



HTx36 S
Solid Shaft



HTx36 HK
Clamp Hollow Shaft



HTx36 H
Screw Hollow Shaft

Key Features

- Ø36 aluminium metal housing
- Maximum life time expectation
- High continuous actuation shaft speeds
- High shaft loads
- Magnetic, gradient-based signal evaluation
- µProcessor-based digital signal processing
- Double ball bearings
- Shaft bearings IP65, option IP67
- Housing IP68
- Operating temperature -30..85°C
- Measuring range 360° singleturn, up to 72000° multiturn
- Electrical connections M12 plug or round cable
- Cable/connector outlet radial or axial
- Ex works programmable signal output functions (single turn), field-programmable signal output for multiturn version

Applications

- Plant engineering
- Mechanical engineering
- Equipment manufacturing
- Laboratory equipment
- Driverless transport systems
- Wind turbines
- Medical equipment
- Special vehicles

	HTx36 (this data sheet):	HTx36E (separate data sheet):
Singleturn absolute encoders	<ul style="list-style-type: none"> ▪ Analogue voltage or current loop output ▪ Digital outputs PWM, SPI (also redundant), SER or SSI, ▪ Absolute Linearity up to 0.6% 	<ul style="list-style-type: none"> ▪ Resolution up to 16 bit ▪ CANopen, CAN SAE J1939, SSI ▪ Patented technology for a system accuracy < 0.35°
Multiturn encoders	<ul style="list-style-type: none"> ▪ Analogue voltage or current loop output ▪ Resolution 12 bit ▪ Not True-Power-On, max. 200 revolutions (72000°) 	<ul style="list-style-type: none"> ▪ CANopen, CAN SAE J1939, SSI ▪ Patented battery and gear-less true-power-on multiturn technology (energy harvesting) ▪ up to 43 bit multiturn resolution
Incremental encoders	<ul style="list-style-type: none"> ▪ 1 to 1024 Impulses per revolution (ppr.) ▪ Outputs TTL, Push-Pull, Open Collector or Linedriver 	<ul style="list-style-type: none"> ▪ 1 to 16384 Impulses per revolution (ppr.) ▪ Outputs TTL or HTL ▪ Optional user-parameterizable index pulse (Z) position

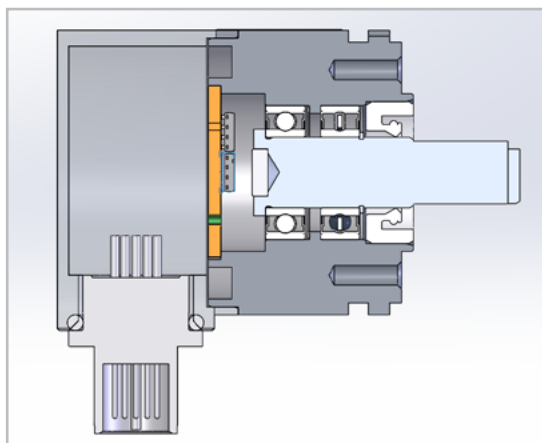
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Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

HTx36 encoder – robust, ball bearing, sealed, with solid or hollow shaft

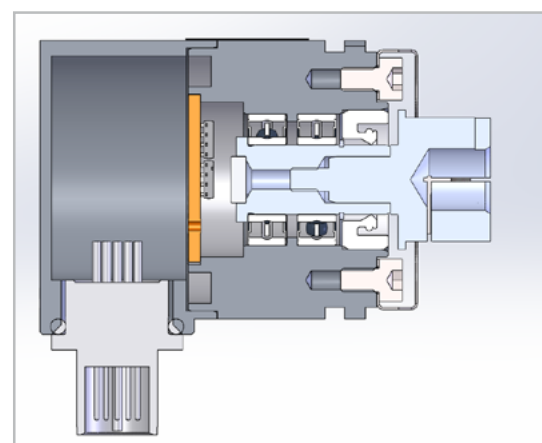
The encoders of the HTx36 series are specially designed for use between simple applications and heavy-duty applications. The contactless encoders in the Ø36 mm metal housing can be precisely matched to the respective area of application thanks to their numerous electronic and mechanical options. Whether as incremental or absolute value encoders, they cover a wide range of applications and, depending on the output electronics, are used in systems, laboratory devices and medical devices, for example.

HTx36 rotary encoders are among the most robust encoders with magnetic sensor technology in the MEGATRON product range. This is due to the solid aluminium housing, the high IP protection class and a double ball-bearing stainless steel shaft that withstands high axle loads and allows high actuation speeds. The signal processing is digital and based on magnetic recording of measured values. The gradient-based evaluation ensures high interference immunity, e.g. B. against temperature fluctuations and EMC influences achieved. This technology leaves the disadvantages of conventional Hall sensors far behind. HTx36 rotary encoders are designed for maximum service life and even surpass the robust optical data acquisition. The number of defects or failures in rotary encoders with this technological design is practically zero, even after decades of use.

In addition to a large number of standard options, the modular system of the HTx36 encoders enables optimal adaptation to the respective requirements of the application. In addition, the concept also allows timely customer-specific adjustments (even in small series) on the basis of a clearly structured price model. Typical modifications are, for example, customer-specific shaft geometries, signal output functions, special cable lengths or individually assembled electrical connection cables.



Sectional Model HTx36 S – Solid Shaft



Sectional Model HTx36 H – Hollow Shaft

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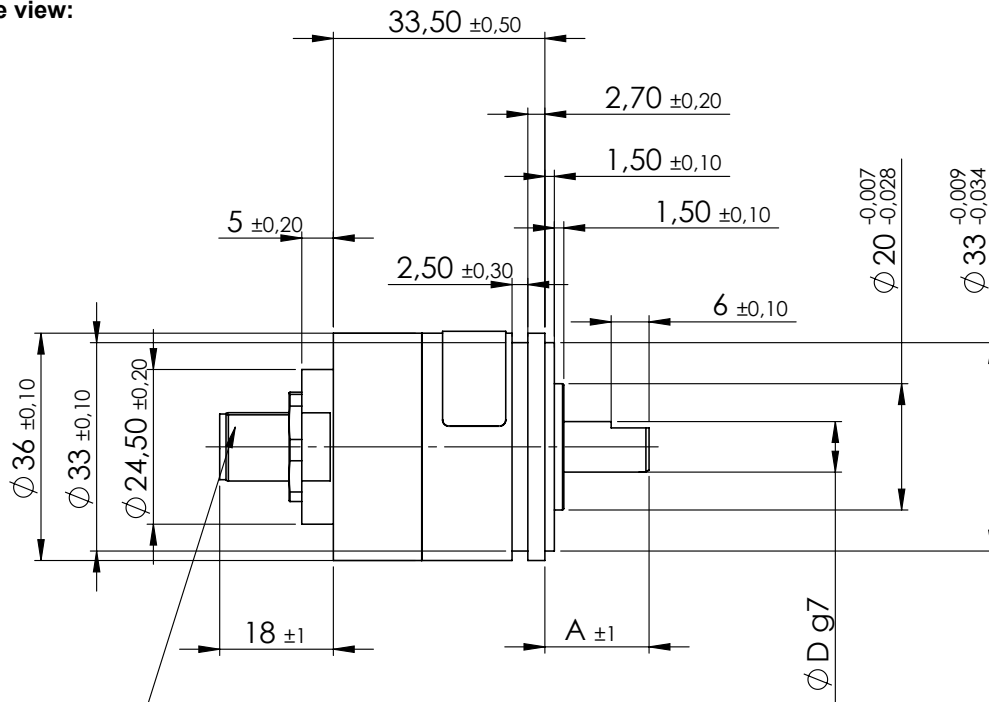
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Drawings HTx36 S – solid shaft

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

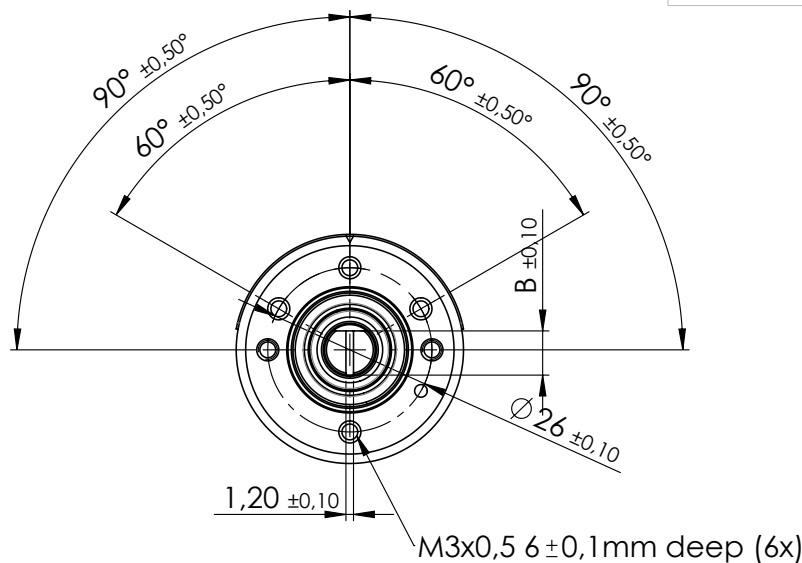
Side view:



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

Standard shaft dimensions: HTx36 S with solid shaft	
Shaft length A	16.5 mm
Shaft diameter D	6 mm 8 mm

Front view:



(* Tolerances according IPC Association)

