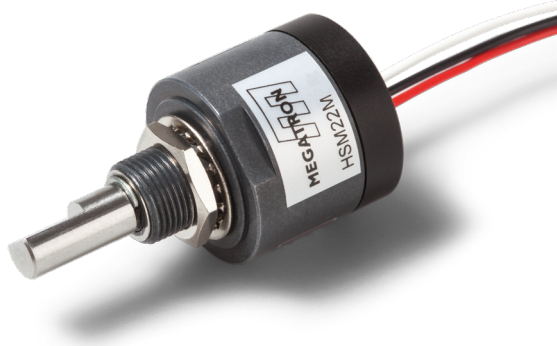


# Data Sheet for Angle Sensors

## Hall-Effect Multi-Turn Rotary Encoder

## Series HSM22M



- 10 turn (=3600°) Hall rotary encoder
- True-Power-On
- Compact Ø22.5 mm housing
- Ø6 mm Shaft
- Sleeve bearing
- 5 V, 12 V or 24 V supply voltage
- Voltage or current output
- As option with redundant output electronic
- High reliability in measurement value capturing and processing

The rotary encoders from the HSM22M series are real "True-Power-On" multiturn encoders, in which the output signal always corresponds to the angle of rotation, even if the angle of rotation changes during loss of supply voltage. In the comparison to other multiturn rotary encoder technologies and signal evaluation processing methods the MEGATRON HSM22M ensures the highest level of reliability and failure safety.

### Electrical Data

Effective electrical angle of rotation 1.)	Standard 3600°±7°, As option programmable ex works 360° ≤ α ≤ 3600° ±7°	
Independent linearity (best straight line) 1.)	±0.5 % @3600°	
Output signal	Voltage output: @ VSUP 5 V Output voltage: 5 % ±3 %..95 % ±3 % ratiometric @ VSUP 24 V or 12 V Output voltage: 5 % ±3 %..95 % ±3 %	Current output: 4..20 mA
Resolution 1.)	12 Bit (4096 steps)	
Update rate	800 µs	
Backlash (Hysteresis) 1.)	≤ 10°	
Supply voltage	With voltage output: 5 VDC ±0.5 V 12 VDC ±0.5 V 24VDC ±0.5 V	With current output: 24 VDC ±0.5 V
Power consumption (no load)	Voltage output: < 16 mA (single) < 32 mA (redundant)	Current output: < 22 mA
Output load	Voltage output: ≥ 10 kΩ	Current output: ≤ 500 Ohm
Insulation voltage	±8 kV contact discharge, ±16 kV arial discharge (IEC 61000-4-2)	
Insulation resistance 1.)	>1000 MΩ @ 500 VDC	

### Mechanical and Environmental Data

Mechanical angle of rotation 1.)	360° without stop
Lifetime 2.)	> 20 mio. shaft revolutions
Bearing	Sleeve bearing
Max. operational speed	400 rev./min
Operational torque @ RT 1.) 2.)	≤ 5 Nmm
Operating temperature range	-40..+85 °C
Storage temperature range	-40..+85 °C
Protection grade front side (IEC 60529)	IP50

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Hall-Effect Multi-Turn Rotary Encoder

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## Mechanical and Environmental Data, Miscellaneous

Vibration (IEC 68-2-6, Test Fc)	10 to 2000 Hz 196 m/s <sup>2</sup> 12 hours
Shock (IEC 68-2-27, Test Ea)	490 m/s <sup>2</sup> within 18 times
Housing diameter / length	22.5 mm
Housing depth	20.6 mm
Shaft diameter	6 mm
Shaft type	Solid shaft with shaft flattening
Max. allowed radial load	≤1 N
Max. allowed axial load	≤1 N
Connection type	All variants with voltage output: Single strands 180 mm ± 20 mm Variant with current output: solder terminals
Connection position	Axial
Sensor mounting	Bushing
Mass	app. 35 g
Fastening parts included in delivery	Hex nut (AF14), tooth washer
Fastening torque mounting nut	< 100 Ncm
Material shaft	Stainless steel
Material housing	Metal, plastic

