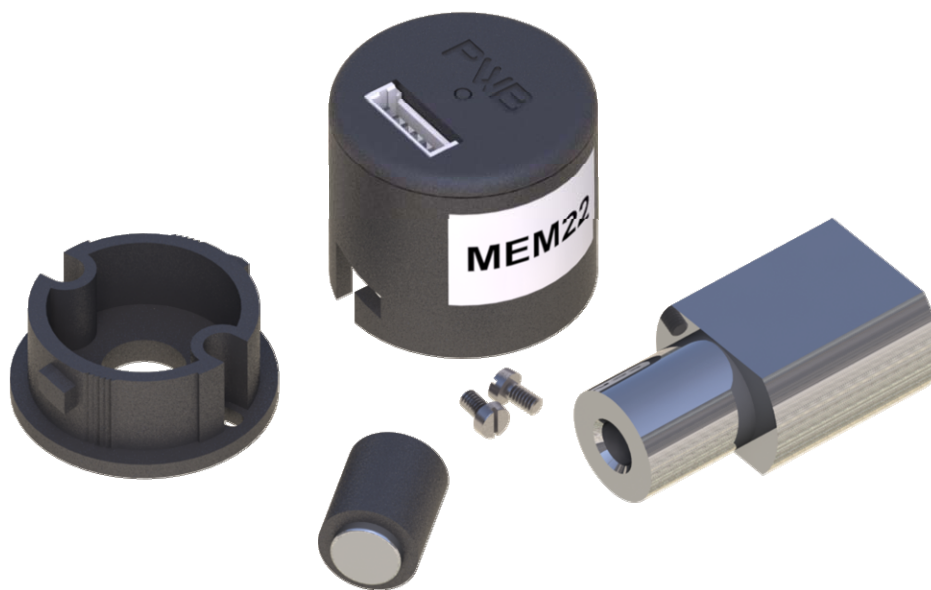


## Absolute Encoder Magnetic



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## Description

The MEM 22 is a magnetic absolute singleturn encoder. He is a reliable low cost hollow shaft encoder that can be fixed quickly and easily on different sizes of motor shafts.

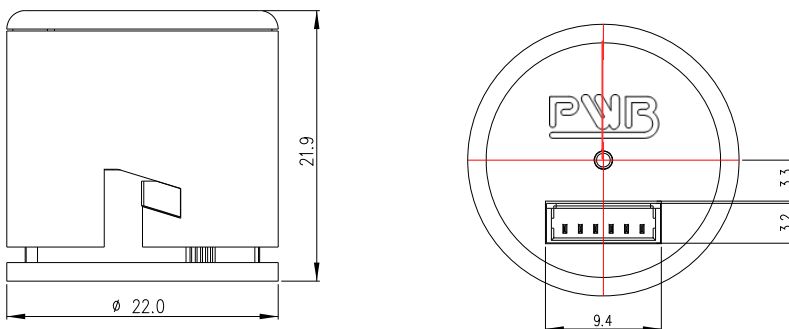
The encoder is developed for brushless motors, motor feedback applications and rotational speed control. The MEM 22 is a real time system for high speed applications and rough environments.

The encoder is available with to different interfaces: SSI or BiSS ®.

The power supply is selectable in a wide voltage range (5V up to 30V).

Power supply and signals are provided by a 6 pin Molex connector.

## Dimensions



## Features

- Absolute singleturn encoder
- Magnetic sensing
- Interface: SSI (synchron serial interface) or BiSS ® (bidirectional serial synchron)
- Output: RS 485 compatible
- Resolution: 4096 (12 Bit) steps per revolution
- Quick and easy assembly
- Small size: 22.0 mm diameter x 21.9 mm length
- Maximum shaft diameter: 8 mm
- Operating temperature: -40°C to +85°C
- Compliant EU-directive 2002/95/EG (RoHS)



