Series HTA25KPM – multi-/singleturn, programmable, analogue output

Key features HTA25KPM :

- Measuring range 10° to max. 72000° (200 turns)
- Programmable by the user. Programmable are the sense of rotation (CW/CCW) and the effective electrical angle [°]
- Programmable up to 10000 times
- Can also be used as a programmable singleturn rotary encoder
- Maximum rotation in a voltage-free state without loss of the angle information +/-179°
- Factory programming (ex works): effective electrical angle of rotation 3600° (10 turns), sense rotation CW
- Supply voltage: 9 to 30 VDC, 15 to 30 VDC
- Output signal: 4 to 20 mA, 0 to 5 V, 0 to 10 V

Electrical data HTA25KPM – multi-/singleturn, programmable, analogue output

Effective electrical angle of rotation 1.)	0 to 10° - 0 to 72000° (max. 200 turns) Start point, endpoint and sense of rotation programmable by the customer. Ex works the angle is set to 3600°. For detecting absolute position >360° the sensor should not be turned more than ±179° without supply voltage.		
Independent linearity (best straight line) 1.)	±0.05% @ 3600°		
Output signal	0 to 5 V	0 to 10 V	4 to 20 mA
Resolution 1.)	12 Bit		
Update rate	3 ms		
Supply voltage	9 to 30 V	15 to 30 V	11 to 30 V
Power consumption (no load)	< 10 mA		< 14 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		
Max. number of programming cycles	10000		
MTTF (SN29500-2005-1)	224a		229a

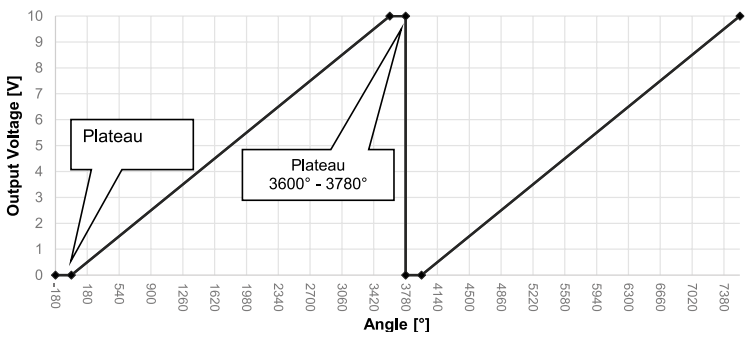
1.) According IEC 60393

Signal output function (factory programming). Automatic function for inserting signal plateaus

The function represents the output signal in the state of delivery, when turning clockwise (sense of rotation CW). The effective electrical angle of rotation is 3600° ex works. Before and after the linearly rising output signal for 3600° the HTA25KPM integrates automatically signal plateaus for a rotation angle of each 180° .
The following example shows the output signal pattern in the delivery state when turning for 11 revolutions clockwise (sense of rotation CW), starting at the 0° position:

1. 10 rotations clockwise 0° to 3600°, linearly increasing output signal 0% to 100% FS
2. 1/2 rotation 180° (3600° to 3780°) signal plateau 100% FS
3. 1/2 rotation 180° (3780° to 3960°) signal plateau 0% FS

The drawing shows the signal-amplitude function for 0 to 10 V signal output



Order Code HTA25KPM – singleturn or multiturn, analogue output

Description	Selection: standard=**black/bold**, possible options=*grey/italic*			
Series	**HTA25KPM**			
Supply voltage / output signal: **VSUP = 24 V (15 to 30 V) / OUT = 0 to 10 V** **VSUP = 24 V (9 to 30 V) / OUT = 4 to 20 mA** **VSUP = 24 V (9 to 30 V) / OUT = 0 to 5 V**		 **2410** **2442** **2405**		
Electrical connection, cable length: **1 m round cable, axial** **1 m round cable, radial** **Connector M8, axial** **Connector M8, radial** *Round cable, customer-specific cable length [X,XX m], axial* *Round cable, customer-specific cable length [X,XX m], radial*			 **PG** **PGR** **M8** **M8R** *PGX,XX* *PGRX,XX*	
Installation variant/drilling pattern: **Variant S** (Pins for exact alignment optional and not included) **Variant P** (pins pre-installed on the rotary encoder for precise alignment)				 **S** **P**

