

### DATA SHEET

### ABSOLUTE MAGNETIC ROTARY ENCODER HEAVY DUTY

### CANOPEN



## CANopen

Robust rotary sensor based on reliable magnetic technology. Its steel housing with an automotive certified coating and high protection class of IP69K make the MCD Heavy Duty resistant against high-pressure water and corrosion. Combined with the sturdy ball bearings (for high shaft loads up to 200N) this sensor is an ideal choice for reliable

measurement under extreme environmental conditions and outdoor applications. The MCD Series uses the Wiegand effect technology to keep perfect track of the number of rotations even if the rotations are slow and/or there is no system power. The system comes without backup batteries making it maintenance free as well as ROHS compliant.

#### Main Features

- Cost Efficient Heavy Duty absolute Encoder
- Steel housing with scratch resistant protection coating
- Saltspray resistant according to EN ISO 9227
- Protection Class up to IP69K & IP68
- Compact Design (36mm)
- Up to 180N Shaft Load
- Interface: CANopen (DS406)  
CANopen Lift (DSP417)
- Max. Revolution Not Limited (typical 13 bit)
- Velocity Output
- LSS services
- Gear and Battery Less Multi-Turn

#### Mechanical Structure

- Aluminum Flange
- Coated Steel Housing (automotive proof)
- Stainless Steel Shaft
- Sturdy Ball Bearings

#### Applications

- Construction Machinery
- Cranes
- Trucks
- Onshore and Mobile Applications

#### Electrical Features

- Polarity inversion protection
- Over-voltage-peak protection
- Galvanic Isolation

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#### Technical Data

##### Electrical Data

Interface	Transceiver according ISO 11898, galvanically isolated by opto-couplers
Transmission Rate	Max. 1 MBaud
Device Addressing	Adjustable by SDO telegrams or Layer Setting Services
Supply Voltage	10-30 V DC (absolute maximum ratings) <sup>1</sup>
Current Consumption	Max. 100 mA with 10 V DC, max. 50 mA with 24 V DC
Power Consumption	Max. 1,2 Watts
Electrical Lifetime	> 10 <sup>5</sup> h
EMC	Emitted interference: EN 61000-6-4 Noise immunity: EN 61000-6-2

<sup>1</sup> Supply voltage according to EN 50 178 (safety extra-low voltage)

##### Sensor Data

	Single-Turn	Multi-Turn
Technology	Magnetic 2 axis Hall sensor	Self supplied magnetic pulse counter (Wiegand Sensor)
Resolution	Up to 4096 steps /revolution (12 Bit)	Can measure up to 200 Billion revolutions
Accuracy	± 0.35°	
Internal cycle time	< 1 ms	

##### Environmental Conditions

Operating Temperature Sensor	-40 – +85° (-40 – +185°F)
Storage Temperature	-40 – +85° (-40 – +185°F)
Humidity	98 % (without liquid state)
Protection Class (EN 60529)	IP 65 / IP 67 / IP68 / IP 69K

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#### Mechanical Data

Housing	Steel Housing with Scratch Resistant Coating
Flange	Aluminum
Shaft	Stainless Steel (1.4112; ASTM/AISI 440B; UNS S44003)
Lifetime	Dependent on shaft version and shaft loading – refer to table
Max. Shaft Loading	Axial 180 N, Radial 180 N (for 1*10 <sup>9</sup> turns)
Friction Torque at +25°C	≤ 3 Ncm, (2.8 oz-in)
RPM (continuous operation)	Max. 6.000 RPM
Shock	EN 60068-2-27 ≤ 300 g (half sine, 6 ms XYZ)
	MIL-STD-810C ≤ 200 g (half sine, 3 ms XYZ)
Permanent Shock	EN 60028-2-29 ≤ 30 g (half sine, 16 ms XYZ)
	MIL-STD-810C ≤ 30 g (half sine, 11 ms XYZ)
Vibration	EN 60068-2-6 ≤ 30 g (10 Hz – 1000 Hz XYZ)
	MIL-STD-810 ≤ 4.2 g (5 Hz – 500 Hz XYZ)
Weight (Standard Version)	≈ 180 g (0.77 lbs)