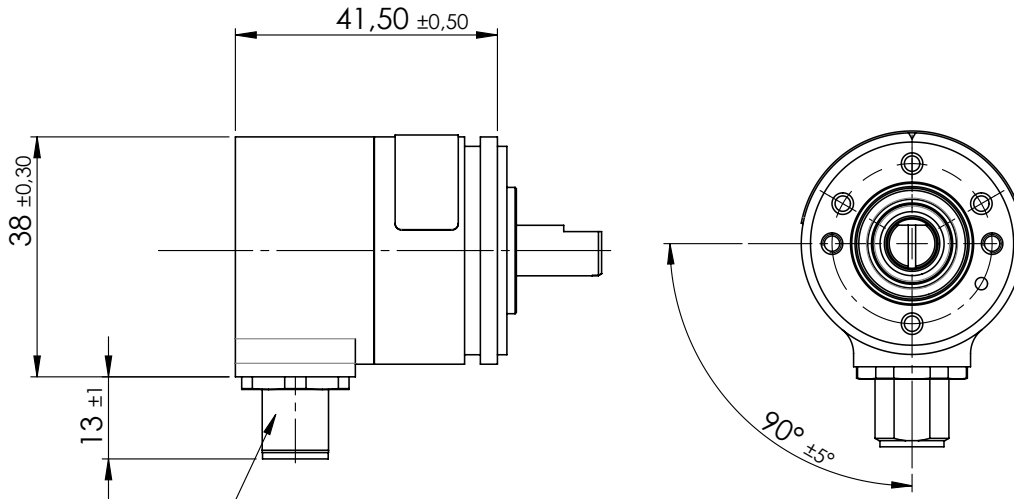
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Drawings HTx36 S – solid shaft

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

Side view:

Front view:



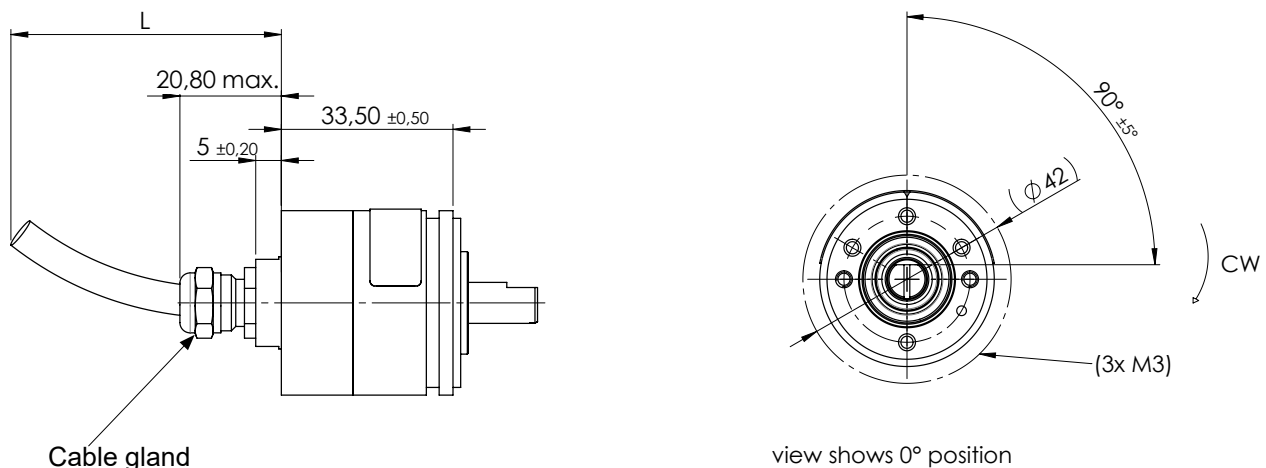
Binder male panel mount connector, range M12-A, 713 series or interoperable product

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

Side view:

Option PG with cable gland is the standard electrical connection for HTx36 series

Front view:



Information about the standard signal cable which is included in the option PG(R)

Option	Standard cable length L	Number of single strands (depends on electronics)	Cable sheath Ø	Single strands cross section	Allowed tolerance (L)	Minimum bend radius
PG(R)	1000 mm	3	4.3 mm	AWG26	-20 mm to +40 mm	3 x D Ø (D= cable sheath diameter Ø)
		6	5.2 mm			
		8	5.6 mm			
		12	6 mm	AWG28		

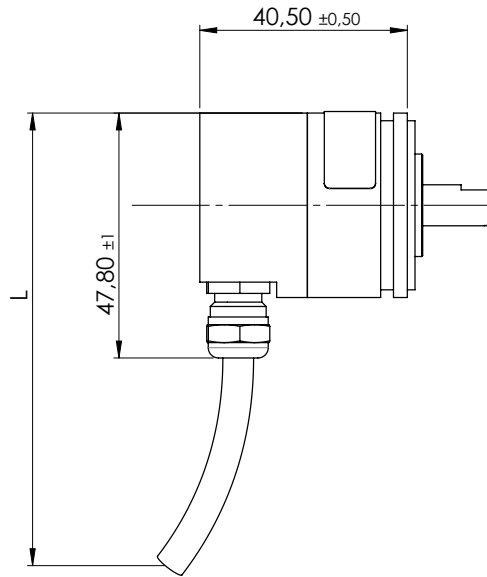
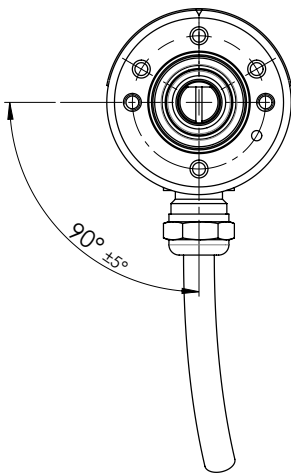
Shielded signal cable (standard)

Drawings HTx36 S – solid shaft

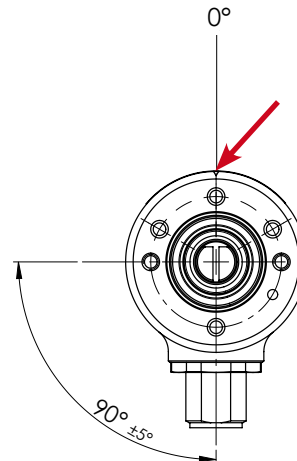
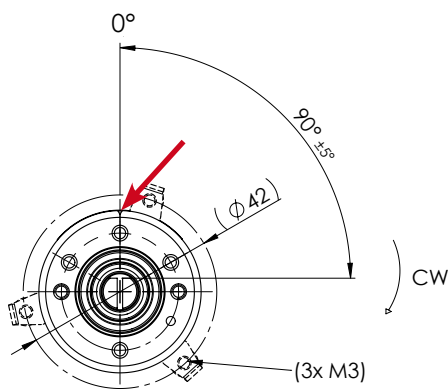
HTx36 S option PG R – cable gland, radial orientation incl. signal cable

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.

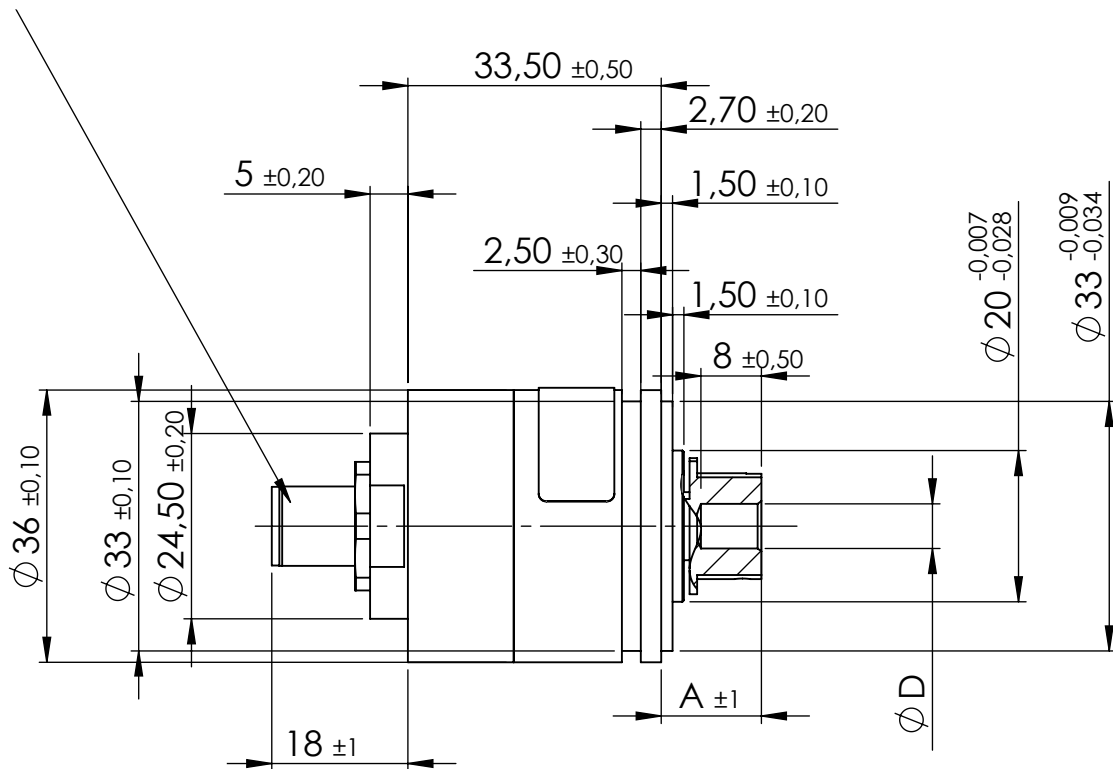
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Multiturn HTA36 PM
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Drawings HTx36 H – hollow shaft (screw fixation)

