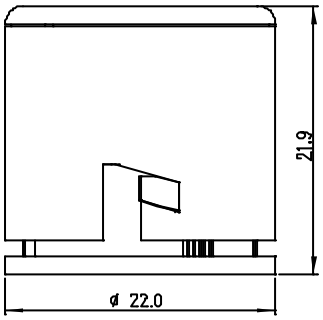
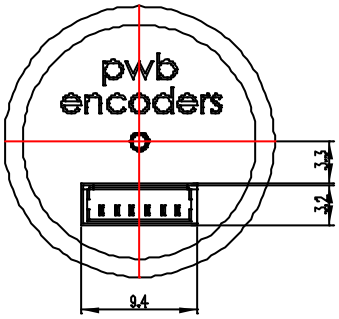
Description

The MEC22HR is a high resolution 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 and one index channel (one pulse per revolution).
The resolution of the encoder is determined by the number of counts per revolution (CPR).
Power supply and signals are provided by a 6 pin Molex connector.

Dimensions





Features

- Small size: 22.0 mm diameter x 21.9 mm length.
- Quick and easy assembly without touching sensitive components
- Two channel quadrature output (A / B)
- Two channel quadrature output with index pulse (A / B / I)
- Power supply: 5 VDC
- Output type: TTL compatible
- Output circuit: pull-up
- Resolution up to 8192 CPR (counts per revolution)
- Maximum shaft diameter: 8.0 mm
- Operating temperature range: -20 °C to 85 °C
- Compliant EU-directive 2011/65/EU (RoHS)

Recommended operating conditions

Electrical characteristics are only effective for the range of the operating temperatures.
Typical values at 25 °C and V_{CC} = 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	V_{DC}	
Supply current	I_{cc}		27	60	mA	
Load capacitance	C_L			100	pF	internal pull-up 2.7 kΩ
Count frequency	f			240	kHz	rpm x N / 60 x 10^{-3} 4X Interpolation Factor
High level output voltage	V_{oH}	2.4		Vcc	V_{DC}	
Low level output voltage	V_{oL}			0.4	V_{DC}	
Rise time	t_r		<100		ns	
Fall time	t_f		<100		ns	

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}			7	V_{DC}	
Output voltage	V_o			V_{cc}	V_{DC}	
Output current per channel	I_{out}			4	mA	
Vibration				2000	Hz	20 g

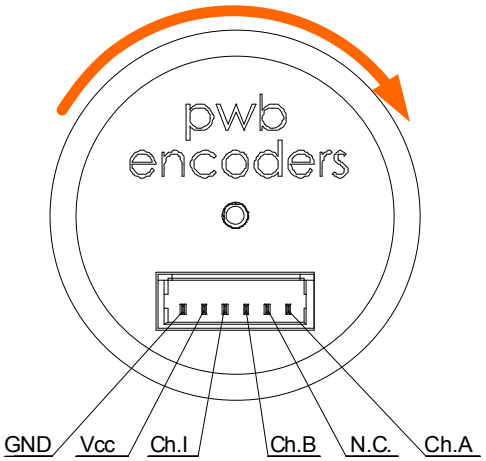
Encoding characteristics

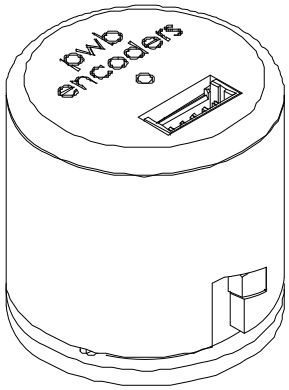
Parameter	Symbol	Nominal	Max. Error	Unit
Pulse width	P	180	±45	°e
Phase shift	φ	90	±45	°e