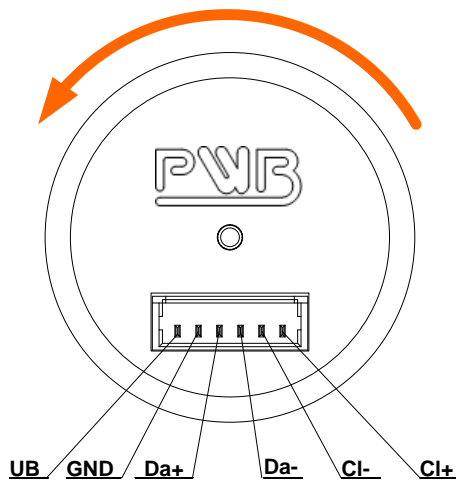
## Recommended operating conditions

Electrical characteristics are only effective for the range of the operating temperatures.  
Typical values at 25 °C.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply voltage	$U_B$	4.5	5.0	5.5	$V_{DC}$	
	$U_B$	8.0	12.0	30.0	$V_{DC}$	
Supply current	$I_{LB}$	20	37	44	mA	no load
Reverse polarity protection	$U_B$	-36		0	$V_{DC}$	8-30V version
			None			5V version
Start up time	$t_T$			2	ms	
ESD voltage	$U_{ESD}$			2	kV	discharged over 1,5k $\Omega$
<b>SSI / BiSS</b>						
Clock frequency	f	80		5000	kHz	
Scan ratio of T		40	50	60	%	
Time lag	$t_v$		150		ns	
Monoflop time	$t_m$		20 + T/2		$\mu$ s	
Clock interval	$t_p$	25			$\mu$ s	
Rise time	$t_r$	3	11	25	ns	$R_L = 50\Omega, C_L = 100pF$
Fall time	$t_f$	3	11	25	ns	$R_L = 50\Omega, C_L = 100pF$
High level output voltage	$V_{oH}$	2.0	3.0	5.5	$V_{DC}$	$R_L = 50\Omega$
Low level output voltage	$V_{oL}$			0.8	$V_{DC}$	$R_L = 50\Omega$
High level input voltage	$V_{iH}$	2.0		5.5	$V_{DC}$	
Low level input voltage	$V_{iL}$			0.8	$V_{DC}$	
Load capacitance	$C_T$			100	pF	
Load Resistor	$R_T$	25	270	1000	$\Omega$	
Output current per channel	$I_{out}$	-1.0		20	mA	overload protection
<b>Environment</b>						
Operating temperature	$T_A$	-40	25	85	$^{\circ}C$	
Storage temperature	$T_S$	-40		85	$^{\circ}C$	
Humidity exposure				90	%RH	not condensing
Vibration				2000	Hz	20 g
Magnet axis displacement				0.2	mm	vs. center of sensor

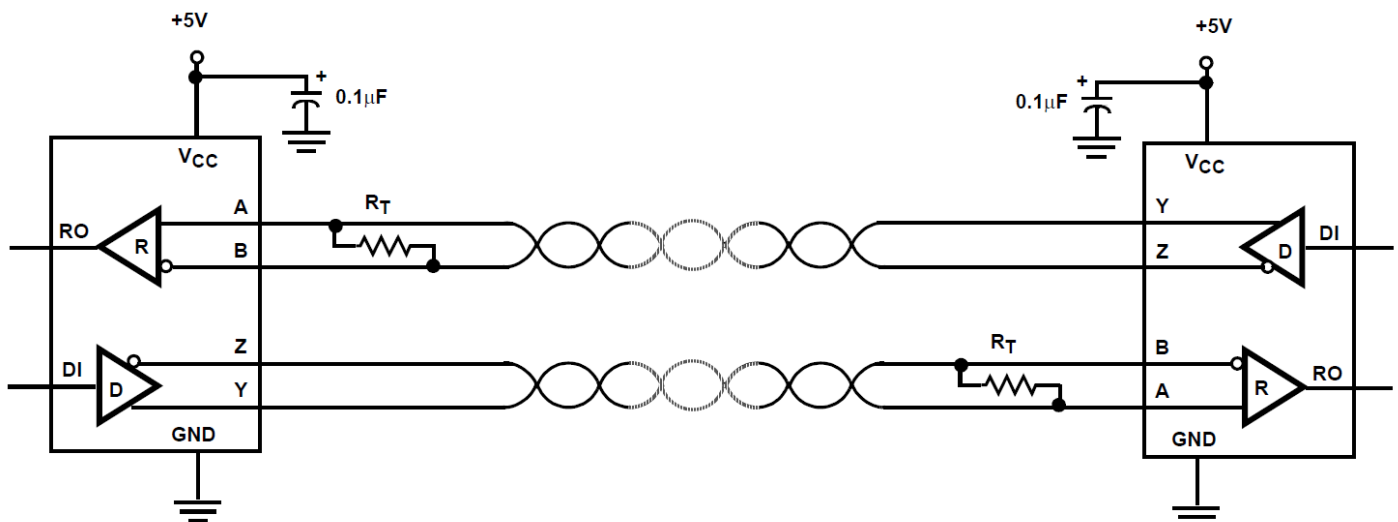
**ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.**

