Data Sheet ME16

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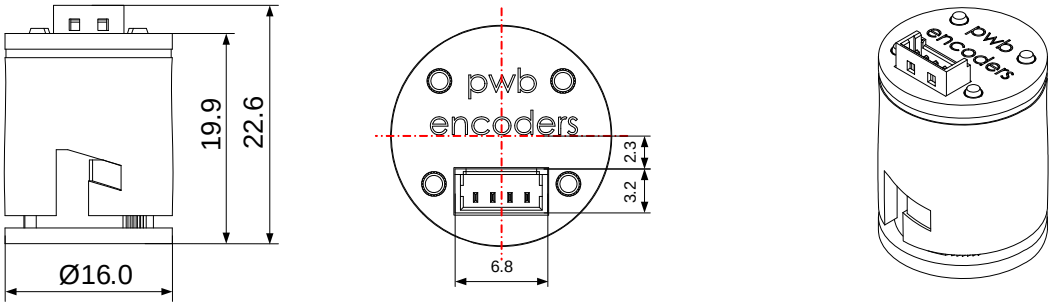
Description

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 revolution (CPR).
Power supply and signals are provided by a 4 pin Molex connector.

Dimensions



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 230 CPR (counts per revolution)
- Maximum shaft diameter: 3.175 mm (1/8")
- Operating temperature: -20 °C to 85 °C
- Frequency: 60 kHz
- Compliant EU-directive 2002/95/EG (RoHS)

Encoder Resolution (CPR)
036
075
080
150
160
200
220
230

Motor shaft Ø Diameter (mm)
1.500
2.000
2.300
2.500
3.000
3 .175 (1/8“)

Recommended operating conditions

Electrical characteristics are only effective for the range of the operating temperatures.
Typical values at 25 °C and Vcc = 5 VDC.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating temperature	T_A	-20	25	85	°C	
Supply voltage	V_{cc}	4.5	5.0	5.5	VDC	
Supply current	I_{cc}	13	15	18	mA	
Load capacitance	C_L			100	pF	
Count frequency	f			60	kHz	rpm x N / 60 x 10^{-3}
High level output voltage	V_{oH}	2.4		Vcc	VDC	I_{oH} = -0.2 mA
Low level output voltage	V_{oL}			0.4	VDC	I_{oL} = 8.0 mA
Rise time	t_r		500		ns	C_L = 25 pF, R_L = 2.7 KΩ
Fall time	t_f		100		ns	C_L = 25 pF, R_L = 2.7 KΩ

Absolute maximum ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage temperature	T_s	-40		85	°C	
Operating temperature	T_A	-20		85	°C	
Humidity exposure				90	% RH	not condensing
Supply voltage	V_{cc}	-0.5		7	VDC	
Output voltage	V_o	-0.5		V_{cc}	VDC	
Output current per channel	I_{out}	-1.0		8	mA	
Vibration				2000	Hz	20g

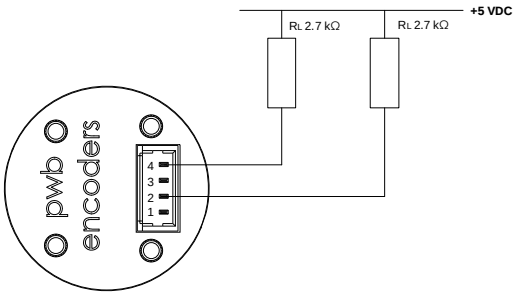
Encoding characteristics channel A & B

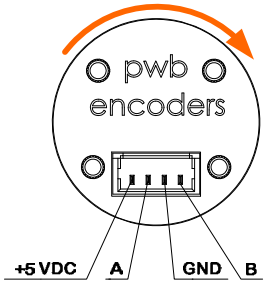
Parameter	Symbol	Nominal	Max.Error	Unit
Pulse width	P	180	±70	°e
Phase shift	φ	90	±60	°e

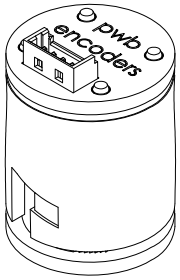
ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.