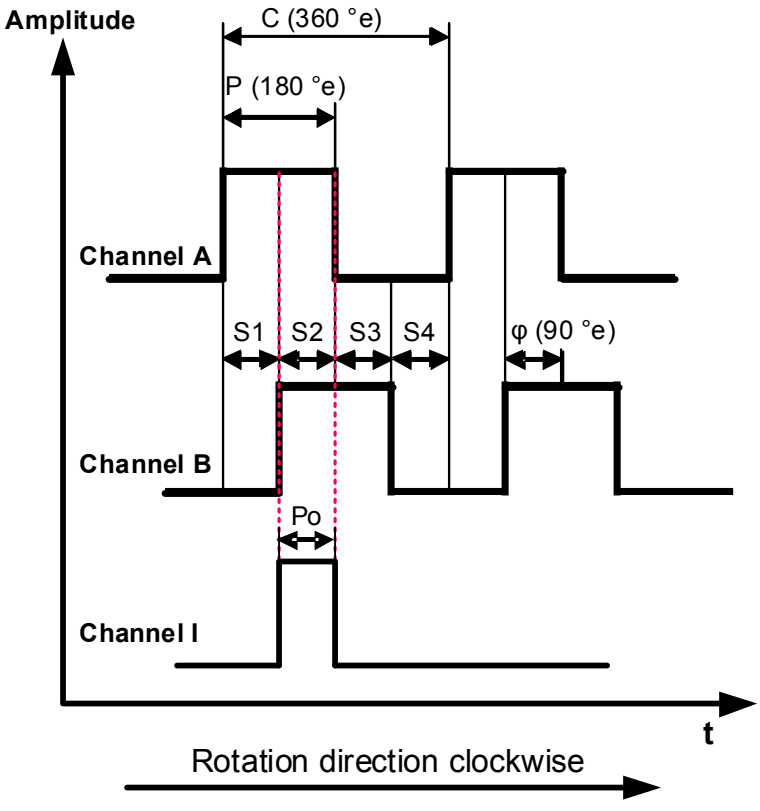
ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.

PWB encoders GmbH Am Goldberg 2 D-99817 Eisenach Germany
info@pwb-encoders.com / www.pwb-encoders.com

Electrical interface







Definitions

Counts per Revolution (CPR):
The number of increments per revolution.

One Cycle (C):
360 electrical degrees (°e), one period of the signal.

Cycle Error (ΔC): The deviation in electrical degrees of the pulse width from its ideal value. It is an indication of cycle uniformity.

Pulse Width (P): The number of electrical degrees when an output is "HIGH" during one cycle, nominally 180 °e or half a cycle.

Pulse Width Error (ΔP): The deviation in electrical degrees of the pulse width from its ideal value of 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 (S1 – S4).

State Width Error (ΔS): The deviation in electrical degrees of each state width from its ideal value of 90 °e.

Phase (ϕ): The number of electrical degrees between the centre of the high state on channel A and the centre of the high state on channel B. This value is nominally 90 °e (the signals A and B can be used for quadrature).

Phase Error (Δϕ): The deviation in electrical degrees of the phase from its ideal value of 90 °e.

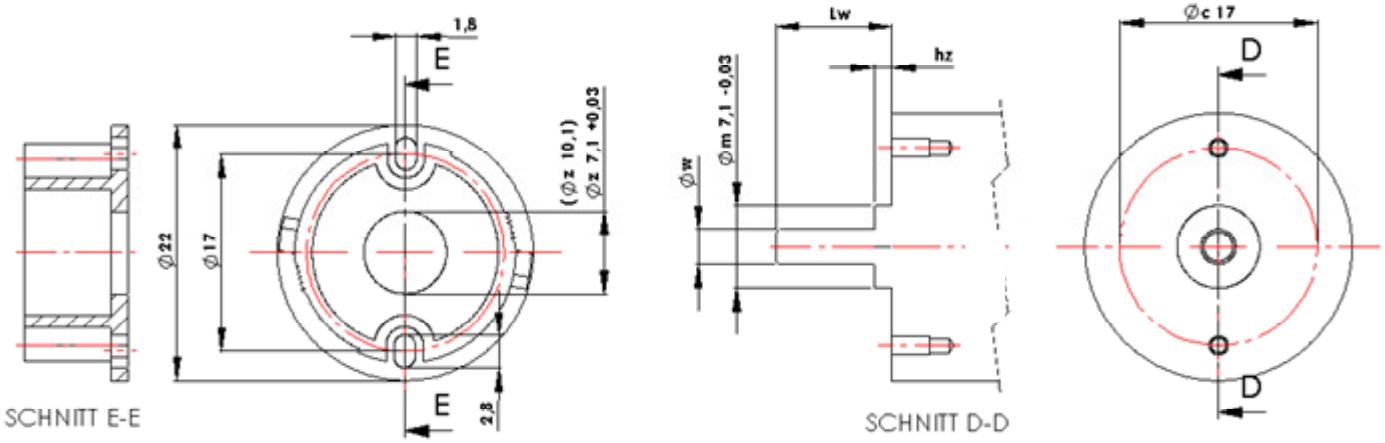
Index pulse width (Po): The number of electrical degrees when the index is high during one full shaft revolution.