Order example HTA25KPM

Requirement:
VSUP=24 V / OUT=0 to 5 V, sense of rotation CW, rotation angle ex works 3600° (can be programmed by customer), round cable 1 m radial

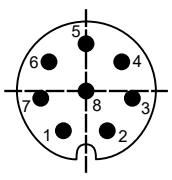
Example for order code:
HTA25KPM 2405 PGR

Cable and pin assignment

Function	Roundcable (Option R)	Option M8(R), 8 pin
DIR	orange	Pin 1
END	green	Pin 2
START	yellow	Pin 3
VSUP	red	Pin 4
OUT	brown	Pin 5
GND	black	Pin 6
-	-	Pin 7 n/c
-	-	Pin 8 n/c

For details on output programming see page 29.

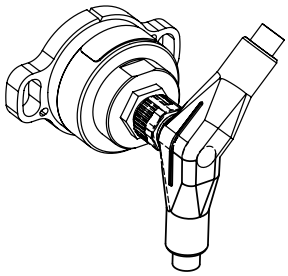
Connector M8(R) – pin assignment for 8-pin connector



Pin-Numbering of socket connector in the encoder housing

The orientation of the connector relative to the encoder housing is not defined and differs from one encoder to the next. When using angled connectors in combination with axial outlet, the orientation of the cable outlet is thus not defined.

If you need a defined orientation of the cable outlet, please choose our housings with radial cable outlet and use straight mating connectors.



Orientation will vary when using angled connectors.

Order example HTA25KPM programmer

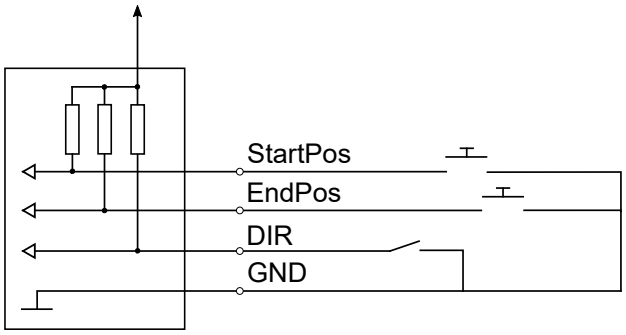
Key features HTA25KPM programmer:
- Programmable measuring range from 10° to max. 72000° (200 turns)
- Programmable: sense of rotation (CW/CCW), effective electrical angle [°]
- Up to 10,000 programming cycles per rotary encoder

Order number:	Order code:
135945	Programmer Tool for ETA HTA PM

Programming of HTA25KPM

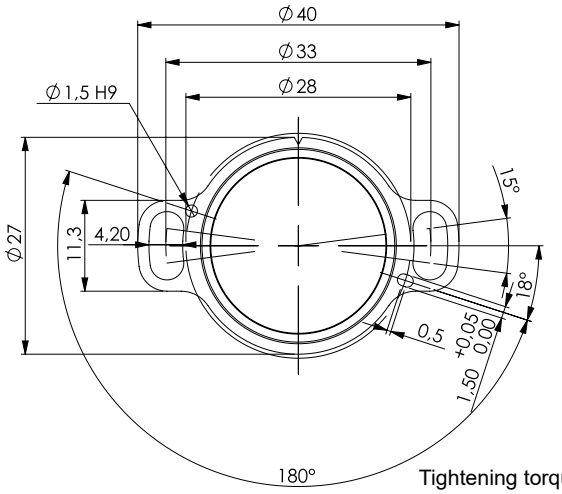
The programming guide is available for download on the MEGATRON web page https://www.megatron.de/

To program the HTA25KPM rotary encoder either the following circuit must be built, or the programmer must be ordered from MEGATRON.

