

**Series ETI25 – singleturn, incremental output**

**Key features ETI25:**

- Channels: A, B and index signal Z
- TTL, Push Pull or Open Collector electronics
- Option: ex works programmable number of pulses from 1 to 10,000 ppr in one pulse step-width

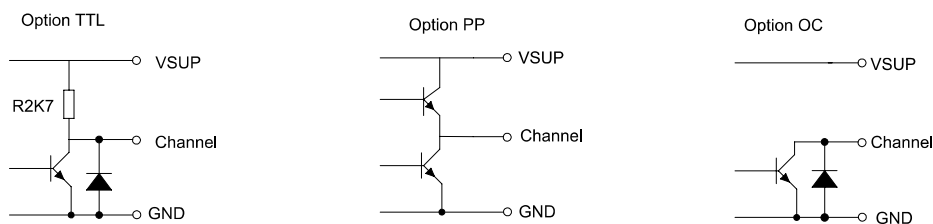


**Electrical data ETI25 – singleturn, incremental output**

Output Signal	TTL	Push-Pull	Open Collector
Number of pulses		1 to 10,000 ppr.	
Limit frequency		250 kHz	
Switch-on delay		20 ms	
Supply voltage	3.3 or 5 VDC $\pm 10\%$	5 to 30 V	5 to 30 V
Power consumption (no load)	$\leq 15$ mA	$\leq 50$ mA	$\leq 25$ mA
Output load		$\geq 5$ kOhm	
Max. pull-up voltage		-	30 VDC
Insulation voltage 1.)		1000 VAC @ 50 Hz, 1 min	
Insulation resistance 1.)		2 MOhm @ 500 VDC, 1 min	