## Electrical interface



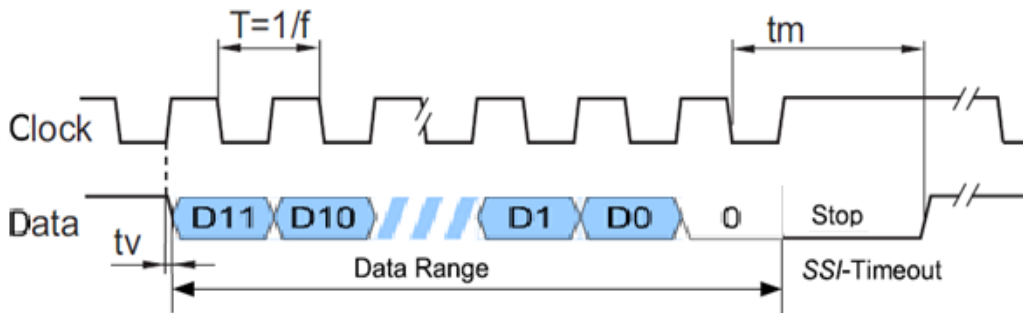
Connector Pin	Connector Signal	Cable color of wire
1	UB	red
2	GND	purple
3	Da +	brown
4	Da -	yellow
5	Cl -	orange
6	Cl +	black

## Typical operating circuit

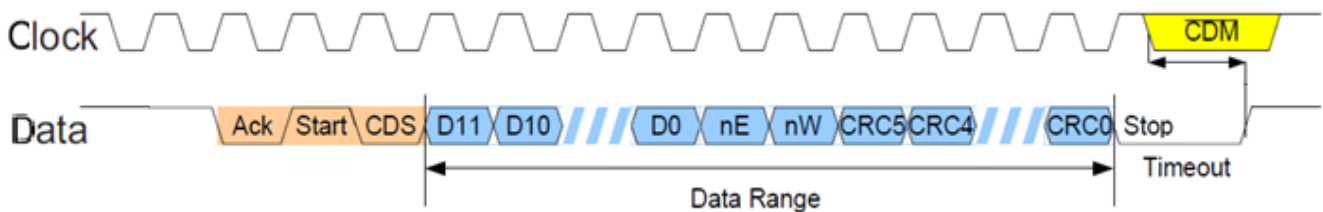


## Interface:

### Data transfer: SSI Gray-Code



### Data transfer: BiSS (C-Mode) Binary-Code



Serial interface protocol	Definition
Cycle start sequence	Ack/Start/CDS
Length of sensor data	12 Bit + ERR + WARN
CRC Polynom	0b1000011
CRC Mode	Inverted
Ack	Acknowledge-Bit
Start	Start-Bit
CDS	Control-Bit
D0 - D11	Position-Data
nE	Low activ error
nW	Low activ warning
CRC0 - CRC5	Cyclic redundancy code
Stop	Stop-Bit
CDM	Control data master

