Series ETP25K – singleturn, PWM output, not redundant

Key features ETP25K:
- PWM signal output
- Frequency 244 Hz (constant)
- Pulse width (duty cycle) 10% (0°) to 90% (360°)
- Supply voltage: 5 VDC +/-10%

Electrical data ETP25K – singleturn, PWM output, not redundant

Effective electrical angle of rotation 1.)	7° ≤ α ≤ 360° (programmable in factory), ±0.5°
Independent linearity (best straight line) 1.)	±0.4% @ 360°
Absolute Linearity 1.)	±0.6% @ 360°
Output signal	PWM (pulse width modulation)
Output signal voltage	5 V
Carrier frequency	244 Hz (constant)
Minimum duty cycle	10%, equal to app. 0.4 ms
Maximum duty cycle	90%, equal to app. 3.5 ms
Resolution	12 Bit
Supply voltage	5 V ±10%
Power consumption (no load)	≤ 10 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)	1267a

1.) According IEC 60393

Function description PWM signal output ETP25K

The ETP25K provides a constant carrier frequency with 244 Hz at the signal output, with HIGH and LOW signal levels which have a constant signal amplitude. A constant carrier frequency means a constant length of the period duration. The duty cycle and thus the pulse width changes in dependency of the rotating angle between 10% to 90% relative to the signal period.
If the CW option is selected, the duty cycle increases clockwise when turning the shaft clockwise. If the CCW option is selected, the duty cycle decreases clockwise if the shaft is turned clockwise. Normally no signal conversion is required for further processing of the output signal, because many µControllers already have an input for PWM signals.

Cable and pin assignment

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

For details on output programming see page 24.

Order Code ETP25K – singleturn, PWM output, not redundant					
Description	Selection: standard=**black/bold**, possible options=*grey/italic*				
Series	**ETP25K**				
Supply voltage / output signal:					
VSUP=5 V (4.5...5.5 V) / OUT=5 V / 244 Hz / PWM 10-90%		**5PWM**			
Sense of rotation: (when looking at the encoder's front surface)					
Clockwise			**CW**		
Counterclockwise			*CCW*		
Rotation angle* in [°]:					
360				*360*	
320				*320*	
270				*270*	
180				*180*	
90				*90*	
Custom rotation angle (≥7°, positive integer)				*XXX*	
Electrical connection, cable length:					
Flat ribbon cable, standard length 0.15 m					**F0,15**
Flat ribbon cable with custom length [x.xx m]					*FX,XX*
Round cable, standard length 1 m					**R1,00**
Round cable with custom length [x.xx m]					*RX,XX*

* For details see page 24.

Order example ETP25K – singleturn, PWM output, not redundant
Requirement: VSUP=5 V / OUT=244 Hz, sense of rotation CW, rotation angle 360°, round cable 1 m
Example for order code: ETP25K 5PWM CW 360 R1,00

Drawing ETx25K Family

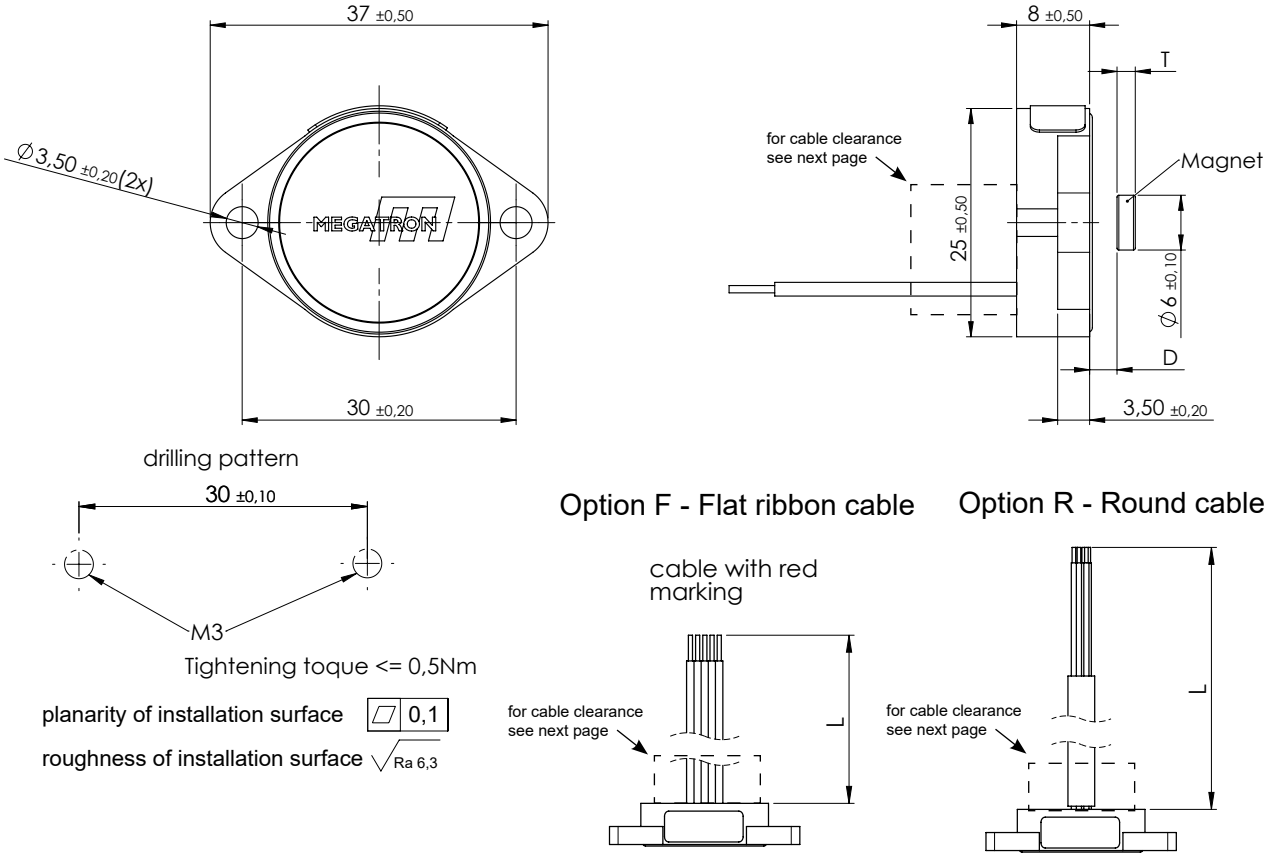
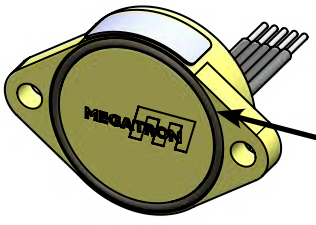


