

ABSOLUTE MAGNETIC ROTARY ENCODER ANALOG



High-resolution absolute encoder via magnetic technology. Singleturn encoding based on 360° Hall effect technology. Multiturn encoding based on magnetic pulse counter. No batteries used.

Main Features

- Compact industrial model
- Interface: Analog – Current, Voltage
- Housing: 36,5 mm Ø
- Shaft: 6 mm Ø
- Blind hollow shaft 6 mm Ø
- 12 bit total resolution
- Max turns (Default) : 16 turns (0 to 5760°)
- Inputs for user defined measuring range
- Over range and Under range Deadband
- EMC: EN 61000-6-2, EN 61000-6-4

Mechanical Structure

- Aluminum flange
- Nickel-plated steel housing
- Stainless steel shaft
- Precision ball bearings with sealing or cover rings

Suitable for Applications Requiring:

- Sensing of Angles or Distances of Rotating Shafts
- Straightforward Communication
- Potentiometer Replacement
- Robustness with High IP Rating
- Minimum Wiring

Electrical Features

- Polarity inversion protection
- Over-voltage-peak protection
- Patented battery backup free counter

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Technical Data

Electrical data

Current Options	4-20 mA	0-20 mA
Load Resistance	R _L < 500 Ω with 12V DC	
Linearity	0.15%	
Supply voltage*	12-30 V DC (absolute maximum ratings)	
Turn on time	< 1 s	
Settling Time	80 ms	
Current consumption	Typical 50 mA	
Electrical lifetime	> 10 ⁵ h	
EMC	Emitted interference: EN 61000-6-4	
	Noise immunity: EN 61000-6-2	
Connection	cable exit or M12 Connector	

* Supply voltage according to EN 50 178 (safety extra-low voltage)

Voltage Options	0-5 V	0.5-4.5V	0-10 V
Load Resistance	R _L > 10 kΩ with 12V DC		
Linearity	0.15%		
Supply voltage*	12-30 V DC (absolute maximum ratings)		
Turn on time	< 1 s		
Settling Time	80 ms		
Current consumption	Typical 50 mA		
Electrical lifetime	> 10 ⁵ h		
EMC	Emitted interference: EN 61000-6-4		
	Noise immunity: EN 61000-6-2		
Connection	cable exit or M12 Connector		

* Supply voltage according to EN 50 178 (safety extra-low voltage)

Sensor data

Singleturn technology	magnetic 2 axis Hall sensor
Resolution of output	max 12 bits over entire measuring range
Minimum measurement range	0 to 22.5 °
Singleturn accuracy	calibrated +/-0.35°
Multiturn technology	self supplied magnetic pulse counter
Number of turns (for multiturn sensor only)	16 turns (default setting) User can use the scaling functionality to measure up to 65,536 turns

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Environmental Conditions

Operating temperature: sensor *	- 40 ... + 85°C (-40...+185 °F)
Storage temperature	- 40 ... + 85 °C (-40...+185 °F)
Humidity	98 % (without liquid state)
Protection Class (EN 60529)**	Casing side : IP 54 (molded : <i>MCD-...-CAW</i>) Casing side : IP 64 (other types: <i>MCD-...-PAM</i> and <i>MCD-...-GAW</i>)
	Shaft side: IP 64

* Higher temperatures (upto 125°C (257 °F) for Singleturn) possible on request. See Operating Temperature : Cables

** Higher IP ratings (upto 69K) on request.

Mechanical data

Housing	nickel-plated steel housing
Flange	Aluminum
Shaft	stainless steel
Lifetime	Dependent on shaft version and shaft loading – refer to table
Max. shaft loading	Axial 20 N (4.5 lbs), radial 80 N (18 lbs)
Inertia of rotor	≤ 20 gcm ² (0.11 oz-in ²)
Friction torque at +25°C	≤ 2 Ncm (2.8 oz-in)
RPM (continuous operation)	Max. 12,000 RPM
Shock (EN 60068-2-27)	≤ 100 g (half sine, 6 ms)
Permanent shock (EN 60028-2-29)	≤ 10 g (half sine, 16 ms)
Vibration (EN 60068-2-6)	≤ 10 g (10 Hz ... 1,000 Hz)
Weight (standard version)	≈ 150 g (0.33 lbs), including cable

Flange	Synchro (S)	Hub shaft (B)
Shaft diameter	6 mm (~0.236 in)	6 mm (~0.236 in)
Shaft length	11,5 mm (~0.453 in)	*

* Mating Shaft: min: 8 mm (~0.315 in) / max: 18 mm (~0.709 in)

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Minimum (mechanical) lifetime

Flange	Lifetime in 10 ⁸ revolutions with F _a / F _r		
	20 N / 20 N	20 N / 40 N	20 N / 80 N
S6 Synchro Flange	224	28	3

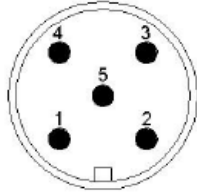
Cable

Operating temperature cable	flexing -5°C to +70°C (+23 ... +158 °F) static -30°C to +70°C (-22 ... +158 °F)
Minimum bend radius	flexing 10x cable diameter static 5x cable diameter
Cable	approx 6 mm (~0.236 in) Ø / type : LIYCY 4x2x0.14

