

DATA SHEET

ABSOLUTE MAGNETIC ROTARY ENCODER INDUSTRIAL

CANOPEN



CANopen

High-resolution absolute encoder based on magnetical technology. Single Turn sensing based on 360° Hall technology. Multi Turn sensing based on magnetic pulse counter. No batteries used.

Main Features

- Compact Industrial Design
- Interface: CANopen (DS406),
CANopen Lift (DSP417)
- Housing: Ø 36.5 mm
- Solid Shaft: Ø 6 or 10 mm
- Blind Hollow Shaft / Hub Shaft : Ø 6 mm
- EMC: bEN 61000-6-2, EN 61000-6-4
- Max. Number of Revolutions
- Not Limited (Typical 15 Bit)
- Velocity Output
- LSS Services

Mechanical Structure

- Aluminum Flange
- Coated Steel Steel Housing
- Stainless Steel Shaft
- Precision Ball Bearings With Sealing
or Cover rings

Programmable Parameters

- Baud Rate and CAN-Identifier
- Resolution per Revolution
- Total Resolution
- Direction of Rotation (Complement)
- Preset Value
- Two Limit Switches
- Transmission mode: Polled Mode,
Cyclic Mode, Sync Mode
- Termination Resistor (120 Ohm, Internal)

Electrical Features

- Reverse Voltage Protection
- Over-Voltage-Protection
- Galvanic Isolation
- Internal Termination

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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) ¹⁾
Current Consumption	Max. 100 mA with 10 V DC, max. 50 mA with 24 V DC
Power Consumption	Max 1.2 Watt
MTBF EN/IEC 61709 (SN 29500)	> 3x10 ⁶ h @ T = 40°C
EMC	Emitted Interference: EN 61000-6-4 Noise Immunity: EN 61000-6-2

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

Sensor Data

Single Turn Technology	Magnetic 2 Axis Hall Sensor
Single Turn Resolution	Up to 4096 Steps/Revolution (12 Bit)
Single Turn Accuracy	± 0.35°
Internal Cycle Time	< 1 ms
Multi Turn Technology	Self Powered Magnetic Pulse Counter (Wiegand Sensor)
Multi Turn Resolution	Can Count up to 200 Billion Revolutions
Data Retention Time	≥ 1.25x10 ⁵ h @ T = 35°C

Environmental Conditions

Operating Temperature Sensor*	-30 – +85° (-22 – +185°F)
Storage Temperature ¹⁾	-30 – +85° (-22 – +185°F)
Humidity	98 % (without liquid state)
Protection Class	IP 54 (Moulded : MCD-...-CAW and MCD-...-CRW)
(EN 60529)	IP 65 (Other : MCD-...-PAM and MCD-...-GAW)
Shaft Side	IP 65 (Clamp Flange MCD-...-C100-...)
	IP 54 (Other Types : MCD-...-S060-... and MCD-...-B060-...)

1) Please also refer to temperature range of cable

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Mechanical Data

Housing	Coated Steel Housing
Flange	Aluminum
Shaft	Stainless Steel
Lifetime	Dependent on shaft version and shaft loading – refer to table
Max. Shaft Loading	Axial 40 N, Radial 110 N
Inertia of Rotor	$\leq 30 \text{ gcm}^2$ (0.11 oz-in ²)
Friction Torque at +25°C	$\leq 3 \text{ Ncm}$, (2.8 oz-in)
RPM (continuous operation)	Max. 12.000 RPM
Shock	EN 60068-2-27 $\leq 100 \text{ g}$ (half sine, 6 ms XYZ)
	MIL-STD-810C $\leq 200 \text{ g}$ (half sine, 3 ms XYZ)
Permanent Shock	EN 60068-2-29 $\leq 10 \text{ g}$ (half sine, 16 ms XYZ)
	MIL-STD-810C $\leq 30 \text{ g}$ (half sine, 11 ms XYZ)
Vibration	EN 60068-2-6 $\leq 10 \text{ g}$ (10 Hz – 1000 Hz XYZ)
	MIL-STD-810 $\leq 4.2 \text{ g}$ (5 Hz – 500 Hz XYZ)
Weight (Standard Version)	$\approx 150 \text{ g}$ (0.33 lbs), including cable