Table for parameter L see next page

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
Serial single turn ETS25K mit SER (veraltet)	4 mm	0.20 +/- 0.15 mm
Analogue/ Serial redundant, ETA25KX, ETS25KX	2.5 mm	0.50 +/- 0.15 mm
Incremental ETI25K	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.

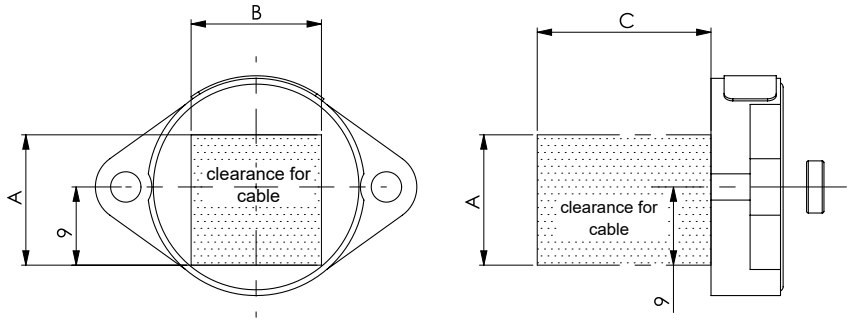
Cable specs for option F (flat ribbon cable) and R (round control cable)						
Option	**Standard cable length L**	**Number of single strands (depends on electronics)**	**Cable sheath Ø or width**	**Single strands cross section**	**Allowed tolerance (L)**	**Minimum bending radius**
R	Standard 1000 mm	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

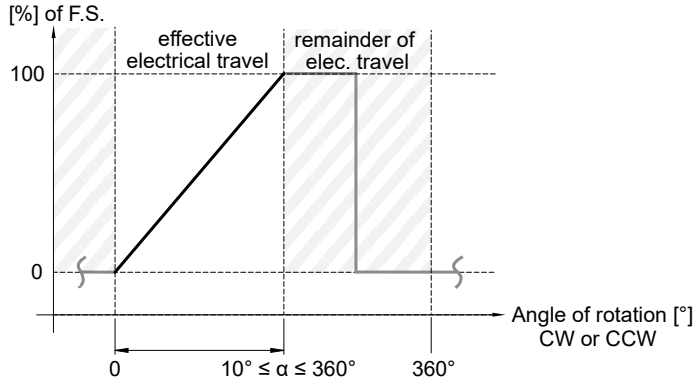
Cable harness length measured from sensor surface or soldering pad including connector.
Minimum cable length: 0.08 m (for round cable), 0.05 m for ribbon cable

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	9	14	15
ETS25KX	Serial, redundant, single turn (SPI)	18	12	20



Signal definition for custom rotation angles

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.



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: $rev./min.(@max.\ resolution) = \frac{1}{2^{\text{Resolution in Bit}} * Updaterate\ in\ s} * 60s$ 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 / REACH / RoHS	
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
REACH Regulation (EC) 1907/2006 including the SVHC list	
RoHS Directive 2011/65/EU	