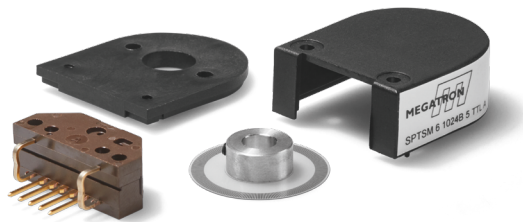


# Data Sheet for Angle Sensors

## Optical Kit Encoder

## Series SPTSM



- Up to 1024 pulses / 360°
- 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 17mm 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. Thanks to the option with bore hole in the housing cover, it is also suitable in conjunction with long shafts.

### Electrical Data

Number of pulses	50, 96, 100, 200, 256, 360, 400, 500, 512, 1000, 1024 Imp./Rev.
Output channels	A, B, Z (Z not available for 96 Imp./Rev. and 1024 Imp./Rev.)
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)	IP 30
Operating temperature range	-40 °C...+85 °C
Storage temperature range	-40 °C...+100 °C
Material housing	Thermoplastic
Material encoder disc / hub	Thermoplastic /aluminium
Assembling parts: Included in delivery	2 screws for fixing the housing cover are included in
Not included in delivery	Screws for mounting the base plate are not included in delivery
Required assembling tools (not included in delivery): Assembling tools are mandatory for mounting the sensor in the application and they must be ordered separately	1. Distance gauge: applicable for all shaft diameters 2. Centering gauge must be ordered according the 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

**Assembling tools are not part of the scope of delivery. Assembling tools are duty !  
Please order assembling tools separately, order numbers of assembling tools see please next page.**

Description	Selection: standard=black/bold, possible options=grey/cursive						
<b>Series:</b>	<b>SPTSM</b>						
<b>For shaft diameter:</b>							
Option Ø 4 mm		4					
Option Ø 5 mm		5					
<b>Standard Ø 6mm</b>		<b>6</b>					
Option Ø 6,35 mm		6,35					
Option Ø 8 mm		8					
<b>Pulses per revolution / number of channels 1.)</b> The number of pulses and the number of channels are not variable, they are coupled together. BZ: means 3 channels A, B, Z B: means 2 channels A, B							
Option: 50 pulses, BZ=3 channels 2.)			0050		BZ		
Option: 96 pulses, B=2 channels 2.)			0096		B		
Option: 100 pulses, BZ=3 channels 3.)			0100		BZ		
Option: 200 pulses, BZ=3 channels 2.)			0200		BZ		
Option: 256 pulses, BZ=3 channels 2.)			0256		BZ		
<b>360 pulses, BZ=3 channels</b>			<b>0360</b>		<b>BZ</b>		
Option: 400 pulses, BZ=3 channels 2.)			0400		BZ		
<b>500 pulses, BZ=3 channels</b>			<b>0500</b>		<b>BZ</b>		
Option: 512 pulses, BZ=3 channels 2.)			0512		BZ		
<b>1000 pulses, BZ=3 channels</b>			<b>1000</b>		<b>BZ</b>		
Option: 1024 pulses, B=2 channels 2.)			1024		B		
<b>Supply voltage:</b> <b>VSUP: 5 V (+/- 10 %)</b>				5			
<b>Output signal:</b> <b>TTL</b>						TTL	
Option Linedriver 2.)						N	
<b>Cover:</b> <b>Standard housing cover is closed without bore-hole for longer shafts</b> (in standard housing the shaft is located inside the SPTSM encoder housing due to its length) Option with through hole Ø 10 mm in the housing cover (shaft is longer than the housing depth of the SPTSM encoder housing => through hollow shaft)							A
							B
<b>Electrical connection:</b> <b>Standard contact pin's</b>							-
Option 5 pol. socket (for 5 pol. connector with latch)							ST

- 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 100ppr in combination with 4mm 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  $\varnothing$  6.00 mm, optical resolution 512 impulses per revolution, 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 per revolution: 1250 / 2000 / 2048 / 2500 / 4000 / 4096 / 5000
- Applicable on other shaft diameters  $\leq$  8 mm, for example wave diameters in inch
- Special cable and connection design

## Assembling Tools:

### Important notes for ordering assembling tools:

1. To install the kit encoder in the application, the SPTSM centering gauge is required in combination with the SPTS distance gauge
2. The centering gauge is required for each shaft diameter once, the distance gauge is applicable for all shaft diameters (means only one distance gauge is necessary)
3. The assembling tools do not remain in the kit encoder after installation and can be used for assembling additional kit encoders
4. Assembly tools are required for the correct assembly function of the KIT encoder (obligatory!) and hence must be ordered separately for SPTSM kit encoder