#### Minimum (mechanical) Lifetime

	Lifetime in 10 <sup>8</sup> revolutions with (F <sub>a</sub> /F <sub>r</sub> )		
Flange	180 N/180 N	150 N/150 N	100 N/100 N
S10 Synchro Flange (MCD-...-S10D-...)	10	15	30

#### Cable<sup>1</sup>

Operating temperature cable	Flexing -30°C to +70°C (-22 – +158 °F)
	Static -40°C to +70°C (-40 – +158 °F)
Minimum bend radius	Flexing 10x cable diameter
	Static 5x cable diameter
Cable	Approx Ø 7 mm (~0.275 in)
	Type : LSP12YC11Y 4x2x0.35 - (~AWG22 )

<sup>1</sup> Valid for types: MCD-...-GAW, MCD-...-GRW

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## Interface

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By default, the encoder has a standard configuration of Node Number 32 and a baud rate of 20KBaud. Customers can use SDO protocol for

adapting to the specific applications. In general, valid baud rates range from 20K to 1MBaud and can contain 0 to 127 nodes.

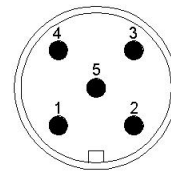
### Electrical Interface

The Sensor is connected via a 5 pin circular M12 connector. Counter connectors /Connection cables are available from POSITAL or third party suppliers.

Refer to the table below for the Pin configuration.

Pin M12	Function	Wire-end
1	Can-GND	green
2	+ Ub= 10-30 V	red
3	GND	yellow
4	Can High	white
5	Can Low	brown

MCD-XXXX-XXXX-XXXX-PAM



5 Pin M12 Connector Male

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#### Programmable Encoder – Parameters

Operating Parameters	Includes the Complement or Direction parameter. This parameter defines if the encoder increase or decrease the position value with a given direction of shaft rotation.
Resolution per Revolution	It is used to scale the encoder output value to required number of steps.
Total Resolution	It is used to program the desired number of measuring units over the total measuring range. This value may not exceed the total resolution of the absolute rotary encoder. When used in continuous measuring applications, certain specific rules (outlined in the encoder manual) for setting the parameters have to be followed.
Preset Value	The preset value is the desired position value, which should be reached at a certain physical position of the axis. The position value is set to the desired process value by the parameter preset.
Limit Switch (Min. and Max)	Minimum and maximum values can be programmed as limit switches. On reaching either of the positions, one bit of the 32 Bit process value is set to high.
Cam	Eight position values can be programmed as cams. By reaching these values bits in object 6300 h Cam state register are set.

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##### Programmable CAN Transmission Modes

Polled Mode	It is a passive mode in which the encoder transmits the process values only upon request. The current process value is requested by the connected host through a remote transmission request telegram. When requested, the encoder reads the current position values and according to the set parameters, calculates the process value and sends it back through the same identifier.
Cyclic Mode	The absolute rotary encoder transmits the current process values at regular time intervals, without being called by the host. The cycle time can be programmed in milliseconds ranging from 1 ms to 65536 ms.
Sync Mode	After receiving a sync telegram from the host, the absolute rotary encoder responds back with the current process value. If more than one node (encoder) is evoked after receiving a sync telegram, the reply telegrams of the nodes will be received by the host in order of their node numbers. The programming of an offset-time is not necessary. If the node do not answer after each sync telegram on the CAN network, the parameter sync counter can be programmed to skip a certain number of Sync telegrams before answering again.