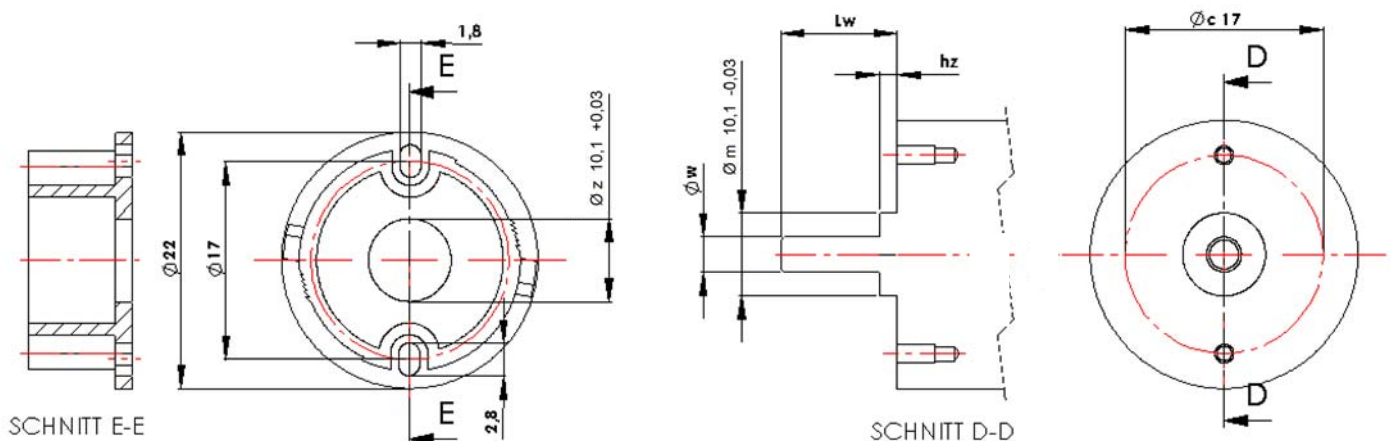
For a detailed description of the protocol, see separate interface specification.

## Mechanical Notes

Parameter	Value	Tolerance	Unit
Outer dimensions	Ø 22.0 x 21.9	-	mm
Shaft diameter $\varnothing w$	2.0 / 2.5 / 3.0 / 4.0 / 5.0 / 6.0 / 6.35 / 8.0	$\pm 0.01$	mm
Required shaft length $L_w$	9.5	+1.5	mm
Max. allowable axial shaft play of motor	0.3	-	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 $\varnothing c$	17.0	$\pm 1.0$	mm
Flange bore diameter diameter $\varnothing z$	10.1	+0.03	mm
Mounting boss diameter $\varnothing m$	10.1	-0.03	mm
Max. mounting boss height $h_z$	1.5	-0.1	mm
Mating connector (Molex)	contact 6x 50079-8000 housing 1x 51021-0600	-	-
Total weight	8	-	g
Moment of inertia of the hub with the magnet	6.0	$\pm 1.0$	gmm <sup>2</sup>
Protection grade according to DIN 40500	IP50	-	-

## Mounting considerations:

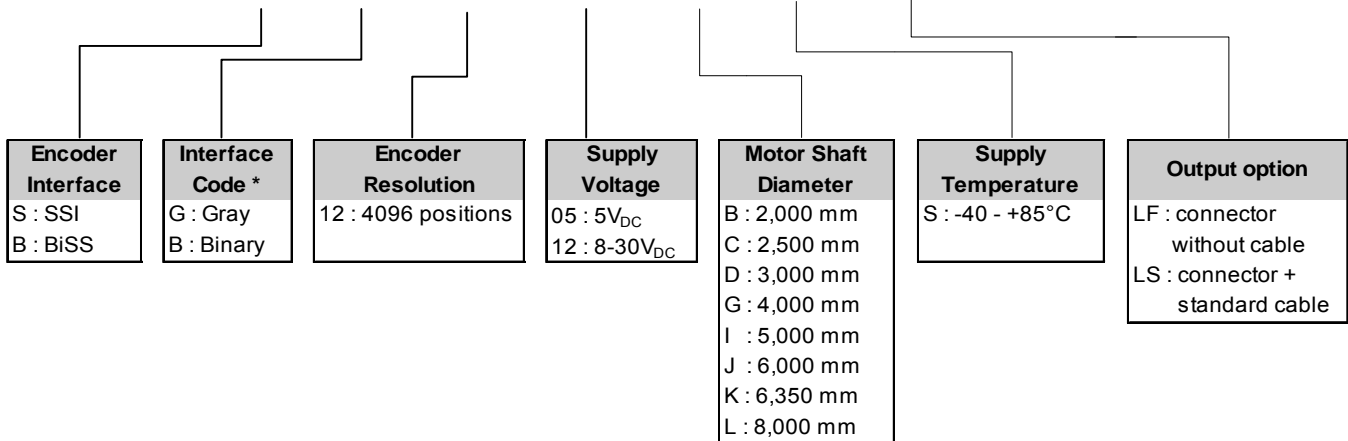
The MEM 22 encoder is designed to self align by using a mounting boss. The drawing shows the configuration of the mounting boss along with the location of the mounting screw holes. Shaft diameter and tolerances are given in the above mentioned chart.