1.) According to IEC 60393

**Output circuit ETI25 per channel**

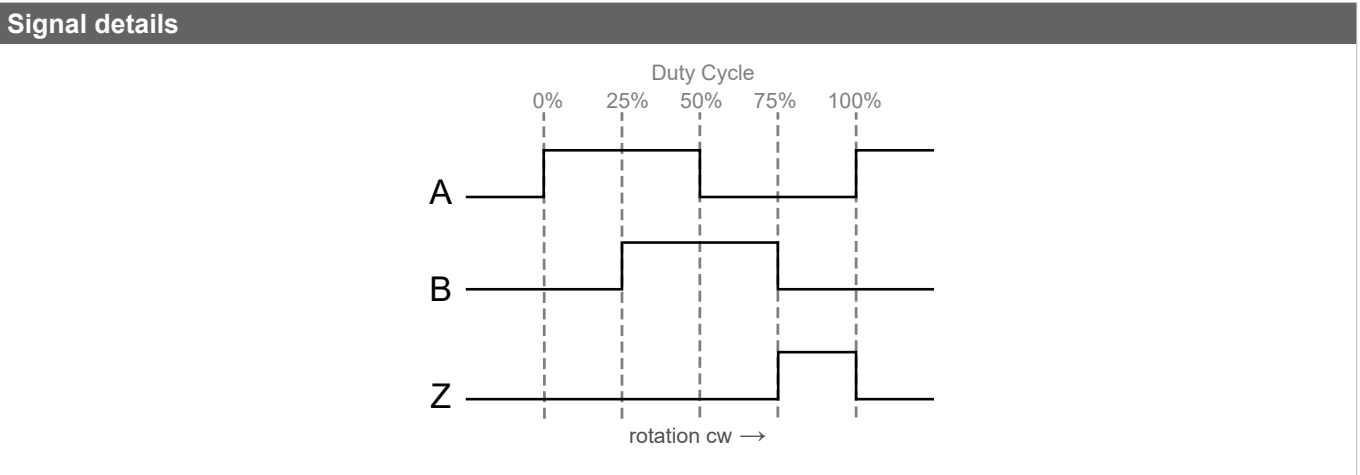


**For details on zero point definition and output programming see page 30.**

Order Code ETI25 – singleturn, incremental output									
Description	Selection: standard= <b>black/bold</b> , possible options= <i>grey/italic</i>								
<b>Series</b>	<b>ETI25</b>								
<b>Shaft diameter, shaft length:</b> Shaft diameter $\varnothing$ 6 mm, shaft length 22 mm <i>Shaft diameter <math>\varnothing</math> 6.35 mm, shaft length 22 mm</i> <i>Custom shaft dimensions [mm] <math>\varnothing \leq 6.35</math> mm</i>		<b>6x22</b> <i>6,35x22</i> <i>XxXX</i>							
<b>Number of pulses (ppr):</b> 32 64 128 256 512 <b>1024</b> <i>User-defined number of pulses 1 to 10000, increment 1 pulse</i>									
<b>Supply voltage / output signal:</b> Push-pull A, B, Z / $V_{SUP} = 5$ to 30 V TTL A, B, Z / $V_{SUP} = 3,3$ V or 5 V $\pm 10\%$ Open collector A, B, Z / $V_{SUP} = 5$ to 30 V									
<b>Operational Torque:</b> Standard torque <i>Improved/medium torque</i>									
<b>Shaft sealing:</b> None <i>With shaft sealing</i>									
<b>Electrical connection, cable length:</b> Flat ribbon cable, standard length 0.15 m <i>Flat ribbon cable with custom length [x,xx m]</i> Round cable, standard length 1 m <i>Round cable with custom length [x,xx m]</i>									
<b>Anti-rotation pin, zero point definition:</b> Pin A Pin B <i>None (pins removed) (no zero point definition possible)</i>									

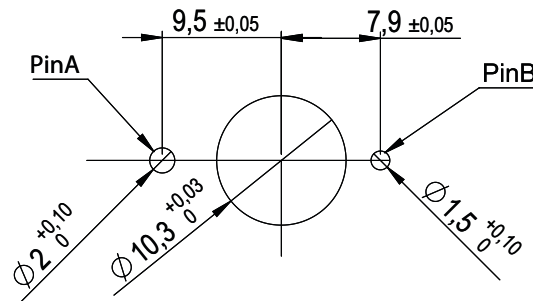
Order example ETI25 – singleturn, incremental output									
<b>Requirement:</b> Shaft $\varnothing$ 6.00 mm, shaft length 22 mm, number of pulses 1024 TTL output, VSUP=5 V/TTL, no shaft sealing, round cable 1,20 m, anti-rotation pin AB									
<b>Example for order code:</b> ETI25 6x22 1024 05BZTTL R1,20B									

Cable/colour assignment			
Flat ribbon cable (option F)		Round signal cable (option R)	
Lead	Function	Wire colour	Function
Lead 1 (red)	VSUP	red	VSUP
Lead 2	GND	black	GND
Lead 3	A	brown	A
Lead 4	B	orange	B
Lead 5	Z	yellow	Z