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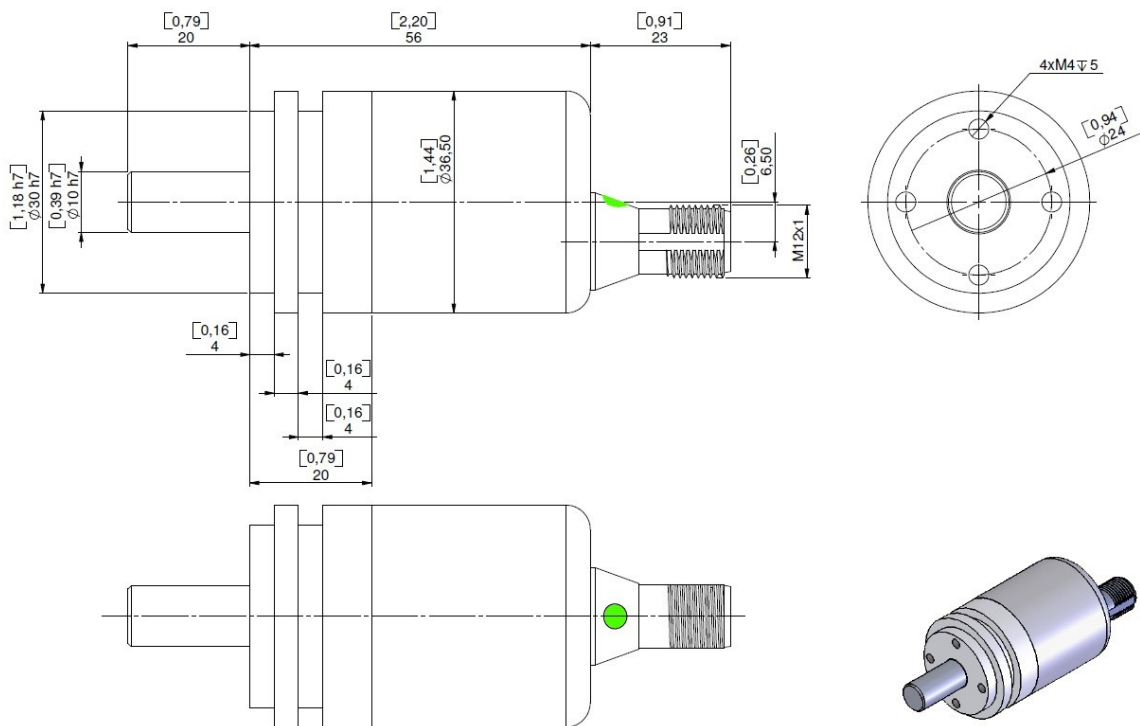
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#### Mechanical Models

#### Synchro Flange

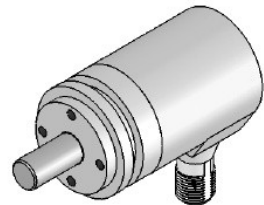
MCD-CA~~XX~~B-~~XXXX~~-S10D-PAM



All dimensions in mm/ [inch]

## DATA SHEET

MCD-CAXXX-XXXX-S10D-PRM



All dimensions in mm/ [inch]