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

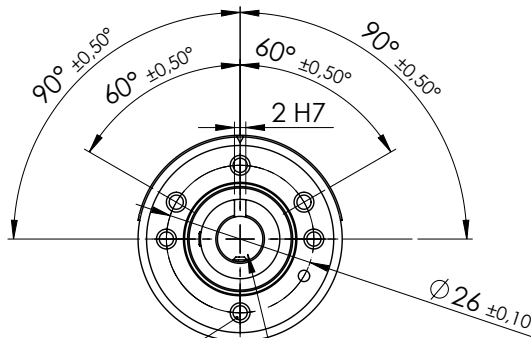
Side view:

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



Front view:

View shows Product without Offset Bracket



M3x0,5 6 ±0,1mm deep (6x)

tightening torque of M2,5 screws $SW1,3 \leq 0,5Nm$

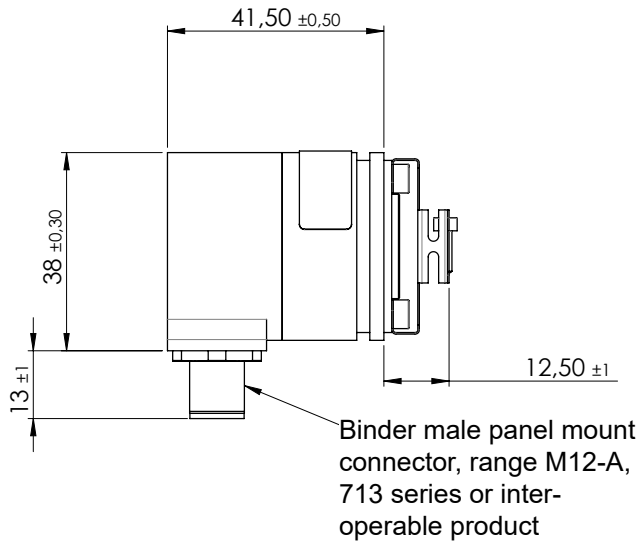
Standard hollow shaft dimensions for HTx36 H with grub screw fixation

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

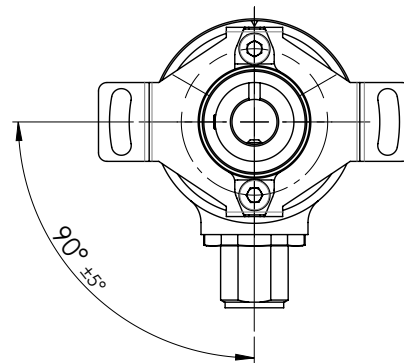
Drawings HTx36 H – hollow shaft (screw fixation)

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

Side view:



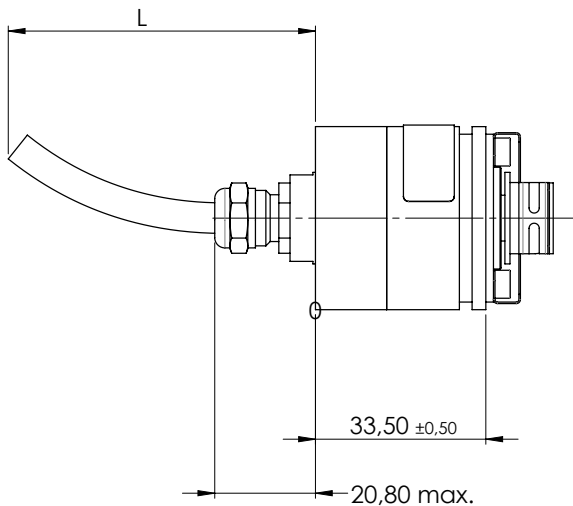
Front view:



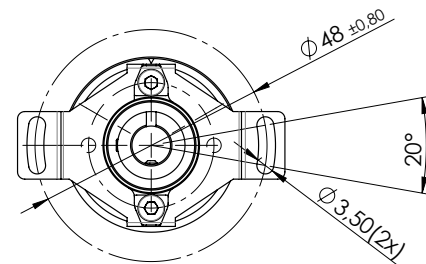
HTx36 H (hollow shaft, grub screw fixation), option PG – cable gland, axial orientation incl. signal cable

Side view:

Option PG with cable gland is the standard electrical connection for HTx36 series



Front view:



Information about the standard signal cable which is included in the option PG(R)

Option	Standard cable length L	Number of single strands (depends on electronics)	Cable sheath Ø	Single strands cross section	Allowed tolerance (L)	Minimum bend radius
PG(R)	1000 mm	3	4.3 mm	AWG26	-20 mm to +40 mm	3 x D Ø (D= cable sheath diameter Ø)
		6	5.2 mm			
		8	5.6 mm			
		12	6 mm	AWG28		

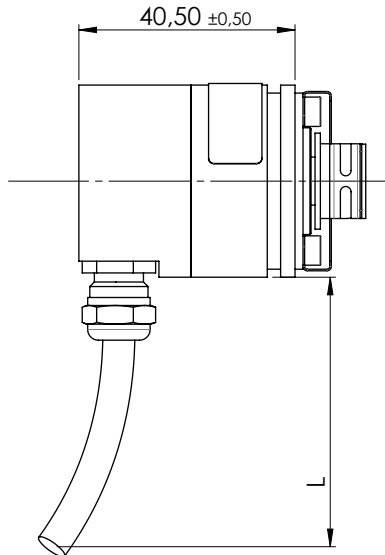
Shielded signal cable (standard)

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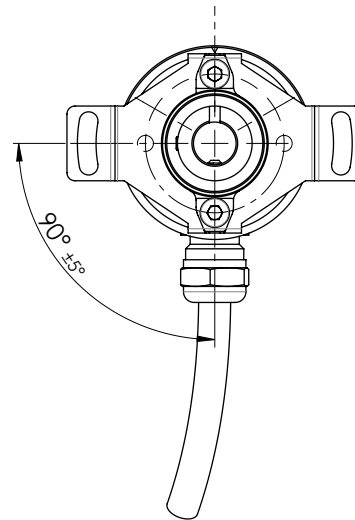
Drawings HTx36 H – hollow shaft (screw fixation)

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

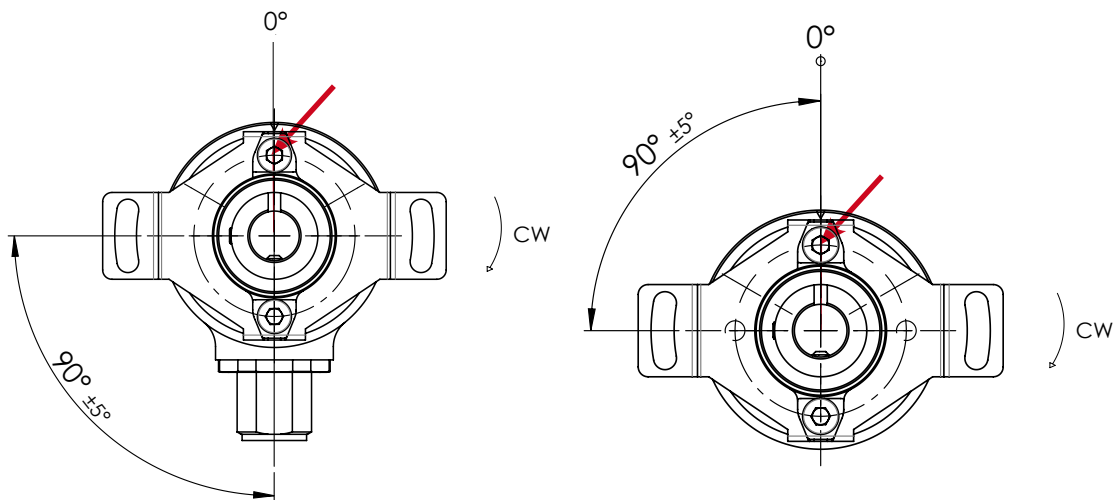
Side view:



Front view:



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



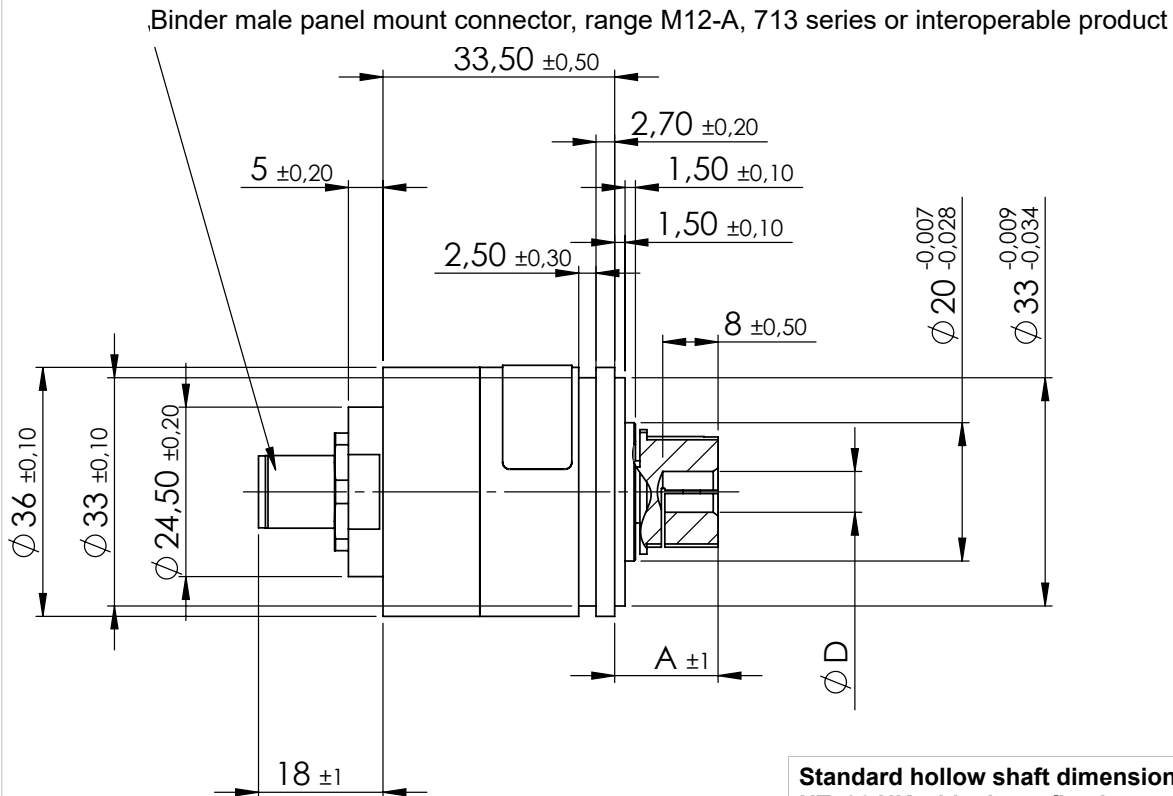
- (*) The drawings above shows the zero degree (0°) reference correlation for HTx36 H rotary encoders ex works
- 0° position: If the shaft slot is in a line with the groove in the encoder housing (groove is marked with a red arrow) then the output signal is 0% full-scale.