Drilling pattern

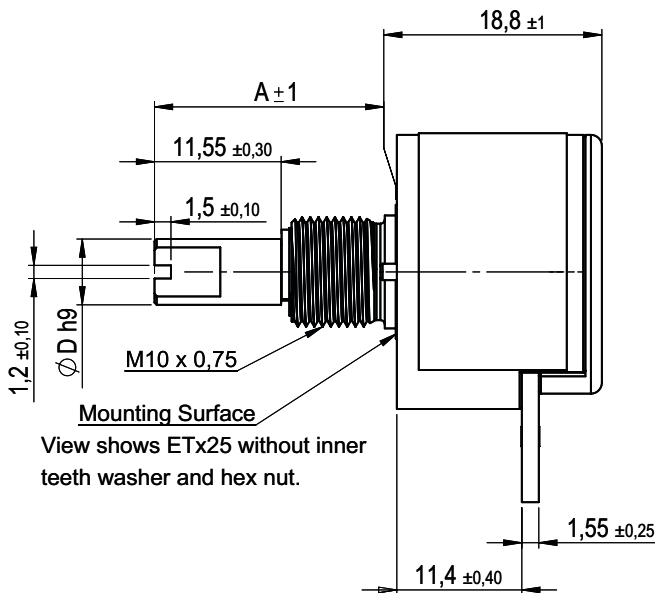
Pattern of Drilling



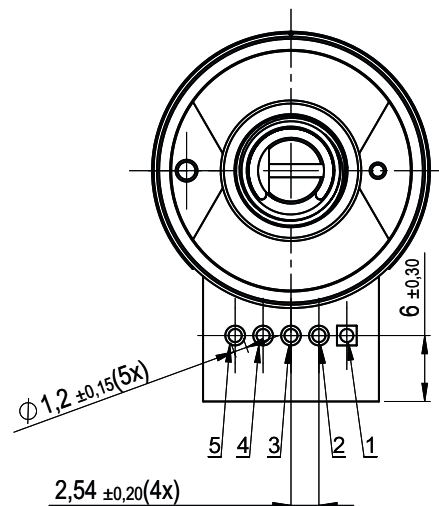
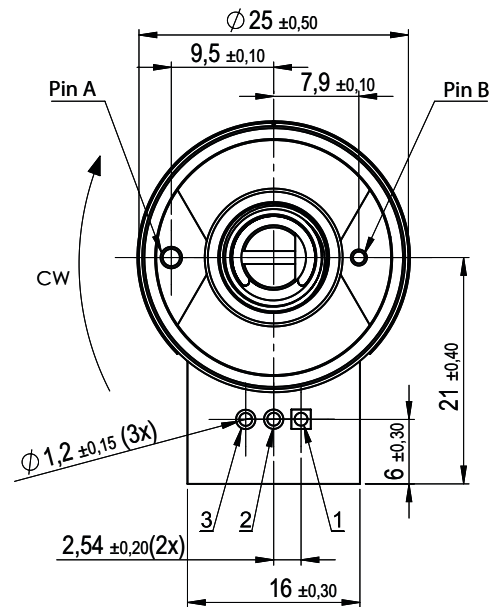
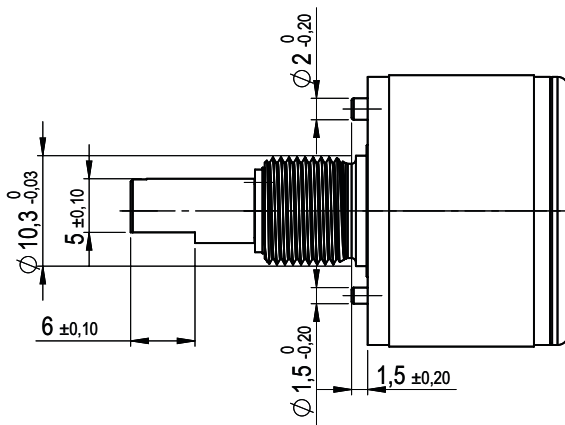
Either pin A or pin B must be chosen as anti-rotation pin. Please select by specifying the variant in the order code. The unused pin can be left out when drilling.

Drawings ETx25 – with solder holes (option L)

Option L



View shows ETx25 without inner teeth washer and hex nut.