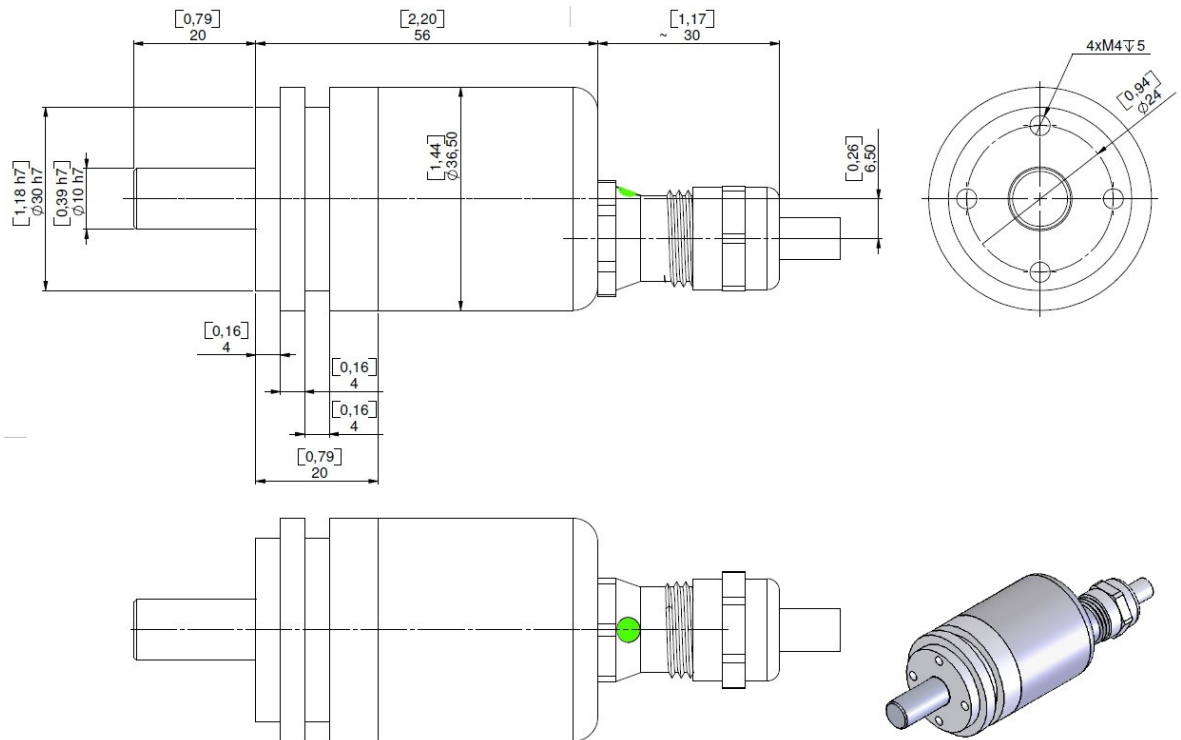


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MCD-CAXXX-XXXX-S10D-GAW



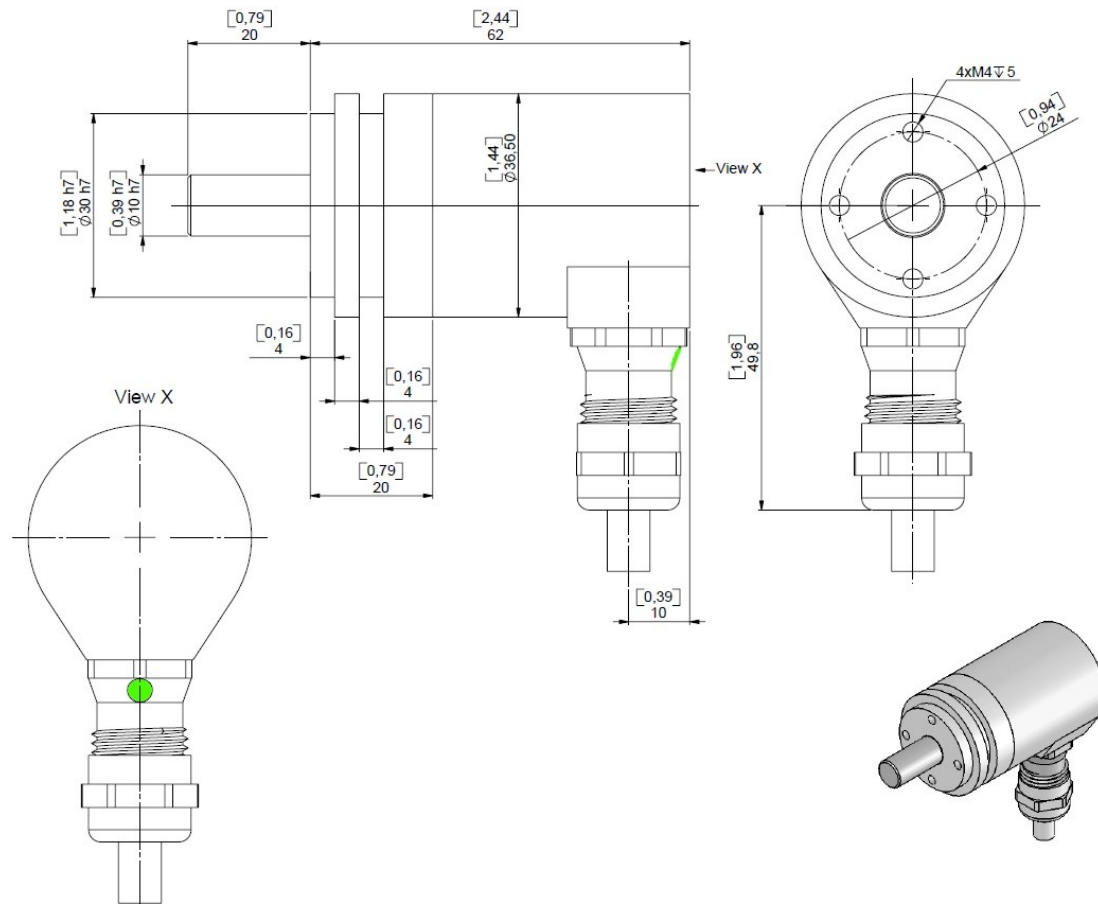
All dimensions in mm/ [inch]