### 1. SPTS centering gauge (is required once for each shaft diameter):

Order no.:	Order designation:
134153	SPTSM centering gauge for shaft diameter $\varnothing$ 4 mm
134154	SPTSM centering gauge for shaft diameter $\varnothing$ 5 mm
134155	SPTSM centering gauge for shaft diameter $\varnothing$ 6 mm
134156	SPTSM centering gauge for shaft diameter $\varnothing$ 6,35 mm
134157	SPTSM centering gauge for shaft diameter $\varnothing$ 8 mm

### 2. SPTS distance gauge (only once needed):

Order no.:	Order designation:
134152	SPTSM distance gauge

## Order example SPTSM assembling tools:

### Example: purchase requisition

10 pcs. kit encoders 1024 Imp./Rev. for shaft diameter  $\varnothing$  6,00 mm and  
10 psc. kit encoder 256 Imp./Rev. for shaft diameter  $\varnothing$  4,00 mm

### Example: required assembling tools

1 x #134155 centering gauge  $\varnothing$  6 mm  
1 x #134153 centering gauge  $\varnothing$  4 mm  
1 x #134152 distance gauge

# Data Sheet for Angle Sensors

Optical Kit Encoder

Series SPTSM

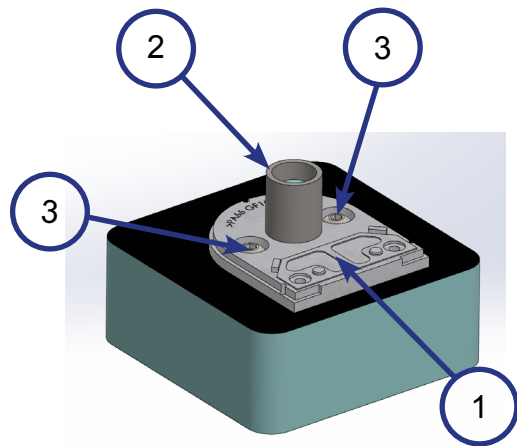
## Assembling Instructions:

General installation instructions:

1. When unpacking the components and during assembly, make sure that the optical disc is not touched in the area of the increments. The encoder disc and the optical module shall not come into contact with oil and / or grease. Wearing latex or cloth gloves during installation is helpful.
2. Take care to apply the ESD protection guidelines when handling the optical module. We recommend leaving the ex works shipped 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. Our recommendation is to secure the screws which fix the base plate and the grub screw. For mounting the encoder disc screw saving varnish (anaerobe liquid adhesive) for a reliable and durable operation.

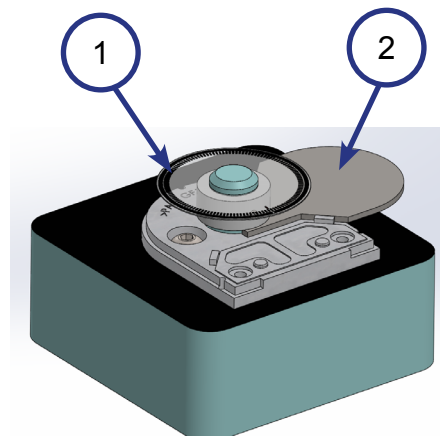
### Step A

- 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. Fix 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

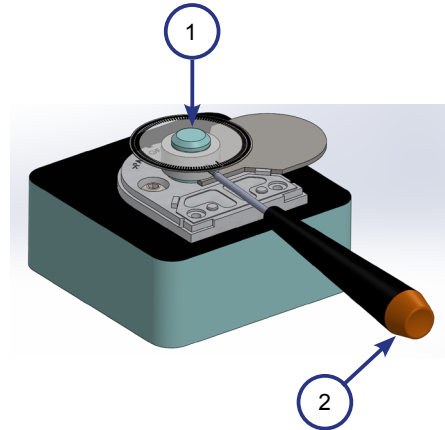
## Assembling Instructions:

### Step C

C 1. Put a gentle 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)

Take care that the torque which is applied to the grub screw is not higher than 5.5 Ncm

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

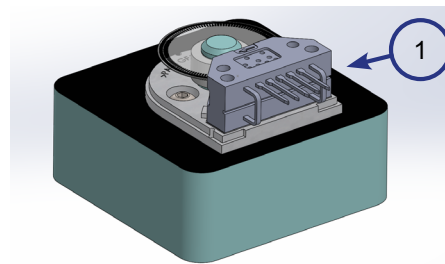


### Step D

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

#### Note:

Avoid touching the contact pin's of the optical module during assembly. Leave the ESD protection supplied ex works on the electrical connections of the module as long as possible.



