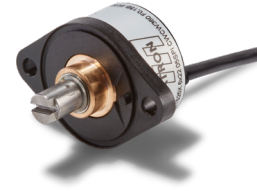


Series ETA25F
Key features ETA25F:

- Analogue outputs 0 to 5 V, 0 to 10 V, 4 to 20 mA
- Redundant versions available – see separate section
- Several factory programming possibilities
- Supply voltages: 5 VDC $\pm 10\%$, 15 to 30 VDC, 9 to 30 VDC


Electrical data

Effective electrical angle of rotation 1.)	$7^\circ \leq \alpha \leq 360^\circ$ (programmable ex works), $\pm 0.5^\circ$		
Independent linearity (best straight line) 1.)	$\pm 0.3\%$ @ 360°		
Absolute Linearity 1.)	$\pm 0.6\%$ @ 360°		
Output signal	0 to 5 V ratiometric	0 to 10 V	4 to 20 mA
Resolution	12 Bit		
Update rate	200 μ s		
Supply voltage V_{SUP}	5 V $\pm 10\%$	15 to 30 V	9 to 30 V
Power consumption (no load)	≤ 18 mA		
Output load	≥ 5 kOhm		≤ 500 Ohm
Insulation voltage 1.)	1000 VAC @ 50 Hz, 1 min		
Insulation resistance 1.)	2 MOhm @ 500 VDC, 1 min		
MTTF (EN29500-2005-1)	1173a	965a	379a

1.) According to IEC 60393

Wire colour/pin assignment

Function:	Option F	Option R
OUT	Strand 2	brown
VSUP	Strand 1 (red)	red
GND	Strand 3	black

For details on zero point definition and output programming see page 27.

Order Code ETA25F – singleturn, analogue output, not redundant									
Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>								
Series	ETA25F								
Shaft diameter, shaft length: Shaft diameter Ø 6 mm, shaft length 15.6 mm <i>Shaft diameter Ø 6.35 mm, shaft length 15.6 mm</i> <i>Custom shaft dimensions [mm] Ø ≤ 6.35 mm</i>		6x15,6 <i>6,35x15,6</i> <i>XxXX</i>							
Supply voltage / output signal: V_{SUP}=5 V (4.5 to 5.5 V) / OUT=0 to 5 V (ratiometric) V_{SUP}=24 V (15 to 30 V) / OUT=0 to 10 V <i>V_{SUP}=24 V (9 to 30 V) / OUT=4 to 20 mA</i> <i>V_{SUP}=24 V (9 to 30 V) / OUT=0 to 5 V</i>			0505 2410 <i>2442</i> <i>2405</i>						
Sense of rotation: (when looking at the shaft, from the front) Clockwise <i>Counterclockwise</i>				CW <i>CCW</i>					
Rotation angle in [°]: 360 <i>320</i> <i>270</i> <i>180</i> <i>90</i> <i>Custom rotation angle (≥7°, positive integer)</i>					360 <i>320</i> <i>270</i> <i>180</i> <i>90</i> <i>XXX</i>				
Operational Torque: Standard torque <i>Improved/medium torque</i>						- <i>MT</i>			
Shaft sealing: None <i>With shaft sealing</i>							- <i>D</i>		
Electrical connection, cable length: 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>								F0,15 <i>FX,XX</i> R1,00 <i>RX,XX</i>	
Anti-rotation pin: Pin A <i>None (pin removed)</i>									A <i>-</i>

Order example ETA25F									
Requirements: Shaft Ø 6.00 mm, shaft length 15.6 mm, VSUP=5 V / OUT=0 to 5 V, sense of rotation CW, rotation angle 360° round cable 1.00 m, anti-rotation pin A									
Example for order code: ETA25F 6x15,6 0505 CW 360 R1,00A									

Series ETA25FX – singleturn, analogue output, redundant
Key features ETA25FX :

- Independent signal processing. The ETA25FX rotary encoder electronics are based mainly on one Hall IC in which two semiconductor dies independently capture, evaluate and output the measured values
- Supply voltage, signal output and ground are galvanically insulated => separate electrical connections
- Supply voltages: 2 x 5 VDC or 2 x 15 to 30 VDC
- Signal outputs: 2 x 0 to 5 V or 2 x 0 to 10 V

Electrical data ETA25FX – singleturn, analogue output, redundant

Effective electrical angle of rotation 1.)	7° ≤ α ≤ 360° (programmable ex works), ±0.5°	
Independent linearity (best straight line) 1.)	±0.3% @ 360°	
Absolute Linearity 1.)	±0.6% @ 360°	
Output signal	0 to 5 V ratiometric	0 to 10 V
Resolution	12 Bit	
Update rate	200 μs	
Supply voltage V _{SUP}	5 V ±10%	15 to 30 V
Power consumption (no load)	≤ 23 mA	
Output load	≥ 5 kOhm	
Insulation voltage 1.)	1000 VAC @ 50 Hz, 1 min	
Insulation resistance 1.)	2 MOhm @ 500 VDC, 1 min	
MTTF (EN29500-2005-1)	613a	202a