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MCD-CAXXX-XXXX-S10D-GRW



All dimensions in mm/ [inch]

All dimensions in mm/ [inch]

For detailed drawings please refer our website as drawing, IGES Drawing and STEP 3D Model under [mechanical drawings](#) or contact us.

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#### Models / Ordering Description

Description

IXARC Magnetic	MCD-	--	00	B -	--	--	S	10	D-	PAM
Interface and Version	CANopen	<b>CA</b>								
	CANopen lift (DSP417)	CL								
Current Version	CA	<b>00</b>								
	CL	00								
Code	Binary		<b>B</b>							
Bits for Revolutions	Single-Turn				00					
	Multi-Turn (4.096 turns)				12					
	Multi-Turn (3.2768 turns)				<b>13</b>					
Steps per revolution	4096					<b>12</b>				
Flange	Synchro flange (10 mm Shaft Diameter)						<b>S</b>			
Shaft Diameter	10 mm							<b>10</b>		
Mechanical Options	Heavy Duty								<b>D</b>	
Connection	Connector 5 pol M12 axial									<b>PAM</b>
	Connector 5 pol M12 radial									PRM
	Cable exit axial 1m cable length									GAW
	Cable exit radial 1m cable length									GRW

**Standard = bold**, further models on request

Ordering example:

MCD-CA00B-1312-S10G-PAM

#### Accessories

Article No.	Article	Description steps
34050515	PAM5	Female cable connector M12x1 5pin A-coded for MCD-...-PAM (only IP67)
10001978	PAM5 2m	Connecting cable PAM5 2m shielded for MCD-...-PAM

List of types

MCD-CA00B-0012-S10D-PAM  
MCD-CA00B-0012-S10D-PRM  
MCD-CA00B-0012-S10D-GAW

MCD-CA00B-0012-S10D-GRW  
MCD-CA00B-1212-S10D-PAM  
MCD-CA00B-1212-S10D-PRM

MCD-CA00B-1212-S10D-GAW  
MCD-CA00B-1212-S10D-GRW  
MCD-CA00B-1312-S10D-PAM

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MCD-CA00B-1312-S10D-PRM

MCD-CA00B-1312-S10D-GAW

MCD-CA00B-1312-S10D-GRW

#### Check Out Some of the Other POSITAL Products



##### **Absolute Magnetic Encoders for Industrial Environment**

To measure rotary movements or rotary displacements, an absolute magnetic rotary encoder can be used. The contact-free measuring sensor stage of the IXARC Magnetic Sensor does not have any abrasion. The Sensor can be connected directly to digital control

units via SSI, CANopen or Analog Interface.

[More Information](#)



##### **Heavy Duty Stainless steel Magnetic Encoders for the Toughest Environments**

Its stainless steel housing and high protection class of IP69K makes the IXARC Magnetic Heavy Duty rotary encoder resistant against active chemical cleaning and corrosion. Combined with the sturdy ball bearings this sensor is an ideal choice for reliable measurement under extreme environmental conditions and outdoor applications.

[More Information](#)



##### **Tilt Sensors to Measure Inclinations up to 360°**

TILTIX is developed on advanced MEMS technology based capacitance measurement. The sensor is a pre-calibrated device which can be put into immediate operation, upon simple and easy installation with a three point mount and setting of preset. Its compact design, installation "anywhere" and other versatile features makes it an ideal choice for very accurate measurement.

[More Information](#)

#### **Disclaimer**

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