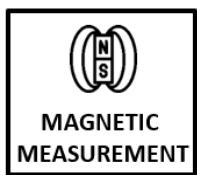


# MULTITURN PROGRAMMABLE ABSOLUTE ROTARY ENCODER

## MAH S 50

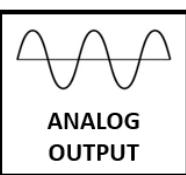
“50 mm Body, With Shaft, CANopen or Programmable Analog Output, IP68 Protection”



MAGNETIC  
MEASUREMENT



CANopen  
OUTPUT



ANALOG  
OUTPUT



IP68  
PROTECTION



HIGH  
ACCURACY



LONG SERVICE  
LIFE

- Absolute measurement with magnetic principle
- 50 mm body diameter
- 6, 8, 10, 12, 14, 15 or 17 mm shaft options
- Analog or CANopen output options
- Programmable analog output
- For Analog output : 16 bit,  
For CANopen output : single turn 1...14 bit, multturn 1...32 bit resolution
- IP68 protection class

The MAH series encoders operate absolute. In other words, unlike the incremental systems, they do not lose their positions in power outages and continue to measure from where they left off.

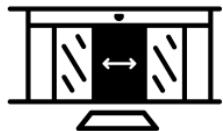
The MAH series multi-turn absolute rotary encoders offer highly flexible solutions in use, with different analog output signals and shaft diameters. With its IP68 protection class, it is resistant to harsh environmental conditions and vibrations.

The MAH multi-turn absolute rotary encoder with integrated reference provides high quality feedback.

## APPLICATION FIELDS

Speed and position accuracy in one application; If it is more important than fault tolerance and system simplicity, absolute encoders should be used. Absolute encoders provide precise operation in applications.

- Identifying multi-axis orientation in CNC machines used in component manufacturing
- Automatically determine the height of the scissor bearings used in hospitals
- Correct placement of multiple stabilizers for large vehicles such as cranes or air lifts
- Automatic doors or slots to move without limiting key
- Continue robotic movement even after a power failure



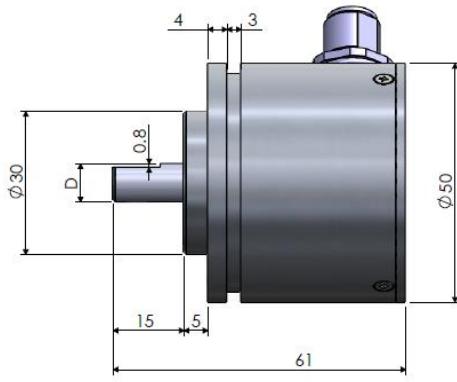
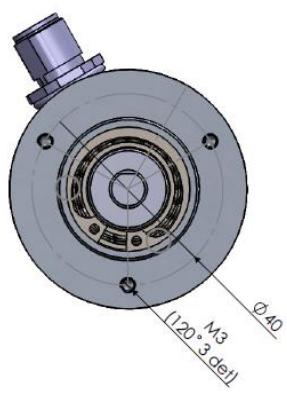
## MECHANICAL SPECIFICATIONS

<b>Maximum Speed</b>	3000 rpm
<b>Body Diameter</b>	50 mm
<b>Shaft Diameter</b>	6, 8, 10, 12, 14, 15 or 17 mm
<b>Weight</b>	~170 gr
<b>Protection Class</b>	IP 68
<b>Operating Temp.</b>	-45°C ... +85°C
<b>Relative Humidity</b>	%10 ... %90
<b>Material</b>	Shaft: Stainless Steel Body: Aluminum