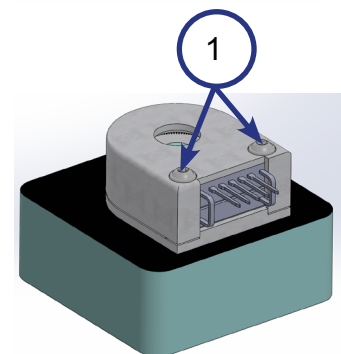
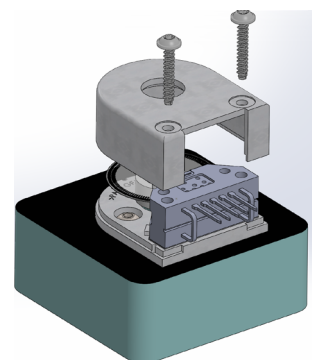
### Step E

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

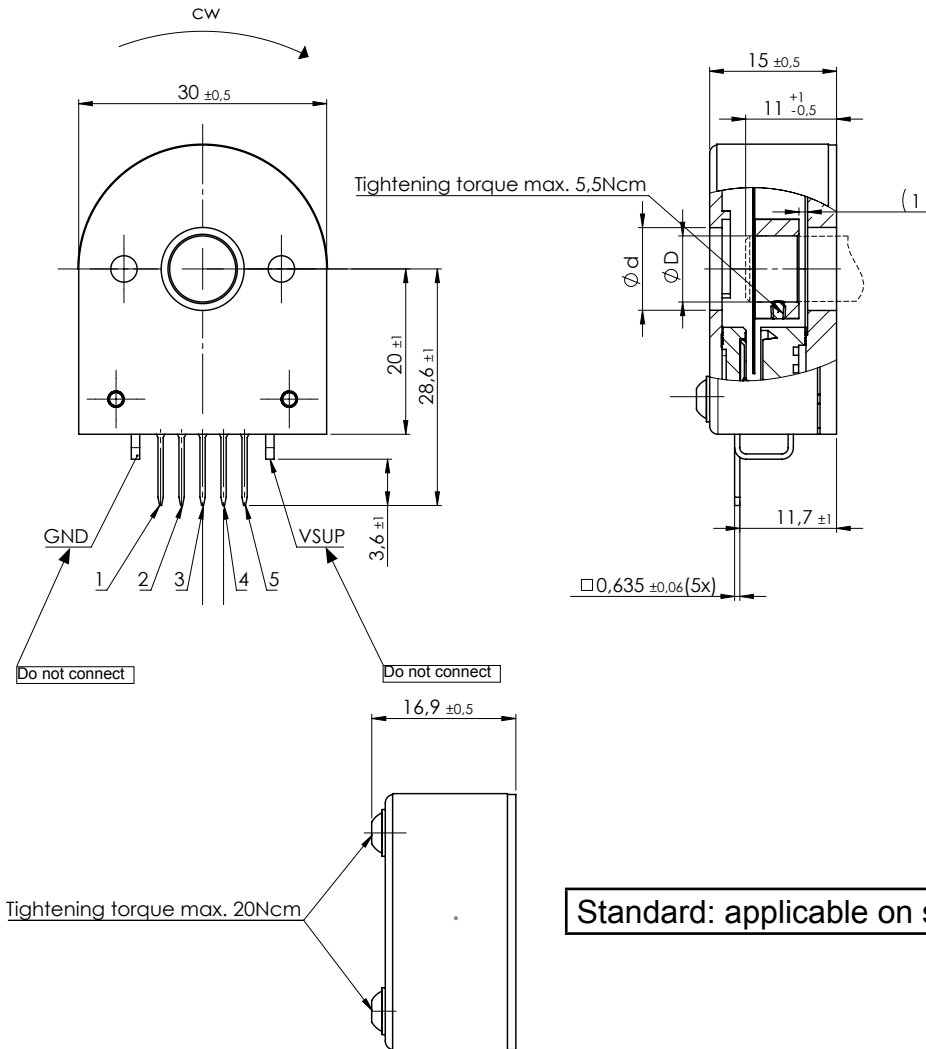


# Data Sheet for Angle Sensors

Optical Kit Encoder

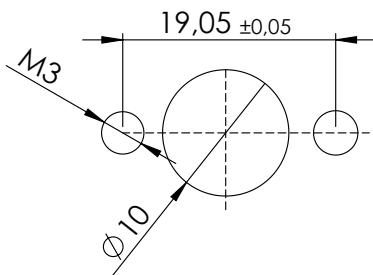
Series SPTSM

## Drawing



Standard: applicable on shaft diameter D 6 mm

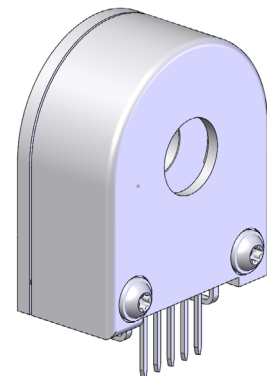
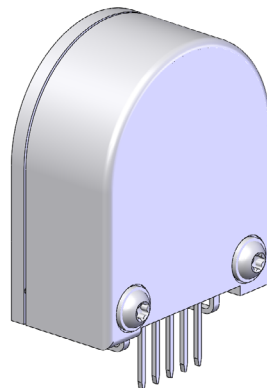
### Recommended Drilling Pattern:



### Option Through Hole in Case Cover

Standard: A  
Without borehole  
in cover

Option: B  
With borehole in cover for  
longer shafts



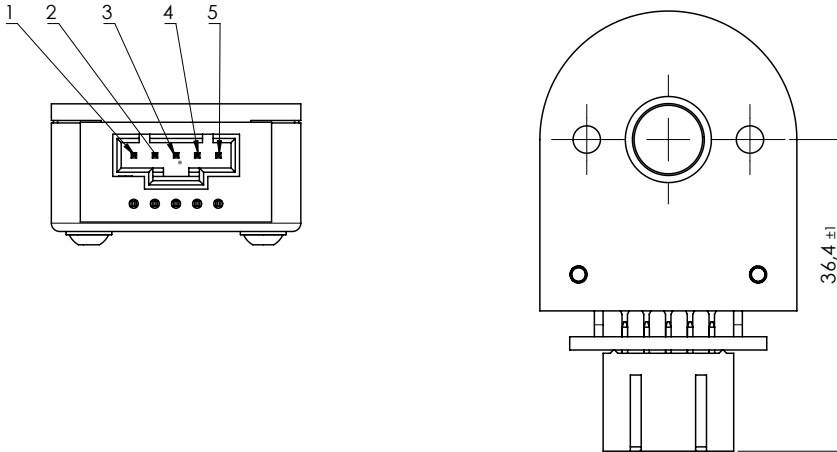
# Data Sheet for Angle Sensors

Optical Kit Encoder

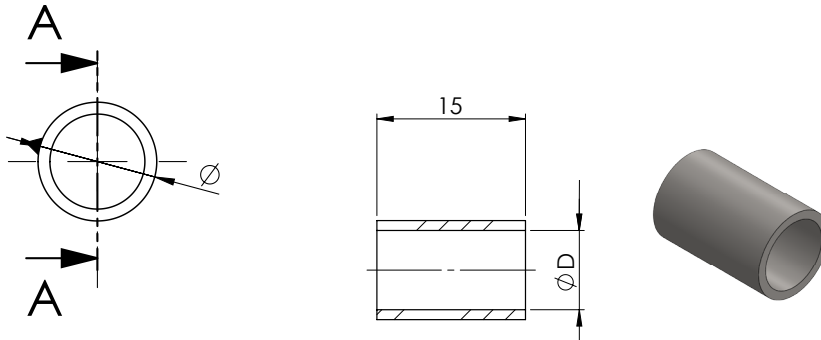
Series SPTSM

Drawing

Option ST

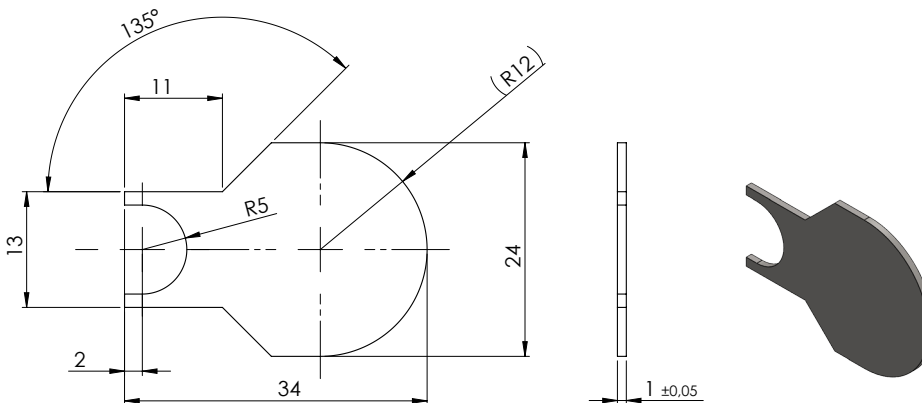


Mounting Tool: Centering Gauge



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

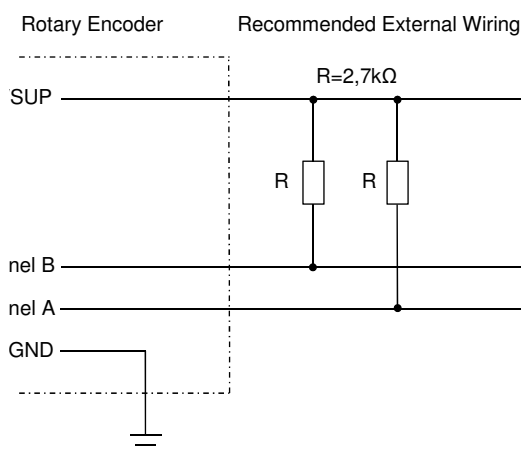
#### For Option ST (with plug and TTL output):

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

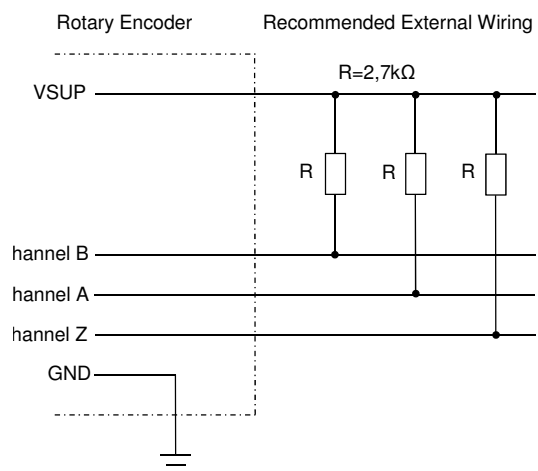
#### For Option N (with plug and linedriver output):

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

### Recommended Output Circuit TTL (2 Channels)



### Recommended Output Circuit TTL (3 Channels)



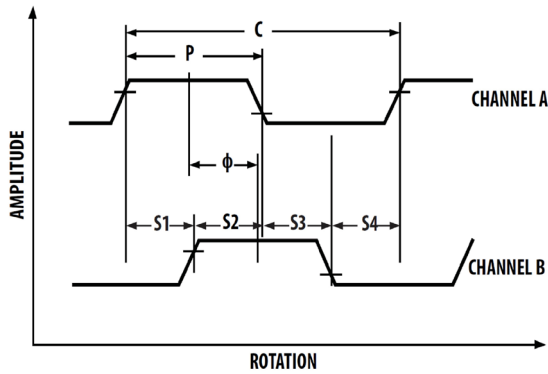


