

Series HTP36 – singleturn, not redundant

Key features HTP36:

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



Electrical data HTP36 – singleturn, not redundant

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.)	$\pm 0.4\%$ @ 360°
Absolute Linearity 1.)	$\pm 0.6\%$ @ 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 $\pm 10\%$
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 (SN29500-2005-1)	1267a

1.) According IEC 60393

Function description HTP36

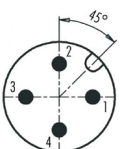
The HTP36 provides a constant carrier frequency with 244 Hz at the signal output, with HIGH and LOW signal levels which have a constant signal amplitude. A constant carrier frequency means a constant length of the period duration. The duty cycle and thus the pulse width changes in dependency of the rotating 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 μ Controllers already have an input for PWM signals.

Cable and pin assignment HTP36 – singleturn, analogue output, not redundant

Function:	Option PG(R)	Option M12(R)
VSUP	red	PIN 1
GND	black	PIN 2
OUT	brown	PIN 3
-	-	PIN 4 n/c

Plug M12 (R) HTP36 – pin assignment

Type 1 (4 pole)



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.

Absolute Encoders with Pulse Width Modulation (PWM)

Series HTP36

Order code HTP36 - solid or hollow shaft, singleturn, analogue signal output, not redundant									
Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>								
Series HTP36	HTP36								
Shaft type: Solid shaft Hollow shaft with screw fixation <i>Hollow shaft with clamp fixation</i>	S H <i>HK</i>								
Shaft diameter, shaft length: Shaft diameter Ø 6 mm <i>Shaft diameter Ø 8 mm</i> <i>Shaft diameter Ø 6.35 mm</i> <i>User-defined shaft diameter [mm]</i> <i>Ø ≤ 8 mm in connection with option S</i> <i>Ø ≤ 10 mm in connection with option H or HK</i> <i>Ø ≤ 12 mm exclusively in connection with Option H</i>			6 <i>8</i> <i>6,35</i> <i>X</i>						
Multiplication symbol [x]: For solid shaft (S) For Hollow shaft H or HK				x <i>-</i>					
Visible shaft length: Shaft length 16.5 mm for solid shaft (S) Shaft length for hollow shafts H or HK <i>User-defined shaft length for solid shaft S [mm]</i>					16,5 <i>-</i> <i>XX</i>				
Supply voltage / Output signal: $V_{SUP}=5\text{ V (4.5 to 5.5 V)}$ / OUT=5 V / 244 Hz / PWM 10-90%						05PWM			
Sense of rotation: Sense of rotation CW (output signal increases clockwise) <i>Sense of rotation CCW (output signal increases counter clockwise)</i>							CW <i>CCW</i>		
Electrical angle: Electrical angle 360° <i>User-defined effective electrical angle</i> <i>(≥7°, positive integer)</i>								360 <i>XXX</i>	
Shaft sealing: Without shaft sealing IP65 <i>With shaft sealing (IP67)</i>									- <i>D</i>
Electrical connection, cable length, position: 1 m round cable, axial 1 m round cable, radial Plug M12, axial Plug M12, radial <i>Round cable, customer-specific cable length [X,XX m], axial</i> <i>Round cable, customer-specific cable length [X,XX m], radial</i>									PG PGR M12 M12R <i>PG X,XX</i> <i>PGR X,XX</i>

Order example HTP36 - solid shaft, singleturn, PWM output, not redundant

Requirements:

Solid shaft Ø 6.00 mm, shaft length 16.5 mm, VSUP=5 V (4.5 to 5.5 V) / OUT=5 V / 244 Hz / PWM 10-90 %, sense of rotation CW, electrical angle 360°, no shaft sealing, round cable 1 m, cable outlet (in dependency to the shaft)

Example for order code:

HTP36 S 6x16,5 05PWM CW360 PG

Order example HTP36 - hollow shaft, singleturn, PWM output, not redundant

Requirements:

Hollow shaft Ø 6.00 mm, fixation of the applications side shaft in the hollow shaft by means of grub screw, VSUP=5 V (4.5 to 5.5 V) / OUT=5 V / 244 Hz / PWM 10-90 %, sense of rotation CW, electrical angle 360°, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)

Example for order code:

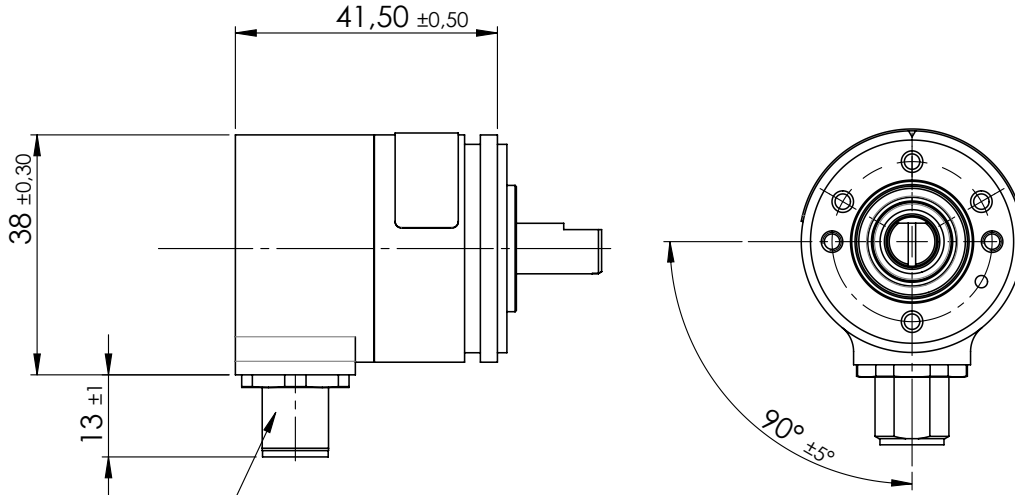
HTP36 H 6 05PWM CW360 PG

Drawings HTx36 S – solid shaft

HTx36 S (solid shaft), option M12R – M12 plug, radial orientation

Side view:

Front view:

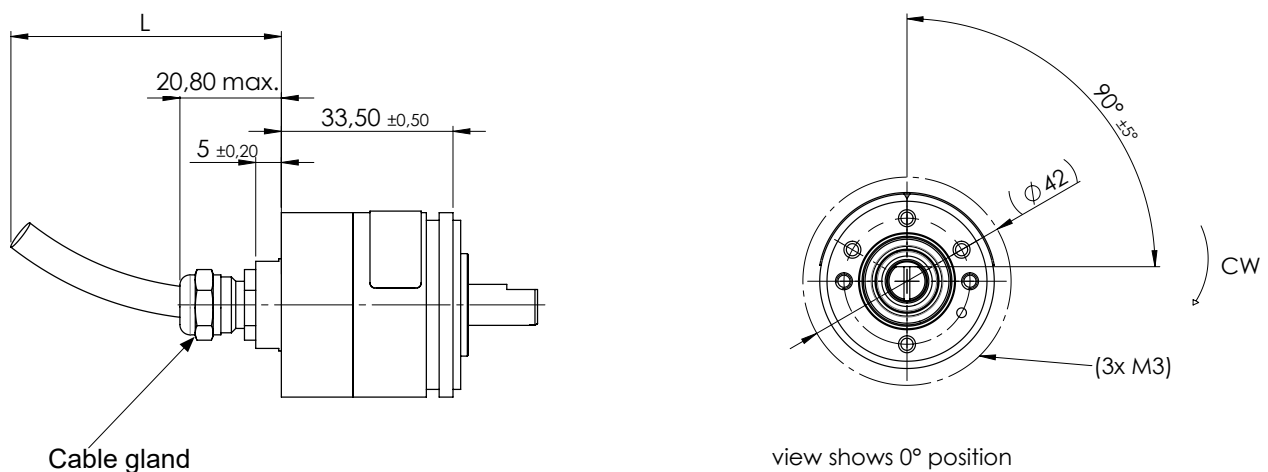


Binder male panel mount connector, range M12-A, 713 series or interoperable product

HTx36 S (solid shaft), option PG – cable gland, axial orientation incl. signal cable

Side view:

Front view:

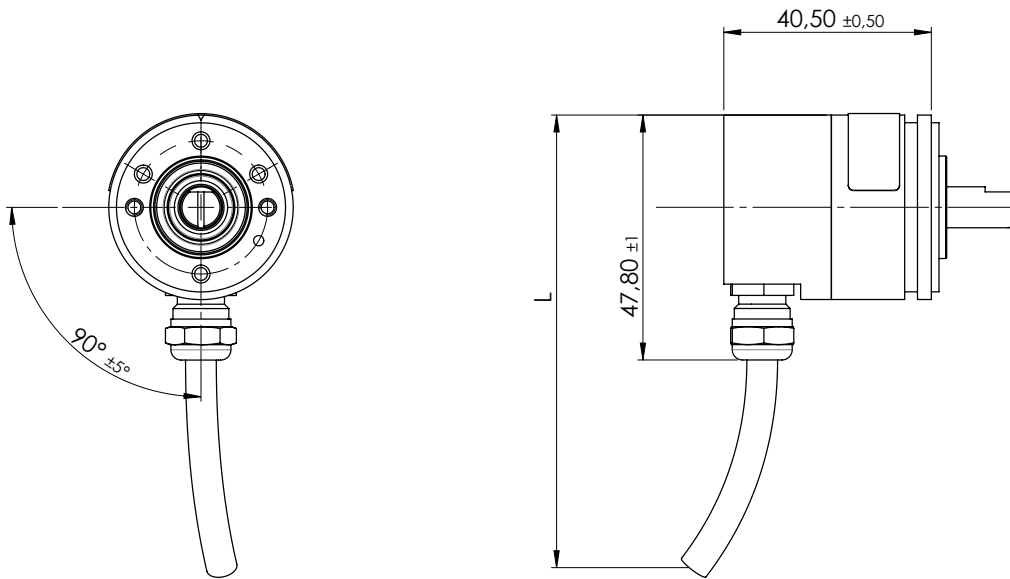


Drawings HTx36 S – solid shaft

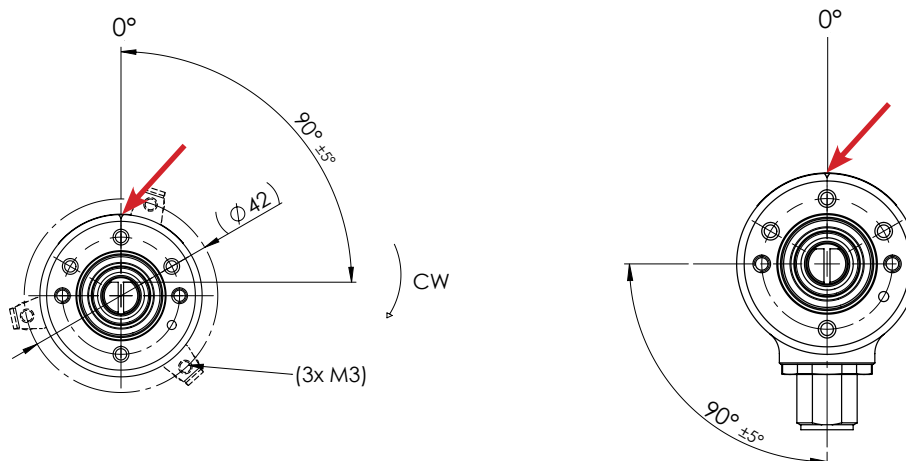
HTx36 S option PG R – cable gland, radial orientation incl. signal cable

Front view:

Side view:



Ex works zero degree reference point (*), sense of rotation:



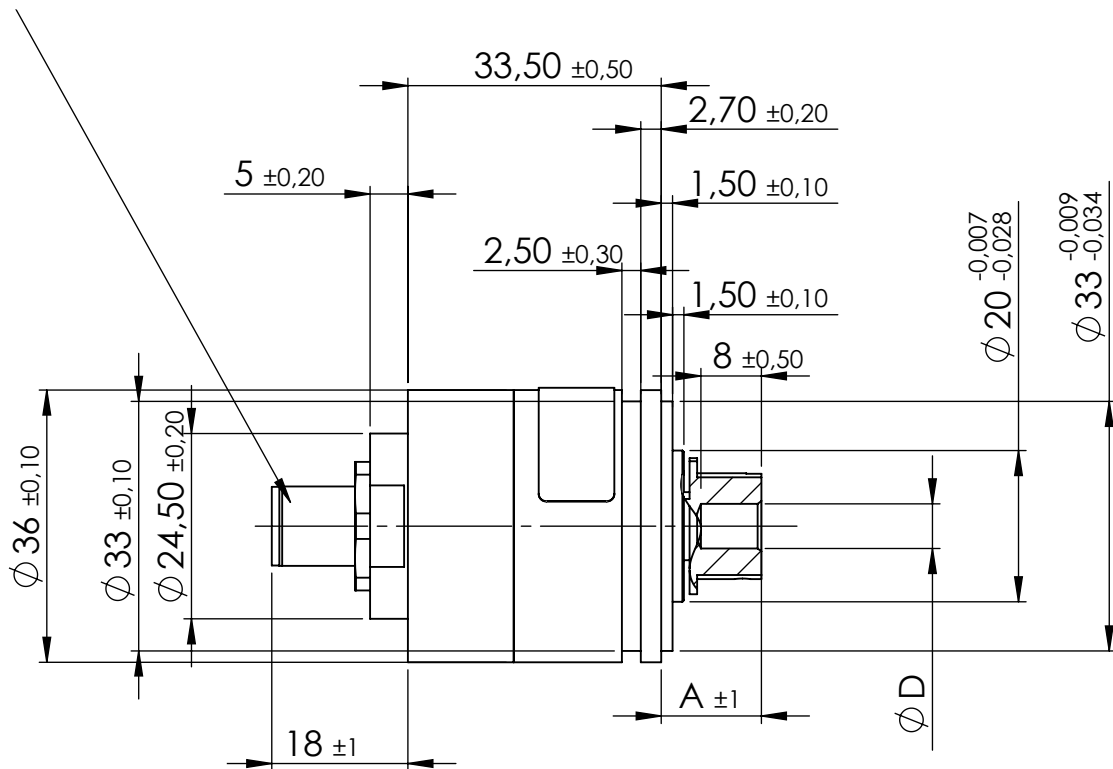
- (*) The drawings above shows the zero degree (0°) reference correlation for HTx36 S rotary encoders
- 0° position: If the shaft flattening is facing the groove marked with the red arrow (see drawing above), then the output signal is 0% full-scale.

