

DATASHEET

ABSOLUTE MAGNETIC ROTARY ENCODER CANOPEN



CANopen®

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

Main Features

- Compact Industrial Design
- Interface: CANopen (DS406)
CANopen Lift (DSP417)
- Housing: 36.5 mm \varnothing
- Solid Shaft: 6 or 10 mm \varnothing
- Blind Hollow Shaft / Hub Shaft : 6 mm \varnothing
- EMC: EN 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) *
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

* Supply voltage according to EN 50 178 (Safety Extra-Low Voltage)

Sensor Data

Singleturn Technology	Magnetic 2 Axis Hall Sensor
Singleturn Resolution	Up to 4096 Steps / Revolution (12 Bit)
Singleturn Accuracy	± 0.35°
Internal Cycle Time	< 1 ms
Multiturn Technology	Self Powered Magnetic Pulse Counter (Wiegand Sensor)
Multiturn 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 °C (-22 ...+185 °F)
Storage Temperature (*)	- 30 ... + 85 °C (-22 ...+185 °F)
Humidity	98 % (Without Condensation)
Protection Class (EN 60529) Casing Side:	Casing Side: IP 54 (Moulded : MCD-...-CAW and MCD-...-CRW) Casing Side: IP 65 (Other : MCD-...-PAM and MCD-...-GAW)
Protection Class (EN 60529) Shaft Side:	IP 65 (Clamp Flange MCD-...-C100-..) IP 54 (Other Types : MCD-...-S060-... and MCD-...-B060-...)

(*) 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 Load – Refer to Table
Max. Shaft Load	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 60028-2-29	$\leq 10 \text{ g}$ (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 ... 1,000 Hz, XYZ)
MIL-STD-810C	$\leq 4.2 \text{ g}$ (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)			
S6 Synchro Flange (MCD-...-S060-...)	224 (20N/20N)	28 (20N/40N)	3 (20N/80N)	
C100 flange (MCD-...-C100-...)	247 (40N/60N)	104 (40N/80N)	40 (40N/110N)	

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 - (~AWG26)

(*) Valid for types: MCD-...-CAW MCD-...-GAW MCD-...-CRW

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Interface

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

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 20K 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.

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

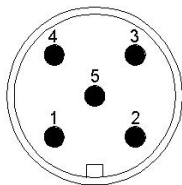
Connection plan

Function	Wire end	Connector Pin RJ45	Connector Pin M12
Can High	white	1	4
Can Low	brown	2	5
Can-GND	green	3	1
GND	yellow	4	3
+ U _b = 10-30 V	red	8	2

Connectors (front view)

M12 Connector

MCD-XXXX-XXXX-XXXX-PAM



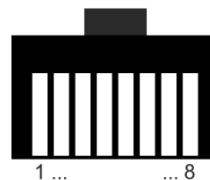
5 pin M12 connector male

Axial Cable Exit (*)

MCD-XXXX-XXXX-XXXX-CAW

MCD-XXXX-XXXX-XXXX-GAW

MCD-XXXX-XXXX-XXXX-GRW



RJ45 Connector

(*) 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 increases or decreases 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 physical 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 pre-set.
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.

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 master 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 in regular time intervals, without Master request. 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 does 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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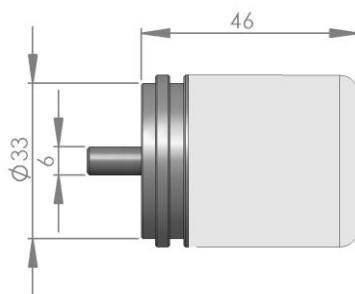
Mechanical Models

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

Flange Types

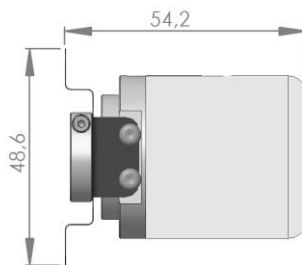
Synchro Flange

MCD-XXXX-XXXX-S060-XXX



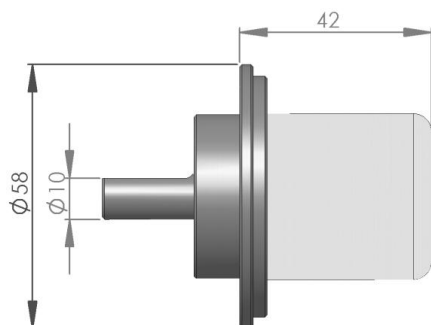
Blind Hollow Shaft / Hub Shaft

MCD-XXXX-XXXX-B060-XXX



Clamp Flange

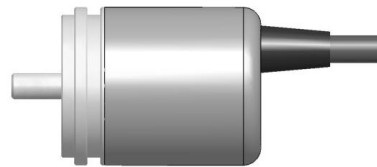
MCD-XXXX-XXXX-C100-XXX



Housing and Connector Types

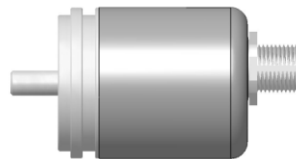
Axial Cable Exit

MCD-XXXX-XXXX-XXXX-CAW



M12 Connector

MCD-XXXX-XXXX-XXXX-P8M



Axial Cable Exit with Gland

MCD-XXXX-XXXX-XXXX-GAW



Radial Cable Exit

MCD-XXXX-XXXX-XXXX-CRW



All units measured in [mm]

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Models / Ordering Description

Description

Magnetocode	MCD-	---	00	B	-	---	-	---	0-	---
Interface and Version	CANopen	CA								
	CANopen lift (DSP417)	CL								
Current Version	CA		00							
	CL		00							
Code	Binary									
Bits for Revolutions	Single turn									00
	Multi turn (4096 turns)									12
	Multi turn (32768 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	06 mm (Flange S and B)									
	10 mm (Flange C)									
Mechanical Options	Without									0
	Customized									C
Connection	Cable Exit, Axial 1m, Moulded									CAW
	Cable Exit, Radial 1m, Moulded									CRW
	Cable Exit, Axial 1m, with Cable Gland									GAW
	Connector 5pol M12									PAM

Standard = bold, further models on request

Ordering example:

MCD-CA00B-1512-S060-CAW

Accessories

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

Disclaimer

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Check out some of the other POSITAL products :

Draw Wire Sensor to Measure Linear Displacements



To measure linear movements or linear displacements, an absolute magnetic rotary encoder can be combined with a draw wire sensor. The contact-free measuring sensor stage of the MCD Sensor didn't have any abrasion. The Sensor can directly connected to digital control units via SSI- or CANopen or Analog Interface

[website](#)

Heavy Duty Magnetic Encoder Line for Toughest Environments



Its stainless steel housing and high protection class of IP69K make the MCD Heavy Duty rotary encoder resistant against active chemical cleaning, high-pressure water and corrosion. Combined with the sturdy ball bearings (for high shaft loads up to 300N) this sensor is an ideal choice for reliable measurement under extreme environmental conditions and outdoor applications.

[website](#)

Tilt Sensors to Measure Inclinations up to 360°



ACS 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 genuine and accurate measurement.

[website](#)

ABSOLUTE MAGNETIC ROTARY ENCODER CANOPEN

Typelist :

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