1.) According to IEC 60393

Cable and pin assignment ETA25FX – singleturn, analogue output, redundant

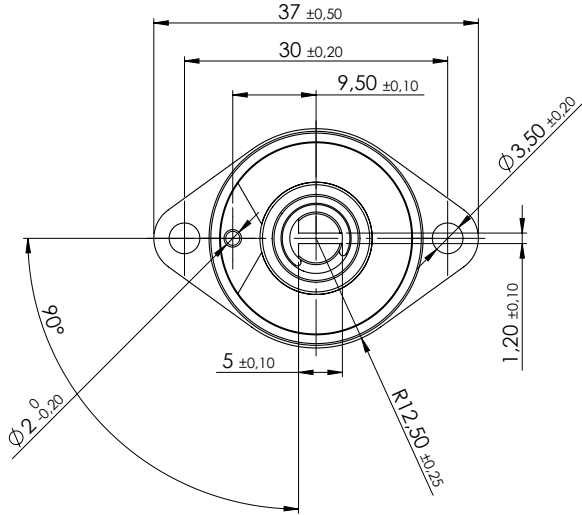
Function:	Option F	Option R
VSUP 1	Lead 1 (red)	red
OUT 1	Lead 2	brown
GND 1	Lead 3	black
GND 2	Lead 4	green
OUT 2	Lead 5	yellow
VSUP 2	Lead 6	orange

For details on zero point definition and output programming see page 27.

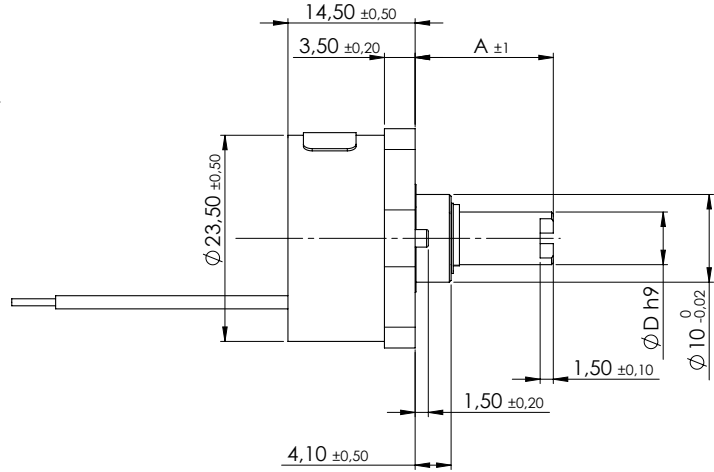
Order Code ETA25FX – redundant, singleturn, analogue output									
Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>								
Series	ETA25FX								
Shaft diameter, shaft length: Shaft diameter \varnothing 6 mm, shaft length 15.6 mm <i>Shaft diameter \varnothing 6.35 mm, shaft length 15.6 mm</i> <i>Custom shaft dimensions [mm] $\varnothing \leq 6.35$ mm</i>		6x15,6 <i>6,35x15,6</i> <i>XxXX</i>							
Supply voltage / output signal: $V_{SUP} = 5$ V (4.5 to 5.5 V) / OUT=0 to 5 V (ratiometric) $V_{SUP} = 24$ V (15 to 30 V) / OUT=0 to 10 V								0505 2410	
Sense of rotation: (when looking at the shaft, from the front) Clockwise/Clockwise (ganging) <i>Clockwise/Counterclockwise (counter rotational)</i>								CW CW <i>CW CCW</i>	
Rotation angle in [°]: 360 320 270 180 90 <i>Custom rotation angle ($\geq 7^\circ$, positive integer)</i>								360 320 270 180 90 XXX	
Operational Torque: Standard torque <i>Improved/medium torque</i>								- <i>MT</i>	
Shaft sealing: None <i>With shaft sealing</i>								- <i>D</i>	
Electrical connection, cable length: 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>								F0,15 <i>FX,XX</i> R1,00 <i>RX,XX</i>	
Anti-rotation pin: Pin A <i>None (pin removed)</i>									A -

Order example ETA25FX – redundant, singleturn, analogue output									
Requirement: Redundant, shaft \varnothing 6.00 mm, shaft length 15.6 mm, VSUP=5 V /OUT=0...5 V, signal 1 sense of rotation CW, signal 2 sense of rotation CW, electrical rotation 360° signal 1 and 2, no shaft sealing, flat ribbon cable 0.15 m, anti-rotation pin A									
Example for order code: ETA25FX 6x15,6 0505 CW CW 360 F0.15A									