**Note:** The product is mechanically non-stop.

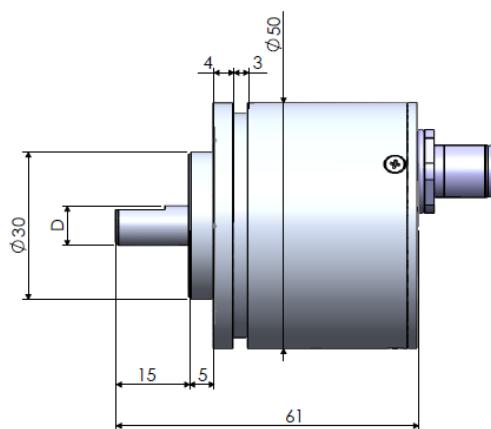
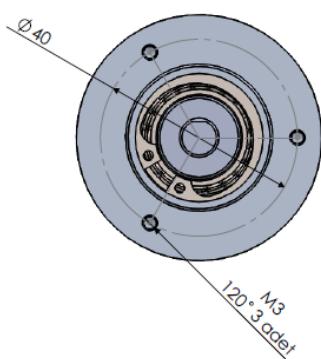
## MECHANICAL DIMENSIONS (mm)

### M12 CONNECTOR FROM SIDE



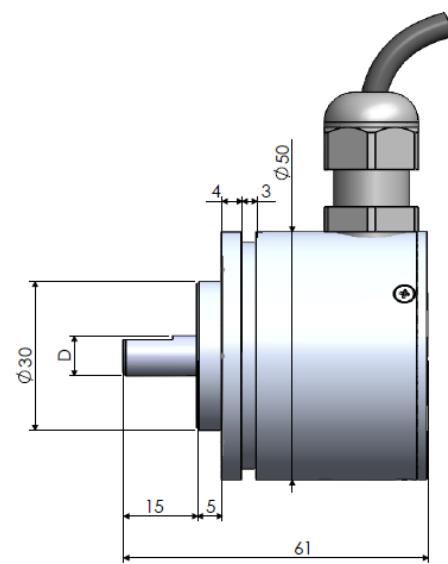
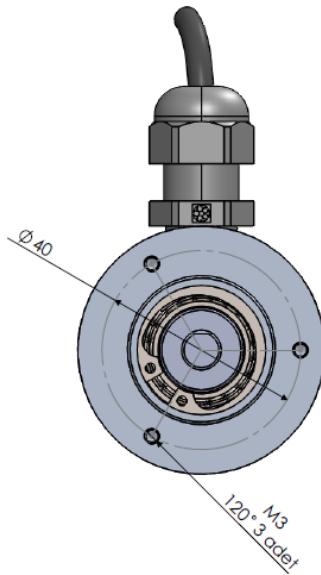
<b>ØD</b>	6	8	10	12	14	15	17
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## M12 CONNECTOR FROM BACKSIDE



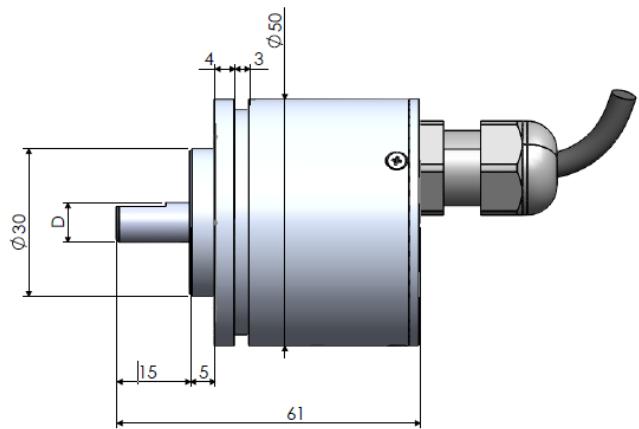
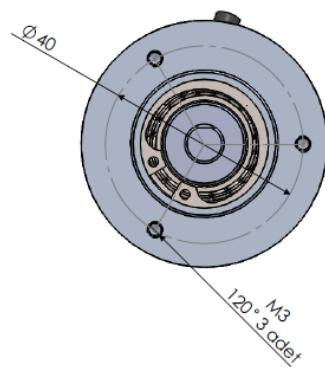
ØD	6	8	10	12	14	15	17
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## CABLE FROM SIDE