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
S10 Synchro Flange (MCD-...-S10G-...)	224	28	3
C100 Clamp Flange (MCD-...-C100-...)	40 N/60 N	40 N/80 N	40 N/110 N
	224	104	40

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Interface

Configuration

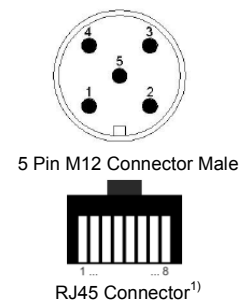
By default, the encoder has a standard configuration of Node ID 32d (20h) and a baud rate of 125 kBaud. Customers can use SDO protocol for adapting to the specific applications. In general, valid baud rates range from 20 K to 1MBaud and Node ID range from 0 to 127.

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. This product is also available with analog or SSI interface, please check our [website](#).

Remark: The encoder adds internal 1 to the adjusted node number

Connector Pin M12	Connector RJ45	Wire End	Function
1	3	Green	Can-GND
2	8	Red	+ U_b = 10-30 V
3	4	Yellow	GND
4	1	White	Can High
5	2	Brown	Can Low



1) A RJ45 Connector is mounted on the cable end for the CAW / CRW version. This connector can be used for test purposes also for custom installation. Do not connect to any Ethernet network, devices may

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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 6300h 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.

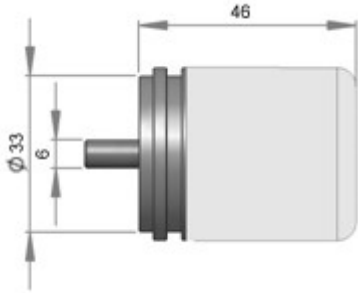

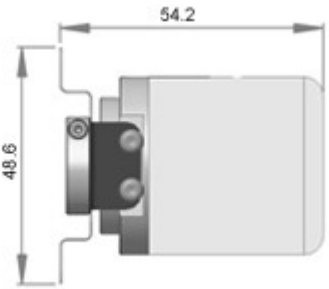
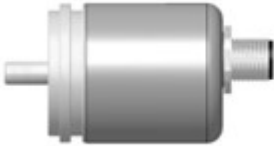
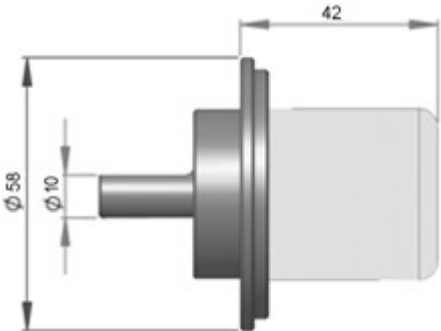


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Mechanical Models

For detailed drawings please refer our [website](#) or directly contact us. Also available as IGES Drawing and STEP 3D Model.

Flange Type	Housing and Connector Type
<p>Synchro Flange. MCD-XXXX-XXXX-S060-XXX</p> 	<p>Axial Cable Exit MCD-XXXX-XXXX-XXXX-CAW</p> 
<p>Blind Hollow Shaft / Hub Shaft MCD-XXXX-XXXX-B060-XXX</p> 	<p>M12 Connector MCD-XXXX-XXXX-XXXX-PAM</p> 
<p>Clamp Flange MCD-XXXX-XXXX-C100-XXX</p> 	<p>Axial Cable Exit with Gland MCD-XXXX-XXXX-XXXX-GAW</p> 
	<p>Radial Cable Exit</p> 

All units measured in mm

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Models / Ordering Description

Description	Type key									
IXARC Magnetic	MCD -	--	00	B-	--	--	-	--	0-	---
Interface and Version	CANopen	AC								
	CANopen lift (DSP417)	AV								
Current Version	CA	00								
	CL	00								
Code	Binary									
Bits for Revolutions	Single Turn		00							
	Multi Turn (4.096 Turns)		12							
	Multi Turn (32.768 Turns)		15							
Steps per Revolution	4096			12						
Flange	Synchro flange (6mm Shaft Diameter)				S	06				
	Blind Hollow (Hub) Shaft (6mm Shaft Diameter)				B	06				
	58mm Clamping Flange (10mm Shaft Diameter)				C	10				
Shaft Diameter	6 mm (Flange S and B)									
	10 mm (Flange C)									
Mechanical Options	Without							0		
	Customized							C		
Connection	Cable exit, axial 1 m molded								CAW	
	Cable exit, radial 1 m molded								CRW	
	Cable exit, axial 1 m, with cable gland								GAW	
	Connector 5 pol M12								PAM	

