

## Data Sheet ME16



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## The World of Motion Control

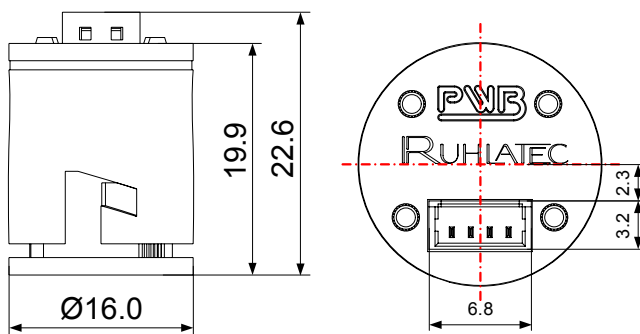
### Description

The ME16 is a reliable low cost optical hollow shaft encoder that can be fixed quickly and easily on different sizes of motor shafts.

The encoder provides two square wave outputs in quadrature (90 degrees phase shifted) for counting and direction information.

The resolution of the encoder is determined by the number of counts per rotation (CPR). Power supply and signals are provided by a 4 pin Molex connector.

### Dimensions



Encoder Resolution (CPR)
075
150
160
200

Motor Shaft $\varnothing$ Diameter (mm)
1.500
2.000
2.300
2.500
3.000
3.175 (1/8")

### Features

- Small Size: 16.0 mm diameter x 22.6 mm length.
- Quick and easy assembly without touching sensitive components.
- Output channels: 2 (quadrature).
- Power supply: 5 VDC.
- Output type: TTL compatible.
- Resolution up to 200 CPR (counts per rotation).
- No signal adjusting required.
- Maximum shaft diameter: 3.175 mm (1/8").
- Operating temperature: -10 °C to +85 °C.
- Frequency: 60 kHz / 75 kHz upon request.
- RoHS compliant.

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### Recommended Operating Conditions

Electrical characteristics are only effective for the range of the operating temperatures.  
Typical values at 25 °C and V<sub>cc</sub> = 5 VDC.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Temperature	T <sub>A</sub>	0	25	85	°C	
Supply Voltage	V <sub>cc</sub>	4.5	5.0	5.5	VDC	
Supply Current	I <sub>cc</sub>	13	15	18	mA	
Load Capacitance	C <sub>L</sub>			100	pF	
Count Frequency	f		30	60 (75) <sup>1</sup>	kHz	RPM x N / 60 x 10 <sup>-3</sup>
High Level Output Voltage	V <sub>oH</sub>	2.4		V <sub>cc</sub>	VDC	I <sub>bH</sub> = -0.2 mA
Low Level Output Voltage	V <sub>oL</sub>			0.4	VDC	I <sub>bL</sub> = 8.0 mA
Rise Time	t <sub>r</sub>		500		ns	C <sub>L</sub> = 25 pF, R <sub>L</sub> = 2.7 KΩ
Fall Time	t <sub>f</sub>		100		ns	C <sub>L</sub> = 25 pF, R <sub>L</sub> = 2.7 KΩ

1. on demand

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	T <sub>s</sub>	-40		85	°C	
Operating Temperature	T <sub>A</sub>	-20		85	°C	
Humidity Exposure				90	% RH	not condensing
Supply Voltage	V <sub>cc</sub>	-0.5		7	VDC	
Output Voltage	V <sub>o</sub>	-0.5		V <sub>cc</sub>	VDC	
Output Current per channel	I <sub>out</sub>	-1.0		8	mA	
Vibration				2000	Hz	20g