## Ordering information

Ordering code:

**MEM 22 - X - X - 12 - XX - X - S - XX**



\* SSI only with gray code  
BiSS only with binary code

Selectable and required accessories see page 10:

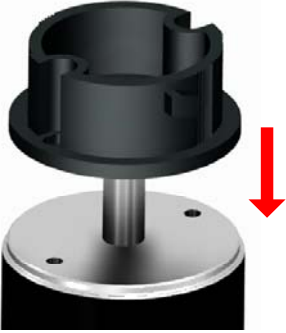



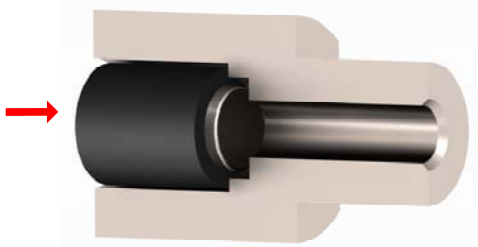
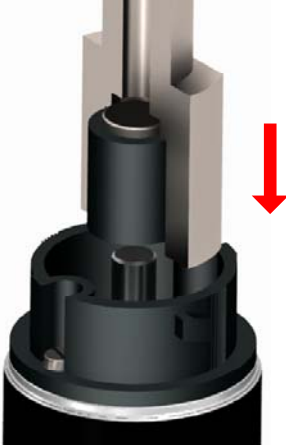
- cable 300 mm length (UL1061 / AWG28)
- centering and assembly gauge for different motor shafts
- adapter plates for different motors
- fastening screws DIN 84 M1.6x3 or M1.6x4

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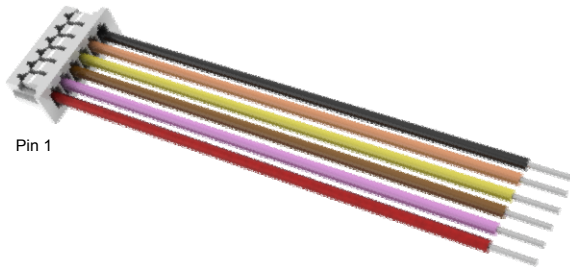
<b>MEM 22 MOUNTING INSTRUCTION</b>	
<b>1</b>	 <p style="text-align: center;">Set the base plate onto the motor</p>
<b>2</b>	 <p style="text-align: center;">Align the base plate to the motor shaft by using the centering gauge</p>
<b>3</b>	 <p style="text-align: center;">Afterwards fix the base plate to the motor flange using two screws</p>
<b>4</b>	 <p style="text-align: center;">Remove the centering gauge</p>
<b>5</b>	 <p style="text-align: center;">Set the hub with magnet into the centering gauge</p>
<b>6</b>	 <p style="text-align: center;">Press the hub with magnet onto the motor shaft by the centering gauge</p>



<b>MEM 22 MOUNTING INSTRUCTION</b>	
<b>7</b>	<p>Press the centering gauge down to the final position</p>
<b>8</b>	<p>Afterwards remove the centering gauge</p>
<b>9</b>	<p>Align the housing to the base plate, slide the housing onto the base plate</p>
<b>10</b>	<p>Press the housing into the final position</p>
<b>11</b>	<p>Turn the housing into its final position, the encoder is now ready for use</p>
<b>12</b>	<p style="color: red; text-align: center;"><b><u>WARNING</u></b></p> <p style="color: red; text-align: center;"><b>Do not rotate and pull out the encoder after assembly or when it is in operation.</b></p>

**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 10)

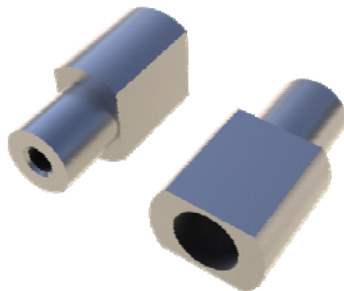
## Scope of delivery \*



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

\* Note: see ordering code LS

## Essential assembly tool



Centering and assembly gauge for centering the base plate on the motor flange or an adapter plate and also positioning the magnet

## Available accessories



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.

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