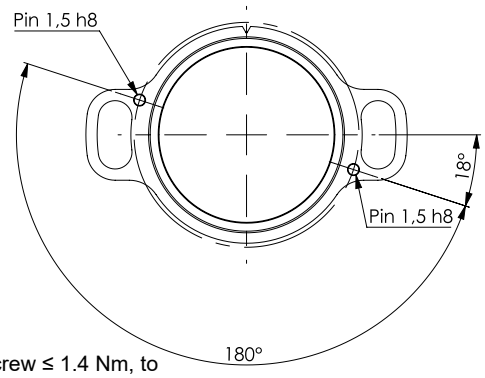


Drawings HTx25K – Drilling patterns S and P

Dimensions Sensor head for Version with drilling pattern S
(pins optional, to be set by customer)

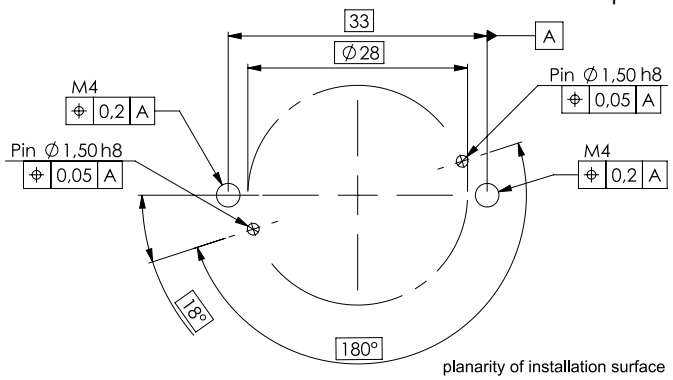


Deviations of variant with drilling pattern P
(cylindrical pins part of the rotary encoder)

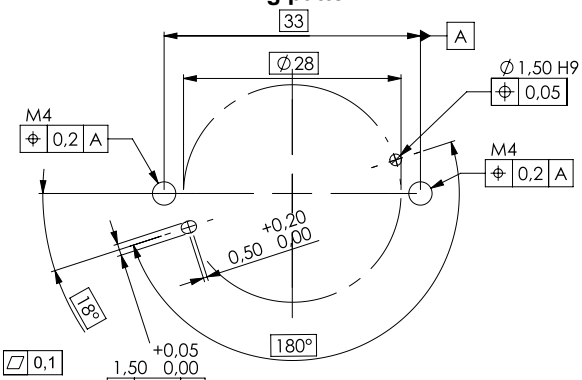


Tightening torque of M4 screw ≤ 1.4 Nm, to be locked by medium strength threadlocking adhesive if required