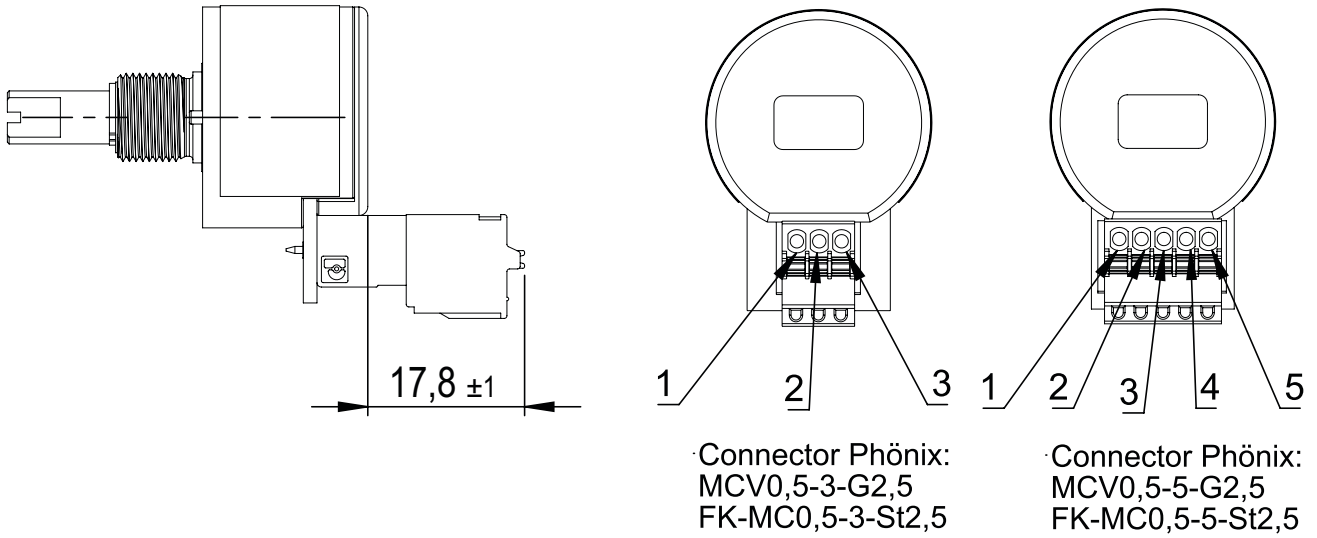
All dimensions in mm

Standard shaft dimensions / tolerances

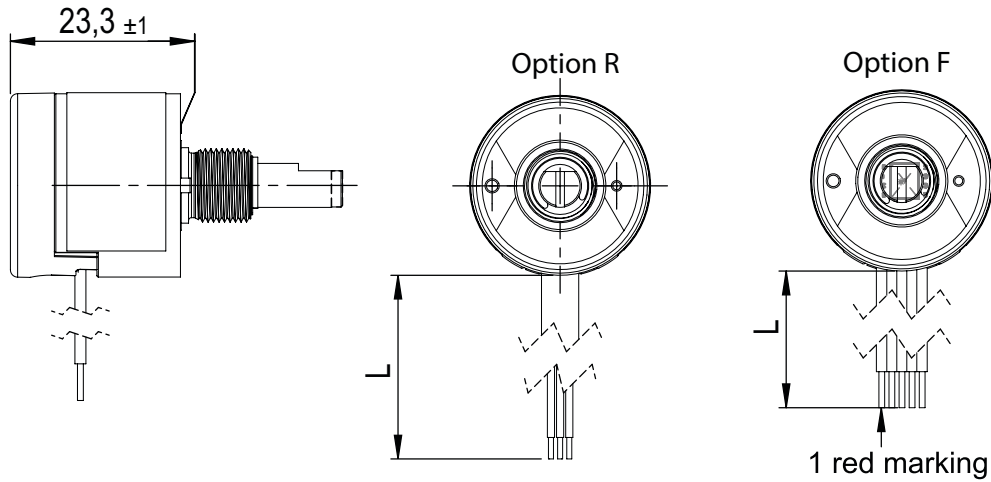
Shaft length A	22 +/- 1 mm
Shaft diameter D	6 h9 mm, 6.35 h9 mm
Shaft flattening (D-flat)	6 +/- 0.1 mm

Drawings ETx25 – clamping terminals (option K) and cable versions (options R and F)

Option K (clamping terminals)



Options F (flat ribbon cable) and R (round control cable)



Cable specs for option F (flat ribbon cable) and R (round control cable)						
Option	Standard cable length L	Number of single strands (depends on electronics)	Cable sheath Ø or width	Single strands cross section	Allowed tolerance (L)	Minimum bending radius
R	Standard 1000 mm	3	4.3 mm	AWG26	-20 mm to +50 mm	3 x D Ø (D = cable sheath diameter Ø)
		6	5.2 mm			
		8	5.6 mm			
		12	6 mm	AWG28		
F	150 mm	3 to 12	ca. 1.25 per strand	AWG26	-20 mm to +25 mm	-

Cables without cable shield

(\*) Tolerances according IPC Association

Cable length tolerances – custom lengths	
Length L	Tolerance
≤ 0.3 m	+25 mm / -20 mm
> 0.3 m - 1.5 m	+50 mm / -20 mm
> 1.5 m - 3 m	+100 mm / -40 mm
> 3 m - 7.5 m	+150 mm / -60 mm

Cable harness length measured from sensor surface or soldering pad including connector.  
 Minimum cable length: 0.08 m (for round cable), 0.05 m for ribbon cable

Mechanical and environmental data, miscellaneous	
Mechanical angle of rotation 1.)	Endless or 320° (270°/180°/90°), ±5° with mechanical stop option
Lifetime 2.)	≤ 100 Mio. shaft rotation movements Option D: Sealing of the shaft is working up to 200 000 shaft rotation movements
Bearing	Sleeve bearing
Max. operational speed	100 rpm (< 1 min. 800 rpm)
Operational torque	0.1 ≤ M ≤ 0.6 Ncm (without shaft sealing) 0.3 ≤ M ≤ 1.3 Ncm (@RT, 10 rpm) (with increased torque)
Operating temperature range	Standard: -40 to +85 °C (cable fixed installed) Option TS: -25 to +70 °C
Storage temperature range	Standard: -40 to +105 °C Option TS: -40 to +90 °C (teach-In multiturn)
Protection grade (IEC 60529) front side	From shaft side: <ul style="list-style-type: none"> <li>▪ IP40 standard</li> <li>▪ IP55M (IP66S) with shaft sealing (option D)</li> </ul>
Protection grade (IEC 60529) rear side	<ul style="list-style-type: none"> <li>▪ IP50 Solder holes / clamping terminals (solder holes / connector excluded)</li> <li>▪ IP66 flat ribbon and round signal cable (cable ends excluded)</li> <li>▪ IP00 option TS (teach-in multiturn)</li> </ul>
Vibration (DIN EN 60068-2-6)	±1.5 mm / 30 g / 10 to 2000 Hz / 16 frequency cycles (3x4 h)
Shock (DIN EN 60068-2-27)	100 g / 6 ms / half sine (3x6 shocks)
Housing diameter	Ø 25 mm
Housing depth	see drawings
Shaft diameter	Standards: Ø 6 mm, Ø 6.35 mm Option: User defined shaft diameter [mm]
Max. radial load	1 N
Max. axial load	1 N
Mass (circa)	<ul style="list-style-type: none"> <li>▪ ca. 26 g (option L: solder lugs)</li> <li>▪ ca. 60 g (option R: cable, valid for 1 m only)</li> <li>▪ ca. 32 g (option F: flat ribbon cable, valid for 15 cm only)</li> <li>▪ ca. 27 g (option K: clamping terminals)</li> <li>▪ ca. 31 g (option TS: teach-In multiturn)</li> </ul>
Connection type	<ul style="list-style-type: none"> <li>▪ Solder lugs (option L)</li> <li>▪ Ribbon cable (option F)</li> <li>▪ Cable (option R)</li> <li>▪ Connector (option K)</li> </ul>
Connection position	Radial
Sensor mounting	Bushing via M10 x 0,75
Fastening parts included in delivery	Hex nut and tooth washer, if option D is ordered then an additional O-Ring is part of delivery as sealing between mounting panel and rotary encoder.
Fastening torque mounting nut	≤ 3 Nm
Material shaft	Stainless steel