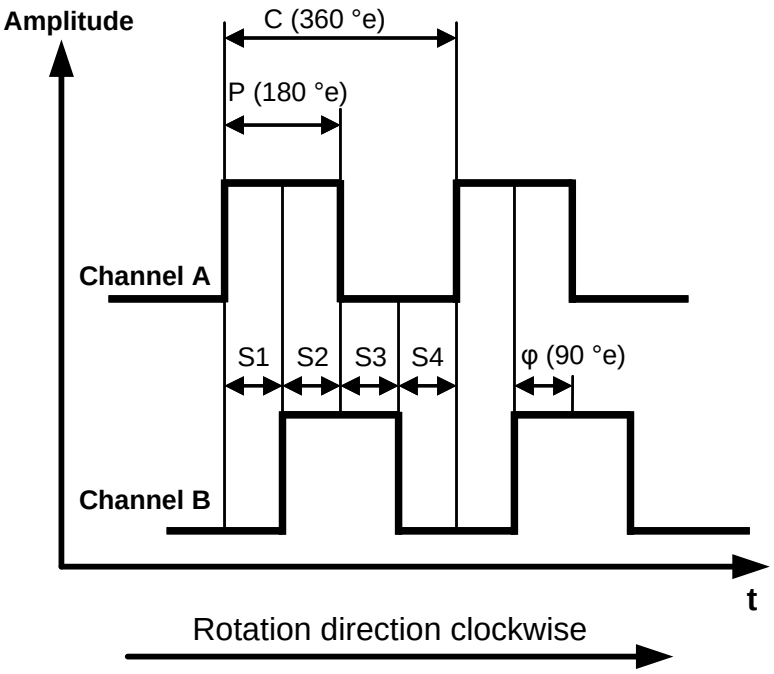
Electrical interface

The ME16 encoder requires 2.7 kΩ (±10 %) external pull-up resistors on output pins 2 and 4 (Channels A and B).









Definitions

Counts per Revolution (CPR):
The number of bar and window pairs or increments per revolution of the code wheel.

One Cycle (C):
360 electrical degrees (°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 °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 °e.

Phase (φ):
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 °e.

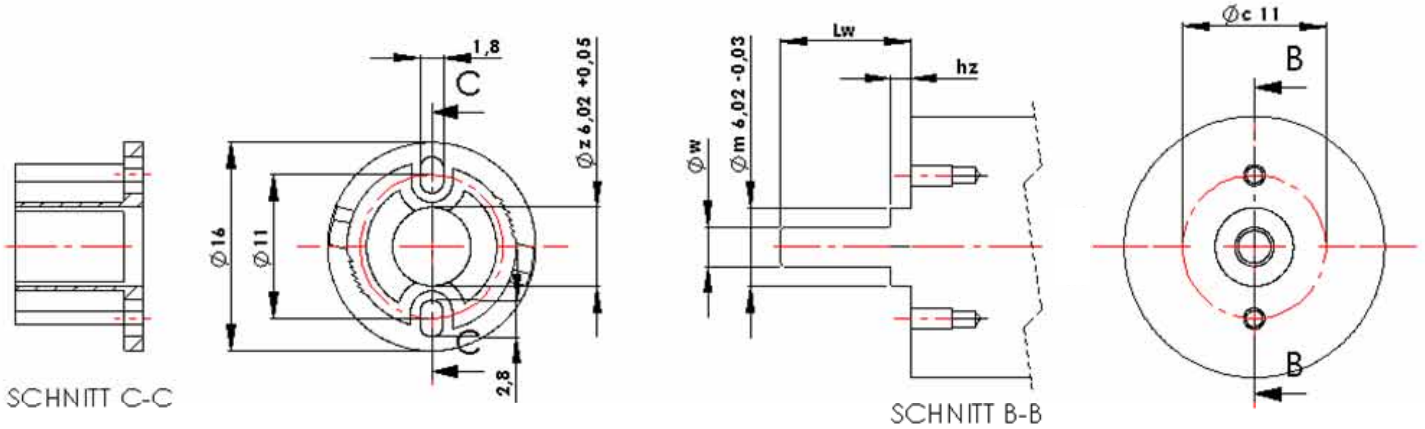
Position Error (ΔQ):
The angular difference between the actual angular shaft position and the position indicated by the encoder cycle count.

Mechanical specifications

Parameter	Value	Tolerance	Unit
Outer dimensions connector version	Ø16.0 x 22.6	-	mm
Shaft diameter **Øw**	1.5 / 2.0 / 2.3 / 2.5 / 3.0 / 3.175	±0.01	mm
Required shaft length L_W	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
Mounting screw size (DIN 84)	M1.6	-	-
Tightening torque of the screws	15	-5	Ncm
Pitch circle diameter **Øc**	11.0	±1.0	mm
Flange bore diameter diameter **Øz**	6.02	+0.05	mm
Mounting boss diameter **Øm**	6.02	-0.03	
Max. mounting boss height h_Z	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^2
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.