ØD	6	8	10	12	14	15	17
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## CABLE FROM BACKSIDE



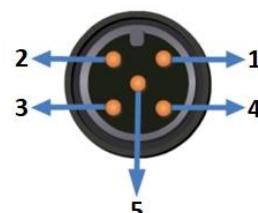
ØD	6	8	10	12	14	15	17
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## Electrical Specifications

<b>Working Principle</b>	Hall Effect
<b>Measuring Range</b>	2... $2^{17}$ turns
<b>Supply Voltage</b>	15 ... 26 VDC
<b>Current Consumption</b>	$\leq 60$ mA
<b>Reverse Polarity Protection</b>	Yes, there is
<b>Short -circuit protection</b>	Yes (only supply)
<b>Accuracy</b>	$\pm 0,5^\circ$
<b>Angular Resolution</b>	16 Bit
<b>Response Frequency</b>	500 Hz
<b>Electrical Interface</b>	4-20 mA, 0-10 V, 0.5- 4.5 V, 0-5 V 20-4 mA, 10-0 V, 4.5-0.5 V, 5-0 V
<b>Output Load</b>	For current output model; min 250 $\Omega$ For voltage output model; min 1 k $\Omega$
<b>Electrical Connection</b>	M12 5 pin male connector or 5 x 0,14 mm $^2$ shielded cable

## Electrical Connection

Signal	Cable	M12 / 5 Pin Male Connector
V+ (15...26 VDC)	Red	Pin 1
Analog Output	Yellow	Pin 2
GND	Black	Pin 3
Direction Change	Green	Pin 4
Reset	Pink	Pin 5

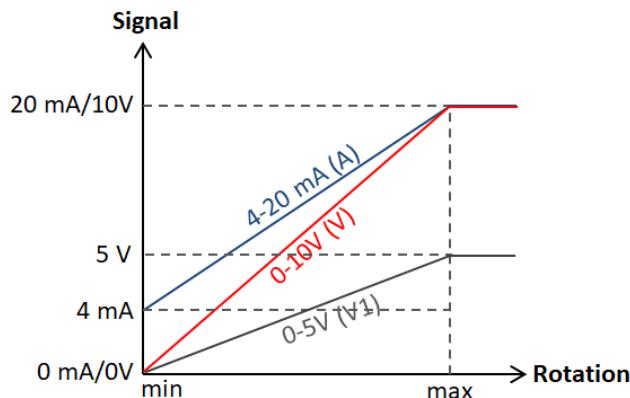


**RESET:** With the reset function you can set the desired location to 0. The reset terminal and GND are short-circuited for about 5 seconds and then disconnected. The sensor then accepts the current position as zero.

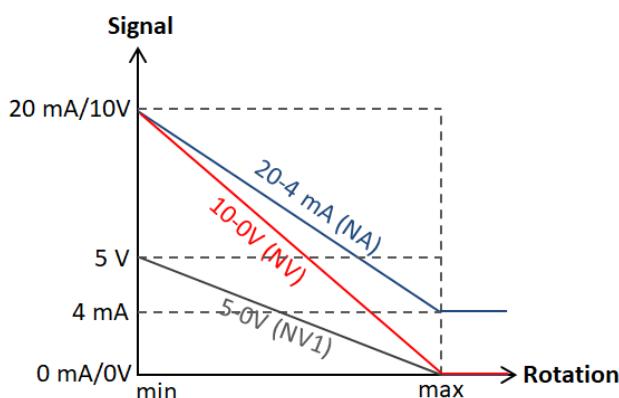
**DIRECTION CHANGE:** You can change the angle increase direction with the direction change function. The direction changing terminal and GND are short-circuited for about 5 seconds and then disconnected. Thus, the sensor reverses the angle direction (CW is CCW and CCW is CW).