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Drawings HTx36 HK – hollow shaft with clamp fixation

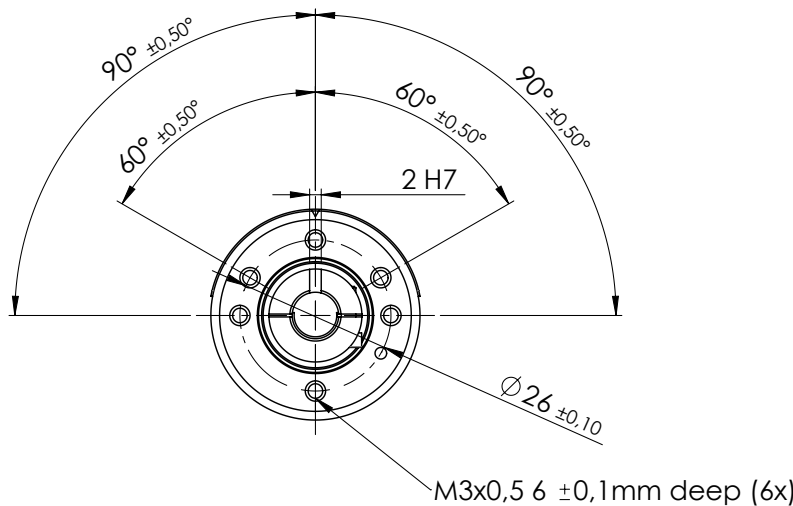
HTx36 HK (hollow shaft, clamp fixation), option M12 – M12 plug, axial orientation

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:

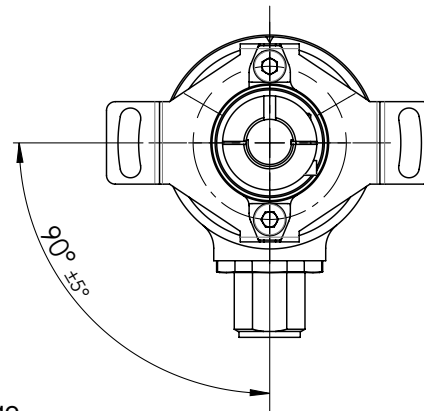
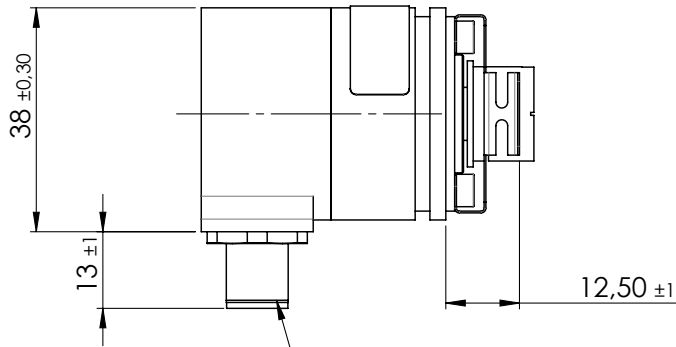


Drawings HTx36 HK – hollow shaft with clamp fixation

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

Side view:

Front view:



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

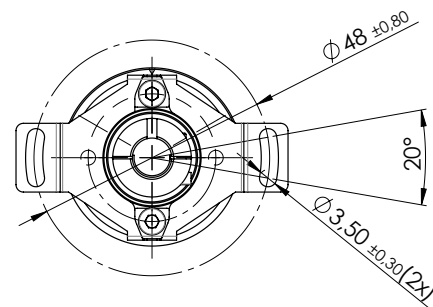
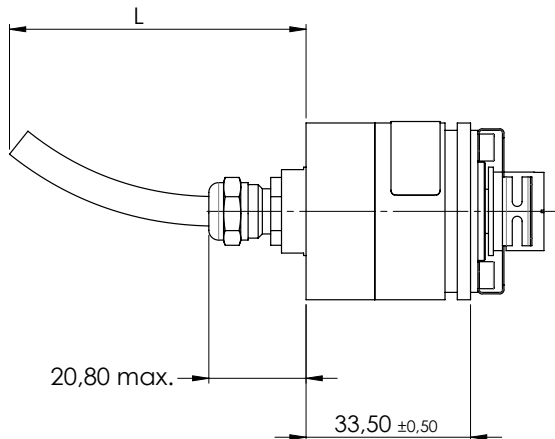
view shows connector orientation

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

Side view:

Option PG with cable gland is the standard electrical connection for HTx36 series

Front view:



Information about the standard signal cable which is included in the option PG(R)

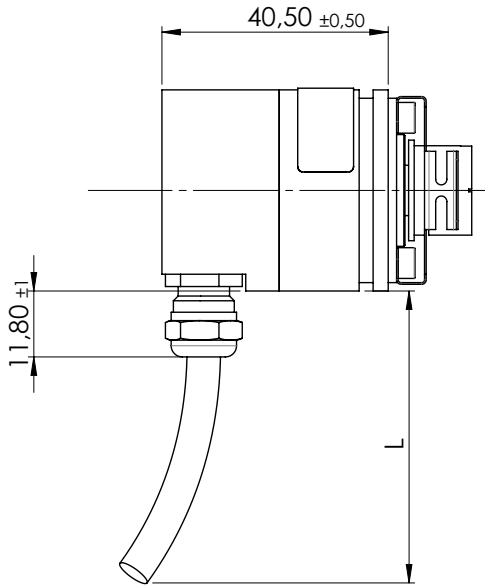
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		6	5.2 mm			
		8	5.6 mm			
		12	6 mm	AWG28		

Shielded signal cable (standard)

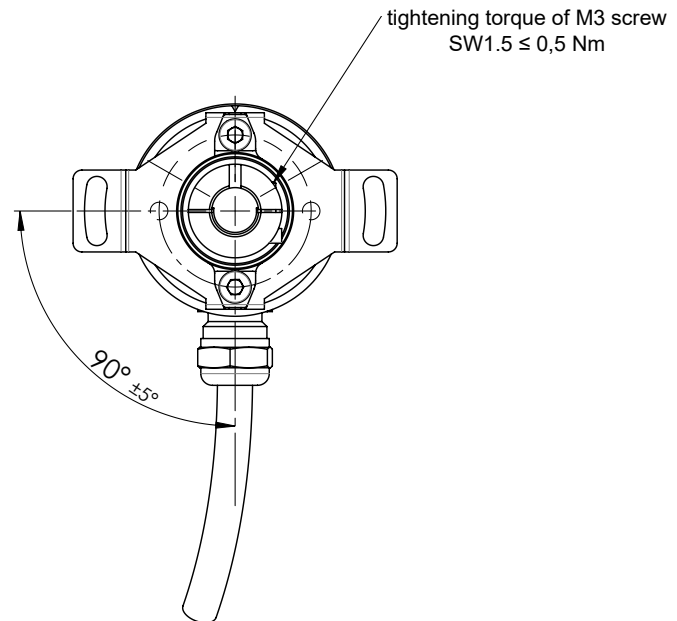
Drawings HTx36 HK – hollow shaft with clamp fixation

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

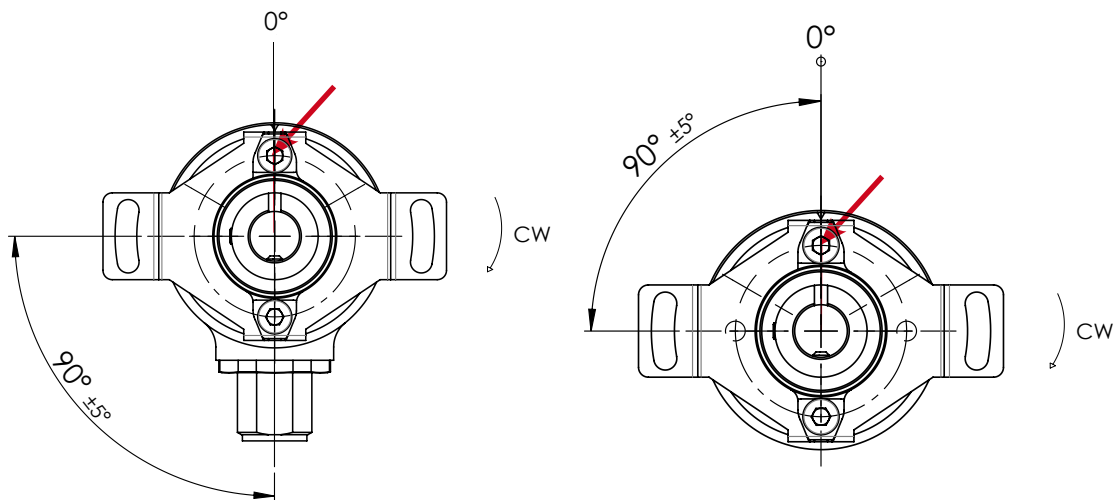
Side view:



Front view:



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



- (*) The drawings above shows the zero degree (0°) reference correlation for HTx36 HK rotary encoders ex works
- 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.

