Service manual
Optical encoder ME 22

Description

The ME22 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 revolution of the encoder is determined by the number of counts per revolution (CPR).
Power supply and signals are provided by a 5 pin Molex connector.

Features

- Small size: 22 mm diameter x 21.9 mm length.
- Quick and easy assembly without touching sensitive components
- Output channels: 2 in quadrature
- Power supply: 5 VDC
- Output type: TTL compatible
- Output circuit: pull-up
- Resolution up to 360 CPR (counts per revolution)
- Maximum shaft diameter: 9.525 mm (3/8)
- Operating temperature: -20 °C to 85 °C
- Frequency: 60 kHz
- Compliant EU-directive 2002/95/EG (RoHS)

Ordering information

ME22	100	6.000	2	LS

Encoder Resolution (CPR)*	Motor shaft diameter *(mm)*	Number of channels	Output option
001 **	1.500	1 = 1 Canale	LS = connector + standar cable
002 **	2.000	2 = 2 Canali	
004 **	2.300		
008 **	2.500		
050 ***	3.000		
064 ***	3.175 (1/8”)		
100	3.969 (5/32”)		
108	4.000		
120	4.763 (3/16”)		
124	5.000		
128	6.000		
150	6.350 (1/4”)		
160	8.000		
200	9.000		
250	9.525 (3/8”)		
256			
300			
360			

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

Preferential codes

Available accessories, see page 8

- cable 300 mm length (UL1061 / AWG28)
- centering gauge (not included as standard part)
- fastening screws DIN 84 M1.6x3

Recommended operating conditions

Electrical characteristics are only effective for the range of the operating temperatures.
Standard values at 25 °C and V_{DC} = 5 V.

Parameter	Symbol	Min.	Standard	Max.	Unit	Notes
Operating temperature	T_A	+25	- 20	+85	° C	
Supply voltage	V_{DC}	5.0	4.5	5.5	V_{CC}	
Supply current (two channels)	I_{CC}	15	13	18	mA	
Load capacitance	C_L			100	pF	internal pull-up 2.7 kΩ
Count frequency	f			60	kHz	rpm x N / 60 x 10^{-3}
A & B Channel						
High level output voltage	V_{OH}		2.4		V_{CC}	I_{OH} = -0.2 mA
Low level output voltage	V_{OL}			0.4	V_{CC}	I_{OL} = 8 mA
Rise time	T_r	500/(7)*			ns /(µs)*	C_L = 25 pF
Fall time	T_f	100/(1.3)*			ns /(µs)*	R_L = 2.7 kΩ

