

Series ETA25K

Key features ETA25K:

- Analogue outputs 0 to 5 V, 0 to 10 V, 4 to 20 mA
- Redundant versions available – see separate section
- Versatile connecting possibilities
- 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 in factory), $\pm 0.5^\circ$		
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	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 IEC 60393

Wire colour/pin assignment

Function:	Option F (flat ribbon cable)	Option R (round signal cable)
OUT	Strand 2	brown
VSUP	Strand 1 (red)	red
GND	Strand 3	black

For details output programming see page 25.

Absolute Encoders with Current Loop or Voltage Output

Series ETA25K

Order Code ETA25K – singleturn, analogue output, not redundant

Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>				
Series	ETA25K				
Supply voltage / output signal: VSUP=5 V (4.5 to 5.5 V) / OUT=0 to 5 V (<i>ratiometric</i>) VSUP=24 V (15 to 30 V) / OUT=0 to 10 V VSUP=24 V (9 to 30 V) / OUT=4 to 20 mA <i>VSUP=24 V (9 to 30 V) / OUT=0 to 5 V</i>	0505 2410 2442 <i>2405</i>				
Sense of rotation: (when looking at the encoder's front surface) 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>	
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>

* For details see page 25.

Order example ETA25K

Requirements:
VSUP=5 V / OUT=0 to 5 V, sense of rotation CW, rotation angle 360°, round cable 1.00 m

Example for order code:
ETA25K 0505 CW360 R1,00

Series ETA25KX – singleturn, analogue output, redundant

Key features ETA25KX :

- Independent signal processing. The ETA25KX 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 ETA25KX – singleturn, analogue output, redundant

Effective electrical angle of rotation 1.)	7° ≤ α ≤ 360° (programmable at factory), ±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	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 IEC 60393

Cable and pin assignment ETA25KX – singleturn, analogue output, redundant

Function:	Option F (flat ribbon cable)	Option R (round signal cable)
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 output programming see page 25.

Absolute Encoders with Redundant Voltage Output

Series ETA25KX

Order Code ETA25KX – redundant, singleturn, analogue output

Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>				
Series	ETA25KX				
Supply voltage / output signal: VSUP=5 V (4.5 to 5.5 V) / OUT=0 to 5 V (ratiometric) VSUP=24 V (15 to 30 V) / OUT=0 to 10 V		0505 2410			
Sense of rotation: (when looking at the encoder's front surface) Clockwise/Clockwise (ganging) <i>Clockwise/Counterclockwise (counterrotational)</i>			CW CW <i>CW CCW</i>		
Rotation angle* in [°]: 360 320 270 180 90 <i>Custom rotation angle (≥7°, positive integer)</i>				360 320 270 180 90 XXX	
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>

* For details see page 25.

Order example ETA25KX – redundant, singleturn, analogue output

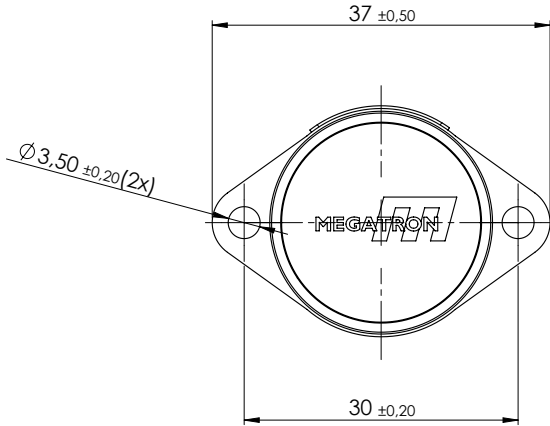
Requirement:

Redundant, 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, flat ribbon cable 0.15 m

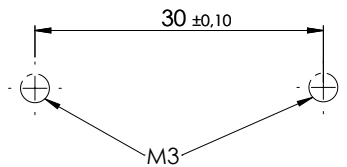
Example for order code:

ETA25KX 0505 CW CW 360 F0,15

Drawing ETx25K Family

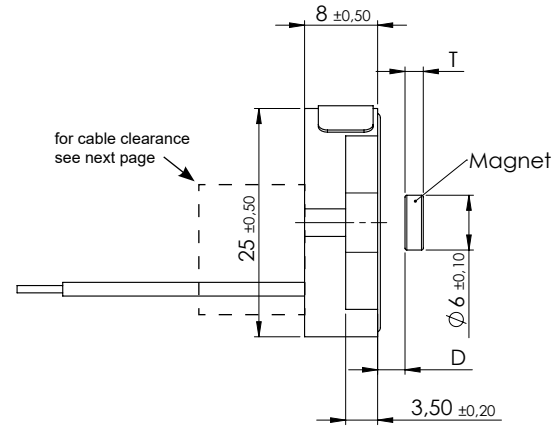


drilling pattern



Tightening torque $\leq 0,5\text{Nm}$

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



Option F - Flat ribbon cable

Option R - Round cable

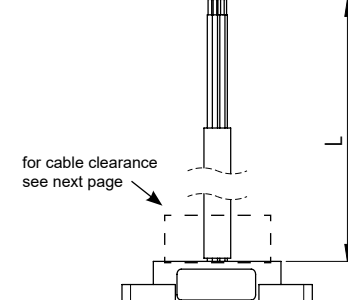
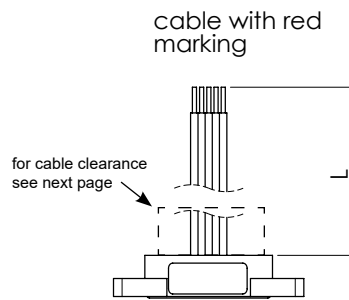


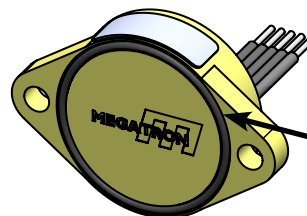
Table for parameter L see next page

Magnet thickness and distance from sensor surface (standard magnet only)

Electronics	Thickness T of the magnet	Mounting distance D
Analogue single turn not redundant, ETA25K, ETP25K, ETS25K (SPI only)	2 mm	1.00 +/- 0.15 mm
Analogue / Serial redundant, ETA25KX, ETS25KX	2.5 mm	0.50 +/- 0.15 mm
Incremental ETI25K, Serial ETS25K (SSI only)	4 mm	0.20 +/- 0.15 mm
Analogue Multi/singleturn ETA25KPM	4 mm	0.20 +/- 0.15 mm

Angular error in dependency of the deviation of the magnet to the center axis

Deviation from the center axis	Angular error
0.50 mm	0.6°
0.75 mm	1.2°



O-ring, part no. 133324
DIN 3771-22x1-NBR 70

- for sealing between sensor front and installation surface,
- not included in delivery, please order separately

Important note:

The correct thickness T of the magnet, the mounting distance D and the positioning relative to the central axis of the kit encoder are crucial for its correct function.

Drawings

Family ETx25K

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

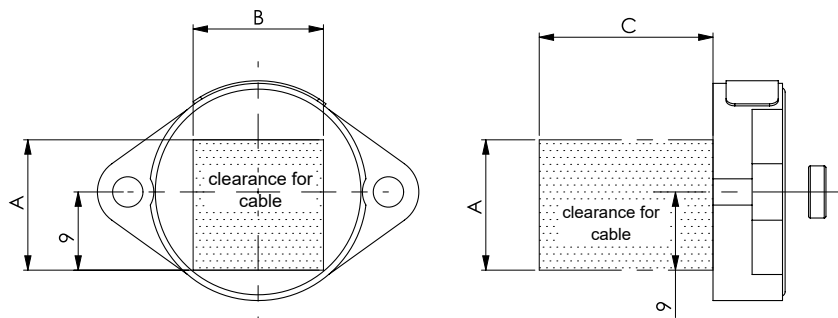
Cable length tolerances – custom lengths