Drilling pattern S



Drilling pattern P

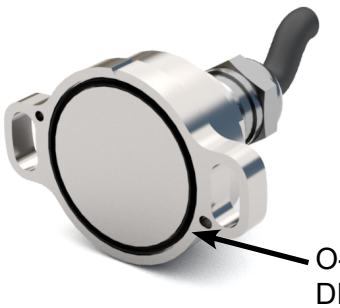


planarity of installation surface ▱ 0,1

roughness of installation surface $\sqrt{Ra\ 6,3}$

All dimensions in mm

Accessories – Sealing ring

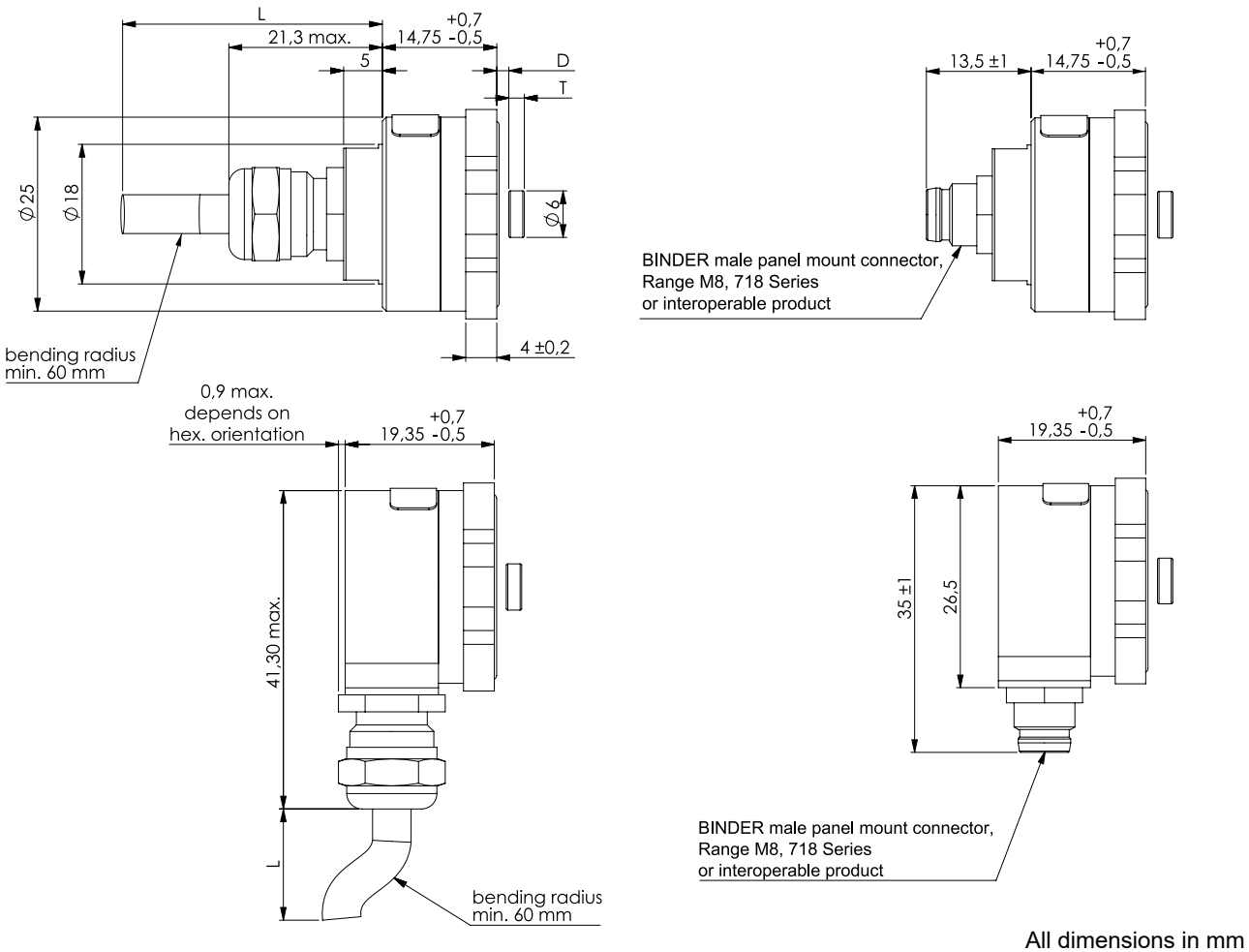


O-ring, part no. 133324
DIN 3771-22x1-NBR 70

- For sealing between sensor front and mounting surface,
- Not included in delivery, please order separately

All dimensions in mm

Drawings HTx25K – Versions for drilling pattern S, magnet positioning



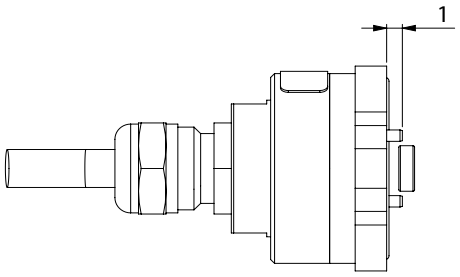
All dimensions in mm

Magnet selection and positioning for enclosed standard NdFeB magnets

Important note:
The correct mounting distance D as well as the correct positioning of the in relation to the central axis to the housing surface of the kit encoder is mandatory for its correct function. The values below are not valid for other magnets (e. g. accessories).

Magnet thickness and distance from sensor surface		
Electronics	**Thickness T of the magnet**	**Mounting distance D**
Analogue singleturn not redundant, HTA25K, HTP25K, HTS25K (only SPI)	3 mm	1.50 +/- 0.15 mm
Serial, SPI, (HTS25K)	3 mm	1.50 +/- 0.15 mm
Serial, SSI, (HTS25K)	4 mm	0.50 +/- 0.15 mm
Analogue redundant, HTA25KX	2.5 mm	0.50 +/- 0.15 mm
Incremental, HTI25K	4 mm	0.50 +/- 0.15 mm
Analogue multi turn HTA25KPM	4 mm	1.00 +/- 0.15 mm