### Encoding Characteristics Channel A & B

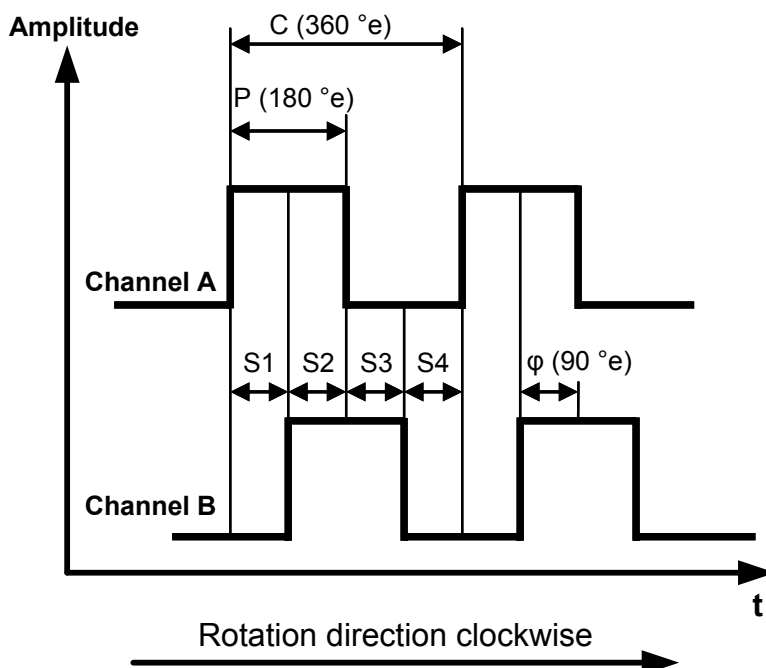
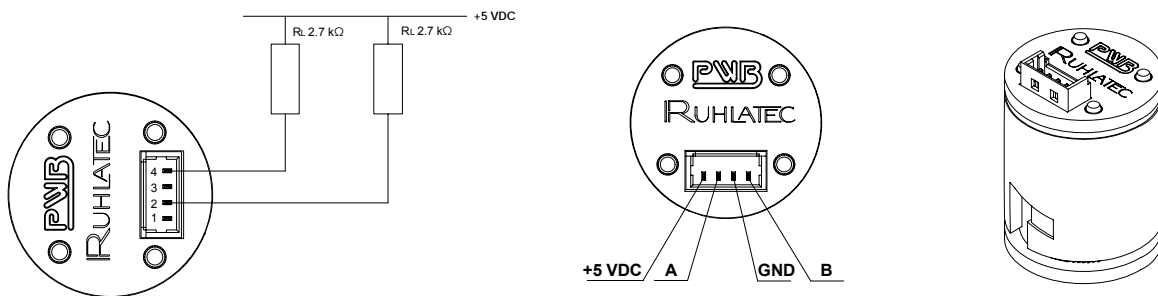
Parameter	Symbol	Nominal	Max.Error	Unit
Pulse Width	P	180	±75	°e
Phase	φ	90	±60	°e
Position Error	ΔQ	0	1.3	°m

**ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.**

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### Electrical interface

The ME16 encoder requires 2.7 k $\Omega$  ( $\pm 10\%$ ) external pull-up resistors on output pins 2 and 4 (Channels A and B).



### Definitions

#### **Counts per Rotation (CPR):**

The number of bar and window pairs or increments per revolution of the code wheel.

#### **One Cycle (C):**

360 electrical degrees ( $^{\circ}e$ ), one period of the signal, caused by one pair of bar and window.

#### **Pulse Width (P):**

The number of electrical degrees that an output is high during one cycle. This value is nominally 180  $^{\circ}e$ .

#### **State Width (S):**

The number of electrical degrees between a transition in the output of channel A and the neighbouring transition in the output of channel B. There are 4 states per cycle, each nominally 90  $^{\circ}e$ .

#### **Phase ( $\phi$ ):**

The number of electrical degrees between the centre of the high state of channel A and the center of the high state of channel B. This value is nominally 90  $^{\circ}e$ .

#### **Position Error ( $\Delta Q$ ):**

The angular difference between the actual angular shaft position and the position indicated by the encoder cycle count.

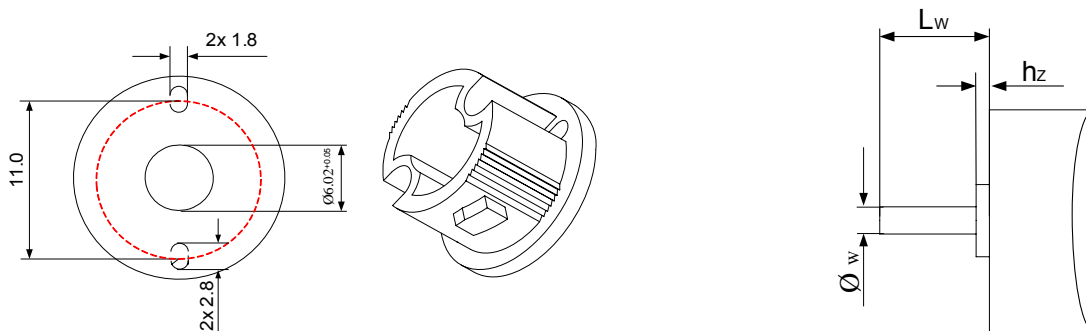
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### Mechanical specifications