## Sample Output Signal Graphic

## Output Signal (V, V1, A, V3)



## Reverse of Output Signal (NV, NV1, NA, NV3)



## Order Code

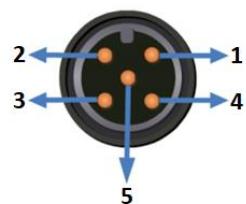
Model	Body Diameter 050 : 50 mm	Supply Voltage PP : 15...26 VDC	Signal Increasing Direction CW : Clockwise CCW : Counter clockwise	Cable or Connector Direction Y : From side A : From backside	Flange Type C: Clamping
MAH - X - XXX - XX - XXX - XXX - X - XXX - XXX - X - X					
Shaft Type S : Shaft	Turn Number The desired number of turns between 2 and $2^{17}$ can be selected	Output Signal V : 0-10 VDC V1 : 0-5 VDC A : 4-20 mA V3 : 0.5-4.5 VDC NV : 10-0 VDC NV1 : 5-0 VDC NA : 20-4 mA NV3 : 4.5-0.5 VDC	Electrical Connection 1.5M : 1.5 m cable S13M : M12 / 5 pin male socket *Optional others	Shaft Diameter 6 : 6 mm 8 : 8 mm 10 : 10 mm 12 : 12 mm 14 : 14 mm 15 : 15 mm 17 : 17 mm	

## Electrical Specifications

Working Principle	Hall Effect
Measuring Range	2...2 <sup>17</sup> turns
Supply Voltage	15 ... 26 VDC
Current Consumption	≤60 mA
Reverse Polarity Protection	Yes, there is
Short -circuit protection	Yes (only supply)
Accuracy	±0,5°
Angular Resolution	16 Bit
Response Frequency	500 Hz
Electrical Interface	4-20 mA, 0-10 V, 0.5- 4.5 V, 0-5 V (programmable) 20-4 mA, 10-0 V, 4.5-0.5 V, 5-0 V (programmable)
Output Load	For current output model; min 250 Ω For voltage output model; min 1 kΩ
Electrical Connection	M12 5 pin male connector or 5 x 0,14 mm <sup>2</sup> shielded cable

## Electrical Connection

Signal	Cable	M12 / 5 pin male connector
V+ (15...26 VDC)	Red	Pin 1
Analog output	Yellow	Pin 2
GND	Black	Pin 3
N/C	Green	Pin 4
SPAN/ZERO	Pink	Pin 5



## SETTING THE MEASUREMENT RANGE

With this feature, you can adjust the analog output scale according to the start and end points you have determined.

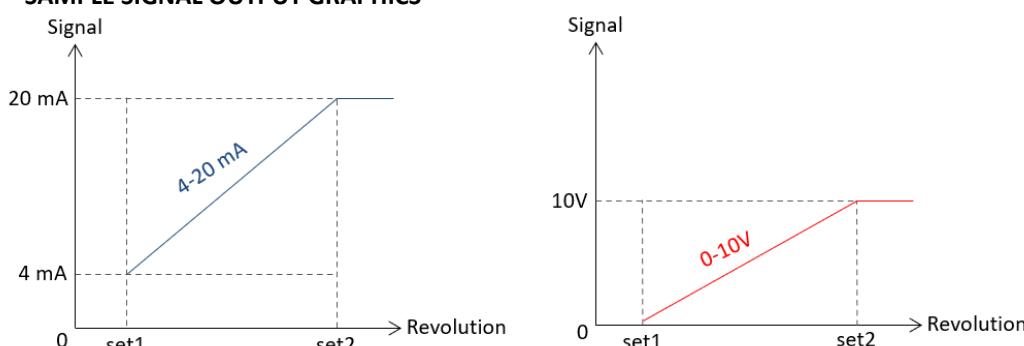
To determine the **start point (set1)**, when the shaft is at the start point, the SPAN/ZERO and GND terminals are short-circuited for at least 3 seconds and released.