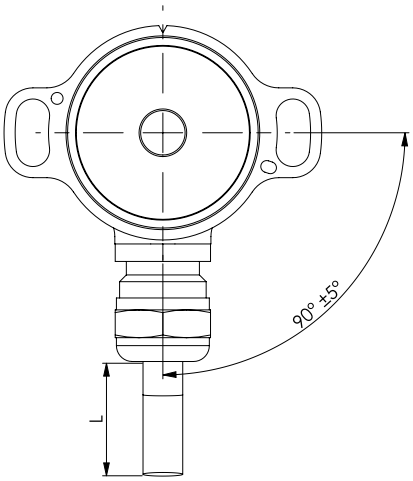
Drawings HTx25K – Deviations for drilling pattern P



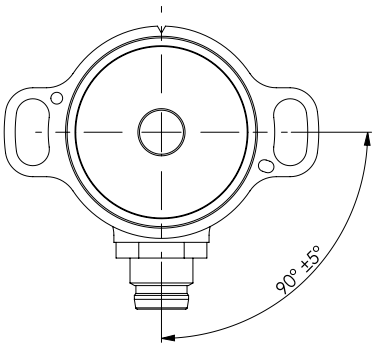
Pins/cylindrical pins are only pre-assembled if drilling hole pattern P is selected.
Missing dimensions see drawings of the variants for hole pattern S.

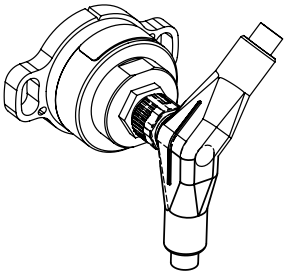
Drawings – Cable/connector exit direction for radial versions (M8R, PGR)

view shows cable orientation



view shows connector position





The orientation of the M8 connector pins relative to the encoder housing is not defined and differs from one encoder to the next. When using angled connectors in combination with axial outlet, the orientation of the cable outlet is thus not defined.

If you need a defined orientation of the cable outlet, please choose our housings with radial cable outlet and use straight mating connectors.

Cable specs for option PG(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
PG PGR	Standard 1000 mm	3		AWG26	-20 mm to +40 mm	10 x D Ø (D = cable sheath diameter Ø)
		6				
		8				
		10		AWG28		
		12				
Cables delivered with cable shield						

(*) Tolerances according IPC Association

Cable length tolerances – custom lengths

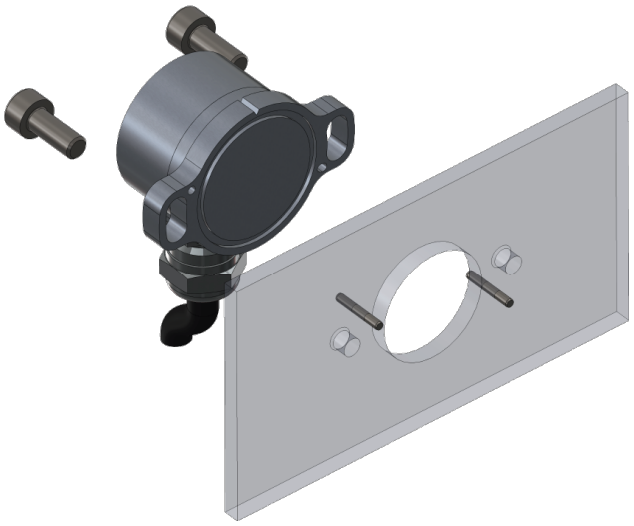
Length L	Tolerance
≤ 0.3 m	+25 mm / -20 mm
> 0.3 m - 1.5 m	+40 mm / -20 mm
> 1.5 m - 3 m	+100 mm / -40 mm
> 3 m - 7.5 m	+150 mm / -60 mm
Wire harness length measured from sensor face including connector. Minimum cable length: 0.08 m (for round cable). Please contact us for lengths > 3 m regarding handling and packaging.	