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

Clearance for cable exit at back side

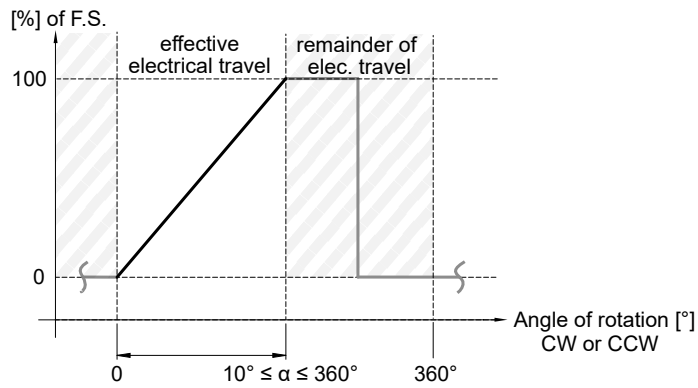
Series	Electronics	Clearance parameters [mm]		
		A	B	C
ETP25K	PWM, single turn	6	8	15
ETA25K	Analogue, single turn	6	8	15
ETA25KPM	Analogue, programmable multiturn	6	14	15
ETA25KX	Analogue, redundant single turn	18	8	15
ETI25K	Incremental, single turn, A, B, Z	6	14	15
	Serial, single turn, SER (deprecated)	6	14	15
	Serial, single turn, SPI, SSI	9	14	15
ETS25KX	Serial, redundant, single turn (SPI)	18	12	20



Signal definition for custom rotation angles

Custom angles $< 360^\circ$

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



Mechanical Data

Family ETx25K

Mechanical and environmental data - ETx25K Family

Mechanical angle of rotation 1.)	Endless
Lifetime 2.)	Mechanically unlimited
Max. operational speed	The maximum actuation speed is not limited mechanically. The maximum permissible actuation speed [rev./min] is calculated in relation to the resolution. For absolute encoders: $rev./min. (@max. resolution) = \frac{1}{2^{Resolution\ in\ Bit} * Update\ rate\ in\ s}} * 60s$ For incremental encoders: $Max. rev./min. = \frac{Limit\ Frequency\ \frac{1}{s} * 60s}{Number\ of\ Pulses}$
Operating temperature range	-40..+85°C (fixed cable)
Storage temperature range	-40..+105°C
Protection grade front side (IEC 60529)	IP6
Protection grade rear side (IEC 60529)	IP67 (end of cable excluded) - standard with encapsulated electronics IP00 (end of cable excluded) - option without encapsulated electronics
Vibration (IEC 68-2-6, Test Fc)	±1.5 mm / 20 g / 10 bis 2000 Hz / 16 frequency cycles (3x4 h)
Mechanical shock (IEC 68-27, Test Ea)	50 g / 11 ms / halfsine (3x6 shocks)
Housing diameter / length	25 mm (dimensions of the mounting flange, height: 37 mm, width 25 mm)
Housing depth	8 mm
Shaft diameter	No limitation
Mass	Option F (0.15 m flat ribbon cable) approx. 15 g Option R (1.00 m round cable) approx. 40 g
Connection type	▪ Flat ribbon cable (AWG26, 0.15 m with tinned cable endings) ▪ Round cable (AWG26, 1 m with tinned cable endings) ▪ Other connection types on request
Connection position	Axial
Sensor mounting	Flange, by means of two pieces of screws M3
Delivery content	Kit Encoder and Magnet. O-ring/gasket must be ordered separately (Screws for fastening the rotary encoder are not part of the scope of delivery)
Fastening torque (per screw or nut)	≤ 0.5 Nm
Housing material	Glass-fibre reinforced thermoplastic

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	Class B