1.) According IEC 60393

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

# Data Sheet for Angle Sensors

Hall-Effect Multi-Turn Rotary Encoder

Series HSM22M

## Order Code for single output version (non redundant version)

Description	Selection: Standard=black/bold, possible options=grey/cursive					
<b>Series:</b>	<b>HSM22</b>					
<b>Multiturn:</b>		<b>M</b>				
<b>Shaft diameter / shaft length:</b> <b>Ø 6.00 x 23.1 mm</b> <i>Option: user defined shaft dimensions [mm]</i> <i>(shaft diameters &gt; 6.00 mm are designed as two part shaft)</i>			<b>6x23.1</b> <i>XxXX</i>			
<b>Supply voltage / output signal:</b> <b>VSUP=5 V ±10 % / output voltage:</b> <b>5 % ±3%..95 % ±3 % from VSUP (ratiometric)</b> <i>Option: VSUP 12 V ±0.5 V</i> <i>Output voltage: 0.6 V ±0.36 V..11.4 ±0.36 V</i> <i>Option: VSUP 24 V ±0,5 V</i> <i>Output voltage: 1.2 V ±0.72 V..22.8 ±0.72 V</i> <i>Option: 24 V ±0.5 V / current output: 4..20 mA</i>				<b>0505</b>  1212  2424  2442		
<b>Sense of rotation:</b> <b>Signal increases by turning the shaft clockwise</b> <i>Option: signal decreases by turning the shaft clockwise</i>					<b>CW</b> CCW	
<b>Effective electrical angle:</b> <b>3600° (=10 turns)</b> <i>Option: user defined effective electrical angle</i> <i>(A user defined effective electrical angle is possible in a range: 360° ≤ α ≤ 3600°)</i>						<b>3600</b> XXXX
<b>Electrical connection:</b> <b>Single strands length 0,18 m for voltage output</b> <small>(Single strands only available in combination with voltage output 0505, 1212, 2424. Not available for 2442 electronics with current output)</small> <b>Solder terminals for current output</b> <small>(Solder terminals exclusively available in combination with 2442 electronics with current output. Solder terminals not available for voltage output 0505, 1212, 2424. Solder terminals not available for voltage output 0505, 1212, 2424.)</small> <i>Option: signal cable length in x,xx [m]</i>						<b>L0,18</b>  LF  <i>Lx,xx</i>

## Order example HSM22M for single output version (non redundant version):

### Requirement:

Multiturn rotary encoder without redundancy, shaft Ø 6.00 mm, shaft length 23.1 mm, VSUP=5 V / OUT = 0.25..4.75 V, output signal increases clockwise CW, effective electrical angle 3600°, signal cable length 18 cm