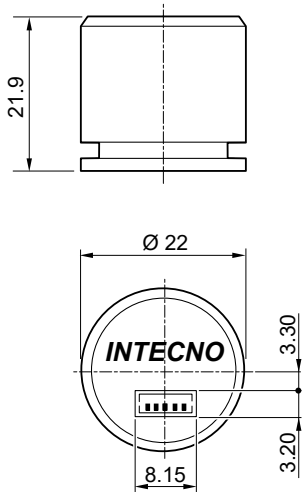
* only for 1, 2, 4, 8 CPR variant

Absolute maximum ratings

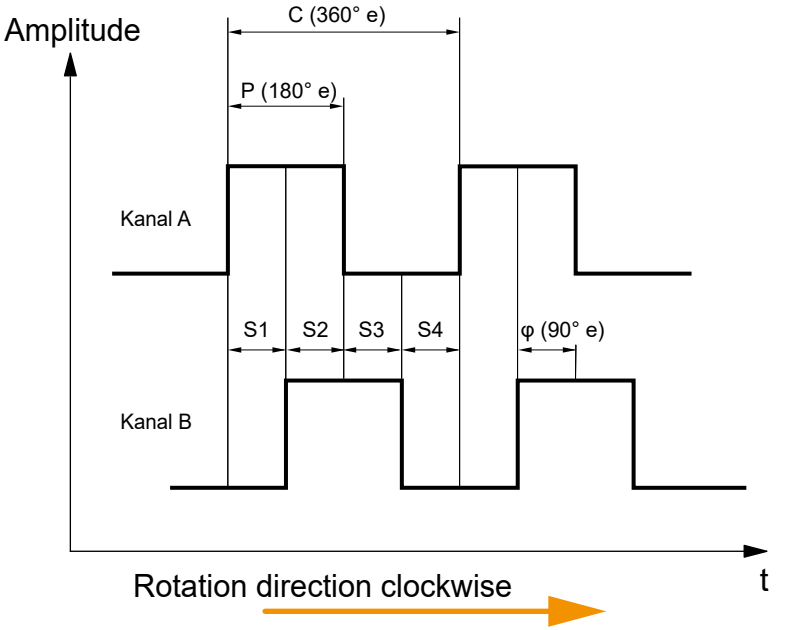
Parameter	Symbol	Min.	Max.	Unit	Notes
Storage temperature	T_S	- 40	+ 85	° C	
Operating temperature	T_A	- 20	+ 85	V_{CC}	
Humidity exposure			90	% RH	not condensing
Supply voltage	V_{CC}	- 0.5	7	V_{CC}	
Output voltage	V_O	- 0.5		V_{CC}	
Output current per channel	I_{OUT}	- 1.0	8	mA	
Vibration			2000	Hz	20 g

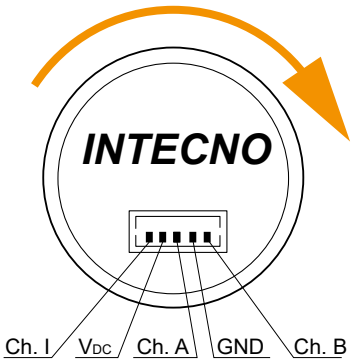
ATTENTION
ESD Warning:
Normal handling precautions should be taken to avoid static discharge damage to the sensor.

Dimensions



Electrical interface





Definitions:

- **CPR -** Counts per Revolution: The number of bar and window pairs or increments per revolution of the code wheel.
- **C -** One cycle: 360 electrical degrees (°e), one period of the signal, caused by one pair of bar and window.
- **P -** Pulse Width: The number of electrical degrees that an output is high during one cycle. This value is nominally 180 °e.
- **S -** State Width: 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.
- **φ -** Phase: 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.
- **ΔQ -** Position error: The angular difference between the actual angular shaft position and the position indicated by the encoder cycle count.

Encoding characteristics channel A & B:

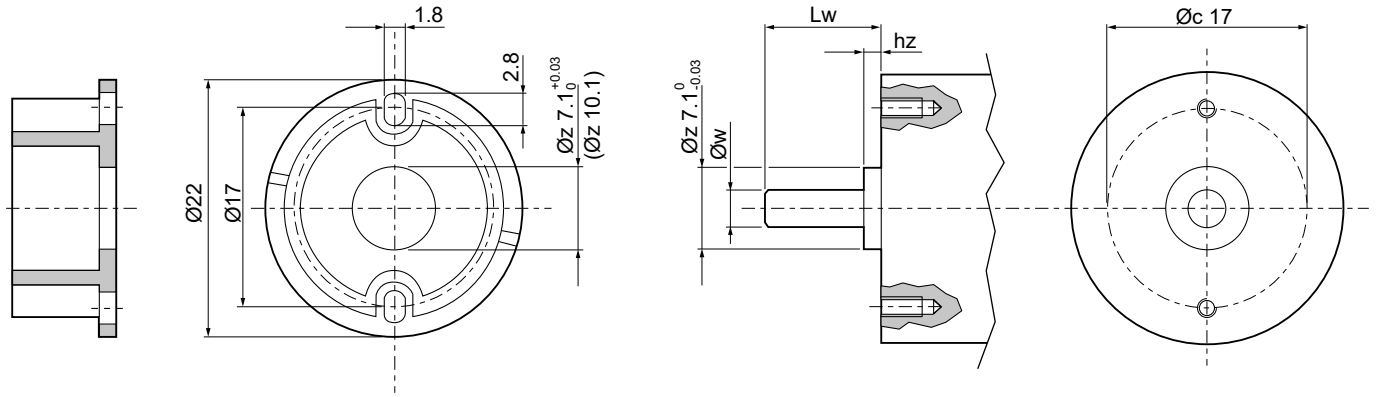
Parameter	Symbol	Nominal	Max. Error	Unit
Pulse width	P	180	± 70	°e
Phase shift	φ	90	± 60	°e