Drawing ETx25F Family

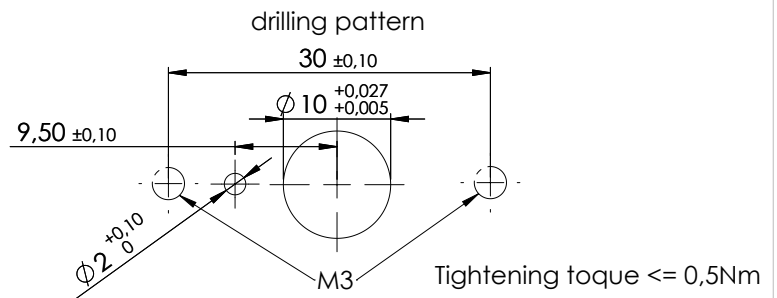


View shows 0° position

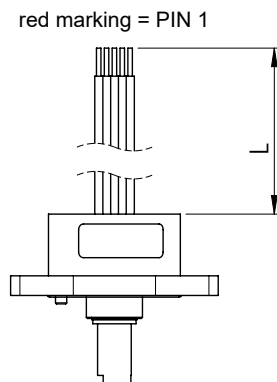


Standard shaft dimensions	
Shaft length A	15,6 mm
Shaft diameter D	6 mm

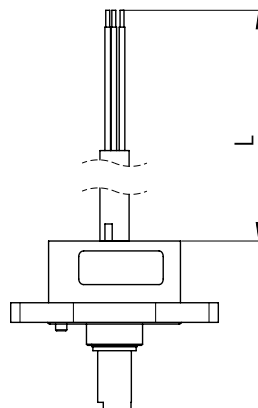
planarity of installation surface 0,1
 roughness of installation surface \sqrt{Ra} 6,3



Option F - Flat ribbon cable



Option R - Round cable



Standard shaft dimensions	
Shaft length A	15.6 +/- 1 mm
Shaft diameter D	6 h9 mm, 6.35 h9 mm
Shaft flattening (D-flat)	1 +/- 0.1 mm

All dimensions in mm

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
Lifetime 2.)	> 100 Mio. shaft rotation movements Option D: Sealing specified for $\geq 200\,000$ shaft rotation movements
Bearing	Sleeve bearing
Max. operational speed	100 rpm (< 1 min. 800 rpm)
Operational torque	$0.1 \leq M \leq 0.6$ Ncm (without shaft sealing) $0.3 \leq M \leq 1.3$ Ncm (@RT, 10 rpm) (with increased torque)
Operating temperature range	Standard: -40 to +85 °C (cable not moving)
Storage temperature range	Standard: -40 to +105 °C
Protection grade (IEC 60529) front side	<ul style="list-style-type: none"> ▪ IP40 standard ▪ IP55M (IP66S) with shaft sealing (option D)
Protection grade (IEC 60529) rear side	IP66 (cable ends excluded)
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)	50 g / 11 ms / half sine (3x6 shocks)
Housing diameter	$\varnothing 23.5$ mm (dimensions of the mounting flange, height: 37 mm, width 25 mm)
Housing depth	14.5 mm
Shaft diameter	Standards: $\varnothing 6$ mm, $\varnothing 6.35$ 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"> ▪ ca. 40 g (option R: cable, valid for 1 m only) ▪ ca. 23 g (option F: flat ribbon cable, valid for 15 cm only)
Connection type	<ul style="list-style-type: none"> ▪ Ribbon cable (option F) ▪ Cable (option R)
Connection position	Axial
Sensor mounting	Flange, by means of two screws M3 (not enclosed)
Fastening parts included in delivery	If option D is ordered 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
Material housing	Plastic / Bronze

1.) According to 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	Class B

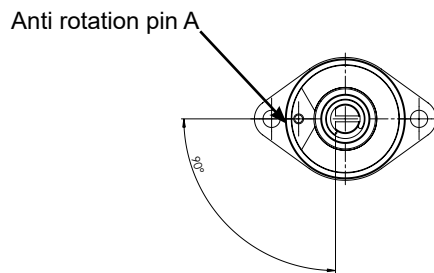
Definition of the zero position / anti-rotation pin

Output at the zero point:

ETA25F (analogue outputs): Output signal 0% full scale (F. S.)
 ETP25F (PWM output): duty cycle 10% (10% duty cycle)
 ETS25F (serial output): Output signal 0% full scale (F. S.)
 ETI25F (incremental output): The index signal is output (Z)

Position of the zero position:

anti-rotation pin A	Zero position when shaft flattening faces anti-rotation pin A
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Signal definition for custom rotation angles

Custom angles <math><360^\circ</math>

When programming the electrical angle of rotation of <math><360^\circ</math>, the remaining non-effective range of rotation is divided equally into high and low.

