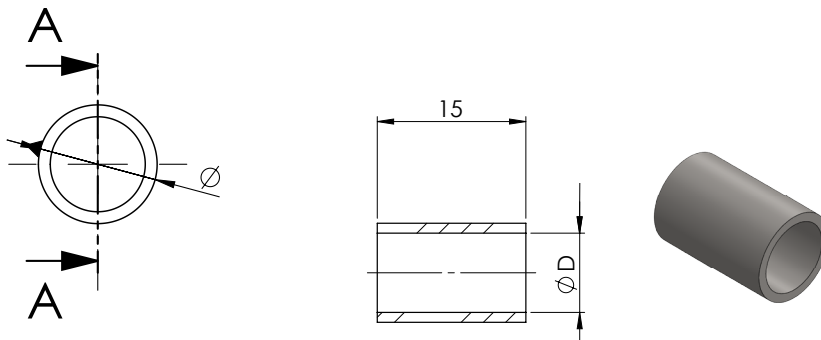
Series SPTSM

Drawing

Option ST

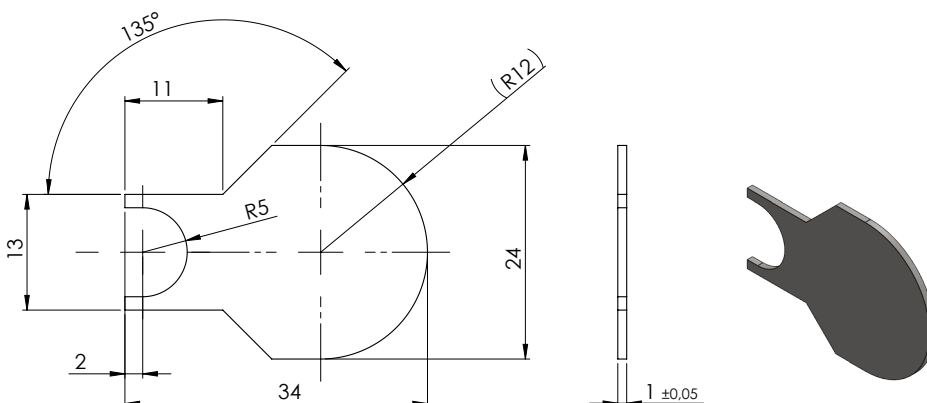


Mounting Tool: Centering Gauge



| 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



Data Sheet for Angle Sensors

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

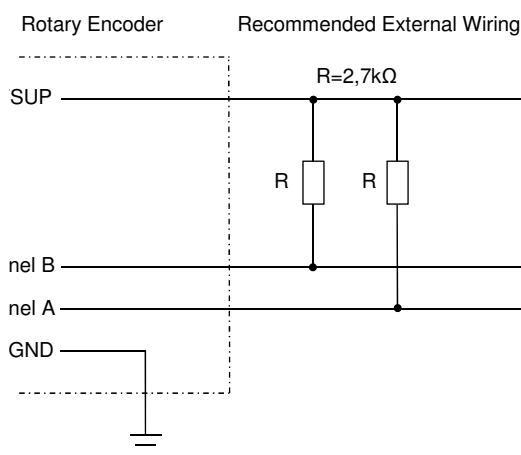
For Option ST (with plug and TTL output):

MOLEX: SL crimp housing, 5 circuits, series 70066
 SL crimp terminals series 70058

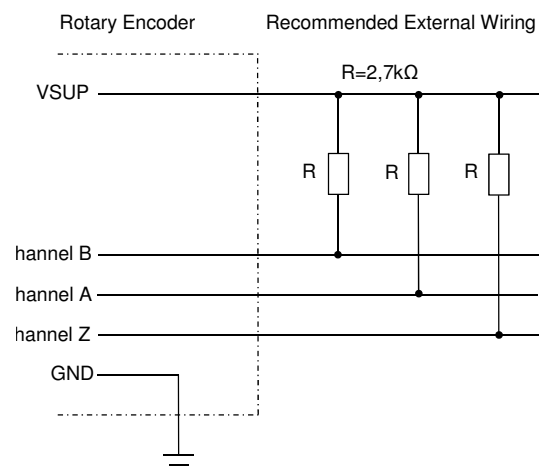
For Option N (with plug and linedriver output):

MOLEX: SL housing, 8 circuits, series 70066
 SL crimp terminals series 70058

Recommended Output Circuit TTL (2 Channels)



Recommended Output Circuit TTL (3 Channels)

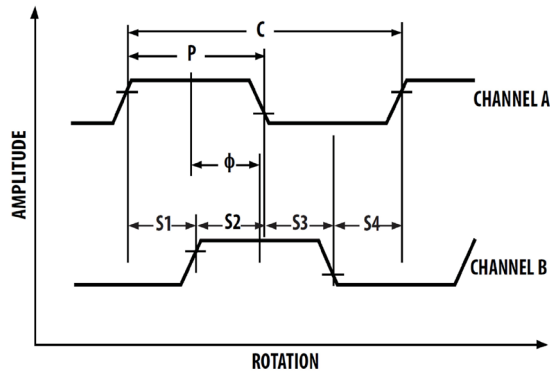


Data Sheet for Angle Sensors

Optical Kit Encoder

Series SPTSM

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



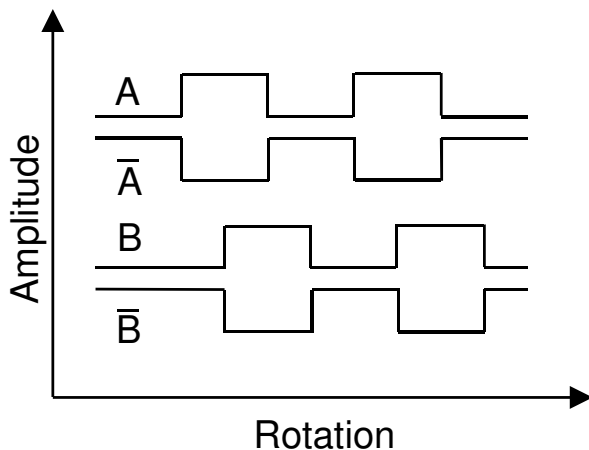
Possible Output Signal Deviations
(2 Channels)

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

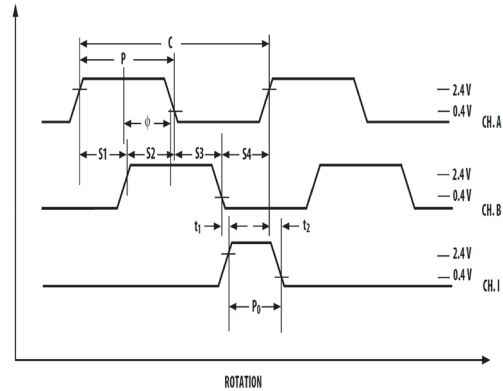
$$P = \frac{C}{2} \pm \frac{C}{12}$$

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

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



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



Possible Output Signal Deviations
(3 Channels)

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

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

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

$$P_0 = \frac{C}{4} \pm \frac{C}{12}$$

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

