

## DATASHEET

### HEAVY DUTY ABSOLUTE ROTARY ENCODER CANOPEN



Robust rotary sensor based on reliable magnetic technology. Its stainless steel housing and high protection class of IP69K make the MCD Heavy Duty 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. The POSITAL 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

- Heavy Duty Design
- IP69K Protection Class (EN 60529)
- 300 N Shaft Load
- Shock resistance: 300 g (EN 60068-2-27)
- Interface: CANopen (DS406)  
CANopen Lift (DSP417)
- Velocity and Acceleration Output
- LSS services

#### Mechanical Structure

- Stainless Steel Flange
- Stainless Steel Housing
- Stainless Steel Shaft
- Sturdy Ball Bearings

#### Applications

- Construction Machinery
- Cranes
- Trucks
- Elevators
- Offshore and Marine Equipment
- Food Production
- Chemical Industry

#### Electrical Features

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

## 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 Watts
Electrical lifetime	> 10 <sup>5</sup> h
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 Singleturn	< 1 ms
Multiturn technology	self supplied magnetic pulse counter ( Wiegand Sensor )
Multiturn resolution	Can measure up to 200 Billion revolutions

### Environmental Conditions

Operating temperature sensor	- 30 ... + 85 °C ( -22 ...+185 °F )
Storage temperature	- 30 ... + 85 °C ( -22 ...+185 °F )
Humidity	98 % ( without liquid state )
Protection Class (EN 60529)	IP 69 K

**Mechanical data**

Housing	stainless steel
Flange	stainless steel
Shaft	stainless steel
Lifetime	Dependent on shaft version and shaft loading – refer to table
Max. shaft loading	axial 270 N, radial 270 N (for $1 \cdot 10^9$ turns)
Friction torque at + 25°C	$\leq 3 \text{ Ncm}$ ( 2.8 oz-in ) xxx
RPM (continuous operation)	max. 12.000 RPM
Shock	
EN 60068-2-27	$\leq 300 \text{ g}$ ( half sine, 6 ms XYZ)
MIL-STD-810C	$\leq 200 \text{ g}$ ( half sine, 3 ms XYZ)
Permanent shock	
EN 60028-2-29	$\leq 30 \text{ g}$ ( half sine, 16 ms XYZ)
MIL-STD-810C	$\leq 30 \text{ g}$ ( half sine, 11 ms XYZ )
Vibration	
EN 60068-2-6	$\leq 30 \text{ g}$ (10 Hz ... 1,000 Hz, XYZ)
MIL-STD-810	$\leq 4.2 \text{ g}$ ( 5 Hz ... 500 Hz XYZ)
Weight (standard version)	$\approx 350 \text{ g}$ ( 0.77 lbs )

**Minimum (mechanical) lifetime**

Flange	Lifetime in $10^8$ revolutions with ( $F_a/F_r$ )		
S10 Synchro flange (MCD-... S10G-...)	7.6 ( 300N/300N )	10 ( 270N/270N )	200 ( 100N/100N )

## Interface

### Configuration

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.

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

### 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.

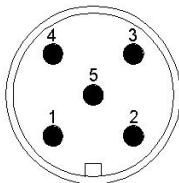
### Connection plan

Function	Connector Pin M12
Can High	4
Can Low	5
Can-GND	1
GND	3
+ U <sub>b</sub> = 10-30 V	2

### Connectors (front view)

#### M12 Connector

MCD-XXXX-XXXX-XXXX-PAM



5 pin M12 connector male

**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 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.

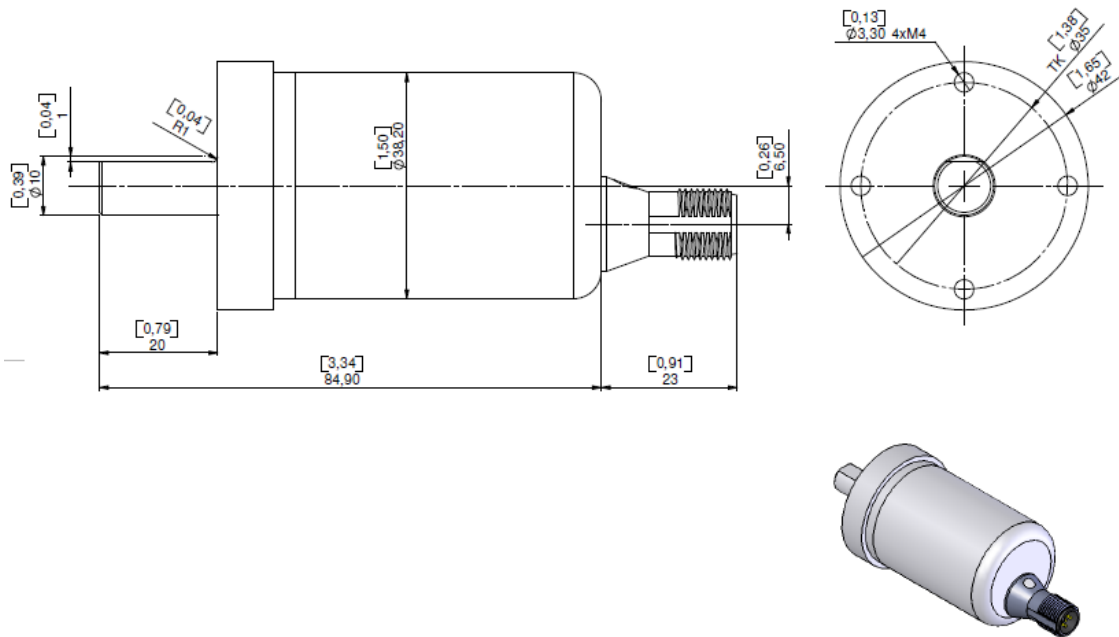
**Programmable CAN Transmission Modes**

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 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.

## Mechanical Models

### Synchro Flange

MCD-XXXX-XXXX-S10G-XXX



all dimensions mm [inch]

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

**Models / Ordering Description**

**Description**

Interface and Version	CANopen	<b>CA</b>				
	CANopen lift (DSP417)	CL				
Current Version	CA	<b>00</b>				
	CL	00				
Code	Binary					
Bits for Revolutions	Single turn		00			
	Multi turn (4096 turns)		12			
	Multi turn (32768 turns)		<b>15</b>			
Steps per revolution	4096			12		
Flange	Synchro flange (10 mm shaft diameter)				<b>S</b>	
Shaft diameter	10 mm					<b>10</b>
Mechanical options	Heavy duty / stainless steel					<b>G</b>
Connection	Connector 5pol M12					PAM

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

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