Mechanical Notes

Parameter	Value	Tolerance	Unit
Outer dimensions	Ø 22.0 x 21.9	-	mm
Shaft diameter **Øw**	4.0 / 6.0 / 8.0	±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**	17.0	±1.0	mm
Flange bore diameter diameter $Ø_Z$	7.1 or 10.1	+0.03	mm
Mounting boss diameter **Øm**	7.1	-0.03	mm
Max. mounting boss height h_Z	1.5	-0.1	mm
Mating connector (Molex)	contact 5x 50079-8000 housing 1x 51021-0600	-	-
Total weight	7	-	g
Moment of inertia of the hub with the code wheel	5.2	±1.0	gmm^2
Protection grade according to DIN 40500	IP50	-	-

Mounting considerations:

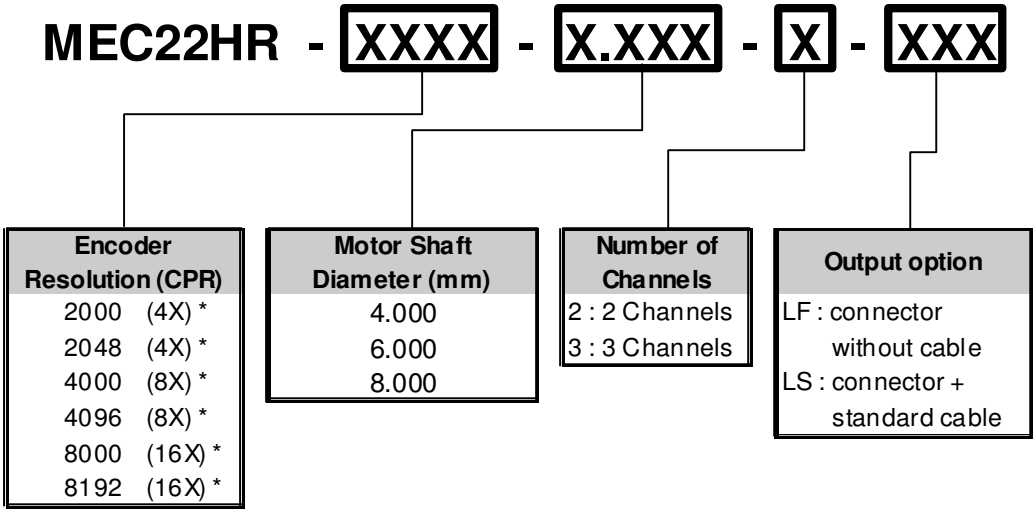
The MEC22HR encoder is designed to self align by using a mounting boss. The drawing shows the configuration of the mounting boss along with the location of the mounting screw holes. Shaft diameter and tolerances are given in the above mentioned chart.



PWB encoders GmbH Am Goldberg 2 D-99817 Eisenach Germany
info@pwb-encoders.com / www.pwb-encoders.com

Ordering information

Ordering code:



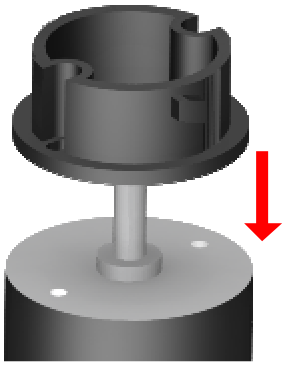
Note:
* interpolation factor

Available accessories see page 8 (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