### Example for order code:

HSM22M 6x23.1 0505 CW 3600 L0.18

# Data Sheet for Angle Sensors

Hall-Effect Multi-Turn Rotary Encoder

Series HSM22M

## Order Code for redundant Version

Description	Selection: standard=black, possible options=grey/cursive							
<b>Series:</b>	<b>HSM22</b>							
<b>Multiturn:</b>		<b>M</b>						
<b>Redundant electronic:</b>								
<b>Galvanically insulated electronic</b> (2 separate supply voltages, 2 separate grounds, =6 electrical connection cables [VSUP1, VSUP2, Ground 1, Ground 2, Out 1, Out 2])			<b>X1</b>					
<i>Galvanically not insulated electronics</i> (one supply voltage, one ground, =4 electrical connection cables [1xVSUP, 1xGround, Out 1, Out2])			<b>X2</b>					
<b>Shaft diameter / shaft length:</b> <b>Ø 6.00 mm x 23.1 mm</b> <i>Option: user defined shaft [mm]</i> <i>(Shaft diameters &gt; 6,00 mm are designed as two piece shaft)</i>				<b>6x23.1</b> <i>XxXX</i>				
<b>Supply voltage / output signal:</b> <b>VSUP=5 V ±10 % / output voltage:</b> <b>5 % ±3%..95 % ±3 % from VSUP (ratiometric)</b> <i>Option: VSUP 12 V ±0.5 V</i> <i>Output voltage: 0.6 V ±0.36 V..11.4 V ±0.36 V</i> <i>Option: VSUP 24 V ±0,5 V</i> <i>Output voltage: 1.2 V ±0.72 V..22.8 V ±0.72 V</i>					<b>0505</b>  1212  2424			
<b>Sense of rotation output signal 1:</b> <b>Signal 1 increases by turning the shaft clockwise</b> <i>Option: signal 1 decreases by turning the shaft clockwise</i>						<b>CW</b>  CCW		
<b>Sense of rotation output signal 2:</b> <b>Signal 2 increases by turning the shaft clockwise</b> <i>Option: signal 2 decreases by turning the shaft clockwise</i>							<b>CW</b> CCW	
<b>Effective electrical angle</b> <b>3600° (=10 turns)</b> <i>Option: user defined effective electrical angle</i> <i>(A user defined effective electrical angle is possible in a range: 360° ≤ α ≤ 3600°)</i>								<b>3600</b> xxxx
<b>Electrical connection:</b> <b>Single strands length 0.18 m</b> <i>Option: signal cable length in x.xx [m]</i>								<b>L0.18</b> <i>Lx.xx</i>

## Order example HSM22M (redundant version):

### Requirement:

Multiturn, redundant galvanically insulated electronic, shaft Ø 6.00 mm, shaft length 23.1 mm, VSUP = 5 V / OUT = 0.25..4.75 V, Sense of rotation signal output 1: signal 1 increases by turning the shaft clockwise, Sense of rotation signal output 2: Signal 2 increases by turning the shaft clockwise, Effective electrical angle for each signal output 3600°, signal cable length 18cm

### Example for order code:

HSM22M X1 6x23.1 0505 CW CW 3600 L0.18

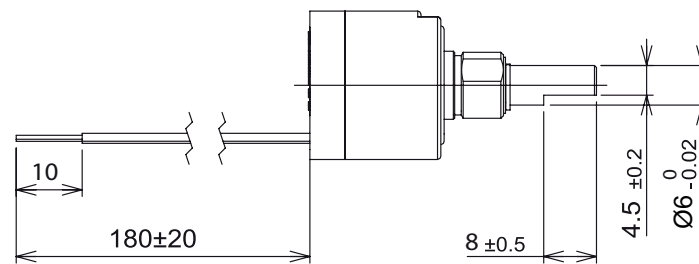
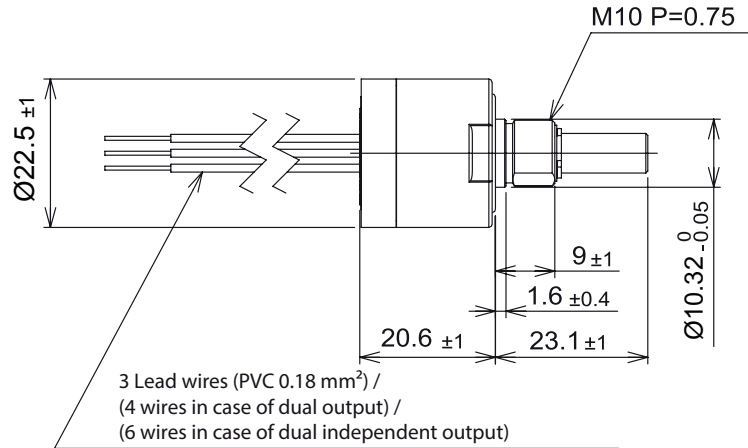
## For higher quantities or on-going demand, additional options are available as described below

For example:

- Electrical connection for 2442 electronics, instead of solder terminals with single strands
- Redundant output with 2442 electronics with current outputs
- PWM-output (pulse width modulation)
- Customized output signal, e.g.:
  - Signal plateaus
- Changed shaft design
  - Slot in the shaft
  - Special shaft flattening
- Special cable and connection design

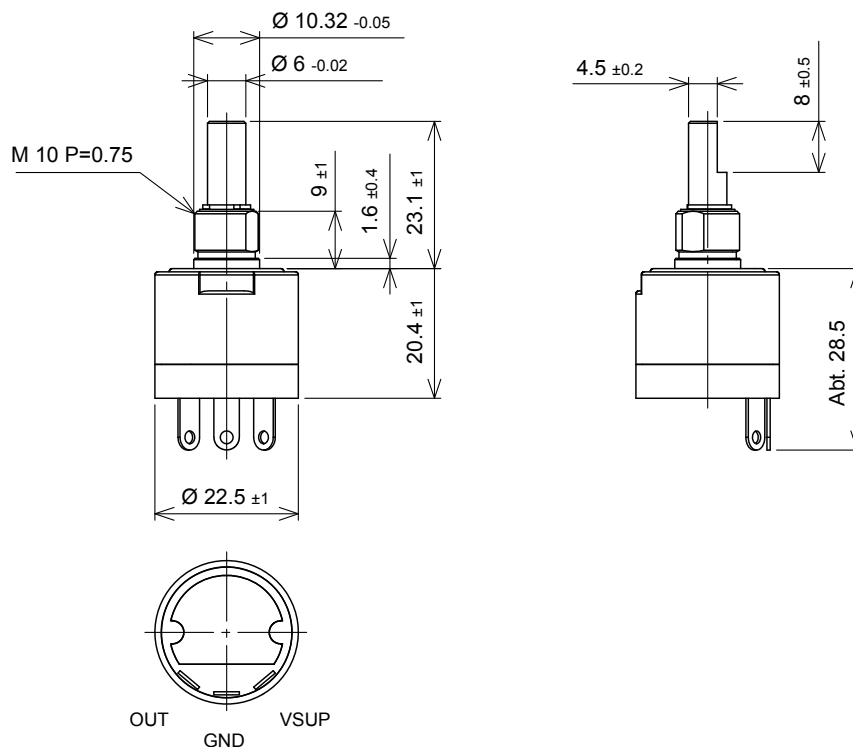
### Technical Drawing

HSM22M version with voltage output 0505 or 1212 or 2424 electronic with single strands as electrical connection



Note: 1. 1 pc. each of inner teeth washer and hex nut is attached.  
 2. Please duly note that inner construction may burn out when applying the voltage to the wrong terminals except input terminal.

HSM22M version with current output 2442 electronic with solder terminals as electrical connection



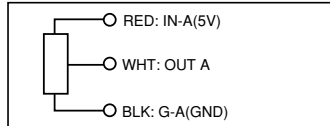
# Data Sheet for Angle Sensors

## Hall-Effect Multi-Turn Rotary Encoder

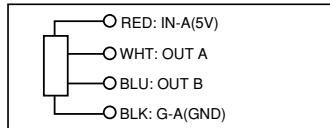
Series HSM22M

### Connection Diagrams for Single Strands

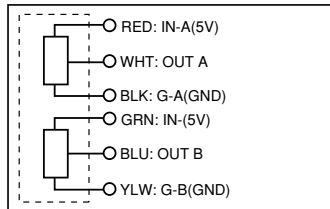
Single electronic:  
1 electrical output