1.) According IEC 60393

2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

**Immunity / Electrostatic Discharge**

EN 61000-4-3 RF sine wave	Class A
EN 61000-4-6 Conducted sine wave	Class A
EN 61000-4-8 Power frequency magnetic fields	Class A
EN 61000-4-2 ESD 3.)	Class B

3.) Not tested for Option TS

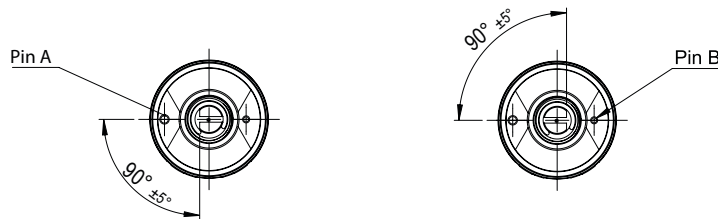
**Definition of the zero position / anti-rotation pin**

**Output at the zero point:**

ETA25 (analogue outputs): Output signal 0% full scale (F. S.)  
 ETP25 (PWM output): duty cycle 10% (10% duty cycle)  
 ETS25 (serial output): Output signal 0% full scale (F. S.)  
 ETI25 (incremental output): The index signal is output (Z)

**Position of the zero position:**

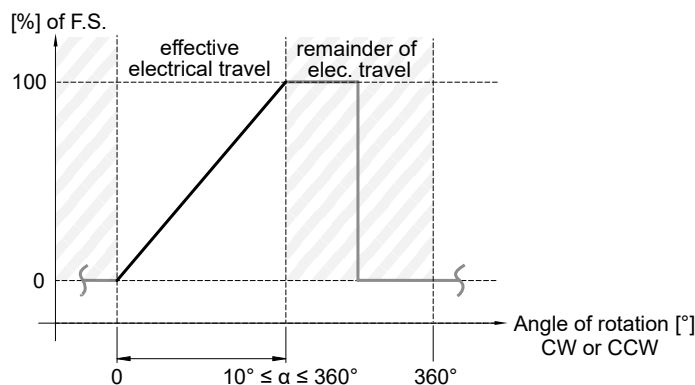
Option anti-rotation pin A	Zero position when shaft flattening faces anti-rotation pin A
Option anti-rotation pin B	Zero position when shaft flattening faces anti-rotation pin B



**Signal definition for custom rotation angles (without mechanical stop)**

Custom angles <360°

When programming the electrical angle of rotation of <360°, the remaining non-effective range of rotation is divided equally into high and low. Valid only for encoders without mechanical stop!



**Mechanical stop and centre detent for manual encoder applications**

- A mechanical stop limits the rotation to either 320°, 270°, 180° or 90° (±5°). Other angles are not available. Due to the mechanical tolerances (±5°), the effective electrical angle is reduced by 10°.
- Optionally a centre detent can be selected in addition to the mechanical stop. It enables the operator to e. g. feel the centre position when operating the encoder by hand
- The zero point definition for mechanical stop option differs from the standard zero point definition. Only drilling pattern B (pin B) is available. See the details below.

**Mechanical stop only: relationship between mechanical and effective electrical angle of rotation**

Mechanical angle of rotation (±5°)	Effective electrical angle of rotation (±0.5°)
320°	310°
270°	260°
180°	170°
90°	80°