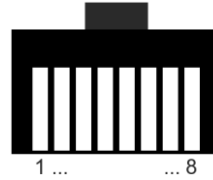
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Interface

Electrical connection



Pinning M12 (male)



Pinning RJ45

Function	Wire end	Connector Pin-No. RJ45	Connector Pin-No. M12
GND (Supply)	Yellow	4	3
+ Ub Supply Voltage	Red	8	2
Current/Voltage Output	Green	3	1
Set 1	Brown	2	5
Set 2	White	1	4
Shielding	Shielding	-	Housing

Scaling Functionality

Using the Set 1 and Set 2 Input Signals the measuring range (min range of 22.5°) with the analog output range can be scaled

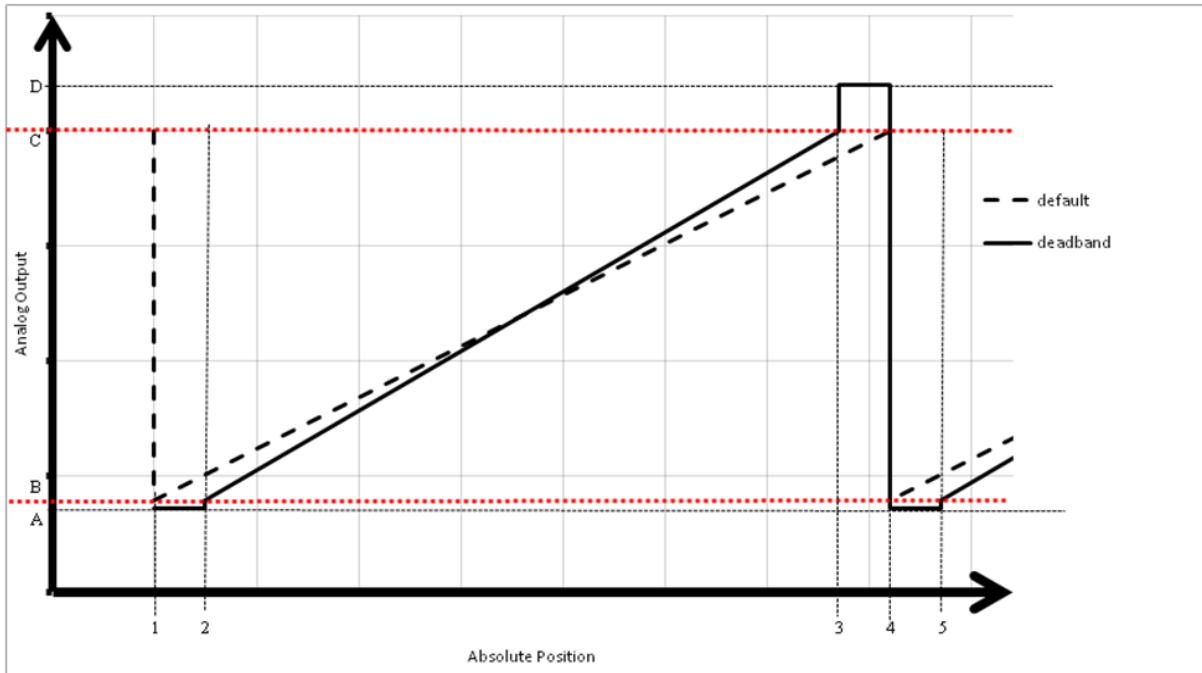
- Turn the shaft to the min position (One end of the measuring range)
- Connect Set 1 signal to high level for 1 second.
- Turn the encoder shaft to the max position(Other end of the measuring range)
- Connect Set 2 signal to high level for 1 second.
- Analog Output is scaled to the new measuring range.

Set 2 (White)	Set 1 (Brown)	Function
0 (Input = N.C. or GND)	0 (Input = N.C. or GND)	Normal Operation
0 (Input = N.C. or GND)	1 (Input $\geq 12V$ / Input $\leq U_b$)	Preset Zero Point
1 (Input $\geq 12V$ / Input $\leq U_b$)	0 (Input = N.C. or GND)	Preset Max Point
1 (Input $\geq 12V$ / Input $\leq U_b$)	1 (Input $\geq 12V$ / Input $\leq U_b$)	Set Midpoint of Default Scale*

*The default measuring range is restored. Output value corresponds to midpoint of scale (e.g. 2.5V for ...-AV003-..., 12mA for ...-AC001-., etc.)