Mechanical and Environmental data	
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: $rev./min.(@max.\ resolution) = \frac{1}{2^{Resolution\ in\ Bit} * Updaterate\ in\ s} * 60s$ For incremental encoders: $Max.\ rev./min. = \frac{Limit\ Frequency\ \frac{1}{s} * 60s}{Number\ of\ Pulses}$
Operating temperature range	Option M8 (connector) ▪ -30 to +80°C Option PG (cable gland incl. cable) ▪ -30 to +85°C cable fixed ▪ -10 to +85°C cable in movement
Storage temperature range	-30 to +105°C
Protection grade (IEC 60529) front side	IP67
Protection grade (IEC 60529) rear side	Option PG: IP68 (cable ends excluded) Option M8: IP67 (when mated with IP67 type M8 cable)
Vibration (DIN EN 60068-2-64:2008 + A1: 2019)	±1.5 mm / 30 g / 10 to 2000 Hz / 16 frequency cycles (3x4 h)
Shock (DIN EN 60068-2-27)	400 m/s² / 6 ms / half sine (100±5) shocks
Housing diameter	Ø 25 mm
Housing depth	In dependency to the electrical connection position: ▪ axial 28.25 mm (variant with M8 connector) ▪ radial 19.35 mm (variant with M8 connector)
Shaft diameter	No limitation (customer side)
Mass (approx.)	HTx25K with connector M8(R), 19 g HTx25K with cable gland and 1 m signal cable PG(R), 48 g

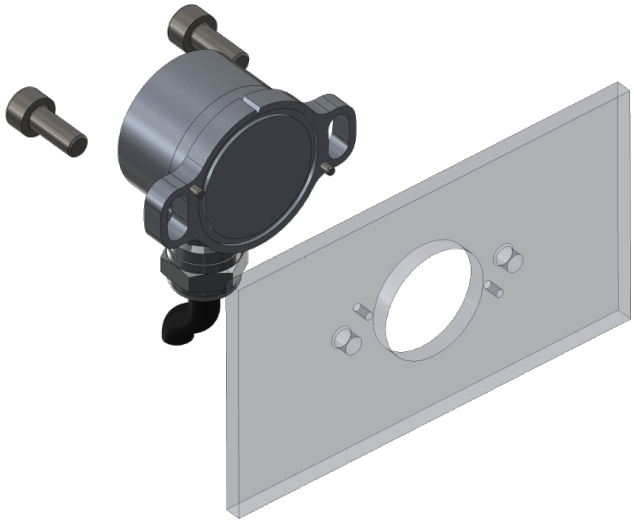
1.) According IEC 60393
2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

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

Mechanical and environmental data, miscellaneous	
Sensor mounting	Standard mounting is done by using M4 screws. A rotation of +/- 7.5° is possible to find the zero point in the application when installing the magnet. Alternatively, it is possible to align the rotary encoder exactly to the magnet using cylinder pins (1.5 mm) in the application (a rotation is then not possible, however). There are two variants/two drilling patterns to choose from: ▪ Variant S (standard): Cylindrical pins are installed by the customer in the application and the rotary encoder is attached and fixed using M4 screws ▪ Variant P: Cylindrical pins are pre-installed on the rotary encoder. The drillings for the pins must be implemented on the mounting position in the application. This variant is suitable, for example, for mounting on thin sheet metal.
Mounting hardware included	none (Note: With hole pattern P, the cylinder pins are already fixed on the rotary encoder)
Fastening torque per screw for fastening of the rotary encoder	≤ 1.4 Nm (M4 screws, thread tensile strength class 5.6) For screw securing, the use of a medium-strength thread securing adhesive is recommended
Material housing	Aluminium
Material cable gland (PG)	Stainless steel
Material connector M8	CuZn nickel-plated



Mounting example of the variant for drilling pattern S
Mount using 2 M4 screws, optional exact alignment using 2 cylindrical pins h8 1.5 (e.g. ISO 2338 B)
(screws and pins not included)



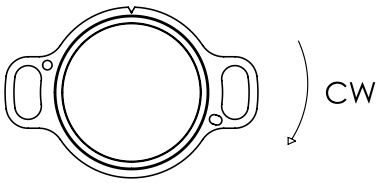
Mounting example of the variant for drilling pattern P:
Mount using 2 M4 screws, exact alignment is ensured using cylindrical pins h8 1.5 pre-assembled at encoder
(screws not included)

Definition of the zero position

The supplied magnet has no marking, so the zero point cannot be set mechanically when installing this magnet. Please contact us if you need a solution with a mechanically defined zero point.

Output at the zero point:
HTA25K (analogue outputs): Output signal 0% full scale (F. S.)
HTP25K (PWM output): duty cycle 10% (10% duty cycle)
HTS25K (serial output): Output signal 0% full scale (F. S.)
HTI25K (incremental output): The index signal is output (Z)

The direction of rotation is defined when looking at the flat front of the encoder:



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.