Then the shaft is turned in CW (clockwise) or CCW (counterclockwise) direction to the end point and SPAN/ZERO and GND tip are short-circuited for at least 6 seconds and released to determine the **end point (set2)**.

Thus, the measuring range will be permanently stored. To **return to the factory settings**, the SPAN/ZERO and GND terminal are short-circuited for at least 10 seconds.

**Note:** If the zero point is to be changed again after the programming is finished, the set2 point must be defined.

## SAMPLE SIGNAL OUTPUT GRAPHICS



## Order Code

Model	Body Diameter 050 : 50 mm	Supply Voltage PP : 15...26 VDC	Signal Increasing Direction CW : Clockwise CCW : Counter clockwise	Cable or Connector Direction Y : From side A : From backside	Flange Type C: Clamping
MAH - X - XXX - XX - XX - XXX - XXX - XXX - X - XX - X - XX					
Shaft Type S : Shaft	Turn Number The desired number of turns between 2 and 2 <sup>17</sup> can be selected	Output Signal V : 0-10 VDC V1 : 0-5 VDC A : 4-20 mA V3 : 0.5-4.5 VDC NV : 10-0 VDC NV1 : 5-0 VDC NA : 20-4 mA NV3 : 4.5-0.5 VDC	Electrical Connection 1.5M : 1.5 m cable S13M : M12 / 5 pin male socket *Optional others	Shaft Diameter 6 : 6 mm 8 : 8 mm 10 : 10 mm 12 : 12 mm 14 : 14 mm 15 : 15 mm 17 : 17 mm	Programming Feature PL: Programmable

## Electrical Specifications

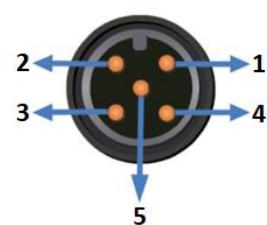
Working Principle	Hall Effect
Measuring Range	2...2 <sup>17</sup> turns
Supply Voltage	8 ... 32 VDC
Current Consumption	≤60 mA
Reverse Polarity Protection	Yes
Short-circuit Protection	Yes (only supply)
Accuracy	±0,5°
Response Frequency	500 Hz
Resolution	1...14 bits can be selected in singleturn. 1...31 bit can be selected in multiturn. singleturn + multturn <= 31 bits.
Electrical Connection	M12 5 pin male connector

## CANopen Specifications

Communication Profile	CiA 301
Device Type	CANopen, CiA DS406
ID (Node ID)	It can be set from 1 to 127 with LSS or SDO.
Baud Rate	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 Mbit/s
PDO Data Rate	100 ms
Error Control	Heartbeat, Emergency Message
PDO	3 Tx PDO
PDO Modes	Event/Time triggered, Synch/Asynch
SDO	1 server
Position Information	Object Dictionary 0x6020
Termination Resistance	Optional 120Ω

## Electrical Connection

Signal	M12 / 5 Pin Male Connector	Cable
CAN SHIELD	Pin 1	CAN SHIELD
V+ (8...32VDC)	Pin 2	Red
GND	Pin 3	Black
CAN_H	Pin 4	Yellow
CAN_L	Pin 5	Green



## Order Code

Model	Body Diameter 050 : 50 mm	Supply Voltage PP : 8...32 VDC	Signal Increasing Direction CW : Clockwise CCW : Counter clockwise	Connector Direction Y : From side A : From backside	Flange Type C : Clamping
MAH - X - XXX - XX - XX - X - XX - XXX - X - XX - XXX - X - XX - X					
Shaft Type S : Shaft	Turn Number 14 / 17	Output Signal C : CANopen	Electrical Connection S13M : M12 5 pin male connector	Shaft Diameter 6 : 6 mm 8 : 8 mm 10 : 10 mm 12 : 12 mm 14 : 14 mm 15 : 15 mm 17 : 17 mm	
	*14: Number of bits in 1 turn 17: Number of turn (2 <sup>17</sup> )				