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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	Standard: <ul style="list-style-type: none"> ▪ Cable gland stainless steel M12, axial, shielded round cable, 1 m, AWG26, PVC sheath, cable endings tinned Option: <ul style="list-style-type: none"> ▪ Plug M12, axial or radial
Connection position	Axial or radial
Sensor mounting	Sensor mounting possibilities for solid shaft rotary encoders HTx36 S: <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 Sensor mounting for hollow shaft rotary encoders HTx36 H(K): <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	None <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	≤ 0.6 Nm (M3 screw) For screw securing, the use of a medium-strength thread securing adhesive is recommended
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	

Series Overview with electrical Data

		Singleturn					Multiturn	
Series		HTI36	HTS36	HTS36X	HTA36	HTA36X	HTP36	HTA36PM
Electronics redundant		NO	NO	YES	NO	YES	NO	NO
Output signal(s)		Incremental A, B, Z Optional: A, A/, B, B/, Z, Z/, UVW	Digital absolute SSI: 12 bit, UVW SPI: 14 bit SER: 12 bit	Digital absolute SPI: 14 bit	Analogue absolute 0 to 5 V 0 to 10 V 4 to 20 mA	Analogue absolute 0 to 5 V 0 to 10 V	PWM absolute 5 V / 244 Hz / PWM 10-90 % 12 bit	Analogue absolute 0 to 5 V 0 to 10 V 4 to 20 mA
Effective electrical angle of rotation		360°			15° ≤ α ≤ 360° (programmable in factory)		10° ≤ α ≤ 360° (programmable in factory)	0-10° to 0-72000° (pro- grammable by user) factory program- ming 0 to 3600°
Resolution		-	SSI: 12 bit SPI: 14 bit SER: 12 bit	SPI: 14 bit	12 bit		12 bit	12 bit
Supply voltage(s)	Type	Push-Pull, Open Collector	SPI, SER	SPI	Voltage 0 to 5 V	Voltage 0 to 5 V	PWM	Voltage 0 to 5 V
	Value	24 V (10 to 30 V)	5 V ± 10%	5 V ± 10%	5 V ± 10% (ratiometric) or 24 V (9 to 30 V)	5 V ± 10%	5 V ± 10%	24 V (9 to 30 V)
	Type	TTL	SSI		Voltage 0 to 10 V	Voltage 0 to 10 V		Voltage 0 to 10 V
	Value	5 V ± 10%	24 V (10 to 30 V)		24 V (15 to 30 V)	24 V (15 to 30 V)		24 V (15 to 30 V)
	Type				Current loop 4 to 20 mA			Current loop 4 to 20 mA
	Value				24 V (9 to 30 V)			24 V (9 to 30 V)
Programmable by customer		NO	NO	NO	NO	NO	NO	YES
Programmable ex works		YES	YES	YES	YES	YES	YES	YES

Series HTA36 – singleturn, analogue output, not redundant

Key features HTA36 :

- Supply voltage: 5 VDC ±10%, 15 to 30 VDC, 9 to 30 VDC
- Signal output: 0 to 5 V, 0 to 10 V, 4 to 20 mA

Electrical data HTA36 – singleturn, analogue output, not redundant

Effective electrical angle of rotation 1.)	15° ≤ α ≤ 360° (programmable in 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	4 to 20 mA
Resolution	12 Bit		
Update rate	200 µs		
Supply voltage	5 V ±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

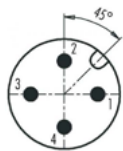
1.) According IEC 60393

Cable and pin assignment HTA36 – 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) HTA36 – 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.

General
 Contents
 Solid Shaft
 Hollow shaft V1
 Hollow shaft V2
 Drawings
 Mechanical Data
 Voltage/Current
 Analogue (HTA36)
 Redundant
 Analogue (HTA36)
 PWM (HTP36)
 SER/SP/SSI
 Serial (HTS36)
 Redundant
 Serial (HTS36)
 Incremental (HTI36)
 Multiturn HTA36 PM
 Accessories

Order code HTA36 – solid or hollow shaft, singleturn, analogue signal output, not redundant									
Description	Selection: standard=black/bold , possible <i>options=grey/italic</i>								
Series HTA36	HTA36								
Shaft type: Solid shaft Hollow shaft with screw fixation <i>Option: 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>Option user defined shaft diameter [mm]</i> <small>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 H</small>		6 8 6,35 <i>X</i>							
Multiplication symbol [x]: For solid shaft (S) For Hollow shaft H or HK				x -					
Visible shaft length: Shaft length 16.5 mm for solid shaft (S) Shaft length for hollow shafts H or HK <i>Option: user defined shaft length for solid shaft S [mm]</i>					16,5 - <i>XX</i>				
Supply voltage / Output signal: VSUP=24 V (9 to 30 V) / OUT=4 to 20 mA VSUP=24 V (15 to 30 V) / OUT=0 to 10 V <i>VSUP=5 V (4.5 to 5.5 V) / OUT=0 to 5 V (ratiometric)</i> <i>VSUP=24 V (9 to 30 V) / OUT=0 to 5 V</i>						2442 2410 <i>0505</i> <i>2405</i>			
Sense of rotation: Sense of rotation CW (output signal increases clockwise) <i>Option: CCW (output signal increases counter clockwise)</i>							CW <i>CCW</i>		
Electrical angle: Electrical angle 360° <i>Option: User defined effective electrical angle (≥15°, positive integer)</i>								360 <i>XXX</i>	
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>									- <i>D</i>
Electrical connection, cable length, position: 1 m round cable, axial <i>Option: 1 m round cable, radial</i> <i>Option: plug M12, axial</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial</i> <i>Option: customer specific cable length, radial</i>									PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>

Order example HTA36 S – solid shaft, singleturn, analogue output, not redundant

Requirements:
Solid shaft Ø 6.00 mm, shaft length 16.5 mm, VSUP=24 V / OUT=0 to 5 V, 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:
HTA36 S 6x16,5 2442 CW360 PG

Order example HTA36 H – hollow shaft, singleturn, analogue 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=24 V / OUT=4 to 20 mA, 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: HTA36 H 6 2442 CW360 PG

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SP/SSI (HTS36)
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Series HTA36X – singleturn, analogue output, redundant

Key features HTA36X :

- Independent signal processing. The HTA36X rotary encoder electronics are based mainly on one 3D-Hall IC in which two semiconductor chips 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 HTA36X – singleturn, analogue output, redundant

Effective electrical angle of rotation 1.)	15° ≤ 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

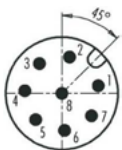
1.) According IEC 60393

Cable and pin assignment HTA36X – singleturn, analogue output, redundant

Function:	Option PG(R)	Option M12(R)
VSUP 1	red	PIN 1
OUT 1	brown	PIN 2
GND 1	black	PIN 3
GND 2	green	PIN 4
OUT 2	yellow	PIN 5
VSUP 2	orange	PIN 6
-	-	PIN 7 n/c
-	-	PIN 8 n/c

Plug M12 (R) HTA36X – pin assignment

Type 2 (8 pole)



The orientation of the connector relative to the encoder housing is not defined and differs from one encoder to the next.

Order code HTA36X – solid or hollow shaft, singleturn, analogue signal output, redundant										
Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>									
Series HTA36X	HTA36X									
Shaft type: Solid shaft Hollow shaft with screw fixation <i>Option: 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>Option: 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 8 6,35 X							
Multiplication symbol [x]: For solid shaft (S) For hollow shaft H or HK				x -						
Visible shaft length: Shaft length 16.5 mm for solid shaft (S) Shaft length for hollow shafts H or HK <i>Option: user defined shaft length for solid shaft S [mm]</i>					16,5 - XX					
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 output 1: Sense of rotation CW (output signal increases clockwise) <i>Option: CCW (output signal increases counter clockwise)</i>							CW <i>CCW</i>			
Sense of rotation output 2: Sense of rotation CW (output signal increases clockwise) <i>Option: CCW (output signal increases counter clockwise)</i>							CW <i>CCW</i>			
Electrical angle: Electrical angle 360° <i>Option: User defined effective electrical angle (≥15°, positive integer)</i>								360 XXX		
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>									- <i>D</i>	
Electrical connection, cable length, position: 1 m round cable, axial <i>Option: 1 m round cable, radial</i> <i>Option: plug M12, axial</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial</i> <i>Option: customer specific cable length, radial</i>										PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>

Order example HTA36X S - solid shaft, singleturn, analogue output, not redundant

Requirements:
Solid shaft Ø 6.00 mm, shaft length 16.5 mm, VSUP=24 V / OUT=0 to 10 V, signal 1 sense of rotation CW, signal 2 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:

HTA36X S 6x16,5 2410 CW CW360 PG

Series HTP36 – singleturn, PWM output, 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, PWM output, not redundant

Effective electrical angle of rotation ^{1.)}	$10^\circ \leq \alpha \leq 360^\circ$ (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 (EN29500-2005-1)	1267a

1.) According IEC 60393

Function description PWM signal output HTP36

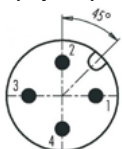
The HTP36 provides a constant carrier frequency with 244 Hz at the signal output, with HIGH and LOW signal levels which have a constant signal amplitude. A constant carrier frequency means a constant length of the period duration. The duty cycle and thus the pulse width changes in dependency of the rotating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