Ordering information

Ordering code:

ME16 - XXX - X.XXX - X - XX

Encoder Resolution (CPR)*	Motor Shaft Diameter (mm)	Number of Channels	Output option
036**	1.500	1 : 1 Channel	**LF** : connector without cable
075	2.000	2 : 2 Channels	**LS** : connector + standard cable
080	2.500		
150	3.000		
160	3.175 (1/8 ")		
200			
220			
230			

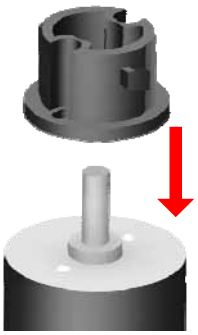
Note:
* other encoder resolutions on request
** only one channel

Available accessories see page 9 (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 or M1.6x4

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

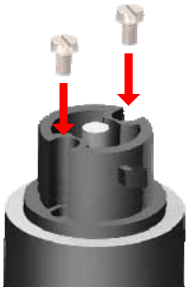
ME16 MOUNTING INSTRUCTION

1



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

2

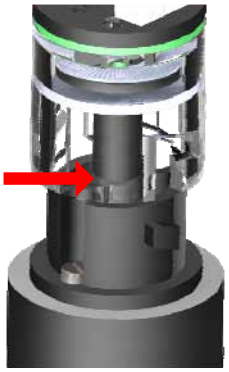


Afterwards fix the base plate to the motor flange using two screws

3

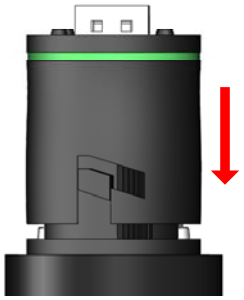
Align the housing to the base plate, slide the housing onto the base plate

4



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

5



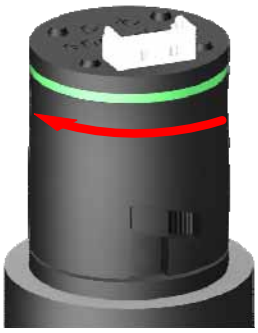
From this position the housing cannot be locked

6

Press the housing into the final position

ME16 MOUNTING INSTRUCTION

7

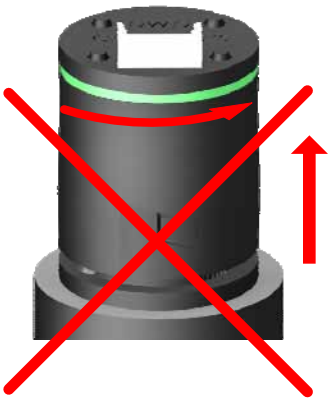


Now the housing can be locked

8

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

WARNING

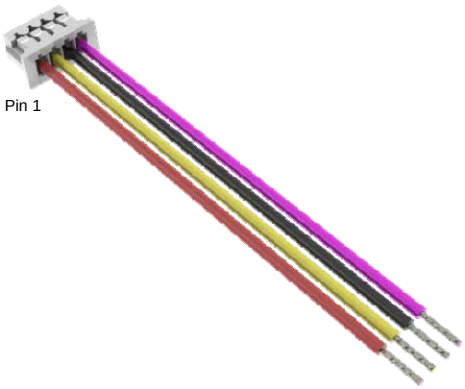


Do not rotate and pull out the encoder after assembly or when it is in operation.

ATTENTION!

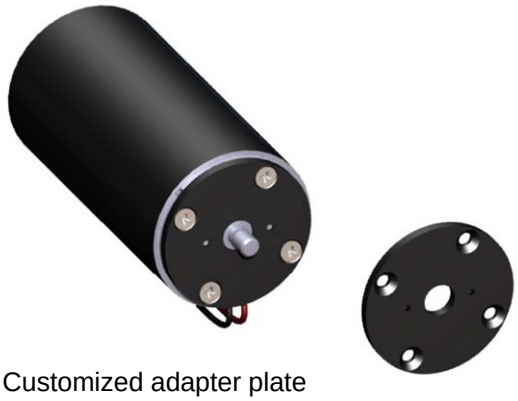
The encoder is so designed that it may be assembled only one time, otherwise the guarantee will be voided. Note: see IMPORTANT NOTICE (page 9)

Available accessories



Standard cable length 300 mm
(UL 1061 / AWG 28)

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 or M1.6 X 4

IMPORTANT NOTICE

The encoder is so designed that it may be assembled only one time, otherwise the guarantee will be voided.
The guarantee will be voided by misuse, accident, modification, unsuitable physical or operating environment, operation in other than the specified operating environment, or failure caused by a product for which ***PWB encoders GmbH*** is not responsible.

PWB encoders GmbH reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services also datasheets at any time.

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