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Output Characteristics



Encoder Type*	Absolute Position in Degrees				
	1	2	3	4	5
MCD-AX00X-0012-...	0	-	-	360° or 0°	-
User Scaled ..-0012-..	0	Preset Zero	Preset Max	360° or 0°	Preset Zero
MCD-AX00X-0412-...	0	-	-	2 ⁴ * 360° or 0°	-
User Scaled ..-0412-..	0	Preset Zero	Preset Max	2 ⁿ * 360° or 0°	Preset Zero

n is any integer between 0 and 16

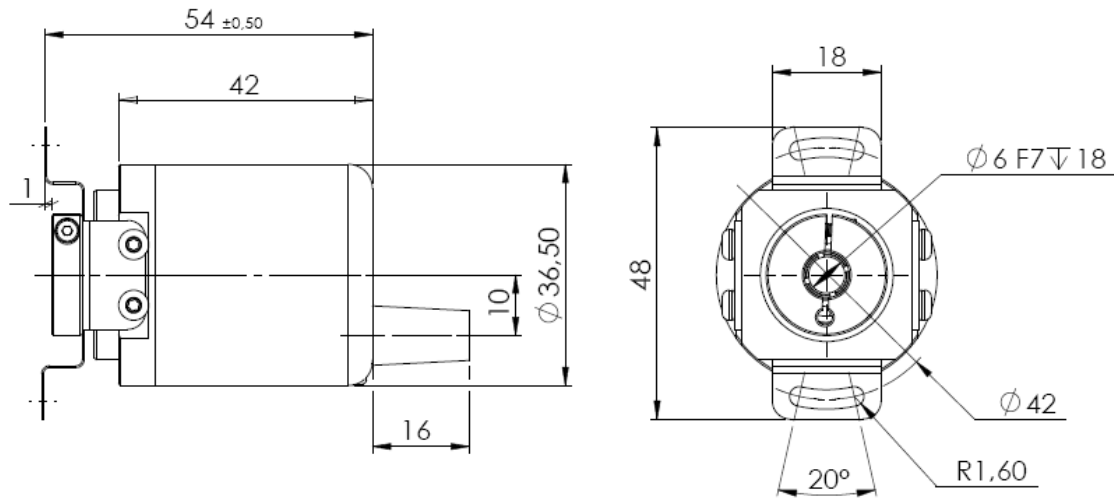
* Refer to "Models / Ordering Description" for detailed information

Encoder Output Type	Analog Output Value in mA or V			
	A	B	C	D
4-20 mA	3.6	4	20	22
0-20 mA	-	4	20	-
0-5 V	-	0	5	-
0.5-4.5 V	0.25	0.5	4.5	4.75
0-10 V	-	0	10	-

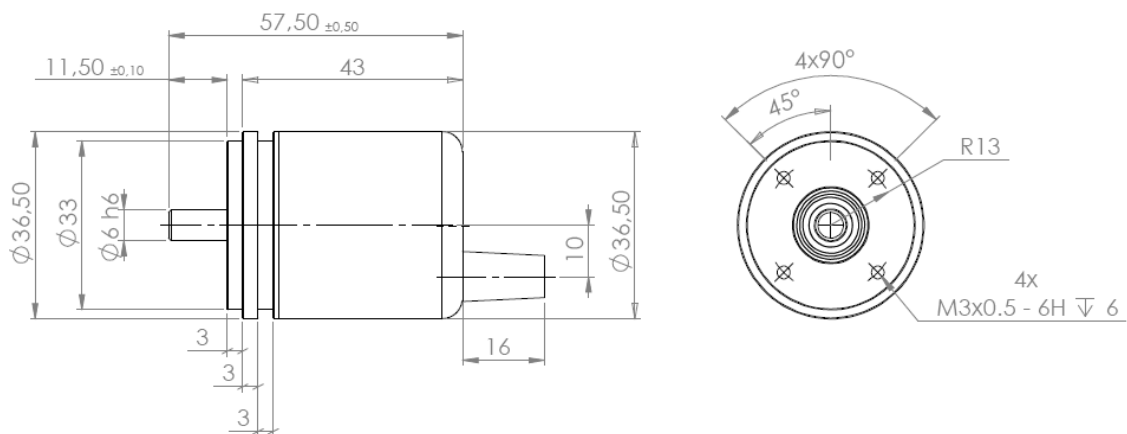
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Mechanical Drawings

Blind hollow shaft (B)



Synchro Flange (S)



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Models / Ordering Description

Description	Type key							
Magnetocode	MCD -	--	00	--	--	--	--	--
Interface *	Current	AC						
	Voltage	AV						
Version			00					
Code	AC = 4-20 mA			1				
	AV = 0-5V							
	AC = 0-20 mA			2				
	AV = 0-10V							
	AV = 0.5-4.5V			3				
Bits corresponding to	16 turns					04		
Number of Turns	0 turns					00		
Bits for max Single Turn resolution **	4096						12	
Flange	Synchro flange					S	06	
	Blind hollow shaft					B	06	
Shaft diameter								
Mechanical options	Without						0	
Connection	Cable exit, axial 1m							CAW
	Cable exit, axial 1m, with cable gland							GAW
	1x 5 pin M12 connector male							PAM

* PWM interface available on Request

** Would be less for a multiturn encoder. The total resolution of 12 bits shall be spread over the entire measuring range.

Standard = bold, further models on request

Ordering example:

MCD-AC001-0412-S060-CAW

Disclaimer

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