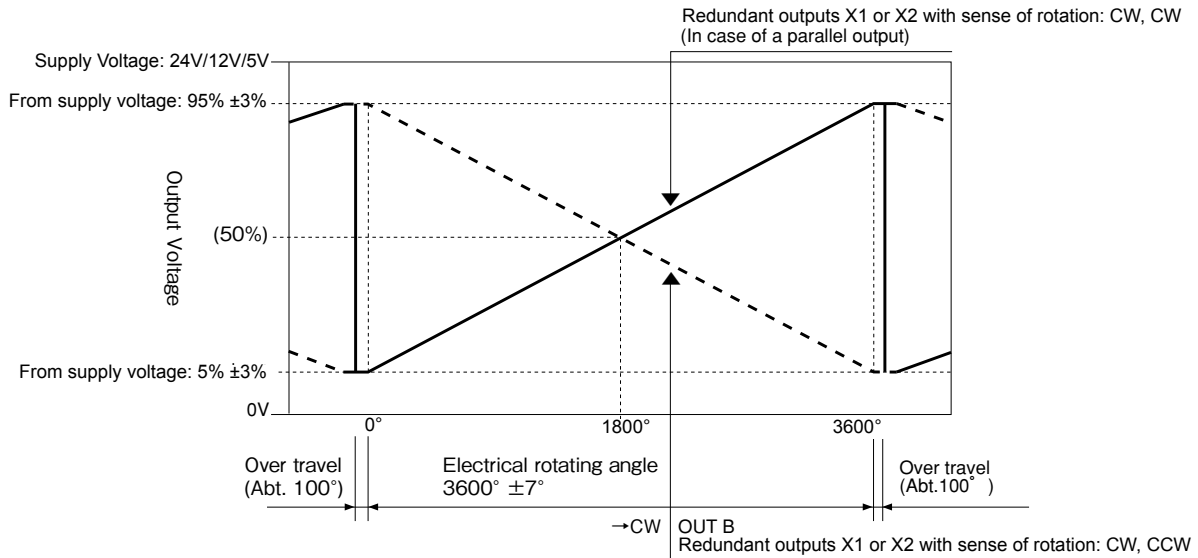
Redundant electronics X2:  
2 electrical outputs  
galvanically not insulated



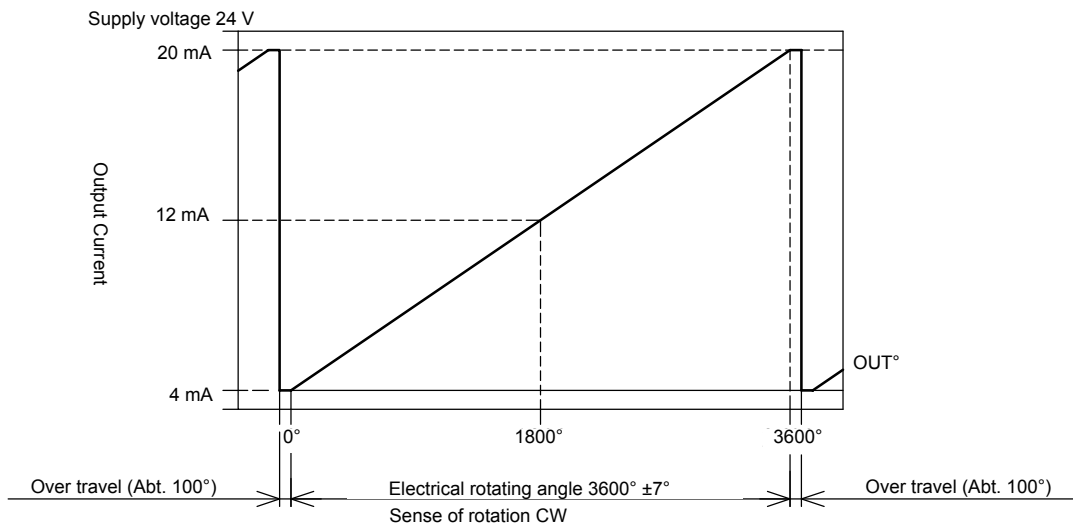
Redundant electronics X1:  
2 electrical outputs  
galvanically insulated



**Voltage Output Diagram:**



**4..20 mA Output Diagram:**



**4..20 mA Output Diagram:**