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>Option: 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>Option 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>Option: user defined shaft length for solid shaft S [mm]</i>				16,5 <i>-</i> <i>XX</i>					
Supply voltage / Output signal: VSUP=5 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>Option: CCW (output signal increases counter clockwise)</i>						CW <i>CCW</i>			
Electrical angle: Electrical angle 360° <i>Option: User defined effective electrical angle</i> <i>(≥15°, positive integer)</i>							360 <i>XXX</i>		
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>								- <i>D</i>	
Electrical connection, cable length, position: 1 m round cable, axial <i>Option: 1 m round cable, radial</i> <i>Option: plug M12, axial</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial</i> <i>Option: customer specific cable length, radial</i>									PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>

Order example HTP36 S - 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 H - 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

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SP/SSI (HTS36)
Redundant
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Series HTS36 – singleturn, digital output, not redundant

Key features HTS36:

- SSI interface
- Option SPI, SER interface. SPI and SER signal transmission only possible via short signal cables (max. 1 m)
- Supply voltage SSI: 24 VDC (9 to 30 V), SER and SPI: 5 VDC +/-10%

Electrical data HTS36 – singleturn, digital output, not redundant

Output signal	SER	SPI	SSI
Effective electrical angle of rotation 1.)	360°		
Independent linearity (best straight line) 1.)	±0,4% @ 360°	±0,3% @ 360°	
Absolute linearity 1.)	±0,8% @ 360°	±0,6% @ 360°	
Resolution	12 Bit	14 Bit	10-18 Bit
Update rate	96 µs	200 µs	
Supply voltage	5 VDC ±10 %		24 VDC (5 to 30 V)
Power consumption (no load)	≤ 14 mA	≤ 12 mA	≤ 20 mA
Insulation voltage 1.)	1000 VAC @ 50 Hz, 1 min		
Insulation resistance 1.)	2 MOhm @ 500 VDC, 1 min		
MTTF (EN29500-2005-1)	1267a	2046a	535a

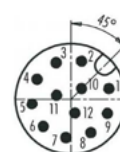
1.) According IEC 60393

Connector types M12 (R) HTS36 – pin numbering

Type 2 (8 pole)



Type 3 (12 pole)



The orientation of the connector relative to the encoder housing is not defined and differs from one encoder to the next.

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SPI/SSI
Redundant
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Order Code HTS36 – solid or hollow shaft, singleturn, not redundant, SSI interface

Description	Selection: standard=black/bold , possible <i>options=grey/italic</i>						
Series HTS36	HTS36						
Shaft type: Solid shaft Hollow shaft with screw fixation <i>Option: 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>Option 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 8 6,35 X					
Multiplication symbol [x]: For solid shaft (S) For Hollow shaft H or HK				x -			
Visible shaft length: Shaft length 16.5 mm for solid shaft (S) Shaft length for hollow shaft H or HK <i>Option: user defined shaft length for solid shaft S [mm]</i>					16.5 - XX		
Supply voltage / Output signal: 24 VDC (5 to 30 V) / SSI 12 Bit <i>5 VDC ± 10% / SPI 14 Bit</i> <i>5 VDC ± 10% / SER 12 Bit</i>						24SSI <i>05SPI</i> <i>05SER</i>	
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>						- D	
Electrical connection, cable length, position: >>> For SPI or SER interface max. allowed cable length is 1 m <<< 1 m round cable, axial <i>Option: 1m round cable, radial (*)</i> <i>Option: plug M12, axial (*)</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial (*)</i> <i>Option: customer specific cable length, radial (*)</i>							PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>

Order example HTS36 S – solid shaft, singleturn, serial output, not redundant

Requirements: Solid shaft Ø 6.00 mm, shaft length 16.5 mm, electronics: 12Bit/24VDC/SSI, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)
Example for order code: HTS36 S 6x16,5 24SSI PG

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current (HTA36)
Redundant Analogue (HTP36)
PWM (HTP36)
Redundant SER/SPI/SSI Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Order example HTS36 H – hollow shaft, singleturn, serial output, not redundant
Requirements:

Hollow shaft Ø 6,00 mm, fixation of the applications side shaft in the hollow shaft by means of grub screws, electronics 12Bit/24VDC/SSI, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)

Example for order code:

HTS36 H 6 24SSI PG

Cable and pin assignment HTS36 - singleturn, SSI interface, not redundant

Function:	Option PG(R)	Option M12(R)
GND	black	PIN 1
VSUP	red	PIN 2
CLK+	brown	PIN 3
CLK-	orange	PIN 4
DATA+	yellow	PIN 5
DATA-	green	PIN 6
-	-	PIN 7 n/c
-	-	PIN 8 n/c

Cable and pin assignment HTS36 - singleturn, SSI interface, UVW, not redundant

Function:	Option PG(R) <small>The connection type PG(R) is only available in the combination with 24SSI UVW in the context of project business</small>	Option M12(R)
GND	black	PIN 1
VSUP	red	PIN 2
CLK+	brown	PIN 3
CLK-	orange	PIN 4
DATA+	yellow	PIN 5
DATA-	green	PIN 6
U	blue	PIN 7
V	violet	PIN 8
W	grey	PIN 9
-	white/brown n/c	PIN 10 n/c
-	white/black n/c	PIN 11 n/c
-	white n/c	PIN 12 n/c

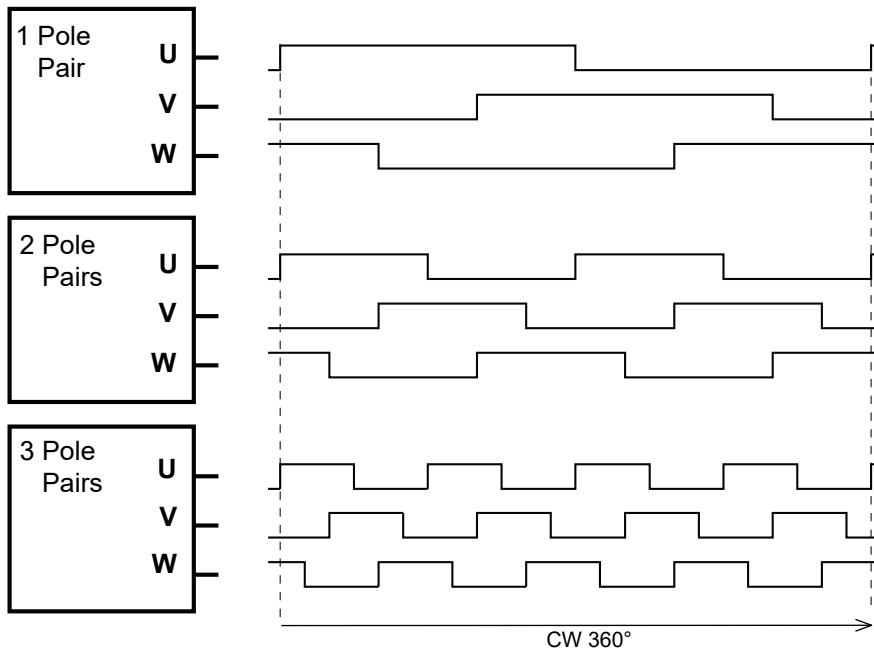
Cable and pin assignment HTS36 - singleturn, SPI or SER interface, not redundant

Function:	Option PG(R)	Option M12(R)
VSUP	red	PIN 1
GND	black	PIN 2
CS, MOSI	yellow	PIN 3
CLK	green	PIN 4
DATA	orange	PIN 5
-	brown n/c	PIN 6 n/c
-	-	PIN 7 n/c
-	-	PIN 8 n/c

Signal details for option UVW

In connection with option **24SSI UVW**

Example: UVW signal output for motor commutation of DC motors, if selected 1, 2 or 3 pole pairs



Further information regarding the signal outputs can be found in the data sheets of the IC manufacturers:

SER-Interface

Manufacturer: ams
 IC Type: AS5045
 URL: www.ams.com

SPI-Interface

Manufacturer: Melexis
 IC Type: MLX90316EDC (not redundant variant)
 URL: www.melexis.com

SSI + UVW Interface:

Manufacturer: IC-HAUS
 IC Type: IC-MH16
 URL: www.ichaus.de/

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SPI/SSI (HTS36)
Redundant
Serial
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Series HTS36X – singleturn, SPI output, redundant

Key features HTS36X :

- Independent signal processing. The HTS36X rotary encoder electronics are based mainly on one 3D-Hall IC in which two semiconductor elements independently capture, evaluate and output measured values
- Supply voltage, signal output and ground are galvanically insulated => separate electrical connections
- Supply voltage: 2 x 5 VDC ±10 %
- Signal output: 2 x SPI
- Maximum allowed signal cable length (each) 1 m

Electrical data HTS36X – singleturn, SPI output, redundant

Effective electrical angle of rotation 1.)	360°
Independent linearity (best straight line) 1.)	±0.4% @ 360°
Absolute linearity 1.)	±0.8% @ 360°
Output signal	SPI
Resolution	14 Bit
Update rate	600 µs
Supply voltage	5 VDC ±10%
Power consumption (no load)	≤ 24 mA
Insulation voltage 1.)	1000 VAC @ 50 Hz, 1 min
Insulation resistance 1.)	2 MOhm @ 500 VDC, 1 min
MTTF (EN29500-2005-1)	2046a

1.) According IEC 60393

Cable and pin assignment HTS36X – singleturn, SPI output, redundant

Function:	Option PG(R):	Option M12(R)
VSUP 1	red	PIN 1
GND 1	black	PIN 2
CS, MOSI 1	yellow	PIN 3
CLK 1	green	PIN 4
DATA 1	orange	PIN 5
VSUP 2	brown	PIN 6
GND 2	blue	PIN 7
CS, MOSI 2	violet	PIN 8
CLK 2	grey	PIN 9
DATA 2	white	PIN 10
-	n/c	PIN 11 n/c
-	n/c	PIN 12 n/c

Further information regarding the signal outputs can be found in the data sheet of the IC manufacturer.