Drawings HTx36 H – hollow shaft (screw fixation)

HTx36 H (hollow shaft, grub screw fixation), option M12 – M12 plug, axial orientation

Side view:

Binder male panel mount connector, range M12-A, 713 series or interoperable product

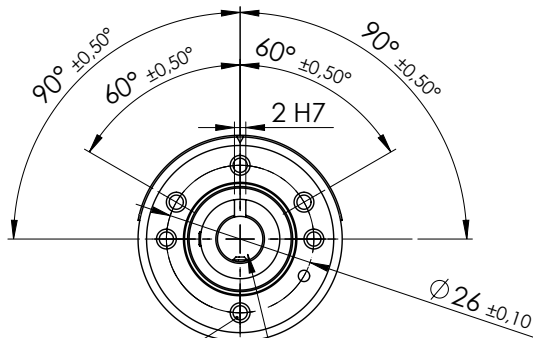


Front view:

View shows Product without Offset Bracket

Standard hollow shaft dimensions for HTx36 H with grub screw fixation

Hollow shaft length A	13.3 mm
Hollow shaft diameter D	6 mm 8 mm



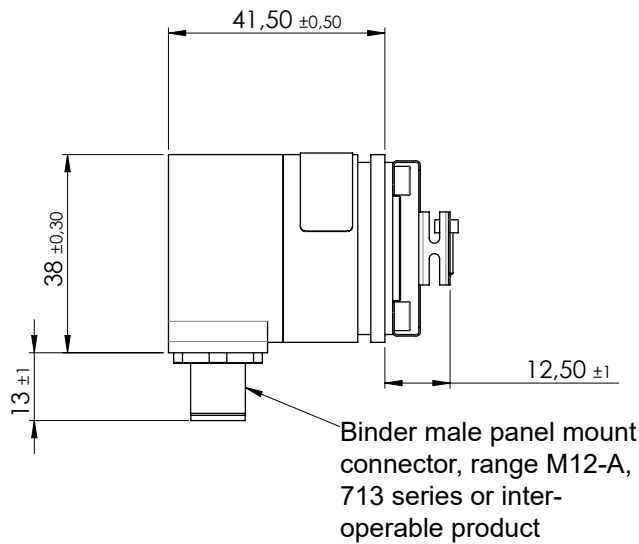
M3x0,5 6 ±0,1 mm deep (6x)

tightening torque of M2,5 screws SW1,3 ≤ 0,5Nm

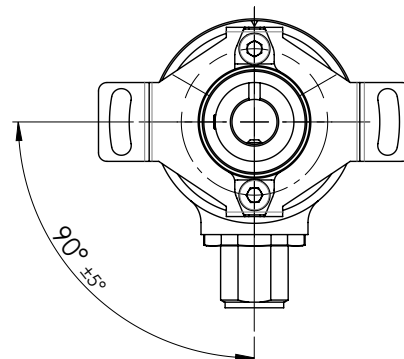
Drawings HTx36 H – hollow shaft (screw fixation)

HTx36 H (hollow shaft screw fixation), option M12R – M12 plug, radial orientation

Side view:

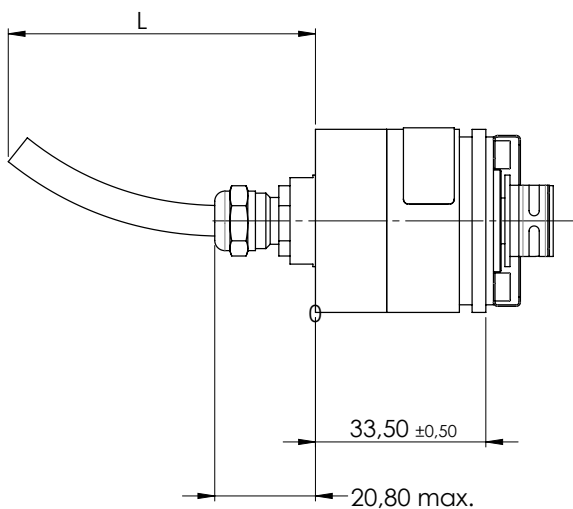


Front view:

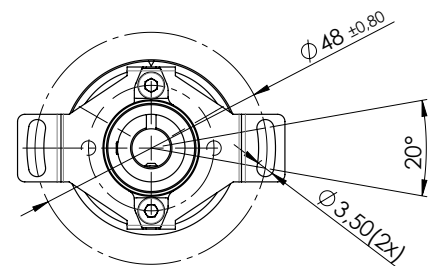


HTx36 H (hollow shaft, grub screw fixation), option PG – cable gland, axial orientation incl. signal cable

Side view:



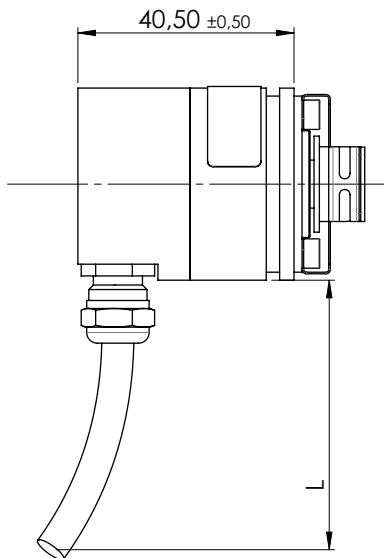
Front view:



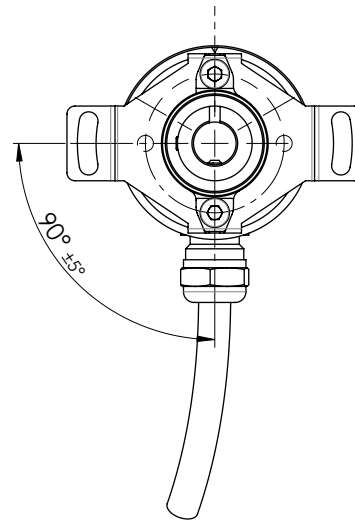
Drawings HTx36 H – hollow shaft (screw fixation)

HTx36 H (hollow shaft, grub screws fixation), option PG R – cable gland, radial orientation, incl. signal cable

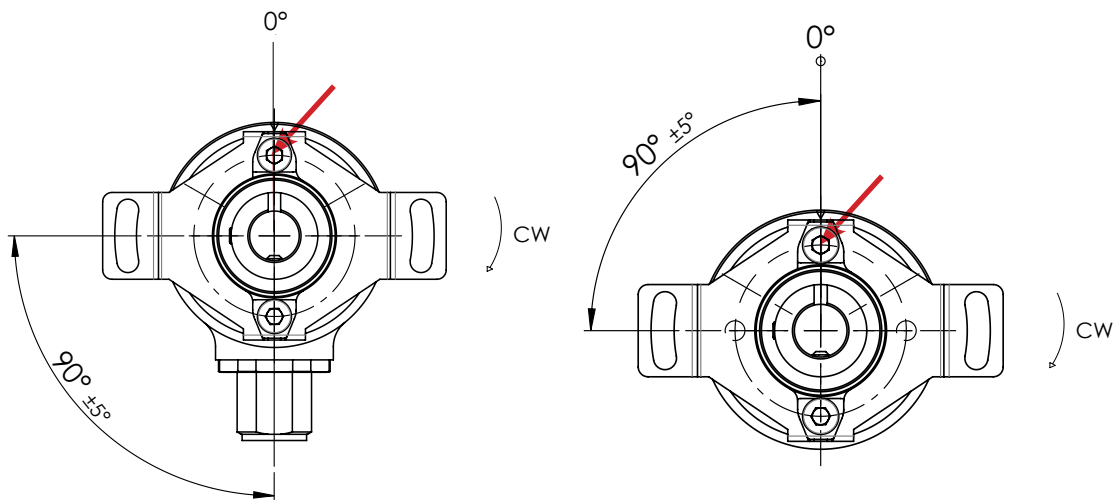
Side view:



Front view:



Ex works 0° position (*), sense of rotation:

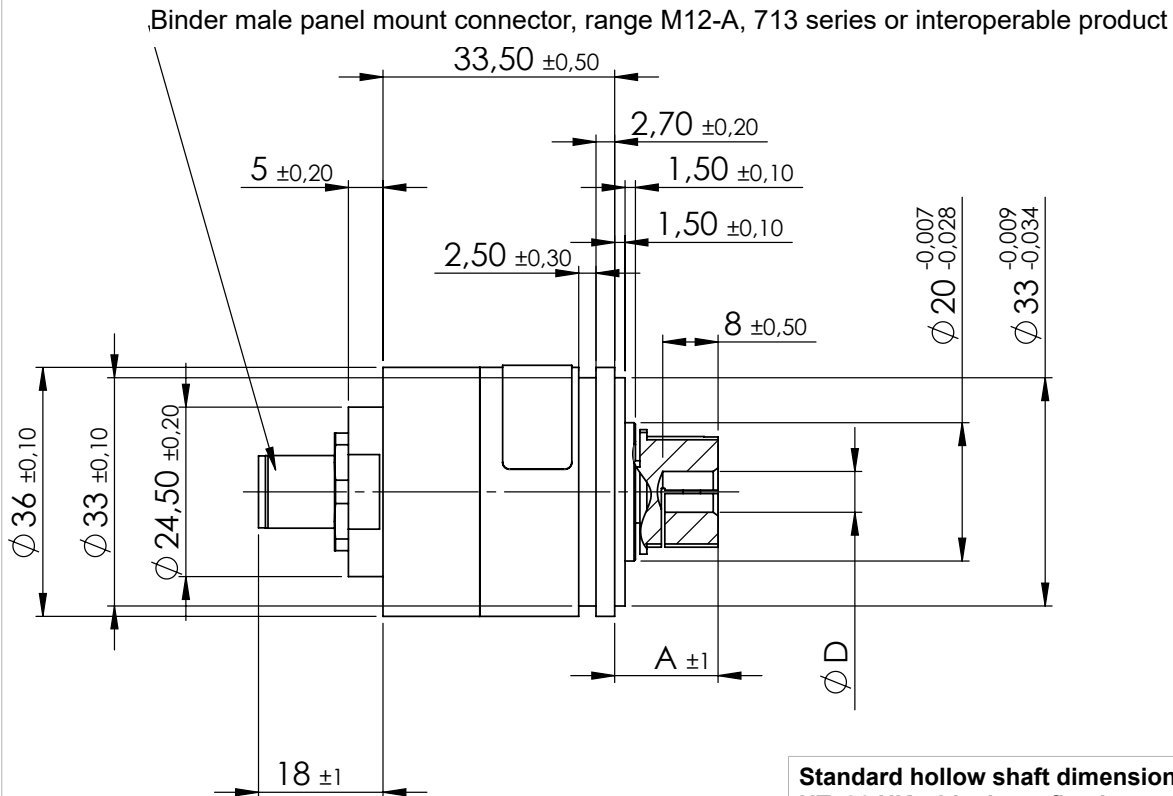


(*) The drawings above shows the zero degree (0°) reference
 If the shaft slot is in a line with the groove in the encoder housing (groove is marked with a red arrow) then the output signal is 0% full-scale.

Drawings HTx36 HK – hollow shaft with clamp fixation

HTx36 HK (hollow shaft, clamp fixation), option M12 – M12 plug, axial orientation

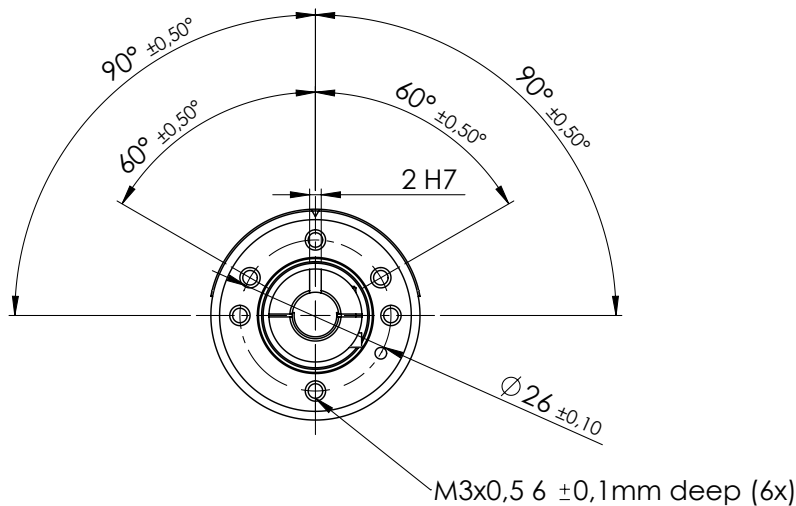
Side view:



Standard hollow shaft dimensions for HTx36 HK with clamp fixation

Hollow shaft length A	15 mm
Hollow shaft diameter D	6 mm 8 mm

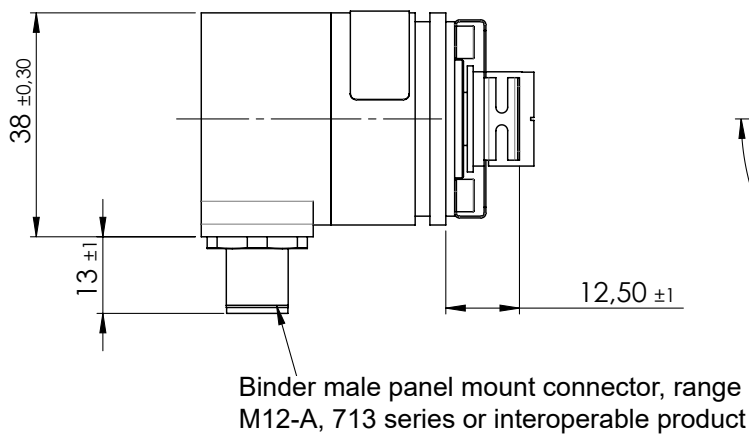
Front view:



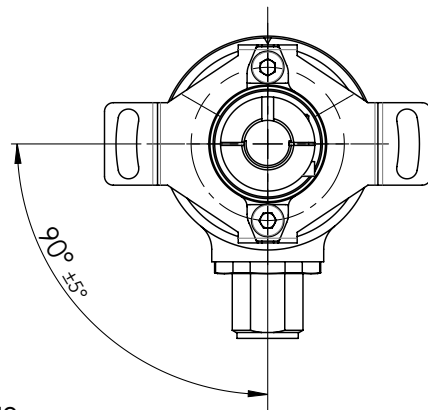
Drawings HTx36 HK – hollow shaft with clamp fixation

HTx36 HK hollow shaft, clamp fixation, option M12R – M12 plug, radial orientation

Side view:



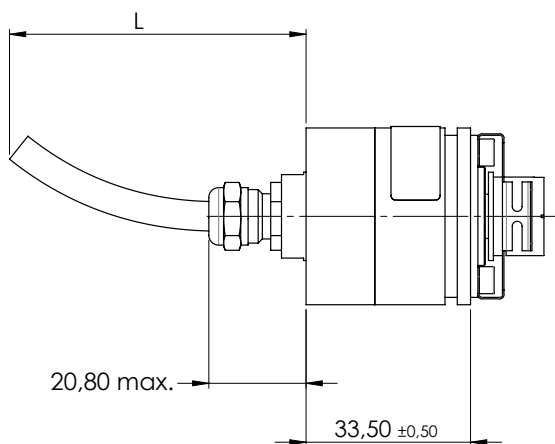
Front view:



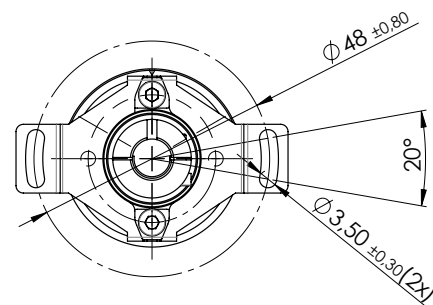
view shows connector orientation

HTx36 HK hollow shaft, clamp fixation, option PG – cable gland, axial orientation, incl. signal cable

Side view:



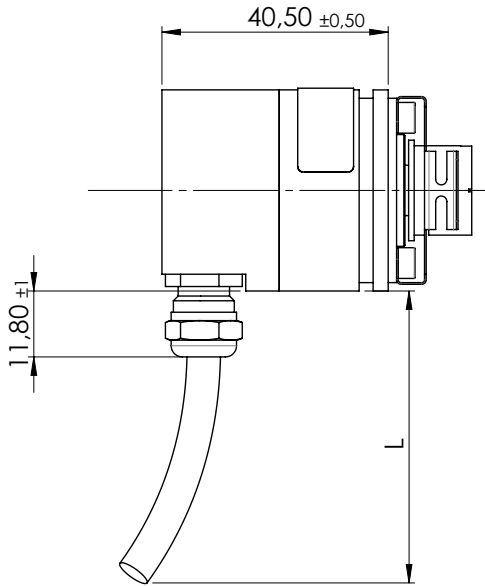
Front view:



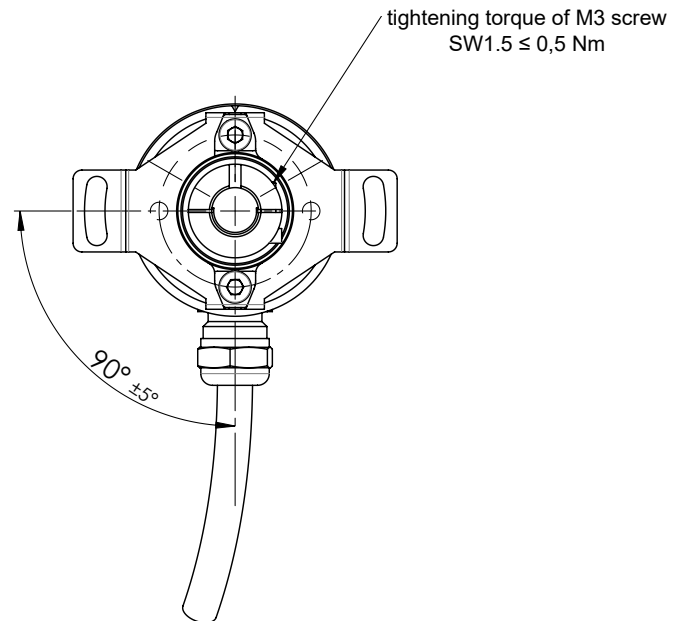
Drawings HTx36 HK – hollow shaft with clamp fixation

HTx36 HK with hollow shaft, clamp fixation), option PGR – cable gland, radial orientation, incl. signal cable

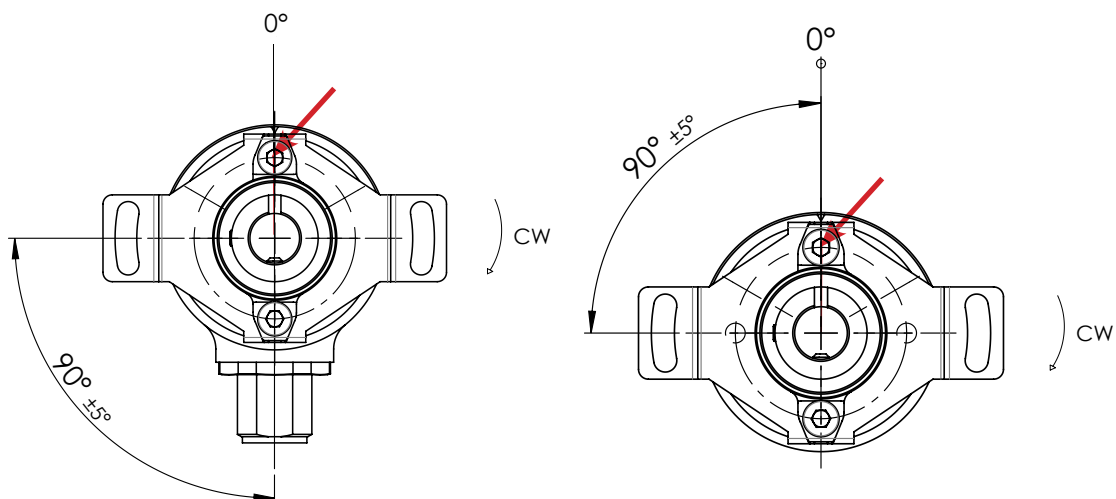
Side view:



Front view:



Ex works 0° position (*), sense of rotation:



(* The drawings above shows the zero degree (0°) position
 If the shaft slot is in a line with the groove in the encoder housing (groove is marked with a red arrow) then the output signal is 0% full-scale.