Parameter	Value	Tolerance	Unit
Outer dimensions	Ø16.0 x 22.6	-	mm
Shaft diameter Ø <sub>w</sub>	1.5 / 2.0 / 2.3 / 2.5 / 3.0 / 3.175	±0.01	mm
Required shaft length L <sub>w</sub>	9.5	+ 2.0	mm
Max. allowable axial shaft play of motor	0.6	-	mm
Max. allowable radial shaft play of motor	0.025	-	mm
Max. allowable eccentricity of motorshaft (concerning to the centering shoulder)	0.12	-	mm
Max. allowable radial run-out error of motor shaft	0.025	-	mm
Mounting screw size (DIN 84)	M1.6	-	-
Tightening torque of the screws	15	-5	Ncm
Hole circle	11.0	±1.0	mm
Mounting boss diameter Ø <sub>z</sub>	6.02	+0.05	mm
Max. mounting boss height h <sub>z</sub>	1.5	-0.1	mm
Mating connector (Molex)	contact 4x 50079-8000 housing 1x 51021-0400	-	-
Total weight	4	-	g
Moment of inertia of the hub with the code wheel	2.35	±1.0	gmm <sup>2</sup>
Protection grade according to DIN 40500	IP50	-	-

### Mounting considerations:

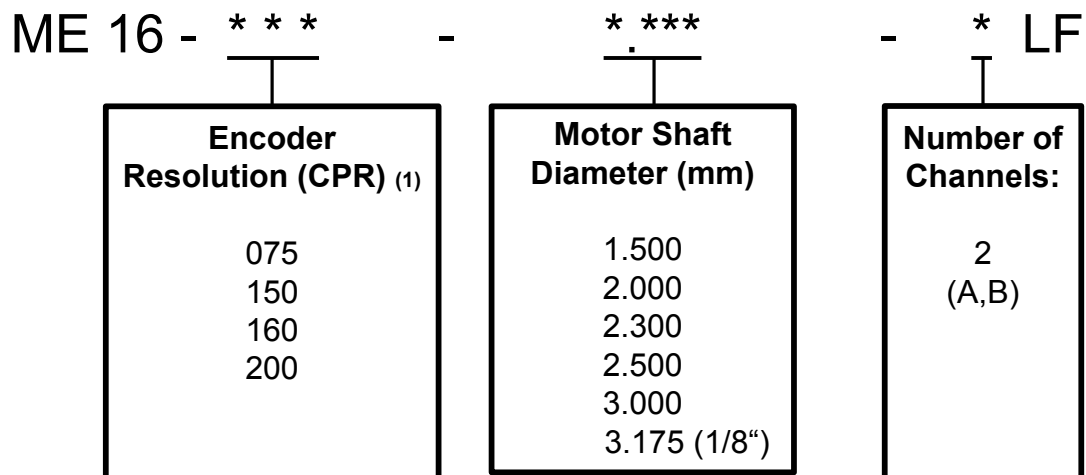
The ME16 encoder is designed to self align by using a mounting boss. The drawing shows the configuration of the mounting boss along with the location of the mounting screw holes. Shaft diameter and tolerances are given in the above mentioned chart.



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### Ordering information

Ordering code:



(1) other encoder resolutions on request

Available accessories (no parts of standard delivery):

- cable 300 mm length (UL1061 / AWG28)
- adapter plates for different motors
- centering gauge for different motor shafts
- fastening screws DIN 84 M1.6x3

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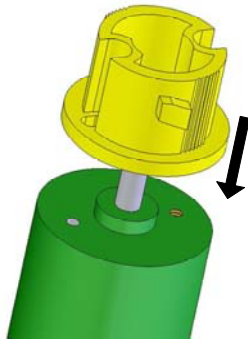
***INFORMATION CONTAINED IN THIS PUBLICATION MAY BE SUPERSEDED BY UPDATES. IT IS YOUR RESPONSIBILITY TO ENSURE THAT YOUR APPLICATION MEETS WITH YOUR SPECIFICATIONS.***