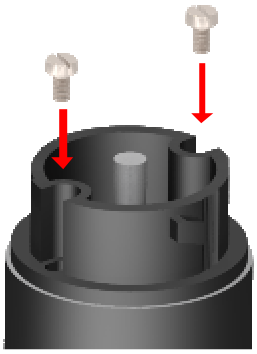
MEC22 MOUNTING INSTRUCTION

1



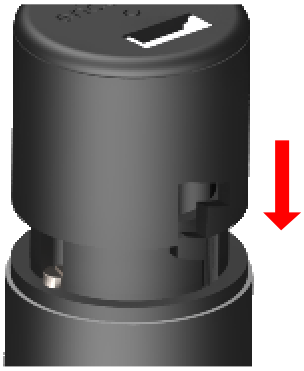
Align the base plate to the motor shaft by using the centering gauge

2



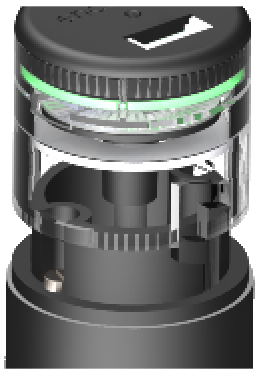
Afterwards fix the base plate to the motor flange using two screws

3



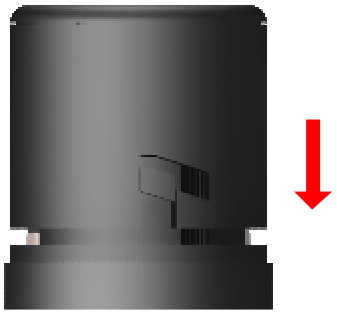
Align the housing to the base plate, slide the housing onto the base plate

4



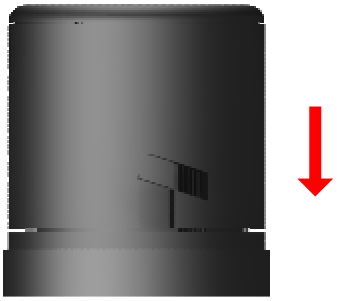
... and the hub centers itself on the motor shaft

5



From this position the housing cannot be locked

6



Press the housing into the final position

MEC22 MOUNTING INSTRUCTION

7	8
	
Now the housing can be locked	Turn the housing into its final position, the encoder is now ready for use

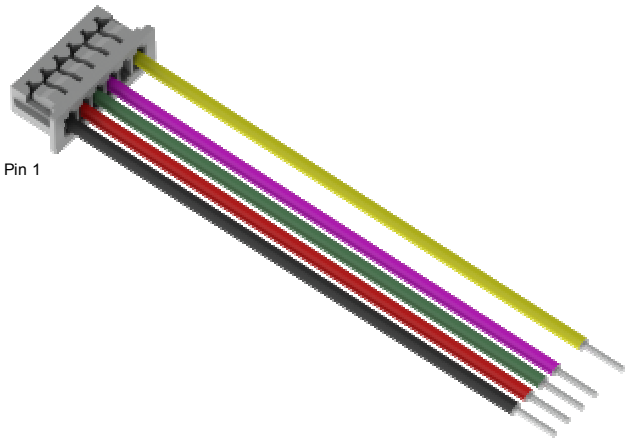
WARNING

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

ATTENTION!

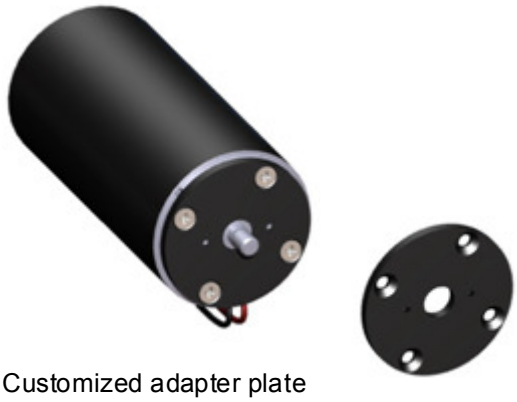
The encoder is so designed that it may be assembled only one time, otherwise the guarantee will be voided. Note: see IMPORTANT NOTICE (page 8)

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

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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.

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