Mechanical Notes

Parameter	Symbol	Value	Tolerance	Unit
Outer dimensions		Ø 22,0 x 21,9	-	mm
Shaft diameter	**Øw**	1,5 / 2,0 / 2,3 / 2,5 / 3,0 / 3,175 / 3,969 / 4,0 4,763 / 5,0 / 6,0 / 6,35 / 8,0 / 9,0 / 9,525	± 0.01	mm
Required shaft length	**Lw**	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 inside bore diameter	**Øz**	7,1 o 10,1	+ 0.03	mm
Mounting boss diameter	**Øm**	7,1	- 0.03	mm
Max. mounting boss height	**hz**	1,5	- 0.1	mm
Mating connector (Molex)		5 pin 50079-8000 housing 51021-0500	-	
Total weight		7	-	g
Moment of inertia of the hub with the code wheel		5,2	± 1.0	g·mm^2
Protection grade according to DIN 40500		IP50	-	-

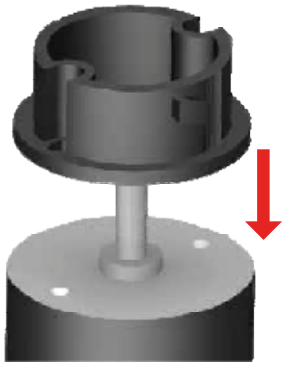
Mounting considerations

The ME22 encoder is designed to self align by using a mounting boss. **You need a tool centering gauge.**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.



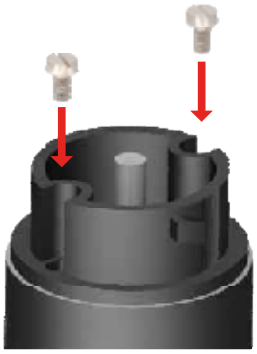
ME22 mounting instructions

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

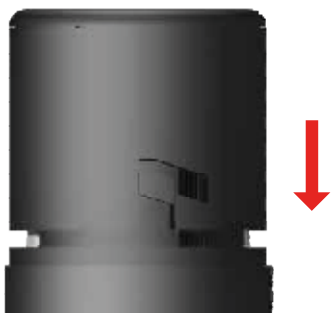
3

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

4

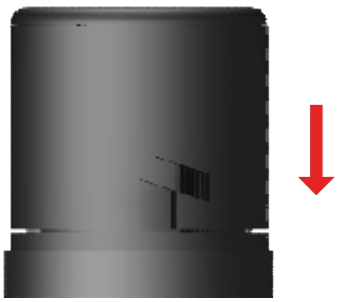
and the hub centers itself on the motor shaft

5



From this position the housing cannot be locked

6



Press the housing into the final position

ME22 mounting instructions

RoHS compliant

7

Now the housing can be locked

8

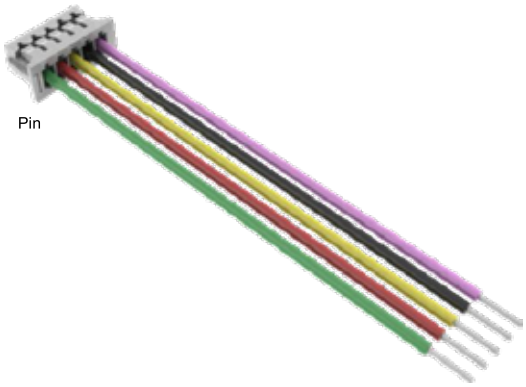
Turn the housing into its final position, the encoder is now ready for use

WARNING

DO NOT ROTATE AND PULL OUT THE ENCODER AFTER ASSEMBLY OR WHEN IT IS IN OPERATION.

ATTENTION
The encoder is 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

- Screws DIN84 M1.6 X 3

IMPORTANT NOTICE

The encoder is 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 the manufacturer is not responsible.

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