Patents: U.S 5,828,047 ; U.S 5,508,088 ; U.S 5,859,425 ; U.S 6,462,442

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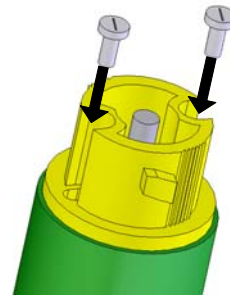
**ME16 MOUNTING INSTRUCTION**

1



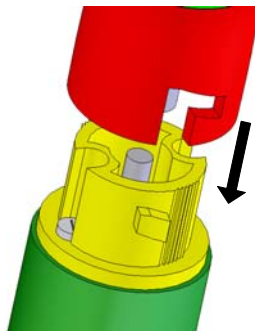
Align the base plate to the motor shaft by using the centering gauge

2



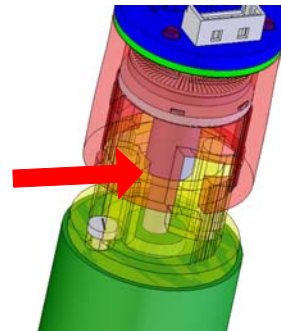
Afterwards fix the base plate to the motor flange using two screws

3



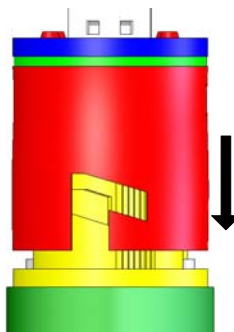
Align the housing to the base plate, slide the housing onto the base plate

4



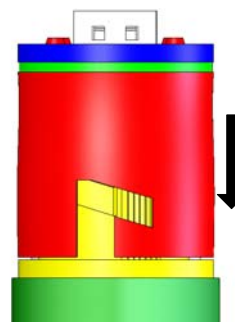
... and the hub centers itself on the motor shaft

5



From this position the housing cannot be locked

6

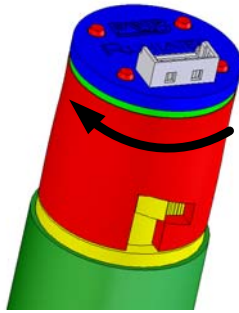


Press the housing into the final position

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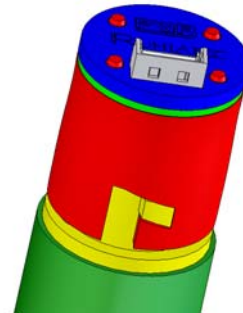
**ME16 MOUNTING INSTRUCTION**

7



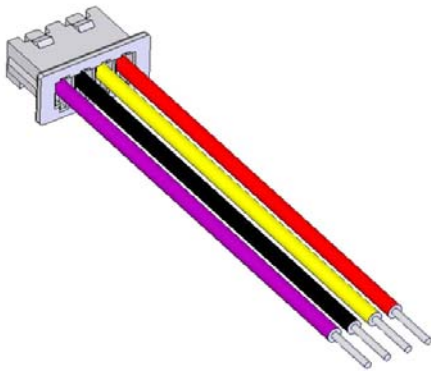
Now the housing can be locked

8

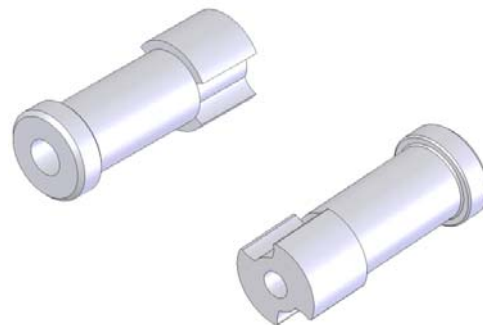


Turn the housing into its final position, the encoder is now ready for use

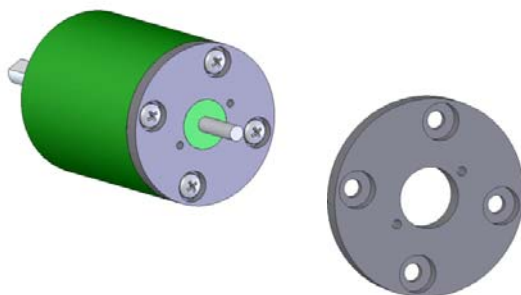
**ACCESSORIES**



Standard cable length 300 mm  
(UL1061 / AWG28)



Centering gauge for centering the ME base plate on the motor flange or an adapter plate



Customized adapter plate



screws DIN84 M1.6 X 3