SPI-Interface

MLX90316EDC DUAL (redundant version)

URL: www.melexis.com

Connector types M12 (R) HTS36X – pin numbering

Type 3 (12 pole)



The orientation of the connector relative to the encoder housing is not defined and differs from one encoder to the next.

Order code for HTS36X - solid or hollow shaft, singleturn, SPI output, redundant

Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>									
Series HTS36X	HTS36X									
Shaft type: Solid shaft Hollow shaft with screw fixation Option: with clamp fixation	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>Option 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>Option: user defined shaft length for solid shaft S [mm]</i>							16,5 <i>-</i> <i>XX</i>			
Supply voltages / output signals: 2 x 5 VDC ± 10% / 2 x SPI 14 Bit								05SPI		
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>									- <i>D</i>	
Electrical connection, cable length, position: >>> Max. allowed cable length 1 m <<< 1 m round cable, axial <i>Option: 1 m round cable, radial</i> <i>Option: plug M12, axial</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial</i> <i>Option: customer specific cable length, radial</i>										PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>

Order example HTS36X S - solid shaft, singleturn, SPI output, redundant

Requirements: Solid Shaft Ø 6.00 mm, shaft length 16.5 mm, electronics 14 Bit/5 VDC/SPI redundant, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)
Example for order code: HTS36X S 6x16,5 05SPI PG

Order example HTS36X H - hollow shaft, singleturn, SPI output, redundant

Requirements: Hollow shaft Ø 6.00 mm, fixation of the applications side shaft in the hollow shaft by means of grub screws, electronics 14 Bit/ 5 VDC/SPI redundant, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)
Example for order code: HTS36X S 6 05SPI PG

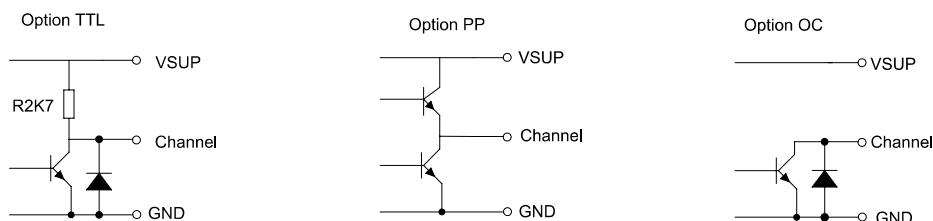
General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current (HTA36)
Redundant Analogue (HTA36)
PWM (HTP36)
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

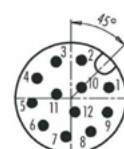
Series HTI36 - singleturn, incremental output, not redundant
Key features HTI36:

- Channels: A, B and index signal Z. Option differential signal output A, A/, B, B/, Z, Z/
- UVW signal output for motor commutation of DC-motors selectable from 1 to 16 pole pairs
- TTL, Push Pull or Open Collector electronics
- Maximum number of pulses per channel 1024 pulses per revolution (4096 steps)
- Option: ex works programmable number of pulses from 1 to 1024 pulses per revolution in one pulse step-width

Electrical data HTI36 - singleturn, incremental output, not redundant

Output Signal	TTL	Push-Pull	Open Collector
Number of pulses	1 to 1024 ppr		1 to 360 ppr
Differential signal output (A, A/, B, B/, Z, Z/)	OPTION		NO
Limit frequency	100 kHz		10 kHz
Switch on delay	20 ms		
Supply voltage	5 VDC ±10%	10 to 30 V	10 to 30 V
Power consumption (no load)	≤ 15 mA	≤ 50 mA	≤ 25 mA
Output load	≥ 5 kOhm		
Max. pull-up voltage	-		30 VDC
Insulation voltage ^{1.)}	1000 VAC @ 50 Hz, 1 min		
Insulation resistance ^{1.)}	2 MOhm @ 500 VDC, 1 min		
MTTF (EN29500-2005-1)	473a	462a	570a

Output circuit HTI36 per channel

Connector types M12 (R) HTI36 – pin numbering
Type 2 (8 pole)

Type 3 (12 pole)


The orientation of the connector relative to the encoder housing is not defined and differs from one encoder to the next.

Order Code HTI36 - solid or hollow shaft, singleturn, incremental signal output, not redundant

Description	Selection: standard= black/bold , possible options= <i>grey/italic</i>									
Series HTI36	HTI36									
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>Option: 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>Option: user defined shaft length for solid shaft S [mm]</i>					16,5 <i>-</i> <i>XX</i>					
Number of pulses (pulses per revolution) <i>100</i> 360 <i>512 (only for TTL and Push-Pull)</i> 1024 (only for TTL and Push-Pull) <i>Option: user defined number of pulses 1 to 1024, step-width 1 increment</i> <i>(>360 pulses only for TTL and Push-Pull)</i>						<i>100</i> 360 <i>512</i> 1024 <i>XXXX</i>				
Supply voltage / output signals: VSUP=24 V (10 to 30 V) / OUT=Push-Pull A, B, Z VSUP=5 V ± 10% / OUT=TTL A, B, Z VSUP=24 V (10 to 30 V) / OUT=Open Collector A, B, Z							24BZPP 05BZTTL 24BZOC			
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>								<i>-</i> <i>D</i>		
Electrical connection, cable length, position: 1 m round cable, axial (*) <i>Option: 1 m round cable, radial (*)</i> <i>Option: plug M12, axial</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial (*)</i> <i>Option: customer specific cable length, radial (*)</i>									PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>	

Order example HTI36 S - solid shaft, singleturn, incremental output, not redundant

Requirements:
Solid shaft Ø 6.00 mm, Shaft length 16.5 mm, number of pulses 1024, VSUP=5 V/TTL output signal, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)

Example for order code:
HTI36 S 6x16,5 1024 05BZTTL PG

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SP/SSI (HTS36)
Redundant
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Order example HTI36 H – hollow shaft, singleturn, incremental output, not redundant, differential signal output

Requirements:

Hollow shaft Ø 6.00 mm, fixation of the applications side shaft in the hollow shaft by means of grub screws, number of pulses 1024, VSUP=5 V, differential signal outputs, TTL level, no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)

Example for order code:

HTI36 H 6 1024 05BZ N TTL PG

Cable and pin assignment HTI36 – option PP, TTL, OC

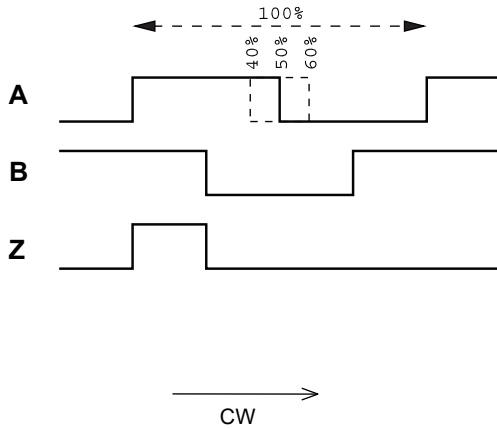
Function:	Option PG(R)	Option M12(R)
GND	black	PIN 1
VSUP	red	PIN 2
Z	yellow	PIN 3
B	orange	PIN 4
A	brown	PIN 5
-	green n/c	PIN 6 n/c
-	-	PIN 7 n/c
-	-	PIN 8 n/c

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SP/SSI (HTS36)
Redundant
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

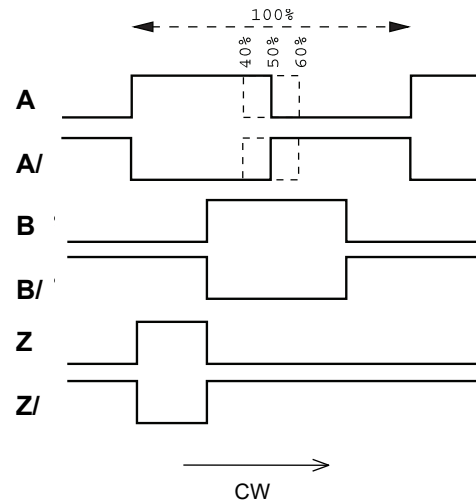
Signal details

Incremental signal output pattern:

A, B, Z (Standard)

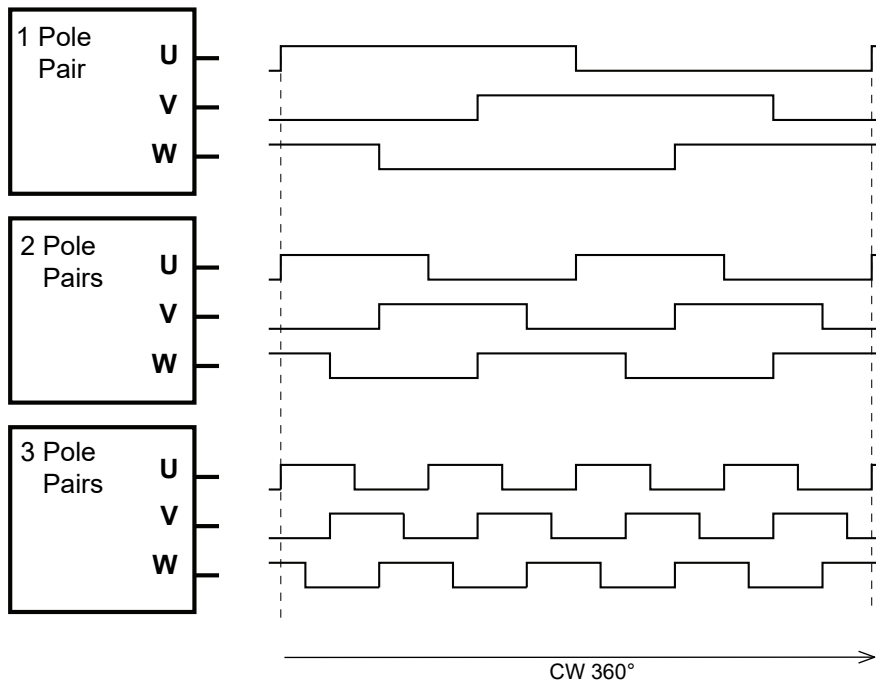


Option differential signal output
A, A/, B B/, Z Z/



The percentage information describes the proportion of a pulse in dependency to the duration of one period

Example: UVW signal output for motor commutation of DC motors, if chosen 1, 2 or 3 pole pairs



Further information regarding the signal outputs can be found in the data sheet of the IC manufacturer.