# Data Sheet for Angle Sensors

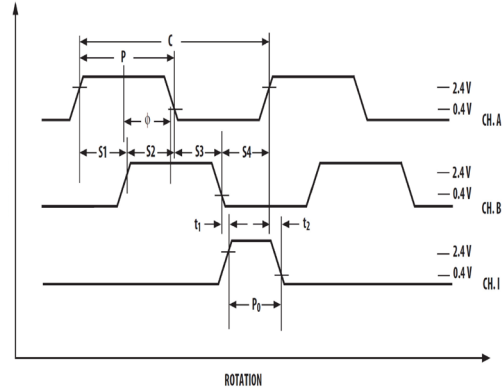
Optical Kit Encoder

Series SPTSM

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



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



Possible Output Signal Deviations  
(2 Channels)

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

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

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

Possible Output Signal Deviations  
(3 Channels)

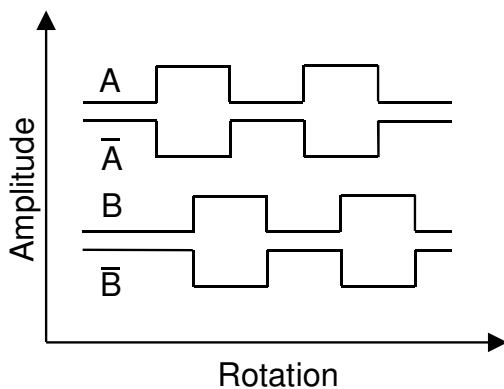
$$S1, S2, S3, S4 = \frac{C}{4} \pm \frac{C}{12}$$

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

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

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

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



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