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 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	+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, miscellaneous – Family HTx36	
Shaft type	Solid shaft (HTx36 S) or hollow shaft (HTx36 H)
Mechanical angle of rotation 1.)	Endless
Lifetime (HTx36 S – solid shaft encoders) 2.)	@100 % of max. permissible radial shaft load >1.4x10E8 shaft revolutions @80 % of max. permissible radial shaft load >2x10E9 shaft revolution @20 % of max. permissible radial shaft load >1.7x10E10 shaft revolutions For option D (shaft sealing), the denseness is up to 1E6 shaft revolutions ensured
Bearing	2 pcs. groove ball bearings type 2RS
Max. operational speed (with shaft sealing)	12.000 rpm
Operational torque: (@ room temperature and 10 rev/min)	Solid shaft: ▪ Standard IP65: ≤ 0.3 Ncm ▪ With option D IP67: ≤ 2 Ncm Hollow shaft: ▪ Standard IP65: ≤ 0.5 Ncm ▪ With option D IP67: ≤ 2 Ncm
Operating temperature range	Option M12 (plug) ▪ -30 to +85°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	From shaft side: ▪ Standard IP65 ▪ With option D IP67
Protection grade (IEC 60529) rear side	IP68 (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)	100 g / 6 ms / half sine (3x6 shocks)
Housing diameter	Ø 36 mm
Housing depth	In dependency to the electrical connection position ▪ axial 33.5 mm ▪ radial 40.5 mm
Shaft diameter	Shaft diameter solid shaft: Standard: shaft diameter Ø 6 mm, Ø 8 mm Shaft diameter Ø 6.35 mm Option User-defined shaft diameter [mm] Ø ≤8 mm in connection with option S Ø ≤10 mm in connection with option H or HK Ø ≤12 mm exclusively in connection with option HK
Max. radial load (HTx36E S)	80 N (load point 80% in dependency to the visible standard shaft length)
Max. axial load	50 N (axial application of force onto the shaft end)
Mass (circa)	HTx36 with Plug M12(R) and: ▪ Solid shaft: axial 98 g, radial 90 g ▪ Hollow shaft: axial 102 g, radial 104 g HTx36 with cable gland and 1 m signal cable PG(R) and: ▪ Solid shaft: axial 133 g, radial 123 g ▪ Hollow shaft, axial 140 g, radial 133 g

1.) According IEC 60393

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

Mechanical and environmental data, miscellaneous – Family HTx36

Connection type	<p>Standard:</p> <ul style="list-style-type: none"> ▪ Cable gland stainless steel M12, axial, shielded round cable, 1 m, AWG26, PVC sheath, cable endings tinned <p>Option:</p> <ul style="list-style-type: none"> ▪ Plug M12, axial or radial
Connection position	Axial or radial
Sensor mounting	<p>Sensor mounting possibilities for solid shaft rotary encoders HTx36 S:</p> <ul style="list-style-type: none"> ▪ Via threaded holes integrated in the sensors head by use of stainless steel screws M3x0.5 ▪ Via synchro flange with optional available servo mount fixing nails SFN1 incl. screws M3 x 0.5 from MEGATRON <p>Sensor mounting for hollow shaft rotary encoders HTx36 H(K):</p> <ul style="list-style-type: none"> ▪ Using the ex work mounted torque bracket on the rotary encoder (spring plate) by means of 2 pcs of M3 screws
Fastening parts included in delivery	<p>None</p> <ul style="list-style-type: none"> ▪ For fastening the rotary encoder by means of servo mount fixing nails SFN1 – available from MEGATRON as accessory ▪ For options M12 (R), the M12 plug is not part of the scope of delivery. M12 plugs also incl. signal cable available as accessory from MEGATRON
Fastening torque per screw for fastening of the rotary encoder	<p>≤ 0.6 Nm (M3 screw)</p> <p>For screw securing, the use of a medium-strength thread securing adhesive is recommended</p>
Maximum tightening torque for grub screw for fixation of the shaft, only HTx36 H	≤ 0.5 Nm (wrench size M2.5 grub screw)
Maximum tightening torque for grub screw for fixation of the shaft, only HTx36 HK	≤ 0.5 Nm (wrench size M1.5 grub screw)
Material shaft	Stainless steel
Material housing	Aluminium
Material cable gland M12	Stainless steel

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	