For rotary encoders with option UVW and differential signal output:

Manufacturer: IC-HAUS
Type: IC-MH16
URL: www.ichaus.de/

General
Contents
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Drawings
Mechanical Data
Voltage/Current
Redundant
Analogue (HTA36)
PWM (HTP36)
SER/SP/SSI (HTS36)
Redundant
Serial (HTS36)
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Series HTA36PM – multiturn/singleturn, programmable, analogue output, not redundant

Key features HTA36PM :

- Measuring range 10° to max. 72000° (200 shaft revolutions)
- Programmable by the user. Programmable are the sense of rotation (CW/CCW) and the effective electrical angle [°]
- Programmable up to 10.000 times
- Can also be used as a programmable singleturn rotary encoder
- Maximum rotation of the shaft in a voltage-free state without loss of the angle information +/-179°
- Factory programming (ex works): effective electrical angle of rotation 3600° (10 shaft revolutions), 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 HTA36PM – multiturn/singleturn, programmable, analogue output, not redundant

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°		
Absolute Linearity 1.)	±0.1% @ 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 (EN29500-2005-1)	224a		229a

1.) According IEC 60393

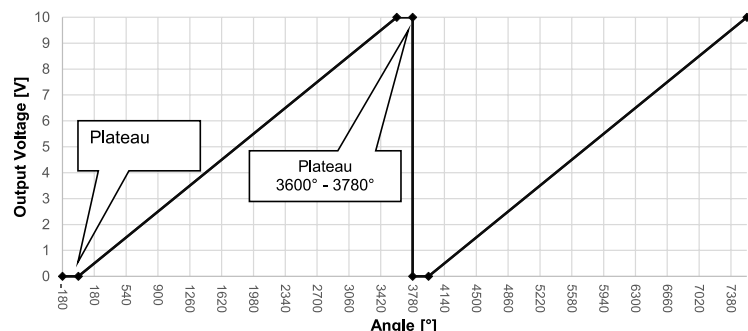
Signal output function (factory programming). Automatic function for inserting signal plateaus

The function represents the relationship between the zero degree marking on the rotary encoder housing in dependency to the 0° position of the shaft and the resulting output signal in the state of delivery, when turning the shaft 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 HTA36PM integrates automatically signal plateaus for a rotation angle of each 180° .

The following example shows the output signal pattern when actuating the shaft in the delivery state for 11 revolutions clockwise (sense of rotation CW), starting at the 0° position:

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

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



Order code HTA36PM – multiturn/singleturn, programmable, analogue output, not redundant

Description: User programmable multiturn/singleturn rotary encoder. Programmable sense of rotation, effective electrical angle ex works: CW, 3600° (10 turns)	Selection: standard= black/bold , possible options= <i>grey/italic</i>									
Series HTA36PM	HTA36									
Shaft type: Solid shaft Hollow shaft with screw fixation <i>Option: 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>Option user defined shaft diameter [mm]</i> <small>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 H</small>			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>Option: user defined shaft length for solid shaft S [mm]</i>						16,5 <i>-</i> <i>XX</i>				
Supply voltage / Output signal: VSUP=24 V (11 to 30 V) / OUT=4 to 20 mA VSUP=24 V (9 to 30 V) / OUT=0 to 5 V VSUP=24 V (15 to 30 V) / OUT=0 to 10 V							2442 2405 2410			
Shaft sealing: Without shaft sealing IP65: <i>Option: D with shaft sealing (IP67)</i>								- <i>D</i>		
Electrical connection, cable length, position: 1 m round cable, axial <i>Option: 1 m round cable, radial</i> <i>Option: plug M12, axial</i> <i>Option: plug M12, radial</i> <i>Option: customer specific cable length, axial</i> <i>Option: customer specific cable length, radial</i>									PG <i>PGR</i> <i>M12</i> <i>M12R</i> <i>PG X,XX</i> <i>PGR X,XX</i>	

Order example HTA36PM S – solid shaft, multiturn/singleturn, programmable, analogue output, not redundant

Requirements:
Shaft Ø 6.00 mm, shaft length 16.5 mm, VSUP=24 V / OUT=0 to 5 V, sense of rotation ex works CW (programmable by customer), effective electrical angle ex works 3600° (programmable by the customer), no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)

Example for order code: HTA36PM S 6x16,5 2405 PG

Order example HTA36PM H – hollow shaft, multiturn/singleturn, programmable, analogue output, not redundant

Requirements:
Hollow shaft Ø 6.00 mm, fixation of the applications side shaft in the hollow shaft by means of grub screws, VSUP=24 V / OUT=4 to 20 mA, sense of rotation ex works CW (programmable by customer), effective electrical angle ex works 3600° (programmable by the customer), no shaft sealing, round cable 1 m, cable outlet position axial (in dependency to the shaft)

Example for order code: HTA36PM H 6 2442 PG

General
Contents
Drawings
Solid Shaft
Hollow shaft V1
Hollow shaft V2
Mechanical Data
Voltage/Current
Analogue (HTA36)
Redundant
Pulse Width Modulation (HTP36)
Serial (HTS36)
SER/SP/SSI
Incremental (HTI36)
Multiturn HTA36 PM
Accessories

Order example HTA36PM programmer

Key features HTA36PM programmer "PRO":

- For programming of the sense of rotation (CCW/CW)
- For programming of the effective electrical angle of rotation [°]



Order number:

135945

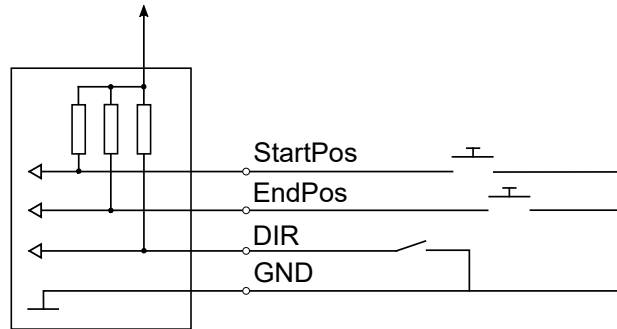
Order code:

Programmer Tool for series ETAxPM | HTAxPM

Programming of HTA36PM – multiturn/singleturn, programmable, analogue output, not redundant

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

To program the HTA36PM rotary encoder either the following circuit must be built, or the programmer must be ordered from MEGATRON.

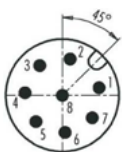


Cable and pin assignment HTA36PM – singleturn/multiturn, programmable, analogue output, not redundant

Function:	Option PG(R):	Option M12(R)
GND	black	PIN 1
VSUP	red	PIN 2
OUT	brown	PIN 3
DIR	orange	PIN 4
START	yellow	PIN 5
END	green	PIN 6
-	-	PIN 7 n/c
-	-	PIN 8 n/c

Connector types M12 (R) HTA36PM – pin numbering

Type 2 (8 pole)



The orientation of the connector relative to the encoder housing is not defined and differs from one encoder to the next.

Servomount fixing nails SFN for encoders with solid shaft

- Required for mounting the rotary encoder when using synchro flange
- Fastening the rotary encoder requires at least 3 pcs.
- Ideal for panel mounting of the rotary encoder so that no holes have to be drilled through the panel
- By rotating the rotary encoder housing around its own axis, synchro clamps allow a zero point alignment with an application-side shaft that is already coupled to the rotary encoder (0° position)
- Material: stainless steel



M12 plugs without or with cable for option M12(R)

- STE plug without cable
- STK plug with cable



Shaft couplings for encoders with solid shaft

- Connect two shafts, even with different diameters
- Absorb larger angular and radial deviations
- Have a low inertia
- Do not cause a change in the transmission speed
- Damp torsional vibrations
- Serves as mechanical protection against oversized pairs of forces
- Made of plastic (also with metal hubs) act electrically and heat insulating



Counter ICs for HTI36 (incremental encoders)

- LS7083 in DIP or SOIC form factor, generates from incremental-signals quadrature-signals
- LS7166 24-Bit counter IC



LS7083/4N-S



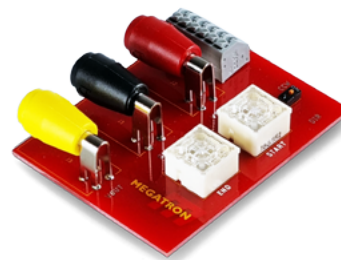
LS7166



LS7083/4N

Programmer "PRO" for multiturn encoder HTA36PM

- For programming of the sense of rotation (CCW/CW)
- For programming of the effective electrical angle of rotation [°]



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Solid Shaft
Hollow shaft V1
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