Standard = bold, further models on request

Ordering Example

MCD-CA00B-1512-S060-CAW

Accessories

Article No.	Article	Description steps
34050515	PAM4	Female cable connector M12x1 5pin A-coded for MCD-...-PAM
10001978	PAM5 2m	Connecting cable PAM5 2m shielded for MCD-...-PAM

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Typelist

MCD-CA00B-0012-S060-CAW	MCD-CA00B-1212-C100-CRW	MCD-CL00B-0012-C100-CRW
MCD-CA00B-0012-S060-CAW	MCD-CA00B-1512-S060-CAW	MCD-CL00B-1212-S060-CAW
MCD-CA00B-0012-S060-PAM	MCD-CA00B-1512-S060-PAM	MCD-CL00B-1212-S060-PAM
MCD-CA00B-0012-S060-GAW	MCD-CA00B-1512-S060-GAW	MCD-CL00B-1212-S060-GAW
MCD-CA00B-0012-S060-CRW	MCD-CA00B-1512-S060-CRW	MCD-CL00B-1212-S060-CRW
MCD-CA00B-0012-B060-CAW	MCD-CA00B-1512-B060-CAW	MCD-CL00B-1212-B060-CAW
MCD-CA00B-0012-B060-PAM	MCD-CA00B-1512-B060-PAM	MCD-CL00B-1212-B060-PAM
MCD-CA00B-0012-B060-GAW	MCD-CA00B-1512-B060-GAW	MCD-CL00B-1212-B060-GAW
MCD-CA00B-0012-B060-CRW	MCD-CA00B-1512-B060-CRW	MCD-CL00B-1212-B060-CRW
MCD-CA00B-0012-C100-CAW	MCD-CA00B-1512-C100-CAW	MCD-CL00B-1212-C100-CAW
MCD-CA00B-0012-C100-PAM	MCD-CA00B-1512-C100-PAM	MCD-CL00B-1212-C100-PAM
MCD-CA00B-0012-C100-GAW	MCD-CA00B-1512-C100-GAW	MCD-CL00B-1212-C100-GAW
MCD-CA00B-0012-C100-CRW	MCD-CA00B-1512-C100-CRW	MCD-CL00B-1212-C100-CRW
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MCD-CA00B-1212-S060-PAM	MCD-CL00B-0012-S060-PAM	MCD-CL00B-1512-S060-PAM
MCD-CA00B-1212-S060-GAW	MCD-CL00B-0012-S060-GAW	MCD-CL00B-1512-S060-GAW
MCD-CA00B-1212-S060-CRW	MCD-CL00B-0012-S060-CRW	MCD-CL00B-1512-S060-CRW
MCD-CA00B-1212-B060-CAW	MCD-CL00B-0012-B060-CAW	MCD-CL00B-1512-B060-CAW
MCD-CA00B-1212-B060-PAM	MCD-CL00B-0012-B060-PAM	MCD-CL00B-1512-B060-PAM
MCD-CA00B-1212-B060-GAW	MCD-CL00B-0012-B060-GAW	MCD-CL00B-1512-B060-GAW
MCD-CA00B-1212-B060-CRW	MCD-CL00B-0012-B060-CRW	MCD-CL00B-1512-B060-CRW
MCD-CA00B-1212-C100-CAW	MCD-CL00B-0012-C100-CAW	MCD-CL00B-1512-C100-CAW
MCD-CA00B-1212-C100-PAM	MCD-CL00B-0012-C100-PAM	MCD-CL00B-1512-C100-PAM
MCD-CA00B-1212-C100-GAW	MCD-CL00B-0012-C100-GAW	MCD-CL00B-1512-C100-GAW
		MCD-CL00B-1512-C100-CRW

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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 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 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](#)

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